TRANSNET

SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENT

Scoping and Environmental Impact Assessment for the proposed Manganese Export Facility and Associated Infrastructure in the Coega Industrial Development Zone, Port of Ngqura and Tankatara area

DRAFT EIA REPORT

CHAPTER 9:

AQUATIC ECOLOGY IMPACT ASSESSMENT

Summary

This study was initiated with the aim of conducting an assessment of the potential water bodies (wetlands, rivers and the estuary) that could be impacted upon by the various components required for the proposed development of the Manganese ore export facility at the Port of Ngqura and adjacent Tankatara farm. The project components will extend into the back areas of the Coega Industrial Development Zone (IDZ) within an area that contains small drainage lines and wetlands such as the Coega Bontveld endorheic depressions. The assessment will also form part of the Water Use License Application (WULA) required by the National Department of Water Affairs.

The study site is located approximately 25 – 30 km north of the Port Elizabeth CBD, located near the Coega River. The Majority of the development falls within the Quaternary catchment M10C. The proposed development will have a direct link to the Coega Estuary. Several aquatic systems are known within the site and include watercourses (drainage lines), rivers, pans / depressions (natural & modified) and the highly modified Coega Estuary. The water bodies and wetland areas have therefore been assessed using the National Wetland Classification System, which does allow for categorisation of wetland areas within river channels and drainage lines (SANBI, 2009).

During this investigation it was found that the greatest number of impacts would occur due to the construction of the Compilation Yard, the Railway Doubling and the new road bridge of the Coega River, with regard to the physical disturbance of wetlands and water courses. The remaining project components such as the overland conveyor and stockyard would have no to limited impact on the aquatic environment. Most of the impacts would also occur within the construction phase, i.e. habitat or catchment changes, with only a few impacts occurring during the operational or decommissioning phase.

Eight potential impacts were identified, during this assessment. Seven of these impacts relate to the construction phase, i.e.

- The potential loss of wetland habitat (physical destruction)
- The potential loss of riverine habitat (physical destruction)
- Potential changes to the hydrological regime (impeding or diverting flow)
- Potential impact on water quality and risk to the aquatic environment (riverine and estuarine)
- Loss of ecosystem services
- Aquatic habitat fragmentation
- Potential loss of aquatic Species of Special Concern (Aquatic vegetation)
- Erosion and sedimentation.

Four impacts would persist into the operational phase, i.e. potential changes to the hydrological regime (impeding or diverting flow); Potential impact on water quality and risk to the aquatic environment (riverine and estuarine); Loss of ecosystem services and Erosion and sedimentation. These same impacts would remain should the project be decommissioned. All impacts, based on the author's knowledge of the project and the surrounding environment, were assessed with a high degree of confidence.

The compilation yard Alternative 1 (preferred layout) is preferred in terms of impacts on aquatic ecology as it only impacts on one wetland which is already degraded and contained several modifications as a

result of bush clearing and the creation of livestock water areas (i.e. PES = D and EIS of this system is Low) and only a few wetland plants remain around the drinking troughs. The Alternative 2 layout for the proposed compilation yard would result in the loss of two relatively intact wetlands.

The greatest potential impacts (***high*** significance rating without mitigation) were related to the potential loss of wetland(s), habitat fragmentation and loss of ecosystem services. With the effective implementation of the recommended key mitigation measures, the residual impacts of the proposed development (considering the Alternative 1 layout for the compilation yard) are predicted be of ***low*** significance, with the exception of the loss of wetlands which is of ***medium*** significance with mitigation. The impacts ito of loss of wetland habitats, loss of ecosystem services and habitat fragmentation associated with the construction of Alternative 2 compilation yard would remain of ***high*** significance after mitigation.

The key mitigation measures recommended are as follows:

- All the demarcated wetlands that were considered intact (inclusive of the 50m buffers) should be avoided due the importance and uniqueness of the depressions observed in the study area.
- Note that it is also recommended to realign the proposed CDC access road (outside the scope of this EIA) and this recommendation should be forwarded to the Coega CDC for consideration in their future plans and proposals.
- With the exception of the Coega River crossing, any of the proposed culverts and or lattice bridges should be suitably designed so as not to impound any surface flows and any construction should be kept to a minimum in any of the demarcated water courses shown in Figure 9.4. The proposed Coega River bridge, will have beneficial impact on the river system, when compared to the current low level causeway, assuming that this causeway will be removed when the new bridge is constructed.
- No batching plants, vehicle refuelling or vehicle maintenance should occur within 32m of a water course or 50m from wetlands
- No laydown areas /construction camps or stormwater control dams/attenuation ponds should be placed within the 1:100 floodline

Further recommendations and monitoring guidelines include:

- Stormwater should be managed using suitable structures such stormwater control dams and attenuation ponds so that any run-off from the development site is attenuated. Although this has been incorporated into the proposed layout, Transnet must ensure that the effectiveness of these systems are monitored and that any remediation or improvement of these stormwater control systems take place immediately. Separation of clean and dirty streams must be adhered to with regard to stormwater management particularly around the stockyard.
- Silts and sedimentation should be kept to a minimum, through the use of the above mentioned structures and by also ensuring that all structures don't create any form of erosion. Stormwater should be managed using suitable structures such as swales, gabions and rock rip-wrap so that any run-off from the development site is attenuated prior to discharge.
- Silts and containments should be removed from the stormwater control dams and attenuation ponds on a regular basis in order to maintain the depth and capacity of the dams/ponds.
- Include mechanisms to minimise spillages and dust through the use of best practices for spill containment and dust suppression.

- Vegetation clearing should occur in parallel with the construction progress to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment.
- Only indigenous plant species must be used in the re-vegetation process. The species list mentioned in this chapter and the vegetation and terrestrial fauna chapter should be used as a guide
- All construction materials including fuels and oil should be stored in demarcated areas that are contained within berms / bunds to avoid spread of any contamination into wetlands or rivers. Washing and cleaning of equipment should also be done in berms or bunds, in order to trap any cement and prevent excessive soil erosion. These sites must be re-vegetated after construction has been completed. Mechanical plant and bowsers must not be refuelled or serviced within or directly adjacent to any river channel. It is therefore suggested that all construction camps, lay down areas, batching plants or areas and any storage areas should be more than 50m from the wetland or riverine areas.
- The spillage of oils / grease and any concrete / cement must be closely monitored during the construction phase and any spills should be cleared and disposed of correctly immediately.
- It is recommended that an Environmental Officer, with a good understanding of the local flora be appointed prior to the construction phase. The EO should be able to make clear recommendations with regards to the re-vegetation of the newly completed / disturbed areas, using selected species detailed in this and the terrestrial vegetation report.
- All alien plant re-growth must be monitored and should it occur these plants should be eradicated. Where any works (e.g. storm water control measures) near a wetland or river is required specific attention should be paid to the immediate re-vegetation of cleared areas to prevent future erosion of sedimentation issues.
- All relevant buffers mentioned in this report should be included into future designs and later engineering diagrams
- All the relevant CDC/ IDZ environmental specifications and the 2002 EIA Record of Decision conditions should be used as a guideline when Transnet develops their own environmental specifications

The following monitoring is proposed with regard the potential impacts on the aquatic environment:

- Monitoring of any spills, erosion of cleared areas or downstream sedimentation should occur on a daily basis, with any remediation being instituted immediately.
- Monitoring of any vegetated areas must take place at least every month during construction, and every three months during a maintenance period.
- Monitoring, which includes the cleaning and / or reinstatement of any erosion protection measures, swales and control/attenuation dams/ponds should occur on a biannual basis for the lifespan of the project by the developer.
- Transnet should also take into consideration the current CDC surface and groundwater water monitoring plans that are been conducted by SRK Consulting within a well-established monitoring plan. The monitoring sites and variables will also adequately cover this proposed development.

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TABLES AND FIGURES

CHAPTER 9: GEOHYDROLOGY

This chapter presents the Aquatic Ecology Impact Specialist study undertaken by Dr Brian Colloty from Scherman Colloty and Associates (SC&A), under appointment to CSIR, as part of the Environmental Impact Assessment for the proposed Manganese ore export facility and associated infrastructure in the Coega Industrial Development Zone, Port of Ngqura and Tankatara area.

9.1 INTRODUCTION AND METHODOLOGY

This study was initiated with the aim of conducting an assessment of the potential water bodies (wetlands, rivers and the estuary) that could be impacted upon by the various components required for the proposed development of the Manganese ore export facility at the Port of Ngqura and adjacent Tankatara farm. The project components will extend into the back areas of the Coega Industrial Development Zone (IDZ) within an area that contains small drainage lines and wetlands such as the Coega Bontveld endorheic depressions. This document as well as the remainder of the EIA, Environmental Management Plans and construction method statements will also be used as part of the Water Use License Applications where required, e.g. construction within a bed or bank of a water course.

9.1.1 Scope and Objectives

SC&A conducted a Present Ecological State (PES) assessment of the aquatic ecosystems within the development footprint as well as within a 500m radius of the site. The assessment will also form part of the Water Use License Application (WULA) required by the National Department of Water Affairs (DWA), which will be compiled by SC&A under one application for the project. The WULA application will be submitted after submission of the draft EIA report to account for feedback from DWA.

9.1.2 Terms of References

The following scope of work has been derived for the Aquatic Impact Assessment study:

- **Describe the affected environment and determine the status quo.** The existing environment must be described in terms of aquatic ecology within the proposed project area in conjunction with the likely occurrences within the project area for whatever reason such as habitat transformation etc. A description of the aquatic species composition and any potential protected, endangered or vulnerable species should be determined in conjunction with the irreplaceability value of the aquatic species composition. Species which may not necessarily occur on site, but which are likely to be impacted upon as a result of the proposed development must also be identified and described. Different micro-habitats must also be described as well as the species associated with those habitats. Vulnerable, endangered or threatened species must be identified and discussed. The assessment should be based on existing information, professional experience and field work conducted. The study will also include a delineation of surface water bodies and an assessment of any wetland areas given the presence of a number of the doline wetlands (small endorheic pans) associated with the Bontveld in the northern part of the site.

- **Provide a sensitivity map.** Sensitivity maps of the site indicating the presence of species or wetland/riverine ecosystems of special concern, "no-go" areas, as well as the identification of red flags or risks associated with the proposed project area must be outlined, and preferred areas for project implementation from an ecological perspective must be provided.

- **Gaps in baseline data.** Gaps in baseline data must be highlighted and discussed. An indication of the confidence levels must be given. The best available data sources must be used to predict the impacts, and extensive use must be made of local knowledge. Information derived from similar specialist studies conducted previously within the area should also be utilised (Refer to sections 9.1.5 and 9.1.6).

- Assessment of identified impacts, and potential cumulative impacts associated with the construction, operation and possible decommissioning phases of the proposed project. The potential direct, indirect and cumulative impacts of the proposed project on aquatic/wetland/riverine ecosystems based on the construction, operational and decommissioning phases of the proposed Manganese ore export terminal and associated infrastructure, must be assessed and evaluated according to the magnitude, spatial scale, timing, duration, reversibility, probability and significance (or any other criteria required by the CSIR). The cumulative impact on aquatic ecology likely to be generated as a result of the proposed project must be identified and assessed (e.g. loss of habitat and displacement etc.).

- **Assessment of alternatives.** Provide specialist input relating to the proposed stockyard layout, and siting of the conveyor and railway routings and associated infrastructure in terms of the aquatic environment.

