CEN INTEGRATED ENVIRONMENTAL MA UNIT

Environmental and Rural Development Specialist

Draft Scoping Report for the Proposed Establishment of a Common User Integrated Marine Abstraction and Discharge Servitude and associated Land-based Infrastructure for Industries in the Coega Industrial Development Zone, Nelson Mandela Bay Municipality, Eastern Cape

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Project Title:

Draft Scoping Report for the Proposed Establishment of a Common User Integrated Marine Abstraction and Discharge Servitude and associated Land-based Infrastructure for Industries in the Coega Industrial Development Zone, Nelson Mandela Bay Municipality, Eastern Cape.

Project Applicant: Coega Development Corporation

Reference Number:

DEA EIA Application: 14/12/16/3/3/2/997

DEA (Oceans and Coasts Coastal Waters Discharge Permit): 2014/008/EC/Coega IDZ

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Executive Summary

The Coega Development Corporation (CDC) plans to establish a common-user integrated marine abstraction and discharge servitude in which current and future investors in the Coega Industrial Development Zone (IDZ) can establish infrastructure to abstract seawater and discharge treated effluent as required by various industrial processes. An integrated servitude would be preferable to a number of individual pipelines and/or other infrastructure by various industries along the coastline, as it would limit possible visual, economic, logistical and environmental impacts. The project entails the selection of the servitude area(s), as well as an assessment of the construction and establishment of associated infrastructure in the marine environment and on land (e.g. pipelines, pumpstations, holding reservoirs). For the latter purposes, this EIA will also advise on the preferred location and alignment of a land-based servitude.

The Coega IDZ is situated on the northern side of Port Elizabeth within the Nelson Mandela Bay Municipality (NMBM), Sarah Baartman District, Eastern Cape and is ~11 500 ha in size. The IDZ comprises 14 zones designated for various light, medium and heavy industrial land uses. Owing to the nature of the planned pipeline servitude (i.e. for the abstraction of seawater and discharge of effluent to the marine environment), the servitude itself and associated infrastructure needs to be situated along the coast and in the marine environment. Various areas for the placement of the servitude are therefore being assessed along the coastal zone adjacent to the IDZ boundary (refer to Chapter 4 – Project Alternatives for further details). Figure i is a map showing the relative location of the Coega IDZ in the Nelson Mandela Bay Municipal area in the Eastern Cape.

Figure i: Locality Map of the Coega IDZ within the Nelson Mandela Bay Municipality, Eastern Cape.

1.1 Application Process

1.1.1 Previous Applications

A Scoping Report was done by the CSIR for the proposed activities under the 2006 EIA Regulations, and approved by the DEA in 2012. CEN IEM Unit was appointed to do the Environmental Impact Assessment, and submitted an amended EIA application form to DEA to handle the application under the 2006 EIA Regulations, but which took cognisance of the 2010 Regulations that were in effect at the time. The application form was acknowledged on 6 June 2014, and a reference number was issued (DEA 12/12/20/1982). A draft Coastal Waters Discharge Permit (CWDP) application (as required by Section 69 of the NEM: Integrated Coastal Management Act No. 24 of 2008 for discharge of waste to the marine environment) was also submitted to the DEA:Oceans and Coasts Branch. A reference number was issued on 24 April 2014 (2014/008/EC/Coega IDZ). The DEA however closed the project file on 6 November 2015 and noted that a new application would need to be submitted in terms of the EIA Regulations (2014), and the process would need to start afresh (i.e. Scoping and EIA phases would need to be done).

1.1.2 Current Application

CEN Integrated Environmental Management Unit has been appointed by the Coega Development Corporation (CDC) to make the necessary applications for approval from respective state departments for the establishment of the proposed servitude(s) and associated infrastructure in terms of the EIA Regulations (2014). A Scoping and Environmental Impact Assessment (EIA) process is required in terms Regulations promulgated under Section 24(5) read with section 44 of the National Environment Management Act (Act 107 of 1998) as amended. The application will assess impacts of activities listed under Listing Notices 1, 2 and 3 of the EIA Regulations (2014) (refer to Table i for a list of activities applied for). The competent review authority for the EIA process is the National Department of Environmental Affairs (DEA). A Coastal Waters Discharge Permit (CWDP) will also have to be sought from the DEA: Oceans and Coasts Branch for the discharge of effluent to the marine environment.

An EIA application form for activities listed in terms of the EIA Regulations (2014) was submitted to the DEA on 25 January 2017 and a reference number issued on 26 January 2017 (14/12/16/3/3/2/997). The reference number issued for the Coastal Waters Discharge Permit in 2014 remains valid, but the application will be updated to reflect the most recent information. The intention is for the application processes to run in parallel.

1.2 Purpose of the Scoping Report

The main purpose of this Environmental Scoping report is to:

- Make application to the authorities to undertake the listed activities

- Describe the proposed activity and nature of the receiving environment in sufficient detail to allow the reader to make an informed decision on the suitability of the project proposal
- Identify and describe feasible and reasonable project alternatives
- Identify and describe environmental issues and potential impacts
- Solicit issues and concerns from Interested and Affected Parties on the proposed activities and address the environmental concerns raised.
- Describe the methodology that will be followed in assessing impacts and alternatives
- Develop a plan of study for EIA, including a Terms of Reference for any specialist studies

The Scoping Report has been designed to meet the content requirements set out in Appendix 2 of the EIA Regulations (2014).

Table i: Possible Listed Activities in terms of the EIA Regulations (2014) triggered by the proposed development

Activity	Description
Listing 1: Activity 9 The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water – (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more;	Construction of infrastructure for the transfer of abstracted seawater from the marine abstraction servitude to the zone boundaries of respective industries
Listing 1: Activity 10 The development and related operation of infrastructure exceeding 1000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes – (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more;	Construction of infrastructure for the transfer of effluent from the zone boundary of respective industries to the marine discharge servitude
Listing 1: Activity 11 The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more	Construction of infrastructure to transfer electricity from the Sonop substation to pumpstations at the headworks
Listing 1: Activity 15 The development of structures in the coastal public property where the development footprint is bigger than 50 square metres	Development of land-based infrastructure (e.g. headworks, pumpstation, wells, distribution chamber)
Listing 1: Activity 17 Development— (i) in the sea; (ii) in an estuary (iii) within the littoral active zone; (iv) in front of a development setback; or (v) if no development setback exists, within a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever is the greater; in respect of— (a) fixed or floating jetties and slipways (c) embankments; (d) rock revetments or stabilising structures including stabilising	Development of a jetty and embankments for constructing infrastructure required for the marine pipeline servitude in the coastal environment

Activity	Description
walls; (e) buildings of 50 square metres or more; or (f) infrastructure with a development footprint of 50 square metres or more	
Listing 1: Activity 18 The planting of vegetation or placing of any material on dunes or exposed sand surfaces of more than 10 square metres, within the littoral active zone, for the purpose of preventing the free movement of sand, erosion or accretion	Possible stabilisation of areas in the littoral active zone post-construction by means of planting vegetation
Listing 1: Activity 19 The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from— (ii) the seashore; or (iii) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater	Excavation and infilling of material in the coastal environment for the construction of infrastructure related to the marine servitude
Listing 1: Activity 27 The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity	Construction of associated infrastructure (e.g. pumpstation, headworks, distribution chamber, access roads, electrical distribution) would most likely result in the clearing of more than 1 ha of vegetation
Listing 2: Activity 6 The development of facilities or infrastructure for any process or activity which requires a permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent	The discharge of effluent to the marine environment via the marine servitude will require a Coastal Waters Discharge Permit in terms of Section 69 of the NEM:ICMA
Listing 2: Activity 14 The development and related operation of— (iii) any other structure or infrastructure on, below or along the sea bed	Construction of pipelines/channels/tunnels etc. in the marine servitude for abstracting seawater and/or discharging effluent
Listing 2: Activity 26 Development-- (i) in the sea; (ii) in an estuary; (iii) within the littoral active zone; (iv) in front of a development setback; or	Development of infrastructure associated with the marine servitude in the coastal environment

Activity	Description
(v) if no development setback exists, within a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever is the greater; in respect of — (b) piers; (g) tunnels; or (h) underwater channels	
Listing 3: Activity 4 The development of a road wider than 4 metres with a reserve less than 13,5 metres (b) in the Eastern Cape (ii) outside urban areas in: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas (hh) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined	Development of access roads for construction phase, and for maintenance of infrastructure in the marine servitude in operational phase
Listing 3: Activity 12 The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan (a) in the Eastern Cape ii. Within critical biodiversity areas identified in bioregional plans iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas; or iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space,	Constructing associated infrastructure for the marine and land based servitude will result in the clearance of more than 300 m2 of indigenous vegetation. The area is within a CBA in the metro's current Bioregional Plan. Alternatives will be assessed in this EIA process for the placement of infrastructure, but it is likely that some structures/infrastructure may occur in the littoral active zone and/or within 100 m of the high water mark of the sea

Activity	Description
conservation or had an equivalent zoning	

1.3 Project Description

The rationale for developing an integrated marine discharge and abstraction servitude(s) is to have a common user servitude in which a number of possible industries in the Coega IDZ can establish infrastructure required to abstract seawater and/or discharge effluent to the marine environment. As a starting point, the various types of industries and their respective effluent profiles and abstraction requirements needs to be defined.

1.3.1 Description of Industry Types

While there is no definitive list of industries that will establish in the Coega IDZ in the medium to long term, the types of industries that may require seawater in their process and/or that may need to discharge effluent to the marine environment can be grouped into 4 groups that would represent the likely types of industries in the IDZ – mariculture, thermal, brine and wastewater treatment works (domestic and industrial). More detail on each industry type (where available at this stage) is given in Chapter 2. Environmental Impact Assessment studies are currently underway for a land-based aquaculture development zone, a CCGT power plant, and a waste water treatment works in the Coega IDZ, all of which would require the servitude in some manner.

It is envisaged that a single discharge servitude and possibly 2 abstraction servitudes would be needed:

- A single servitude in which various industries can establish infrastructure to discharge treated effluent to the marine environment. Depending on the volume and nature of the effluent, different types of discharge infrastructure may be built in the servitude (e.g. pipelines, raceways, channels). The time of construction of the various discharge structures within the servitude will be dictated by the demand and timing of the implementation of these various industries. It is likely that the first discharge structure to be constructed would be a pipeline for the planned Aquaculture Development Zone in Zone 10 of the IDZ. The position of the discharge servitude, depth of discharge, and design of discharge infrastructure will be determined via a midfield dispersion model and engineering studies.

- Two abstraction servitudes would be needed for the abstraction of seawater required by industries for various processes – one for industries that require good quality seawater (e.g. aquaculture facilities and desalination plants), and the other for industries that are not as reliant on good water quality (i.e. the use of seawater for cooling purposes, for example the planned CCGT power plant).

1.3.2 Characterising and managing the effluent profile of industry types

To assess impacts of discharging effluent to the marine environment in this EIA, and to make recommendations on the position of a discharge and abstraction servitude(s); a marine dispersion model has to be done. Because of the large volumes of abstraction and discharge anticipated, and the potential risk of recirculation of effluent from the discharge plume and interaction with abstraction points; a far-, near- and mid-field model will be done. The models will determine the dispersion and dilution of the discharge plume under different physical conditions. The models will further anticipate the water quality at the edge of the mixing zone of the plume, which is compared to water quality objectives of the receiving environment and beneficial users of the marine environment that rely on good water quality (e.g. fisheries, salt works, aquaculture facilities). Outcomes of the model and marine impact assessment will inform the preferred position of the discharge servitude, the depth and type of discharge to meet the required dilution, and the design of the discharge infrastructure. Based on the outcomes of the study, recommendations will be made for industrial types as to the standards that need to be met in the effluent that they may discharge to the servitude, amongst others. Mitigation measures will be suggested to reduce the risks of discharging poor quality effluent to the sea, especially in the event of an upset condition or anticipated worst-case scenarios. It is likely that industries (depending on the nature of the industry and the anticipated effluent constituents) would have to pre-treat effluent prior to releasing it to the sewer network that goes to the planned Coega WWTW and/or directly to the proposed marine servitude. The planned ADZ will have a number of different operations with varying effluent constituents and volumes. The EIA being done for the project includes infrastructure to gravitate effluent from the various facilities in the ADZ to a collection chamber prior to discharging to the marine servitude. The collection chamber will serve as the collection point for all pre-treated effluent from individual ADZ operations. If it is found that the collective effluent contained in the collection chamber exceeds permit standards prescribed for the ADZ.

The position of the discharge servitude will also determine the position of the abstraction servitude(s), primarily by checking if there will be any interaction between the discharge plume and abstraction points so as not to compromise intake water quality for industries that rely on good water quality (e.g. aquaculture).

For the model to run, the water quality and volume requirements as well as a discharge profile and discharge volumes for each industry type must be described. As part of this EIA, a table of expected and worst-case scenario seawater requirements and discharge parameters (in terms of volume and quality) for the 4 industry types has been compiled (refer to Appendix 2). The list was drawn up with inputs from representatives of the various industries (e.g. EAPs managing respective EIA processes, CDC employees, investors etc.). The information was sent to the marine specialist (Anchor Environmental) to use as a basis for the effluent profile to be used in their nearfield model. Anchor used this information to devise the final list of pollutant concentrations and volumes at end of pipe that have been used in the near-field model (see Table ii).

Table ii: Pollutant concentrations used to model outfall scenarios in the nearfield model (CorMix). All concentrations apply to effluent at the end of pipe (Anchor Environmental, 2016).

