PROPOSED TRADEZONE 2 WETLAND REHABILITATION OFFSET PLAN

DRAFT BASIC ASSESSMENT REPORT

Prepared by:

Nzingwe Consultancy

63 Adelaide Tambo Drive

Durban North

4016

Tel: 031 563 2205

Fax: 086 662 1789

Prepared for:

Dube TradePort Corporation

29° South, 7 Umsinsi Junction

Dube City

La Mercy

Durban

4399

Tel: 032 8140000

Fax: 032 814 0100

NZINGWE CONSULTANCY Environmental & Safety Planners		TITLE: **Proposed Wetland Rehabilitation Offset for TradeZone 2**	
Ref No:	**ETHE/18/02**	**DATE:** 06 May 2019	REPORT STATUS: **Draft**
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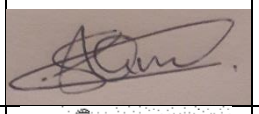
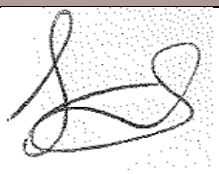
Prepared By: Nzingwe Consultancy 63 Adelaide Tambo Drive Durban North 4016 Tel: 031 563 2205 Fax: 086 662 1789	**Prepared For:** Dube TradePort Corporation 29° South, 7 Umsinsi Junction Dube City La Mercy Durban 4399 Tel: 032 8140000 Fax: 032 814 0100
AUTHOR: **Sinobuhle Mntambo**	**CLIENT CONTACT PERSON**: Zama Dlamini
SYNOPSIS: **Draft Basic Assessment Report**	

Verification	Capacity	Name	Signature	Date
Author	Junior Consultant	**Sinobuhle Mntambo** *BSc. Life and Earth Sciences*		06 May 2019
Checked by	Business Manager	**Lungelo Ncwane** *BSc Eng (Mech), Pr.Eng(Candidate)*		06 May 2019
Authorised by	Director	**Silindile Nqoko** *BSc. (Hons), (Cand. Nat. Sci.)*		06 May 2019

NOTICE

This Draft Basic Assessment Report (dBAR) has been prepared by Nzingwe Consultancy on behalf of Dube TradePort Corporation with regards to the proposed Wetland Rehabilitation Offset Plan for TradeZone 2 found in Ward 58 of the eThekwini Metropolitan Municipality.

The purpose of this Basic Assessment Report (BAR) is to present the proposed project as well as its need. The affected environment is described at a sufficient level of detail to simplify informed decision making. A BAR is also beneficial as it assesses the predicted positive and negative impacts of the project on the environment, enabling the Environmental Consultant to provide recommendations to avoid or mitigate negative impacts and enhance the positive benefits of the project. An Environmental Management Programme (EMPr) for the proposed development will also be provided. The information contained in this report is a combination of primary data collection (onsite exercise) and secondary desktop research.

The draft Basic Assessment Report will be made available to all Interested and Affected Parties (I&APs) and stakeholders for a 30-day review period. All comments received during this period will be taken into consideration and included in this Final Basic Assessment Report (fBAR) as applicable and where necessary.

BACKGROUND

Dube Tradeport Corporation proposal and EIA application to develop Phase 2 of the TradeZone development (TradeZone 2) the Remainder of Portion 9 of La Mercy Airport No. 15124 was registered (with the DEA) in 2012. Environmental authorization to proceed with the TradeZone 2 development was obtained on 8 March 2017 and this authorisation included a condition for a wetland offset rehabilitation and management plan to be finalised in consultation with eZemvelo KZN Wildlife (EKZNW). This led to the development of a Strategic Offset Plan and associated Offset Agreement (dated 18 December 2017) which have been signed off by both DTPC and EKZNW. These documents included a programme for implementation which includes the need to compile and implement a detailed wetland rehabilitation plan for the wetland offset receiving area and to confirm the gains to be achieved with the proposed rehabilitation. A strategic wetland offset plan was specifically designed for DTPC owned landholding dated April 2018 then compiled by Eco-Pulse for DTPC landholding areas within the eThekwini North Spatial Development Plan region. This included the calculation of offset targets and the identification of offset receiving areas for all of proposed wetland and riparian zone losses across a range of DTPC and Tongaat Hullet Developments (THD) developments including TradeZone2. Due to the proposed structures (weirs and gabions) that are to be built for the improvement of wetland functioning, it was then determined that the latter triggers Environmental Authorisation in terms of NEMA (2014) as amended in April 2017 EIA Regulations.

EXECUTIVE SUMMARY

Project Description

Dube Tradeport Corporation proposed to develop Phase 2 of the TradeZone development (TradeZone 2) the Remainder of Portion 9 of La Mercy Airport No. 15124. An authorisation for this development was received on 8 March 2017. As part of the EA conditions, a wetland offset rehabilitation and management plan was required, Eco-Pulse Environmental Consulting in conjunction with Groundtruth compiled a Detailed and Strategic Wetland Offset Rehabilitation Plan. The plan to offset for the ecosystem's services lost as part of the TradeZone 2 development (loss of wetland), requires the following to be done:

- Channel and/or drain plugging using engineered control structures (e.g. buttress and drop inlet weirs).
- Headcut and knickpoint stabilisation structures.
- Channel and/or drain backfilling and surface reshaping (earthworks and reshaping).
- Valley bottom widening and reshaping (earthworks and reshaping).
- Dam backfilling.
- Re-vegetation.
- Alien plant eradication and control.

Environmental Assessment Framework

With regards to the National Environmental Management Act (107 of 1998) in line with the Environmental Impact Assessment Regulations, as amended on 07 April 2017, Listing Notices GNR 324- GNR 327. The proposed development triggers the following activities:

- GNR 327, Activity 19 (i): "The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from watercourse"
    - The construction of weirs as part of the interventions to be done for the offset management plan will cause excavation of more than 10 cubic metres from a water course. The backfilling of the dam will consist of more than 10 cubic metres of material.

The above listed activity triggers a Basic Assessment, therefore, Dube TradePort Corporation needs to send an application for an Environmental Authorisation, to the Department of Environmental Affairs (DEA) in order to proceed with the construction of the proposed wetland rehabilitation offset for TradeZone 2.

Public Participation

A Background Information Document (BID)was circulated to the various stakeholders, in order to inform them of the proposed development. They were given an opportunity to comment on the proposed development. Their comments from the BID were incorporated into the dBAR. Site Notices were put up around the community public places, informing the community of the proposed construction of the proposed Wetland Rehabilitation Offset for TradeZone 2. An IsiZulu and English advert were published in the Isolezwe and Mercury Newspapers respectively

The following specialist studies were conducted for the proposed Wetland Rehabilitation Offset for TradeZone 2, and are included in the draft BAR and have been attached in **Appendix E.**

- Botanical Assessment
- Wetland Assessment
- Social Assessment
- Geotechnical Assessment
- Geohydrological Assessment
- Hydrological Assessment
- Heritage Impact Assessment

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1. INTRODUCTION

Dube Tradeport Corporation (DTPC) proposal to develop Phase 2 of the TradeZone development (TradeZone 2) the Remainder of Portion 9 of La Mercy Airport No. 15124 was submitted to the Competent Authority (the DEA) in 2012. The Environmental Authorization to proceed with the TradeZone 2 development was obtained on 8 March 2017 and this authorisation included a condition for a wetland offset rehabilitation and management plan to be finalised in consultation with Ezemvelo KZN Wildlife (EKZNW). This led to the development of a Strategic Offset Plan and associated Offset Agreement (dated 18 December 2017) which have been signed off by both DTPC, eThekwini Municipality and EKZNW. These documents included a programme for implementation which includes the need to compile a detailed wetland rehabilitation plan for the wetland offset receiving area and to confirm the gains to be achieved with the proposed rehabilitation. A strategic wetland offset plan was therefore compiled by Eco-Pulse Environmental Consultants for DTPC and Tongaat Hulett Developments (THD) landholding areas within the eThekwini North Spatial Development Plan region. This included the calculation of offset targets and the identification of offset receiving areas for all of proposed wetland and riparian zone losses across a range of DTPC and THD developments including TradeZone2. Due to the structures (in a form of weirs and gabions) that are to be built for the improvement and enhancement of wetland functioning to meet offset requirements, it was then determined the latter triggers a listed activity in terms of the NEMA (2014) EIA Regulations.

Wetland offsets are measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken.

The need for wetland rehabilitation in South Africa is compelling, loss and degradation of wetlands have been great and national policy and legislation provides clear direction and support for rehabilitation.

The applicant, Dube TradePort Corporation (hereafter referred to as the ‘DTPC’), proposes to develop Phase 2 of the TradeZone development (hereafter referred to as the ‘TradeZone 2’) on the Remainder of Portion 9 of La Mercy Airport No. 15124. Nzingwe Consultancy has been appointed by Dube TradePort Corporation in accordance to the requirements of the National Environmental Management Act (107 of 1998) as Independent Environmental Consultants for

the proposed Wetland Rehabilitation Offset for TradeZone 2 in Ward 58 of eThekweni Municipality, in the La Mercy area. The main interventions for this offset include the construction of weirs as well as reshaping.

2. DETAILS OF EAP

Silindile Nqoko (BSc Environmental Science (Honours)) (**Project Leader**): Miss Nqoko has 10 years' experience working as an EAP. She has worked with varies government entities and private developers in all parts of South Africa as both an Environmental and Safety Consultant where she has managed and compiled EIA's, Basic Assessment Report, Environmental Management Programme and conducted ECO duties. She has also drafted OHS specifications for tender documents, OHS Audits and OHS Training during the construction phase. She is also registered with SACNASP. Proof of qualification is attached in **Appendix A.**

Email: silindile@nzingwe.co.za

Sinobuhle Mntambo (BSc Life and Earth Science) (**Report Writing**): Sinobuhle has 3 years' experience working as an EAP. She is currently involved in the compilation of Integrated Waste Water Management Programme (IWWMP), Water Use License Application (WULA), BAR, EMPr as well as undertaking research relating to EIAs and Water Use License process being undertaken by the company.
Email: enviro3@nzingwe.co.za

Lungelo Ncwane (Reviewer): Lungelo Ncwane holds a BSc Mechanical Engineering and has completed his certificate in Safety Management Training Course (SAMTRAC). As Business Manager of the company Lungelo is charge of the day to day running of this company reporting to the Managing Director.
Email: silungelo@nzingwe.co.za

3. PROJECT OVERVIEW

3.1 Location

The proposed Wetland Rehabilitation Offset for TradeZone 2 is in Ward 58 of the eThekwini Municipality in KwaZulu Natal. See **Figure 1** below for the proposed site. See attached **Appendix B** for a Locality Map.