- **Outline mitigation measures and management actions, as well as additional management guidelines.** Practical mitigation, monitoring and management measures with which to avoid/minimize any negative impacts and enhance the positive impacts of the proposed project on the aquatic ecology and wetland/riverine ecosystems in relation to the proposed project must be recommended and discussed. Any monitoring or baseline environmental studies required before the installation and operation of the project must be identified. The requirements that would need to be implemented as part of the proposed project EMP would also need to be identified, and an appropriate programme for such monitoring should be recommended. The findings of other similar monitoring programmes within the area should be mentioned in the interim.

- **Summarise residual impacts after mitigation.** An impact summary table must be provided, discussing expected impacts on the aquatic ecology and wetland/riverine ecosystems before and after mitigation. The expected significance of impacts after having undergone mitigation should be mentioned and compared to the significance of the same impacts prior to mitigation.

- **Indicate a monitoring programme.** The need for a monitoring programme must be discussed and if recommended a suitable programme must be proposed.

9.1.3 Approach and Methodology

This study followed the approaches of several national guidelines with regards to wetland assessment. These have been modified by the author, to provide a relevant mechanism of assessing the present state of the study systems, applicable to the specific environment and in a clear and objective means assess the potential impacts.

Current water resource classification systems make use of the Hydrogeomorphic (HGM) approach, and for this reason, the National Wetland Classification System approach was used in this study. It is also important to understand wetland definition, means of assessing wetland conservation and importance as well as understanding the pertinent legislation with regards to protecting wetlands. These aspects have been discussed in greater depth in the following sections, as they form the basis of the study approach to assessing aquatic impacts.

In summary the following approach was followed:

- A desktop biodiversity assessment of the study area. This covered the development footprint in relation to available ecological information related to wetland and riverine ecosystems functioning within the region.
- A map demarcating the relevant local drainage area of the respective wetland/s, i.e. the wetland, its respective catchment and other wetland areas within a 500m radius of the study area. This was used to demonstrate, from a holistic point of view, the connectivity between the site and the surrounding regions, i.e. the zone of influence.
- Maps depicting demarcated wetland areas delineated to a scale of 1:10 000, following the methodology described by the DWAF (2005), together with a classification of delineated wetland areas, according to the methods contained in the Level 1 WET-Health methodology and the latest National Wetland Classification System (2010).
- The determination of the ecological state of any wetland areas, estimating their biodiversity, conservation and ecosystem function importance with regard ecosystem services. (Note that this determination did not include avifaunal, herpetological or invertebrate studies; however possible habitat for species of special concern were commented on).
- Recommend buffer zones and No-go areas around any delineated wetland areas based on the relevant legislation, e.g. Eastern Cape Biodiversity Conservation Plan guidelines, NMBM Draft Bioregional Plan (SRK, 2010) or best practice.
- Assess the potential impacts, based on a supplied methodology (refer to Chapter 4 Section 4.8.1)
- Provide mitigations regarding project related impacts, including engineering services that could negatively affect demarcated wetland areas. Should the proponent require that wetlands be removed, feasible alternatives (i.e. offsets) will be recommended.
- Recommend specific actions that could enhance the wetland functioning in the areas, allowing the potential for a positive contribution by the project, e.g. useful of artificial wetlands in stormwater control.

9.1.4 Present Ecological Condition

To assess the Present Ecological State (PES) or condition of the observed wetlands and water courses, a modified Index of Habitat Integrity (DWAF, 2007) was used. The Index of Habitat Integrity (WETLAND-IHI) is a tool developed for use in the National Aquatic Ecosystem Health Monitoring Programme (NAEHMP), formerly known as the River Health Programme (RHP). The output scores from the WETLAND-IHI model are presented in the standard DWAF A-F ecological categories (Table 9.1), and provide a score of the Present Ecological State of the habitat integrity of the system being examined.

With regard wetlands, the author has included additional criteria into the model based system to include additional wetland types. This system is preferred when compared to systems such as WET-Health – wetland management series (WRC 2009), as WET-Health (Level 1) was developed with wetland rehabilitation in mind, and is not always suitable for impact assessments. This coupled with the degraded state of the wetlands in the study area, indicated that a complex study approach was not warranted, i.e. conduct a Wet-Health Level 2 and WET-Ecosystems Services study required for an impact assessment.

Table 9-1 Description of A – F ecological categories based on Kleynhans et al., (2005)

ECOLOGICAL CATEGORY	ECOLOGICAL DESCRIPTION	MANAGEMENT PERSPECTIVE
A	Unmodified, natural.	Protected systems; relatively untouched by human hands; no discharges or impoundments allowed
B	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.	Some human-related disturbance, but mostly of low impact potential
C	Moderately modified. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.	Multiple disturbances associated with need for socio-economic development, e.g. impoundment, habitat modification and water quality degradation
D	Largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred.	
E	Seriously modified. The loss of natural habitat, biota and basic ecosystem functions is extensive.	Often characterized by high human densities or extensive resource exploitation. Management intervention is needed to improve health, e.g. to restore flow patterns, river habitats or water quality
F	Critically / Extremely modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible.	

The WETLAND-IHI model is composed of four modules. The "Hydrology", "Geomorphology" and "Water Quality" modules all assess the contemporary driving processes behind wetland formation and maintenance. The last module, "Vegetation Alteration", provides an indication of the intensity of human landuse activities on the wetland surface itself and how these may have modified the condition of the wetland. The integration of the scores from these 4 modules provides an overall Present Ecological State (PES) score for the wetland system being examined. The WETLAND-IHI model is an MS Excel-based model, and the data required for the assessment are generated during the site visit.

Additional data may be obtained from remotely sensed imagery (aerial photos; maps and/or satellite imagery) to assist with the assessment. The interface of the WETLAND-IHI has been developed in a format which is similar to DWA's River EcoStatus models which are currently used for the assessment of PES in riverine environments.

9.1.5 Assumptions and Limitations

In order to obtain a comprehensive understanding of the dynamics of both the flora and fauna of both the terrestrial and aquatic communities within a study site, as well as the status of endemic, rare or threatened species in any given area, an assessment should always consider investigations at different time scales (across seasons/years) and through replication. However, due to time constraints a long-term study was not feasible and this study is therefore based on instantaneous sampling. Therefore the information contained in this study is based on the authors understanding of the area, having conducted several other studies within the Port of Ngqura and the Coega IDZ and surrounds and the site visit that was conducted on 20 April 2012.

It should be emphasised that information, as presented in this document, only has reference to the study area as indicated on the accompanying maps. Therefore, this information cannot be applied to any other area without detailed investigation.

Furthermore, additional information may come to light during a later stage of the process or development. This company, the consultants and/or specialist investigators do not accept any responsibility for conclusions, suggestions, limitations and recommendations made in good faith, based on the information presented to them, obtained from the surveys or requests made to them at the time of this report.

9.1.6 Source of Information

Relevant literature for e.g. South African Biodiversity Information Facility (SABIF), South African Bird & Herpetological Atlas Projects, relevant Red Data books, provincial ordinances and all systematic bioregional / conservation plans, were consulted. Particular attention was paid to the CBA 1 & 2 areas shown in the Eastern Cape Biodiversity Conservation Plan or ECBCP and important areas identified in the Draft Bioregional Plan for Nelson Mandela Bay (SRK Consulting, 2010).

SC&A also has access the geographic information that forms part of the latest National Freshwater Ecosystems Priority Areas (2011) Atlas being finalised by the CSIR.

The site visit in April 2012 coincided with a period of heavy rainfall and high temperatures, which aided the assessment, by promoting optimal growth requirements of the vegetation. Most animals associated with the observed aquatic habitats were also very active increasing the number of observations made.

Additional documents that were consulted included the following:

- Coega CDC Environmental Specifications, 2004
- CDC IDZ Water Quality Monitoring - Interim Report for August 2012 Monitoring (SRK, 2012)

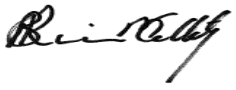
It should be noted that the available literature and thus understanding of the Bontveld endorheic pans, seen in this study is limiting. Thus little is known or understood on how these systems were formed or function within the landscape. Thus it is important to conserve these areas until they are better understood as they perform an important aquatic link between the Coega, Sundays and Swartkops Rivers.

9.1.7 Declaration of independence

The declaration of independence by the aquatic impact assessment specialist is provided in Box 9.1 below:

BOX 9.1: DECLARATION OF INDEPENDENCE FOR AQUATIC ECOLOGY IMPACT ASSESSMENT

I, Dr Brian Colloty, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed Manganese ore export terminal, Port of Ngqura, application or appeal in respect of which I was appointed, other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.



Name: Dr Brian Colloty
Ecologist (Pr. Sci. Nat. 400268/07) & EAPSA certified

9.2 DESCRIPTION OF PROJECT ASPECTS RELEVANT TO AQUATIC ENVIRONMENT IMPACTS

A detailed description of the project is contained in Chapter 2 of the EIA report. For the purposes of this report only the project aspects that will have an impact on the aquatic ecology within the study area are discussed.

Furthermore, when train lines or tracks are referred to in this report, it is implied that any construction will require the laying of track on rock or stone ballast, with the associated infrastructure such as service roads, cabling for signals as well as fences etc.

9.2.1 Proposed Manganese Ore Export Terminal

The proposed manganese ore export terminal will be located in Zone 9 of the Coega IDZ, north of the N2, connected via overland conveyor to a ship loading facility within the Port of Ngqura. Thus the major components of this facility will be the rail network (most already constructed) within Zone 9, a wagon tippler system and then the stockyard. These will be constructed within a highly disturbed portion of the site (brick yard discard and ash dump site).

An important part of the stockyard and Manganese ore export terminal will be the construction of two stormwater run-off control dams, one at the stockyard and one at the quay. These dams will be used to capture any contaminated surface run-off that will be re-used as part of the dust mitigation system. The control dam at the stockyard (Figure 9.1) has been designed in such a manner that most particles (silts) will be trapped, recovered and added to the stockpiles for export. The stormwater control dams will need to be cleaned at intervals to be determined during the operations (but anticipated to be very infrequent) and the material recovered from the dams will be disposed off at an appropriate landfill site.

All of these components have been located outside of the 1:100 year floodline and have been designed in such a manner that potential impacts on the aquatic environment are minimised. Similarly the rail and road crossings over the Coega River will use existing networks as far as possible, with only a new road bridge being required as part of the access road. This bridge across the Coega River is required to connect the stock yard to the remainder of the IDZ road network.

The proposed Coega River Bridge to access the proposed stockyard will be constructed using 6 x 7 m span SSE12 Superlite Armco culverts that are approximately 4m high. These will be separated in groups of 3 cells by several (11) smaller 1.5m pipe culverts (Type Armco KA1) in order to span Coega River floodplain.