Pollutant concentrations (actual)	*Flow rate (Ml/day)*	*Flow rate (m3/sec)*	*Temp (°C)*	*Salinity (PSU)*	*TSS (mg/L)*	*Ammonia (mg/l)*	*E. Coli (cfu/100 ml)*
Individual Discharge Scenarios							
Aquaculture	*960*	*11.11*	*25*	*35*	*200*	*50*	*0*
Cooling Water (CCGT and refinery)	*5219*	*60.41*	*30*	*35*	*10*	*0.40*	*0*
Waste Water Treatment Works	*120*	*1.39*	*35*	*0*	*740*	*36.67*	*100 000*
Industry	*21.6*	*0.25*	*18*	*0*	*570.95*	*12.77*	*0*
Desalination (brine)	*244*	*2.82*	*22*	*70*	*10*	*1*	*0*
Combined Discharge Scenarios							
A. Industry, Brine, Aquaculture, Cooling Water	*6444*	*74.59*	*29*	*36.21*	*40.18*	*7.85*	*0*
B. WWTW, Industry, Brine, Aquaculture, Cooling	*6564*	*75.98*	*29*	*35.55*	*52.98*	*8.38*	*1828*
C. WWTW, Industry, Brine, Aquaculture	*1346*	*15.58*	*18.5*	*37.66*	*219.66*	*39.33*	*8917*

1.3.3 Scope of Works to be covered in the EIA

This EIA will cover the following aspects:

- Recommend the position of a single marine-based servitude in which future industries can establish infrastructure (e.g. pipelines, open raceways) for the discharge of effluent to the sea. Depending on the volume and type of effluent, and the outcomes of the nearfield marine dispersion model that is being done by Anchor Environmental Consultants and others to be appointed for the midfield model, there may be different types of discharges within the servitude. The final design of the pipelines / discharge infrastructure will be determined by the marine dispersion model and coastal engineering studies at EIA stage. The servitude must be wide enough to allow future industries to establish their required infrastructure with time. Pre-feasibility investigations indicated a width of ~300 m would be needed. The EIA will also assess impacts associated with construction of infrastructure required for discharge by various industries in the servitude.

- Recommend the positions of 2 marine-based servitudes in which future industries can establish infrastructure for abstracting seawater i.e. one to service the requirements of the aquaculture development zone and desalination, and another to service the requirements of the proposed CCGT power stations. The design of the pipelines will be determined by coastal engineering studies at EIA stage. The servitude must be wide enough to allow for future industries to establish their required infrastructure with time. Pre-feasibility investigations indicated a width of ~300

m would be needed. The EIA will also assess impacts associated with construction of infrastructure required for abstraction of seawater by various industries in the servitude.

- Recommend the position of a landward servitude for the establishment of infrastructure required to transfer abstracted seawater from the marine servitude to respective industries and to transfer effluent from respective industries to the marine discharge servitude. The servitude and required infrastructure will extend from the Zone boundary in which the respective industries are situated to the marine discharge and abstraction servitudes.

- The construction and establishment of energy distribution infrastructure required to run the pumpstations. Electricity for the pump station will be obtained from the Sonop Substation via 132 kV power lines.

- The construction and establishment of any roads that may be needed to access infrastructure related to the abstraction and discharge servitudes and related land-based infrastructure for maintenance in operational phase.

- Establishment of temporary structures/infrastructure needed for construction phase (e.g. site camps, access road, launching facilities etc. – temporary structures in the coastal zone that will be needed to establish infrastructure in the marine servitudes will be elaborated on at EIA stage when engineering designs are available).

- Construction activities are likely to include vegetation clearing, excavation, possibly blasting, laying of pipes and other infrastructure, embedment, anchoring, stabilisation, rehabilitation.

1.3.4 Defining the area to be included in the EIA Process

Since the nature of the marine-based servitude relates to abstraction of seawater and discharge of effluent to the marine environment, the study area that will be included for the servitude and associated infrastructure will include the coastal zone within the boundary of the Coega IDZ and the Port of Ngqura (i.e. the area within 100 m of the high water mark of the sea and/or below the coastal management line, whichever is greater) and the adjacent marine environment (Figure ii). The latter will extend to a distance of ~2.5 km seaward of the high water mark of the sea (but is ultimately dependent on the findings of the midfield dispersion model). The marine dispersion model will assess 12 discharge scenarios within the study area, and recommend a preferred position for the discharge and abstraction servitude(s). Once defined, detailed specialist studies on each servitude area will be done.

This EIA will advise on the position of a land-based servitude for the placement of infrastructure required to transfer abstracted seawater to the respective Zone boundaries of industries that require seawater, as well as infrastructure needed to transfer effluent from the Zone boundaries of industries that would discharge effluent to the marine environment. The study area for the land-based servitude will include the area within the Coega IDZ between the high water mark of the sea, the MR435 (R334) / R367 to the north-east, and Neptune Road to the west. Sections of the IDZ that are unlikely to host industries that will require seawater and/or have discharge needs are not included in the study area (Figure iii). A high level screening exercise of the land-based study area will be done to select preferred servitude(s) for subsequent detailed specialist investigation.

Figure ii: An indication of the survey area for the placement of a marine servitude and related infrastructure.

Figure iii: An indication of the survey area for the placement of the land-based servitude and related infrastructure.

1.4 Need and Desirability

The primary need for the provision of an integrated common-user marine servitude is to facilitate the co-ordinated development of infrastructure for a number of possible investors in the Coega IDZ that would require seawater in their process and/or that need to discharge effluent. As described earlier, examples of the types of industries that would use the servitude include those that would use seawater for cooling processes, aquaculture facilities, desalination plants, and wastewater treatment plants.

Relevant state departments involved with water resource and coastal management (e.g. DWS and DEA: Oceans and Coasts), have advised the CDC that it would be beneficial for the IDZ to have dedicated servitude area for the placement of infrastructure needed for abstraction of seawater and discharge of effluent to the marine environment rather than each industry establishing their own set of infrastructure. This would make management of the volumes and quality of effluent easier, and would also result in less physical impacts to the coastal environment by reducing the number of points where hard structures are placed in the dynamic coastal zone.

Further, the development of an integrated servitude would have economic benefits by confining the placement of infrastructure to a dedicated area with the potential for shared infrastructure, thereby limiting costs associated with a network of pipes and pumpstations for example. Similarly, planning requirements would be reduced.

The abstraction of seawater for use in industrial activities reduces reliance on municipal supply of potable water. Depending on the receiving environment and the position and depth of discharge, the release of effluent to the marine environment rather than rivers or estuaries has potentially less environmental impact because of increased assimilative and dispersive capacity.

1.5 Project Alternatives

1.5.1 The 'No-Go' Alternative

Various industrial activities occur in and are planned for the Coega IDZ. Several of the industry types will require seawater for their operations (e.g. aquaculture, cooling facilities) and/or will have to discharge effluent to an environment other than a WWTW. The latter relates mostly to industries that will use seawater in their processes. However, effluent from industries that is discharged to a WWTW (whether on-site or to a central WWTW such as the planned Coega WWTW) will still ultimately end up in the marine environment – this could either be directly discharged to the marine environment or indirectly if for example, effluent is discharged to the Coega River that will end up in the sea. The use of seawater for industrial activities will reduce reliance on municipal services and infrastructure that would be needed to supply large volumes of potable water.

Considering the vast nature of the IDZ and the array of industrial types planned (refer to the Development Framework Plan and the zonation map for the IDZ), the need for an integrated and common-user servitude for abstraction and discharge infrastructure has been identified. In the absence of this, individual industries would need to plan and apply for separate abstraction and discharge infrastructure along the coastline which would likely present far greater environmental impact on the receiving marine environment from haphazard and multiple discharge points. Individual discharges would also make it difficult to control and monitor discharge quality, and to manage risks that may occur in the event of upset conditions. An integrated and common-user servitude would also result in cost-savings for both the CDC and investors, and would present a more efficient way of planning and providing the required infrastructure for industries to develop and operate in the IDZ. In summary, the following potential benefits are anticipated from having a common-user abstraction and discharge servitude versus individual abstraction and discharge points along the coast:

- The development of an integrated marine servitude avoids the need for several pipelines/infrastructure crossing the beach into the sea, thereby limiting the visual, economic, planning and environmental impacts associated with these.
- The discharge of wastewater to the marine environment potentially presents less of a risk when properly managed than discharging to fresh water environments, primarily because of the greater assimilative capacity of the marine environment. This will however need to be confirmed by the marine dispersion studies and impact assessment.

There are however obvious risks associated with the planned servitude(s) during both construction and operational phases, and careful consideration has to be given to the management of these in the operational phase especially as various industries will become operational at different stages. The purpose of this EIA process is to assess impacts of establishing the servitude(s) in comparison with the no-go option, and to provide mitigation measures for industries (current and future) to incorporate in their design and operations to avoid and/or reduce impacts on the receiving marine environment.

The 'no go' option will be used as a baseline throughout the assessment process against which potential impacts will be compared in an objective manner.

1.5.2 The option of re-using effluent as an alternative to discharge

Water is a scarce resource, and with growing population and development pressure in South Africa; the need to look at ways to re-use water rather than dispose of it is essential. Industries that will discharge process water (i.e. potable water or return effluent that has been used in a manufacturing process) via the proposed servitude would mainly be those that send their effluent to the planned Coega WWTW for treatment. Some of these may do pre-treatment of waste on site to

meet the required NMBM by-law standards for discharge of effluent to the sewer network. While this EIA acknowledges and encourages the need to investigate re-use of effluent both on site by individual industries and via industrial ecology by sharing treated effluent with nearby and similar industries, as well as the re-use of treated effluent from the planned Coega WWTW; it is beyond the scope to make specific recommendations for individual industries or the planned WWTW – rather, individual EIAs done for these projects will very likely address sustainable and efficient use of resources.

1.5.3 Location Alternatives for the proposed marine discharge and abstraction servitude(s)

1.5.3.1 History of location alternatives for the marine discharge servitude

The Scoping Report done by the CSIR for the project under the 2006 EIA Regulations assessed 7 alternative positions for the planned marine servitude along the coastline adjacent to the Coega IDZ (refer to Figure iv). The positions were comparatively assessed by considering environmental, social, technological and cost attributes. The Scoping Report recommended 3 alternatives for further assessment at EIA stage, all situated NE of the harbour in Zone 10 of the IDZ (refer to Alternatives 5 – 7 in Figure iv). The report and alternatives were approved by the DEA in 2012.

Considering the proposed declaration of the marine environment directly adjacent to the Coega IDZ and north-east of the harbour as a marine protected area, and the legislative restrictions for discharge of effluent into protected areas in terms of the NEM:Protected Areas Act[1], a review of the scoring system used in the assessment of alternatives in the Scoping Report was done by CEN IEM Unit and Anchor Environmental. In consultation with the CDC and DEA:Oceans and Coasts, it was decided that the current EIA process and more specifically, the marine dispersion model, will assess discharge points to the south-west and north-east of the Port, as well as in the vicinity of the Port and possibly by making use of existing Port infrastructure.

1.5.3.2 Approach to investigating alternative locations for the marine servitude(s) in this EIA process

It is proposed to establish a single discharge servitude and 2 abstraction servitudes in the marine environment, in which various industries in the Coega IDZ can construct infrastructure for the release of treated effluent to the sea and/or the abstraction of seawater; as required by their processes when they become operational.

[1] Section 48A(2) of the Act allows the Minister to make a decision to discharge into an MPA based on the outcomes of a marine specialist study and EIA process. However, the approach taken in this EIA is that the marine dispersion model and specialist study must do a detailed investigation of alternatives effluent discharge positions in areas other than just north-east of the Port.

Pre-feasibility engineering studies and site selection risk assessment studies assessed a number of alternative locations for the proposed marine servitudes and allocated three broad areas for consideration: east of the Port of Ngqura, west of the Port and along the eastern breakwater and/or in the vicinity of the Port (CSIR 2012, PRDW, 2016). Based on the outcomes of these studies, a nearfield dispersion model has been done by Anchor Environmental (see Appendix 5) where 12 discharge scenarios were modelled from 4 sites (see Figure v):

- Approximately 2 km south-west of the western Breakwater at 10 and 16 m depth (Option 1)
- Along the seaward side of the eastern Breakwater at 10 m depth (Option 2)
- Approximately 900 m to the north-east and parallel to the eastern Breakwater at 10 m depth (Option 3)
- Along the seaward side of the eastern Breakwater at 16 m depth (Option 4)

Subtidal pipelines (below the sea surface) and surface canals were both assessed for outfall design options based on predicted effluent volume and buoyancy. Where applicable, outfalls were modelled at two depths, 10 m and 16 m, although the shallow gradient of the seafloor restricted deeper outfalls. The footprint of the proposed Addo MPA limits outfall depth on the eastern side of the Port of Ngqura. Although the 'Draft Notice Declaring the Addo Elephant Marine Protected Area Under Section 22A of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003)' permits outfalls within the proposed MPA, this goes against the recommendations laid out in the 'Assessment Framework for the Management of Effluent from Land Based Sources Discharged into the Marine Environment' (Anchor 2015). As a result, the nearfield model does not consider outfalls within the proposed MPA, and the outfall depth at Option 3 was limited to 10 m. Extremely buoyant effluent was only modelled as submerged outfalls, while brine effluent was modelled as a surface discharge through an open channel. This is in line with current engineering designs using 'training walls' to direct the effluent offshore (PRDW 2016). A shore based outfall was modelled for the high volume cooling water outfall; however, this also goes against recommendations included in the DEA Assessment Framework (Anchor 2015) and will not be considered as an acceptable outfall option by the authorities. If sufficient dilution was not achievable with a single port diffuser, risers with one diffuser each were added to the discharge design to promote mixing. Five diffusers were added to the 10 m depth options, while ten diffusers were added to the deeper 16 m options (Anchor, 2016).