Name	ERF	Portion	21-digit code
Portion 1181 of Farm 1575 Cotton Lands Farm	15750	1181	N00000000000157501181

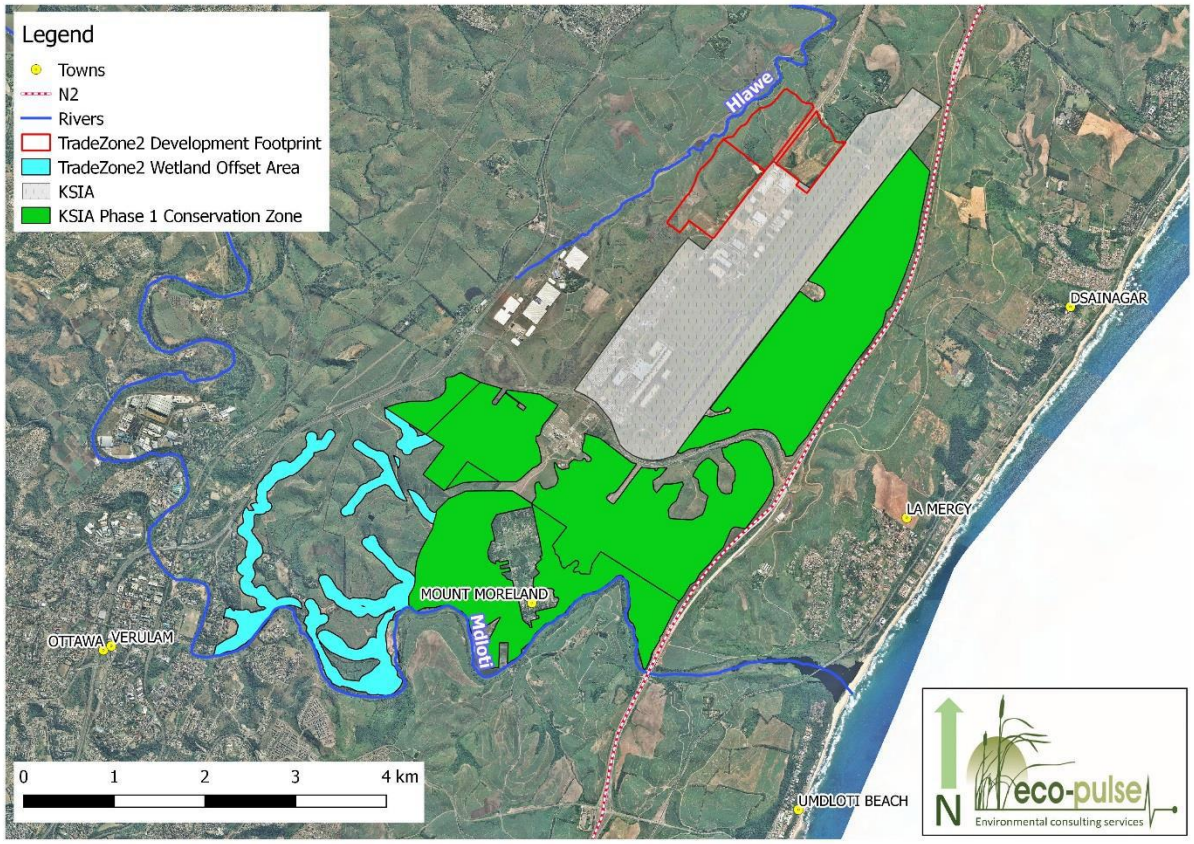

Figure 1: Map showing the location of the Proposed site for the Wetland Offset Rehabilitation for TradeZone 2 in relation to the development site

3.2 Project Description

Dube Tradeport Corporation proposed to develop Phase 2 of the TradeZone development (TradeZone 2) the Remainder of Portion 9 of La Mercy Airport No. 15124. An authorisation for this development was received on 8 March 2017. As part of the EA conditions, an offset management plan was to be done, Eco-Pulse Environmental Consultants in conjunction with Groundtruth compiled a strategic wetland offset plan. The plan to offset for the ecosystem's services lost as part of the TradeZone 2 development (loss of wetland), requires the following to be undertaken:

- Channel and/or drain plugging using engineered control structures (e.g. buttress and drop inlet weirs).
- Headcut and knickpoint stabilisation structures.
- Channel and/or drain backfilling and surface reshaping (earthworks and reshaping).
- Valley bottom widening and reshaping (earthworks and reshaping).
- Dam backfilling.
- Re-vegetation.
- Alien plant eradication and control.

There will be several rehabilitation interventions taking place with this wetland offset at different locations (Refer to the Wetland & Riparian Zone Rehabilitation Plan.)

Table 1: Intervention Details

Intervention	Intervention type	Coordinates
C1_R1-001	Concrete Buttress weir and Re-shaping	29° 38' 33.89" S, 31° 3' 45.59" E
C2_VB1-001	Concrete Weir, Re-Shaping and De-activation of Drain.	29° 38' 31.75" S, 31° 3' 45.85" E
C2_VB5-001	Concrete Drop Inlet Weir and Re-shaping	29° 38' 28.02" S, 31° 3' 39.66" E
C2_VB9-001	Concrete Weir and Re-Shaping	29° 38' 19.14" S, 31° 3' 35.72" E
C2_VB10-001	Concrete Drop Inlet Weir and Re-shaping	29° 38' 0.95" S, 31° 3' 36.48" E
C2_VB12-001	Concrete Weir	29° 37' 55.43" S, 31° 3' 46.86" E

C2_VB16-001	Brick Drop Inlet Weir	29° 37' 44.81" S, 31° 3' 51.65" E
C2_VB20-001	Brick Drop Inlet Weir	29° 37' 37.51" S, 31° 4' 1.49" E
C2_VB23-001	Concrete Drop Inlet Weir	29° 37' 35.26" S, 31° 4' 7.31" E
C3_VB1-001	Concrete Weir and Re-shaping	29° 38' 38.31" S, 31° 4' 1.05" E
C3_VB2-001	Concrete Weir and Re-shaping	29° 38' 35.39" S, 31° 4' 3.87" E
C4_VB1-001	Concrete Drop Inlet Weir and Re-shaping	29° 38' 49.67" S, 31° 4' 31.7" E
C5_VB1-001	Concrete Weir and Re-shaping	29° 38' 32.3" S, 31° 4' 39.94" E
C5_VB8-001	Concrete Drop Inlet Weir	29° 38' 31.56" S, 31° 4' 16.28" E
C5_VB8-002	Concrete Drop Inlet Weir	29° 38' 31.22"S, 31° 4' 15.81"E
D-001	Backfilling Existing Dam and Lowering Brick Tower Outlet Structure	29° 38' 12.67" S, 31° 3' 38.69" E
S-001	Re-Shaping of Seep Areas	
R-001	Removal of Existing Roads	

3.3 Description of proposed Activity

For the wetland rehabilitation offset, weirs will be constructed. For the construction of the weirs, excavation of more than 10 cubic metres from a watercourse will be done. Backfilling of the dam will also occur, the site will need to be cleared of vegetation to make way for the construction of weirs. Levelling of the site might also be required.

With regards to the National Environmental Management Act (107 of 1998) in line with the Environmental Impact Assessment Regulations, 2014 as amended on 07 April 2017, Listing Notices GNR 324- GNR 327. The proposed development triggers the following activities:

Table 2: Listed Activities Triggered

Number and date of notice	**Activity No.**	**Describe the listed activity**	**Describe each listed activity as per the project description (and not as per wording of the relevant**

			Government Notice)[1]:
GNR 327: Listing Notice 1 (April 2017)	Activity no. 19 (i) (a)	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than10 cubic metres from a watercourse	The construction of weirs as part of the interventions to be done for the offset management plan will cause excavation of more than 10 cubic metres from a water course. The backfilling of the dam will consist of more than 10 cubic metres of material.

4. APPLICABLE LEGISLATIONS, POLICIES AND GUIDELINES

The table below represents a list of legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA regulations:

Table 3: Applicable Legislations

Title of legislation, policy or guideline	Administering authority:	Applicability to the project
Constitution of the Republic South Africa (Act No. 108 of 1996, Section 24) General respect for the environment and people's rights to a healthy and clean environment	National	This is a rehabilitation offset project that aims to protect and conserve the wetland's

[1] Please note that this description should not be a repetition of the listed activity as contained in the relevant Government Notice, but should be a brief description of activities to be undertaken as per the project description, i.e. describe the components of the desired development

National Environmental Management Act (No. 107 of 1998), as amended. section 23, 24 requirements for environmental assessment of all activities which have a significant impact on the environment and which require authorization by law **Section 28** Duty of care and remediation of environmental damage	Department of Environmental Affairs	ecosystems. As such, the listed legislation, policies and guidelines are of relevance to the project.
National Water Act (No. 38 of 1996)	Department of Water and Sanitation	
National Environmental Management: Protected Areas Act (Act 57 of 2003)		
National Environmental Management: Waste Act (No. 59 of 2008) **Section 16** Separation of waste	Department of Environmental Affairs	
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	Department of Environmental Affairs	
National Heritage Resources Act (No. 25 of 1999)	South African Heritage Resource Association	
Occupational Health and Safety Act (No. 85 of 1993) Provides measures for promoting the health and safety in the workplace	Department of Labour	

National Environmental Management Act (Act No. 107 of 1998), Environmental Impact Assessment Regulations	Department of Environmental Affairs	

5. NEED AND DESIRABILITY

5.1 Activity

The wetland offset was due to a proposed development by Dube TradePort Corporation, to develop Phase 2 of the TradeZone development on the Remainder of Portion 9 of La Mercy Airport No. 15124. The proposed development involves the infilling of 44.19ha of wetland and riparian areas and losses of 11.04ha functional equivalents and 3.69ha habitat equivalents respectively. When also accounting for 'opportunity loss', these figures increase substantially to 22.51ha function equivalents and 21.69ha habitat equivalents. The proposed wetland and riverine habitat losses, and associated losses in ecosystem services (present and potential) and wetland habitat representation (present and potential), was assessed as a highly significant impact that cannot be mitigated through planning, construction and or operational phase mitigation measures or onsite rehabilitation / remediation.