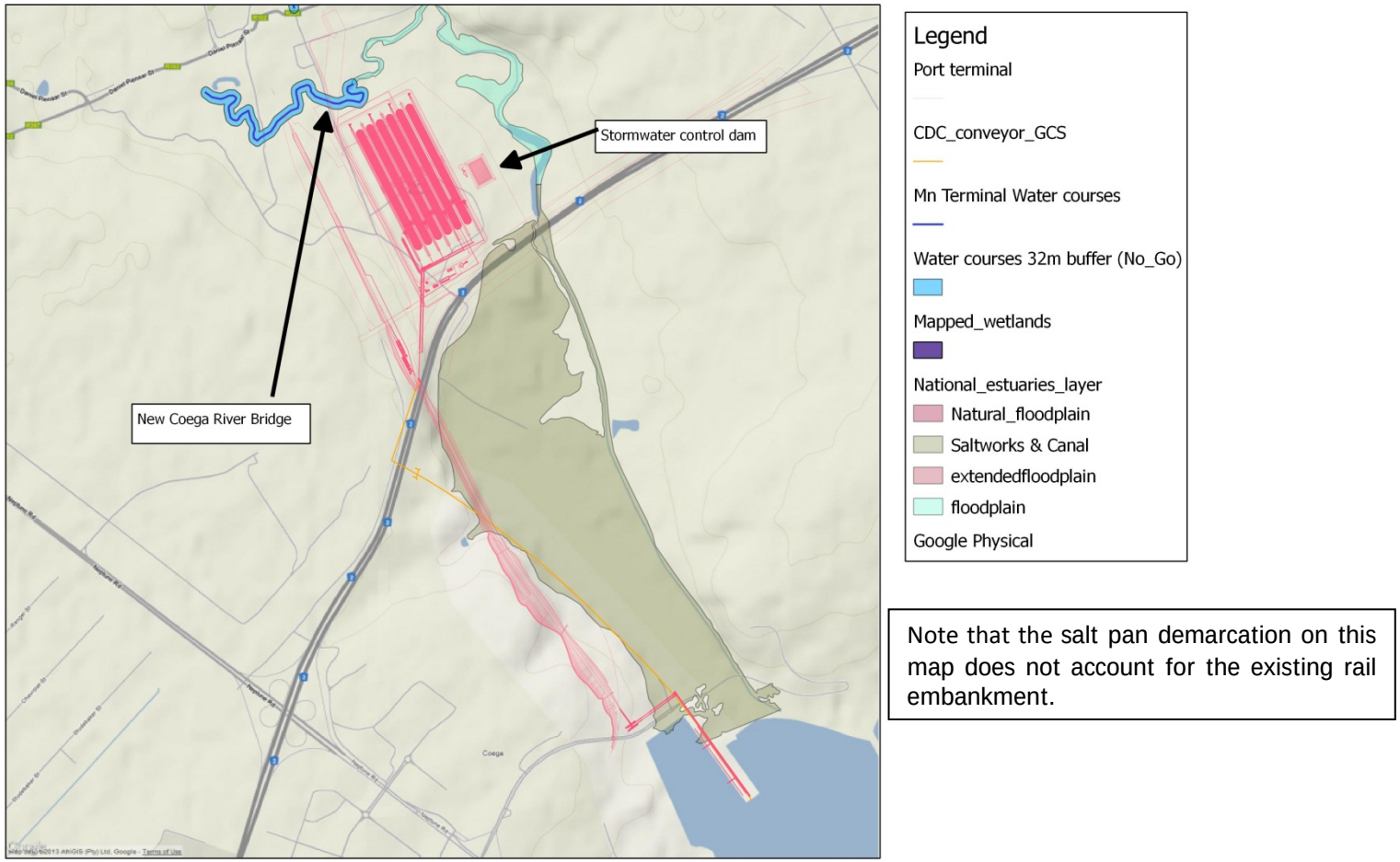


Figure 9.1: Locality of the stock yard and stormwater control dam in relation to the Coega Estuary floodplain, according to the CSIR National Estuary data

9.2.2 Proposed Compilation Yard and Doubling of Railway

The proposed compilation yard is mostly located within Zone 11 of the IDZ, with a portion being located on an adjoining farm, the remainder of Farm Tankatara Trust 643 (Figure 9.2). The compilation yard consists mostly of a rail shunting facility with an extended loop to allow for the handling of up to 200 wagon length trains. Due to the volume of trains anticipated, the rail network connecting the compilation yard and port areas, will require doubling, i.e. increase the number of train tracks (Figure 9.3).

Two alternatives for the location of the compilation yard (Figure 9.2) were selected based on a number of preliminary assessments to avoid any additional impacts on the surrounding Sundays Thicket and Bontveld areas and any known wetlands (depressions) within the study area (Pote, 2012). The compilation yard has the potential to cross several drainage lines and it has been proposed that these crossings will be constructed using mostly culverts or lattice type structures (refer to Chapter 2 Project Description, section 2.3.4).

Based on the supplied information, the overall project (rail and roads) will require a total of 36 culverts (Figure 9.4) of which 13 are already in place and most only requiring lengthening, while the remaining 23 will be new culverts. Only 6 of these new culverts are associated with delineated water courses or within the 32m buffer (Figure 9.4) and would thus require water use licensing. It has also been proposed that lattice structures be placed in two strategic areas within the compilation yard (refer to Chapter 2 Project Description, section 2.3.4).

In addition, two attenuation ponds (with a combined storage capacity of maximum 10 Ml) will be constructed at the rail compilation yard to collect all stormwater from this railway area. These stormwater ponds will be constructed in such a manner so as to recreate natural wetland depressions, which could have a positive effect by the project. These types of stormwater ponds are also known as Sustainable Urban Drainage Systems (SUDS).

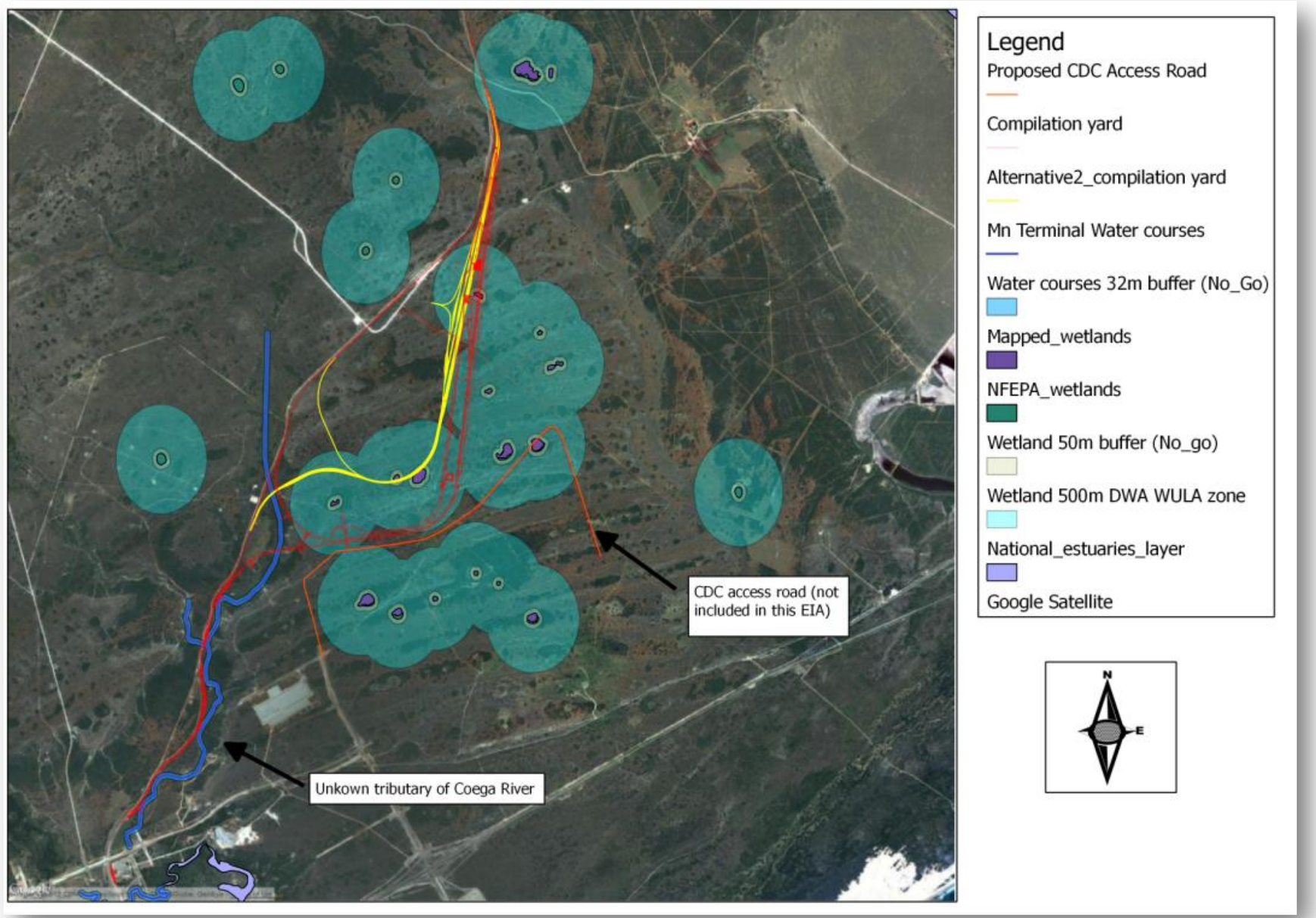


Figure 9.2: ***Locality of the compilation yard in relation to the observed depression. The respective 50 and 500m buffers are also indicated. The CDC road is a future proposed road and does not form part of this EIA.***

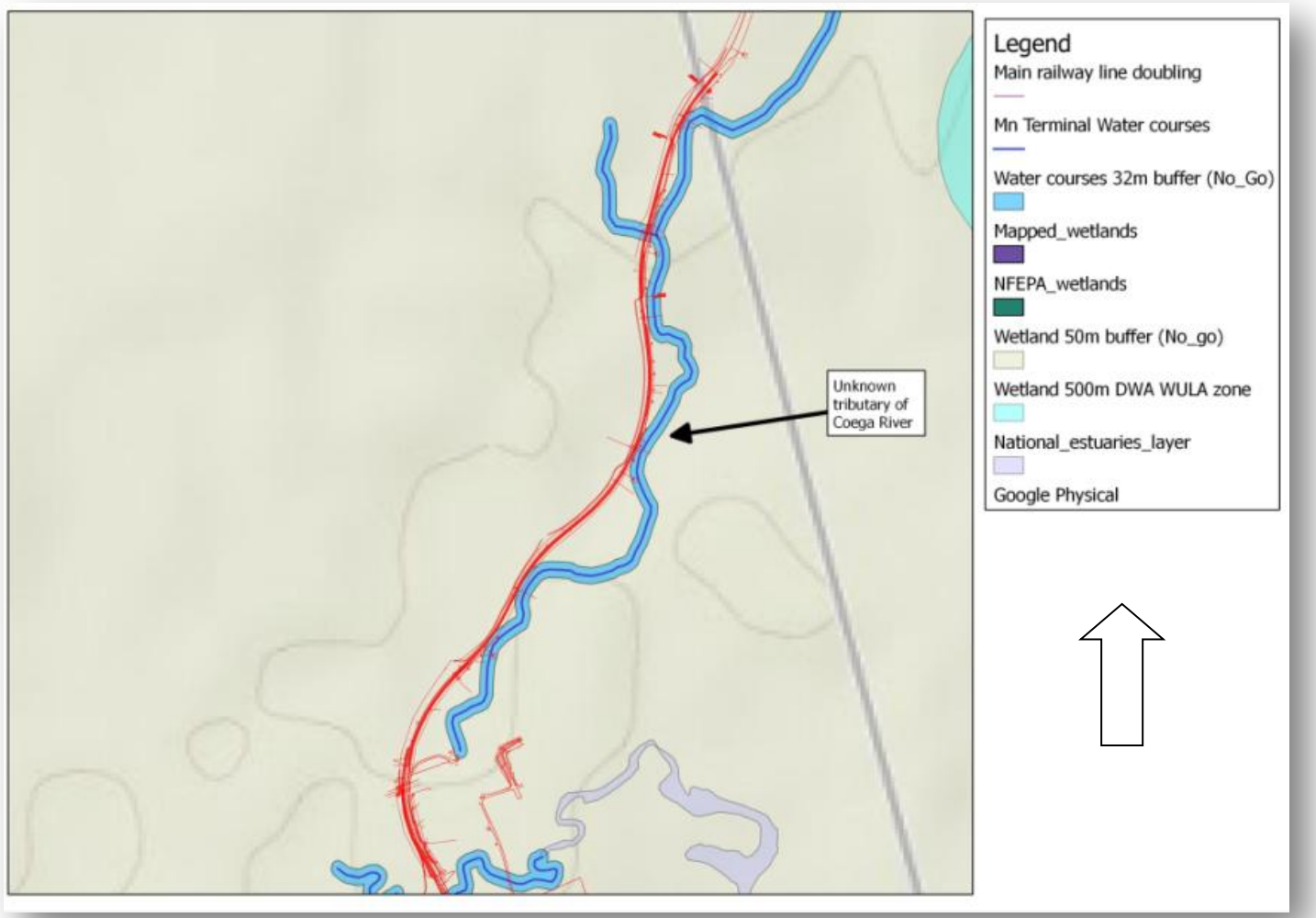


Figure 9.3: Locality of the proposed rail line area where doubling will occur in relation to the observed water courses with 32m buffer