In consultation with EAPs working on EIAs for other planned projects in the IDZ that would use the marine servitudes, as well as planners from the CDC and potential investors; a worst-case scenario effluent profile was compiled (w.r.t. volume and water quality – see Appendix 2 and Table ii) and provided to Anchor Environmental to use in their nearfield model. To take into account the possibility of separate discharges from various industries as well as a combined discharge; the model looked at 12 scenarios. The model also considered effluent discharge with and without effluent from the planned Coega WWTW as it is a possibility that the EIA for the project may recommend that effluent not be discharged via the marine servitude:

Option 1a (Separate discharge at Site 1 for two wind directions – minimum of 10 models):

- Aquaculture outfall discharge located ~2 km south-west of the Western Breakwater at a minimum depth of 10 m.
- Domestic effluent outfall discharge located ~2 km south-west of the Western Breakwater at a minimum depth of 10 m.
- Brine effluent outfall discharge located ~2 km south-west of the Western Breakwater at a minimum depth of 10 m.
- Industrial effluent outfall discharge located ~2 km south-west of the Western Breakwater at a minimum depth of 10 m.
- Cooling water raceway discharge located ~2 km south-west of the Western Breakwater at a depth of 10 m.

Option 1b (Simultaneous discharge at Site 1 for two wind directions – minimum of 4 models):

- Combined discharge for aquaculture, domestic, brine and industrial effluent located ~2 km south-west of the Western Breakwater at a minimum depth of 10 m.
- Cooling water raceway discharge located ~2 km south-west of the Western Breakwater at a minimum depth of 10 m.

Option 2a (Separate discharge at Site 2 for two wind directions – minimum of 10 models):

- Same as Option 1a but with discharges located along the seaward side of the Eastern Breakwater at a minimum depth of 10 m.

Option 2b (Simultaneous discharge at Site 2 for two wind directions – minimum of 4 models):

- Same as Option 1b but with discharges located along the seaward side of the Eastern Breakwater at a minimum depth of 10 m.

Option 3a (Separate discharge at Site 3 for two wind directions – minimum of 10 models):

- Same as Option 1a but with discharges located ~900 m to the north-east and parallel to the Eastern Breakwater at a minimum depth of 10 m.

Option 3b (Simultaneous discharge at Site 3 for two wind directions – minimum of 4 models):

- Same as Option 1b but with discharges located ~900 m to the north-east and parallel to the Eastern Breakwater at a minimum depth of 10 m.

Option 4a (Separate discharge at Site 4 for two wind directions – minimum of 8 models):

- Aquaculture outfall discharge located along the seaward side of the Eastern Breakwater at a minimum depth of 16 m.
- Domestic effluent outfall discharge located along the seaward side of the Eastern Breakwater at a minimum depth of 16 m.

- Brine effluent outfall discharge located along the seaward side of the Eastern Breakwater at a minimum depth of 16 m.

- Industrial effluent outfall discharge located along the seaward side of the Eastern Breakwater at a minimum depth of 16 m.

Option 4b (Simultaneous discharge at Site 4 for two wind directions – minimum of 2 models):

- Combined discharge for aquaculture, domestic, brine and industrial effluent located along the seaward side of the Eastern Breakwater at a minimum depth of 16 m

Near field (NF) modelling was performed using CorMix software to assess a number of proposed outfall designs (as listed above). The scenarios chosen for modelling were based on the depth required to allow effluent to mix sufficiently in order to meet Water Quality Guidelines (WQG) (DWAF 1995a-d) at the distances specified in the recently revised assessment framework for effluent discharged from land based sources (Anchor 2015).
Three pollutants were modelled for this study: Ammonia, *E. coli* and Total Suspended Solids (TSS). Bays are generally considered to be retentive, sheltered environments in comparison to exposed rocky headlands. As important conservation areas are within close proximity of the study area (numerous offshore islands and the recently drafted Addo MPA), the most stringent WQG were implemented (DWAF 1995a). According to the Department of Water Affairs and Forestry (DWAF 1995a), these guidelines are applicable to the 'Natural Environment' to facilitate the protection of organisms that are found within sensitive areas (Anchor Environmental, 2016).

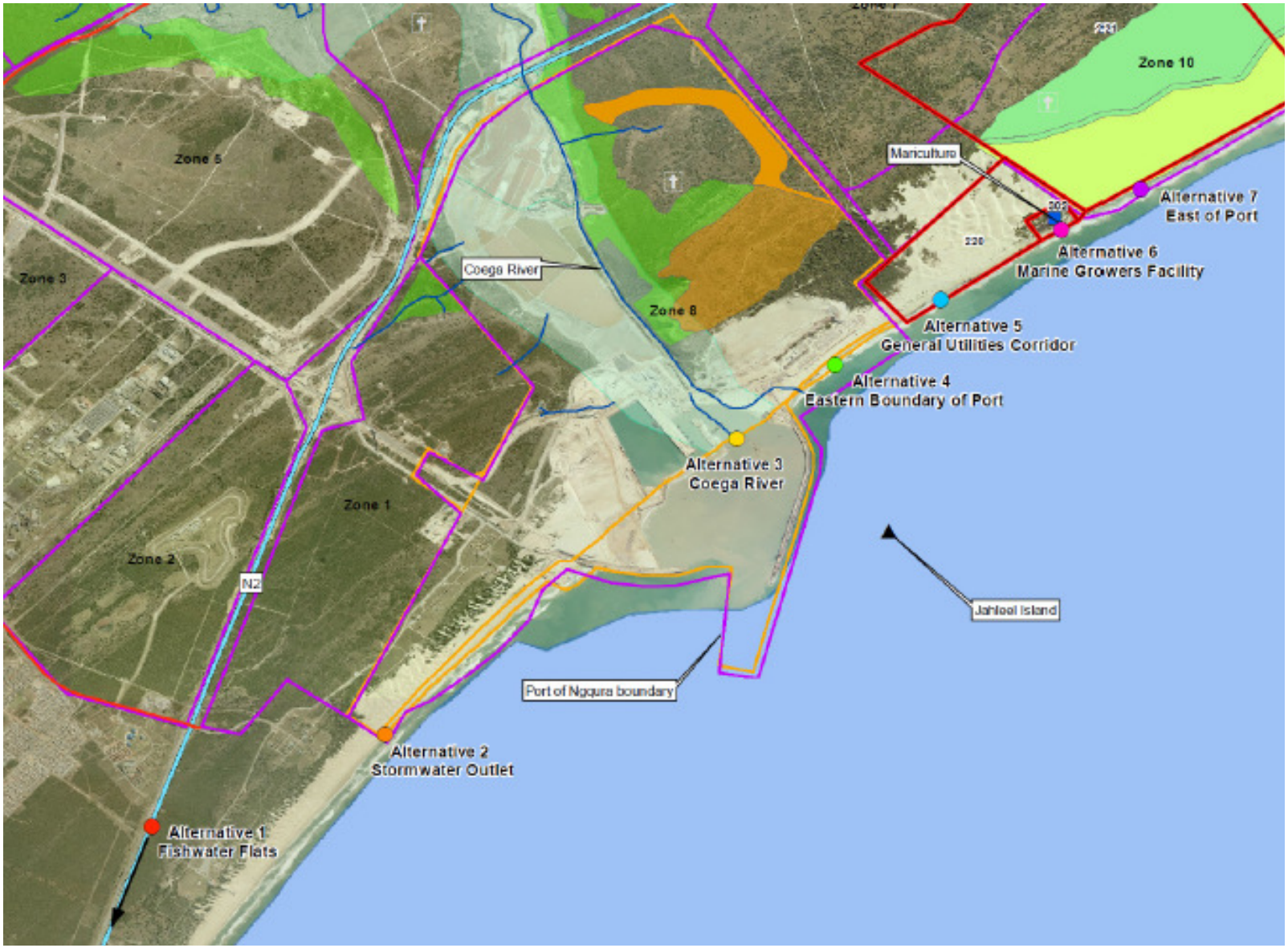

Figure iv: Seven alternative locations for the marine servitude(s) assessed in the original Scoping Report done by the CSIR.

Figure v: Four alternative positions from which the nearfield model was run (Anchor Environmental, 2016)

1.5.3.3 Model Simulation Data

The temperature, salinity (salt content) and dissolved oxygen concentrations occurring in marine waters are the variables most frequently measured by scientists in order to understand the physical and biological processes impacting on, or occurring within a body of seawater. Together with other water quality parameters such as Total Suspended Solids (TSS), ammonia, and *E. coli,* these water quality parameters can give an indication of the health of the environment (Anchor Environmental, 2016).

The Criterion Maximum Concentration (CMC) is the concentration of a pollutant which protects against acute lethality of biota, while the Criterion Continuous Concentration (CCC) protects against chronic effects on biota. The CCC is the maximum allowable concentration of the pollutant at the edge of the mixing zone according to the South African Water Quality Guidelines (DWAF 1995). Data indicating the likelihood of this criterion being met for a range of different contaminants (Ammonia, *E. coli*, TSS) at a range of different outfall localities and depths are shown in Table 4.2 and Figure 4.1 to Figure 4.6 in Appendix 5. A mixing zone with a radius of 30 m was selected for nearshore environments (≤500 m from shore or ≤10 m depth) due to the close proximity of a special management area i.e. the Addo MPA, while a mixing zone of 300 m is applicable to outfall locations greater than 500 m offshore or more than 10 m deep (Anchor 2015).

Model results showed that the following scenarios either met or came close to meeting the WQG at the edge of the RMZ for all pollutants and are considered to be acceptable in terms of pollutant concentrations at the edge of the RMZ (Anchor, 2016):

- Stand-alone outfalls:
    - A subtidal *aquaculture* effluent pipe with 10 diffusers at 16 m depth west of the western breakwater (Option 1a)
    - A subtidal *aquaculture* effluent pipe with 10 diffusers at 16 m depth at the end of the eastern breakwater (Option 4a)
    - A subtidal *industrial* effluent pipe with 5 diffusers at 10 m depth west of the western breakwater (Option 1a)
    - A subtidal *industrial* effluent pipe with 10 diffusers at 16 m depth west of the western breakwater (Option 1a)
    - A subtidal *industrial* effluent pipe with 5 diffusers at 10 m depth at the bend in the eastern breakwater (Option 2a)
    - A subtidal *industrial* effluent pipe with 5 diffusers at 10 m depth east of the eastern breakwater (Option 3a)

- A subtidal *industrial* effluent pipe with 10 diffusers at 16 m depth at the end of the eastern breakwater (Option 4a)
- A subtidal Waste Water Treatment Works (*WWTW*) effluent pipe with 10 diffusers at 16 m depth west of the western breakwater (Option 1a)
- A subtidal *WWTW* effluent pipe with 10 diffusers at 16 m depth at the end of the eastern breakwater (Option 4a)
- A surface effluent outfall for *cooling water* in the form of a 16 m wide and 2 m deep canal bounded by the eastern breakwater on one side and a training wall on the other flowing out at the end of the eastern breakwater at 16 m depth (Option 4b)

❖ Combined outfalls:

- A combined surface effluent outfall for *industry, brine, aquaculture and cooling water* in the form of a 16 m wide canal bounded by two training walls extending to 10 m depth (Option 3b)
- A combined surface effluent outfall for *industry, brine, aquaculture and cooling water* in the form of a 16 m wide canal bounded by the eastern breakwater on one side and a training wall on the other flowing out at the bend in the eastern breakwater at 10 m depth (Option 2b)
- A combined surface effluent outfall for *industry, brine, aquaculture and cooling water* in the form of a 16 m wide canal bounded by the eastern breakwater on one side and a training wall on the other flowing out at the end of the eastern breakwater at 16 m depth (Option 4b)
- A combined surface effluent outfall for *WWTW, industry, brine, aquaculture and cooling water* in the form of a 16 m wide canal bounded by the eastern breakwater on one side and a training wall on the other flowing out at the end of the eastern breakwater at 16 m depth (Option 4b)

If separate outfalls are constructed, it must be ensured that WQGs are met before the point of effluent plume interaction. This must be determined using Delft-3D midfield modelling, which will be done at EIA phase. Midfield modelling will also be required to predict the suitability of water quality for abstraction and likely dilution values beyond the nearfield (Anchor Environmental, 2016).

All outfall options are positioned within the north-western 'Priority Conservation Area' (Figure vi). This impact cannot be avoided since the area stretches along more than 30 km of coastline from the Swartkops River mouth to the Sundays River mouth. Of the outfall options that meet WQG at the edge of the RMZ, none of the predicted effluent footprints interact with any of the sensitive areas identified in the marine specialist study (Figure vii). However, a combined surface outfall at 10 m depth (Option 3) may affect one of the proposed seawater intake sites (final positions to be determined at EIA phase via a midfield model). Due to the close proximity of outfalls to the shoreline, effluent plumes will experience bank interaction along the coast. Although, all pollutants for the discharge scenarios listed above are expected to be

sufficiently diluted at the point of bank interaction, concentrations should be reduced as far as possible at the end of pipe. This is especially important for trace metals, toxic pollutants and Total Suspended Solids (TSS). TSS concentrations should be reduced as far as possible by the filtering (using screens as similar to those used in WWTW) or settlement of effluent, especially for WWTW and industrial effluent. As a precautionary measure to mitigate risks associated with the vast number of pollutants that are likely to occur in industrial effluent as well as the uncertainty of industries that will discharge into the servitude, industrial effluent must not contain harmful chemicals, trace metals or other substances that exceed GDA standards. This would require land-based treatment at the respective industrial sites prior to discharge to the planned WWTW and/or the proposed marine servitude. Meeting this requirement will also protect against damage to WWTW bacterial treatment processes should industrial effluent be received and treated by the planned Coega WWTW (Anchor, 2016).