However, since the proposed development forms part of a national priority mixed use, light industrial urban node centred around the King Shaka International Airport (KSIA), the proposed wetland loss is inevitable considering the extensive platforms required to support such envisaged land uses. Thus, the consideration of offsets as compensation and mitigation for the significant residual impacts was considered a necessary form of mitigation and the only 'mitigation vehicle' available to reduce the residual impacts to more acceptable levels. This is a compliance project in terms of the Environmental Authorisation (EA) issued for TradeZone 2, as the offset plan was approved as part of this EA. Although offsets are regarded as the last option in the mitigation hierarchy, it is still a way of mitigating when other measures at the top of the mitigation hierarchy were taken to no avail.

Despite the importance of wetlands and the services that they provide, the 2011 National Biodiversity Assessment (NBA) has estimated that between 35% and 60% of wetlands and the benefits that they provide, have been lost or severely degraded (NBA, 2011). Furthermore, 65% of wetland ecosystem types are threatened (48% critically endangered, 12% endangered and 5% vulnerable), making wetlands the most threatened of all ecosystems assessed in the

2011 NBA. This wetland rehabilitation offset is therefore important because wetlands play a pivotal role in the natural environment. Wetlands reduce the impacts of floods, absorb pollutants and improve water quality. They provide habitat for animals and plants and many contain a wide diversity of life. The wetland offset is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure, ecosystem function and peoples use of and cultural values associated with biodiversity. A more comprehensive list of ecosystem services provided by wetlands are given below:

- Wetlands provide services such as water provision, regulation, purification and groundwater;
- replenishments are crucial in addressing objectives of water security and water for food security;
- Wetlands play a critical role in improving the ecological health of an ecosystem by performing many functions that include flood control, water purification, sediment and nutrient retention and export, recharge of groundwater, as well as acting as vital habitats for diverse plant and animal species;
- Wetlands provide ecological infrastructure and replace the need for municipal infrastructure by providing the same or better benefit at a fraction of the costs;
- Wetlands retard the movement of water in the landscape, which offers the dual benefit of flood control and water purification;
- Wetlands function as valuable open spaces and create recreational opportunities for people that include hiking, fishing, boating, and bird-watching; and
- Many wetlands also have cultural and spiritual significance for the communities living nearby. Commercially, products such as reeds and peat are also harvested from wetlands.

This project (TradeZone 2 Wetland Offset) is therefore of importance since the wetland offset policy goals in South Africa require that no net loss in the overall wetland functional area occurs by providing gains equivalent to residual impacts and appropriate and adequate compensation for residual impacts on key ecosystem services should be provided. The broad aims of the wetland interventions proposed are:

- Restoration the hydrological integrity of wetland systems;
- Recreation of wetland habitat;
- Prevention of sediment loss; and

- Enhancement of biodiversity and the conservation thereof

The proposed rehabilitation activities would not compromise any Environmental Management Frameworks (EMF) adopted by the DEA, or the objectives of the Provincial Spatial Development Framework (SDF) or the Local Municipality's Integrated Development Plan (IDP) and SDF. The rehabilitation of wetlands would be aligned with the objectives of government as it aims to restore the hydrological integrity of wetland systems, enhance biodiversity and create job opportunities while also contributing to social improvement.

5.2 Location

The area already has wetlands, the offset land is of similar nature, it has similar characteristics to the land, which was developed, hence this proposed offset area fits 'like for like' requirement. The area is currently under sugarcane farming and therefore the soil wetness and fertility is moderate to high.

6. PROJECT ALTERNATIVES

6.1 Design and Layout alternatives

6.1.1 Alternative 1 (Preferred)

During the development of the Wetland Rehabilitation Offset for TradeZone 2, the final choice of the proposed site was largely driven by the opportunity to achieve maximum offset targets.

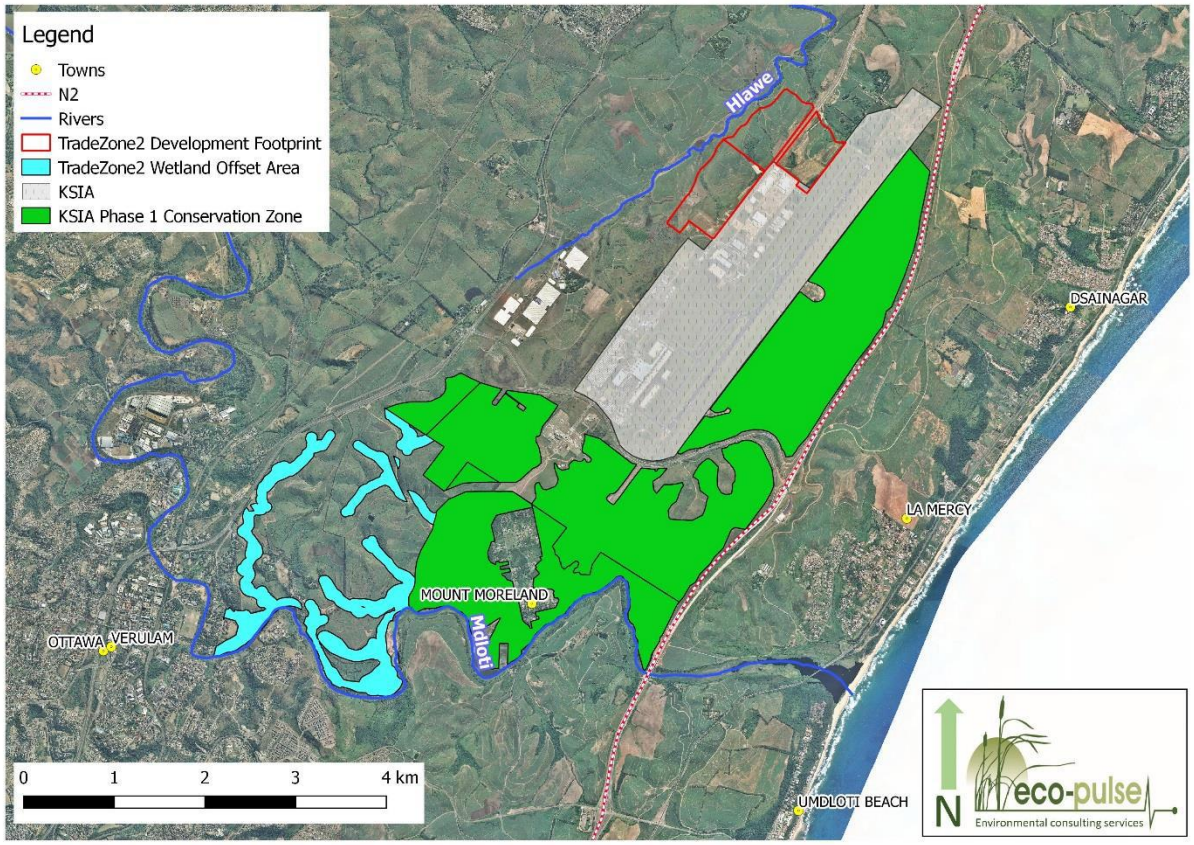

Figure 2: Map depicting area where interventions and offsets will take place.

6.2 No-go Alternative

The "No-Go" alternative represents a scenario within which no rehabilitation activities occur in the target area. If the no go alternative is explored this means that losses of 22.51ha function equivalents and 21.69ha habitat equivalents will be experienced. These losses cannot be mitigated through planning, construction and or operational phase mitigation measures or onsite rehabilitation, therefore, compensation, which is the wetland offset, is required. an overall negative impact on aquatic and terrestrial ecosystems, habitats and species of conservation significance will be experienced. In the absence of rehabilitation, the important

role of these wetlands in flood attenuation, nutrient retention and water quality amelioration, as well as ecological service provision will not be realised.

6.3 Technology used

The use of heavy machinery to undertake earthworks within the wetlands as part of the excavation, widening and rehashing of the wetland basins is deemed acceptable and practical due to all the affected wetlands being under cane or banana cultivation. Other technology used will depend on the tasks that need to be done, as well as the characteristics of that section of the area, such as construction vehicles.

6.4 Activity type

The current development of TradeZone 2 platform has resulted to the infilling of 44.19ha of wetland and riparian areas. Therefore, the proposed wetland offset interventions will include; channel and/or drain plugging using engineered control structures (e.g. buttress and drop inlet weirs), the construction of head cut and knickpoint stabilisation structures, channel and/or drain backfilling and surface reshaping (earthworks and reshaping), valley bottom widening and reshaping (earthworks and reshaping), dam backfilling, re-vegetation and alien plant eradication and control. (Refer to the Method Statement (Rehabilitation Intervention Details and Draft Implementation Plan for Rehabilitation Interventions in **Appendix H** for more details).

Therefore, no alternative activity type is relevant.

6.5 Activity location

The location for the proposed activity is the preferred site and the most suitable, the final choice of the proposed site was largely driven by the opportunity to achieve maximum offset targets. Based on the characteristics of the site, that there are already existing wetlands in the area and the soil is fertile, therefore vegetation will grow well in the area.

Therefore, no alternative location is relevant.

6.6 Other Alternatives

A design alternative can be included, these include intervention types and intervention size. Instead of a concrete weir, other alternatives such as stone masonry weirs, gabion weirs and earth berms could be used.