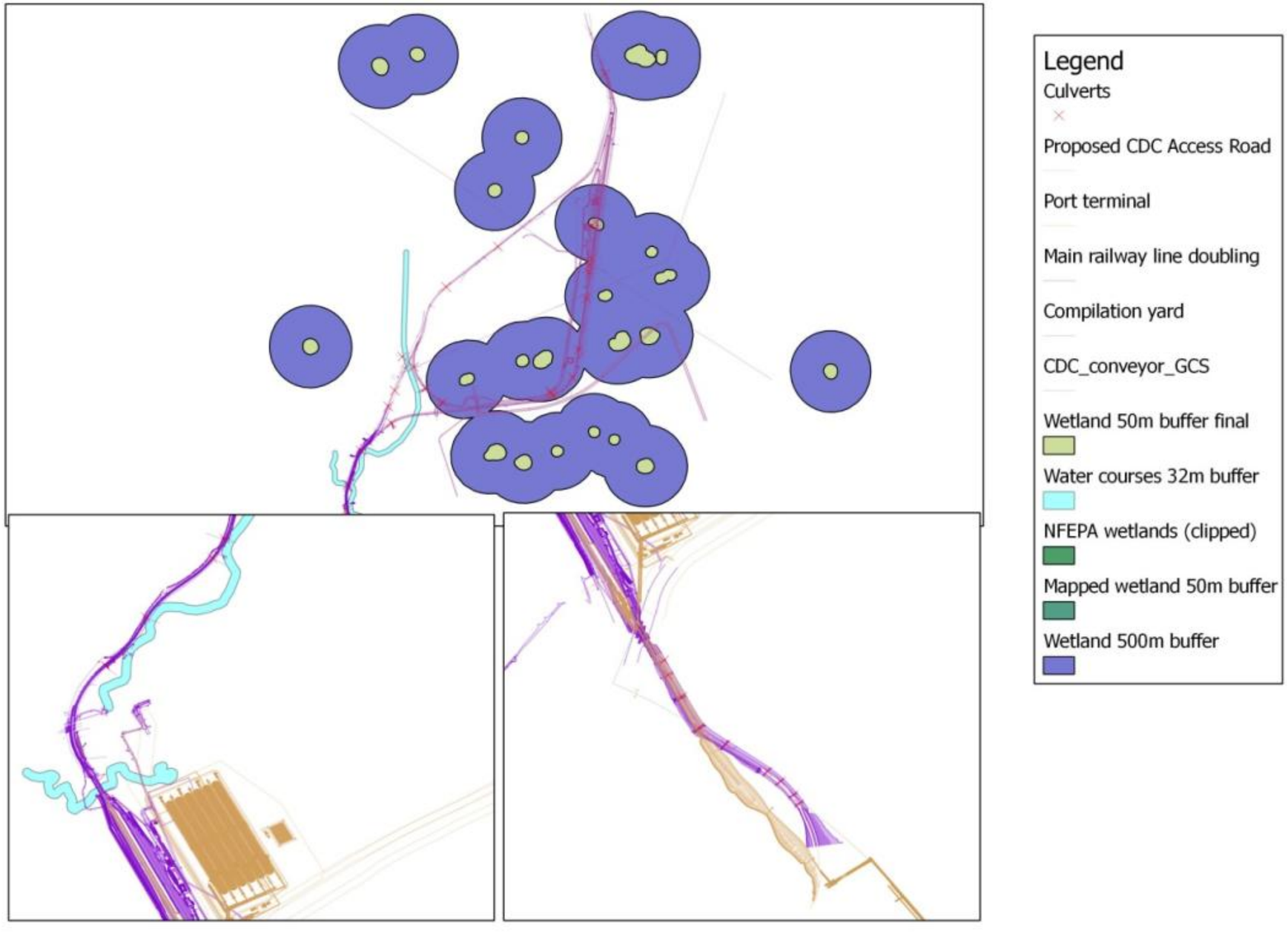


Figure 9.4: ***Localities of the various culverts discussed in the report, with the majority of the new culverts required in the Compilation and Rail Doubling areas of the project***

9.3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

The study site is located approximately 25 – 30 km north of the Port Elizabeth CBD, located near the Coega River. The majority of the development falls within the Quaternary catchment M30A. The proposed development will have a direct link to the Coega Estuary and the marine environment. The marine environment is dealt with in Chapter 10 Marine Ecology Assessment.

Several aquatic systems are known within the site and include watercourses (drainage lines), rivers, pans / depressions (natural & modified) and the highly modified Coega Estuary. These are discussed below:

9.3.1 Rivers and water courses

Two distinct water courses were observed within the study area. These included the Coega River and an unknown tributary. A dominant feature of the study area is the degree to which the lower portion of the Coega River has been modified, either through past flooding or anthropogenic modifications (roads, quarries, salt pans, brick yards and dumping sites). However this system retains some form of function, and the Present Ecological State in 1999 (Kleynhans, 2005) was B (Largely Natural) and now in 2012 (SC&A, 2012) was rated C (Moderately Modified) within the upper and middle reaches. Similarly the Ecological Importance and Sensitivity (EIS) of the Coega River would also be moderate, due to the degree of degradation already found within the system.

Present ecological state and importance

The unknown tributary was rated as high with regard to PES and EIS, as this system contained fewer impacts than those observed in the Coega River itself. The impacts were mostly related to cattle and informal crossings and bush encroachment. These impacts on the tributary reduce the habitat continuity and thus the PES was rated as A/B (mostly natural). The EIS was B, as the riparian zones are largely intact, however the importance and sensitivity is lowered due to the lack of surface flows, which limit the formation of any significant instream habitat.

9.3.2 Wetlands

Most of the wetland systems observed within the study area were consistent with what Marker and Sweeting (1983) identify as dolines (Figure 9.2 & Plate 9.1), or natural depressions, occurring in association with much larger polje type formations. According to these authors, poljes, which are effectively blind valleys, are initiated by fluvial incision and either later blocked by aeolian deposits or may have always drained underground. These systems are endorheic, having no surface inlet or outlets, i.e. enclosed, although are often associated with subterranean drainage to some extent. Well-developed soil profiles tend to form, acting to regulate surface water infiltration and drainage (Ford & Williams, 1989). This often results in ponding, sometimes spanning several months after rainfall events (Marker, 1996) and leading to the establishment of hydrophilic floral and faunal assemblages. Most dolines, resemble circular enclosed hollows, are the dominant karst landform throughout the region, and range size between tens of meters and up to 250m in diameter (Figure 9.2). Their distribution is typically associated with areas where the limestones are shallow, and underlain by impermeable strata which prevent vertical infiltration (Marker, 1998).

Those depressions associated with the Bontveld areas, such as those found within the study, will also contain elements of this vegetation type, and contain large numbers of plant species that are protected by provincial legislation. Typical protected species within the Coega IDZ include, with most being observed in this study:

- *Aloe striata*
- *Haworthia translucens*
- *Cyrtanthus clavatus*

- *Cyrtanthus spiralis*
- *Bergeranthus addoensis*
- *Bergeranthus longisepalus*
- *Bergeranthus scapiger*
- *Trichodiadema bulbosum*
- *Cotyledon orbiculata var. flanaganii*
- *Euphorbia globosa.*

Notably these are species listed in the CDC EMP & Environmental Specifications under species that require special consideration and will need the requisite permits for removal. Therefore the proposed Transnet Environmental Specifications, based on the CDC documents, should include these aspects, as well as the conditions set out in the 2002 IDZ Record of Decision (RoD).

Plate 9.1: An example of depression in close proximity to the consolidation yard, with well-established sedge/ hydrophilic grass communities

Present ecological state and Importance

The significance of these karst systems in terms of ecological processes in the region is poorly studied, As the extent of karst in South Africa is very small in relation to the total surface area of the country, these habitats are somewhat unique, suggesting that they may well perform specialised ecological functions.

The importance of small, 'isolated' wetlands as refugia for flora and fauna has been well established in other regions (Semlitsch & Bodie, 1998). In hydrological terms, aquifers in the carbonate rocks and Quaternary sands are important sources of water in the region, and dolines and blind river valleys contribute significantly to groundwater infiltration to these aquifers, which underlie the site (Marker & Sweeting, 1983).

A significant number of these systems were used as impoundments for water by farmers in the region, altering their hydrological regimes. On a large scale, this may eventually affect surface infiltration to aquifers, and can have deleterious impacts on wetland obligate amphibian and water fowl species, which require ephemeral waters for breeding purposes (Sexton & Phillips, 1986).

Due to the lack of obligate aquatic vegetation and any flows within these systems, standard Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) scoring systems could not be applied. However these systems form important corridors for between the upper Bontveld areas of the site and the Coega / Sundays river valleys, and any infrastructure within 500m of these wetlands (Figure 9.2 & 9.3), would require a Water Use License Application (Section 21 c & i). For this reason, all these depressions, based on professional opinion would attain a PES of B/C (Low to Moderate modification) and EIS of A/B (High conservation value).

9.3.3 Coega River and associated water courses

Due to the largely ephemeral nature of both the Coega River (and the tributary), and the steeply incised river banks, broad riparian zones are only within small areas where sedimentation has occurred allowing the formation of bars or small floodplains. Thus any facultative riparian trees are supported by deep water tables, accessed by their deep root systems. This riparian structure thus precludes the two systems found on site, from being defined as true wetlands (i.e. water table less than 50cm below the surface). Tree species dominance was limited to *Acacia karroo* (Sweet-thorn), *Ziziphus mucronata* (Buffalo thorn), *Rhus undulata*. Obligate hydrophytes are limited to small reed and sedges species found near the remaining pools or moist soils, which are maintained by the underlying aquifers (SRK, 2010) or behind impoundments such as low level bridges across the Coega River. Of interest is the salt marsh estuarine species such as *Sarcocornia perennis* and *Juncus kraussii*, found in the upper reaches of the river (near the R335 bridge) which are supported by brackish conditions as a result of the saline aquifers.

The tributary of the Coega River (Figure 9.2) is largely natural within the study site, but has been modified by a number of actions such as stormwater management features, road bridge crossings and diversion by quarrying activities near the confluence between the two study area systems.
Due to the ephemeral nature of these systems and the low aquatic habitat diversity (riffles, rapids and pools), sampling effort within the systems is low and thus very little long-term monitoring data exists on the fish and macro-invertebrate populations within the catchment. Past records are thus limited to four sites being collected by the Albany museum in 2002 and 2007 for respective EIA related projects with respect to aquatic macro-invertebrates (Albany Museum records, accessed 2012). The results showed a predominance of tolerant taxa, such as Simuliidae (Blackflies), Chironomidae (midges) and Ceratopogonidae (Biting midges). These groups thus indicate that the overall water quality of the Coega River in particular is erratic with a tendency to become saline (SC&A, 2010).