A geological survey of the area north-east of the Port showed that approximately 65% of the seafloor consisted of rocks, while surficial sediment sampling within the Port of Ngqura revealed very muddy sediments (CSIR 2010a&b *in* Anchor, 2016). As a result, the Port area is more susceptible to the absorption of contaminants than the area north-east of the breakwater and effluent outfall positioning should be designed to prevent effluent entrainment within the Port (Anchor, 2016).

The next step is to do a midfield model - the nearfield model results have identified a number of stand-alone and combined discharge options that are acceptable from an ecological perspective for the worst-case effluent characteristics. These options will be considered in consultation with coastal engineers and planners, and the most feasible alternatives will be assessed in a midfield model at EIA stage. Once the midfield model results are available, a final decision can be made on the preferred position of the proposed marine discharge servitude from a marine ecology and water quality perspective (including impacts on existing and planned beneficial users of the marine environment that rely on good water quality). Further consideration will be given to:

- Impacts on existing Port infrastructure and Port expansion plans
- Impacts on existing mining rights by PPC and others in the dunefields north-east of the Port
- Cost implications of constructing infrastructure within the two servitude areas
- Logistical and planning issues with regards to connection of the marine servitude with required land-based structures and infrastructure and proximity to industries that would use the servitude

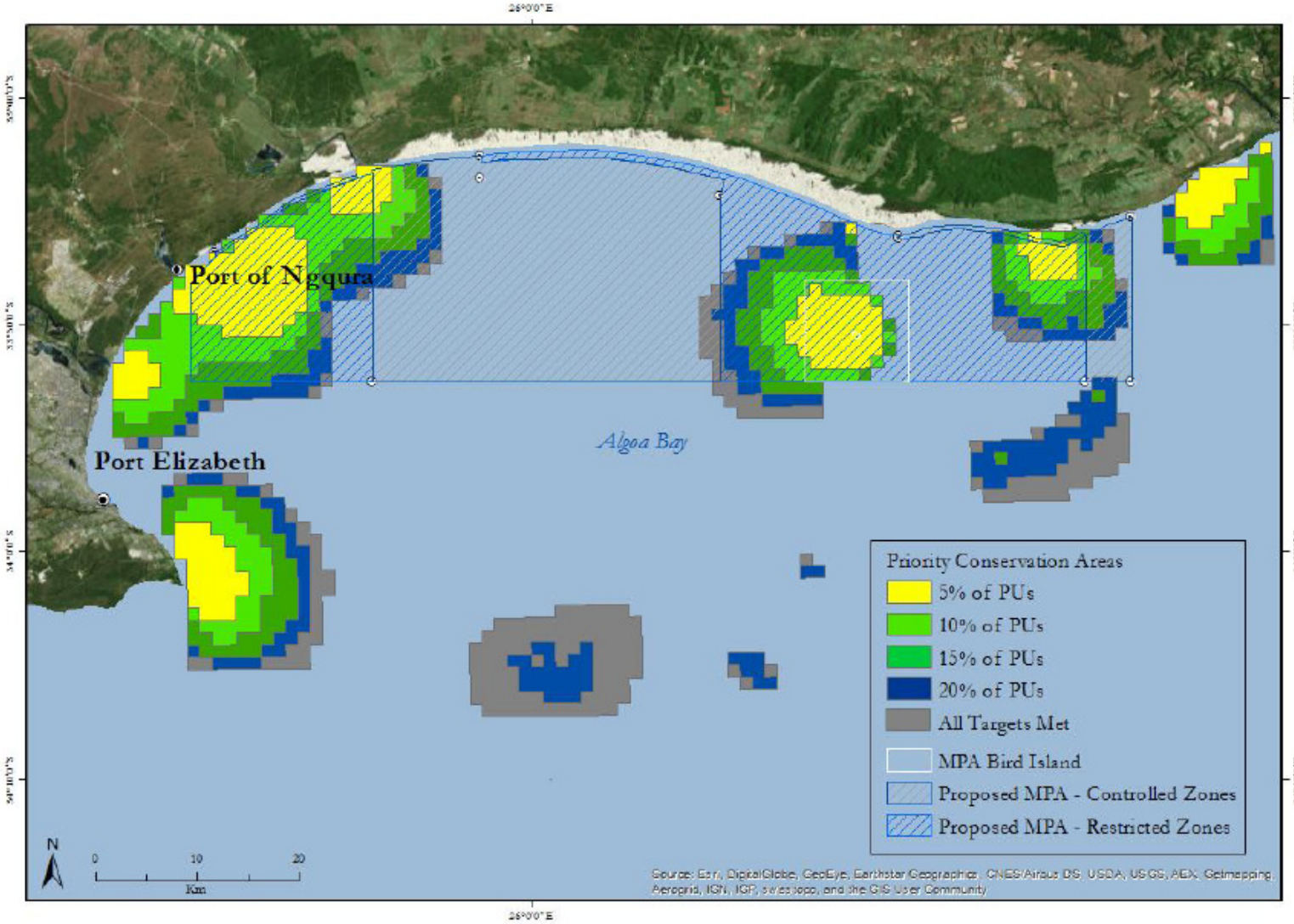

Figure vi: Priority conservation areas within Algoa Bay (data source: Chalmers 2012). The Port of Ngqura is situated within the Coega Industrial Development Zone (IDZ) and is located adjacent to the western border of the proposed Addo MPA (Anchor, 2016).

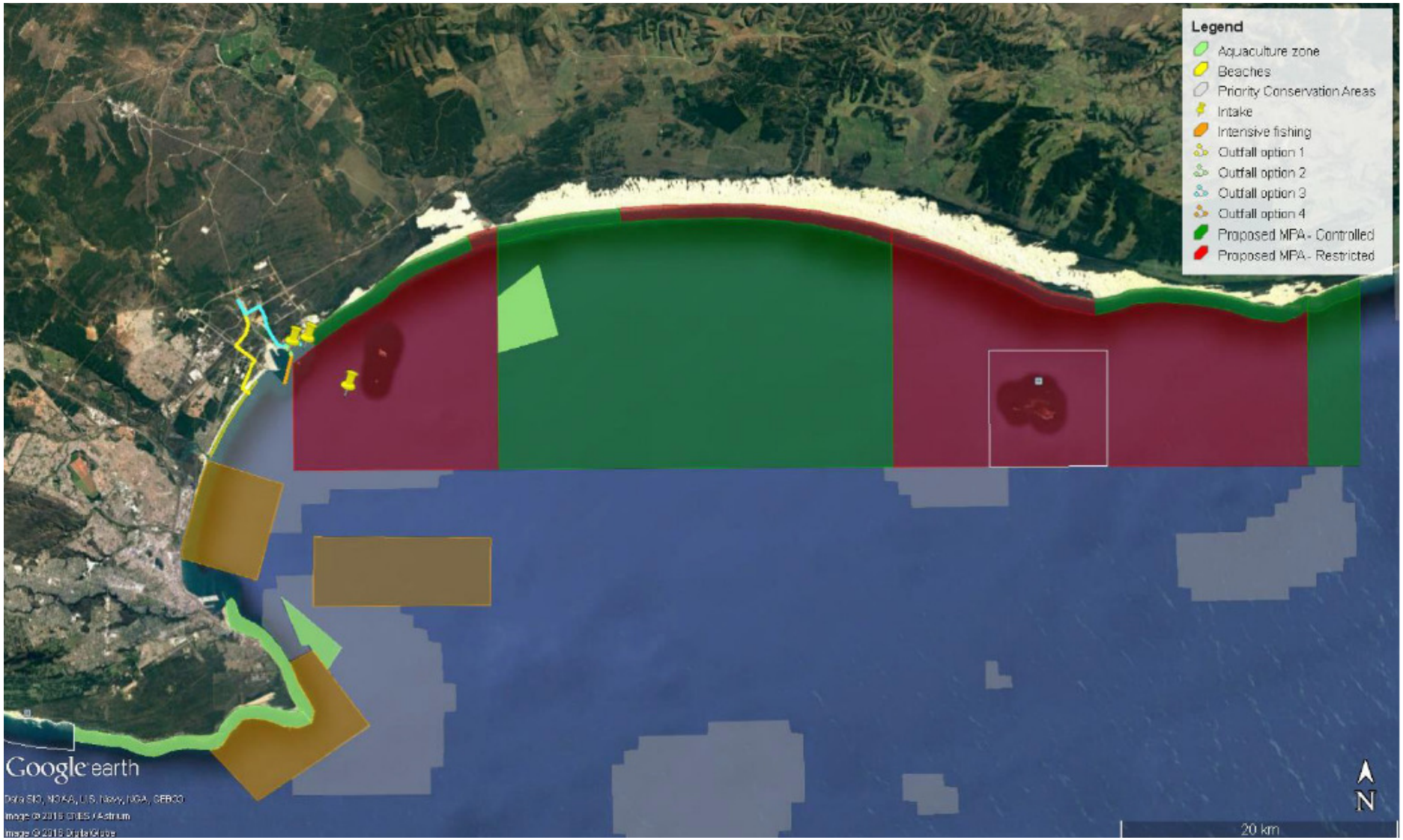

Figure vii: Sensitive areas within Algoa Bay include Marine Protected Areas, Priority Conservation Areas (e.g. offshore reefs), shoreline available for recreational use, aquaculture zones and areas in which recreational and commercial fishing is focused (Anchor, 2016).

1.5.4 Location Alternatives for the proposed land based servitude for the placement of infrastructure required to transfer seawater to industries, and effluent from industries to the marine discharge servitude

The nearfield dispersion model has provided a number of different discharge positions and scenarios where WQG at the edge of the RMZ for all pollutants would be met, and considered to be acceptable in terms of pollutant concentrations at the edge of the RMZ. The final position of the servitude will be determined at EIA stage once a midfield model has been done, and after consideration of the variables listed above. Chapter 2 describes possible land-based infrastructure that will be needed to transfer abstracted seawater to industries, and to transfer effluent from industries to the marine discharge servitude.

At Scoping Phase, a desktop screening exercise of available information on sensitive terrestrial and aquatic environments has been done to identify 'red-flags' of where the land-based servitude should NOT be positioned, as well as to advise on possible alignments for the servitude. Once the preferred position of the marine servitude is known, the position of the land-based servitude can be finalised; and detailed site-specific terrestrial ecological surveys of the area can be done. The following areas should be avoided when placing land-based infrastructure as far as practically possible:

- Areas below the coastal management line and/or within 100 m of the high water mark of the sea (unless the nature of the required structure necessitates it to be positioned in this area, in which case appropriate design mitigation must be used to prevent damage to structures or infrastructure as a result of storm surges, unusual high tides, coastal erosion etc.) (see Figure viii)
- Mobile dune process areas and/or areas sensitive to coastal erosion (see Figure viii)
- Areas that occur within CBAs designated in the IDZ OSMP
- Known and anticipated habitats used by damara terns (this would correspond with dunefield areas and duneslacks)
- Areas that occur within the 1:100 year floodline of the Coega River or 100 m of the Coega River/Estuary (whichever is greater) and 50 m of wetlands (see Figure ix)
- Areas where sensitive archaeological and paleontological sites have been recorded (see Figure x)
- Areas that would conflict with existing facilities or infrastructure (e.g. Port facilities) and / or rights (e.g. mining rights in the coastal dunefields) and planned expansions/infrastructure reflected on approved development plans (e.g. the IDZ development framework plan and OSMP that shows the position of stormwater infrastructure (Figure xi)

As part of the approved rezoning EIA for the IDZ, a services corridor has been designated. The alignment and positioning of required land-based infrastructure should co-incide with this corridor as far as practically possible. Further,

required infrastructure should be limited to disturbed areas such as along roadsides and adjacent to the boundary of approved sites. Possible positions of landward servitudes are given in Figure viii to Figure xi. The alignments and preferred positions will be finalised at EIA stage with input from design engineers to advise on items such as topography, pumping requirements, costs, flow rates etc.