The size of the intervention will depend on:

- The depth of the channel;
- The height of the existing water level as well as the positions of proposed interventions that are to be located 'heel-to-toe' with the aim of flooding back onto each other where applicable; and
- The potential new required upstream water level is also taken into consideration as this would assist in reducing erosion in this area.

Criteria used to determine the most appropriate design alternative include the

following:

- Environmental criteria (Hydrology, geology and soils, seasonal influences and site specific constraints);
- Engineering criteria (Bio-physical aspects, risk and liability, construction material selection);
- Social criteria (Health and safety, availability of materials, skills levels and opportunity for skills development); and
- Wetland rehabilitation criteria (Stabilisation of head-cuts and erosion gullies, elevation of watertable, sediment trapping, eradication of problem species).

7. PUBLIC PARTICIPATION PROCESS

7.1 Objectives of public participation in Environmental Authorisation processes

The objectives of public participation in an EA process are to provide I&APs' access to enough information in an objective manner so as to:

- Ensure transparency throughout the process and to promote informed decision making;
- Assist I&APs to identify issues of concern, and providing suggestions for enhanced benefits and alternatives;
- Contribute their local knowledge and experience;
- Verify that their issues have been considered and to help define the scope of the technical studies to be undertaken during the Impact Assessment;

- Comment on the findings of the Basic Assessment, including the measures that have been proposed to enhance positive impacts and reduce or avoid negative ones.

7.2 Identification of Interested and Affected Parties (I&APs)

The identification of key stakeholders was undertaken with Dube TradePort Corporation. The applicant has conducted a similar project in the study area; therefore, a stakeholder database was readily available. Key stakeholders include representatives from the municipality (local authority) in which the proposed wetland offset rehabilitation measures were proposed to be implemented, eZemvelo KZN Wildlife as well as stakeholders that had actively taken part in the public participation process for the TradeZone 2 development undertaken in 2017 and members of the Dube TradePort TradeZone 2 Offset Oversight Committee and King Shaka International Airport Conservation Area Advisory Forum. These stakeholders were notified that should no response or request to be registered be received from these stakeholders in 30 days, it would be accepted that these stakeholders did not wish to comment.

Table 4: Interested and Affected Parties

NAME OF DEPARTMENT	CONTACT PERSON	ADDRESS
Department of Environmental Affairs	Thabile Sangweni	Cnr Steve Biko and Soutpansberg Road Environment House 473 Steve Biko Arcadia Pretoria 0083
Department of Economic Development, Tourism and Environmental Affairs (EDTEA)	Yugeshni Govender	Private Bag X 885 Port Shepstone 4240
Department of Agriculture, Forestry and Fisheries	Ms K Moodley	Office 02; 5th Floor; Old Mutual Building 185 Langalibalele Street

		Pietermaritzburg 3200
eThekwini Municipality	Dianne Van Rensburg	166 Old Fort Road City Engineers Building
Ezemvelo KZN Wildlife	DinesreeThambu	EKZN Wildlife Head Integrated Environmental Planning P.O Box 13053 Cascade 3202
Department of Water and Sanitation	Miss N.M Mokoena	P.O Box 1018 Durban 4000

Comments from the BID were received from eThekwini Municipality and the Department of Water and Sanitation (DWS) only. The Draft BAR will be circulated to all the above I&APs.

7.3 Announcement of the Basic Assessment process

An email was sent to I&APs as identified in the table in the section above. The email consisted of a Background Information Document (BID) that provided background to the proposed project and Basic Assessment process. This email was sent on 31 August 2018. Proof of notification is attached in **Appendix D.**

Site Notices informing the potential I&APs of the proposed development as well as the application for authorisation, were put up in and around the proposed offset site on 7 November 2018. Photographic evidence of the site notices erected on site are attached in **Appendix D.**

An Advertisement was placed in The Mercury Newspaper in English on 05 October 2018 and in the Isolezwe Newspaper in IsiZulu on the 05 October 2018. This was informing he I&APs of the proposed development as notifying them on their right to participate and register to be an I&AP.

7.4 Issues Trail

Comments received from the BAR have been attached and will be found in **Appendix D**. The responses to the comments are also found in the issues trail found in **Appendix D.**

8. BIOPHYSICAL FACTORS

8.1 Locality

The proposed development area is situated approximately 1.3 km to the east of Verulam, adjacent to the R102, EThekwini Municipality. The proposed site is in the Cottonlands Farm 1575 located in ward 58 of the eThekwini Municipality. A Locality Plan indicating the site location is presented in **Appendix B.**

8.2 Climate

The proposed site normally receives about 766mm of rain per year, with most rainfall occurring mainly during mid-summer. The chart below (lower left) shows the average rainfall values for Verulam per month. It receives the lowest rainfall (13mm) in June and the highest (108mm) in February. The monthly distribution of average daily maximum temperatures (centre chart below) shows that the average midday temperatures for Verulam range from 22.2°C in July to 27.4°C in February. The region is the coldest during July when the mercury drops to 9.4°C on average during the night.

8.3 Land Use

The study area is partly being used for sugar cane and banana farming, buildings and some infrastructure associated with farming enterprises, such as a dam, occur on the property. Some residential housing occurring on the far eastern section of the area demarcated for scoping exercise.

8.4 Vegetation

The vegetation on site consists of dense bush which lies within a drainage feature. There is also the presence of the Provincially Protected *Tritoniadisticha*.

The area is characterised by coastal peneplains and gentle undulating hills with very flat table lands and very steep river gorges. These different landscape features are usually rich in grassland species with a variety of different scattered small shrubs and small trees. The area also comprises of rocky outcrops and krantzes. Sea cliffs can also be observed in the area. A

suite of local endemic and biogeographically important taxa, such as *Utricula*riasandersonii, *Kniphofia rooperi*, *Podalyriavelutina*, *Watsoniabachmannii* and *Watsoniapondoensis*, is linked to hygromorphic soils and are supported by the slight depressions on the coastal plateau and rock pools on rocky outcrops.

Certain vegetation was found to be protected, this is explained further and in detail, in the attached Ecological Report, **Appendix E.**

8.5 Hydrogeology

The study area spans the T40F catchment and receives a mean annual precipitation of 1020 mm. The sandstone bedrock forms part of an intergranular and fractured primary aquifer system. Surface water naturally flows down gradient in the perennial feature, towards the Indian Ocean.

8.6 Geology

According to the 1: 250 000 Geological Series Map No.3030, Port Shepstone, the site is underlain by coarse to fine-grained arkose to subarkose, light grey quartz arenite, micaceous, grit, conglomerate, subordinate siltstone and mudstone (O-Sn). This rock unit forms part of the Natal Group. On site the sandstone bedrock is present which is overlain by superficial alluvial and colluvial horizons. The geology of the area gives rise to shallow, skeletal acidic sandy soils which is also poor in nutrients. There is a geological link between the sourvelds of South Africa; the link between these sourvelds is because of the sandstone geology of the Pondoland. Pondoland forms the lowest step along a staircase of nutrient-poor geologies, comprising further the early Palaeozoic Natal Sandstones of the KwaZulu-Natal Midlands and the Late Triassic Clarens sandstones of the Drakensberg.

8.7 Socio-Economic

Employment opportunities will be created during the construction phase of the proposed project.

8.8 Heritage and Agricultural

There are no heritage or agricultural implications associated with this development currently as there have been no signs of any cultural or heritage monuments present on site. Any heritage and cultural artifacts encountered during the construction phase needs to be reported to the

relevant authority for consideration and further investigation. The study area is partly being used for sugar cane and banana farming.

9. POTENTIAL IMPACTS

9.1 Construction Phase

9.1.1 Direct

In-stream Drop Structures

In-stream drop structures are proposed for the rehabilitation of the stream beds where bed incision has taken place in conjunction with changes to the natural flow regime, and where such incision has additionally altered the distribution of water in the landscape. The predominant role of in-stream drop structures is to halt and/or reverse stream bed incision and to raise water levels thereby extending wetted areas. The preferred structure type will comprise grouted boulders and construction will be by manual labour. The construction of in-stream drop structures will have the following potential impacts: removal, disturbance or damage of wetland vegetation and associated biodiversity, excavation and disturbance of wetland soils / substrates, use of a coffer dam/s to temporarily store or divert water, increase potential for invasion by alien plant species, increase potential for erosion associated with installed structures, increased potential for fire and increased potential for contamination of the environment with cement or cement products.

Removal of vegetation

Removal, disturbance or damage of wetland vegetation and associated biodiversity. Vegetation will be trampled to access the site and it will be removed in demarcated areas to facilitate construction. Both disturbance and removal must be strictly controlled and minimised to as small an area as is required.

Habitat Destruction

A certain amount of habitat destruction during the construction phase of the project is unavoidable, but with careful management should be limited to the footprint of the development. The disturbance created will lead to alien plant invasion if not properly managed.

Excavation and disturbance of wetland soils

Trenching will be required for the installation to proceed.

Oil and Diesel Spillages

Construction vehicles might leave behind traces of the lubricants and fuel used to operate them. These include diesel, oil, hydraulic fluid and other similar products. These products pollute the soil and cause plants that are directly contaminated by these fuels spillages to die. The presence of diesel and oil on the site are dangers that could threaten the water quality if mitigation measures are not correctly adhered to.

Bank alteration and disturbance to slope stability

During the construction phase, there will be excavation throughout the development site Alteration of the slopes will decrease bank stability and increase localised erosion.

Soil Erosion

Increase potential for erosion associated with installed structures and the construction process. Soil within the area will be exposed as a result of the removal of vegetation. The soil will further be loosened as a result of the earth works that will be part of the proposed project. Top soil from the disturbed areas will be removed and stockpiled. These factors will contribute to the occurrence of soil erosion on and around the working area. Design specifications must be strictly adhered to, especially with regards to mixing proportions, concrete strengths and tie-in depths and lengths. Backfilling around constructed interventions should be compacted by hand (stampers or wackers) to pre-construction conditions.

