FINAL
ENVIRONMENTAL IMPACT ASSESSMENT

CES

ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

MARINE INTAKE AND OUTFALL INFRASTRUCTURE SERVITUDE PROJECT, ZONE 10, COEGA SEZ, EASTERN CAPE PROVINCE, SOUTH AFRICA

DFFE REFERENCE NUMBER: 14/12/16/3/3/2/2036

MARINE INTAKE AND OUTFALL INFRASTRUCTURE SERVITUDE PROJECT – ENVIRONMENTAL IMPACT ASSESSMENT

FINAL

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South Africa	South Africa

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LIST OF ABBREVIATIONS

ADZ	Aquaculture Development Zone
AIA	Archaeological Impact Assessment
BID	Background Information Document
CBAs	Critical Biodiversity Areas
CD	Chart Datum
CDC	Coega Development Corporation
CES	Coastal and Environmental Services
CITES	Convention on International Trade in Endangered Species
COD	Chemical Oxygen Demand
CPP	Coastal Public Property
CWDP	Coastal Waters Discharge Permit
dB	Decibel
DAFF	Department of Agriculture, Forestry and Fisheries
DCP	Dynamic Cone Penetrometer
DEA	Department of Environmental Affairs
DEDEAT	Department of Economic Development, Environmental Affairs and Tourism
DEFF	Department of Environment, Forestry and Fisheries
DFFE	Department of Forestry, Fisheries and the Environment
DFP	Development Framework Plan
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
DWAF	Department of Water Affairs and Forestry
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act
ECBCP	Eastern Cape Biodiversity Conservation Plan
ECDOH	Eastern Cape Department of Health
EEIA	Environmental Economic Impact Assessment
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIR	Environmental Impact Report
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
EMS	Environmental Management Systems
ELC	Environmental Liaison Committee
G2P	Gas to Power
GAENP	Greater Addo Elephant National Park
GDP	Gross Domestic Product
GHG	GHG National Inventory for SA 2000-2010
GN	Government Notice
GRP	Glass-fibre Reinforced Plastic
GoSA	Government of South Africa
HDPE	High Density Polyethylene
HIV	Human Immunodeficiency Virus
IBA	Important Bird Area
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
ICMA	Integrated Coastal Management Act

IUCN	International Union for Conservation of Nature
IRT	Issues and Response Trail
KPI	Key Performance Indicators
LED	Local Economic Development
LNG	Liquefied Natural Gas
LTMS	Long-term mitigation scenario
MPA	Marine Protected Area
MOSS	Metropolitan Open Space System
MSDF	Metropolitan Spatial Development Framework
MSL	Mean Sea Level
MW	MegaWatt
NEES	National Energy Efficiency Strategy
NEMA	National Environmental Management Act
NEM:BA	National Environmental Management: Biodiversity Act
NGO	Non-Governmental Organisations
NHRA	National Heritage Resources Act
NMBM	Nelson Mandela Bay Municipality
NEM:ICMA	National Environmental Management: Integrated Coastal Management Act
NFEPA	National Freshwater Ecosystems Priority Areas
NPAES	National Protection Expansion Strategy
NSBA	National Spatial Biodiversity Assessment
NSDP	Government's National Spatial Development Perspective
NWA	National Water Act
OC	Oceans and Coasts
OSMP	Open Space Management Plan
PGDP	Provincial Growth and Development Plan
PNCO	Provincial Nature Conservation Ordinance PNCO
PoS	Plan of Study
PPP	Public Participation Process
PSU	Practical Salinity Unit
QDS	Quarter Degree Square
RIB	Rigid inflatable boat
SABAP	Southern African Bird Atlas Project
SABS	South African Bureau of Standards
SANBI	South African National Biodiversity Institute
SAHRA	South African Heritage Resources Agency
SANParks	South African National Parks
SCC	Species of Conservation Concern
SANS	South African National Standards
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
SEZ	Special Economic Zone
STEP	Subtropical Thicket Ecosystem Project
SKEP	Succulent Karoo Ecosystem Programme
TB	Tuberculosis
TBM	Tunnel Boring Machine
TLB	Tractor-Loader Backhoe
TNPA	Transnet National Ports Authority
TOPS	Threatened or Protected Species
TOR	Terms of Reference

SABAP2	Southern African Bird Atlas Project
UHIA	Underwater Heritage Impact Assessment
WWTW	Wastewater Treatment Works

PROJECT SUMMARY

INTRODUCTION AND BACKGROUND

The purpose of the marine intake and outfall infrastructure and servitudes project is to enable the provisioning of seawater to various industries within the Coega SEZ (aquaculture, power provision and seawater desalination plant) via a number of seawater intakes; and to discharge treated effluents into the marine environment. In terms of the National Environmental Management: Integrated Coastal Management Act (Act No. 24 of 2008) (ICMA), this infrastructure is defined as coast dependant, and needs to be constructed along the coast adjacent to the Coega SEZ.

PROJECT DECRIPTION

Seawater Abstraction Servitudes: The need for marine seawater abstraction servitudes is driven by the water requirements for the following proposed Coega SEZ industries:

- Cooling water for two (2) 1000 MW LNG power stations (EIA currently in progress).
- Land based abalone and finfish aquaculture (42,370 tonnes / year). (EA received 7th of February 2018).
- Desalination plant (maximum capacity of 60 Ml / day). (Authorisation received as part of the environmental authorisation for the Coega Aquaculture Development Zone (ADZ) on the 7th of February 2018).

The following maximum seawater intake requirements are projected:

PURPOSE	WORSE CASE INTAKE FLOW RATES
Cooling Water: Once-Through Cooling	14.70 m^3/sec
Cooling Water: Wet Mechanical Draft Cooling	0.42 m^3/sec
Aquaculture flow through system for abalone	5.00 m^3/sec
Aquaculture recirculation system for finfish	0.94 m^3/sec
Seawater Desalination Plant	2.03 m^3/sec
Total	**23.09 m^3/sec**

Two seawater abstraction servitudes will be required:

(1) Inside the Port of Ngqura for the high volumes required for the Once-through and Wet Mechanical power station cooling water requirements; and
(2) East of the Port of Ngqura to meet the more specific water quality requirements of the aquaculture industries, and for desalination.

The following types of seawater abstraction technologies will be located within the servitudes:

- Abstraction basin with concrete intake channels (within the Port);
- Abstraction pipeline and intake jetty (within the Port);
- Seawater abstraction pipelines;
- Vertical beach wells;
- Onshore pump stations and screening facility; and
- WEROP wave pumps.

Effluent Discharge Servitudes: The need for the marine effluent discharge servitudes is mostly driven by the corresponding need of the respective Coega SEZ industries to return mostly seawater effluent used for cooling water and aquaculture, back into the offshore marine

environment. Other additional effluent streams include wastewater from the proposed Coega WWTW, brine from the desalination plant and stormwater. The position of the discharge servitudes, depth of discharge, and design of discharge infrastructure has been determined by a dispersion modelling process and engineering studies, primarily driven by the need to ensure adequate mixing of the various effluent plumes.

The following **maximum** effluent discharge requirements are projected:

PURPOSE	TYPE OF EFFLUENT	WORSE CASE DISCHARGE FLOW RATES
Cooling water: once-through cooling	Seawater at 28ºC and 35 ppt	14.70 m^3/sec
Cooling water: wet mechanical cooling	Seawater at 23ºC and 53 ppt	0.30 m^3/sec
Aquaculture flow through system for abalone	Seawater with projected concentrations of ammonia, nitrate, nitrite, TSS, COD.	5.00 m^3/sec
Aquaculture recirculation system for finfish	Seawater with projected concentrations of ammonia, nitrate, nitrite, TSS, COD.	0.94 m^3/sec
Desalination brine	Brine at 60 ppt	1.22 m^3/sec
Wastewater	Treated domestic and industrial waste water with projected concentrations of ammonia, nitrate, nitrite, TSS, COD, salinity heavy metals and E.coli	0.93 + 0.46 m^3/sec
Stormwater	Rainwater	Uncertain
TOTAL		**23.55 m^3/sec**

The following technologies will be implemented to discharge the various effluent streams from the various proposed land-based uses into the sea.

- Tunnel discharge;
- Pipeline discharge;
- Surf zone discharge

NEED AND DESIRABILITY

The rationale for the project is to develop a common user servitude for the establishment of infrastructure required for the abstraction of seawater from the marine environment, and the discharge of effluents. The primary need for the abstraction of seawater is to facilitate the co-ordinated development of infrastructure for a number of possible investors in the Coega SEZ that would require seawater in their processes. Having the appropriate infrastructure available to investors will enhance the attractiveness of the Coega SEZ as an investment destination.

To reduce cumulative impacts it is preferable for the SEZ to have dedicated servitudes for the placement of this infrastructure, rather than each industry establishing its own set of infrastructure. This approach also has economic benefits, as by confining the placement of infrastructure into dedicated areas the potential for sharing some of the infrastructure becomes possible, thereby reducing capital costs. The largest volumes of seawater are required for the cooling of two proposed 1,000 MW water-cooled power plants in Zone 10 of the SEZ, which will enable the CDC to provide tenants with secure access to energy and which will contribute to the

overall energy security of South Africa, a critical need when the country is subjected to frequent rolling blackouts due to load-shedding.

The establishment of a desalination plant will allow the CDC to provide tenants with secure access to fresh water, thereby improving its value proposition as a world-class investment location and reducing the demand on the NMBM to provide the required amount of fresh water for CDC tenants and industry within the SEZ. This is critically important in a water scarce area. The establishment of an Aquaculture Development Zone (ADZ) within Zone 10 of the Coega SEZ has been in planning for many years. The ADZ will provide significant employment opportunities, estimated at over 5000 people in the long-term. Accessing seawater for land-based marine aquaculture is essential for the ADZ.

The NMBM currently does not have the capacity to treat all the effluent generated by its residents to the required standards. The recent upgrade of the Fishwater Flats WWTW, as well as the additional capacity and infrastructure currently being constructed at the Driftsands WWTW will assist, but additional sewage capacity is still required within the NMBM. This will ultimately result in the discharge of larger volumes of treated effluent into the sea.

SEAWATER INTAKE ALTERNATIVES

The preferred alternatives for both seawater intake and effluent discharge servitudes were based on a high-levelled risk assessment process.

Risk assessment for alternative intake locations: A high-levelled risk assessment was conducted to assess the six (6) potential seawater intake servitude locations. The following environmental, social and economic risks were identified and considered with respect to determining the preferred seawater intake locations.

- Geographical location;
- Physical conditions (e.g. water quality);
- Terrestrial ecology;
- Marine ecology;
- Social;
- Socio-economic;
- Economic;
- Heritage & cultural;
- Technical;
- Climate change mitigation; and
- Climate change adaptation.

The risks were also considered with respect to the design, construction, operation and decommissioning project phases and took into consideration the impact assessment and mitigation hierarchy, including:

- The nature of potential impacts including significance, consequence, extent, duration and probability; and
- Irreplaceable loss or reversible? Can the impact be avoided, managed or mitigated?

Preferred* seawater intake servitude *alternatives: The following table provides a summary description of the preferred seawater intake servitude alternatives, which includes two separate servitudes which were assessed in the EIA. No other alternatives were assessed (except for the no-go alternative), since there are no other reasonable and feasible alternatives.

ALTERNATIVE CATEGORY	PREFERRED ALTERNATIVE	
Servitude	**INTAKE SERVITUDE 1**	**INTAKE SERVITUDE 2**
Activity	• Abstraction of seawater from the sea for Once-Through and Wet Mechanical Cooling of power stations (high volumes).	• Abstraction of seawater from the sea for land-based aquaculture and desalination (good water quality).
Broad geographical location	• Cooling water intake servitude inside the Port of Ngqura located at the base of the eastern breakwater as indicated in PRDW map, Figure 4.1).	• Combined aquaculture and desalination water intake servitude located east of the Port of Ngqura as indicated in PRDW map, Figure 4.1.
Specific location	• Servitude radius of 100 m and a depth of -6 m CD.	• Servitude width of 200 m to a distance of 600 m offshore and a depth of -10 m CD.
Design and Technology	• Once-Through Cooling water intake basin with four concrete channels each 3.5 m wide. • Wet Mechanical Cooling water intake jetty with a 710 mm HDPE pipe.	• Desalination – up to three 1,000 mm diameter HDPE intake pipes; • Aquaculture – up to three 1,600 mm diameter pipeline tunnels; • Vertical beach wells; • WEROP wave pumps

Activity Alternatives – The project is to establish marine intake servitudes alongside the Coega SEZ for the maximum seawater abstraction volumes listed above. Alternative activities other than the establishment of a marine intake servitude for abstracting seawater from the ocean are not considered to be reasonable or feasible.

Location Alternatives – Two separate seawater intake servitudes will be constructed at the following preferred locations:

- Intake servitude 1: Seawater for Once-Through Cooling and Wet Mechanical Cooling located inside the Port of Ngqura (for cooling water only) with a servitude radius of 100 m; and
- Intake servitude 2: Seawater for aquaculture and desalination located to the east of the Port of Ngqura (for combined aquaculture and desalination) with a servitude width of 200 m to a distance of 600 m offshore, and to a depth of -10 m CD.

***Design and technology*:**

- **All** feasible seawater intake infrastructure design and technology options (i.e. intake basin, pipeline, jetty, WEROP wave pumps, pipeline tunnel and vertical beach wells) are preferred. Consequently, impacts relating to **all** the maximum intake design and technology options were assessed in the EIA.

EFFLUENT DISCHARGE ALTERNATIVES

The same high-levelled risk assessment procedure described above was also conducted to assess the three (3) broad potential seawater discharge servitudes locations:

- West of the Port;
- Within the Port; and
- East of the Port.

A detailed Environmental Economic Impact Assessment (EEIA) and climate change impacts assessment was completed to compare the capital and operational costs and environmental costs of discharging effluent to the west and the east of the Port. The study determined that the significance of the capital and operating costs associated with transporting the effluent streams from the east to the west of the Port of Ngqura varies between industries. The industries that use greater quantities of seawater are more greatly affected by the additional western discharge costs. However, the additional direct cost to transport effluent to the west of the Port was determined to be R9.5 billion. The EEIA also projected that the carbon footprint for pumping effluent around the Port would amount to 94 608 tCO_2e per annum or 1 892 160 tCO_2e over a 20 year period.

Preferred alternative effluent discharge servitudes: The following table provides a summary of the preferred alternative effluent discharge servitudes (made up of three servitudes) that were assessed in the EIA. No other alternatives were assessed except for the no-go alternative, since there are no other reasonable and feasible alternatives.

ALTERNATIVE CATEGORY	**PREFERRED ALTERNATIVE**		
Servitude	**DISCHARGE SERVITUDE 1**	**DISCHARGE SERVITUDE 2**	**DISCHARGE SERVITUDE 3**
Activity	Discharge of Once-Through and Wet Mechanical cooling water effluent totalling 15.0 m^3/sec, back into the sea.	Discharge of finfish aquaculture recirculation system effluent (0.94 m^3/sec), brine (1.22 m^3/sec), treated wastewater (1.4 m^3/sec) in three separate pipelines.	Discharge of abalone aquaculture flow-through effluent (5.0 m^3/sec).
Geographical location	East of the Port of Ngqura, as indicated in PRDW map, Figure 4.3.	East of the Port of Ngqura, as indicated in PRDW map (Figure 4.3).	East of the Port of Ngqura, as indicated in PRDW map (Figure 4.3).
Specific location	Servitude of 200 m width to -11 m CD, 650 m offshore.	Servitude of 200 m width with: • Brine discharge to -13.5 m CD, 1,000 m offshore. • Finfish aquaculture discharge to -16 m CD, 1,500 m offshore. • Wastewater from phase 2 of the WWTW to -20 m CD, 3,000 m offshore.	Abalone aquaculture flow-through system effluent discharge servitude 100 m wide into the surf zone.
Design and layout	Tunnel with diameter of up to 3,000 mm.	Pipelines including: • Brine – 700 mm diameter HDPE pipe; • Finfish – 700 mm diameter HDPE pipe; • Wastewater – up to 700 mm diameter HDPE pipe.	Beach pipeline – 1,600 mm diameter HDPE pipe.

PUBLIC PARTICIPATION

The following has been completed as part of the PPP process:

- A site notice has been displayed on the electronic notice board at the Coega Business Centre. The e-notice was displayed for the duration of the EIA process. This methodology and approach have been agreed to by both DEDEAT and DEFF. The e-notice replaces the site notice because the area in which the development is proposed, is remote and a site notice will not fulfil the intended purpose of the regulations.
- Landowners, occupiers, adjacent landowners and occupiers, municipal ward councillor, NMBM Municipality and Organs of State were notified of the proposed development by **phone call, sms and/or email notification.**
- A Newspaper advertisement was placed in The Herald, a locally and provincially distributed newspaper, on the 13th of November 2020 to notify the general public of the submission of the application for Environmental Authorisation, as well as the availability of the Draft Scoping Report for a thirty (30) day public review period. The advertisement included a brief description of the proposed project, the main listed activities which are triggered by the proposed project, and the contact details of the EAP (phone number, e-mail address, web address and postal address). The advertisement also encouraged potential I&APs to register on the project I&AP Database and provide information on how to register as an I&AP.
- Virtual Meetings were held with Key Stakeholders on request, i.e. SANParks on the 8th of December 2020 and the 3rd of May 2021; Oceans and Coasts on the 11th of April 2021. A site visit was also conducted on the 4th of February 2021 with SANParks representatives, the CDC and their engineers, as well as the EAP in order to discuss alternative stormwater options. ELC Meetings were conducted on the 20th of August 2020, 19th of November 2020, 11th of February 2021 and the 20th of May 2021.
- All comments received from I&APs to date have been incorporated into and responded to in an Issues and Response Trail.

IMPACTS IDENTIFIED

The following impacts have been identified as a result of the proposed project:

ISSUE	PREFERRED ALTERNATIVE		NO-GO ALTERNATIVE
	IMPACT	RESIDUAL IMPACT	IMPACT
DESIGN / PLANNING PHASE			
Alignment with planning instruments	**MODERATE +**	**MODERATE +**	**LOW -**
Excavation of Test Pits for Geotechnical Study	**LOW -**	**LOW -**	**LOW -**
CONSTRUCTION PHASE			
GEOGRAPHICAL IMPACTS			
Overall impacts of the Coega Marine Servitude Project on the Addo MPA	**MODERATE -**	**LOW -**	**MODERATE -**
Loss of Euryops ericifolius, Erica chloroloma, Psoralea repens	**HIGH -**	**MODERATE -**	**MODERATE -**
Loss of Cotyledon adscendens, Brunsvigia litoralis, Rapanea	**VERY HIGH -**	**MODERATE -**	**MODERATE -**

ISSUE	PREFERRED ALTERNATIVE		NO-GO ALTERNATIVE
	IMPACT	RESIDUAL IMPACT	IMPACT
gilliana, Gymnosporia elliptica, Agathosma stenopetala, Erica glumiflora, Othonna rufibarbis, Salvia obtusata			
Loss of mammal SCC	HIGH -	MODERATE -	N/A
Disturbance to Damara tern population / Loss of habitat	HIGH -	HIGH -	N/A
Loss of Chlorotalpa duthiae (Duthie's Golden Mole) and/or associated habitat	MODERATE -	LOW -	N/A
Climate Change	MODERATE -	LOW -	MODERATE -
PHYSICAL ENVIRONMENT			
Reduced water quality in the marine environment	LOW -	VERY LOW -	HIGH -
Pollution generated during construction	LOW -	VERY LOW -	LOW -
Hazardous substance spills	LOW -	VERY LOW -	N/A
Erosion	LOW -	LOW -	N/A
Impacts on topography (terrestrial environment)	MODERATE -	MODERATE -	N/A
Impacts on bathymetry (marine environment)	MODERATE -	MODERATE -	N/A
Soil Contamination	LOW -	LOW -	N/A
Impacts on Surface and Groundwater Resources	MODERATE -	LOW -	N/A
Impacts to the Coastal Dune System	HIGH -	MODERATE -	N/A
Waste Management	MODERATE -	LOW -	LOW -
Traffic	LOW -	LOW -	N/A
Air Quality	LOW -	LOW -	N/A
Visual Impact	LOW -	LOW -	MODERATE -
IMPACTS ON THE BIOLOGICAL ENVIRONMENT			
Loss of sandy beach, intertidal and subtidal habitat and biota	MODERATE -	LOW -	N/A
Disturbance of pelagic open water habitat	LOW -	VERY LOW -	MODERATE -
Barotrauma impacts on marine fauna as a result of blasting	MODERATE -	LOW -	N/A
Noise disturbance to marine fauna	MODERATE -	LOW -	LOW -
Loss of Indigenous Vegetation (Cape Seashore Vegetation and St Francis Dune Thicket)	MODERATE -	LOW -	MODERATE -
Loss of Biodiversity / Encroachment into Priority Biodiversity Areas	MODERATE -	LOW -	N/A
Spread of Alien Plant Species	MODERATE -	LOW -	MODERATE -
Habitat Loss/Fragmentation	MODERATE -	LOW -	MODERATE -

ISSUE	PREFERRED ALTERNATIVE		NO-GO ALTERNATIVE
	IMPACT	RESIDUAL IMPACT	IMPACT
IMPACTS ON THE SOCIAL ENVIRONMENT			
Impacts on land use	HIGH +	HIGH +	HIGH -
Health and Safety	MODERATE -	HIGH -	LOW -
ECONOMIC IMPACTS			
Employment Creation	MODERATE +	HIGH +	HIGH -
Trench Stability	MODERATE -	LOW -	N/A
HERITAGE AND CULTURAL ASPECTS			
Impacts on maritime cultural heritage	NO EFFECT	NO EFFECT	LOW -
Chance Finds	LOW -	LOW -	LOW -
Terrestrial Heritage Impacts	LOW -	LOW -	LOW -
OPERATIONAL PHASE			
GEOGRAPHICAL IMPACTS			
Overall impacts of the Coega Marine Servitude Project on the Addo MPA	HIGH -	LOW -	MODERATE -
Climate Change	MODERATE -	LOW -	N/A
IMPACTS ON THE PHYSICAL ENVIRONMENT			
Impacts on marine sediments	LOW -	LOW -	MODERATE -
Impact of increased bio-active compounds use and disease transmission	N/A		
Soil Contamination	MODERATE -	LOW -	MODERATE -
Impacts on Surface and Groundwater Resources	MODERATE -	LOW -	LOW -
Waste Management	MODERATE -	LOW -	LOW -
Visual Impact	LOW -	LOW -	N/A
IMPACTS ON THE BIOLOGICAL ENVIRONMENT			
Impacts of seawater abstraction on marine biota as a result of beach wells	VERY LOW -	VERY LOW -	N/A
Impacts of seawater abstraction on marine biota as a result of intake pipelines	LOW -	VERY LOW -	N/A
Impacts of elevated temperature in the marine environment	LOW -	VERY LOW -	N/A
Impacts of changes to salinity in the marine environment	VERY LOW -	INSIGNIFICANT	N/A
Impacts of elevated nutrients in the marine environment	HIGH -	LOW -	N/A
Impacts of elevated suspended solids in the marine environment	MODERATE -	LOW -	N/A
Impacts of elevated trace metal and inorganic compound concentrations in the marine environment	HIGH -	LOW -	N/A
Impacts of reduced dissolved	MODERATE -	VERY LOW -	N/A