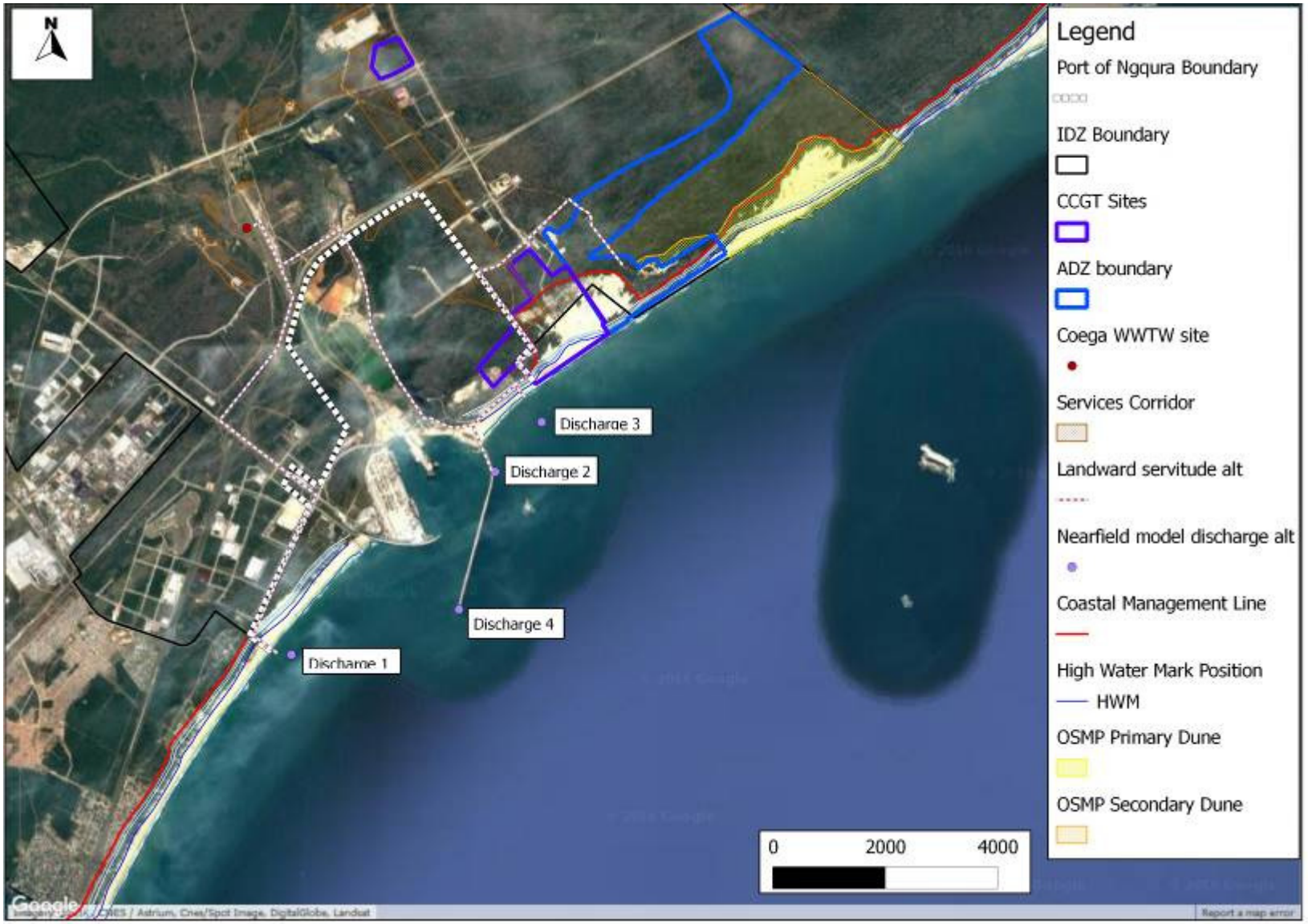

Figure viii: Aerial image showing the position of the coastal management line and high water mark of the sea as well as primary and secondary dunefields (as per the IDZ OSMP) in relation to the 4 alternative positions of the marine discharge servitude assessed in the nearfield model and the planned position of some of the known industries that will utilise the servitude.

Figure ix: Aerial image showing the 1:100 year floodline of the Coega River, the Coega Estuarine Functional zone and NFEPA and NMBM wetlands in relation to the 4 alternative positions of the marine discharge servitude assessed in the nearfield model and the planned position of some of the known industries that will utilise the servitude.

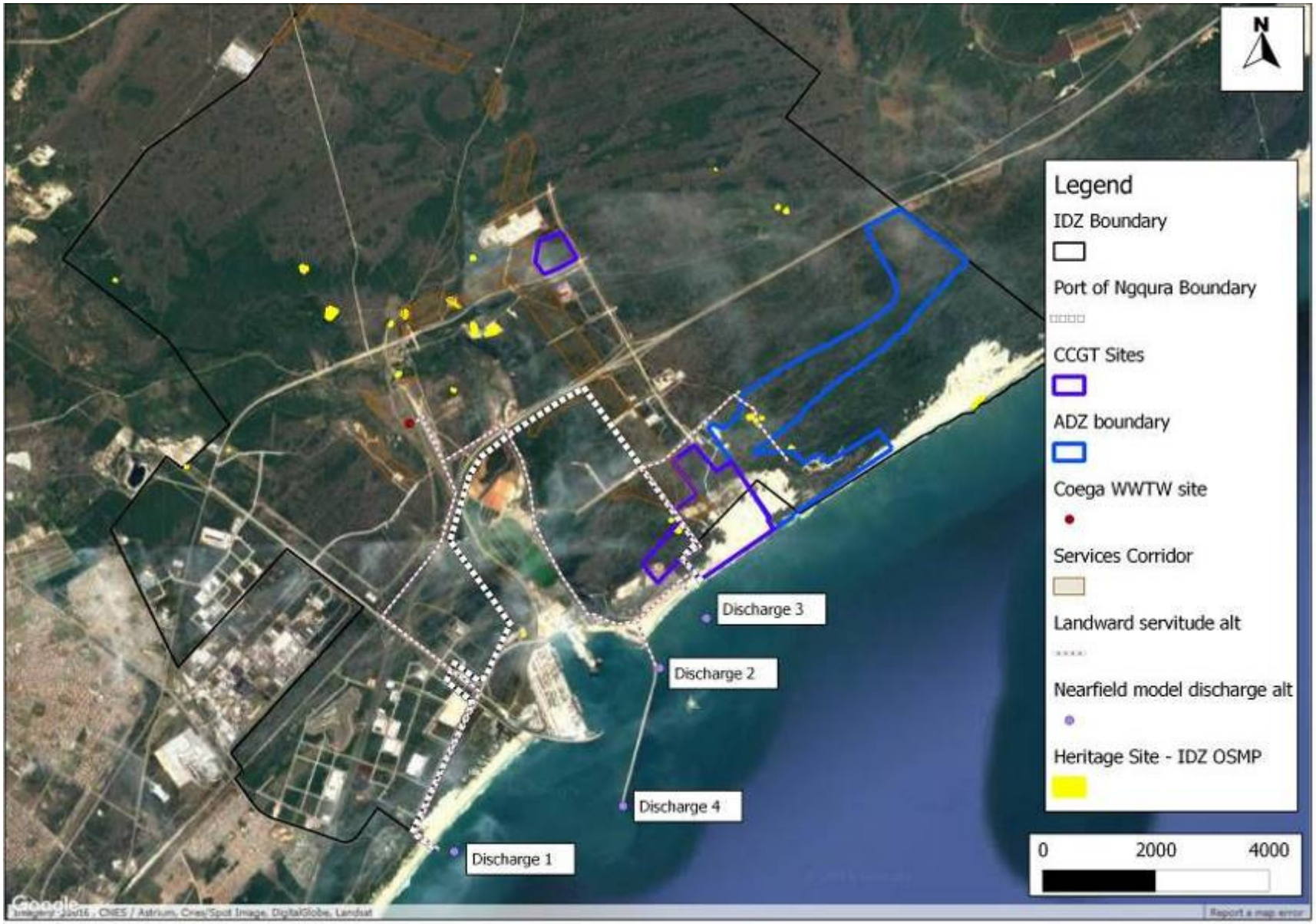

Figure x: Aerial image showing recorded archaeological and paleontological sites in relation to the 4 alternative positions of the marine discharge servitude assessed in the nearfield model and the planned position of some of the known industries that will utilise the servitude.

Figure xi: Aerial image showing the location of existing and planned structures, infrastructure and expansion plans in relation to the 4 alternative positions of the marine discharge servitude assessed in the nearfield model and the planned position of some of the known industries that will utilise the servitude.

1.6 Methodology

The specific methodology adopted in identifying and assessing impacts and project alternatives is described in Chapter 6 of the Scoping Report. The methodology was designed to meet the requirements of the EIA Regulations (2014).

1.6.1 Specialist Studies

The following specialist studies will be/have been done:

1.6.1.1 Baseline Marine Biophysical and Ecological Description and Assessment and Dispersion Model

Terms of Reference and Methodology

The marine impact assessment will include a team of specialists that will collectively provide information to describe the existing biophysical and chemical characteristics of the receiving environment and predict the impact of the proposed servitude(s) and related infrastructure on the natural environment, and recreational and commercial users (i.e. beneficial users). Baseline marine ecology and physical conditions will be used together with a marine dispersion model to advise the most suitable location of the servitude(s) and depth of discharge as well as dilution requirements. The study will provide a set of area-specific standards and water quality objectives to avoid and/or reduce potential impacts on the receiving environment and users thereof. A set of monitoring requirements for operational phase will be developed. The study will be designed to meet the criteria listed in the 'Assessment Criteria for a Waste Discharge Permit in terms of the ICMA'. The following studies will need to be done:

- Hydrodynamic and geophysical characteristics
- Biogeochemical processes (water column and sediment)
- Marine ecology
- Dilution and Dispersion model

The study will cover the following aspects:

- Describe the affected hydrographical and geophysical environment
- Provide a detailed description of the hydrodynamic processes (i.e. currents, water column stratification, water temperature variability and turbulence) for a range of environmental conditions (i.e. for various tides, waves, winds and air-sea fluxes as experienced in the affected marine environment)
- Provide a detailed description of the biogeochemical processes (water column and sediment)
- Modelling: The behaviour of the effluent plumes for discharge points will be evaluated and modelled under various scenarios using a near-field dilution model (with the software program CORMIX, MixZon Inc., USA) and a far-field

dispersion model (with the Regional Ocean Modelling System, Shchepetkin and McWilliams 2005). Modelling studies will be used to determine the nearshore and farfield ocean circulation patterns under a variety of wind conditions, the main driver of surface currents in the ocean. The dispersion and advection of the effluent will be simulated using a passive tracer approach, which will serve as proxy for the effluent. In addition, the dispersion and advection of temperature and salinity will also be simulated since the effluent will contain fresh water at a temperature different from that of the receiving marine environment. The three dimensional model will include the oceans response to, wind, tides, temperature stratification, salinity as well as heat fluxes to account for air-sea interactions. It is proposed that the behaviour of the effluent be simulated for a representative range of environmental conditions. **NOTE:** the near-field model has been done and the results are included in Chapter 5 of this DSR as they are used as part of the comparative assessment of alternatives to select preferred servitude areas for more detailed assessment at EIA stage (i.e. via a midfield model).

- Marine ecological assessment (desktop study):
    - Production of a geo-referenced map showing the distribution of the various habitat types and the associated biological resources that highlights areas with:
        - Biological resources of conservation importance
        - Biological resources targeted for exploitation
        - Biological resources that have been lost, or are stressed, as a result of anthropogenic influence
        - Biological resources endemic to that area.
    - A list of dominant species, species of particular conservation importance and species targeted for exploitation, with best estimates of spatial and temporal variability.
    - Likely migration routes and patterns of above mentioned species in relation to estuary mouths in the region (Coega, Sundays, and Swartkops estuaries)
    - List of biological resources that are potentially sensitive to anthropogenic influences already present in the area and/or that may be sensitive to constituents present in the proposed wastewater discharge, and quantification of cause-and-effect relationships as best as possible (i.e. to refine the ecological quality objectives).
    - Assessment of the likely impacts of the proposed discharge on the habitat of the species identified above

1.6.1.2 Mid-field Dispersion Model

In addition to the above-mentioned far- and near-field modelling studies, midfield modelling will also be required to predict the suitability of water quality for abstraction and likely dilution values beyond the nearfield. Results of the nearfield model will be used to narrow down the options by finding the most suitable depth and type of discharge at selected areas. Only the options with acceptable dilution at the edge of the mixing zone will be carried across to the midfield model.

Terms of Reference and Methodology

- Assess the dispersion of effluent discharged from the Coega IDZ in terms of changes in key water quality parameters (e.g. temperature, salinity, suspended solids and a conservative tracer) using an appropriate wave refraction and hydrodynamic model (SWAN, Delft3D-WAVE and FLOW, MIKE21);

- Determine levels of these water quality parameters at the edge of the mixing zone and proposed water intake localities. The midfield model must investigate/assess dispersion plume movement and water quality at the edge of the mixing zone. That will be overlaid on suggested abstraction points to determine if there will be abstraction of poor quality water. The results will inform the final position of the seawater abstraction points within the abstraction servitude(s);

- Advise on the position of water intake localities for anticipated uses;

- Advise on the position of the discharge servitude(s). Input should be given to engineers on the type and depth of discharge required to achieve desired dilution and dispersion;

- The near-field parameters (e.g. types of effluent, changes in water temperature and salinity as well as initial dilutions) must be determined in consultation with Anchor Environmental Consultants. The results will enable a marine ecologist to assess the impacts of the discharges on the various ecosystems as well as to provide information on the best location for the intakes (outfalls) and depth of intake (discharge).

- The hydrodynamic model will be used to determine the near shore wave conditions and wave energy dissipation. The hydrodynamic model will thus be three-dimensional and include the effects of waves, wind, tides, temperature stratification, salinity and heat fluxes.

- Twelve scenarios will be simulated, as determined by a specific location (horizontal and vertical position), a specific discharge rate, and associated discharge parameters. The environmental conditions for a scenario will include a winter, summer and a calm period. (Anchor Environmental will provide a profile for the effluent to be modelled for each scenario (maximum 12 depth/location/profile scenarios).

- The study will need to confirm that the water quality at the proposed aquaculture / seawater cooling intakes is not impaired by the proximity of the proposed discharges and associated effluent plumes.

- The modelling must address the worst case scenario and characterise the extent and duration for which there is non-compliance with the required dilutions governed by applicable water quality guidelines and / or the water quality requirements of other users in the region.

- The effluent dispersion modelling study must quantitatively inform the associated marine ecological assessment.

- The specialist report must include:

    - Identification and brief summary of any applicable legislation and/or license/permit applications that may be required or that are relevant to the specialist study being undertaken;

- An assessment of the compliance of the effluent discharges with receiving water quality guidelines, the extent and duration of the exceedance of these guidelines and any potential effects of the effluent discharges on water quality at the proposed aquaculture / seawater cooling intakes and other beneficial users (current and known/likely future);
- Recommendations on mitigation measures required to minimise identified impacts;
- Inputs into the EMP for the proposed construction and operation of the marine discharge structure

1.6.1.3 Terrestrial Ecology Assessment (Dr Niels Jacobsen)

Terms of Reference

- Describe the vegetation on the study area in terms of its status and composition; and identify and locate threatened and protected species
- Provide a vegetation sensitivity map of the study area, indicating no-go areas for development planning
- Do a Faunal Assessment (mammal, avifauna, amphibian and reptile)
- Assess alternative locations/sites for all proposed infrastructure
- Identify red-flags and/or fatal flaws
- Identify and assess impacts of the landside component of the development on the terrestrial environment (including the coastal dune system)
- Provide mitigation measures to reduce the significance of anticipated impacts
- Provide input into the EMP
- Assist with responding to comments raised by IAPs

Methodology

The survey will be limited to the terrestrial environment above the high-water mark of the sea, but will include coastal dunefields.