Runoff management must be in such that no excessive erosion occurs during construction and operational phases. Vegetation must be used to ensure soil cohesion and reduce erosion susceptibility of the soil. the operation of earth moving equipment and stockpile areas during construction will result in increased levels of disturbance, removal of protective plant cover and compaction of soils. Habitat quality will be degraded by soil erosion and siltation of down-slope areas whether natural vegetation or wetlands. Negative ecological impacts can operate long after construction is complete if soil erosion remains uncontrolled. Provided the soil erosion and compaction issues produced by the construction phase are dealt with, the operation and maintenance phase will have a far lesser effect.

Fauna

The development will impact additionally on fauna through disturbance. This disturbance may affect feeding, roosting and breeding activities. The effect will be most severe during the construction phase.

Air Pollution

Short-term negative impacts on air quality will occur from heavy equipment, dust and exhaust fumes during the construction phase.

Noise and Dust

Vehicles travelling to and from the construction site at high speed on unpaved road surfaces tend to disperse any surface particles and debris. The dust will be carried some distance away from the road, varying according to wind speed, direction and other climatic factors, such as temperature and precipitation moisture levels.

Noise and dust are common during such a proposed development as it involves large machinery, however this is not a permanent impact. Noise and dust will occur during the construction phase and once construction has been completed this will no longer affect the community where the proposed development will take place.

Soil Contamination

Care should be taken not to contaminate topsoil in cases of negligent fuel storage and cement mixing.

9.1.2 Indirect

Proliferation of Invasive Alien Plants (IAP)

Once areas have been cleared of vegetation it is most likely that invasive alien plants will colonize certain areas posing a threat to indigenous vegetation. IAP species have the ability to propagate and proliferate rapidly. Once established, IAP species generally outcompete indigenous plant species for natural resources therefore altering the structure and functioning of terrestrial ecosystems.

It is therefore proposed that for all phases of construction and post construction, IAPs be monitored and controlled to ensure that the above is prevented. Given sufficient care during the construction phase, this possibility can be eliminated almost completely.

Contamination of Freshwater resources

The proposed development may increase turbidity in watercourses, either from upland erosion, runoff or by disturbing bottom sediments as a result of the rehabilitation activities which may affect the water quality of receiving waterbodies. Reduction of water quality resulting from hydrocarbon spills including grease, oils and other pollutants which are discharged or washed into nearby watercourses. The generation of general waste and hazardous waste may also result in contamination of watercourses. The use of chemicals for the clearing and control of alien and invasive plants as per the approved Wetland and Riparian Zone Rehabilitation Plan may result in contamination of watercourses.

Construction Traffic

The delivery of construction equipment and materials poses safety problems for other road users and pedestrians if not strictly controlled. Community property and access roads to the home steads in the region can be damaged if construction vehicles take routes that are not adequate for heavy vehicle usage.

9.1.3 Mitigation Measures

Habitat Destruction

Construction and maintenance activities should be carried out according to accepted environmental best practice. Existing access should be utilised wherever possible. Aggregates and construction materials brought to site should be laid down in pre-construction demarcated areas outside of the wetland boundary.

Excavation and disturbance of wetland soils

Area to be trenched must be clearly demarcated before commencement and activities confined to these areas. Trenching to be done by hand (i.e. with pick and shovel) and not by heavy plant such as TLBs. The timing of trenching is to be coordinated such as to not have open trenches for long periods of time, and where possible is to proceed in the non-rainy season. The top 300mm layer which contains plant material is to be kept separate from other substrates for reuse after construction. This will be replaced on top to promote revegetation within the wetland. Should distinct layering be present in sub-soils, these different soil types must be stockpiled separately and not mixed with different types. Replacement of sub-soil must be in reverse order of when they were excavated and be as close to the original as possible in both layering and compaction.

Increase potential for erosion associated with installed structures and the construction process (Soil Compaction and erosion)

Design specifications must be strictly adhered to, especially with regards to mixing proportions, concrete strengths and tie-in depths and lengths. Backfilling around constructed interventions should be compacted by hand (stampers or wackers) to pre-construction conditions. Backfilling upstream of constructed interventions is particularly important and should be revegetated using the top layers of plant containing soils from the site. Sites must be monitored for any form of erosion. Any ensuing erosion must be addressed immediately and in the correct manner. Professional guidance should be sought if required.

- The movement of construction and maintenance vehicles and personnel should be restricted as far as possible and where practical and access of machinery and vehicles should be carefully controlled. Compaction from human and vehicular traffic will result in higher runoff and erosion leading to loss of topsoil and delayed rehabilitation.
- Checks must be carried out at regular intervals to identify areas where erosion is occurring. Appropriate remedial action, including the rehabilitation of the eroded areas should be undertaken.

Proliferation of Invasive Alien Plants (IAP)

Disturbance will promote colonisation by alien plant species, particularly annual weeds. Disturbance must be kept to a minimum. Backfilling of the Works must make use of material removed from the same site and layering must reflect pre-disturbance structure. The use of foreign material for backfilling or landscaping will favour the spread of alien plant species and must be avoided. The top layers of wetland soil/clay removed from site and which contains indigenous plant species must be placed on top of backfilling to promote revegetation by [pre-existing] indigenous wetland plants. Aggregates brought to site for construction purposes must be screened for alien plant species propagules and discarded if these are present. After completion of the Works the site should be monitored for the presence of alien plant species and managed according to the EMP.

Job creation and skills development

Ensure that the required workers are sourced from local communities and that maximum employment numbers are maintained throughout the project duration. Project implementers to support local businesses (e.g. local quarry owners to obtain rock for gabions) where possible.

Fauna

- Educational programmes for the contractor's staff must be implemented to ensure that project workers are alerted to the possibility of herpetofauna and other animals being found during construction. The construction team must be briefed about the management of these in such instances. In particular, construction workers are to undergo training to ensure that these species are not killed or persecuted when found.
- Open trenches and holes (pits) pose a threat to smaller animals should they fall in and, therefore, a sloping section of the trench wall should be made available for the escape of any trapped animals. If encountered, they should be removed and placed into suitable habitat away from the construction area. Pits should be checked daily.
- No plants should be collected, nor animals intentionally killed or destroyed and poaching and hunting should not be permitted on the site and severe contractual fines must be imposed and immediate dismissal of any contract employee who is found attempting to snare or otherwise harm wild animals or collect plants or plant parts;

Contamination of Freshwater resources

- The development will take place in and near an aquatic environment and extra diligence will need to be exercised to ensure that pollutants and toxins such as building materials (concrete, etc.) and hydrocarbons (oil, diesel, etc.) do not enter the stream or soils.
- Keep vehicle movement to designated access roads to avoid compaction and sedimentation outside of designated works areas;
- Erosion control measures must be implemented in areas sensitive to erosion. These have been detailed in (Eco-Pulse & GroundTruth, 2018) and include revegetation of target areas, use of plugs or sods for rapid establishment on valley floors, the use of concrete weirs to deactivate head cut erosion and to act as control structures at the outlets of the wetlands.
- All waste generated during construction is to be disposed of in an approved manner by controlling the mix of contaminated water with clean water;
- Minimise spills and keep vehicles away from the watercourses and conduct quick clean-ups when spills occur. Used oils and grease should be disposed of by accredited vendors.

Construction Traffic

- Construction routes must be clearly defined, and construction vehicles must not deviate from the route.
- Planning of site delivery hours must be scheduled to avoid weekends, evenings insofar as possible.
- Servicing of vehicles must be done off-site.
- A site speed limit of 20km/h must not be exceeded at the actual construction site location.

9.2 Operational Phase

9.2.1 Direct Impacts

Impact on Communities

There are no communities found within the property, so the impacts of the proposed interventions are not applicable. However, downstream agricultural activities as well as neighbouring communities are present.

Ecological Function

The proposed interventions would restore the ecological functioning of the wetlands and would therefore improve the delivery of ecosystem services i.e. improved water quality and flood regulation services to the downstream agricultural operations. Overall, the proposed interventions should contribute to several new job opportunities while restoring wetland functioning.

- The raising of water levels thereby extending upstream and lateral wetted areas
- Improvement of water retention upstream
- Improvement of flood retention capacity upstream of the structure.
- Promotes the trapping of sediments upstream of the structure
- Restoring wetland continuity and corridors
- Re-direction of stream flow

Water Quality

Water quality enhancement by trapping pollutants emanating from urban runoff and agricultural lands. These contaminants include sediments, nutrients and chemical

detoxification. This is achieved through the flow of contaminants through dense vegetation cover in the wetland area by the following wetland functions (State of Vermont, 2019):

i. The dense vegetation cover slows flow and allows suspended material to settle in the wetland before release into receiving waterbodies.
ii. Contaminants from agricultural land may contain nitrogen and phosphorous which can act as plant fertilizers in natural water bodies and stimulate excessive plant, algae, and cyanobacteria growth. Wetlands can take up these excess nutrients and accumulate them in less harmful chemical forms.

Flood Attenuation

Flood attenuation by increasing residence time of water in the catchment by temporarily storing flood waters during high runoff events. The water is then released slowly to the stream channel from wetland soils, hence reducing the severity of downstream flooding and erosion.

Streamflow Regulation

Streamflow regulation due to the slow release of water. This reduces peak discharge and improves water availability during periods of low flow.

9.3 Decommissioning or Closure Phase

9.3.1 Mitigations

Restoring wetland continuity and corridors

Follow planned interventions identified for rehabilitation that were identified during the planning phase. Structures need to be monitored annually and after large floods or rainfall events to check for undercutting or erosion associated with the structure. Any sign of erosion or destabilisation must be rectified immediately. Pipe outlets need to be inspected regularly (at least monthly) for blockages and unblocked should these have developed.

9.4 General Mitigations

The purpose of mitigation measures is to reduce the significance level of the anticipated impact. Therefore, the reduction in the significance level after mitigation is directly related to the scores used in the impact assessment criteria. The effect of potential mitigation measures to reduce the overall significance level is also to be considered in each issues table (i.e. values with or without mitigation are presented).