ISSUE	PREFERRED ALTERNATIVE		NO-GO ALTERNATIVE
	IMPACT	RESIDUAL IMPACT	IMPACT
oxygen			
Impacts of introduction of alien and invasive species into the marine environment	N/A		
Spread of Terrestrial Alien Plant Species	MODERATE -	LOW -	MODERATE -
IMPACTS ON THE SOCIAL ENVIRONMENT			
Impacts of elevated pathogen levels in the marine environment	HIGH -	LOW -	N/A
Impacts on fisheries – Small Pelagics	LOW -	VERY LOW -	N/A
Impacts on fisheries – Linefish	HIGH -	LOW -	N/A
Impacts on fisheries – Squid	LOW -	VERY LOW -	N/A
Impacts on fisheries – Sharks	VERY LOW -	VERY LOW -	N/A
Impacts on land use	HIGH +	HIGH +	N/A
Health and Safety	LOW -	LOW -	LOW -
ECONOMIC IMPACTS			
Direct Employment Creation	MODERATE +	HIGH +	HIGH -
Indirect Economic Impacts	MODERATE +	HIGH +	HIGH -
Provision of seawater for industrial developments	HIGH +	HIGH +	HIGH -
Provision of discharge infrastructure for industrial developments	HIGH +	HIGH +	HIGH -
HERITAGE AND CULTURAL ASPECTS			
NONE IDENTIFIED AS NO EXCAVATIONS WILL BE CONDUCTED DURING THE OPERATIONAL PHASE OF THE PROJECT			
DECOMMISSIONING PHASE			
NO DECOMMISSIONING PROCEDURES OR RESTORATION PLANS HAVE BEEN COMPILED AT THIS STAGE, ALTHOUGH IMPACTS ARE EXPECTED TO BE SIMILAR (IF NOT LESS) THAN THOSE ASSESSED DURING THE CONSTRUCTION PHASE. THE POTENTIAL IMPACTS DURING THE DECOMMISSIONING PHASE ARE EXPECTED TO BE LOW IN COMPARISON TO THOSE OCCURRING DURING THE OPERATIONAL PHASE, AND NO KEY ISSUES RELATED TO THE MARINE AND/OR TERRESTRIAL ENVIRONMENT HAVE BEEN IDENTIFIED AT THIS STAGE. THE SAME MITIGATION PROCEDURES AS THOSE EXPLAINED IN THE CONSTRUCTION PHASE SHOULD BE ADHERED TO IN THE DECOMMISSIONING PHASE IN ORDER TO MITIGATE FOR ANY OF THE IMPACTS LISTED ABOVE.			
CUMULATIVE IMPACTS			
Cumulative Impacts on the Marine Environment	HIGH -	LOW -	N/A
Loss of Indigenous Vegetation (Cape Seashore Vegetation and St Francis Dune Thicket)	NO EFFECT	NO EFFECT	N/A
Loss of Plant SCC	NO EFFECT	NO EFFECT	N/A
Social benefits from the project	HIGH +	HIGH +	HIGH -

MITIGATION MEASURE FOR INCLUSION IN THE EA

It is recommended that an ECO be appointed to ensure all recommendations in the EMP as well as all mitigation measures (Chapter 10) are adhered to. The most important mitigation measures are related to the construction and operational phases of the project and are included in Sections 11.1 and 11.2 in Chapter 11 of this EIAR.

CONCLUSIONS

The main areas of concern are:

- The ecological sensitivity of the proposed coastal and marine development site;
- That the servitudes discharge into a Marine Protected Area;
- Whether or not the constituents proposed to be discharged can consistently meet the legislated discharge standards;
- Whether there will be sufficient mixing of the discharge plumes at the recommended discharge depths for the various effluents.

Algoa Bay is known to support a high biodiversity of marine life, particularly reef-associated invertebrates and fish, as well as several breeding colonies of endangered or vulnerable seabirds and a range of cetacean species (dolphins, whales). For these reasons, 1,200 km^2 of Algoa Bay is protected as part of the Addo Elephant National Park Marine Protected Area (MPA). This MPA extends the protection of the land based Addo Elephant National Park to include marine species such as the great white shark and several whale species that frequent the Algoa Bay coastline (Bryde's, Minke, Humpback and Southern Right whales). In addition, the MPA protects the breeding and important feeding grounds of two endangered bird species, namely African penguin and Cape gannet, which breed on the St Croix and Bird Islands located within the MPA.

In addition, the following terrestrial sensitive sites also occur within the proposed development site.

- Areas below the coastal management line and/or within 100 m of the high-water mark of the sea.
- Mobile dune process areas and/or areas sensitive to coastal erosion.
- Areas that occur within CBAs designated in the Coega Open Space Management Plan (OSMP).
- Known and anticipated habitats used by *Damara terns* (the dune field areas and dune slacks).
- 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 from wetlands.
- Areas where sensitive archaeological and paleontological sites have been recorded.

All efforts have been made to avoid these habitats where possible, including the MPA. Options for placing infrastructure in alternative locations were assessed, including within the port and west of the eastern breakwater. Where possible, intake infrastructure has been located within the Port, because the water for cooling the power plants is not water quality dependent. Abstraction of water for the ADZ and desalination plant cannot be located in the port because the water for the ADZ must meet quality and temperature requirements, and thus water from

within the Port is not suitable.

To avoid discharging effluent into the MPA, discharge would need to occur on the western side of the Port. This requires pumping effluent around the perimeter of the Port, and this would result in an additional capital expenditure and additional operational costs over a 20 year period of approximately R9.5 billion rand. This makes the project economically unfeasible.

A further limitation of discharging effluent to the west of the Port is that effluent could be entrained within the Port, which increases the risk associated with constituents accumulating in the port, and especially risks associated with nutrients and heavy metals. If the pipeline is extended to a greater depth of -16 m CD, the achieved dilutions and mixing reduces the risk of effluent entering the Port, but despite the additional costs associated with this, there is still a risk of the effluent being entrained within the port.

For this reason, discharging directly into the Port is also not feasible, as various constituents will become trapped in the Port, resulting in a significant reduction in water quality, thus preventing the Port Authority from meeting their environmental water quality standards and the permit requirements of their annual Dredge Disposal Permit. The high mud fraction of sediment in the Port results in contaminants introduced into the water being retained and accumulating in the sediment to the Port. This is a serious issue for the port, as the concentrations of some metals (copper, zinc and chromium) in the sediment already exceed upper limits. No further discharges should be allowed within the port, especially given the potential for the effluent to get trapped and accumulate over time.

Because of these environmental complexities and economic realities, there is no other viable option other than discharging effluent to the east of the eastern breakwater. To ensure that this could be done in an environmentally responsible manner, additional dispersion modelling was undertaken by coastal engineers in 2020, and an Environmental Risk Assessment was conducted by marine specialists. These two studies determined that the required dilutions would not always be achieved at -11 m CD, achieved at a distance of 300 m offshore. This means that any wastewater discharged must first be treated on land, and must be monitored prior to discharging it into the marine environment. This is required to ensure compliance with the Water Quality Guidelines defined in the Environmental Risk Assessment. In addition, some of the effluents must be discharged at greater depths. Brine must be discharged directly at about 1,000 m offshore at a depth of about -14 m CD. Recirculated finfish aquaculture effluent must be discharged at a distance of about 1,500 m offshore, at a depth of about -16 m CD. Seawater effluent from the flow-through abalone farms can be discharged directly into the surf zone.

The above measures (treatment of effluent and increasing the disposal depth offshore by increasing pipeline length) have resulted in all discharges meeting the required dilutions. This means that the 17 impacts associated with these discharges into the MPA have been reduced to low significance.

Based on the above, we conclude that with appropriate mitigation, impacts related to the proposed development can be mitigated efficiently and as such, **it is the opinion of the EAP that environmental authorisation for this project should be granted under certain conditions (mitigation measures)**, included in Chapter 7, 10 and more specifically Chapter 11, Section 11.2 of this report.

The recommendations made in both the Construction and Operational Environmental Management Programmes must be followed.

1 INTRODUCTION

1.1 OVERVIEW

The Coega Special Economic Zone (SEZ) is situated on the northern side of Port Elizabeth within the Nelson Mandela Bay Metropolitan Municipality (NMBM), Eastern Cape Province (refer to Figure 1.1). The Ngqura Deepwater Port, which is managed by the Transnet National Ports Authority (TNPA) is located within the Coega SEZ.

The integrated SEZ and Port of Ngqura is approximately 11,500 ha in extent and comprises 14 zones designated for various light, medium and heavy industrial land uses. The purpose of the marine intake and outfall infrastructure and servitudes project is to enable the provisioning of seawater to various industries within the Coega SEZ (aquaculture, power provision and seawater desalination plant) via a number of seawater intakes; and the discharge of treated effluent into the marine environment. As such, in terms of the ICMA infrastructure related to this project is defined as coast dependant and needs to be constructed along the coast adjacent to the Coega SEZ. The Port of Ngqura and Zone 10 within the SEZ have been proposed as the locations for the establishment of the marine servitudes.

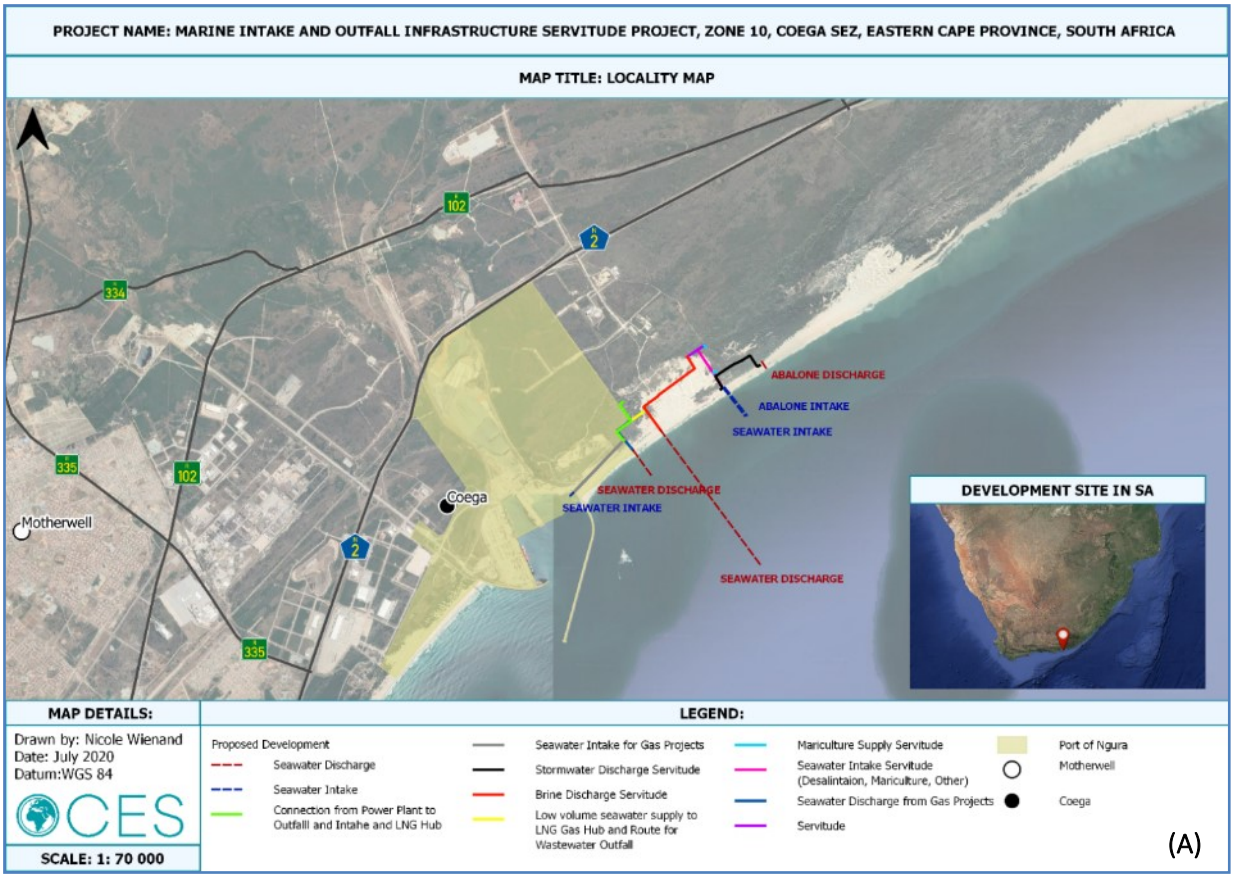

Figure 1.1: Locality map for the proposed project.

Construction of the proposed infrastructure will commence within 5 years of receiving the EA, with an option to apply for an extension for a further 5 years. This is in line with other EA's received from DFFE for projects within the Coega SEZ.

1.2 INTAKE INFRASTRUCTURE

The need for the marine seawater abstraction servitudes is driven by the water requirements for the following proposed Coega SEZ industries:

- Cooling water for two 1000 MW Liquefied Natural Gas (LNG) power stations for which the Environmental Impact Assessment (EIA) is currently in progress.
- Land-based aquaculture (including 42,370 tonnes/year of abalone and finfish). Environmental Authorisation was received on 07 February 2018.
- The Coega Aquaculture Development Zone (ADZ) includes the development of a Seawater Desalination Plant with a maximum capacity of 60 megalitres (Mℓ)/day. Environmental Authorisation was received as part of the authorisation for the ADZ on 7th of February 2018.

The following maximum seawater intake requirements are projected:

Purpose	Worse case intake flow rates
Cooling Water: Once-Through Cooling	14.70 m^3/sec
Cooling Water: Wet Mechanical Draft Cooling	0.42 m^3/sec
Aquaculture flow through system for abalone	5.00 m^3/sec
Aquaculture recirculation system for finfish	0.94 m^3/sec
Seawater Desalination Plant	2.03 m^3/sec
Total	**23.09 m^3/sec**

To supply the above volumes, two seawater abstraction servitudes with associated infrastructure are required:

1. Inside the Port of Ngqura for the Once-Through and the Wet Mechanical power station cooling water requirements; and
2. East of the Port of Ngqura to meet the more specific water quality requirements of the aquaculture industries, and for desalination.

Within each servitude, a number of different seawater abstraction technologies will be utilised, depending on industry requirements. Therefore, ALL the following types of abstraction technologies will be implemented and as such are assessed in this EIAR:

- Abstraction basin with concrete intake channels (within the Port);
- Abstraction pipeline and jetty (within the Port);
- Seawater abstraction pipelines;
- Vertical beach wells;
- Onshore pump stations and screening facilities; and
- WEROP wave pumps.

Detailed descriptions of these technologies are provided in Chapter 2 of this report.

1.3 OUTFALL INFRASTRUCTURE

The need for the marine effluent discharge servitudes is mostly driven by a corresponding need by the respective Coega SEZ industries to return effluent seawater back into the offshore marine environment. Other discharges will include wastewater treatment effluent and stormwater.

The following maximum effluent discharge requirements are projected:

Purpose	Type of effluent	Worse case discharge flow rates
Cooling water: once-through cooling	Seawater at 28°C and salinity of 35 ppt	14.70 m^3/sec
Cooling water: wet mechanical draft cooling	Seawater at 23°C and salinity of 53 ppt	0.30 m^3/sec
Aquaculture flow through system for abalone	Seawater with projected concentrations of ammonia, nitrate, nitrite, TSS, COD.	5.00 m^3/sec
Aquaculture recirculation system for finfish	Seawater with projected concentrations of ammonia, nitrate, nitrite, TSS, COD.	0.94 m^3/sec
Desalination brine	Brine at 60 ppt	1.22 m^3/sec
Wastewater	Treated domestic and industrial wastewater with projected concentrations of ammonia, nitrate, nitrite, TSS, COD, salinity heavy metals and E.coli	0.93 + 0.46 m^3/sec
Stormwater	Rainwater	Uncertain
TOTAL		**23.55 m^3/sec**

ALL the following technologies will be implemented to discharge the various effluent streams from the various proposed land-based uses into the sea.

- Tunnel discharge;
- Pipeline discharge;
- Surf zone discharge

Detailed descriptions of these technologies are provided in Chapter 2 of this report.

The date at which the construction of the various intake and discharge structures within the servitudes will be initiated will be dictated by the demand and timing of the implementation of the various industries.

1.4 PURPOSE OF THIS REPORT

The Coega Development Corporation (CDC) appointed Coastal and Environmental Services (CES) as the independent Environmental Assessment Practitioner (EAP) to conduct the EIA process for the proposed marine intake and outfall infrastructure and servitudes project in terms of the EIA Regulations (2014 and subsequent 2017 amendments).

This application for Environmental Authorisation has been submitted to DEFF, and not the Provincial Department of Economic Development, Environmental Affairs and Tourism as the CDC is a parastatal.

In addition, a Coastal Waters Discharge Permit (CWDP) application must be submitted to the Oceans and Coasts Division of DEFF. This is required in terms Section 69 of the NEM: Integrated Coastal Management Act No. 24 of 2008, whereby the discharge of effluent into the marine environment requires a discharge permit). This was submitted some time ago, and a reference number (2014/008/EC/Coega IDZ) for this application was issued on the 24th of April 2014. Based on personal communication with DEFF: Oceans and Coasts, this reference number is still valid, and an updated application has been submitted to the Department.

This EIAR is the second of a number of reports produced in the EIA process. It has been compiled in accordance with the requirements stipulated in Section 23 and Appendix 3 of the EIA Regulations (GN R.982) (2014 and subsequent 2017 amendments), which clearly outlines the content of an EIAR.

The objective of the environmental impact assessment process, as set out by the EIA Regulations (2014 and subsequent 2017 amendments), is to, "*through a consultative process-*

(a) Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
(b) Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted scoping report;
(c) Identify the location of the development footprint within the approved site as contemplated in the accepted scoping report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
(d) Determine the —
    i. Nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
    ii. Degree to which these impacts —
        (aa) Can be reversed;
        (bb) May cause irreplaceable loss of resources, and
        (cc) Can be avoided, managed or mitigated;
(e) Identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment;
(f) Identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted scoping report through

the life of the activity;
(g) Identify suitable measures to avoid, manage or mitigate identified impacts; and
(h) Identify residual risks that need to be managed and monitored."

1.5 THE PROPONENT

CES has been appointed by the CDC as the independent Environmental Assessment Practitioner to undertake the EIA for the proposed marine servitude project.

Coega Development Corporation

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Telephone: 041 403 0400
Website: www.coega.co.za
Email: sadick.davids@coega.co.za

1.6 THE EIA TEAM

Coastal and Environmental Services (Pty) Ltd (CES), trading as CES Environmental and Social Advisory Services

Physical Address: 36 Pickering Street, Newton Park, Port Elizabeth
Postal Address: 36 Pickering Street, Newton Park, Port Elizabeth
Telephone: +27 41 393 0700
Website: www.cesnet.co.za
Email: info@cesnet.co.za

Project team:

EAP, Team Leader and Internal review: Dr Alan Carter	Alan has over 30 years of experience in both environmental science and financial accounting disciplines including with international accounting firms in South Africa and the USA. He holds a PhD in Plant Sciences and a BCom Honours degree in financial accounting. Alan is a member of a number of professional bodies including American Institute of Certified Public Accountants (AICPA) and Institute of Waste Management South Africa (IWMSA). He is also certified as an Environmental Assessment Practitioner with the Environmental Assessment Practitioners Association of South Africa (EAPASA) and as an ISO14001 EMS auditor with Exemplar Global (formerly the American National Standards Institute). Areas of specialization include: impact assessment, coastal management, waste management, climate change and emissions inventories, aquaculture and environmental accounting and auditing. Alan is a registered scientist with SACNASP.
Internal Review and Quality Control: *Dr Ted Avis*	Ted Avis is a leading expert in the field of Environmental Impact Assessments and environmental management, having project-managed numerous large-scale ESIAs and ESMPs to International Finance Corporation Performance Standards. Ted has been EIA study leader on numerous large scale ESIA's and ESHIA's for projects with capital investments ranging from US$200m to over US$1billion. He

	has been study leader for ESIA and related environmental studies completed to international in, Egypt, Kenya, Liberia, Mozambique, Madagascar, Malawi Sierra Leone, South Africa and Zambia. Ted also has experience in large scale Strategic Environmental Assessments in southern Africa, and has been engaged by the International Finance Corporation (IFC) on a number of projects. Most of the ESIA work Ted has been involved in has included the preparation of various Environmental & Social Management Plans, Resettlement Action Plans and Monitoring Plans. These ESIA's cover a range of sectors including infrastructure, mining (heavy minerals, graphite, tin, copper, iron), agri-industrial, forestry, resorts and housing development, energy, ports and coastal developments. Ted holds a PhD in coastal ecology, and was awarded a bronze medal by the South African Association of Botanists for the best PhD adjudicated in that year, entitled "Coastal Dune Ecology and Management in the Eastern Cape"). He has delivered papers and published in the field of EIA, Strategic Environmental Assessment and Integrated Coastal Zone Management and has been a principal of CES since its inception in 1990, and Managing Director since 1998. Ted was instrumental in establishing the Environmental Science Department at Rhodes University whilst a Senior lecturer in Botany, based on his experience running honours modules in EIA practice and environmental management. He was one of the first certified Environmental Assessment Practitioner in South Africa, gaining certification in April 2004. He has been a professional member of the South African Council for Natural Scientific Professionals since 1993.
Project Manager & Report Production: Dr Chantel Bezuidenhout	Dr Chantel Bezuidenhout holds MSc and PhD degrees in Botany (estuarine ecology) and a BSc degree in Botany and Geography from Nelson Mandela Metropolitan University (South Africa). Dr Bezuidenhout has been an Environmental Consultant for approximately 10 years and as such has been focusing on environmental management and impact assessment. She is well versed in environmental legislation and has managed a number of environmental, social and health impact assessments and management plans for heavy mineral mining in South Africa and Madagascar. These projects have been completed to international standards (IFC and World Bank). In addition, Dr Bezuidenhout has also completed ESHIA's for a number of open cast mines in Zambia and Mozambique. These projects were also completed to IFC Standards and have been granted environmental authorizations from their host countries. All the ESIAs that have been managed by Dr Bezuidenhout included community consultations and as such she has been involved in various forms of community engagements in the rural African settings. Dr Bezuidenhout has also been extensively involved in the data collection and report wring for land and natural resource use assessments in both Madagascar and Mozambique. The data gathering component involves extensive community meetings as well as focus group meetings to establish land use (including agriculture) and natural resources use within the communities and wider regions. Dr Bezuidenhout has recently completed an extensive land survey as part of a RAP process for a heavy minerals mine in Mozambique and an in-kind land survey for a large infrastructure project in Tanzania, and as such is well-versed with the relevant process. She is a Principal Consultant and Branch Manager of the CES Port Elizabeth Office.
Public Participation and GIS Mapping: Ms Nicole	Ms Nicole Wienand is CES's Environmental Consultant who is based in the Port Elizabeth branch. Ms Wienand obtained her BSc Honours in Botany (Environmental Management) from the Nelson Mandela Metropolitan University (NMMU) in December 2018. She also holds a BSc Degree in Environmental Management from NMMU. Ms Wienand's Honours project focused on the

Wienand	composition of subtidal marine benthic communities on warm temperate reefs off the coast of Port Elizabeth (a baseline survey) and for her undergraduate project she investigated dune movement in Sardinia Bay. Her key interests include the GIS Mapping, the general EIA process, Public Participation Process (PPP) and Ecological Impact Assessments.