A desktop review of all available information for the study area will be done to inform the comparative assessment of the location / alignment of the landward servitude and infrastructure required to transfer abstracted seawater to users, and effluent from industries to the marine servitude. The desktop review will access the following information:

- The Open Space Management Plan for the Coega IDZ
- The NMBM Bioregional Plan

- The NMBM Coastal Management Program
- The East Cape Biodiversity Conservation Plan
- The location and extent of watercourses and wetlands mapped as National Freshwater Ecosystem Priority Areas
- The location and extent of wetlands mapped for the NMBM area
- The location and description of national threatened ecosystems (in terms of the NEM: Biodiversity Act)
- Description and threat status of the national vegetation type (Mucina and Rutherford)
- National soil type descriptions and erosivity risk
- Land cover maps
- The Custodian of Rare and Endangered Wildflower's database of the location of threatened floral species
- Information collected by the ECO for the IDZ and Port of Ngqura on the location and status of threatened flora and fauns (e.g. the damara tern)
- Information from specialist studies done as part of EIAs for projects planned in the area

Once a preferred servitude has been selected, a detailed site-specific terrestrial ecological survey of the area will be done. The area will be traversed on foot and by vehicle to assess the condition of the habitat and at the same time compile an inventory of plant and animal species observed or deduced as occurring on the sites with specific reference to rare and threatened species.

1.6.1.4 Paleontological Impact Assessment (Dr Rob Gess)

Terms of Reference

- Describe the type and location of known fossil occurrences in the study area.
- Confirm the importance of any palaeontological features within the study area.
- Specify the potential impact as well as potential cumulative impact of the development.
- Provide management actions (mitigation) for inclusion in the EMP for the construction of the marine pipeline servitude.
- Outline additional management guidelines

Methodology

The survey area will be limited to the area above the high water mark of the sea. The study will include a desktop review of available information for the survey area, including all alternative sites that will be assessed in the EIA process. The desktop review, together with the specialist's knowledge of the area will assist in the selection of the preferred area for the required marine and land-based servitude and associated infrastructure, together with the suite of other specialist studies that will be done. Once the preferred location of the discharge servitude(s) has been determined by the dispersion model; a detailed site-specific paleontological assessment of the area will be done by Dr Gess.

1.6.1.5 Marine and Underwater Cultural and Archaeological Impact Assessment (African Centre for Heritage Activities: Jonathan Sharfman and Vanessa Maitland)

Terms of Reference

- Do a desktop survey of shipwrecks in the area of the Port of Ngqura through study of available databases and historical records.
- Do a desktop survey of affected maritime heritage sites within the proposed work area.
- Do a magnetometer survey and analysis of the affected area, both underwater and on the beach.
- Diver searches on any viable results from the underwater magnetometer survey.
- Full analysis and report on the findings of the fieldwork with probability and significance ratings

Methodology

- The survey will be done of the selected preferred marine servitude area, and includes the marine environment, the nearshore and surf-zone and coastal dunefields.
- A desktop Heritage Impact Assessment of the maritime cultural heritage is the first step in ascertaining the probability of finding maritime and underwater cultural heritage sites in a proposed development area.
- A full analysed magnetometer survey needs to be conducted. The magnetometer is conducted using 20 meter run lines over the proposed area.
- The magnetic anomalies noted are then mapped and analysed. These anomalies are examined through diver searches and the use of an underwater metal detector.
- Underwater heritage sites are mapped on a GIS platform
- As the proposed development area runs through the surf zone and dune area, these areas also need to be surveyed.

- The surf zone is surveyed using a magnetometer towed behind a jet ski. This methodology allows the archaeologists to check the entire inshore, shallow zone.
- The dune area is also surveyed using a magnetometer towed behind a quad bike. The use of a quad bike as opposed to a bigger vehicle reduces the damage to sensitive dune areas.
- The anomalies found in the surf and dune zones are mapped on a GIS platform. Using a metal detector, an attempt will be made to ascertain the depth of the anomaly.
- If the project design requires it, the anomalies can be inspected using a sand probe. The sand probe informs on the depth and composition of a magnetic anomaly. This may be necessary if the proposed pipeline were to be installed below ground, but does not form part of this quote

1.7 Potential Impacts

The following potential impacts have been identified for further study in the EIR:

Impact	Phase
1. Biodiversity impacts - terrestrial	
a. Disturbance to and loss of habitat and associated floral species, including threatened / protected species. Clearing of vegetation will take place for the installation of infrastructure required to transfer abstracted seawater to respective users, as well as that needed to transfer effluent from industries to the marine servitude(s). Further, vegetation clearing may be needed for construction camp sites, access roads, materials and stockpile storage areas etc.	Construction and Operational (if rehabilitation not successful)
b. Impact on ecological processes that are necessary to facilitate biodiversity persistence through disturbance to a critical biodiversity area and sand movement areas – the coastal dunefield on either side of the Port of Ngqura is part of a greater sand process corridor stretching from the Sundays to the Swartkops Rivers, and is part of the greater Alexandria dunefield which is one of the largest active dunefields in the world. Part of the primary and secondary dunefields on the north-eastern side of the harbour in Zone 10 of the Coega IDZ are classified as critical biodiversity areas in the Coega IDZ Open Space Management Plan (OSMP).	Construction and Operational (if rehabilitation not successful and/or if hard structures are placed in dynamic coastal areas such that sediment dynamics are altered/impacted)
c. Loss of/disturbance to habitat for fauna in areas where infrastructure will be constructed. This is particularly important in proximity to the coastal dunefields that provide habitat for threatened species including breeding Damara terns, as well as Duthie's golden mole (*Chlorotalpa duthiae*) and the pygmy hairy-footed gerbil (*Gerbillurus paeba exilis*) which occur in dune thicket	Construction and Operational
d. Presence of construction vehicles and staff may ***disturb and/or kill fauna***	Construction
e. Disturbed areas are prone to ***invasion by alien floral species***	Construction and Operational (if not properly controlled)
f. The presence of construction staff and activities on site creates certain ***risks*** if not properly managed: e.g. fire, poaching of fauna, trampling of vegetation in areas not designated for development	Construction
2. Biodiversity impacts – marine	
a. Loss of intertidal and subtidal biota – Construction of infrastructure in the marine servitudes will require heavy movement of vehicles and use of machinery on the beach and in the intertidal and subtidal sandy and rocky substrate, extending to a distance of approximately 2 km out to sea (depending on outcomes of the midifield model). Assuming a servitude width of 300 m, the total area falling within the footprint of the discharge servitude will be ~0.6 km^2. A similar disturbance area can be expected for the abstraction servitude. The construction of the servitudes will result in disturbance of the sandy and rocky intertidal and subtidal surfaces and associated macrofauna and flora will probably experience high levels of mortality in the affected area. The sandy and rocky intertidal habitat in the area assessed in the baseline marine ecology study is not particularly important in terms of biodiversity conservation as no endemic or endangered species are known from this area, however it provides habitat for juvenile fish and abalone. In contrast, the subtidal reef (especially in the vicinity of outfall option 1 assessed in the nearfield model) has been identified as a biodiversity hotspot and is earmarked as a habitat of conservation priority (Chalmers 2012, Laird *et al*. 2016). In addition, these reef habitats are important for a number of commercially and recreationally important fish and shellfish species (Anchor, 2016)	Construction
b. Barotrauma of marine fauna as a result of blasting - The energy of detonating an explosive is released as physical, thermal and gaseous products. The thermal and detonation impacts associated with an explosion are important to consider near the blast (3 to 10 m), while the impacts of shockwaves, noise and gaseous chemical products are likely to be experienced at greater distances from the blast. Explosive charges in, adjacent to, or beneath a water column produce pressure waves or shockwaves that pass into the water medium. Shockwaves produced by an explosive detonation are "converted suddenly into potential energy of compression and kinetic energy of outward motion in the water medium" (Kramer *et al*. 1968 *in* Anchor, 2016). Shockwaves have harmful and often fatal impacts on organisms with gas cavities; for example swim bladders in fish and sinus cavities and lungs in birds and mammals.	Construction

Impact	Phase
Results of several experiments have shown that underwater blasts cause lung haemorrhages, gastrointestinal lesions and ruptured eardrums in mammals; pulmonary haemorrhages, coronary air embolisms and ruptured air sacs, eardrums, livers and kidneys in birds (Yelverton *et al*. 1973 *in* Anchor, 2016); and ruptures of air bladders, organs and intestines as well as broken ribs in fish (Aplin 1947, Yelverton *et al*. 1975, Wright 1982 *in* Anchor, 2016). Marine invertebrates do not possess gas filled cavities; therefore, the direct impacts of shockwaves produced by blasting are predicted to be negligible. The impacts of underwater blasting on marine fauna are related to the size of the explosion, the type of explosive used and the water depth (Anchor, 2016). Fauna likely to be at risk from blasting activities at the proposed site include coastal fish species, marine birds, sharks and mammals. The marine habitats in the vicinity of the site are not unique to the site, are relatively well represented along adjacent sections of coast and are protected within nearby MPAs (Sardinia Bay MPA and the Bird Island MPA which is likely to be expanded into the Addo MPA in 2017). The fish kills that may result from the blasts are unlikely to result in an irreplaceable loss of resources and should be replaceable following recruitment from adjacent areas. A potential problem may arise where several blasts are triggered throughout the day as predators (birds, fish and mammals) are likely to be attracted to the area to feed on fish killed by the initial blast. This should be mitigated by limiting blasting activities to one detonation per day. Kills of marine mammals as a result of blasting must be avoided due to the importance of the area for cetacean species (Anchor, 2016).	
c. Noise disturbance to marine fauna - Noise will be generated during construction by drilling and blasting activities. Cetaceans have highly developed acoustic sensory systems that enable them to communicate, navigate, forage and avoid predators in the marine environment where hearing is a much more important sense than vision. Increased noise levels may mask acoustic signals or reduce the range at which mammals can detect the signals. This may impact their ability to maintain biological functions such as feeding, mating and protecting and raising young. Marine mammals are likely to avoid the construction area and may potentially change behaviour or become stressed due to noise produced by blasting and drilling. There are high densities of southern right whales supported in Algoa Bay over the winter and spring period. Migrating humpback whales travel through the area with bi-annual peaks in abundance during May-June and November-December and the inshore area along the western shore of Algoa Bay is an important habitat for endangered Indo-Pacific humpback dolphins. Due to the well documented sensitivity of cetaceans to noise disturbance (particularly explosions), the intensity of impacts due to construction noises in the construction area during this period are potentially considerable and mitigation measures must be taken (Anchor, 2016). The St Croix and Bird Island group provide critical habitat for threatened bird species (and are listed as an Important Bird Area). The islands support globally significant populations of Cape gannets (*Morus capensis*), African Penguins (*Spheniscus demersus*) and Roseate Terns (*Sterna dougallii*). It is important that noise and disturbance from construction activities does not impact on the islands and associated biota.	Construction
d. Reduced water quality from construction activities (e.g. drilling and blasting) are likely to generate sediment plumes, which will increase the turbidity of the water and settle on and cover the surrounding seafloor, potentially smothering biota and interfering with organism respiration and feeding. Recommended mitigation includes using NoneX for all blasting purposes. This rock breaking processes produces a much courser fragmentation when compared to the smaller particles produced by explosives. Furthermore, such detonations on land have been reported to produce negligible dust and fumes. Although the use of this blasting technology will result in the release of gases into the water column, these are not noxious as the cartridge is oxygen balanced to produce carbon dioxide, nitrogen and steam (Anchor, 2016).	Construction