Fish data is also limited, with fish records remaining unchanged with regard species presence/absence since the 1980's (SC&A, 2010). Typical species found include two species of eel (*Anguilla mossambica* & *Anguilla marmorata*) and the freshwater mullet (*Myxus capensis*). It was indicated by Bok (2008) that alien vegetation, over abstraction of surface water and impoundments have significantly impacted on the distribution and abundance of fish in the Coega River. These impacts have thus restricted the presence of the Cape kurper (*Sandelia capensis*) to a single area within the river, several kilometres upstream of the study area. This species is endemic to South Africa, limited to Cape Floral Kingdom, with its northern most occurrence being the Coega River (IUCN, 2012).

Little is presently known about the overall water quality of the Coega River system other than long term data collected for the past 4 years at three sites by the Department of Water Affairs (DWA). The samples are only analysed for salinity and nutrient loads as this is pertinent to on-going issues within the upper catchment areas.

A potential impact is the possible contamination of the surrounding water bodies with Mn or Mn leachate. This is not anticipated directly from the Manganese ore itself as all reasonable precautions will be taken to prevent any spills and ensure a good housekeeping, however it is a potential issue to be addressed. Samples of ore taken from the existing export facilities underwent leachate testing and laboratory results are presented in Chapter 2 (Section 2.5) of the EIA. These results indicated that for the water based leachate test, levels of Manganese (Mn) leaching out of the Mn ore dust would exceed the DWA Target Water Quality levels (0.54 mg/l vs 0.18 mg/l). A Toxicity Characteristic Leaching Procedure (TCLP) test was also carried out (i.e. using NaOH and Acetic Acid as leachant) on the manganese ore dust samples and results showed that DWA Target Water Quality levels would be exceeded for both Mn and Cr (0.78 mg/l vs 0.18 mg/l and 0.03mg/l vs 0.007 mg/l for Mn and Cr respectively).

Present ecological state and Importance

The Present Ecological State of the Coega River has been determined on several occasions using several techniques, desktop as well as ground-truthed. The latest assessment is still in progress using a revised PES / EIS technique being developed by the Department of Water Affairs. Currently the Coega River is rated as "not intact" (SRK, 2010), i.e. having a PES of E/F, with a Recommended Ecological Category of D for the entire M30B quaternary catchment.

However the Ecological Importance and Sensitivity rating remains moderate (= D) as the Coega River valley remains an important ecological corridor between a large number of sensitive aquatic and terrestrial habitats within the region, and for this reason the NMBM conservation plans has earmarked this systems as an CBA 1 & 2 (SRK, 2010).

9.3.4 Coega Estuary

The Coega Estuary has been regarded as a transformed system due to the presence of the salt works and the development of the port. The system is now constrained to a narrow channel from the mouth of the system to the N2 Bridge, and shows little tidal variation due to this restricted connection between the marine and riverine environments.

Figure 9.1 also indicates that the proposed infrastructure, especially the stormwater control dam, will not be located within any portion of the Coega Estuary (i.e. located within terrestrial or highly degraded areas or within the current salt work operations).

The remaining natural ecosystems were thus limited to small Salt marsh communities that usually occur in protected estuaries and embayments along the South African coast. These communities play an important role in estuarine functioning by providing a unique niche for many estuarine invertebrates. Several submerged macrophytes and macroalgae such as the eelgrass Zostera

capensis are found in patches in the intertidal zone within the estuary. The macroalgal species *Cladophora sp*. and *Enteromorpha sp*. were present (Coetzee *et al*. 1996), indicating that the systems has a high nutrient status, slow water flow and fluctuating salinities (Lubke and Van Wijk 1988).

However due to past changes in the Coega Estuary, distinct zonation of the salt marsh along a tidal gradient is not evident and the steepness of the riverbanks possibly restrict the development of extensive salt marsh areas. Consequently the Coega estuary has a low faunal diversity (in terms of invertebrates and fish) and the remaining salt marshes are not utilised to the same extent as in more pristine estuaries. No unique or threatened species of invertebrate or fish are known to occur within the system.

Present ecological state and Importance

The Present Ecological State of the system was ranked by the DWA and various stakeholders in a recent study conducted by the CSIR (Van Niekerk & Turpie, 2012). Based on changes to the following parameters within all estuaries nationally, the biological state and Mean Estuary State was estimated:

- Hydrology
- Hydrodynamics
- Water quality
- Physical habitat
- Habitat State
- Microalgae
- Macrophytes
- Invertebrates
- Fish
- Birds

The results of all these parameters for the Coega Estuary were rated as POOR (i.e. in poor health or low to no abundance), and therefore the Biological State and Mean Estuary State was shown as POOR. This system was subsequently not listed as a priority conservation estuary and its importance and sensitivity were ranked as LOW (Van Niekerk & Turpie, 2012).

Marine and estuarine systems

Although no local guidelines on allowable limits are available, studies of the Port Elizabeth harbour have indicated that manganese and iron concentrations in the harbour seawater ranged from 0.7 to 16.8mg/l (Fatoki & Mathabatha, 2001). Should the wastewater limit values set by DWA for discharge of water into a water resource be used as a guide, then it would seem that both the general and special limit standards of 0.1 mg/l were exceeded within all samples taken. It should however be noted that these samples were collected within the marine environment and not at the discharge point and that accumulation in the marine environment may have occurred.

The interpretation of this section has been limited by the availability of data, in the correct format or relevant concentrations, thus several assumptions have been made with regard to the sampling and analysis techniques employed and the state of the element being measured. The ionic state has bearing on the degree that an element will dissolve in water and thus its level of bio-availability. This has bearing on the degree to which a chemical is toxic within the receiving waters.

9.4 IDENTIFICATION OF KEY ISSUES

For the **construction phase**, the following key issues were identified and are assessed below:

- The potential loss of wetland habitat (physical destruction)
- The potential loss of riverine habitat (physical destruction)
- Potential changes to the hydrological regime (impeding or diverting flow)
- Potential impact on water quality and risk to the aquatic environment (riverine and estuarine)
- Loss of ecosystem services
- Aquatic habitat fragmentation
- Potential loss of aquatic Species of Special Concern
- Erosion and sedimentation.

For the **operations phase**, the following key issues were identified and are assessed below:

- Potential changes to the hydrological regime (impeding or diverting flow)
- Potential impact on water quality and risk to the aquatic environment
- Loss of ecosystem services
- Erosion and sedimentation.

For the **decommissioning phase**, the following key issues were identified and are assessed below:

- Potential changes to the hydrological regime (impeding or diverting flow)
- Potential impact on water quality and risk to the aquatic environment
- Loss of ecosystem services
- Erosion and sedimentation.

9.5 APPLICABLE LEGISLATION AND PERMIT REQUIREMENTS

The following documents (amongst others) will be needed for a Water Use License Application (WULA) due to the watercourse crossings in the area as well as the project being within 500m of wetland areas, as required by the Department of Water Affairs (DWA):

- Water body delineation report supplied together with a desktop analysis and potential sensitivity identification
- Application forms for Section 21 (c) and (i) use. Note that the current Section 21 (c) and (i) General Authorizations (GAs) do *not* apply to the use of water within a 500m radius from the boundary of a wetland. Should construction within these boundaries be considered, *licensing* and not registration will have to take place.
- Supporting documentation in terms of the activity and applicant

The following activities associated with the development require a water use license, as stipulated by the legislation shown below:

- NWA (Act 36 of 1998) Section 21
  - ✓ Section 21 (a), abstractive use of water and storage. Any person or body storing water for any purpose in excess of 10 000 cubic meters or where the water area at full supply level exceeds 1 hectare in total on land owned or occupied by that person or body and not in possession of a permit or permission, e.g. the filter basins or reclamation ponds, potential abstraction of water from the Coega River for construction.
  - ✓ Section 21 (c) and (i) use, i.e. water course crossings by, roads, railways or additional infrastructure. This would include any infrastructure that is located within 32m of a delineated water course (Figure 9.1, 9.2 & 9.3, e.g. culverts) or 500m from a wetland (Figure 9.2).
  - ✓ Section 21(f), when **discharging waste or water containing waste into a water resource through a pipe, canal or other conduit.**
  - ✓ Section 21(g) – **disposing of waste in a manner which may detrimentally impact on a water resource**. The 500m wetland zone is shown in Figure 9.2, indicating which of the proposed infrastructure will require a Water Use Licence. The 50m No-go ecological buffer is also shown in Figure 9.2. Furthermore the pre and post development flood line areas must be defined by the engineering team as these will be requested by the DWA as part of the Water Use License process.

The following protected species within the Coega IDZ include, with most being observed in this study and will need the requisite permits for removal from the Provincial Authorities:

- *Aloe striata*
- *Haworthia translucens*
- *Cyrtanthus clavatus*
- *Cyrtanthus spiralis*
- *Bergeranthus addoensis*
- *Bergeranthus longisepalus*
- *Bergeranthus scapiger*
- *Trichodiadema bulbosum*
- *Cotyledon orbiculata var. flanaganii*
- *Euphorbia globosa.*

9.6 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

During this investigation it was found that the greatest number of potential impacts could occur due to the construction of the Compilation Yard and Railway Doubling with regard to the physical disturbance of wetlands and water courses. The remaining project components such as the overland conveyor and stock yard would have no to limited impact on the aquatic environment. Most of the impacts would also occur within the construction phase, i.e. habitat or catchment changes, with only a few impacts occurring during the operational or decommissioning phase. With regard to assessing proposed project description, and in the absence of any final designs for the culverts and bridges, the aquatic impacts were assessed as follows: i.e. with mitigation based on the recommendations made in this report.

9.6.1 The potential loss of wetland habitat (physical destruction)

The project footprint, with or without mitigation would result in the loss of one and two wetlands as a result of the construction of the Compilation Yard Alternative 1 and Alternative 2 respectively (Figure 9.2). The purpose of the 500m buffer shown in Figure 9.2 is to indicate where Water Use License Applications will be required. Note however that the proposed future CDC access road (outside the scope of work of this EIA) would also result in the loss of one wetland. It is therefore proposed that the alignment of these road structures be amended so that they fall outside of the proposed 50m buffer shown in Figure 9.2. This is particularly important as the wetland is largely intact (PES = C and EIS = High).

The wetland (Figure 9.2) that would be lost due to the compilation yard construction (Alternative 1) is already degraded and contained several modifications as a result of bush clearing and the creation of livestock water areas (i.e. PES = D and EIS of this system is Low) and only a few wetland plants remain around the drinking troughs.

Significance of impact
Therefore the significance rating associated with the loss of wetland habitat without mitigation is predicted to be **HIGH** (negative) for both compilation yard alternatives.

Mitigation and management
All the remaining intact wetlands (inclusive of the 50m buffers) should be avoided due the importance and uniqueness of the depressions observed in the study area on a regional scale (Figure 9.2 & 9.3). This excludes the degraded wetland area that would be lost due to the construction of the preferred alternative (Alternative 1).

Additional mitigations include the use of the two proposed Sustainable Urban Drainage Systems or SUDS. These will attenuate the stormwater runoff within the region, possibly replicating the potential wetland habitat (pans) found within the region. Furthermore, run-off should not be allowed to directly enter any natural wetland areas.