CES Specialist Team:

Ecological Specialist: Dr Greer Hawley	Dr Greer Hawley-McMaster has a BSc degree in Botany and Zoology, a BSc (Honours) in Botany from the University of Cape Town and a PhD (Microbiology) from Rhodes University. Dr Hawley-McMaster has a diverse skill set including biodiversity surveys and assessments (plants, fungi and terrestrial ecosystems), developing environmental management policy (EMP's and EMF's), analysis and interpretation of environmental and biodiversity spatial datasets, training, feasibility assessments, environmental impact assessments for a wide range of land use activity proposals, aquaculture feasibility assessments, alien invasive management planning and conservation management planning. Dr Hawley-McMaster has undertaken work in a number of African countries and has specifically surveyed many parts of the Eastern Cape. As a Principal Consultant, Dr Hawley-McMaster manages large projects and has experience with co-ordinating big specialist teams. Dr Hawley-McMaster has recently completed the review of the Eastern Cape Biodiversity Conservation Plan (2019) and continues to develop the Eastern Cape Biodiversity strategy and Action Plan.
Economic Specialist: Dr Alan Carter	See above.

External Specialist Team:

Marine Archaeology Specialist: Ms Vanessa Maitland	Ms Vanessa Maitland received her BA majoring in Archaeology and her Honours degree in Archaeology from the University of the Witwatersrand in 1994 and 1997. She has worked on numerous sites covering all aspects of South African Archaeology. Since 2000, Ms Maitland has specialised in Maritime Archaeology, working on a number of wreck removals and Underwater Heritage Impact Assessments. She has many years of experience in magnetometer surveys and diver searches. Ms Maitland is currently completing her Master's Degree in Maritime Archaeology through UNISA. She is registered as a CRM practitioner with ASAPA.
Geotechnical Assessment: Mr Brent Cock	Mr Brent Cock has been involved in the field of Exploration Geology and Engineering Geology for the past 15 years. His expertise includes Lithostructural Mapping; Geological, Geotechnical core and rock chips logging and sampling including supervision; Geochemical and stream sediment sampling; ground investigations for subsidy housing (in accordance with NHBRC guidelines), road upgrades, pipelines, earth dams, warehouses, buildings of masonry construction, cemeteries, waste water treatment works, renewable energy projects (solar and windfarms) and nuclear sites.
Marine Ecological Assessment: Dr Barry Clark	Dr Barry Clark has twenty-eight (28) years' experience in Marine Biological research and consulting on coastal zone and marine issues. He has worked as a scientific researcher, lecturer and consultant and has experience in tropical, subtropical and temperate ecosystems. He is presently Director of an Environmental Consultancy firm (Anchor Environmental Consultants) and

	Research Associate at the University of Cape Town. As a consultant, he has been concerned primarily with conservation planning, monitoring and assessment of human impacts on estuarine, rocky shore, sandy beach, mangrove, and coral reef ecosystems as well as coastal and littoral zone processes, aquaculture and fisheries. Dr Clark is the author of 27 scientific publications in Class A Scientific Journals as well as numerous scientific reports and popular articles in the free press. Geographically, his main area of expertise is Southern Africa (South Africa, Lesotho, Namibia, Mozambique, Tanzania, Seychelles, Mauritius and Angola), but he also has working experience from elsewhere in Africa (Republic of Congo, Sierra Leone, Liberia, Cote d'Ivoire, Ghana, Nigeria), the Middle East (UAE) and Europe (Azerbaijan).
Marine Dispersion Modelling Mr Stephen Luger	Mr Stephen Luger received an MSc in Civil Engineering from the University of Cape Town in 1991. He was then employed by the Council for Scientific and Industrial Research (CSIR) for sixteen (16) years as a coastal modelling specialist. For the past nine years he has been employed by Prestedge Retief Dresner Wijnberg (PRDW) Consulting Engineers as a coastal modelling specialist and currently holds the post of Technical Director. He has twenty-four years of experience in the application of numerical models in the fields of coastal hydrodynamics, waves, tsunamis, sediment transport, outfalls, water quality, dredging, oil spills and flooding. These modelling studies have been conducted for feasibility studies, environmental impacts studies, nuclear safety studies and detailed engineering design. The countries where the studies have been conducted include South Africa, Namibia, Gabon, Nigeria, Kenya, Mauritius, Seychelles, Guinea, Mozambique, Madagascar, Cameroon, Angola, Egypt, Bahrain, Qatar, United Arab Emirates, Jordan, Israel, Ireland, Chile, Peru, Brazil and Australia. He is the author or co-author of over 20 articles in scientific journals, chapters in books and conference proceedings, over 100 technical reports for external contract clients, and has presented over 20 papers at local and international conferences.
Marine Ecologist responsible for the interpretation of the Marine Dispersion Modelling Mr Robin Carter	Mr Robin Carter carried out post-graduate studies in Marine Science at the University of Natal (Durban) (MSc) and University of Cape Town (PhD). Subsequently, he was employed by CSIR, in Stellenbosch, leading the Marine Biology Division and Marine Biotechnology Programme as well as coordinating their overall Marine Science Research Programme. During this period (1983 – 1997) he led and participated in contract work on oil and gas developments on continental shelves, harbour development studies, primarily in Saldanha Bay and mariculture development focussing on abalone. After leaving CSIR in 1997 he practiced as an Independent Specialist Consultant in Applied Marine Science. His main areas of work were in harbour development (Saldanha, Cape Town and Ngqura), specialist studies within marine oil and gas development EIAs, and investigations on marine discharges and technical reviews of marine monitoring practice and applications. In 2005 he joined Lwandle Technologies (Pty) Ltd, a Level 2 BEE company focused on providing specialist scientific advice and measurement capabilities to commercial and state entities involved in marine and coastal development and enterprises. Their clients include oil and gas companies, Maersk Oil, Sonangol, Petrobras, ENI, PetroSA, Anadarko, Forest Oil and BP, with Shell and Sasol being indirectly served through other consulting groups. A significant component of their business is assessing and measuring the environmental effects of harbour development and expansions of services. Recent contract work covers studies for Transnet in the Ports of Cape Town and Durban, Namibian Marine Phosphates in Walvis Bay, Riversdale Mining Mozambique on coal export though the Zambezi River mouth, Vale (Brazil) on the development of

	coal export facilities in Nacala, Mozambique and for Anadarko Petroleum Corporation on the establishment of an LNG plant in Mozambique. Marine discharges form another important element of Lwandle's business portfolio with their work ranging from effluent tracking through site specific evaluations to participating in provincial and national policy development.

1.7 EIA Requirements as per EIA Regulations (2014 and Subsequent 2017 Amendments)

Table 1.1 outlines the requirements of the EIAR as set out in the NEMA EIA Regulations (2014 and subsequent 2017 amendments). According to Appendix 3 (1) of the Regulations "*An environmental impact assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include…*" the information outlined in Table 1.1 below. In addition, a Public Participation Process (PPP) was undertaken in accordance with Sections 39-44 of the Regulations, which outline the requirements for a successful PPP.

Table 1.1: Requirements for the EIAR and content (in accordance with Appendix 3 of the EIA Regulations).

Relevant section in GNR. 982	Requirement description	Relevant section in this report
(a) Details of-	(i) The EAP who prepared the report; and	Section 1.6 and Appendix 1.
	(ii) The expertise of the EAP, including a curriculum vitae;	
(b) The location of the development footprint of the activity on the approved site as contemplated in the accepted Scoping Report, including-	(i) The 21 digit Surveyor General code of each cadastral land parcel;	Chapter 2, Section 2.2, Table 2.1 and Figure 2.2
	(ii) Where available, the physical address and farm name;	
	(iii) Where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	
(c) A plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is—	(i) A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken;	Chapter 2, Section 2.2, Table 2.1 and Figure 2.2
	(ii) On land where the property has not been defined, the coordinates within which the activity is to be undertaken;	
(d) A description of the scope of the proposed activity, including—	(i) All listed and specified activities triggered and being applied for;	Chapter 3, Section 3.2.1 Table 3.2.
	(ii) A description of the associated structures and infrastructure related to the development;	Chapter 2
(e)	A description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the	Chapter 3.

Relevant section in GNR. 982	Requirement description	Relevant section in this report
	legislation and policy context;	
(f)	A motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report;	Chapter 4
(g)	A motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;	Chapter 4 Section 4.11
(h) A full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including -	(i) Details of the development footprint alternatives considered;	Chapter 5
	(ii) Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Chapter 6 and Appendix 2
	(iii) A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	Chapter 6, Table 6.1 and Appendix 3
	(iv) The environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Chapter 5 Section 5.3.3.3, Table 5.1 and Section 5.4.2.3 Table 5.3
	(v) The impacts and risks identified, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) Can be reversed; (bb) May cause irreplaceable loss of resources; and (cc) Can be avoided, managed or mitigated;	Chapter 7
	(vi) The methodology used in identifying and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	Chapter 7
	(vii) Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Chapter 7
	(viii) The possible mitigation measures that could be applied and level of residual risk;	Chapter 7
	(x) If no alternative development footprints for the activity were investigated, the motivation for not considering such; and	N/A
	(xi) A concluding statement indicating the location of the preferred alternative development footprint, within the approved site as contemplated in the accepted Scoping Report.	Chapter 5, Sections 5.3.2.4, 5.3.3.4, 5.3.3.6, 5.3.4.3, 5.4.1.1, 5.4.2.5, 5.4.3.2, 5.4.4.4, 5.5.4

Relevant section in GNR. 982	Requirement description	Relevant section in this report
(i) A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including—	(i) A description of all environmental issues and risks that were identified during the environmental impact assessment process; and	Chapter 7, Section 7.2
	(ii) An assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	Chapter 7, Section 7.2
(j) An assessment of each identified potentially significant impact and risk, including—	(i) Cumulative Impacts	Chapter 7, Section 7.2
	(ii) The nature, significance and consequences of the impact and risk;	
	(iii) The extent and duration of the impact and risk;	
	(iv) The probability of the impact and risk occurring;	
	(v) The degree to which the impact and risk can be reversed;	
	(vi) The degree to which the impact and risk may cause irreplaceable loss of resources; and	
	(vii) The degree to which the impact and risk can be mitigated;	
(k)	Where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	Chapter 8
(l) An environmental impact statement which contains—	(i) A summary of the key findings of the environmental impact assessment:	Chapter 9
	(ii) A map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and	Chapter 9, Figure 9.1
	(iii) A summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	Chapter 9, Table 9.1
(m)	Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	Chapter 10
(n)	The final proposed alternatives which respond to the impact	Chapter 11, Section

Relevant section in GNR. 982	Requirement description	Relevant section in this report
	management measures, avoidance, and mitigation measures identified through the assessment;	11.1
(o)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Chapter 11, Section 11.2
(p)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Chapter 11, Section 11.3
(q)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Chapter 9, Section 9.1
(r)	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;	N/A. All operational aspects of the proposed development have been included in this EIR.
(s) an undertaking under oath or affirmation by the EAP in relation to-	(i) The correctness of the information provided in the reports;	Appendix 4
	(ii) The inclusion of comments and inputs from stakeholders and I&APs;	
	(iii) The inclusion of inputs and recommendations from the specialist reports where relevant; and	
	(iv) Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	
(t)	Where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	N/A
(u) An indication of any deviation from the approved scoping report, including the plan of study, including–	(i) Any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and	N/A
	(ii) A motivation for the deviation;	
(v)	Any specific information that may be required by the competent authority; and	Appendix 5
(w)	Any other matters required in terms of section 24(4)(a) and (b) of the Act	N/A
(2)	Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to an environmental impact assessment report the requirements as indicated in such notice will apply.	All legislation has been adhered to and is included in Chapter 3 of this report.

1.8 REPORT STRUCTURE

The structure of the report is as follows –

Chapter 1 – Introduction:

Chapter 2 – Project Description: Provides a description of the proposed development, the properties on which the development is to be undertaken and the location of the development on the property. The technical details of the project are also provided in this Chapter.

Chapter 3 – Legal and Policy Framework: Identifies all the legislation and guidelines that have been considered in the preparation of this Environmental Impact Assessment and the compliance of the project thereto.

Chapter 4 – Alternatives: Provides a description of the alternatives to the proposed development or parts of the proposed development. It also includes a comparative assessment of viable alternatives.

Chapter 5 – Need and Desirability: Provides a description of the need and desirability of the proposed activity, including a motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report.

Chapter 6 – Public Participation Process: Provides details of the public participation process conducted in terms of Chapter 6 of the NEMA EIA Regulations.

Chapter 7 – Key Findings of the Specialist Studies: This Chapter summarises the findings of the specialist studies.

Chapter 8 – Climate Change

Chapter 9 – Assessment of Impacts: Provides -

- An indication of the methodology used in determining the significance of potential environmental impacts
- A description of all environmental issues relating to all phases of the proposed development that were identified during the EIA process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures.
- An assessment of each identified potentially significant impact, including:
    i. Cumulative impacts;
    ii. The nature of the impact;
    iii. The extent and duration of the impact;
    iv. The probability of the impact occurring;
    v. The degree to which the impact can be reversed;
    vi. The degree to which the impact may cause irreplaceable loss of resources; and
    vii. The degree to which the impact can be mitigated.

Chapter 10 – Environmental Impact Statement: Provides –

- An opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.
- An environmental impact statement which contains –
    i. A summary of the key findings of the environmental impact assessment; and
    ii. A comparative assessment of the positive and negative implications of the proposed activity and identified alternatives.

Chapter 11 – Impact Management Outcomes: Provides a list of mitigation measures that must be included in the EMPr.

Chapter 12 – Conclusions

References: Cites any texts referred to during preparation of this report.

Appendices: Containing all supporting information.

2 PROJECT DESCRIPTION

The rationale for developing integrated seawater intake and effluent discharge marine servitudes is to have a common user servitude in which a number of industries can establish infrastructure required to abstract seawater and discharge effluent into the marine environment.

This section provides a description of the technical options that will be included in the proposed seawater intake and effluent discharge marine servitudes from the Coega SEZ.

2.1 BACKGROUND TO THE DEVELOPMENT OF THE PROJECT CONCEPT

The development of the project concept has been an iterative process over a period of more than 5 years. The main informants of the design concept have included:

- CES 2015, Feasibility Study for the Development of an Aquaculture Development Zone in the Coega IDZ (Now SEZ).
- PRDW 2016, Coega Aquaculture Development Seawater Intake & Outfall Study, Concept Design Report.
- Mott McDonald 2016, Coega IDZ, Probable Power Plant Configurations.
- PRDW, 2017, Marine Pipeline Servitude for the Coega IDZ: Specialist Marine Modelling Study and Effluent Dispersion.
- Ethical Exchange 2017, Coega Land-Based Aquaculture Development Zone (ADZ) Final Environmental Impact Report.
- Carnegie Energy 2019, MEMO: Technical Inputs to Coega Gas to Power EIA Scoping Report.
- PRDW 2020, Marine Pipeline Project for the Coega SEZ, Marine Effluent Dispersion Modelling.
- Lwandle 2020, Marine Pipeline Project for the Coega SEZ, Marine Ecological Assessment.
- WSP 2020, Techno-economic Assessment: Cooling Options for the Coega SEZ Gas-to-Power Project Report.
- SRK 2020, Proposed Coega 1000 MW Gas-to-Power Plant – Zone 10 South and Zone 10 North. Draft Scoping Reports.
- Coega IDZ Stormwater Management Plan.
- Various meetings and workshops.

Details relating to these various inputs are provided where appropriate in the Project Description outlined below.

Figure 2.1 shows the location of the proposed marine servitudes that is informed by the Marine Dispersion Modelling studies conducted by PRDW (2017 and 2020).

Figure 2.1: Broad locations of the proposed seawater intake (BLUE) and effluent discharge (RED) marine servitudes.

2.2 PROJECT LOCATION

The project is located in the Coega SEZ. The Coega SEZ is situated on the northern side of Port Elizabeth within the Nelson Mandela Bay Municipality (NMBM), seated in the Sarah Baartman District, Eastern Cape Province. The integrated SEZ and Port of Ngqura is approximately 11,500 ha in extent and comprises of 14 zones designated for various light, medium and heavy industrial land uses.

The Port of Ngqura and Zone 10 within the SEZ are the proposed preferred locations for the infrastructure (refer to Table 2.1 and Figure 2.32).

Table 2.1: Properties on which the proposed project is located.

PROPERTIES	21 DIGIT SG CODES	AREA (HA)	CENTRAL GPS-COORDINATE	
			Longitude	Latitude
Erf 220	C07600230000022000000	100 ha	25°42'35.11"E	33°47'1.69"S
Erf 255	C07600230000025500000	53 ha	25°41'56.87"E	33°47'31.34"S
Erf 251	C07600230000025100000	233 ha	25°40'51.84"E	33°47'13.72"S
Erf 221	C07600230000022100000	601 ha	25°43'24.09"E	33°46'7.29"S
Erf 302	C07600230000030200000	7.9 ha	25°43'6.79"E	33°46'51.76"S
Erf 252	C07600230000025200000	264 ha	25°42'1.61"E	33°46'21.27"S

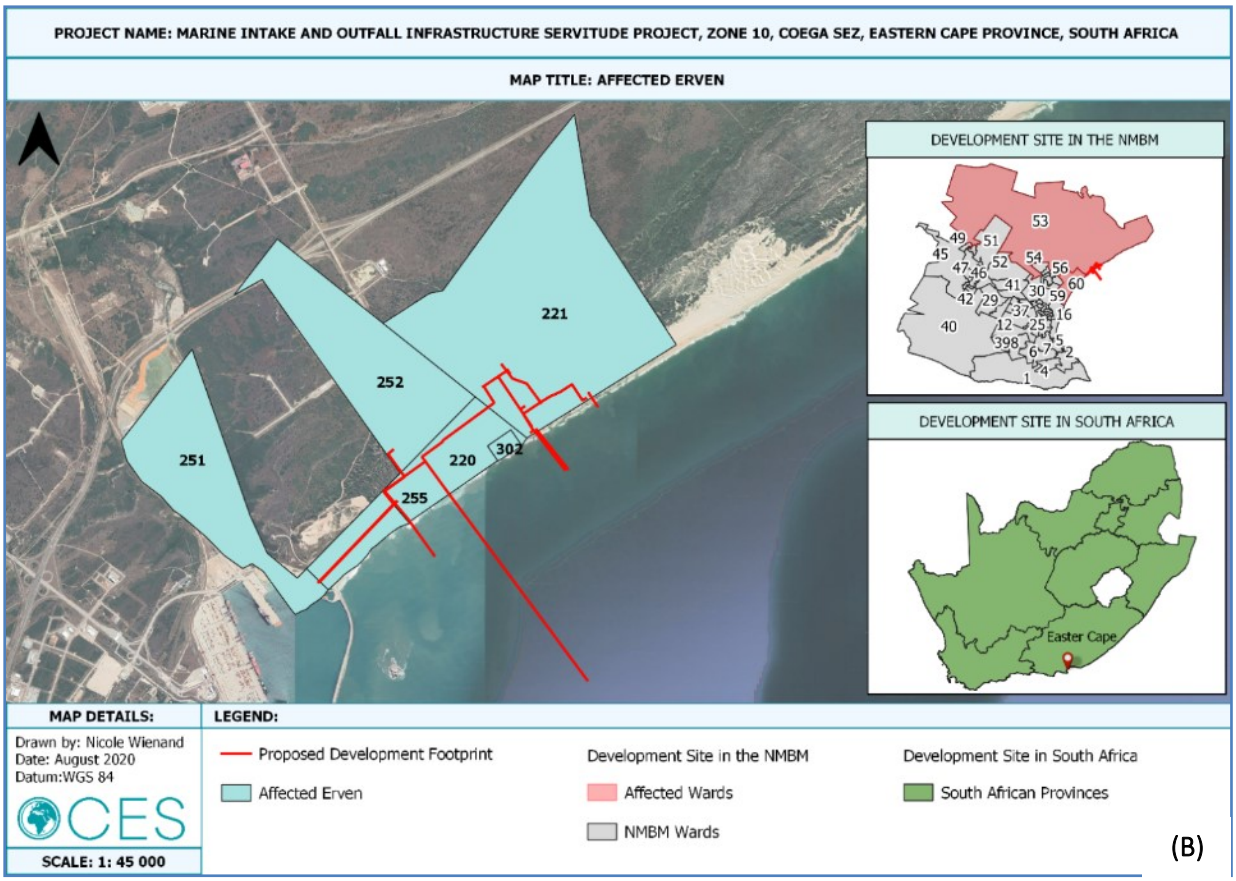

Figure 2.2: Locality map for the proposed project showing farm portions.

Figure 2.3 provides the CDC's baseline plan for the activities within Zone 10 of the Coega SEZ.