- The construction area must be demarcated.
- The Environmental Management Programme (EMPr) must be strictly adhered to.
- The contractor must insure compliance with the conditions of the authorisation.
- An Environmental Control Officer (ECO) must be appointed, to ensure compliance with the EMPr
- The extent of the construction sites should be demarcated on site layout plans and no construction personnel or vehicles should leave the demarcated area except those authorised to do so. Those areas surrounding the construction site that are not part of the demarcated development area should be considered as "zero-access" areas for employees and machinery in order to reduce unnecessary habitat loss and disturbance.
- No open fires shall be allowed on site under any circumstance. The Contractor shall have fire-fighting equipment available on all vehicles working on site, especially during the winter months.

10. SPECIALIST FINDINGS AND RECOMMENDATIONS

10.1 Botanical screening

The botanical screening report was prepared by GJ McDonald.

10.1.1 Specialist recommendation

No plant species that are protected provincially were encountered during the field visit, but this does not preclude their presence. However, it is unlikely that any Red Listed species or species of conservation significance persist. *Barringtoniaracemosa* and *Sideroxyloninerme*, both Nationally Protected Tree species, were found associated with watercourses and fall within the areas proposed as community conservation areas. In addition, no Red listed and endemic species were found in the proposed site.

The proposed development will have little additional impact on the natural vegetation of the area which is already 100% transformed. The results of this initial survey indicate that the impact of the proposed development will be minimal on the remaining area once the community conservation areas are removed from the proposed development.

After completing the survey it is my opinion that as a result of: (a) the highly disturbed nature of the site, (b) the lack of floral diversity, and (c) the sensitive areas already having been declared community conservation areas, that there should be no opposition to the proposed

development of the remainder of the site provided mitigation measures (especially in respect of soil erosion and storm water management) are implemented. With regards the riparian zones, the desired state is to establish dense indigenous herbaceous and woody vegetation and remove all alien invasive and exotic species, which will also contribute to bank stability.

In order to ensure that the selected interventions are implemented effectively and that the interventions are achieving the rehabilitation goals and objectives, monitoring of the rehabilitation process from construction to completion is critically important. Regular monitoring also allows one to identify the need for corrective action for problems that may arise during the course of rehabilitation programme. Furthermore, ecological monitoring is critical to measuring the success of the rehabilitation against rehabilitation objectives and ultimately to confirm whether the predicted offset gains are achieved and that the offset has been successful. In this regard, baseline monitoring is a critical component of the monitoring programme that documents the status quo of the ecosystems prior to offset activities being initiated. Without such information, the improvement in the supply of ecosystem services delivered and ecosystem condition cannot be determined. This monitoring programme includes direct oversight of rehabilitation activities and an ecological monitoring programme as outlined in this section of the report.

10.2Wetland and Riparian zone assessment

The wetland and riparian zone assessment was done by Eco- Pulse Consulting and GroundTruth Engineering.

10.2.1 Specialists recommendations

The dominant HGM (hydro- geomorphic) types occurring in the offset study area are riparian zones and seeps which together account for 75% of target areas. Valley bottom and artificial wetlands occupy a much smaller area, only accounting for 25% of the watercourses in the offset site.

Overall, the average present state functional value for all of the watercourses occurring within the offset study area was 23.67% with the artificial wetlands having the highest average functional value score (42.6%). These results indicate that the naturally occurring wetlands and riparian zones within the study area currently supply relatively low levels of key regulating services, which is expected considering the high degree of freshwater ecosystem transformation and degradation that has occurred across the study area.

Overall the average present state habitat condition for all of the watercourses occurring within the offset study area was 21.3% with the artificial wetlands having the highest present state value score (34%). This is because emergent wetland vegetation was present within some of the artificial wetlands. These results indicate that the habitat condition of the naturally occurring wetlands (VBs and seeps) within the study area is very low (11.3 %), which is expected considering that limited wetland habitat was observed across all the wetlands investigated within the study area…

With regards to the seep wetlands, the desired state will be to reinstate the natural soil saturation regimes that range from temporary to seasonal wetness zones and establish dense herbaceous vegetation cover dominated by grasses typical of locally occurring hygrophilous grasslands.

In a rehabilitation project of this extent, the scheduling of the interventions is of critical importance. The implementation order is determined by the threat to the wetland as well as the maximum gains that an area can yield. Therefore, the implementation order will be determined by the area of re-shaping (largest to smallest). In this regard the following implementation sequence is recommended:

1. Valley bottom wetland rehabilitation interventions – concrete weirs with reshaping and associated road removals: C2_VB1-001, C2_VB5-001, C2_VB9-001, C2_VB10-001, C3_VB1-001, C3_VB2-001, C4_VB1-001, C5_VB1-001. Work should progress in an upstream direction from most downstream control structures.
2. Valley bottom wetland rehabilitation interventions – concrete and brick weirs (no reshaping) and associated road removals: C2_VB12-001, C2_VB16-001, C2_VB20-001, C2_VB23-001, C5_VB8-001, C5_VB8-002. Work should progress in an upstream direction from most downstream control structures.
3. Valley bottom wetland creation interventions – concrete weirs with reshaping C1_R1-001.
4. Low gradient seep reshaping: S1-1, S1-2 and S2-2a. Work should progress in an upstream direction from most downstream control structures.
5. Seep reshaping and associated road removals. Work should progress in an upstream direction in a systematic manner.
6. Riparian zone road removals and re-vegetation. Work should progress in an upstream direction in a systematic manner.
7. Buffer clearing and re-vegetation and associated road removals. Work should progress in an upstream direction in a systematic manner.

8. Riparian zone alien clearing and re-vegetation. Work should progress in a systematic manner.
9. Infilling and reshaping of dam: D-001 – This intervention should be implemented last as material will need to be imported from TradeZone 4 development and other onsite earthworks, and also to negate the possibility of double handling of material.

With regards to the interventions involving both reshaping and the establishment of engineered control structures, the following sequence applies:

- The earthworks/re-shaping must be done first, and temporary berms constructed to deal with the prevailing water.
- Then the structures are to be constructed. Water must first be piped around the proposed structure construction areas and discharged back into the existing channel whilst the structure is being constructed. This is to ensure that the correct levels are achieved and that the structure will be suitable.
- The structure is to be constructed/implemented during the low flow season (winter).

With regards to Point 8 in the sequence above, it is important that the present crops within the buffer zones and adjoining temporary wetlands (active or abandoned) are not cleared until all the engineering and re-vegetation interventions have been effectively implemented and established, and that no harvesting of cane occur during the establishment of the engineering and re-vegetation interventions. This is to ensure that the buffers remain somewhat intact and vegetation cover is maintained so that rates erosion and sedimentation are minimized as far as practically possible. Related to this point, buffer clearing and re-vegetation must be undertaken in a systematic manner and the wholesale clearing of buffer zones for re-vegetation must be avoided.

Commercial availability of desirable plant species – Only those species that are commercially available and can be propagated at large volumes (or required volumes) can be selected. Some species may need to be specifically cultivated and propagated for the purposes of this project which will be costly. Therefore, re-vegetation of the larger areas (e.g. drained wetlands and buffer zones) would be best using mixes of seeds that are currently commercially available to reduce the need and costs of cultivation and propagation by a nursery.

We recommend that a conservative but flexible and experimental approach be adopted for the temporary wetlands and buffer zones with passive recovery and hydroseeding used as the two main approaches to re-vegetation. As part of the initial phase we recommend that hydroseeding be tested at selected sites whilst passive recovery (as implemented on much of the KSIA site) be allowed to continue through the remainder of sites. Monitoring will then be required in order to compare and contrast the effectiveness of rehabilitation using the two alternative approaches – this should be undertaken over at least three seasons in order to have some confidence in the findings. If it is found that hydroseeding is largely ineffective at outcompeting the weedy grass and herb species, then the passive successional approach with prescribed management and future active planting will need to be implemented for temporary wetland areas and buffer zones as and when conditions become suitable. If hydroseeding is found to be successful however, then this option should be integrated into the rehabilitation strategy for the area. The manner in which hydroseeding is integrated into the rehabilitation plan will need to be reviewed following testing. This could entail soil preparation and subsequent hydroseeding across all target areas or could perhaps include a less intensive approach where selected areas (e.g. strips) are treated in this manner.

Cross-sectional Surveys

Cross-sectional profiles of all of the valley bottom wetlands to be receive engineering interventions must be plotted using a dumpy level confirm the morphology of the rehabilitated valley bottom wetlands. The location of the survey transects point(s) must be recorded using a GPS and a spray painted stake should be hammered into the ground at each end of the transect just outside of the valley bottom wetland.

Water Table Monitoring

For the larger wetlands where interventions are expected to create permanently and seasonally saturated conditions, water table depth monitoring must be undertaken to confirm soil saturation conditions. Such monitoring is most critical in the systems with smaller catchments where these is some uncertainty over whether permanent or seasonal saturation can be achieved. Monitoring changes to wetland hydrology (brought about by the proposed rehabilitation activities planned for the site) will be critical since wetland hydrology is generally considered to be the primary driver of wetland formation and persistence (Kentula *et al.*, 2011).

Water Quality Testing

For the larger wetlands where interventions are expected to create permanently and seasonally saturated conditions, surface water collection and laboratory analysis must be undertaken to inform water quality driver effects and trends. The sampling sites must be sampled twice a year during the wet and dry season.

10.3 Social Assessment

The Social Assessment Study was conducted by Urban-Econ.

10.3.1 Specialist Recommendations

Having read the document and its proposals, there will, in our opinion, not be a socio-economic impact for the area under consideration in our Cottonlands Industrial Park Socio-Economic Impact Assessment 2016 report as the project only comprises of an offset.

Based on the specialist recommendations a further re-assessment of our Socio-Economic Impact Assessment 2016 report for Cottonlands Industrial Park report will not be required. Please refer to **Appendix E** Socio-Economic study for full information.

10.4 Geotechnical Assessment

The Geotechnical Assessment Report was prepared by Aecom SA.