Impact	Phase
Reduced water quality as a result of discharge of effluent to the marine environment via the marine discharge servitude: Due to the high diversity of habitats, marine organisms and seabirds in Algoa Bay (several of which are of conservation concern), significant biodiversity importance is attributed to many areas in the Bay (Chalmers 2012 *in* Laird *et al.* 2016[2]). The St Croix Reserve and Bird Island Marine Protected Area (MPA) off Woody Cape make a significant contribution to biodiversity conservation, particularly for birds and offshore island habitat (Barnes 1998, Chalmers 2012 *in* Laird *et. al.* 2016). However, large areas with high biodiversity conservation importance are afforded no protection. The National Protected Areas Expansion Plan (SANBI 2009) proposed an MPA in Algoa Bay, which would adjoin the Greater Addo Elephant National Park (GAENP) and improve biodiversity conservation considerably. The proposed GAENP MPA would be the first in South Africa to incorporate a bay environment, exposed rocky headlands and offshore islands. Detailed research and planning for the proposed MPA began in 2006, and has culminated in the current proposed zonal boundaries for the MPA. The MPA is with the Minister for gazetting. It is key that effluent discharged via the marine servitude does not intersect with or negatively impact on the MPA. Increased nutrient levels in receiving waters can encourage plant growth, which may lead to algal blooms and local eutrophication. An increase in seaweed on intertidal rocky shores and foul smelling subtidal sediments are often indications of enrichment. There are three forms of nitrogen that are commonly measured in water bodies: ammonia, nitrates and nitrites. Total Kjeldahl nitrogen is the sum of organically bound nutrients, while total nitrogen is the sum of inorganic and organic nutrients. Organic nutrients include nitrogen, ammonia (NH_3) and ammonium (NH_4^+), while inorganic nutrients include nitrates (NO_3) and nitrite (NO_2). Organic nutrients need to be broken down into inorganic nutrients before being absorbed by organisms; therefore, inorganic nutrients can be described as being readily available sources of energy (Anchor, 2016). Nitrogen is an essential nutrient for plants and animals; however, an excess amount of nitrogen may lead to low levels of dissolved oxygen in the water (anoxia) and may negatively affecting organisms within the marine environment. For example, a surplus of ammonia and organic nitrogen in a body of water can result in eutrophication and lead to prolific algal growth. Sources of nitrogen include wastewater treatment works (WWTW), runoff from fertilized lawns and croplands, failing septic tank systems, and input from processing factories, aquaculture facilities and industrial discharges. Thus ammonia and the associated ions are required parameters for regulatory reporting at many treatment plants to assist in the monitoring of operations and effluent quality. Ammonia is highly toxic to most organisms and even low levels can cause toxicity issues for animals. Increased concentrations of nitrate (>30 mg/L) can have serious impacts on aquatic organisms as it inhibits growth of some organisms and promotes that in others, and can cause a number of stresses on aquatic life. Increased phosphates can also lead to enrichment and potentially eutrophication, which will result in significant changes to species composition and species diversity in the affected area. Increased levels of nitrates and phosphate can result in an increased abundance of certain algal species and may facilitate the generation of harmful algal blooms (Anchor, 2016). The predicted increase in nutrient concentrations within the combined effluent stream from the marine discharge servitude (i.e. from the 4 anticipated industrial types) may result in higher enrichment levels than currently experienced in the nearshore region of Algoa Bay if not sufficiently diluted within the required mixing zone (RMZ). The nearfield model done by Anchor showed that the 'worst case' discharge volume of the proposed aquaculture facilities (960 megalitres per day) and the 'worst case' ammonia concentration of 50 mg/L is likely to result in a TDZ of approximately 0.37 km^2. This footprint equates to roughly 0.03% of Algoa Bay, which is a relatively small area that may potentially be affected by ammonia toxicity. Aquaculture effluent is expected to be slightly buoyant (due to elevated temperatures), which is likely to reduce impacts on benthic organisms, while	Operational Phase

[2] Laird, Clark and Hutchings. 2016. Description of the Affected Environment: Marine Specialist Report for the Proposed Marine Pipeline Servitude at Coega Industrial Development Zone. Project no. 1563 prepared for CEN and CDC by Anchor Environmental Consultants. Pp 69.

Impact	Phase
larger mobile organisms are unlikely to be affected. It is possible that the frequency of Harmful Algal Blooms (HABs) may increase as a result; however, due to relatively rapid dilution at the discharge options that were considered in the model, this is unlikely. This will be investigated in more detail at EIA stage and via the midfield model. Possible discharge of heated effluent via open raceways may present increased risk of algal blooms (Anchor, 2016). Changes in water temperature can have a substantial impact on marine species and ecosystems, with the effects either influencing the physiology of the biota (e.g. growth and metabolism, reproduction timing and success, mobility and migration patterns, and production); and/or influencing ecosystem functioning (e.g. through altered oxygen solubility). Industry types likely to discharge effluent that may increase temperatures in the receiving environment include those which use seawater for cooling purposes (e.g. the planned CCGT plant) and WWTW (Anchor, 2016). High levels of suspended solids have been known to cause growth deficiencies in marine organisms and in some cases lead to mortalities should smothering of benthic habitats occur. High TSS levels also increase turbidity and decrease light penetration which impacts on primary productivity, respiration and feeding in many marine species. Elevated turbidity also impacts negatively on squid fishing catch rates and the popularity of reefs for SCUBA diving. The nearfield model determined that TSS levels in effluent from the discharge servitude is likely to meet the WQG set in the marine specialist study (5 mg/L). For aquaculture effluent, the Canadian Guideline is likely to be met 344 m from the point of outfall, which exceeds the 300 m RMZ by 44 m. This must be considered in light of the current natural variation in TSS levels in the receiving environment (Laird and Clark, 2016). Faecal pollution contained in, for example, untreated sewage or storm water runoff, may introduce disease-causing micro-organisms into coastal waters. These pathogenic micro-organisms constitute a threat to water users and consumers of seafood. Due to the extensive use of Algoa Bay by non-consumptive (swimmers, surfers, divers etc.) and consumptive (fishers) coastal water users, it is critical that contamination of near shore water is prevented (Anchor, 2016). Sufficient dissolved oxygen (DO) in sea water is essential for the survival of the majority of marine organisms. Excessive discharge of organic effluent via municipal sewage, factory waste, and/or storm water drains often results in low oxygen concentrations in nearshore waters. Following the depletion of oxygen in a water body, anaerobic bacteria that survive without oxygen continue the decay process. Microbial breakdown of excessive organic matter further depletes oxygen levels and anaerobic digestion by hydrogen sulphide producing bacteria can cause “black tides” when the large plankton blooms sink and decompose. Occasionally this results in mass mortality of numerous marine species. DO levels have not been modelled in the nearfield model as waves, wind, storm events etc. all affect DO levels in the marine environment. In addition, no clear guidelines exist for DO offshore, although levels below 3 mg/L are not suitable for most species of fish. DO levels along the coastline within the study area are expected to be high as a result of high wave action. As coastal waters are generally highly saturated, DO concentrations in the effluent entering the sea are likely to have a very minimal effect on the marine biota (Anchor, 2016). The release of a considerable amount of freshwater into the marine environment (from cooling plants and WWTW) will lower the salinity in the receiving environment and could negatively impact the fauna and flora in the immediate vicinity of the impact site. Should the effluent plume meet the shoreline before sufficient dilution is achieved, intertidal organisms which are accustomed to increased salinity due to evaporation during tidal fluctuations should not be affected. These organisms have the ability to ‘shut down’ by retracting into tubes or shells and closing apertures. Furthermore, larger mobile organisms inhabiting the water column, such as fish are able to move away from temporary unfavourable conditions that	

Impact	Phase
may arise at the impact site. The localised change in salinity of the receiving waters is not expected to result in significant disturbance or mortalities of marine biota, nor is it likely to negatively impact on industrial and recreational uses of the area (Laird and Clark, 2016). Besides the contaminants listed above that can be measured and for which water quality targets have been set, there are other variables that may be discharged to the marine environment that may impact on biota and sensitive habitats. These include hormones and pharmaceuticals in WWTW effluent, CIPs chemicals from cleaning pipelines used for desalination and other plants, anti-biotics and other dosing agents used in aquaculture industries, pathogens from aquaculture facilities etc. Deposition of pollutants: As pollutants are strongly associated with the cohesive fraction of sediment, pollutant deposition is most likely to occur where effluent plumes come into close contact with a muddy benthic environment. Industrial and WWTW effluent are the most likely to contain trace metals that may attach to sediment if allowed to settle. CSIR (2010a) conducted a geophysical survey of the area north-east of the Port of Ngqura which showed that approximately 65% of the seafloor area consists of rocks with unconsolidated sediment cover of less than 0.5 m (CSIR 2010a *in* Anchor, 2016). Surficial sediment sampling was done within the Port of Ngqura in 2010 (CSIR 2010b). Sediments were found to be very muddy, indicating that the Port is a depositional area for fine sediments. Therefore the Port area more susceptible to the absorption of contaminants than the area north-east of the eastern breakwater. To limit the possibility of pollutant deposition, effluent outfalls should be positioned far enough away from the Port entrance to prevent entrainment within the Port. This distance must be determined via mid-field modelling at EIA stage. Trace metals in a combined effluent outfall are expected to be low. Trace metal pollution and deposition can be reduced by ensuring that effluent is not drawn into the Port as a result of water movement created by currents and abstraction, and ensuring that concentrations of trace metals and other contaminants do not exceed end of pipe regulatory limits (i.e. by means of effective land-based treatment prior to discharge) (Anchor, 2016).	
e. Waste Management - Construction activities will involve the use of heavy vehicles and machinery in the coastal zone and there is potential for hydrocarbon spills. Suitable management mechanisms must be implemented to mitigate this risk and contingency plans in the event of accidental spills must be prepared. Solid waste from construction activities may include rubble, excavated material, bricks, wire, packaging, concrete or cement, etc. The problem of litter entering the marine environment has escalated dramatically in recent decades, with an ever-increasing proportion of litter consisting of non-biodegradable plastic materials. South Africa has laws against littering, both on land and in the coastal zone, but these laws are seldom rigorously enforced. Objects which have a particular impact on the marine fauna include plastic bags and bottles, pieces of rope and small plastic particles (Wehle and Coleman 1983 *in* Anchor, 2016). Large numbers of marine organisms, including fish and marine mammals, are killed or injured by becoming entangled in debris (Wallace 1985 *in* Anchor, 2016), while others, including seabirds, are at risk through the ingestion of small plastic particles (Shomura and Yoshida 1985 *in* Anchor, 2016). All reasonable measures must be enforced to ensure that there is no littering by construction workers (Anchor, 2016). Solid waste from in operational phase would primarily emanate from maintenance of screens on intake infrastructure and from pumpstations. This would mostly be dead organic material and needs to be disposed of responsibly.	Construction Operational Phase
f. Changes to the sediment dynamics and localised currents and wave action as a result of the placement of physical / hard structures in the dynamic coastal environment	Construction and Operational
g. Impacts on the ***coastal protection zone and coastal public property*** as defined in the Integrated Coastal Management Act	Construction and Operational

Impact	Phase
h. Entrainment of marine organisms in the abstraction infrastructure – certain marine species, especially those that are smaller than the selected screen size for screens/mesh on abstraction infrastructure, may be entrained in the abstracted seawater, and will ultimately die off.	Operational phase
3. Surface and groundwater impacts	
Potential contamination impacts from construction activities on surface and groundwater will be assessed – these typically result from concrete and cement spills, hydrocarbons from generators and construction vehicles, fuel storage and transferring, and paints.	Construction
Wetlands mapped on the NFEPA for the study area are mostly in and around the Coega estuary and on the north-eastern extent in Zone 10. There are also dune slack wetlands in Zone 10 in particular that have not been reflected on the NFEPA system. All planned structures and infrastructure should avoid disturbing wetlands as far as possible as these are important habitats for a diversity of fauna and provide important ecosystem services (e.g. attenuation and filtration of runoff). A water use licence will be required for all activities within 500 m of wetlands. The impact of construction and operational phase activities on surface water flow and wetland functioning will be assessed.	Construction and Operational
The possibility of leaks from the discharge pipelines transferring effluent to the marine discharge servitude and the impact this may have on water quality in wetlands and groundwater will be assessed.	Operational
4. Soil disturbance and erosion	
a. As vegetation is cleared and soils are disturbed, the potential for erosion increases. Erosion risk will be exacerbated by leaving soils exposed for longer periods and during extreme weather events. Soils in the study area are sandy and prone to erosion. Activities in coastal dunefields are a high risk	Construction and Operational
5. Air pollution	
a. Exposed soils will generate dust especially during windy conditions. Dust may also be generated by transporting fine materials, offloading materials, blasting. This may impact the visual quality of the area	Construction
7. Archaeological and Paleontological impacts	
a. Specialists will be appointed to determine the archaeological and paleontological sensitivity of the terrestrial, marine and built environment and assess impacts of establishing the servitude(s) and associated infrastructure on these environments.	Construction
8. Socio-economic impacts	
a. Positive impacts	
a.i. Employment creation and skills development	Construction
a.ii. Provision of an integrated and efficient means of abstracting seawater and discharging effluent for industries wishing to establish in the Coega IDZ – i.e. attracting investors and saving costs as a result of integrated planning and sharing of infrastructure.	Operational
b. Negative impacts	
If treated effluent does not meet the required standards for discharge to the coastal environment and pollution occurs, this could have negative impacts on commercial and recreational use of the area, and indirectly tourism. This is to be assessed by means of a marine dispersion model	Operational

Impact	Phase
Construction of the discharge and abstraction infrastructure in the coastal and marine environment may result in a temporary disruption to use of the area and disturbance to existing commercial operations (e.g. Port operations, commercial fishing, tourism operations)	Construction
Construction vehicles and activities will create noise and may be a nuisance to existing tenants in the IDZ and Port	Construction
9. Climate change impacts: influence of unpredictable / erratic physical conditions on plume dilution and dispersion as well as the placement and integrity of physical structures/infrastructure in the dynamic coastal environment	Operational Phase
10. Visual impacts: construction will take place on the shoreline which is visible mostly to people from boats. Tour-based operations are likely to be impacted by change in visual quality especially during construction when high vehicle numbers and presence of construction staff in the coastal environment is expected. During operational phase, visual impacts could result from visible plumes from the air and also to boat users.	Construction and Operational Phase
11. Cumulative Impacts	
a. Increased pressure on the marine environment of Algoa Bay as a result of discharge of effluent and additional hard structures in the dynamic coastal zone.	Operational

1.8 Public Participation

Public participation was done in accordance with Chapter 6 of the EIA Regulations (2014) and guidelines published in assistance of interpretation of these regulations. Pre-application notices were placed in the media (*The Star,* the *Herald* and *Die Burger),* on the CDC's electronic notice board, and were sent out as Background Information Documents (BIDs) to identified stakeholders (refer to Chapter 9 for the Interested and Affected Party database). IAPs were given 30 days to submit comments on the notices (i.e. from 6 September to 7 October 2016). Comments submitted by IAPs on the pre-application notices have been incorporated in this DSR.

The Draft Scoping Report (pre-application phase) was presented at the Environmental Liaison Committee meeting on 17 November 2016, and a consultation meeting was held with Oceans and Coasts in Cape Town on 28 November 2016.