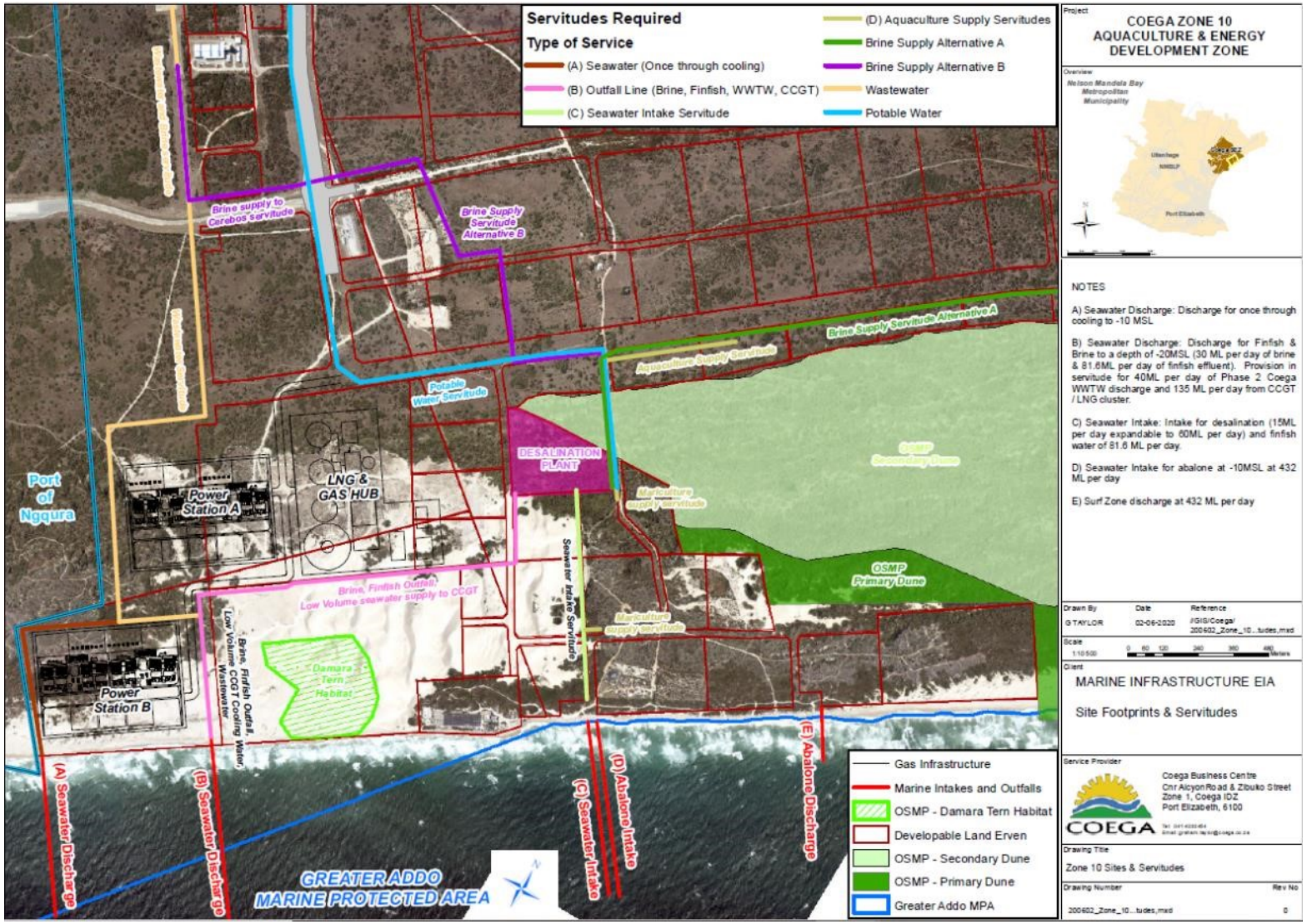

Figure 2.3: Detailed baseline plan for the Coega SEZ Zone 10 Aquaculture and Energy Development Zone.

2.3 PURPOSE OF THE PROJECT

The purpose of the marine intake servitudes is the provision of seawater for various industries (aquaculture, cooling water for power generation plants and desalination) via a number of seawater intakes of varying design to suit the end user. The marine effluent discharge servitudes will be used for the disposal of treated effluent from the aquaculture development zone, brine from the desalination plant, seawater with elevated temperatures from the power generation plants and effluent from land based waste water treatment works, into the marine environment. As such, infrastructure related to this project needs to be constructed along the coast, and hence in terms of the Integrated Coastal Management Act this infrastructure is defined as coastal dependant.

2.4 MARINE INTAKE SERVITUDES

2.4.1 Seawater intake locations and volumes

The need for the two different locations for the marine seawater intake servitudes is driven by the water requirements for the following proposed Coega SEZ industries:

1. Cooling water for two 1000 MW LNG power stations for which the EIA is currently in progress. They require large volumes of water.
2. Land-based aquaculture (including abalone, finfish and algae farming of more than 40,000 tonnes / year). Environmental Authorisation was received on 07 February 2018. Moderate volumes of good quality seawater are required.
3. The Coega ADZ includes the development of a Seawater Desalination Plant with a maximum capacity of 60 Mℓ / day. Environmental Authorisation was received as part of the authorisation for the ADZ on 07 February 2018. Moderate volumes of good quality seawater are required.

Information relating to the seawater requirements is based on input from the following sources: CES (2015), Carnegie Energy (2019), WSP (2020), Ethical Exchange (2017) and SRK (2020). There has also been *ad hoc* communication with various relevant industry specialists to confirm required seawater volume and quality requirements.

Since the water quality for the power station cooling is not critical, the required large volumes can be abstracted from inside the Port area. However, the aquaculture operations require seawater of good quality, and hence abstraction outside the Port is necessary.

The following **maximum** seawater intake volume requirements are projected:

Purpose	Worse case intake flow rates
Cooling Water: Once-Through Cooling	14.70 m^3/sec
Cooling Water: Wet Mechanical Draft Cooling	0.42 m^3/sec
Aquaculture flow through system for abalone	5.00 m^3/sec
Aquaculture recirculation system for finfish	0.94 m^3/sec
Desalination	2.03 m^3/sec
Total	**23.09 m^3/sec**

The technologies described in sections 2.4.2 to 2.4.6 of this report will be implemented to abstract seawater for the various proposed land-based industrial uses. This information is based substantially on the PRDW Concept Design Report (2016) for aquaculture, the WSP Techno-Economic Assessment Report (2020) for cooling water, and technical information provided by the CDC for other seawater requirements.

2.4.2 Marine intake technologies for Once-Through Cooling system

A Once-Through Cooling system for the proposed LNG power station requires large volumes of seawater (14.7 m^3/sec). According to the Techno-Economic Assessment Report by WSP (2020), the abstraction of the required seawater volumes can best be achieved by constructing a seawater intake basin located inside the Port of Ngqura. The intake basin would consist of four or more concrete channels and sump areas (see Plate 2.1), the dimensions of which would be as follows:

Dimension	Intake channels	Sump area	Unit
Length	25	4	m
Width	3.5	3.5	m
Depth	3	3	m

The intake channels would direct the seawater flow at a low velocity to three vertical turbine pumps (flowrate 4.9 m^3/s per pump). Upstream of the pumps, the channels would be fitted with screens to filter out any solids. The screens would be arranged from coarse to fine moving closer to the pumps. The channels could be isolated with a sluice gate from the stilling basin if maintenance is needed on the pumps or the incoming screens. Plate 2.1 and Plate 2.2 show what a cooling water intake basin could look like.

Plate 2.1: Image of cooling water intake channel configuration.

Plate 2.2: Examples of once-through cooling seawater intake infrastructure with vertical pumps on the right (Fluor, Saudi Arabia).

Three pumps would be operational at any one time, with the fourth pump acting as backup. The location of the intake is shown in Plate 2.3, inside the Port either within or directly adjacent to the small craft harbour.

According to the Port Masterplan, this location is the most suitable since it will not conflict with the proposed significant future extensions within the Port of Ngqura that would take place directly to the west of this location.

Plate 2.3: Intake for cooling water located within the Port of Ngqura (Source: WSP, 2020)

2.4.3 Marine intake technologies for Wet Mechanical Cooling system

According to the Techno-Economic Assessment Report by WSP (2020), since a Wet Mechanical Cooling system requires lower volumes of cooling water compared to Once-Through Cooling, an abstraction pipeline is a feasible technical solution.

This would involve the construction of an intake jetty within the Port, which would support the pipes and connect the intake chambers to the land. An intake chamber on the shoreline is required for installing a filtration system that removes larger particles from the abstraction water. However, this would be much smaller than the Once-Through Cooling intake channels.

The intake jetty will be approximately 50 m in length, and accommodate a pipe extending to a depth of about 6 m below mean sea level (MSL). It would be fitted with two vertical pumps located on the shoreline above the highwater mark (1 active and 1 on standby). An example of an intake jetty is presented in Plate 2.4.

A 710 mm diameter High Density Polyethylene (HDPE) pipeline would be required to deliver the required flow of 0.42 m^3/s per power plant. The HDPE is chosen because of its inherent inertness to seawater corrosion.

Plate 2.4: Example of intake jetty.

2.4.4 Marine intake technologies for aquaculture and desalination

Intake pipeline for high seawater volumes

Intake pipelines are suitable for industries that require smaller volumes of seawater than that required for the Once-Through Cooling system. Thus, intake pipelines can be used for the abalone aquaculture flow-through system (5.0 m^3/s), and seawater supply for desalination (2.0 m^3/s). However, unlike the cooling requirements for the power plants, water quality is a particularly critical issue for aquaculture operations, and hence this infrastructure cannot be located within the Port of Ngqura.

The PRDW dispersion modelling report recommends that these larger flow intake pipelines be

located at 600 m offshore, to a depth of -10 Chart Datum (CD).

Depending on the geotechnical conditions, seawater abstraction pipelines are either anchored firmly to the seabed and shoreline, or embedded within excavated trenches. Typically, such a pipeline would be buried in trenches in the high impact beach and surf zone, and then anchored to the seabed beyond the high active surf zone. Suitable anchoring / weighting is required to ensure the pipeline is stable on the seabed during storm conditions. Further work is required to determine whether these pipelines need to be buried or anchored, and how they might be anchored to the seabed.

In the case of a buried pipeline, a channel will be blasted into the rocky shore from above the spring high water mark to below the spring low water mark or excavated on a sandy shoreline. After excavation, a pipe will be laid into the channel, and would then be backfilled with concrete and rock (Figure 2.4). Seawater will then flow by gravity from the sea into the sump, which is situated well below MSL (at approximately -10 CD). The depth and breadth of the sump would be dictated by the water volume requirements. Seawater flows by gravity into the beach sump, and then pumped out using submersible or land-based pumps at the intake pump station into holding tanks and distribution chambers located in the aquaculture zone (or directly to operating sites).

The intake wet well and intake pump station (Figure 2.54) are located above the spring high water mark, above expected tidal surge heights. This location will take into consideration climatic changes and the potential for sea level rise, and additional wave run-up and storm surges.

Figure 2.4 provides a schematic layout of an embedded seawater intake pipeline and beach sump or intake wet well.

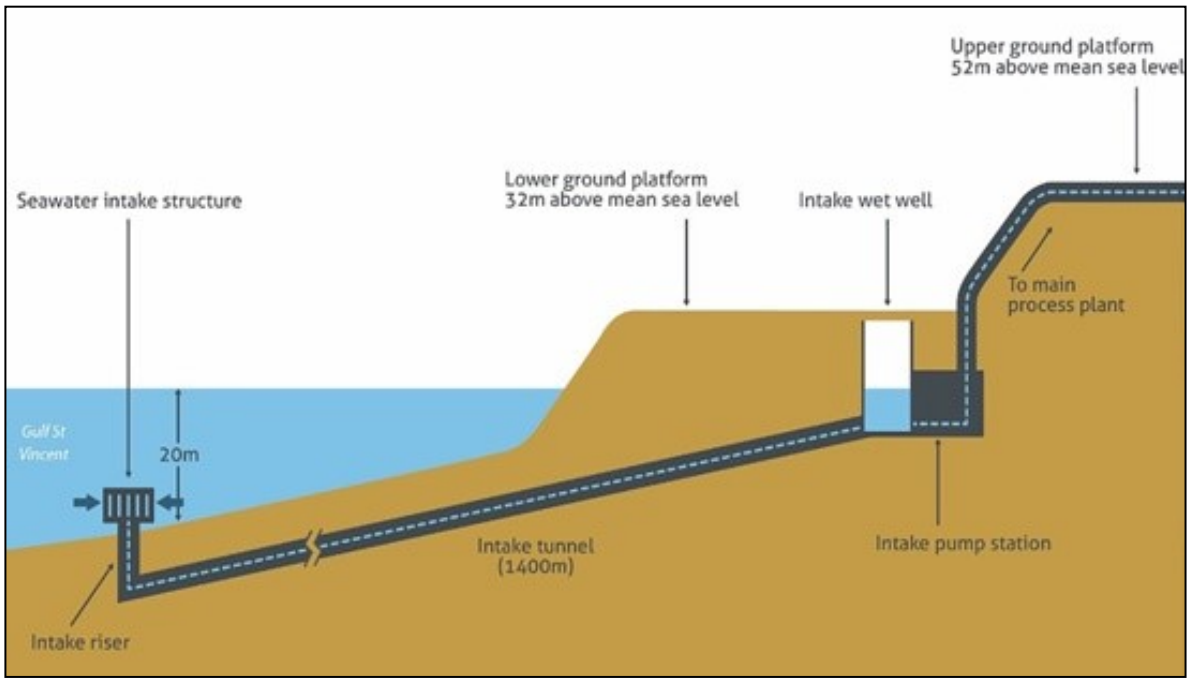

Figure 2.4: Schematic layout of an embedded seawater intake pipeline and beach sump or intake wet well.

Abalone aquaculture

The seawater intake pipeline for abalone aquaculture (5.0 m^3/s) will be made of non-corroding Glass-fibre Reinforced Plastic (GRP) or HDPE. It will be up to 2,500 mm (2.5 m) in diameter, and appropriately anchored to the seabed at an appropriate distance (500 m) and depth (-10 CD) offshore, where good quality seawater will be obtained for aquaculture purposes.

A smaller diameter dual pipeline system will be constructed to supply the 60 Ml/day desalination plant at a rate of 2.03 m^3/s. This will comprise two 1,000 mm (1.0 m) diameter HDPE pipes, laid alongside one another, and appropriately anchored to the seabed at the appropriate distance (500 m) and depth (-10 CD) offshore.

Once the pipes reach land (irrespective of whether it is a single or dual pipeline system), they will be buried in some areas and exposed in other areas, depending on the topography or ground profile along the route of the pipeline. The pipes will exit the water to a submerged pump station on land, similar to that shown in Figure 2.5.

At the offshore end of the pipeline, the intake point will need to be appropriately elevated above the seabed, and equipped with screens to reduce the intake of sediment and marine life. Intake velocities would be limited to 0.15 m/s to reduce impingement and entrainment of marine life, which is the reason for the large diameter pipes. The intake system will include a chemical dosing component to reduce marine growth within the pipeline and intake structure, as well as pigging infrastructure for maintenance. Excavation or dredging of sand will also be required at the intake point, as well as scour protection to ensure that the structure is stable on the seabed.

Directional drilled pipeline

According to PRDW (2016) a tunnelled intake pipeline could also be constructed for aquaculture intake. It is recommended that the section of the pipeline in the surf zone is tunnelled while the remainder of the pipeline is secured to the sea bed.

To the east of the port, the beach comprises pebbles, with sand dunes behind the beach. The seabed surface is covered with a 200mm to 500mm layer of unconsolidated sediment with scattered rock outcrops. Below this layer lies an average 1.5m layer of quaternary calcarenites over a hard bedrock at a depth of -2.0m and deeper. It is envisaged that a tunnelled pipeline will be constructed from a thrust shaft located behind the beach. The thrust shaft is then drilled out through the bedrock underneath the beach and into the sea. The vertical circular thrust shaft is approximately 10.5 m in diameter and constructed from precast concrete units which are sunk to a depth of -4 m CD. A launch seal is installed in the shaft wall and a jacking station is installed in the pit as shown in Figure 2.5. Up to three 1,600 mm diameter pipelines would be needed depending upon the waterflow requirements.

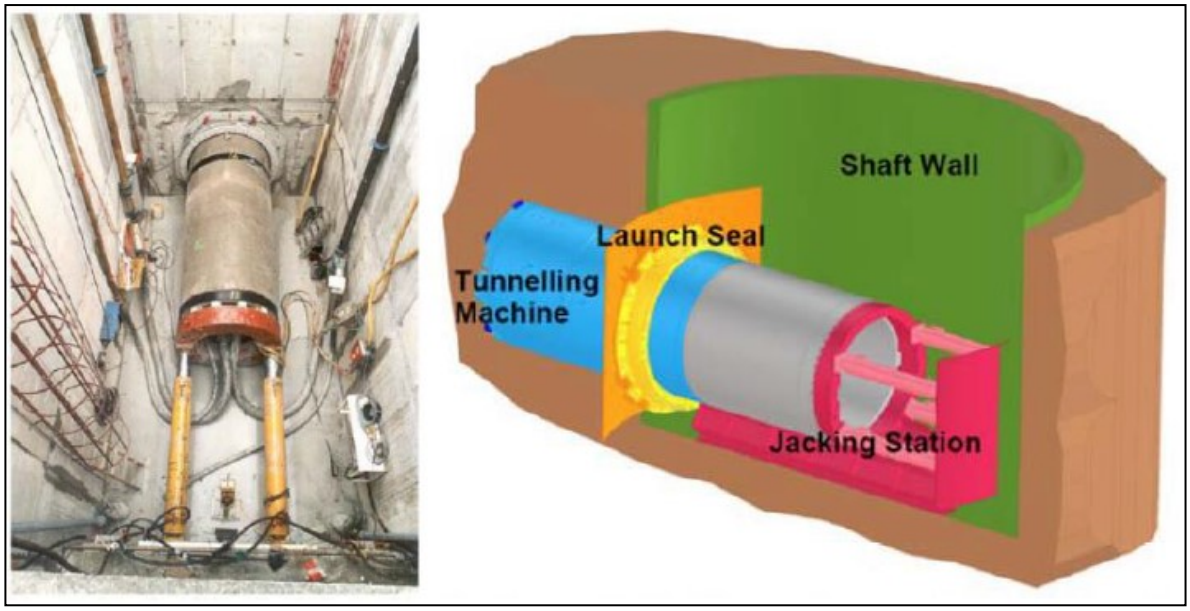

Figure 2.5: Example of thrust shaft and pipe jacking system for constructing pipeline tunnels (PRDW, 2016).

When the tunnel reaches 500 m in length, the tunnelling machine is disconnected, sealed off to prevent water ingress and placed into recovery mode. The material above the machine is then excavated or dredged such that it could be lifted onto a nearby barge. See Figure 2.76. The intake structure is then constructed at -10 m CD.

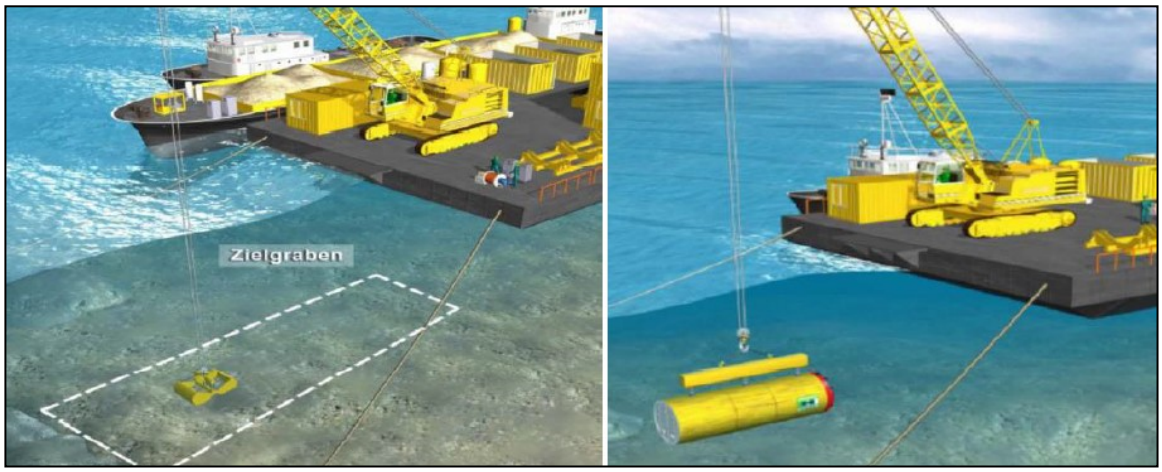

Figure 2.6: Recovery of micro-tunnelling machinery (PRDW, 2016).

Vertical beach wells for low seawater volumes

Vertical beach wells will be used to abstract the smaller volumes (< 1.0 m^3/s) of high-quality seawater required for the land-based finfish aquaculture recirculating systems. This method will require a sandy beach that is continuously connected to the sea. Perforated or slotted pipes will be placed well below chart datum in the sand medium, and these pipelines will then terminate in a sump. The seawater will flow by gravity into the sump and will then be pumped out using submersible or land-based pumps.

The beach wells typically consist of a non-metallic casing, well screen, and vertical turbine pump. It is preferable to locate beach wells as close as possible to the shoreline, which means locating a pump house immediately above the spring high tide mark (Figure 2.87).

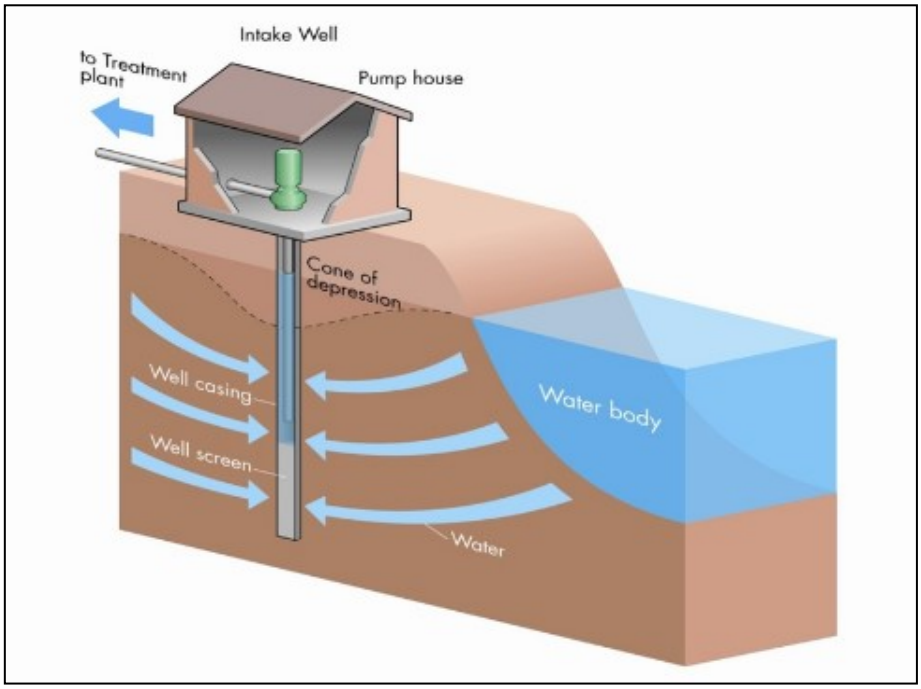

Figure 2.7: Schematic layout of a vertical beach well (Voutchkov, 2011).

Onshore pump station

The onshore raw seawater abstraction system linking to the pump station and end-user (aquaculture or desalination plant), as well as the pump-over scheme's pipe works, will be buried where possible for safety and security reasons.

The facilities required for the pump station are as follows:

- Pump sets, with a separate inlet chamber for each pump;
- Mechanical equipment for seawater screening (mechanical rake screens) and screw conveyors for disposal of screenings to skip;
- Provision for easy access for lifting, transportation and removal of all plant;
- Safe and easy access to the pumping chambers;
- Penstock valves to enable the isolation of each chamber for maintenance purposes;
- Dewatering sumps installed below the lowest floor level in each chamber;
- A superstructure constructed over the pump area;
- All switchgear and control panels and other electrical equipment;
- A permanently installed electrical overhead travelling crane;
- LV MCC switch room; and
- Ventilation room.

2.4.5 WEROP Wave Pump

The WEROP wave pump is a pressure pump technology that makes use of wave energy for the abstraction of water thus eliminating the need for electrical power. This technology will be utilised for pumping smaller volumes of water to the shore either into a sump or directly to the user facility.

The wave pumps use wave energy directly to pre-filter and pump seawater at the requisite pressure to a shore-based end user. The wave pump has a footprint of about 50 m^2 and sits on the seabed at a depth of between -10 and -15 m. The distance offshore would be dictated by the location of the seawater intake point and the topography of the seabed. In the case of the Coega SEZ, this is envisaged to be between 700 m and 1.5 km offshore (Figure 2.98).