Therefore with effective mitigation (listed above), the residual impact of habitat destruction on the wetlands is predicted to be of **MEDIUM** significance for the preferred compilation yard layout (Alternative 1). The alternative compilation yard layout (Alternative 2) is found not acceptable in terms of the number and state of wetlands that would be lost (Figure 9.2). The significance of the impact associated with the loss of wetlands for the Alternative 2 compilation yard layout would therefore remain **HIGH** with mitigation.

Reversibility of impact and irreplaceable loss of resources
Without mitigation, the reversibility of the impact would be *low* and the irreplaceability of resources would be *High* should the two wetland areas be lost. With the effective implementation of recommended mitigation measures (i.e. avoid the intact wetland by re-aligning the proposed road), the reversibility and irreplaceability are predicted to be *low*.

9.6.2 The potential loss of riverine habitat (physical destruction)

Riparian and riverine corridors create longitudinal links between a variety of habitats and refugia. The refugia are particularly important in times when surface flows are low, i.e. fish populations are able to survive in deeper pools during droughts, and then colonise the remaining river reaches, when reconnected by increased river flows.

River crossings, and in particular culvert crossings disrupt both the instream and riparian continuity, both in terms of flows and physical habitat availability, especially if structures elevate the natural levels of the river bed. It is thus important for crossing design to incorporate these aspects with the aim of retaining instream and riparian continuity. This is not easily attained when using culverts, and thus bridges are always recommended

The project footprint could result in the loss of riverine habitat associated with the Compilation Yard and Rail Doubling (Figure 9.2 & 9.3), i.e. the culvert structures of the various crossings impact directly on the riparian vegetation and instream habitat (river beds and river banks) when these structures are placed across a defined water course or within 32m of the water course buffer. It has also been proposed that lattice structures be placed in two strategic areas that would decrease the impact of habitat fragmentation.

It is estimated that the design of the proposed bridge across the Coega River will allow for flow patterns to be reinstated when compared to the present low level causeway that restricts flows.

Significance of impact
The unmitigated impacts associated with the loss of riverine habitat during the construction phase is predicted to be **MEDIUM** as these habitats, although ephemeral, still function as aquatic habitats when surface waters are present within the water courses. Furthermore, the proposed Coega River Bridge is located within an area that forms the interface zone between the Coega River and the estuary.

Mitigation and management
- The footprints of all proposed bridge and culvert crossings must be kept to a minimum within the delineated water courses and their buffers, thus minimising the potential loss of instream habitat. The designated EO must carefully monitor this aspect during the construction phase of the project.
- Ensure that the longitudinal profile of the Coega River, following the construction of the bridge for the proposed access road, is close to natural with little or no impoundment resulting on the upstream side of the proposed crossing. This must also apply for any of the potential culvert crossings and lattice bridges for the remainder of the project and in particular the compilation yard.
- All erosion control / energy dissipation structures must be installed as shown in the proposed design provided by Transnet, i.e. reno mattress and suitable wing walls. This will minimise the potential for riverbed / bank erosion and downstream sedimentation, which also reduces the amount of available habitat. (refer to Chapter 2, section 2.3.2)

With effective mitigation, the residual impact associated with the loss of riverine habitat is anticipated to be of **LOW** (negative) significance, especially compared to the current state as assessed in this study for both the Coega River and its unknown tributary.

Reversibility of impact and irreplaceable loss of resources
Without mitigation both the reversibility of the impacts and irreplaceability of resources would be medium. If the mitigations are upheld, then no direct impacts are anticipated, thus the reversibility of the impact would be High, and the irreplaceability on resources would be Low.

9.6.3 Potential changes to the hydrological regime (impeding or diverting flow)

Due to the nature of the proposed development, such as railways, roads and buildings, it is anticipated that natural ground levels will be affected and surface water run-off would be impeded or diverted from reaching wetland and water courses within the site. However, where stormwater discharge does need to occur, surface water flows will be concentrated, thus increasing the flow velocities. The construction of the hard engineered surfaces thus results in a twofold impact leading either to the drying out of certain areas or the scour of other areas due to the increase flows and flow velocities.

Significance of impact
A greater degree of impact would be anticipated when culverts are incorrectly sized or alter the natural levels, and thus the unmitigated impacts for the construction and operations phases would be **MEDIUM.**

This would persist due to the changes to the landscape and would remain a **MEDIUM** impact without mitigation should the project be decommissioned.

Mitigation and management

- The footprints of all proposed bridge and culvert crossings must be kept to a minimum within the delineated water courses and their buffers thus minimising the potential loss of instream habitat. The designated EO must carefully monitor this aspect during the construction phase of the project.
- Use of box culverts to minimise disruption of surface water flow where the new railway line crosses water courses/drainage lines that feed into the Coega River. The 15 box culverts positions as identified by Transnet in the project proposal (Refer to Table 2.1 in Chapter 2) should be implemented.
- Ensure that the longitudinal profile of the Coega River, following the construction of the bridge for the proposed access road, is close to natural with little or no impoundment resulting on the upstream side of the proposed crossing. The concept bridge design as proposed by Transnet (Figure 2.10 in Chapter 2) should be implemented. This must also apply for any of the potential culvert crossings and lattice bridges for the remainder of the project and in particular the compilation yard.
- All erosion control / energy dissipation structures must be installed as shown in the proposed design provided by Transnet, i.e. reno mattress and suitable wing walls. (refer to Chapter 2, section 2.3.2)

With the effective implementation of the above mitigation measures, the residual impact on the riverine habitat due to changes in the hydrology regime associated with the proposed project is predicted to be of **LOW** significance when compared to the current state of the two area river systems assessed in this study.

Reversibility of impact and irreplaceable loss of resources
Without mitigation both the reversibility of the impacts and irreplaceability of resources would be Medium. If the mitigations are upheld, then no direct impacts are anticipated, thus the reversibility of the impact would be High, and the irreplaceability on resources would be Low.

9.6.4 Potential impact on water quality and risk to the aquatic environment

The manganese ore that will be exported is a complex of minerals or elements which contains, amongst others, Silicon, Calcium, Potassium, Sodium, Chromium and Iron within a stable bond. It has been reported that either through inhalation or ingestion (aquatic organisms), Manganese could be responsible for several kidney and neurological disorders amongst humans and animals. It should be noted that Manganese is a common element and is essential element in most organisms. Manganese will normally be present as soluble Mn^{2+} or in suspension in the form of hydrated oxides.

The current IDZ water quality program has shown that the baseline values for Chromium currently don't exceed the Department of Water Affairs target water quality guideline value of 0.008mg/l at all 11 monitoring sites. In the most recent survey (August 2012), Manganese exceeded the guideline limits of 0.1 mg/l at two sites, i.e. the Culvert A and the Gully sites, and the source is being investigated.

A Water based leaching test undertaken on Manganese ore samples taken at the existing export faiclities for this EIA, indicated that when exposed to water (ratio 1:5) for 18h, the Manganese concentration in the leachate is 0.54 mg/l. It should also be noted that other macro-elements found within the Manganese ore samples tested (e.g. chromium) may also exceed the DWA Water Quality Guidelines if leaching under particular conditions occurs (TCLP - 0.03 mg/l vs 0.008 mg/l for water based test). The chromium concentration found in the leachate for the Water based leaching test was below the DWA Quality Guidelines.

Impacts anticipated during the construction phase are mostly limited to the use of machinery / plant (oils & grease) and concrete within the water courses. During the operation phase, should any of the product spill from the wagons or dust from storage areas be allowed to enter any of the surrounding water courses (no mitigation), it is anticipated that certain levels of contaminants in the rivers and streams of the lower Coega system would increase. Given the above, during the operation phase, the potential impact does exist for both the Coega River and estuary to be contaminated with either direct or windblown contaminants, which could pose a threat to aquatic fauna. Without any mitigation several water quality guidelines could therefore be exceeded for both these environments by macro-elements that are toxic to organisms, i.e. not necessarily Mn but the associated elements found in the ore such as Chromium.

Significance of impact
During the construction phase, the overall significance of the potential impact of the proposed project on water quality and associated risk to the aquatic environment is predicted to be **MEDIUM** to **LOW** for the Manganese Ore Export Terminal and the Compilation yard/Rail doubling respectively (without mitigation).

Without mitigation measures in place, the overall significance of the impact during the operational phase is anticipated to be **MEDIUM** to **LOW** for the Manganese Ore Export Terminal/Rail doubling and for the Compilation yard respectively. The significance of this impact will remain **MEDIUM** to **LOW** without mitigation should the project be decommissioned due to the accumulation of potential contaminants over time.

Mitigation and management
- The spillage of oils / grease and any concrete / cement must be closely monitored during the construction phase and any spills should be cleared and disposed of correctly and immediately

- No batching plants, vehicle refuelling or vehicle maintenance should occur within 32m of a water course or 50m from wetlands (Figures 9.1, 9.2 & 9.3).
- No laydown areas or construction camps should be placed within the 1:100 floodline
- Separation of clean and dirty streams must be adhered to with regard stormwater management particularly around the stockyard
- Include mechanisms to minimise spillages and dust through the use of best practices for spill containment and dust suppression.
- Containment of polluted water within stormwater control dams and attenuation ponds that are located outside of any 1:100 floodlines.
- Silts and contaminants should be removed from the stormwater control dams and attenuation ponds on a regular basis, in order to maintain the depth and capacity of the dams/ponds. Any sediments (silt) captured by the silt traps will be put back on the stockpiles and material cleaned from the bottom of the dams/ponds will be disposed at an appropriate landfill site.
- Transnet should co-ordinate their efforts with the CDC / IDZ water quality monitoring plan in order to monitor the operational phase of the project. The current monitoring plan should adequately capture any potential issues based on the assessment of the current localities in relation to this project, i.e. downstream of any detention ponds or stormwater control features.
- Refer to the air quality specialist study (Chapter 5) for recommended measures to minimise dust deposition in the surroundings of the proposed development.

With effective mitigation in place, the significance of the impact of the proposed development on the water quality is predicted to be **LOW** during the construction and the operational phases**.**

During the decommissioning phase, the impact would be reduced to **LOW** if the mitigation in the construction and operations phases are upheld, i.e. minimise the original impacts on the aquatic environment and that all the rehabilitation, monitoring guidelines had remained in place during the operational phase.

Reversibility of impact and irreplaceable loss of resources
Without mitigation both the reversibility of the impacts and irreplaceability of resources would have a Medium significance. If the mitigations are upheld, then no direct impacts are anticipated, thus the reversibility of the impact would be High, and the irreplaceability on resources would be Low.

9.6.5 Loss of ecosystem services

This impact is linked to the physical disturbance of the wetland and riverine areas and would affect basic habitat function and ecosystem services such as surface flow attenuation (Water quantity issue) and surface flow filtration (Water quality - risk of surface water / groundwater pollution). Potential impacts posed by the development would be similar during both the construction and operational phases, due to the relationship between wetland disturbance (without mitigation) and the loss in the provision of ecosystem services (e.g. flood attenuation or biodiversity maintenance). Linked to this impact is the possible alteration of the habitats due to the potential changes in the local hydrology, i.e. increased flow of surface water flow due to stormwater management brought about by any hard surfaces.

Significance of impact
Without mitigation, the significance of the potential loss of ecosystems services within the study region would be rated as **HIGH** for the Manganese ore export terminal and the Alternative 2 of the compilation yard, i.e. loss of water course function and the two wetland areas and **LOW** for the doubling of the railway line and for the Alternative 1 compilation yard as the wetland potentially affected is already degraded.