This Draft Scoping Report has identified and described potential impacts associated with the proposed establishment of an integrated marine discharge and abstraction servitude (s) and associated land-based infrastructure. All registered IAPs, state departments and other potentially interested IAPs have been notified of the availability of this Draft Scoping Report for review and 30 day commenting period. The notice includes a link to download the full report from CEN IEM Unit's website, and notes that if IAPs have difficulty in downloading the report, they should contact the EAP to make it available by other means. A hard copy of the report has been placed at the CDC's offices and has been provided to commenting state departments (i.e. the Eastern Cape DEDEAT, DEA Oceans and Coasts) as well as the review authority (i.e. DEA). A public open meeting is planned on 22 February 2017 where IAPs can engage with the EAP and project proponent and discuss the project.

Once the 30 day commenting period has ended, the report will be updated to a Final Scoping Report, and submitted to the authorities for review.

All comments on this scoping report should be forwarded to the EAP at:

Dr Mike Cohen (CEN IEM Unit)

Email: steenbok@aerosat.co.za (preferred)

Fax: 086 504 2549

Tel: 041 581 2983 / 082320 3111

Below is a "comments and response sheet" including all issues raised by Interested and Affected Parties as well as the response by the Environmental Assessment Practitioner. Note that comments submitted during previous public participation efforts done by CEN IEM Unit as part of the first EIA process (i.e. where notices of reactivation of the EIA process were distributed) are included for reference purposes.

Table iii Comments and Response Report

Notice of Reactivation of the EIA Process (EIA under 2006 and 2010 regulations)		
IAP	**Comment**	**EAP Response**
Jeanne Vorsatz - Aurecon	What type of marine dispersal studies will be done and what is the duration of the studies	Anchor Environmental are doing the marine specialist study and dispersion model. The study will include the following (this is extracted from terms of reference for their study): 1) description of the affected hydrographical and geophysical environment 2) Detailed description of the hydrodynamic processes (i.e. currents, water column stratification, water temperature variability and turbulence) for a range of environmental conditions (i.e. for various tides, waves, winds and air-sea fluxes as experienced in the affected marine environment) 3) Detailed description of the biogeochemical processes (water column and sediment) 4) Modelling: The behaviour of the effluent plumes for discharge points will be evaluated and modelled under various scenarios using a near-field dilution model (most probably with the software program CORMIX, MixZon Inc., USA) and a far-field dispersion model (most probably the Regional Ocean Modelling System, Shchepetkin and McWilliams 2005). Modelling studies will be used to determine the nearshore and farfield ocean circulation patterns under a variety of wind conditions, the main driver of surface currents in the ocean. The
	What type of studies are proposed for determining existing marine taxa in the marine environment that are likely to be affected by the servitude	

		dispersion and advection of the effluent will be simulated using a passive tracer approach, which will serve as proxy for the effluent. In addition, the dispersion and advection of temperature and salinity will also be simulated since the effluent will contain fresh water at a temperature different from that of the receiving marine environment. The three dimensional model will include the oceans response to, wind, tides, temperature stratification, salinity as well as heat fluxes to account for air-sea interactions. It is proposed that the behaviour of the effluent be simulated for a representative range of environmental conditions. Moreover, experiments will be conducted, where the effluent is released at different locations in the model domain, for example closer vs. further away from shore. The model will be validated against available observations deployed in the region, including temperature, salinity and current measurements, as well as historical data and previously documented studies of the area. Twelve scenarios will be simulated: The plume dimensions will be determined based on exceedance of water quality target values pertinent to the effluent to be discharged. These water quality target values will be decided in consultation with the specialists undertaking the ecological assessments. The results of the modelling exercises will inform the best location of the pipeline along the coast and at what depth the effluent would be best discharged. It is also envisaged that this will provide information on dilution rates and the spatial and temporal

		footprint of the effluent plume. **Note** that since the original terms of reference of was approved, the volumes of effluent to be discharged and abstraction volumes of seawater have increased substantially. A midfield model will also be done to determine possible interactions between the discharge plumes (if more than one servitude is proposed) and also between the plume and abstraction points 5) Marine ecological assessment: a. Desktop study: 1. Production of a geo-referenced map showing the distribution of the various habitat types and the associated biological resources that highlights areas with: i. Biological resources of conservation importance ii. Biological resources targeted for exploitation iii. Biological resources that have been lost, or are stressed, as a result of anthropogenic influence iv. Biological resources endemic to that area. 2. A list of dominant species, species of particular conservation importance and species targeted for exploitation, with best estimates of spatial and temporal variability. 3. Likely migration routes and patterns of above mentioned species in relation to estuary mouths in the region (Coega, Sundays, and Swartkops estuaries) 4. List of biological resources that are potentially sensitive to

		anthropogenic influences already present in the area and/or that may be sensitive to constituents present in the proposed wastewater discharge, and quantification of cause-and-effect relationships as best as possible (i.e. to refine the ecological quality objectives). 5. Assessment of the likely impacts of the proposed discharge on the habitat of the species identified above
	Are there any alternative process treatments that are being investigated instead of marine discharge	At this stage, the idea is that the marine model will set standards that need to be met by investors prior to discharge. It will be up to individual industries to decide what treatment methods to employ to meet standards. However, depending on the outcomes of the midfield model, it may be necessary to implement pre-treatment of effluent prior to discharge. This will be reported on in the EIA phase
	What type of emergency/mitigation measures are being investigated in the event of a discharge pipeline breach	The Scoping Report has identified risks/environmental impacts for further assessment at EIA stage. Emergency/mitigation measures will be listed at EIA stage.
Dan Abraham - Aurecon	Interested in the project, and request to be registered as an IAP	Registered on the IAP database for the project and will be kept updated of the process and all further documentation
Chris Albertyn - LAQS	Request to be registered as an IAP	Registered on the IAP database for the project and will be kept updated of the process and all further documentation
Dave Louw - Cerebos	Our interest in the matter arises in that we currently pump seawater from the immediate vicinity of the proposed abstraction and effluent discharge areas, for purposes of salt	Noted, thank you. This information has been sent to the marine specialist for consideration in the dispersion model. The Saltworks will be regarded as an existing 'beneficial user', where water quality of the user cannot be compromised by the proposed discharge servitude

	manufacture, and wish to ensure the continued quality of such supply, especially with regard to possible pollution concerns of discharging effluent to these areas	
Marisa Bloem - DWS	Requested a hard copy of the Draft Scoping Report for commenting purposes	Noted. A hard copy of the DSR will be delivered to DWS's offices
Huldah Solomon - GMS	General Motors SA has an effluent discharge permit from the NMBM. Request to be registered as an IAP	Noted, thank you. Registered on the IAP database for the project and will be kept updated of the process and all further documentation
Mulalo Tshikotshi – Oceans and Coasts	Requested additional information on the option of positioning the discharge servitude on the Port of Ngqura breakwater. Indicated that as long as the discharge does not compromise water quality for aquaculture or any surrounding sensitive ecosystems, it will be acceptable	A copy of the BID was sent to Oceans and Coasts that identified possible alternative positions of the discharge servitude.
Paul Martin – Environmental Control Officer for the IDZ and Port of Ngqura	Please ensure that I am registered as an I&AP and throughout the EIA process please supply full electronic copies (e.g. including specialist reports) of whatever documents become available	Registered on the IAP database for the project and will be kept updated of the process and all further documentation
	Explain in the EIA why it is being done in terms of the 2006 regulations & whether this	Note the application is now being done in terms of the 2014 regulations. Listed activities applied for are given in Chapter 2 of this DSR

	results in any practical difference (e.g. in the listed activities) compared with the 2010 EIA regulations. The option to take the pipe along the Eastern Breakwater seems very sensible at first glance - why wasn't it considered during the Scoping Phase? Note that to protect Jahleel Island from land predators the 2002 EIA advocates minimal activity, lighting, etc on the Eastern Breakwater.	
	Presumably dispersion modelling will be done to look particularly at the possible effect on Jahleel Island. Note that Stellenbosch University is modelling the currents and sand movements with respect to the sand by-pass at present and there will be synergies with this project (Nomkhitha Kwinana, Enviro Manager at the Port is the contact at TNPA[3]). There seems to be a build up of sand between Jahleel and the E Breakwater due to the sand by-pass discharge - this may have	

[3] Note that the current contact at TNPA is Mandilakhe Mdodana

	an influence (e.g. the pipe entrance could get buried in sand eventually).	
	You are obviously aware of the Damara Tern breeding colony (South Africa's rarest breeding seabird)	
Paul-Pierre Steyn - NMMU	I am a lecturer in the NMMU Botany Department and a researcher with the NMMU Institute for Coastal & Marine Research. I am involved in marine research in Algoa Bay, Hougham Park, and the inshore islands. I would like to register as an I&AP in order to remain informed of the process and the issues that arise	Registered on the IAP database for the project and will be kept updated of the process and all further documentation
Melinda Labuscagne and R Le Roux – NMBM Waste Management	Request to be registered as an IAP	Registered on the IAP database for the project and will be kept updated of the process and all further documentation
Pre-Application Notice – EIA under the 2014 regulations		
Carmen Barends – Leads 2 Business	Request to be registered as an IAP and a copy of the BID	Registered on the IAP database for the project and will be kept updated of the process and all further documentation. Copy of BID provided
John Geeringh - ESKOM	No comments but request to be registered and kept informed	Registered on the IAP database for the project and will be kept updated of the process and all further documentation
Ronald Smith – Digistics (Zone 1, Coega IDZ)	Request to be registered as an IAP	Registered on the IAP database for the project and will be kept updated of the process and all further documentation

Mandilakhe Mdodana - TNPA	Requested clarity on the date when comments on pre-application notice should be submitted as Pg 11 of the BID stated 7 September Noted that TNPA is the holder of an environmental authorisation for the Port and may be affected by the proposed servitude. The Port has an obligation of ensuring its activities do not affect the natural environment negatively and all impacts associated with its activities are kept at minimal levels	Confirmed that the closing date for comments is 7 October 2016 as indicated in the body of the email notice and the front page of the BID Noted. Impacts of construction of infrastructure related to the proposed discharge and abstraction servitudes, as well as that of discharge of effluent and potential impact on water and sediment quality in the Port will be assessed in this EIA process
Alan Southwood - DEDEAT	Requested to be registered as an IAP for the process, and to receive hard copies of the reports for commenting purposes	Registered on the IAP database for the project and will be kept updated of the process and all further documentation. A hard copy of this DSR has been made available to Mr Southwood
Hugo Badenhorst – PPC Cement SA (Pty) Ltd	PPC provided a map indicating the area north-east of the Port where they have mining rights to mine sand dunes and plan to mine in the future. Potential conflicts between mining and planned infrastructure required as part of the proposed abstraction and discharge servitude were noted and objected to.	The EIA process and planning of infrastructure required for the abstraction and discharge servitude(s) will be taken cognisance of. PPC will be engaged throughout the process to avoid conflicts with their mining areas.
Lesla la Grange - SAHRA	Noted that all official comments are now	Thank you, and noted. All future documents will be uploaded to the

	processed electronically via SAHRA's online platform (http://www.sahra.org.za/sahris/). To ensure a timely response to all correspondence relating to the case, SAHRA requested that any documents pertaining to the proposal be uploaded to an application on SAHRIS as they become available Recommended that an archaeological specialist survey the area to assess heritage impacts in full.	website for comment An underwater archaeological specialist has been appointed to survey the selected servitude(s) areas.
Dr Ane Oosthuizen - SANParks	SANParks note that the Islands and proposed MPA as part of Addo ENP has been identified as sensitive areas. Please keep SANParks on the stakeholder list	Thank you and noted. The islands and proposed MPA have been identified as sensitive areas in the baseline marine ecology report. The marine dispersion model will assess the movement of the discharge plume and water quality at the edge of the required mixing zone from servitude areas in relation to these sensitive habitats.
Dr Paul Martin – ECO for the IDZ and Port of Ngqura	Confirmed that he is still a registered IAP. Noted that he can make recent data on damara terns available. There has been a significant increase in their breeding in the area in January 2016	Confirmed that he is still a registered IAP for the process A copy of the BID was made available. Requested further details on the damara tern and any other relevant data that would be useful in the assessment of impacts related to the project
Peter Myles	Requested clarity on the date when comments on pre-application notice should be submitted as Pg 11 of the BID stated 7	Confirmed that the closing date for comments is 7 October 2016 as indicated in the body of the email notice and the front page of the BID

	September	
Kwanele Gxoyiya - Commercial Legal Advisor for MTU South Africa (Pty) Ltd	Rolls-Royce Power Systems (the holding company of MTU South Africa) is part of a consortium which seeks to respond to the Gas to Power project in the Coega IDZ. Requested to be registered as an IAP to provide input w.r.t. their technology (reciprocating gas engines) and the possible impact it may have on the environment.	Explained that CEN IEM Unit is handling the EIA process for the marine servitude, which includes possible abstraction and discharge by a CCGT power plant. Registered as IAP and sent a copy of the BID. Advised the IAP to register for the EIA process for the CCGT power plant being handled by SRK Consulting. Contact details for SRK provided. SRK made contact with IAP.
Brian Bouwer	Requested to be registered as an IAP	Registered on the IAP database for the project and will be kept updated of the process and all further documentation. Copy of BID made available.

1.9 Structure of the Report

Chapter 1 is the Executive Summary. **Chapter 2** of the report presents a background to the Scoping procedure. **Chapter 3** presents a detailed project description, including the relevant legal framework and planning and policy guidelines **Chapter 4** describes the receiving environment. **Chapter 5** identifies and describes project alternatives. **Chapter 6** describes the methodology that will be followed in deriving and assessing impacts and alternatives, and ensuring the report is in compliance with EIA Regulations (2014) and published guidelines. **Chapter 7** lists and describes potential environmental issues and impacts that will be considered further in the EIR. **Chapter 8** presents a Plan of Study for EIA. **Chapter 9** details the public participation phase up to the Scoping Phase. Chapter 10 is a reference list.