The wave pump is secured to the seabed using a variety of methods, depending upon the seabed characteristics. In the case of the Coega SEZ, three options are available but would depend upon the exact location of the wave pumps:

- Sand anchors;
- Rock anchors; or
- Combination of both.

The wave pumps would be assembled within the Port of Ngqura, towed to the site and submerged onto the seabed at the required location.

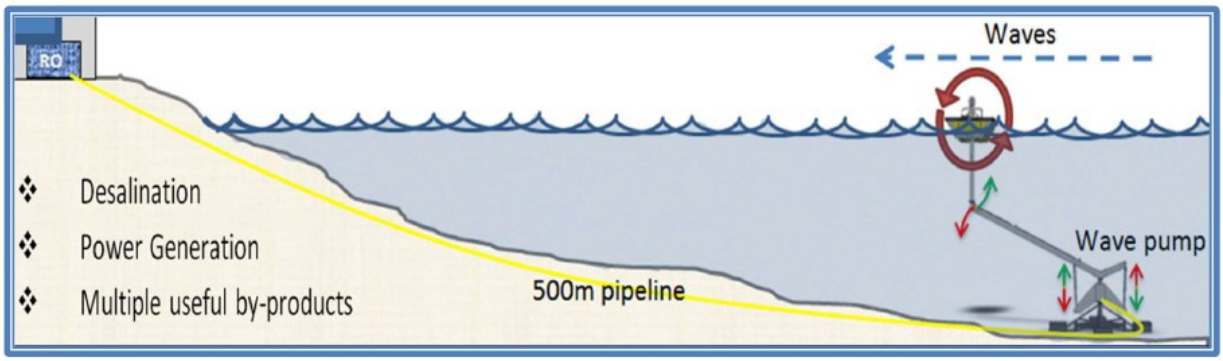

Figure 2.8: Diagram showing offshore wave pumps (Impact Free Water (Pty) Ltd, 2019).

2.4.6 Seawater distribution chamber or reservoir

A seawater distribution chamber or sump will be required close to the shore to supply seawater to the various aquaculture and desalination facilities within the Aquaculture Development Zone (ADZ). The PRDW Concept Design Report (2016) recommended locating the distribution chamber at the lower boundary of the ADZ to accommodate the large seawater supply requirements (5.0 m^3/sec) for the abalone flow-through facilities. The smaller flow demand (0.94 m^3/sec for finfish recirculation system and 2.03 m^3/sec for desalination) is required at elevated altitudes of the ADZ, and would be pumped from the distribution chamber or reservoir to the finfish farms and desalination facility located at the higher elevations.

The seawater distribution chamber or reservoir is located within the ADZ for which Environmental Authorisation (EA) has already been obtained.

2.5 MARINE DISCHARGE SERVITUDES

2.5.1 Discharge volumes

The need for the marine effluent discharge servitudes is mostly driven by a corresponding need of the respective Coega SEZ industries to return mostly seawater effluent used for cooling water and aquaculture, back into the offshore marine environment. Other additional effluent streams include wastewater from the Coega WWTW, brine from the desalination plant and stormwater.

The following **maximum** effluent discharge requirements are projected:

PURPOSE	TYPE OF EFFLUENT	WORSE CASE DISCHARGE FLOW RATES
Cooling water: once-through cooling	Seawater at 28°C and 35 ppt	14.70 m^3/sec
Cooling water: wet mechanical cooling	Seawater at 23°C and 53 ppt	0.30 m^3/sec
Aquaculture flow through system for abalone	Seawater with projected concentrations of ammonia, nitrate, nitrite, TSS, COD.	5.00 m^3/sec
Aquaculture recirculation system for finfish	Seawater with projected concentrations of ammonia, nitrate, nitrite, TSS, COD.	0.94 m^3/sec
Desalination brine	Brine at 60 ppt	1.22 m^3/sec
Wastewater	Treated domestic and industrial wastewater with projected concentrations of ammonia, nitrate, nitrite, TSS, COD, salinity heavy metals and E.coli	0.93 + 0.46 m^3/sec
Stormwater	Rainwater	Uncertain
TOTAL		**23.55 m^3/sec**

One or more of the following technologies will be implemented to discharge the various effluent streams from the various proposed land-based uses into the sea.

2.5.2 Cooling water for Once-Through power stations

The PRDW dispersion modelling report (2020) has determined that the cooling water for the Once-Through Cooling system (14.70 m^3/sec) must be discharged at a distance of 650 m offshore to a depth of -11 m CD in order to meet the applicable water quality guidelines.

The WSP (2020) technical report investigated two types of infrastructure for the discharge of the cooling water, namely:

- Eight (8) metre wide raceway; and
- Three (3) metre diameter tunnel.

Raceway discharge

The possibility of attaching a raceway to the eastern breakwater of the Port was determined to be unfeasible due to the potential risk of compromising the structural integrity of the breakwater. An alternative freestanding raceway was also investigated, such as the one shown in Plate 2.5, used at the Koeberg Power Station.

Plate 2.5: Typical outfall raceway found at the Koeberg Nuclear Power Plant (WSP, 2020).

However, the freestanding raceway option would require significant infrastructure, including two lateral breakwaters that would have a large ecological footprint and would also affect sediment movement. Hence, this option was determined to be both financially and ecologically unacceptable for use in the proposed project.

Tunnel discharge

WSP have recommended that a tunnel is the most feasible option for discharging the large volumes of water from a once-through cooling system. Based on the expected discharge volumes, it is projected that a 3,000 mm outer diameter tunnel will be required for this purpose. The length from the high-water mark to offshore would be about 600 m. Beyond this, seabed mounted pipelines may be used for the diffuser section.

The tunnel would consist of a concrete conduit (concrete pipe section installed by means of jacking and a tunnel boring machine from land) as shown in Plate 2.6 below. The concrete would be of suitable mix to ensure its design life is reached, especially considering the warm seawater flowing inside the tunnel.

The tunnel boring and pipe jacking is a large-scale operation requiring a large beach laydown area during construction, as shown in Plate 2.6. Pipe jacking would be installed from the land

side to the -11 m relief well (offshore retrieval pit) to extract the drilling equipment. It is likely that a marine jack-up barge may be required for this purpose.

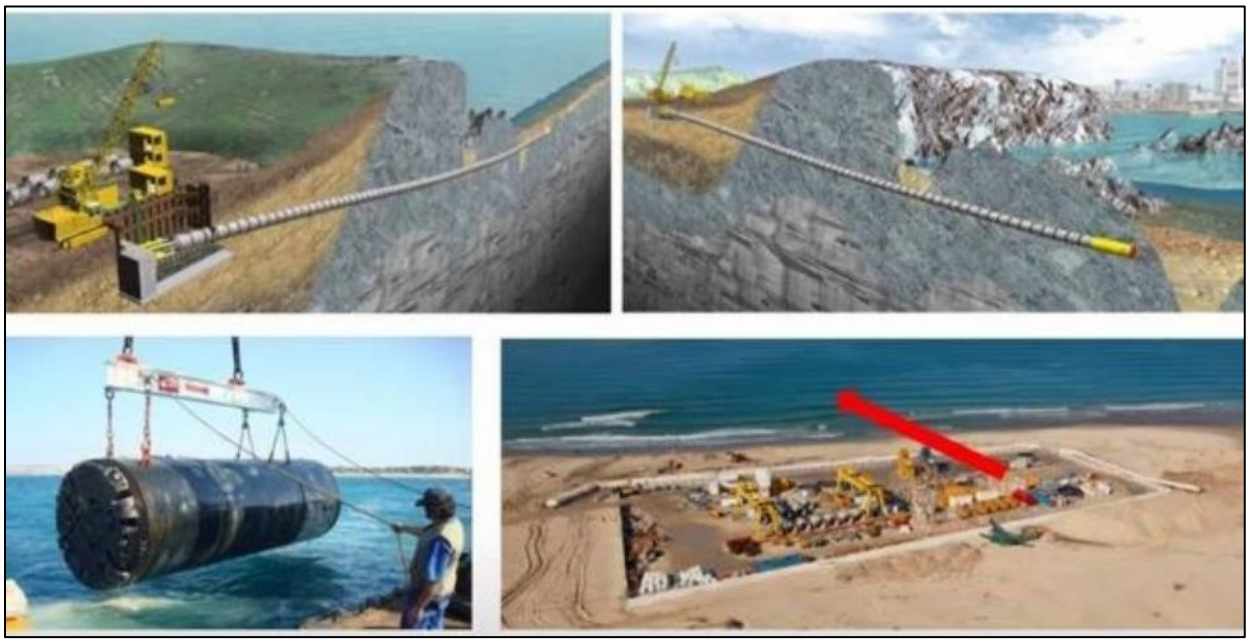

Plate 2.6: Illustration of the on-land launch shaft and jacking process during the tunnelling process (WSP, 2020).

The seaward end of the pipeline or tunnel will have a diffuser section with ports to discharge effluent into the water column at appropriate velocities to promote rapid mixing (see example at Figure 2.9).

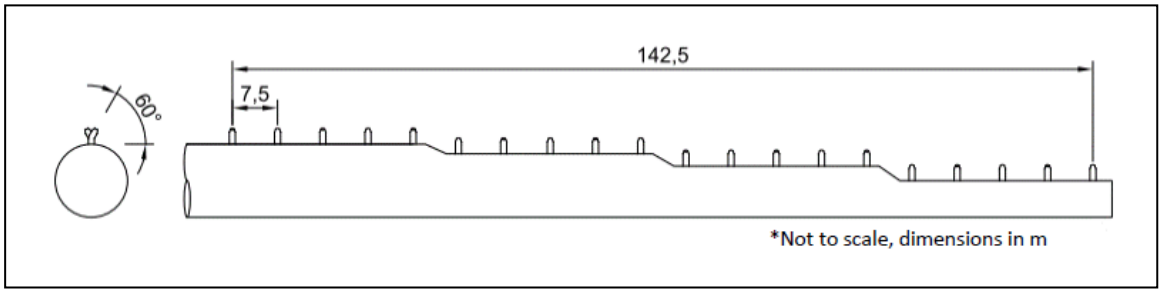

Figure 2.9: Conceptual diffuser section configuration with multiple discharge ports (PRDW, 2020).

2.5.3 Cooling water for Wet Mechanical power stations

The PRDW dispersion modelling report (2020) has determined that the cooling water for two Wet Mechanical Cooling systems (0.54 m^3/sec) (i.e. for two power stations using the Wet Mechanical Cooling technology) must be discharged at a distance of about 650 m offshore to a depth of about -11 m CD in order to meet the applicable water quality guidelines (the same location as the Once-Through Cooling).

The WSP technical report (2020) proposes a pipeline structure for discharging seawater from the Wet Mechanical Cooling power station. This outfall structure would be an HDPE pipeline of

about 560 mm diameter for each plant. The pipeline would be designed to lie on the seabed and weighed down by concrete collars as shown in Plate 2.7.

Plate 2.7: Example of HDPE pipeline with collars to provide hydrodynamic stability when placed on the seabed (WSP).

Where a pipeline is embedded in the surf zone, a temporary jetty structure would be required during the construction period to provide a safe platform from which excavation could be done to bury the pipeline through the surf zone as shown in Figure 2.10.

Figure 2.10: Sheet pile jetty structure to provide access for cranes to excavate pipe burial trench (WSP, 2020).

The pipeline end will be fitted with a diffuser with a number of ports discharging the outflow within the marine environment, in order to improve mixing (similar to that shown in Figure 2.10).

2.5.4 Flow through abalone aquaculture effluent

Seawater effluent from the flow-through abalone farms (5.0 m^3/sec) will be discharged directly into the marine environment via an HDPE beach discharge pipeline, with a diameter of about 2,500 mm, into the surf zone. The pipeline would need to be buried across the beach zone. The option of diverting some of the seawater to a desalination facility will also be explored.

2.5.5 Recirculated finfish aquaculture effluent

Recirculated finfish aquaculture effluent (0.94 m^3/sec) from various users will be treated on site by each investor before being discharged to the marine environment via a pipeline. The pipeline would be similar to the seawater abstraction pipeline described above (i.e. embedded in the surf zone and sitting on the seabed beyond the surf zone) and discharged at a distance of about 1,500 m offshore, at a depth of about -16 m below MSL.

Plate 2.8 provides an example of a discharge pipeline that would be used for finfish effluent discharges.

Plate 2.8: Example of effluent discharge pipeline with concrete collars prior to sinking to the seabed.

2.5.6 Desalination brine discharge

Brine from a 60 Ml/day desalination plant (1.22 m^3/sec) will be discharged directly to the marine environment via a pipeline. The HDPE pipeline will have a diameter of about 700 mm and buried underground on land, and laid on the seabed offshore. It will discharge at a distance of about 1,000 m offshore at a depth of about -14 m CD.

2.5.7 Wastewater Treatment Works

Treated industrial and domestic wastewater from the proposed Coega Wastewater Treatment Works (WWTW), totalling 1.4 m^3/sec, will be discharged directly into the marine environment via a pipeline. The pipeline would be similar to the brine discharge pipeline described in Section 2.3.5 of this report, discharging at a distance of about 3,000 m offshore at a depth of about -20 m CD.

The outfall structure for the wastewater would be an HDPE pipeline of about 700 mm diameter. The pipeline would be designed to lie on the seabed and weighed down by concrete collars as shown in Figure 2.11. The structure would be assembled in the Port, floated out to the site and submerged. The section through the surf-zone would either be embedded in trenches or routed underneath the surf zone using directional drilling technologies.

The seaward end of the pipeline would have a diffuser section with ports to discharge effluent into the water column at appropriate velocities to promote rapid mixing (see example in Figure 2.11 below).

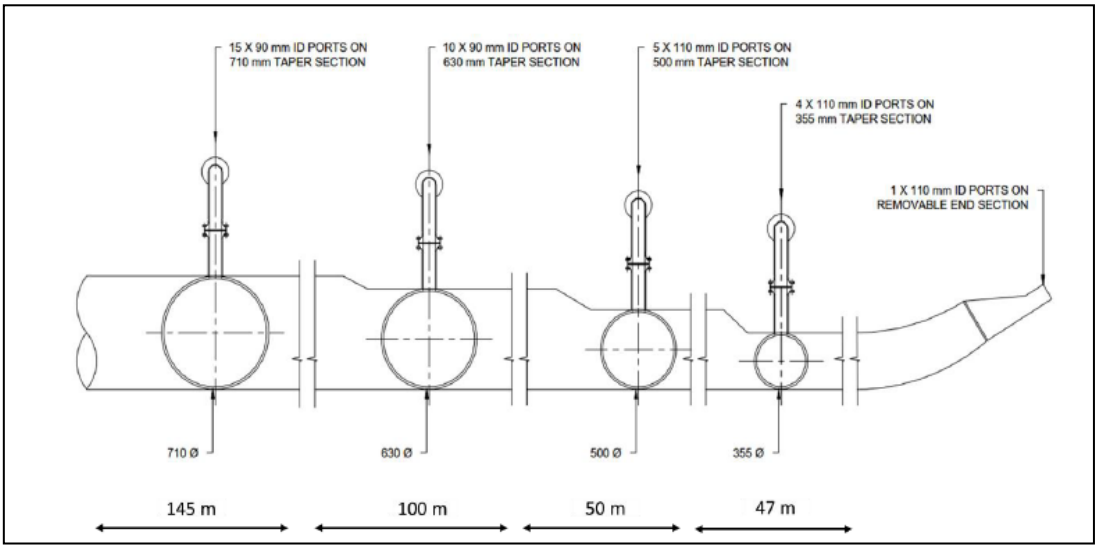

Figure 2.11: Example of diffuser section of a wastewater pipeline with multiple discharge ports.

2.5.8 Stormwater discharge infrastructure

SANParks objected to the stormwater management design presented in the Scoping Report. The CDC and its engineers engaged proactively with SANParks, and have now redesigned the stormwater outlets for Zone 10. The main objective of the stormwater outlet structure is the dissipation of energy and prevention of erosion during rain events. The secondary objective is to collect waste that might wash down the stormwater pipes/channels.

2.5.8.1 Structure location and Design

Stormwater derived from Zone 10 will be attenuated on land behind the foredune area, approximately 40-50 m from the HWM. The stormwater outlet channels will run parallel to the HWM but behind the foredune, and will comprise of gabions and reno mattresses to break the flow of water before it enters a gently sloping lined channel (0%-0.5% slope). This will attenuate the stormwater and allow for the infiltration of water into the underlying sandy substrate. The stormwater strictures have been designed to attenuate the 1:5 year storm event. Three stormwater outlet channels will be constructed (Figure 2.12). A berm surrounding the outlet channel will prevent the overflow of stormwater into the surrounding beach environment. A large reno mattress and associated gabions on the far end of the outlet channel will extend to the rocky shoreline to ensure the system can accommodate major rainfall events (>1:5 year) which may result in the overflow of water from the stormwater outlet channel (Figure 2.13).

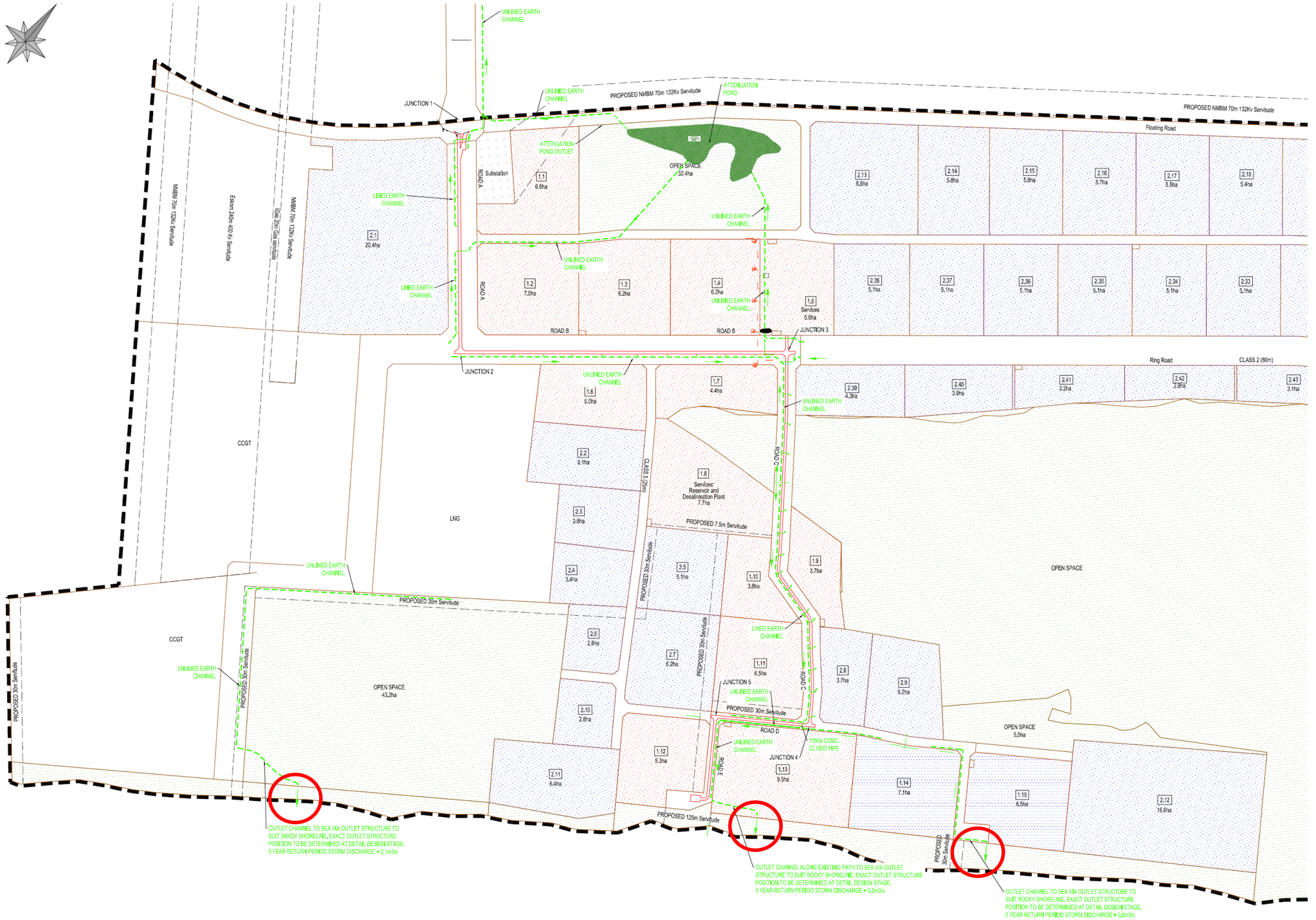

Figure 2.12: Proposed Location of three (3) stormwater discharges.

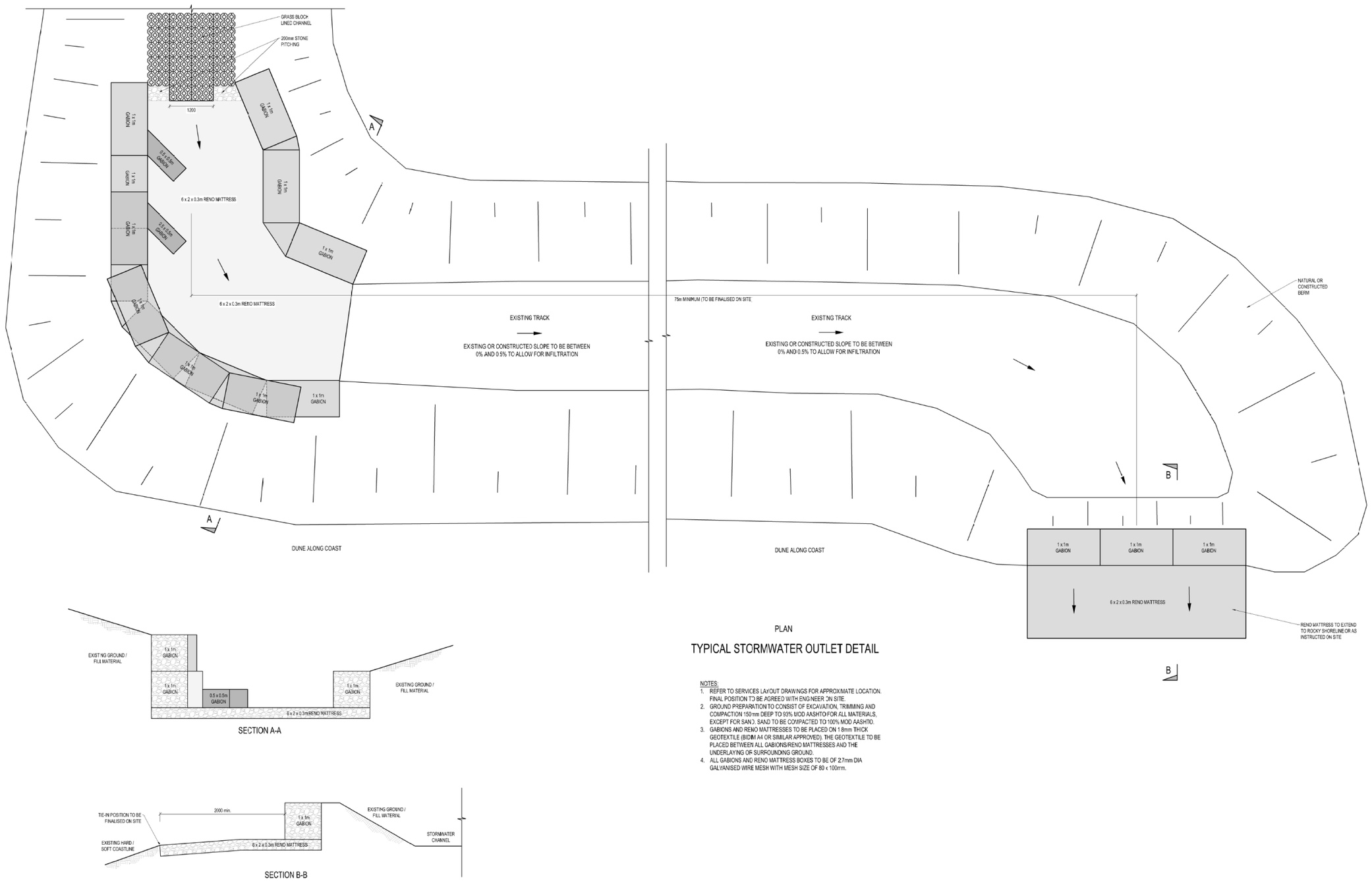

Figure 2.13: Typical details of stormwater structures provided by the CDC.