10.4.1 Specialist Recommendations

Innovative Solutions

Where materials encountered on site are considered to be unsuitable for reuse in platform construction, innovative solutions are necessary to promote the use of the poor quality material available across the precinct. The solutions that are considered as being potentially suitable are as follows:

- **Use of Geosynthetics**

The expected quantities of ‘poor quality’ soils within the DTP precinct has warranted the need to import better quality materials for fill and in the construction of embankments and platforms within each Portion. As an alternative, the existing poor quality residual soils (it is, however, specified that these soils should have less than 15% of the particles less than 0.075mm (clays and silt)) on site may be considered for use provided that they are used together with geosynthetics which improves the ‘performance’ of the reinforced soil structure for

embankment and platform construction. Geosynthetics placed at varying intervals within the soil layers of the embankments and platforms improves the tensile properties of a soil structure as a whole and improves the mechanical properties of the soil structure ensuring the stability and integrity of the reinforced soil structure.

- **Stabilization**

Stabilization of the excavated poor quality materials on site may render these materials suitable for reuse in fills and for embankment construction. The options considered for stabilization include the following:

- **Blending**

Blending is the mixing of good quality soils from either commercial sources or borrow materials with lower quality soils from site to provide an acceptable soil for use as fill material. The success of the blend is dependent on the properties of the two source materials. The blending and reuse of the poorer quality material is considered an alternative solution to the spoiling of the large quantities of unsuitable material. Blending is considered to be a cost effective solution that improves the quality and strength of the poor quality materials and may thereafter be used for fills, embankment and platform creation. Natural poor soil mixed with granular good quality material has been used in construction of base and subbase layers within pavements. This form of stabilization can obtain a well-proportioned mixture of particles with continuous gradation (well graded) and the desired plasticity. The granular particles form the ‘skeletal’ structure while the finer soils generally provide cohesion and ‘cementation’.

- **Chemical Stabilization**

Cementitious and chemical stabilization is a form of ground improvement with the aim of improving the strength and deformation characteristics of soils. Natural soils can be stabilized with cementitious materials which include lime, cement, fly ash, bitumen or a combination of these. These chemical stabilizing options can improve certain properties of the soil to make the soil suitable for engineering purposes. The common binders generally form cementitious composite materials when in contact with water or in the presence of pozzolanic (organic) minerals. Given the varied properties of soils, it is critical to select the correct binding agent and the correct quantity of binding agent. It is recommended that the properties of the treated material comply with specific requirements to ensure adequate strength and durability. For successful stabilization, laboratory and field tests will be required in order to determine the

engineering properties of the stabilized material. The quantity of binding agent is based on that required to achieve the specific standard for the fill material. Laboratory strength tests (UCS and ITS) will be necessary of the soils with different binder content. The binder content versus the strength curve indicates the quantity of stabilizer required to achieve the desired material.

- **Compaction**

Platforms designated for structures with light loads can be constructed with the naturally poor quality material excavated on site that are predominantly sand, however, are not considered to classify as a G10 material. The lightly loaded structures proposed on these platforms may be constructed on a concrete raft or cellular raft and designed to accommodate a certain degree of settlement. Compaction will be essential to improve the strength and reduce settlement of these platform embankments constructed of poor quality material. The durability and stability of a soil embankment is influenced by the compaction of the materials within the embankment. Compaction affects the settlement, shear strength, movement of water and volume change of the soil structure. The advantages of compaction are that it reduces settlement as it leads to densification through rearrangement of the soil particles closer together. In general course grained soils are desirable for fill construction, while the fine grained soils are less desirable. It is recommend that the predominantly sandy soils that are considered to be of poor quality (less than a G10) may be considered for use as fill material provided that adequate compaction can be undertaken to improve the density and strength of the soil and that the platforms constructed of the poorer quality soils are restricted to lightly loaded structures only. Please refer to **Appendix E** Geotechnical study for full information.

10.5 Geohydrological Assessment

The Geo-hydrological Assessment Report was prepared by GCS and Icebo Environmental Projects.

10.5.1 Specialists Recommendation

Phase 1 monitoring

From the risk assessment undertaken, it is anticipated that the vadose zone, non-perennial streams; and the Mdloti River are the potential receptors of pollution which may enter the wetland systems from construction activites. During the construction phase, water and soil monitoring should focus on active rehabilitation areas and heavy machinery used during the rehabilitation / construction phase. Regular visual inspections of active rehab areas and heavy machinery traffic areas need to be undertaken. Moreover, placement and monitoring of drip

trays underneath parked construction vehicles will help to determine which vehicles need to be repaired / taken off-site to prevent contamination while in service.

Sampling upstream and downstream in the non-perennial streams will help to determine if the activity is impacting the surface water quality.

Phase 2 monitoring

Due to the absence of groundwater users in the project area, only surface water quality monitoring is proposed. Moreover, the aim of the wetland offset is to improve the ecology of the area which is bound to have positive effects on the shallow groundwater occurrences in the area. In terms of long-term monitoring, only surface water quality monitoring is proposed.

However, as proposed by Edwards and Maharaj (2018) for larger wetlands where interventions are expected to create permanently and seasonally saturated conditions, water table depth monitoring must be undertaken to confirm soil saturation conditions. This can be achieved by installing several piezometric monitoring boreholes (up to 3 metres) at strategic points within key wetlands.

Monitoring duration

In terms of monitoring duration, it is proposed that monitoring take place up to 1 year after the completion of the development. If no impact is observed, monitoring of the site can be reconsidered by the local environmental authorities or DWS representative.

Monitoring responsibility

It is proposed that the landowner or developer, be responsible for Phase 1 and Phase 2 monitoring. GCS developed a surface water monitoring plan as part of the hydrological assessment undertaken for this project (GCS, 2019). The proposed monitoring points are tabulated in **Table 5.** The spatial distribution of the sites are indicated in Figure 3. Please refer to **Appendix E** Geohydrological study for full water monitoring specifications.

Table 5: Surface Water Sampling Sites (after GCS, 2019)

Site	Co-ordinates (Decimal Degrees)	Monitoring (during construction)	Monitoring (post construction)
1	29.33226 S 31.30024 E	Weekly	Bi-annual
2	29.33046 S 31.30143 E	Weekly	Bi-annual
3	29.33148 S 31.30213 E	Weekly	Bi-annual
4	29.64188 S 31.07058 E	Weekly	Bi-annual
5	29.64120 S 31.07799 E	Weekly	Bi-annual
6	29.64704 S 31.09178 E	Weekly	Bi-annual

7	29.63139 S 31.07855 E	Weekly	Bi-annual
8	29.62632 S 31.07739 E	Weekly	Bi-annual

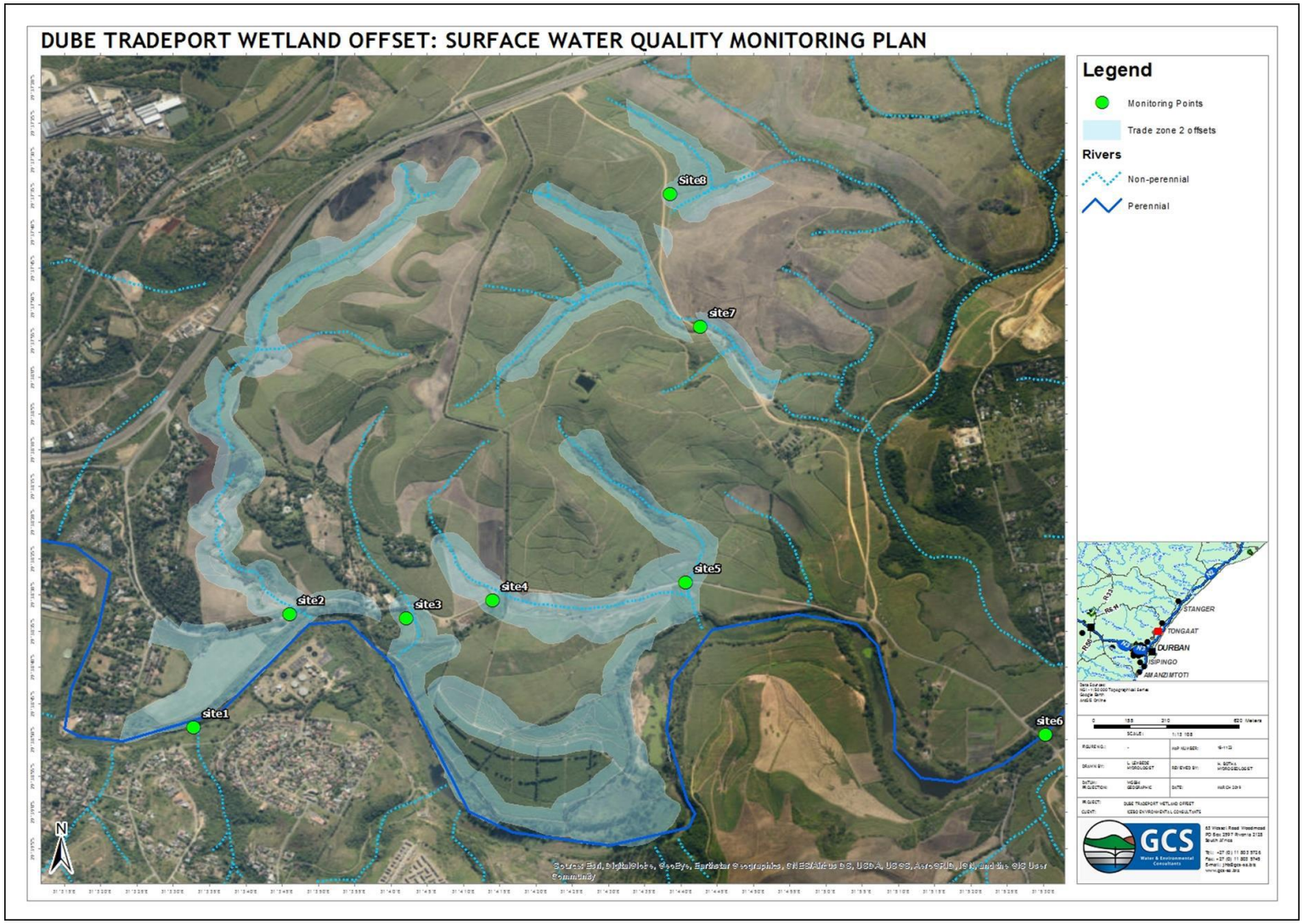

Figure 3: DTCP Zone 2 – Proposed water monitoring network.