Mitigation and management

- Ensure that, following the construction of the bridge, the longitudinal profile of the Coega River is close to natural with little or no impoundment resulting on the upstream side of the proposed crossing.
- All erosion control / energy dissipation structures should be installed as shown in the proposed design i.e. reno mattress and suitable wing walls.
- No stormwater should be discharged directly into any water courses or wetland areas and the use of Sustainable Urban Drainage (SUD) Systems as proposed is highly recommended.

With effective mitigation, the residual impact of the loss of ecosystem services associated with the construction and operation of the proposed development (with Alternative 1 of the compilation yard) is predicted to be of **LOW** significance. The significance of the impact associated with the loss of ecosystem services for the Alternative 2 compilation yard layout would therefore remain **HIGH** with mitigation.

Reversibility of impact and irreplaceable loss of resources

Without mitigation both the reversibility of the impacts and irreplaceability of resources would have a Medium significance. If the mitigations are upheld, then no direct impacts are anticipated, thus the reversibility of the impact would be High, and the irreplaceability on resources would be Low.

9.6.6 Habitat fragmentation

The permanent loss of any aquatic system would be seen as habitat fragmentation. The majority of mobile aquatic organisms require "stepping stones" to leap frog between their required habitats. The depressions play an important role in the landscape with regard to providing this type of refugia for mobile species. This impact would be categorised as a direct impact in the construction phase, as it would impact on the region with regard to habitat fragmentation.

Significance of impact

Due to the scale of the project footprint in relation to the observed water bodies, the potential for habitat fragmentation along the water courses would be significant without mitigation, i.e. **HIGH,** with the exception of the doubling of the railway line for which impacts associated with habitat fragmentation are anticipated to be of **LOW** significance.

Mitigation and management

- The footprints of all proposed bridge and culvert crossings must be kept to a minimum within the delineated water courses and their buffers thus minimising the potential loss of instream habitat. The designated EO must carefully monitor this aspect during the construction phase of the project.
- Ensure that the longitudinal profile of the Coega River, following the construction of the bridge for the proposed access road, is close to natural with little or no impoundment resulting on the upstream side of the proposed crossing. The concept bridge design as proposed by Transnet (Figure 2.10 in Chapter 2) should be implemented. This must also apply for any of the potential culvert crossings and lattice bridges for the remainder of the project and in particular the compilation yard.
- No stormwater should be discharged directly into any water courses or wetland areas and the use of Sustainable Urban Drainage Systems as proposed is highly recommended.

With mitigation, the residual impact associated with habitat fragmentations is predicted to be of **LOW** significance (for the entire proposed development with Alternative 1 compilation yard). The significance of the impact associated with habitat fragmentations for the Alternative 2 compilation yard layout would therefore remain **HIGH** with mitigation.

Reversibility of impact and irreplaceable loss of resources
Without mitigation both the reversibility of the impacts and irreplaceability of resources would be Medium. If the mitigations are upheld, then impact significance would be reduced thus the reversibility of the impact would be High and the loss of irreplaceable resources would be Low.

9.6.7 Potential loss of Species of Special Concern

No aquatic (Wetlands & water course) flora and fauna species of special concern were evident during the study. As a precautionary step, it is important that all wetland areas are retained and allowed to function, as a number of protected terrestrial plant species were seen in the areas surrounding the wetlands (Bontveld and Thicket) which are listed by the Provincial Nature Conservation Ordinance as protected.

Significance of impact
With or without mitigation, the potential loss of Species of Special Concern during the construction phase is predicted to be of **LOW** significance.

Mitigation and management
It is advised that the remaining wetland areas with a buffer of 50m be excluded from the development footprint, preventing any potential risk to the protected terrestrial plant species

Reversibility of impact and irreplaceable loss of resources
If the mitigations are upheld, then no direct impacts are anticipated, thus the reversibility of the impact would be High, and the irreplaceability on resources would be Low.

9.6.8 Erosion and sedimentation

Erosion and sedimentation are usually direct impact as a consequence to the changes in the hydrological regime when any hard engineered surfaces or structures are placed within a water course or wetland area. An increase in surface water flow velocities within the site could result in an increased risk of soil erosion and later downstream sedimentation. Should sediments eventually reach the downstream systems, this could have impacts on sediment loads, but also smother benthic habitats (plants and invertebrates). However the true significance is usually observed further downstream and most often away from the project area thus this impact could also be linked to other catchment impacts that occur upstream and downstream of the site.

Significance of impact
The significance of this impact is anticipated to be **MEDIUM** during the construction and the operational phases, due to the scale and locality of the proposed development. This remain a **MEDIUM** impact without mitigation should the project be decommissioned.

Mitigation and management

- During construction, erosion should be monitored while areas of vegetation are being cleared. Hard engineered surfaces that increase surface water run-off should be limited and a stormwater management plan should be developed for the operational phase (refer to Chapter 10 Integrated Water Management specialist study, Section 10.9. for further details).

- No stormwater should be discharged directly into any water courses or wetland areas and the use of Sustainable Urban Drainage Systems as proposed is highly recommended within the Compilation yard.

With effective mitigation (i.e. management of surface water run-off using a stormwater management plan), the residual impact associated with erosion and sedimentation during the construction and the operational phases is predicted to be of **LOW** significance. During decommissioning, the impact

would remain **LOW** if the mitigation in the construction and operations phases are upheld, i.e. minimise the original impacts on the aquatic environment and that all the rehabilitation, monitoring guidelines had remained in place during the operational phase.

Reversibility of impact and irreplaceable loss of resources
If the mitigations are upheld, then sedimentation and erosion should be limited anticipated both in the construction and operations phase, thus the reversibility of the impact would be High, and the loss of irreplaceable resources would be Low.

9.6.9 Cumulative impacts – habitat fragmentation

This particular impact also needs to be assessed in terms of the other projects within the vicinity, especially due to the linear nature of railways, and therefore on a regional scale. The permanent loss of any aquatic system would be seen as habitat fragmentation. The majority of mobile aquatic organisms require "stepping stones" to leap frog between their required habitats. The depressions play an important role in the landscape with regard to providing this type of refugia for mobile species.

Significance of impact
Due to the scale of the proposed and approved projects within the IDZ footprint in relation to the observed water bodies, the potential for habitat fragment along the water courses would be significant without mitigation, i.e. **HIGH**.

With the effective implementation of all above mitigation measures, the residual impact of habitat on the habitat fragmentations as a cumulative impact is predicted to be of **MEDIUM** significance.

Reversibility of impact and irreplaceable loss of resources
If the mitigations are upheld, then sedimentation and erosion should be limited both in the construction and operations phase, thus the reversibility of the impact would be High, and the loss of irreplaceable resources would be Low.

Table 9-2 Impact assessment summary table for the proposed development

Construction Phase

Direct Impacts

Impact Description	Mitigation	Spatial Extent	Intensity	Duration	Reversibility	Irreplaceability	Probability	Significance & Status		Confidence
								Without Mitigation	*With Mitigation*	
Manganese Ore Export Terminal and associated infrastructures (including shiploading) – Preferred and Alternative conveyor route										
Potential loss of wetland habitat		**N/A**								
Potential loss of riverine habitat	Section 9.6.2	Local	Low	Long-term	Low	Low	Probable	Medium	Low	**High**
Potential changes to the hydrological regime	Section 9.6.3	Local	Low	Long-term	Low	High	Probable	Medium	Low	**High**
Potential impacts on water quality	Section 9.6.4	Local	Low	Short-term	Low	Low	Probable	Medium	Low	**High**
Loss of ecosystem services	Section 9.6.5	Local	Low	Long-term	Low	Low	Probable	High	Low	**High**
Habitat fragmentation	Section 9.6.6	Local	Low	Long-term	Low	Low	Probable	High	Low	**High**
Loss of species of special concern	Section 9.6.7	National	Medium	Long-term	Low	Low	Improbable	Low	Low	**High**
Erosion and sedimentation	Section 9.6.8	Local	Low	Long-term	Low	Low	Probable	Medium	Low	**High**
Compilation Yard and associated infrastructures – Alternative1 (preferred option)										
Potential loss of wetland habitat	Section 9.6.1	Local	High	Long-term	Low	Low	Probable	High	Medium	**High**
Potential loss of riverine habitat	Section 9.6.2	Local	Low	Long-term	Low	Low	Probable	Medium	Low	**High**
Potential changes to the hydrological	Section	Local	Low	Long-term	Low	High	Probable	Medium	Low	**High**

regime	9.6.3									
Potential impacts of water quality	Section 9.6.4	Local	Low	Long-term	Low	Low	Probable	Low	Low	**High**
Loss of ecosystem services	Section 9.6.5	Local	Low	Long-term	Low	Low	Probable	Low	Low	**High**
Habitat fragmentation	Section 9.6.6	Local	Low	Long-term	Low	Low	Probable	High	Low	**High**
Loss of species of special concern	Section 9.6.7	National	Medium	Long-term	Low	Low	Improbable	Low	Low	**High**
Erosion and sedimentation	Section 9.6.8	Local	Low	Long-term	Low	Low	Probable	Medium	Low	**High**
Compilation Yard and associated infrastructures – Alternative 2										
Potential loss of wetland habitat	Section 9.6.1	Local	High	Long-term	Low	Low	Probable	High	High	**High**
Potential loss of riverine habitat	Section 9.6.2	Local	Low	Long-term	Low	Low	Probable	Medium	Low	**High**
Potential changes to the hydrological regime	Section 9.6.3	Local	Low	Long-term	Low	High	Probable	Medium	Low	**High**
Potential impacts of water quality	Section 9.6.4	Local	Low	Long-term	Low	Low	Probable	Low	Low	**High**
Loss of ecosystem services	Section 9.6.5	Local	Low	Long-term	Low	Low	Probable	High	High	**High**
Habitat fragmentation	Section 9.6.6	Local	Low	Long-term	Low	Low	Probable	High	High	**High**
Loss of species of special concern	Section 9.6.7	National	Medium	Long-term	Low	Low	Improbable	Low	Low	**High**
Erosion and sedimentation	Section 9.6.8	Local	Low	Long-term	Low	Low	Probable	Medium	Low	**High**
Doubling of railway line										
Potential loss of wetland habitat	Section 9.6.1	N/A								
Potential loss of riverine habitat	Section 9.6.2	Local	Low	Long-term	Low	Low	Probable	Medium	Low	**High**

Potential changes to the hydrological regime	Section 9.6.3	Local	Low	Long-term	Low	High	Probable	Medium	Low	**High**
Potential impacts of water quality	Section 5.6.4	Local	Low	Long-term	Low	Low	Probable	Low	Low	**High**
Loss of ecosystem services	Section 5.6.5	Local	Low	Long-term	Low	Low	Probable	Low	Low	**High**
Habitat fragmentation	Section 5.6.6	Local	Low	Long-term	Low	Low	Probable	Low	Low	**High**
Loss of species of special concern	Section 5.6.7	National	Medium	Long-term	Low	Low	Improbable	Low	Low	**High**
Erosion and sedimentation	**Section 5.6.8**	**Local**	**Low**	**Long-term**	**Low**	**Low**	**Probable**	**Medium**	**Low**	**High**