3 LEGAL AND POLICY FRAMEWORK

3.1 INTRODUCTION

Item 2 (a) of Appendix 3 of the National Environmental Management Act (NEMA, Act No. 107 of 1998, as amended) Environmental Impact Assessment (EIA) Regulations (2014 and subsequent amendments), states: "*determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context*".

Thus, in line with the above legislative requirement the sections below describe the South African legislation that was taken into consideration during the EIA Phase of the proposed project.

3.2 ENVIRONMENTAL AUTHORISATION LEGISLATIVE PROCESS

3.2.1 NEMA Environmental Authorisation

The National Environmental Management Act (NEMA, Act No. 107 of 1998 and subsequent amendments)

The objective of the NEMA is: "*To provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for coordinating environmental functions exercised by organs of state; and to provide for matters connected therewith*."

A key aspect of the NEMA is that it provides a set of environmental management principles which apply throughout the Republic to the actions of all organs of state that may significantly affect the environment. The proposed development has been assessed in terms of possible conflicts or compliance with these principles. Section 2 of the NEMA contains principles (see Table 3.1) relevant to the proposed project, and which are likely to be utilised in the process of decision making by the competent authority.

Table 3.1: NEMA Environmental Management Principles.

(2)	Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.
(3)	Development must be socially, environmentally and economically sustainable.
(4)(a)	Sustainable development requires the consideration of all relevant factors including the following: i. That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied; ii. That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied; and iii. That waste is avoided, or where it cannot be altogether avoided, minimised and re-used and/or recycled where possible and otherwise disposed of in a responsible manner.
(4)(e)	Responsibility for the environmental health and safety consequences of a policy, programme,

	project, product, process, service or activity exists throughout its life cycle.
(4)(i)	The social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions should be based on the consideration and the findings of the assessment.
(4)(j)	The right of workers to refuse work that is harmful to human health or the environment and to be informed of dangers must be respected and protected.
(4)(p)	The costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment ("the polluter pays").
(4)(r)	Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.

As these principles are utilised as a guideline by the competent authority in ensuring the protection of the environment, the proposed development should, where possible, be in accordance with them. Where this is not possible, deviation from the principles would have to be very strongly motivated.

The NEMA introduces the duty of care concept, which is based on the policy of strict liability. This duty of care extends to the prevention, control and rehabilitation of significant pollution and environmental degradation. It also dictates a duty of care to address emergency incidents of pollution. A failure to perform this duty of care may lead to criminal prosecution, and may lead to the prosecution of managers or directors of companies for the conduct of the legal persons.

In addition, the NEMA introduced a new framework for Environmental Impact Assessments (EIAs), the NEMA EIA Regulations (2014 and subsequent 2017 amendments).

How the proposed activity complies with and responds to the Act:

Three (3) lists of activities, published on the 21st of April 2006 and amended on 4th of December 2014 (and subsequent 2017 amendments), as Government Notice Numbers R.983, R.984, and R.985 define the activities which require, either a Basic Assessment (applies to activities with limited environmental impacts: GNR. 983 and GNR. 985), or a Scoping and Environmental Impact Assessment (applies to activities which are significant in extent and duration: GNR. 984). Listing Notice 3 (contained in GNR. 985) lists activities which would require authorisation if carried out in specified or sensitive geographical areas. It should be noted that even if only one (1) listed activity is triggered in Listing Notice 2 (GNR. 984), the activity will trigger a full Scoping and EIA, regardless of if more than one (1) activity is triggered in Listing Notice 1 (GNR. 983). All listed activities that are triggered in the above listing notices need to be assessed in the assessment report.

The activities triggered by the proposed development are listed in

Table 3.2 below.

Table 3.2: Listed activities triggered by the proposed development.

Number relevant notice	Activity No(s)	Description of each listed activity based on the project description	Comments and observations
Listing Notice 1 of GNR. 983 EIA Regulations dated 4 December 2014	10	The development and related operation of infrastructure exceeding 1,000 metres in length for the bulk transportation of sewage, effluent, process water, wastewater, return water, industrial discharges or slimes: (ii) With a peak throughput of 120 litres per second or more.	The proposed development includes the construction of three effluent discharge pipelines into the sea at a distance exceeding 1,000 metres offshore in pipelines with a diameter of about 3.0 metres, for the following discharges: • Brine discharge to a distance of 1,000 m offshore at a throughput of 1.22 m^3 per second. • Finfish aquaculture effluent discharge to a distance of 1,500 m offshore at a throughput of 0.94 m^3 per second. • Wastewater from phase two wastewater treatment works (WWTW's) to a distance of 3,000 m offshore at a throughput of 1.39 m^3 per second. No exclusions apply.
	15	The development of structures in the coastal public property where the development footprint is bigger than 50 square metres.	The proposed development entails the construction of infrastructure (e.g. effluent discharge tunnels and pipelines) with a physical footprint of 414 391 square meters (41.1 Ha) within coastal public property as defined in terms of Section 7(1) of the NEM:ICMA. No exclusions apply.
	17	Development: (i) In the sea; (iii) Within the littoral active zone; (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 (d) Rock revetments or stabilising structures including stabilising walls; (e) Infrastructure or structures with a development footprint of 50 square metres or more.	The proposed development includes the construction of seawater intake and effluent discharge infrastructure (e.g. effluent discharge tunnel and pipelines, intake basin, pipeline and jetty, headworks, pump station, vertical beach wells, distribution chamber) in the sea, within the littoral active zone and within a distance of 100 metres inland of the high-water mark from the sea. The total footprint of infrastructure will be approximately 470,000 square meters (47 Ha). It is larger than the area presented in Listed Activity 16 above as it also includes areas located 100 meters inland of the high-water mark. No exclusions apply.

Number relevant notice	Activity No(s)	Description of each listed activity based on the project description	Comments and observations
	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.	The proposed development will include the stabilization of disturbed areas of more than 10 square metres, within the littoral active zone after construction has been completed. No exclusions apply.
	19 A	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: (i) The seashore; (ii) 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 is the greater; or (iii) The sea.	The development will require the excavation and infilling of material exceeding 5 cubic metres in the coastal environment for the construction of infrastructure (e.g. effluent discharge tunnel and pipelines, intake basin, pipelines and jetty, headworks, pump station, vertical beach wells, distribution chamber) that will occur within 100 metres inland of the high-water mark, within the seashore and in the sea. No exclusions apply.
Listing Notice 2 of GNR.984 EIA Regulations dated 4 December 2014	6	The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent.	The proposed development includes the construction of effluent discharge infrastructure (e.g. effluent discharge tunnel and pipelines) to discharge various effluent streams (cooling water, brine, aquaculture effluent and wastewater) totalling 23.55 m^3/sec into the marine environment, which will require a Coastal Waters Discharge Permit in terms of Section 69 of the NEM:ICMA. No exclusions apply.
	14	The development and related operation of — (i) An anchored platform; or (ii) Any other structure or infrastructure on, below or along the seabed.	The proposed development includes the construction of a tunnel, pipelines and jetty for abstracting seawater from and discharging effluent into the sea, and wave pressure pumps, where the infrastructure will be located on, below and along the seabed. No exclusions apply.
	26	Development — (i) In the sea; (iii) Within the littoral active zone;	The development will include the construction of a tunnel for the discharge of cooling water into the sea where the tunnel will be located in the sea, within the littoral zone and within a distance of 100 metres

Number relevant notice	Activity No(s)	Description of each listed activity based on the project description	Comments and observations
		(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— (g) Tunnels	inland of the high-water mark. No exclusions apply.
Listing Notice 3 of GNR.985 EIA Regulations dated 4 December 2014	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) 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 (v) On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.	The development will include the construction of land-based infrastructure (e.g. pipelines, pump stations and stormwater discharge infrastructure) that will require the clearance of a maximum of 220,000 square meters (22 Ha) of indigenous vegetation. This area includes all indigenous vegetation within the land-based servitudes. The area to be cleared is within a CBA in terms of the Metro's current Bioregional Plan, within the littoral active zone and open space No exclusions apply.

Based on the NEMA EIA listed activities which have been identified by CES, namely the Listing Notice 2 listed activities in GNR. 984, the proposed project's application for EA will be subject to the Scoping and EIA Process as stipulated in the regulations. As set out by Section 24C of the NEMA, the relevant competent authority for this activity is the DEFF.

This EIA has been drafted to comply with the above-mentioned regulations.

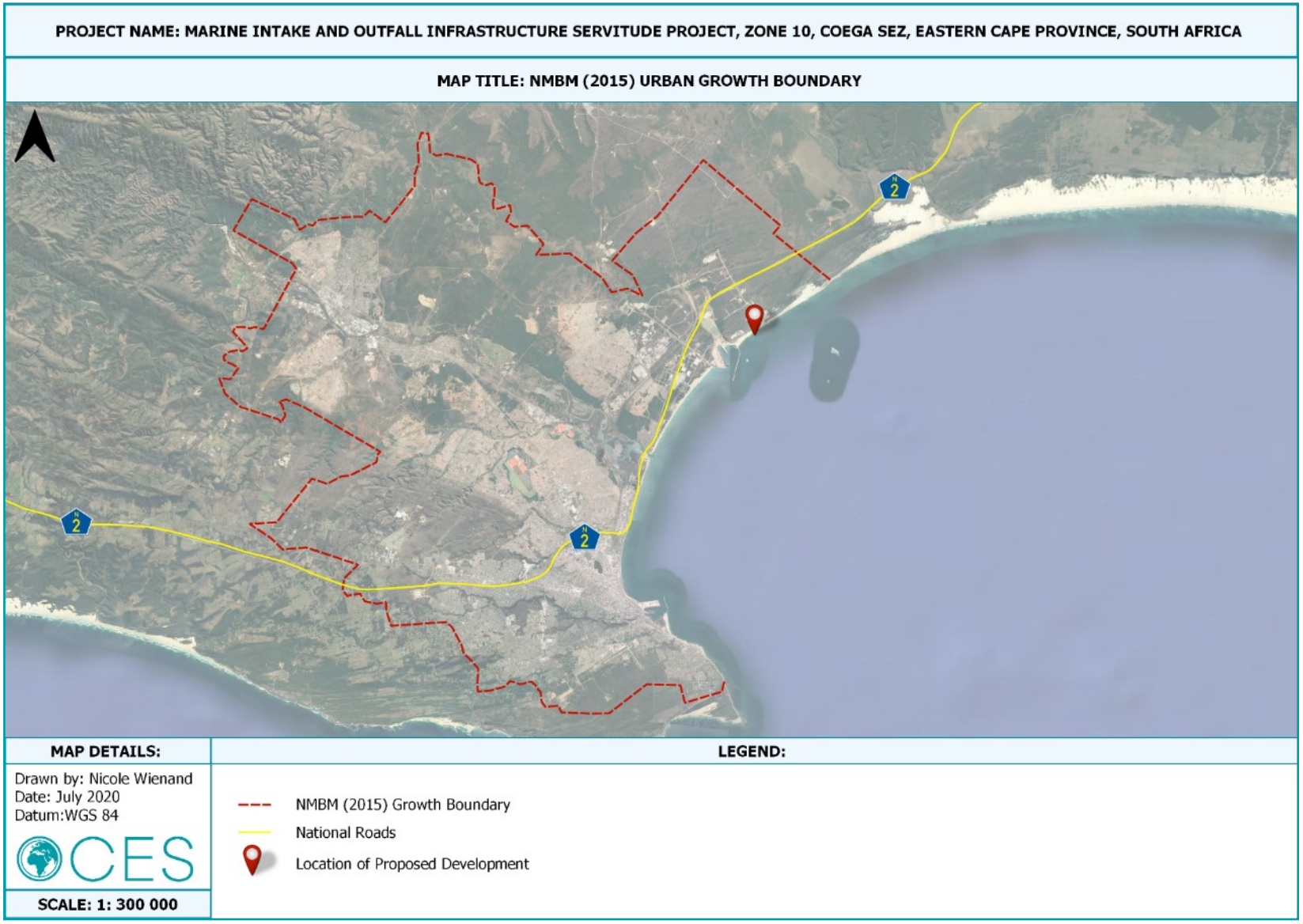

Figure 3.1: The location of the proposed site in relation to the urban edge as outlined in the NMBM SDF (2015).

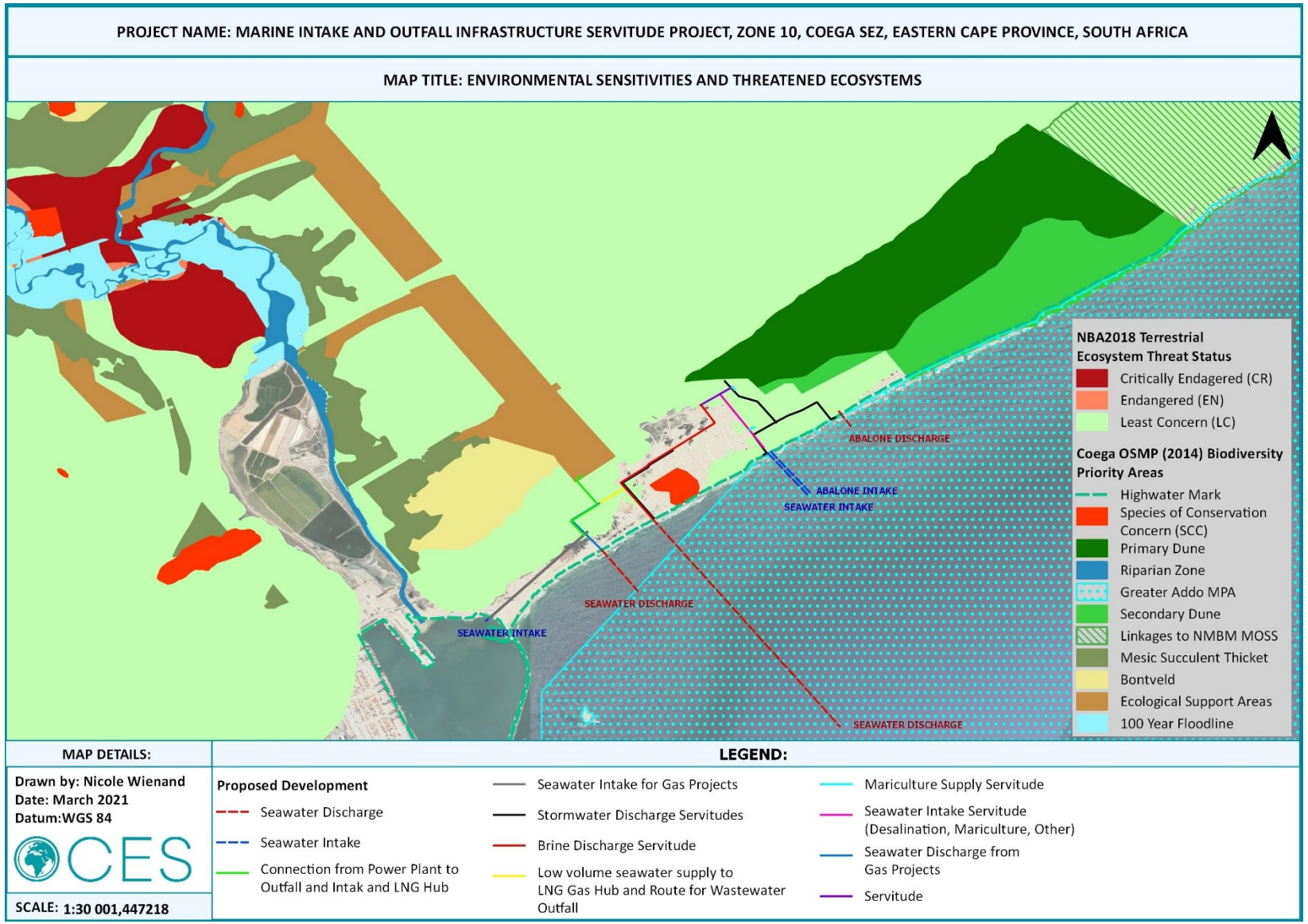

Figure 3.2: Threatened Ecosystems as defined by NEM:BA.

3.2.2 Consolidated Permitting Requirements

National Environmental Management: Integrated Coastal Management Act (24 of 2008)

According to Section 2 of the NEM: ICMA, the objects of this Act are:

- *To determine the coastal zone of the Republic;*
- *To provide, within the framework of the National Environmental Management Act, for the co-ordinated and integrated management of the coastal zone by all spheres of government in accordance with the principles of co-operative governance;*
- *To preserve, protect, extend and enhance the status of coastal public property as being held in trust by the State on behalf of all South Africans, including future generations;*
- *To secure equitable access to the opportunities and benefits of coastal public property; and*
- *To give effect to the Republic's obligations in terms of international law regarding coastal management and the marine environment.*

Section 69(1) of the Act states that no person may discharge effluent that originates from a source on land into coastal waters except in terms of a general discharge permit or a coastal waters discharge permit issued under this section by the Minister after consultation with the Minister responsible for water affairs in instances of discharge of effluent into an estuary.

The abstraction of seawater is not mentioned in the act and therefore this activity does not require any permits from Oceans and Coasts (OC), a branch within the DEFF with jurisdiction over ocean and coastal management in South Africa.

How the proposed activity complies with and responds to the Act:

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 effluent into the marine environment) was submitted to the DEFF: Oceans and Coasts. A reference number (2014/008/EC/Coega IDZ) for this application was issued on the 24th of April 2014. Based on personal communication with DEFF: Oceans and Coasts, this reference number is still valid. A revised application has been attached as Appendix 19 as the Environmental Authorisation must be attached to the application for a CWDP to be submitted to DEFF: Oceans and Coasts. This has been deemed acceptable by DFFE (as per the ELC meeting on the 20th of May 2021).

National Water Act (36 of 1998)

The Act regulates the protection, use, development, conservation, management and control of water resources in South Africa. The principal concerns in terms of the Act are the potential for the proposed development to pollute surface and groundwater resources, and to ensure that water is used as efficiently as possible.

Chapter 4 Part 1 of the NWA sets out general principles for regulating water use. "*Water use is defined broadly, and includes taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation. In general, a water use must be licensed unless it is listed in Schedule 1, as an*

existing lawful use, is permissible under a general authorisation, or if a responsible authority waves the need for a licence. The Minister may limit the amount of water which a responsible authority may allocate. In making regulations the Minister may differentiate between different water resources, classes of water resources and geographical areas."

How the proposed activity complies with and responds to the Act:

In September 2016, the Coega Development Corporation (CDC) appointed Scherman Colloty & Associates (SC&A) to assess and delineate all wetlands located within the Coega SEZ. This study identified three wetlands within Zone 10 of the SEZ, none of which are situated within 500 m of the proposed development (refer to Figure included below), except the Coega River/Estuary (port). As per the NFEPA (2011) spatial data set, the artificial wetland located along the coast, in the centre of the proposed development, is Coega Marine Growers and as such not a natural wetland. Therefore, since the development will not take place within a wetland and/or surface water feature or within 500 m of a wetland and/or surface water feature no water use authorisation will be required for the proposed project.