10.6 Hydrological Assessment

The Hydrological Assessment Report was prepared by GCS and Icebo Environmental Projects.

10.6.1 Specialists Recommendation

Water samples were taken at six (6) sites (Refer to Hydrological Assessment, page 12 in Appendix E for map showing the six sites**);** two sampling sites were dry (i.e. sites 4 and 8) (see Figure 6-1). Water quality results obtained from samples were compared against the Department of Water and Sanitation (DWS) South African Water Quality Guidelines (SAWQ) for aquatic ecosystems (DWA, 1996a) (See Table 6-2). Where the Aquatic Ecosystem guidelines could not be applied, the general and domestic guidelines were applied instead.

The main risks identified during the construction phase include soil erosion and sedimentation as a result of the proposed rehabilitation activities. The operational phase is anticipated to have positive impacts due to the ability of the wetlands to capture and contain excess sediments and nutrients and the ability to attenuate peak runoff and streamflow regulation.

Weekly water quality monitoring is recommended during the construction/establishment phase of the rehabilitation strategy and bi-annual sampling thereafter. It should be noted that baseline data may have seasonal fluctuations, with greater pollution expected during periods of low flows. This is caused by low stream flows which may reduce the assimilative capacity of the stream.

It is recommended that sample site 6 within the uMdloti River be moved closer to the offset project site if possible, to exclude the impact of sand mining at this exit point. This will provide a more accurate picture of the wetland offsets impacts rather than the cumulative impacts which may be added on by sand mining activity taking place upstream of site 6. A limitation of this study was lack of access to upstream points due to steep river banks in site 6.

The main risks identified during the construction phase include soil erosion and sedimentation as a result of the proposed rehabilitation activities. The operational phase is anticipated to have positive impacts due to the ability of the wetlands to capture and contain excess sediments and nutrients and the ability to attenuate peak runoff and streamflow regulation.

Erosion control measures must be implemented in areas sensitive to erosion. These have been detailed in (Eco-Pulse & GroundTruth, 2018) and include revegetation of target areas, use of

plugs or sods for rapid establishment on valley floors, the use of concrete weirs to deactivate head cut erosion and to act as control structures at the outlets of the wetlands.

10.7 Heritage Impact Assessment

The Heritage Impact Assessment Report was prepared by Active Heritage cc.

10.7.1 Specialists Recommendation

A first phase heritage survey of the proposed DTP Cottonlands Industrial Park identified three heritage sites in the project area. These include the Armstrong's Pumphouse (a listed heritage site), some outbuildings, and a dam wall. Various other homesteads older than 60 years occur on the periphery of the project area but these are not threatened by the proposed development. It is proposed that a buffer zone of 30m be maintained around all these identified heritage sites. Should the developer wish to alter or destroy these sites then a phase two heritage impact assessment, by a built heritage specialist, must be called-for. There is no archaeological reason why the development may not proceed on the remainder of the project area, including both alternative bypass road options, as planned. Attention is drawn to the South African Heritage Resources Act, 1999 (Act No. 25 of 1999) and the KwaZulu-Natal Heritage Act (Act no 4 of 2008) which, requires that operations that expose archaeological or historical remains should cease immediately, pending evaluation by the provincial heritage agency.

11. ENVIRONMENTAL IMPACT STATEMENT

The long-term positive effects for both ecological and socioeconomic aspects outweigh the short-term negative impacts related to the construction phase. This is to be expected for the process of wetland rehabilitation. None of the impacts related to the construction phase are expected to last longer than construction, provided that mitigation, and where mitigation involves monitoring, is carried out effectively, and where required, regularly. Impacts related to the construction phase are generally Low to Moderate in significance without mitigation, and generally Low to Negligible with effective mitigation. The impact on socio economics however, is anticipated to be positive and even more positive with mitigation due to the creation of jobs, dissemination of skills and support of local business. Impacts anticipated for the operational phase are expected to be generally positive, the result of which justify the proposed rehabilitation. These impacts are generally positively Moderate without mitigation and positively Substantial with mitigation. More importantly perhaps, is that operational phase impacts for the No-Go option are generally Moderately to Substantially negative as ecological deterioration is expected to continue without intervention. Rehabilitation efforts are expected

to improve wetland habitat, services and overall ecological resilience and integrity, as well as empower some of the local community.

12. EAP RECOMMENDATION

1. The management of the proposed activities must adhere to the mitigation measures outlined in the Environmental Management Programme (EMPr) included in the BAR.

2. The management of the proposed activities must adhere to the management and mitigation measures outlined in the site-specific Wetland Rehabilitation Plan (WRP) of which must be read together with the BAR.

3. The management of the proposed activities must adhere to the management, monitoring, maintenance, evaluation and reporting measures outlined in the Management and Monitoring Plan (Included in the WRP) of which must be read together with the BAR.

4. Vegetation will be trampled to access sites and removed in demarcated areas to facilitate construction. Both disturbance and removal must be strictly controlled and minimised to as small an area as is required.

5. Site demarcation to follow accepted best practice and to be done by a suitably qualified person before the construction phase.

6. Aggregates and construction materials brought to site should be laid down in pre-construction demarcated areas outside of the wetland boundary or on Geo textile to minimize footprint and impact.

7. Area to be trenched must be clearly demarcated before commencement and activities confined to these areas. Trenching to be done by hand (i.e. with pick and shovel) and not by heavy plant (such as TLBs).

8. The timing of trenching is to be co-ordinated such as to not have open trenches for long periods of time, and where possible is to proceed in the non-rainy season.

9. The top 300mm layer of wetland soil is to be kept separate from other substrates for reuse after construction. Soil will be replaced on top, post construction to promote revegetation within the wetland.

10. Should distinct layering be present in sub-soils, these different soil types must be stockpiled separately and not mixed with different types. Replacement of sub-soil must be in reverse order

of when they were excavated and be as close to the original as possible in both layering and compaction. Compaction when replaced is to be done by hand using stampers or wackers.

11. Backfilling of the earthworks must make use of material removed from the same site and layering must reflect pre-disturbance structure. The use of foreign material is not permitted.

12. Aggregates brought to site for construction purposes must be screened for alien plant species propagules and discarded if these are present.

13. After completion of the Works the site should be monitored for the presence of alien plant species and managed if present.

14. Woody species are to be sawn off at ground level by hand (saws or chain saws) and spot-poisoned with a pre-approved toxin. Soil profiles should not be disturbed. Plant material is to be removed from site. Annual weeds are to be mown (with for example a weed eater) in order to prevent successful reproduction i.e. mowing is best done during peak flowering.

15. Design specifications must be strictly adhered to, especially with regards to mixing proportions, concrete strengths and tie-in depths and lengths. Backfilling around constructed interventions should be compacted by hand (stampers or wackers) to pre-construction conditions.

16. Backfilling upstream of constructed interventions is particularly important and should be revegetated using the top layers of plant-containing soils from the site.

17. Ensure that all employees are aware of the potential for fires and the damage that could be caused.

18. Smoking and cooking to be prohibited on site and must take place at designated times at designated sites that have been approved as fire safe. Ensure that a fire response procedure is in place and that all dry season work is organized in liaison with the landowners so that it fits into their firebreak/fire protection programme.

19. All mixing of mortar or concrete to take place in mixing trays with underlying plastic as well.

20. Contaminated water is not to be discarded on site, into the wetland or into the channel. All waste and excess material is to be removed from site daily and dumped at a pre-determined site specifically for this purpose.

21. All site employees to undergo environmental induction training.

22. The EMPr must be followed with regards to sanitation facilities, waste management, noise and site management.

23. Consult with landowners and the local community to ensure that they are aware of, and educated in, the ecological values and sensitivity of the wetland environments, as well as the exact location of the intervention structures to be implemented.

24. Structures must be monitored annually and after large floods or rainfall events to check for undercutting or erosion associated with the structure. Any sign of erosion or destabilisation must be rectified immediately. Consultation with the design engineer is encouraged.

25. I also recommend that this project be approved by the Competent Authority (the DEA) so as to ensure that wetlands are restored and also to fulfil the TradeZone 2 EA conditions.

13. CONCLUSION

By implementing the proposed rehabilitation interventions, Dube TradePort Corporation will rehabilitate approximately 44.19ha of wetland and riparian areas which will contribute to improving the ecological functioning and subsequent delivery of ecosystem services to downstream users. In addition to the ecological benefits, local communities will benefit in job opportunities through the construction of the proposed interventions, which will contribute to the improvement of the local economy. Overall, a gain of 11.43 functional hectare equivalents is predicted to occur as a result of the successful implementation of the rehabilitation plan. The majority of the gains (90%) will be achieved by the rehabilitation of the valley bottoms and seeps, in particular where the drains and channels within these wetland types are proposed to be plugged, backfilled and reshaped as per the plan.

In addition, the gains in riparian zones is predicted to be relatively low (5% of overall gains) considering that flows through riparian zones are largely channelled with very low residence times, most riparian zones are steep, there are limited opportunities to improve bank overtopping frequency, and bank vegetation, although highly invaded, is generally present. A gain of 29.1 habitat hectare equivalents is predicted to occur as a result of the successful implementation of the rehabilitation plan. Relatively similar gains will be achieved for valley bottom wetlands, seeps and riparian zones. It is also important to note that the rehabilitation of

the 50m buffer will contribute 9.7 habitat hectare equivalents to the overall gains, which is measurable (33.3%). This project is of high significance also, as it was approved as part of the Environmental Authorisation. It is therefore, recommended that this project be approved.