Operational Phase

Direct Impacts

Impact Description	Mitigation	Spatial Extent	Intensity	Duration	Reversibility	Irreplaceability	Probability	Significance & Status		Confidence
								Without Mitigation	With Mitigation	
Manganese Ore Export Terminal and associated infrastructures (including shiploading) – Preferred and Alternative conveyor route										
Potential changes to the hydrological regime	Section 5.6.3	Local	Low	Long-term	Low	Low	Probable	Medium	Low	**High**
Loss of ecosystem services	Section 5.6.5	Local	Low	Long-term	Low	Low	Probable	High	Low	**High**
Potential impacts of water quality	Section 5.6.4	Local	Low	Long-term	Low	Low	Probable	Medium	Low	**High**
Erosion and sedimentation	Section 5.6.8	Local	Low	Long-term	Low	Low	Probable	Medium	Low	**High**
Compilation Yard and associated infrastructures – impacts during the operation phase for both Alternative 1 & 2 would be similar										
Potential changes to the hydrological regime	Section 5.6.3	Local	Low	Long-term	Low	Low	Probable	Medium	Low	**High**

Potential impacts of water quality	Section 5.6.4	Local	Low	Long-term	Low	Low	Probable	Low	Low	**High**
Erosion and sedimentation	Section 5.6.8	Local	Low	Long-term	Low	Low	Probable	Medium	Low	**High**
Doubling of railway line										
Potential changes to the hydrological regime	Section 5.6.3	Local	Low	Long-term	Low	Low	Probable	Medium	Low	**High**
Potential impacts of water quality	Section 5.6.4	Local	Low	Long-term	Low	Low	Probable	Medium	Low	**High**
Erosion and sedimentation	**Section 5.6.8**	**Local**	**Low**	**Long-term**	**Low**	**Low**	**Probable**	**Medium**	**Low**	**High**

Decommissioning Phase

Direct Impacts

Impact Description	Mitigation	Spatial Extent	Intensity	Duration	Reversibility	Irreplaceability	Probability	Significance & Status		Confidence
								Without Mitigation	With Mitigation	
Manganese Ore Export Terminal and associated infrastructures (including shiploading)										
Potential changes to the hydrological regime	Section 5.6.3	Local	Low	Long-term	Low	Low	Probable	Medium	Low	**High**
Potential impacts of water quality	Section 5.6.4	Local	Low	Long-term	Low	Low	Probable	Medium	Low	**High**
Erosion and sedimentation	Section 5.6.8	Local	Low	Long-term	Low	Low	Probable	Medium	Low	**High**
Compilation Yard and associated infrastructures										
Potential changes to the hydrological regime	Section 5.6.3	Local	Low	Long-term	Low	Low	Probable	Medium	Low	**High**
Potential impacts of water quality	Section 5.6.4	Local	Low	Long-term	Low	Low	Probable	Low	Low	**High**

Erosion and sedimentation	Section 5.6.8	Local	Low	Long-term	Low	Low	Probable	Medium	Low	**High**
Doubling of railway line										
Potential changes to the hydrological regime	Section 5.6.3	Local	Low	Long-term	Low	Low	Probable	Medium	Low	**High**
Potential impacts of water quality	Section 5.6.4	Local	Low	Long-term	Low	Low	Probable	Medium	Low	**High**
Erosion and sedimentation	**Section 5.6.8**	**Local**	**Low**	**Long-term**	**Low**	**Low**	**Probable**	**Medium**	**Low**	**High**

9.7 CONCLUSION

During this investigation it was found that the greatest number of impacts would occur due to the construction of the Compilation Yard, the Railway Doubling and the new road bridge of the Coega River, with regard to the physical disturbance of wetlands and water courses. The remaining project components such as the overland conveyor and stockyard would have no to limited impact on the aquatic environment. Most of the impacts would also occur within the construction phase, i.e. habitat or catchment changes, with only a few impacts occurring during the operational or decommissioning phase.

Eight potential impacts were identified, during this assessment. Seven of these impacts relate to the construction phase, i.e.

- The potential loss of wetland habitat (physical destruction)
- The potential loss of riverine habitat (physical destruction)
- Potential changes to the hydrological regime (impeding or diverting flow)
- Potential impact on water quality and risk to the aquatic environment (riverine and estuarine)
- Loss of ecosystem services
- Aquatic habitat fragmentation
- Potential loss of aquatic Species of Special Concern (Aquatic vegetation)
- Erosion and sedimentation,

Four would persist into the operational phase, i.e. Potential changes to the hydrological regime (impeding or diverting flow); Potential impact on water quality and risk to the aquatic environment (riverine and estuarine); Loss of ecosystem services and Erosion and sedimentation. These same impacts would remain should the project be decommissioned. All impacts, based on the author's knowledge of the project and the surrounding environment, were assessed with a high degree of confidence.

The compilation yard Alternative 1 (preferred layout) is preferred in terms of impacts on aquatic ecology as it only impacts on one wetland which is already degraded and contained several modifications as a result of bush clearing and the creation of livestock water areas (i.e. PES = D and EIS of this system is Low) and only a few wetland plants remain around the drinking troughs. The Alternative 2 layout for the proposed compilation yard would result in the loss of two relatively intact wetlands.

The greatest potential impacts (***high*** significance rating without mitigation) were related to the potential loss of wetland(s), habitat fragmentation and loss of ecosystem services. With the effective implementation of the recommended key mitigation measures, the residual impacts of the proposed development (considering the Alternative 1 layout for the compilation yard) are predicted be of ***low*** significance, with the exception of the loss of wetlands which is of ***medium*** significance with mitigation. The impacts in terms of loss of wetland habitats, loss of ecosystem services and habitat fragmentation associated with the construction of Alternative 2 compilation yard would remain of ***high*** significance after mitigation.

The key mitigation measures recommended are as follows:

- All the remaining demarcated wetlands (inclusive of the 50m buffers) that will not be impacted upon by the development should be avoided due the importance and uniqueness of the depressions observed in the study area.

- Ensure that, following the construction of the bridge, the longitudinal profile of the Coega is close to natural with little or no impoundment resulting on the upstream side of the proposed crossing.
- All erosion control / energy dissipation structures should be installed as shown in the proposed design i.e. reno mattress and suitable wing walls.
- No stormwater should be discharged directly into any water courses or wetland areas and the use of Sustainable Urban Drainage Systems as proposed is highly recommended.
- No batching plants, vehicle refuelling or vehicle maintenance should occur within 32m of a water course or 50m from wetlands
- No laydown areas /construction camps or stormwater control dams/attenuation ponds should be placed within the 1:100 floodline
- Hard engineered surfaces that increase surface water run-off should be limited.
- The proponent should develop a stormwater management plan for the operational phase of the proposed development.

Further recommendations and monitoring guidelines include:

- Stormwater should be managed using suitable structures such as stormwater control dams and attenuation ponds so that any run-off from the development site is attenuated. Although this has been incorporated into the proposed layout, Transnet must ensure that the effectiveness of these systems is monitored and that any remediation or improvement of these stormwater control systems takes place immediately. Separation of clean and dirty streams must be adhered to with regard stormwater management particularly around the stockyard.
- Silts and sedimentation should be kept to a minimum, through the use of the above mentioned structures and by also ensuring that all structures do not create any form of erosion. Stormwater should be managed using suitable structures such as swales, gabions and rock rip-wrap so that any run-off from the development site is attenuated prior to discharge.
- Silts and contaminants should be removed from the stormwater control dams and attenuation ponds on a regular basis in order to maintain the depth and capacity of the dams/ponds.
- Include mechanisms to minimise spillages and dust through the use of best practices for spill containment and dust suppression.
- Vegetation clearing should occur in parallel with the construction progress to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment.
- Only indigenous plant species must be used in the re-vegetation process. The species list mentioned in this chapter and the vegetation and terrestrial fauna chapter should be used a guide
- All construction materials including fuels and oil should be stored in demarcated areas that are contained within berms / bunds to avoid spread of any contamination into wetlands or rivers. Washing and cleaning of equipment should also be done in berms or bunds, in order to trap any cement and prevent excessive soil erosion. These sites must be re-vegetated after construction has been completed. Mechanical plant and bowsers must not be refuelled or serviced within or directly adjacent to any river channel. It is therefore suggested that all construction camps, lay down areas, batching plants or areas and any storage areas should be more than 50m from the wetland or riverine areas.
- The spillage of oils / grease and any concrete / cement must be prevented during construction. Where spillage does occur this should be cleared immediately and disposed of correctly. .
- It is recommended that an Environmental Officer, assisted by a qualified person with a good understanding of the local flora be appointed prior to the construction phase. The EO should be able to make clear recommendations with regards to the re-vegetation of the newly completed / disturbed areas, using selected species detailed in this and the terrestrial vegetation report.
- All alien plant re-growth must be monitored and should it occur these plants should be eradicated. Where any works (e.g. storm water control measures) near a wetland or river is

required specific attention should be paid to the immediate re-vegetation of cleared areas to prevent future erosion of sedimentation issues.
- All relevant buffers mentioned in this report should be included into future designs and later engineering diagrams
- All the relevant CDC/ IDZ environmental specifications and the 2002 EIA Record of Decision conditions should be used as a guideline when Transnet develops their own environmental specifications

The following monitoring is proposed with regards to the potential impacts on the aquatic environment:

- Monitoring of any spills, erosion of cleared areas or downstream sedimentation should occur on a daily basis, with any remediation being instituted immediately (Contractor's environmental representative reporting to the EO).
- Monitoring of any vegetated areas must take place at least every month during construction, and every three months during a maintenance period (EO & Contractor)
- Monitoring, which includes the cleaning and / or reinstatement of any erosion protection measures, swales and control/attenuation dams/ponds should occur on a biannual basis for the lifespan of the project by the developer.
- Transnet should also take into consideration the current CDC surface and groundwater water monitoring plans that are being conducted by SRK Consulting within a well-established monitoring plan. The monitoring sites and variables will also adequately cover this proposed development.

9.8 BEST INTERNATIONAL PRACTICES

The following practices have been recommended by the Department of Water Affairs, which they have aligned with best international practice. These recommendations will also form part of the Water Use License Application for the development.

With regard to the potential impacts of the project on the aquatic environment, other than the physical destruction of any water course or wetland (including sedimentation and erosion, or habitat change) the next most detrimental impact includes the potential for any water quality changes. Water quality risks include in broad categories:
- Increase in sediment loads, measured as increased suspended sediments
- Hydrocarbon pollution from spilled fuel, oils (incl. shutter and hydraulics) and grease
- Cement products that pose a risk to aquatic organisms
- Contamination from Manganese ore i.e. seepage or dust.

A monitoring programme should therefore be in place not only to ensure conformance with the EMP, but also to monitor any environmental issues and impacts, which have not been accounted for in the EMP or could result in significant environmental impacts for which corrective action is required.

The period and frequency of monitoring must be aligned with the any current programmes being run within the IDZ in consultation with relevant stakeholders and authorities. Transnet and the EO must ensure that the monitoring is conducted and reported.

The following protocols are recommended with regards to monitoring and should be read in conjunction with the Transnet Construction EMP:

- Weekly environmental auditing.
- Monthly or quarterly environmental audit reports to be submitted to the Department of Water Affairs (DWA), or as advised by DWA.
- Immediate notification of transgression to the Site Manager (& Project Contractor/Engineer) and provision of suitable mitigation measures to rectify environmental damage.
- If transgressions continue, report such incidences to the DWA immediately, although such incidences must be recorded in the audit reports.

To this end, it is suggested that the Proponent, Contractor and EO also consult the following guideline as reference:

Department of Water Affairs and Forestry, February 2005. Environmental Best Practice Specifications: Construction Integrated Environmental Management Sub-Series No. IEMS 1.6. Third Edition. Pretoria

Department of Water Affairs and Forestry, February 2005. **Environmental Monitoring and Auditing Guideline**. Integrated Environmental Management Sub-Series No. IEMS 1.7. Third Edition. Pretoria.

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