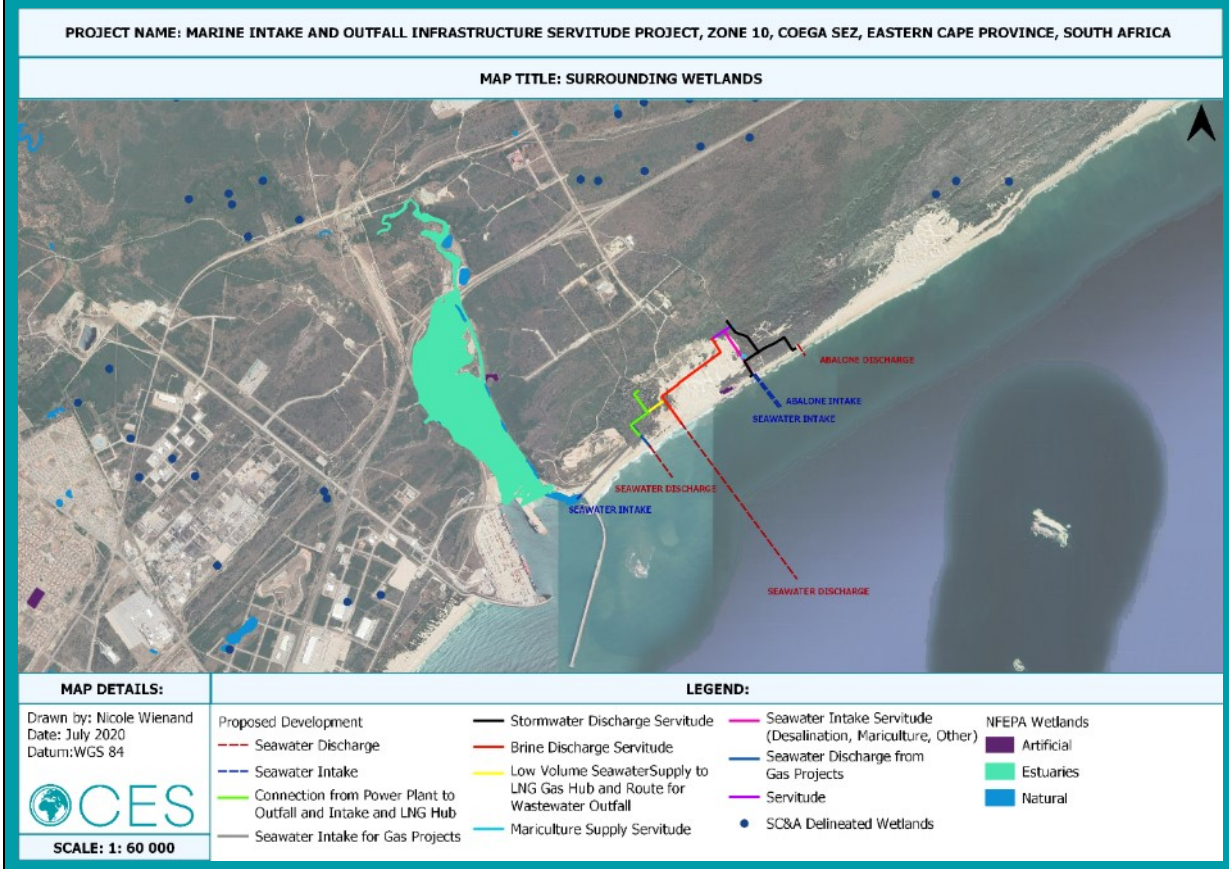

Figure 3.3: Infrastructure overlain on the identified wetlands within the SEZ

Mitigation measures to safeguard both surface and groundwater resources from pollution has been included in both this Environmental Impact Assessment as well as the Construction and Operational EMPrs. **As such this project is considered to be compliant with this Act.**

3.3 Other Applicable Legislation, Policies and/or Guidelines

3.3.1 National Legislation

The Constitution

The Constitution of the Republic of South Africa is the supreme law of the land. As a result, all laws, including those pertaining to the proposed development, must conform to the Constitution. The Bill of Rights - Chapter 2 of the Constitution, includes an environmental right (Section 24) according to which, everyone has the right:

a) To an environment that is not harmful to their health or well-being; and
b) To have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that:

(i) Prevent pollution and ecological degradation;
(ii) Promote conservation; and
(iii) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

How the proposed activity complies with and responds to the Act:

A number of mitigation measures have been included in this EIAR as well as the Construction and Operational Phase EMPrs to ensure that the proposed development will not result in pollution and ecological degradation. In addition, the project design team has worked in conjunction with the EAP and relevant stakeholders such as SANParks and DEFF: Oceans and Coasts to ensure that the proposed development is ecologically sustainable, while demonstrating economic and social development. **As such this project is considered to be compliant with the Constitution.**

The National Environmental Management: Air Quality Act (39 of 2004)

As with the Atmospheric Pollution Prevention Act 45 of 1965, the objective of the Air Quality Act is to protect the environment by providing the necessary legislation for the prevention of air pollution. "*To reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government; for specific air quality measures; and for matters incidental thereto.*"

How the proposed activity complies with and responds to the Act:

The proposed development does not trigger any of the listed activities under this Act and as such no Air Emissions Licence according to the NEM: Air Quality Act (Act 39 of 2004) is required. A number of mitigation measures have been included in this EIAR as well as the Construction Phase EMPr to ensure that the "best practicable means" for the abatement of dust will be taken and to ensure that there are no noxious or offensive odours on site as a result of improper waste storage. **As such this project is considered to be compliant with this Act.**

National Environmental Management: Waste Act (59 of 2008)

This legislation aims to enforce an integrated approach to waste management, with emphasis on prevention and reduction of waste at source and, where this is not possible, to encourage reuse and recycling in preference to disposal.

Section 16 (Chapter 4) of this Act deals with the general duty in respect to waste management and emphasises that, "*A holder of waste must, within the holder's power, take all reasonable measures to:- avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated; reduce, re-use, recycle and recover waste; where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner; manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour or visual impacts; prevent any employee or any person under his or her supervision from contravening this Act; and prevent the waste from being used for an unauthorised purpose*".

Chapter 4, Part 3 of this Act deals with reduction re-use and recovery of waste, Part 4 deals with waste management activities, Part 5 covers storage collection and transportation of waste, Part 6 deals with treatment, processing and disposal of wastes, Part 7 covers industry waste management plans and Part 8 deals with contaminated land. Chapter 5 covers all issues regarding the licensing of waste management activities.

How the proposed activity complies with and responds to the Act:

The proposed development does not trigger any listed activities under this Act and as such does not require a Waste Licence according to the NEM: Waste Act (Act 59 of 2008). All reasonable measures (in the form of mitigation measures) will be taken to avoid the generation of waste and where such generation cannot be avoided, minimise the toxicity and amounts of waste that are generated; reduce, re-use, recycle and recover waste; where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner. In addition, a number of mitigation measures have been included to ensure that waste is managed in such a manner that it does not endanger human health or the environment or cause a nuisance through noise, odour or visual impacts. Training has been incorporated into the EMPr to ensure the prevention of any employee or any person from contravening this Act; and prevent the waste from being used for an unauthorised purpose. **As such this project is considered to be compliant with this Act.**

The National Environmental Management: Biodiversity Act (10 of 2004)

This Act provides for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act 107 of 1998 (see Table 3.3). In terms of the Biodiversity Act, the developer has a responsibility for:

- The conservation of endangered ecosystems and restriction of activities according to the categorisation of the area (not just by listed activity as specified in the EIA Regulations).
- Application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all developments within the area are in line with ecological sustainable development and protection of biodiversity.

- Limit further loss of biodiversity and conserve endangered ecosystems.

Figure 3.3: Management and conservation of South Africa's biodiversity within the framework of NEMA.

CHAPTER 4	
	Provides for the protection of species that are threatened or in need of national protection to ensure their survival in the wild; ○ To give effect to the Republic's obligations under international agreements regulating international trade in specimens of endangered species; and ○ Ensure that the commercial utilization of biodiversity is managed in an ecologically sustainable way.
CHAPTER 5 (Part 2)	
Section 73	A person who is the owner of land on which a listed invasive species occurs must: a) Notify any relevant competent authority, in writing, of the listed invasive species occurring on that land; b) Take steps to control and eradicate the listed invasive species and to prevent it from spreading; and c) Take all required steps to prevent or minimise harm to biodiversity.
Section 75	• Control and eradication of a listed invasive species must be carried out by means or methods that are appropriate for the species concerned and the environment in which it occurs. • Any action taken to control and eradicate a listed invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment. • The methods employed to control and eradicate a listed invasive species must also be directed at the offspring, propagating material and re-growth of such invasive species in order to prevent such species from producing offspring, forming seed, regenerating or re-establishing itself in any manner.

The objectives of this Act are to provide, within the framework of the National Environmental Management Act, for:

- The management and conservation of biological diversity within the Republic;
- The use of indigenous biological resources in a sustainable manner.

The Act's permit system is further regulated in the Act's Threatened or Protected Species Regulations, which were promulgated in February 2007.

How the proposed activity complies with and responds to the Act:

The National Environmental Management: Biodiversity Act, (Act No. 10 OF 2004) (NEM:BA) provides a National List of Ecosystems that are Threatened and in Need of Protection – GN 1002 of 2011. There are no listed threatened ecosystems within or surrounding the project area. The nearest listed threatened ecosystem is situated approximately 4.6 km north west of the project area (Albany Alluvial Vegetation).

These results are in line with the findings of the NBA (2018) Terrestrial Ecosystem Threat Status Assessment which classified the vegetation types within and surrounding the project area as Least Concern (Skowno et al., 2019) based on the IUCN criteria and thresholds for classifying Red List of Ecosystems.

No protected species will be removed or damaged without a permit. The CDC has a NECO permit, issued by DEDEAT, for the removal of indigenous vegetation within all developable areas. The CDC also recently renewed their TOPS permit which requires to be updated annually. In addition, the proposed site will be cleared of alien vegetation using appropriate means. **As such this project is considered to be compliant with this Act.**

The National Forest Act (84 of 1998)

The objective of this Act is to monitor and manage the sustainable use of forests. In terms of Section 12 (1) (d) of this Act and GN No. 1012 (promulgated under the National Forest Act), no person may, except under licence:

- Cut, disturb, damage or destroy a protected tree; or
- Possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree.

How the proposed activity complies with and responds to the Act:

According to the DWAF (now DEFF) Indigenous Forest Patches spatial dataset, the proposed development traverses two (2) forest patches (Figure 3.4). However, it should be noted that the site survey confirmed that there is no forest in the project area and much of the site has been invaded by *Acacia cyclops*. This finding is reinforced in the Coega OSMP and NMB Bioregional Plan, where detailed vegetation mapping was undertaken and no forest was mapped.

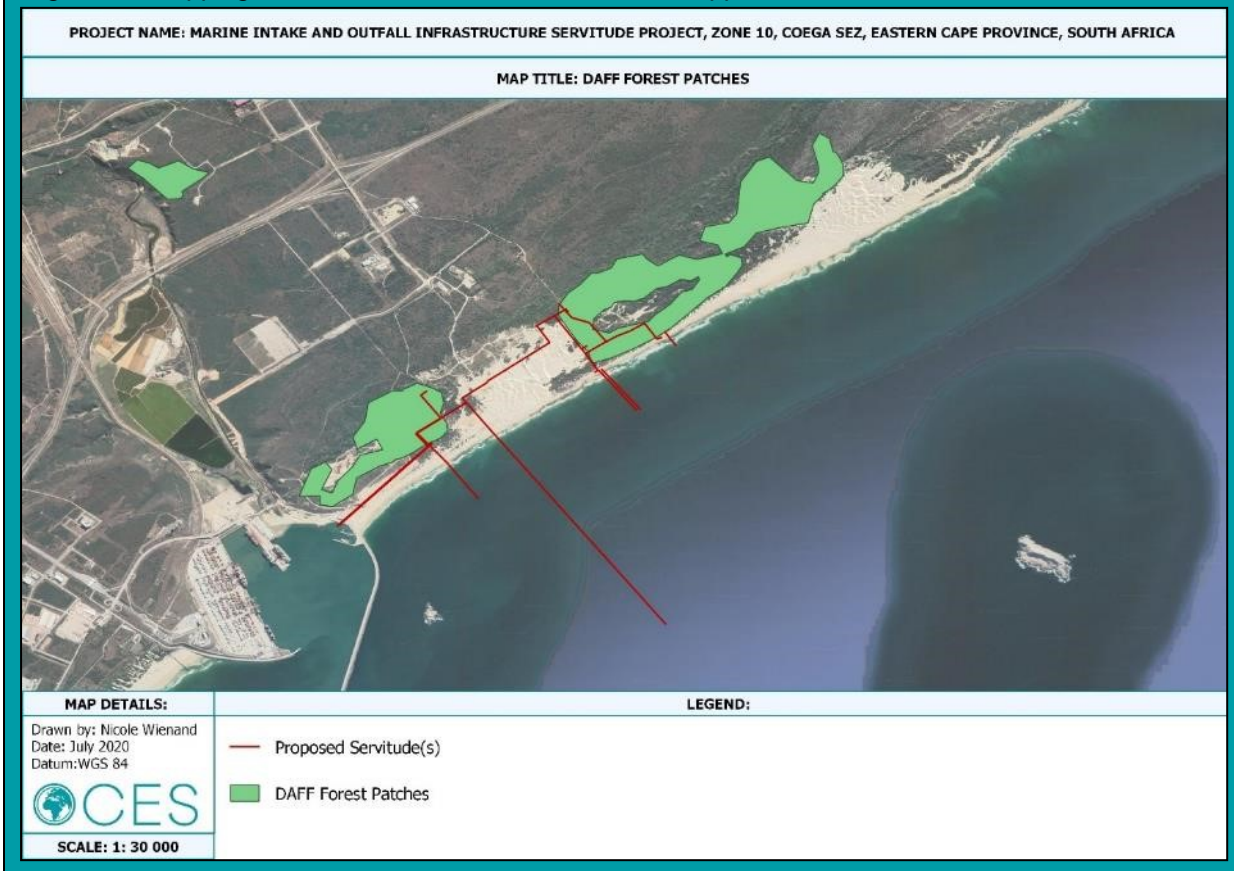

Figure 3.4: DWAF Indigenous Forest Patches within the project area.

A number of milkwood trees (*Sideroxylon inerme*) were present on the development site, these trees will

be avoided as far as practically possible. Should avoidance not be possible the CDC does have the relevant permits in place from DEFF for the removal of this species. **As such this project is considered to be compliant with this Act.**

National Environmental Management: Protected Areas Act (31 of 2004)

The purpose of this Act is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes.

The objectives of this Act are-

- To provide, within the framework of national legislation, including the National Environmental Management Act, for the declaration and management of protected areas;
- To provide for co-operative governance in the declaration and management of protected areas;
- To effect a national system of protected areas in South Africa as part of a strategy to manage and conserve its biodiversity;
- To provide for a representative network of protected areas on state land, private land and communal land;
- To promote sustainable utilisation of protected areas for the benefit of people, in a manner that would preserve the ecological character of such areas;
- To promote participation of local communities in the management of protected areas, where appropriate; and
- To provide for the continued existence of South African National Parks.

How the proposed activity complies with and responds to the Act:

Algoa Bay is known to support a high biodiversity of marine life, particularly reef-associated invertebrates and fish, as well as several breeding colonies of endangered or vulnerable seabirds and a suite of cetaceans. For these reasons, the National Protected Areas Expansion Plan (SANBI 2009) proposed a Marine Protected Area (MPA) in Algoa Bay, which would adjoin the Greater Addo Elephant National Park (GAENP). Detailed research and planning for the MPA began in 2006, and has culminated in the current zonal boundaries for the MPA.

In May 2019, the government formally gazetted the addition of 20 new or expanded Marine Protected Areas (MPA), increasing the total protected area of South Africa's Exclusive Economic Zone (EEZ) to 5% (Government Gazette 42478, Notice No. 757). This area provides some protection to 87% of the different marine ecosystem types found in South African waters, thereby ensuring that the MPA network is representative of the country's important diversity (SANBI 2019). Included in this was the addition of the Addo Elephant National Park Marine Protected Area. The proposed project site is partially located within the Addo National Park (particularly Jahleel Island) and the declared Addo Elephant Marine Protected Area (stretching from the eastern breakwater past the Sundays River Mouth). As such planning of future development around Coega must take the footprint of the MPA into account before construction is authorised. This is necessary to prevent habitat important for ecosystem health from being damaged or lost (Anchor Environmental, 2016).

The National Environmental Management: Protected Areas Act, 2003 (Act No 57 of 2003) Regulations for the management of the Addo Elephant National Park Marine Protected Area (23 May 2019) permits outfalls within the MPA under section 22, subject to obtaining a coastal waters discharge permit from

DEFF: Oceans and Coasts. **As such this project is considered to be compliant with this Act.**

Biodiversity Policy and Strategy for South Africa: Strategy on Buffer Zones for National Parks

The strategy on buffer zones for National Parks was originally established due to the increasing rate and extent of development in and around National Parks, resulting in the isolation of National Parks from wider natural areas. The function of the Buffer Zone is to reduce /mitigate the negative influences that activities in close proximity to National Parks may have on the Park. The function also includes integration of Parks into surrounding landscapes.

The main purpose of the Buffer Zone is thus to:

- "*Protect the purpose and value of the National Park which is to be explicitly defined in the management plan submitted in terms of section 39(2) of the Act;*
- *Protect important areas of high value for biodiversity and/or to society where these extend beyond the boundary of the Protected Area;*
- *Assist adjacent and affected communities to secure appropriate and sustainable benefits from the National Park and buffer zone area itself by promoting a conservation economy, ecotourism and its supporting infrastructure and services, and sustainability through properly planned harvesting*."

According to this strategy, the establishment of a buffer zone around a National Park should be considered if the area is necessary for the proper conservation and effective protection of the National Park and would assist in achieving its objectives. This strategy also states that "*the buffer zone is an area surrounding a National Park which has complementary legal and management restrictions placed on its use and development, aimed at providing an extra layer of protection to the integrity of the National Park.*" This strategy is specifically geared towards sections relating to protected areas as well as Goal 1.4 (Environmentally sound and sustainable development adjacent to protected areas).

A Buffer Zone has the following six (6) objectives:

1. Ensure the persistence of important species and ecological processes;
2. Promote broad based and sustainable economic activity;
3. Preserve, adapt, restore and stabilize cultural heritage and secure the sustainable use thereof;
4. Preserve and improve the quantity and quality of water from catchments in the park and the buffer zone;
5. Protect, enhance and restore the unique and memorable character - the sense of place - that underpins the image of the National Park and their approaches, and
6. Protect and enhance the wilderness experience of park users.

The strategy stipulates that Buffer Zones must be established around National Parks in order to achieve the above goals. These buffer zones should be defined as priority natural areas, catchment protection areas and viewshed protection areas, and be identified by Government and integrated into management plans and Municipal Spatial Frameworks. These may then be established by publication in the Gazette or where appropriate, be declared as protected environments in terms of the Act.

In terms of implementing the buffer zone strategy, the DEFF is responsible for implementing the specific provisions of National Environmental Management legislation, as they relate to buffer zones, while SANParks is responsible for the management of National Parks. The National Park buffer zones, as defined in the park management plan, can be considered special areas in terms of section 24(2)(b) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).

How the proposed activity complies with and responds to the Strategy:

The proposed project area falls within the Addo Elephant National Park buffer zone. According to this policy, all development in a formally established buffer zone that requires an environmental authorisation in terms of the NEMA, will be subject to an environmental impact assessment process at national level. The Department's decision will be informed by the management authority's (SANParks) opinion on the potential impact on the National Park. As such, SANParks was identified as a key stakeholder in the EIAR process and numerous correspondence has been undertaken with them throughout the process thus far. In addition, this application for Environmental Authorisation has been submitted to DEFF (national level). Furthermore, DEFF: Biodiversity has also been made aware of the proposed development. **As such this project is considered to be compliant with this Strategy as an Environmental Impact Assessment is currently underway and will be submitted at a National Level for approval.**

The National Heritage Resources Act (25 of 1999)

The protection of archaeological and paleontological resources is the responsibility of a provincial heritage resources authority and all archaeological objects, paleontological material and meteorites are the property of the State. "*Any person who discovers archaeological or paleontological objects or material or a meteorite in the course of development must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority*".

How the proposed activity complies with and responds to the Act:

A Terrestrial Phase 1 Archaeological Impact Assessment was undertaken for the Coega SEZ (previously referred to as the Coega IDZ) by Dr Johan Binneman in 2010. The section below is as per the findings of the 2010 study.

"*Most of the more than 9 200 hectares of the Coega SEZ is covered by dense low and high grass and impenetrable thicket vegetation, which made it difficult to find archaeological sites/materials. Although most of the inland areas of this large property (the inland zones) are relatively undeveloped, it has been disturbed in the past by small scale farming activities, and more recently by power line and road construction. In a few of the zones large areas have been cleared of vegetation and large-scale developments have taken place. These cleared areas provided windows to search for archaeological sites and materials which were not possible due to the dense vegetation.*

Although the area/zones investigated were occupied extensively in the past (judging from the large quantity of flaked stone randomly scattered throughout the area), it would appear that the area is relatively poor in large and important archaeological sites. However, many sites/materials and human remains may be covered by soil and vegetation. These may only be exposed when development takes place, as is evident in Zone 7 where archaeological remains were exposed when an area was cleared by bulldozers for the construction of a road.

The most important archaeological sites were found along the coast (on TNPA property) and included mainly shell middens which date from the past ca 8-6 000 years. Similar sites in the shifting sand dunes and coast east of the harbour area were much smaller in size, in terms of depth of deposit, quality and quantity of food waste and cultural material. These archaeological features are usually found between two to five kilometres inland from the coast".

The CDC has a Heritage Management Plan, and guidelines from SAHRA in place to ensure that all aspects of heritage are managed. The CDC's Environmental Specifications for Construction include detailed requirements for the management of heritage in the SEZ, amongst others, the appointment of an archaeologist and palaeontologist during the construction phase of a project. These recommendations are included in the impact assessment included in this EIR.

In addition, a marine heritage assessment was conducted for the proposed project in the 4th quarter of 2020. This study included a magnetometer survey. A number of small magnetic anomalies were identified, mainly in the surf zone. These anomalies were further investigated by divers, however, only one metal pipe was found. The specialist is of the opinion that due to the small size of the anomalies, their location close to the shoreline and what was found on the diver searches, that the anomalies probably represent construction debris from the old oyster farm on the beach and from the port's construction.

The Marine Heritage Assessment was submitted to SAHRA and a response was received on the 15th of December 2020, which stated that SAHRA supported the mitigation / recommendations made in the report (which has now been incorporated into this EIR. **As such this project is considered to be compliant with this Act.**

Occupational Health and Safety Act (85 of 1993)

The objective of this Act is to provide for the health and safety of persons at work (See Table 3.4). In addition, the Act requires that, "*as far as reasonably practicable, employers must ensure that their activities do not expose non-employees to health hazards*" (Glazewski, 2005: 575). The importance of the Act lies in its numerous regulations, many of which will be relevant to the proposed development. These cover, among other issues, noise and lighting.

Table 3.4: Health and safety of persons at work according to the Occupational Health and Safety Act

8: GENERAL DUTIES OF THE EMPLOYERS TO THEIR EMPLOYEES	
(1)	Every employer shall provide and maintain, as far as is reasonably practicable, a working environment that is safe and without risk to the health of his employees.
(2)	Without derogating from the generality of an employer's duties under subsection (1), the matters to which those duties refer include in particular- a) The provision and maintenance of systems of work, plant and machinery that, as far as is reasonably practicable, are safe and without risks to health; b) Taking such steps as may be reasonably practicable to eliminate or mitigate any hazard or potential hazard to the safety or health of employees, before resorting to personal protective equipment; d) Establishing, as far as is reasonably practicable, what hazards to the health or safety of persons are attached to any work which is performed, any article or substance which is produced, processed, used, handled, stored or transported and any plant or machinery which is used in his business, and he shall, as far as is reasonably practicable, further establish what precautionary measures should be taken with respect to such work, article, substance, plant or machinery in order to protect the health and safety of persons, and he shall provide the necessary means to apply

8: GENERAL DUTIES OF THE EMPLOYERS TO THEIR EMPLOYEES	
	such precautionary measures; e) Providing such information, instructions, training and supervision as may be necessary to ensure, as far as is reasonably practicable, the health and safety at work of his employees; f) As far as is reasonably practicable, not permitting any employee to do any work or to produce, process, use, handle, store or transport any article or substance or to operate any plant or machinery, unless the precautionary measures contemplated in paragraphs (b) and (d), or any other precautionary measures which may be prescribed, have been taken; g) Taking all necessary measures to ensure that the requirements of this Act are complied with by every person in his employment or on premises under his control where plant or machinery is used; h) Enforcing such measures as may be necessary in the interest of health and safety; i) Ensuring that work is performed and that plant or machinery is used under the general supervision of a person trained to understand the hazards associated with it and who have the authority to ensure that precautionary measures taken by the employer are implemented; and authority as contemplated in Section 37 (1) (b).
14: GENERAL DUTIES OF EMPLOYEES AT WORK Every employee shall at work:-	
(a)	Take reasonable care for the health and safety of himself and of other persons who may be affected by his acts or omissions;
(b)	As regards any duty or requirement imposed on his employer or any other person by this Act, cooperate with such employer or person to enable that duty or requirement to be performed or complied with;
(c)	Carry out any lawful order given to him, and obey the health and safety rules and procedures laid down by his employer or by anyone authorized thereto by his employer, in the interest of health or safety;
(d)	If any situation which is unsafe or unhealthy comes to his attention, as soon as practicable report such situation to his employer or to the health and safety representative for his workplace or section thereof, as the case may be, who shall report it to the employer; and
(e)	If he is involved in any incident which may affect his health or which has caused an injury to himself, report such incident to his employer or to anyone authorized thereto by the employer, or to his health and safety representative, as soon as practicable but not later than the end of the particular shift during which the incident occurred, unless the circumstances were such that the reporting of the incident was not possible, in which case he shall report the incident as soon as practicable thereafter.
15: DUTY NOT TO INTERFERE WITH, DAMAGE OR MISUSE THINGS [S. 15 substituted by S. 3 of Act No. 181 of 1993.]	
	No person shall intentionally or recklessly interfere with, damage or misuse anything which is provided in the interest of health or safety.

How the proposed activity complies with and responds to the Act:

In order to ensure a sound quality, environmental, health and safety performance, the CDC has implemented an Integrated SHEQ Management System based on the requirements of the ISO 9001:2015, ISO 14001:2015 and ISO 45001:2018 International Standards.

Therefore CDC is committed to:

- Comply with the requirements and to continually improve the effectiveness in order to enhance its performance of the Integrated Management system;
- Provide safe and healthy working conditions;
- Prevention of injury and ill health;
- Prevention of pollution;
- Comply with applicable legal and other requirements / compliance obligations to which CDC subscribes which relate to its services and environmental aspects;
- Eliminate OH&S hazards and reduce Occupational Health and Safety risks; and
- Consultation and participation of workers.

In addition, the organisation:

- Ensures that the processes are delivering their outputs;
- Endeavours to undertake its operations in a manner which is economically, ecologically, socially acceptable and sustainable;
- Identifies, advises, coordinates and evaluates hazards and risks related to CDC managed development and activities which may put the safety and health of its personnel, contractors, tenants, visitors, community and other interested parties at risk;
- Ensures recognition of social imperatives, such as socio-economic transformation, employment equity, equal rights to business opportunities and a developmental focus in supply chain management, with a view of improving the quality of lives of all people that CDC has an impact on; and
- Work with interested and affected parties to ensure superior environmental management of the terrestrial, near shore and marine environments, including protecting species of special concern, within the scope of its authority.

The CDC provides a framework and reviews its SHEQ objectives and targets at the annual management review meetings, and the quarterly corporate meetings. These objectives and targets are set for meeting requirements for services, for reduction of consumption of resources, for improvement in waste management, and for minimizing safety-related incidents and health-related concerns.

Top Management continually seek to ensure continual improvement of the Integrated Management System (SHEQ) offered by the CDC through implementing open communication and full participation by all its employees and the establishment of forums where all external stakeholders can participate. **As such this project is considered to be compliant with this Act.**

Hazardous Substances Act (15 of 1973)

The Act aims to manage hazardous substances. It is the principal national legislation that controls the transportation, and manufacturing, storage, handling, treatment or processing facilities for any substance that is dangerous or hazardous (Groups I-IV).

How the proposed activity complies with and responds to the Act:

A number of mitigation measures have been included in this EIAR as well as the Construction Phase EMPr to ensure that the “best practicable means” for the management of hazardous substances are employed to ensure that neither human health, nor the environment are endangered. **As such this project is considered to be compliant with the Constitution.**

Relevant Noise Legislation

Specific noise legislation and the following standards have been used to aid the study and guide the decision-making process with regards to noise pollution:

- South Africa - GNR.154 of January 1992: Noise control regulations in terms of section 25 of the Environment Conservation Act (ECA), 1989 (Act No. 73 of 1989).
- South Africa - GNR.155 of 10 January 1992: Application of noise control regulations made under section 25 of the Environment Conservation Act, 1989 (Act No. 73 of 1989).
- South Africa - SANS 10103:2008 Version 6 - The measurement and rating of

environmental noise with respect to annoyance and to speech communication.

- South Africa - SANS 10210:2004 Edition 2.2 – Calculating and predicting road traffic noise.
- South Africa - SANS 10357:2004 Version 2.1 - The calculation of sound propagation by the Concawe method.
- NMBM noise control by-law 37 of 2010

The ambient noise level guidelines in SANS 10103:2008 is 70dBA during the day and 60dBA at night in industrial districts. These levels can thus be seen as the target levels for any noise emissions within the SEZ.

SANS 10103:2008 provides typical rating levels for noise in various types of districts, as described in Table 3.5.

Table 3.5: Typical rating levels for noise in various types of districts.

Type of District	Equivalent Continuous Rating Level, LReq.T for Noise					
	Outdoors (dB(A))			Indoors, with open windows (dB(A))		
	Day-night	Daytime	Night-time	Day-night	Daytime	Night-time
Rural Districts	45	45	35	35	35	25
Suburban districts with little road traffic	50	50	40	40	40	30
Urban districts	55	55	45	45	45	35
Urban districts with one or more of the following: Workshops; business premises and main roads	60	60	50	50	50	40
Central business districts	65	65	55	55	55	45
Industrial districts	70	70	60	60	60	50

Furthermore, the South African noise control regulations describe a disturbing noise as any noise that exceeds the ambient noise by more than 7dB. This difference is usually measured at the complainant's location should a noise complaint arise. Therefore, if a new noise source is introduced into the environment, irrespective of the current noise levels, and the new source is louder than the existing ambient environmental noise by more than 7dB, the complainant will have a legitimate complaint.

Guidelines for expected community responses to excess environmental noise is reflected in Table 3.6.

Table 3.6: Categories of environmental community / group response (SANS 10103:2008).

EXCESS Lr dB (A)	ESTIMATED COMMUNITY/GROUP RESPONSE	
	CATEGORY	DESCRIPTION
0 - 10	Little	Sporadic complaints
5 - 15	Medium	Widespread complaints
10 - 20	Strong	Threats of community / group action
> 15	Very Strong	Vigorous community / group action

How the proposed activity complies with and responds to the Act:

A number of mitigation measures have been included in this EIAR as well as the Construction Phase EMPr to ensure that noise levels are reduced as far as practically possible. **As such this project is considered to be compliant with the relevant noise regulations.**

Dust Control Regulations

South Africa's National Dust Control Regulations (NDCR) were published on 1 November 2013 (Government Gazette No 36974). The purpose of the regulations is to prescribe general measures for the control of dust in all areas, including residential and light commercial areas. Acceptable dust fallout rates according to the regulations are summarised in Table 3.7.

Table 3.7: Acceptable Dust Fallout Rates

Restriction areas	Dust fallout rate (D) in mg/m²-day over a 30 day average	Permitted frequency of exceedance
Residential areas	D < 600	Two within a year, not sequential months.
Non-residential areas	600 < D < 1 200	Two within a year, not sequential months.

The regulations also specify that the method to be used for measuring dust fallout and the guideline for locating sampling points shall be ASTM D1739 (1970), or equivalent method approved by any internationally recognized body. It is important to note that dust fallout is assessed for nuisance impact and not inhalation health impact.

Revised Draft National Dust Control Regulations were published on 25 March 2018 (Government Gazette No. 41650) which references the same acceptable dust fallout rates but refers to the latest version of the ASTM D1739 method to be used for sampling.

How the proposed activity complies with and responds to the Regulations:

A number of mitigation measures have been included in this EIAR as well as the Construction Phase EMPr to ensure that dust levels are reduced and remain within the abovementioned standards. **As such this project is considered to be compliant with the relevant noise regulations.**

It should be noted that DEDEAT is currently in the process of drafting a Dust Control Strategy to be used as a complementary tool in conjunction with the National Dust Control Regulations, and to provide guidance to all affected spheres of government, and the regulated community on how to assess and manage dust emissions from identified fugitive sources.

The objectives of the Strategy are as follows:

- A coordinated approach to managing dust;
- Provide guidance on identification of major sources of dust pollution to minimize exposure during operational activities;
- Provide measures to prevent nuisance caused by dust emissions;
- Indicate the effects of dust on the environment and human health;
- Provide legislative requirements or mandate in terms of dust control; and
- Outline the roles and responsibilities of the affected stakeholders in terms of dust control in the Republic.

3.3.2 Municipal By-Laws and Planning

There will be certain requirements related to health and safety during construction and approval of method statements. Certain activities related to the proposed development may, in addition to National legislation, be subject to control by municipal by-laws including the Nelson Mandela Bay Metropolitan Municipality (NMB Metro) Integrated Development Plan (IDP) and Spatial Development Framework (SDF).

NMBM SDF (2015)

A review of the metro's 2009 Spatial Development Framework (SDF) was completed, resulting in the compilation of the approved 2015 SDF, outlining the desired spatial development of the metropolitan area as contemplated in the Spatial Planning and Land Use Management Act, 2013 (SPLUMA). The SDF provides basic guidelines for a land use management system, and highlights priority investment and development.

The Human Settlements Strategic Framework was adopted by Council in December 2012 and recommended spatial restructuring of the city through the following interventions:

- *Urban Renewal Precincts*: including Inner City areas, Motherwell, Happy Valley, Lower Baakens Valley, Walmer, Gqebera, Korsten, Helenvale and Greater Ibhayi-Northern Areas Hub;
- *Spatial Transformation Precincts*: such as Parsonsvlei, Coega SEZ / Motherwell, Bay West and N2 Developments;
- *Implementation of an Integrated Zoning Scheme and Land Use System*; and
- *Assembly of well-located public and private land for development of Integrated Human Settlements.*

The SDF seeks to generate means to support and enhance urban development. Various interventions may be utilised to support economic growth and development, based on a number of considerations, such as:

- The importance of linking the residents of the NMB Metro to opportunities;

- Directing investments to places where they will have the greatest effect;
- Protecting and enhancing natural and cultural resources for sustainability and enriching the experience of NMB Metro; and
- Weaving the growth of NMB Metro strongly into the economic fabric of the Eastern Cape Province.

A wide range of activity nodes or areas exist in the Metro which accommodates a variety of activities. These can be divided into four main core areas, namely:

- Port Elizabeth
- Uitenhage
- Despatch
- ***Coega SEZ and the Port of Ngqura***

The SDF recognises the SEZ as a major industrial node in the NMB Metro:
"Coega SEZ (CDC): The development of the Coega SEZ presents a great potential for job creation and economic growth nearby suburbs, especially Wells Estate, Bluewater Bay, Amsterdamhoek and Motherwell, and the whole Municipality. It is proposed that gap-housing opportunities be created in these residential suburbs in order to accommodate the workforce anticipated from the development of the SEZ. Such residential developments, to meet the growth needs, should be located closer to the Coega SEZ'

Coega Open Space Management Plan (2014) and Coega IDZ Development Framework Plan (2006)

The CDC compiled, with advice from Gibb Africa and Metroplan, a Development Framework Plan (DFP) for the Coega SEZ (previously referred to as the Coega IDZ). This DFP aims to provide an overall development strategy for the Coega IDZ by identifying a series of defined objectives so that the implementation of the Coega IDZ can progress from concept to detailed planning and design. The DFP is based on a range of clusters and activity nodes. It achieves this by:

- Providing a robust but flexible land use, transportation and infrastructure strategy for the Coega site,
- Ensuring that the strategy conforms with National Policy for the planning of Development Zones, confirming that the strategy is consistent with local planning initiatives, commitments and objectives, and
- Demonstrating that the strategy is based on previous feasibility studies, and current "best practice", as demonstrated in similar projects.

An Open Space Management Plan was prepared by CES (2006) and revised and approved in 2014, to provide ecological input into the DFP. The OSMP identifies sensitive ecological areas, and areas of high biodiversity, to ensure that spatial planning considered the ecological setting. Ecological corridors and areas of high biodiversity or where unique fauna and flora occur were identified and where possible incorporated into the DFP.

Nelson Mandela Bay Metropolitan Municipality Coastal Management Program (2015)
The NEM:ICMA was developed to facilitate holistic and integrated management of the coast that allows for conservation of the coastal environment as well as equitable access to, and sustainable use of, coastal resources. Section 48 of the Act specifies the need for municipalities

to prepare coastal management programs to facilitate management of the coastal zone, and to review these every 5 years. The Coastal Zone of the NMBM extends from the Van Stadens River in the west to the Sundays River in the east.

The main purpose of the CMP is:

- To protect, enhance and maintain the social, economic, cultural and environmental integrity of the coast;
- To encourage a sense of ownership and value of coastal resources amongst the public through environmental education and awareness thereby allowing enhanced community participation in maintaining the diversity of coastal ecosystems;
- To allow equitable access to and sustainable utilisation of natural coastal resources by all members of the community, and in so doing enhance their quality of life;
- To promote development within the coastal zone in a sustainable manner in which stakeholder participation and scientific integrity are the basis for responsible decision-making;
- To promote the rehabilitation of currently spoilt and degraded coastal environments;
- To ensure coastal zone integrity and biodiversity is sustained for the enjoyment of current and future generations through the protection of coastal ecosystems and resources; and
- To realise coastal management is a dynamic and continuous process that requires an interdisciplinary approach.

4 ALTERNATIVES

4.1 BACKGROUND

This section provides an assessment of the various alternatives associated with the proposed establishment of the marine servitudes for seawater abstraction and effluent discharge (including return cooling / heating and aquaculture seawater, brine, treated wastewater and stormwater) adjacent to the Coega SEZ, and outlines the process informing the identification of the **preferred alternative(s).**

4.2 REASONABLE AND FEASIBLE ALTERNATIVES

The identification of alternatives is a key aspect of the EIA process. In relation to a proposed activity, "*alternatives*" mean different ways of meeting the general purposes and requirements of the proposed activity. Most guidelines use terms such as "*reasonable*", "*practicable*", "*feasible*" or "*viable*" to define the range of alternatives that could be considered.

There are three broad types of alternatives that need to be considered:

4.2.1 Fundamental alternatives

Fundamental alternatives are developments or activities that are substantially different from the proposed project description and usually include the following:

- Alternative type of activity to be undertaken; and
- Alternative location where the proposed activity will be undertaken.

4.2.2 Incremental alternatives

Incremental alternatives relate to modifications or variations to the design of a project that provide different options to reduce or minimise environmental impacts. There are several incremental alternatives that can be considered with respect to the current project, including:

- Alternative design or layout of the activity;
- Alternative technology to be used in the activity; and
- Alternative operational aspects associated with the activity.

4.2.3 No-go alternative

It is mandatory to consider the "*no-go*" alternative in the EIA process. The "*no-go*" alternative refers to the continuation of the existing land or sea use, i.e. maintain the current status quo and the risks and impacts associated with it. Some existing activities may carry risks that may be undesirable (e.g. an existing contaminated site earmarked for a development).

For clarity and to avoid confusion, the assessment of alternatives for this project is divided into two broad categories, namely:

- Marine intake servitudes for seawater abstraction; and
- Marine outfall servitudes for effluent discharges.

4.3 Analysis of Marine Intake Servitude Alternatives

4.3.1 Volume Requirements

A detailed motivation for the need to source seawater for various land-based industries in the Coega SEZ is provided in Chapter 4 of this report.

The need for the marine seawater abstraction servitudes is driven by the following water requirements for the industries that will potentially be established within the Coega SEZ:

- Cooling water for two 1000 MW LNG power stations for which the EIA is currently in progress.
- Land based aquaculture (including >40,000 tonnes / year of abalone and finfish). Environmental Authorisation was received on the 7th of February 2018.
- The Coega Aquaculture Development Zone (ADZ) includes the development of a seawater desalination plant with a maximum capacity of 60 Mℓ / day. Environmental Authorisation was received as part of the authorisation for the aquaculture development zone on 07 February 2018.

Information relating to the seawater requirements is based on input from the following sources: CES (2015), Carnegie Energy (2019), WSP (2020), Ethical Exchange (2017) and SRK (2020). There has also been *ad hoc* communication with various relevant industry specialists and CDC personnel to confirm seawater volume requirements.

Based on the various inputs, the following **maximum** seawater intake requirements are projected:

Purpose	Worse case intake flow rates
Cooling Water: Once-Through Cooling	14.70 m^3/sec
Cooling Water: Wet Mechanical Draft Cooling	0.42 m^3/sec
Aquaculture flow through system for abalone	5.00 m^3/sec
Aquaculture recirculation system for finfish	0.94 m^3/sec
Seawater Desalination Plant	2.03 m^3/sec
Total	**23.09 m^3/sec**

4.3.2 Alternative Type of Activity

Chapter 4 provides a motivation for the need for abstracting seawater for various proposed Coega SEZ industries, including:

- Cooling water for the power station hub to provide tenants with secure access to energy and contribute to broader energy security in South Africa;
- Desalination to supplement freshwater supply from the NMBM and to provide tenants with secure access to freshwater in a water stressed region; and
- Seawater for marine aquaculture to promote local food security and export products.

The following sections provide an explanation and rationale as to why the abstraction of seawater is the **only reasonable and feasible alternative for securing water** for the various water requirements at the Coega SEZ.

Cooling water for power stations

An initial PRDW (2017) dispersion modelling report was based on a projected flow rate of 45 m^3/sec to cool three 1,000 MW power stations using the Once-Through Cooling system. However, the more recent WSP (2020) technical report has recommended a mixture of various alternative power station cooling technologies in addition to the Once-Through Cooling system, that require less or no water at all. These include:

- Wet mechanical system - 0.42 m^3/sec per 1,000 MW unit; and
- Air cooled system - no water required.

The WSP report (2020) provides a comparative modelling analysis of the various power station cooling technical options based on pumping requirements to the various elevations and distances of the three proposed power station locations, and net technical efficiencies. The report determined the following to be the most feasible options:

- Once-through seawater cooling option for Zone 10 South;
- Wet mechanical cooling for Zone 10 North; and
- Air cooling for Zone 13 (no water required).

Based on the above, the total maximum seawater requirements for power station cooling will be 14.7 m^3/sec, reduced from an initial 45 m^3/sec as per the PRDW (2017) Report. This is significantly lower than operating all three power stations using the Once-Through Cooling system, and hence these alternatives have reduced the potential environmental impacts of sea water abstraction. However, it is not feasible or possible to source the required volumes of cooling water from freshwater sources such as boreholes and municipal water, and it would be environmentally unacceptable to do so in a water stressed area.

Recycling of cooling water is a further option that required consideration. This was the rationale behind considering the Wet Mechanical Cooling technology option. However, the trade-off for this option is that it requires significant land to construct the water recycling infrastructure. The recycling of water used for Wet Mechanical Cooling would require significant land for constructing holding dams at a much greater additional capital cost. Thus, the use of both these options has been recommended for two of the power stations, with the trade-offs being reduced seawater abstraction balanced against reduced land requirements and costs.

Conclusion: The only feasible alternative for sourcing cooling water, is to abstract the required water from the ocean.

Desalination

The Coega SEZ currently sources its potable water supply from the NMBM water supply network. The NMBM purchases water from the Department of Water and Sanitation (DWS), which is

supplied from the Orange River Water Scheme. The CDC has been investigating the feasibility of developing a desalination facility to supplement the current NMBM supply, to provide tenants with a secure supply of freshwater for various industrial purposes. Environmental authorisation for the development of a desalination plant to supplement water supply from the NMBM, was approved in 2018. The desalination project will follow a phased approach and will start with an initial capacity of 15 Mℓ/day of potable water, ramping up incrementally to 60 Mℓ/day.

Conclusion: Based on the above, there are no other feasible options for supplementing the existing fresh water supply from the NMBM in a water stressed region, other than sourcing seawater from the ocean for desalination.

Land-based marine aquaculture

The establishment of an Aquaculture Development Zone (ADZ) within Zone 10 of the Coega SEZ has been in planning over a number of years. The economic motivation for the establishment of a 440 Ha and 42,370 tonnes per annum ADZ is provided in the CES feasibility study conducted in 2015. Consequently, the CDC progressed the ADZ concept and obtained environmental authorisation for the development of the ADZ in 2018.

With respect to the potential for recycling aquaculture seawater, the proposed Coega ADZ finfish aquaculture concept is based on the well-advanced recirculation technology, where up to 90% of the abstracted seawater is recycled using various filtration and treatment processes such as biofilters. In contrast, the abalone aquaculture has proven only to be feasible using a flow-through system.

The manufacture of seawater for culturing marine species has been attempted but with little success. In this instance, access to large volumes of freshwater would be needed, which would be problematic within the water constrained Coega area.

Conclusion: Based on the above information there are no other reasonable or feasible types of activities for sourcing large volumes of water for the aquaculture industry within the SEZ, other than sourcing the required water from the sea.

Overall Conclusion for Activity Alternatives

The **preferred alternative activity** is to establish marine intake servitudes alongside the Coega SEZ for the worst-case seawater abstraction requirements listed above. Alternative activities other than the establishment of a marine intake servitude for abstracting seawater from the ocean, are not considered to be reasonable or feasible.

4.3.3 Alternative Locations for the proposed Activity

This assessment addresses the alternative locations for the proposed abstraction of seawater adjacent to the Coega SEZ.

The identification and assessment of reasonable or feasible marine intake servitude alternatives for abstracting seawater has been an iterative process over a number of years. Pre-feasibility engineering studies (PRDW 2016, for aquaculture) and site selection risk assessment studies

(PRDW, 2017) assessed a number of alternative locations for the proposed marine intake servitudes.

PRDW 2016 Concept Design Report

The 2016 PRDW Concept Design Report assessed three (3) broad "*locations*" for the abstraction of seawater for aquaculture (i.e. it did not consider the power station cooling water requirements, as this project had not been conceptualised at that time). These included:

- East of the Port of Ngqura;
- In the vicinity of the Port of Ngqura, and;
- West of the Port of Ngqura.

The conclusion was that locating an intake servitude east of the Port of Ngqura is the most feasible alternative mostly due to the significant economic advantages associated with abstracting seawater closer to the aquaculture zone.

PRDW 2017 Dispersion Modelling Report

The 2017 PRDW Dispersion Modelling Report assessed six (6) locations for the proposed seawater abstraction or intake points, with a view to identifying common seawater intake servitudes. Compared with the 2016 PRDW Concept Design Report, this analysis also included cooling water. The six locations included (refer to Figure 4.1):

- W1 - Western intake at -10 m Chart Datum (CD)
- W2 - Western intake at -16 m CD
- CW - Cooling water intake inside the Port of Ngqura
- CB1 - Cerebos intake within the Port of Ngqura
- CB 2 - Cerebos intake at Sundays River Mouth
- E1 - Eastern intake at -10 m CD

The following conclusions were arrived at with respect to the preferred marine intake servitude locations, considering the results for the recommended outfall locations, where intakes were identified to prevent recirculation of effluent into the intake seawater:

- W1, W2 and CB2 were identified as **'not viable'** for seawater intake due to the large volumes of water required for cooling water and aquaculture development and the long distance of these sites from the power station sites and aquaculture zone, resulting in significantly higher economic costs due to the much longer reticulation distance.
- CW and CB1 were considered **'potentially viable'** if separate aquaculture and cooling water intakes are constructed, as the quality of the seawater within the Port of Ngqura is not suitable for aquaculture.
- E1 was considered **'potentially viable'** since the required effluent dilutions can be achieved, but still subject to the outcome of the marine ecological impact assessment.

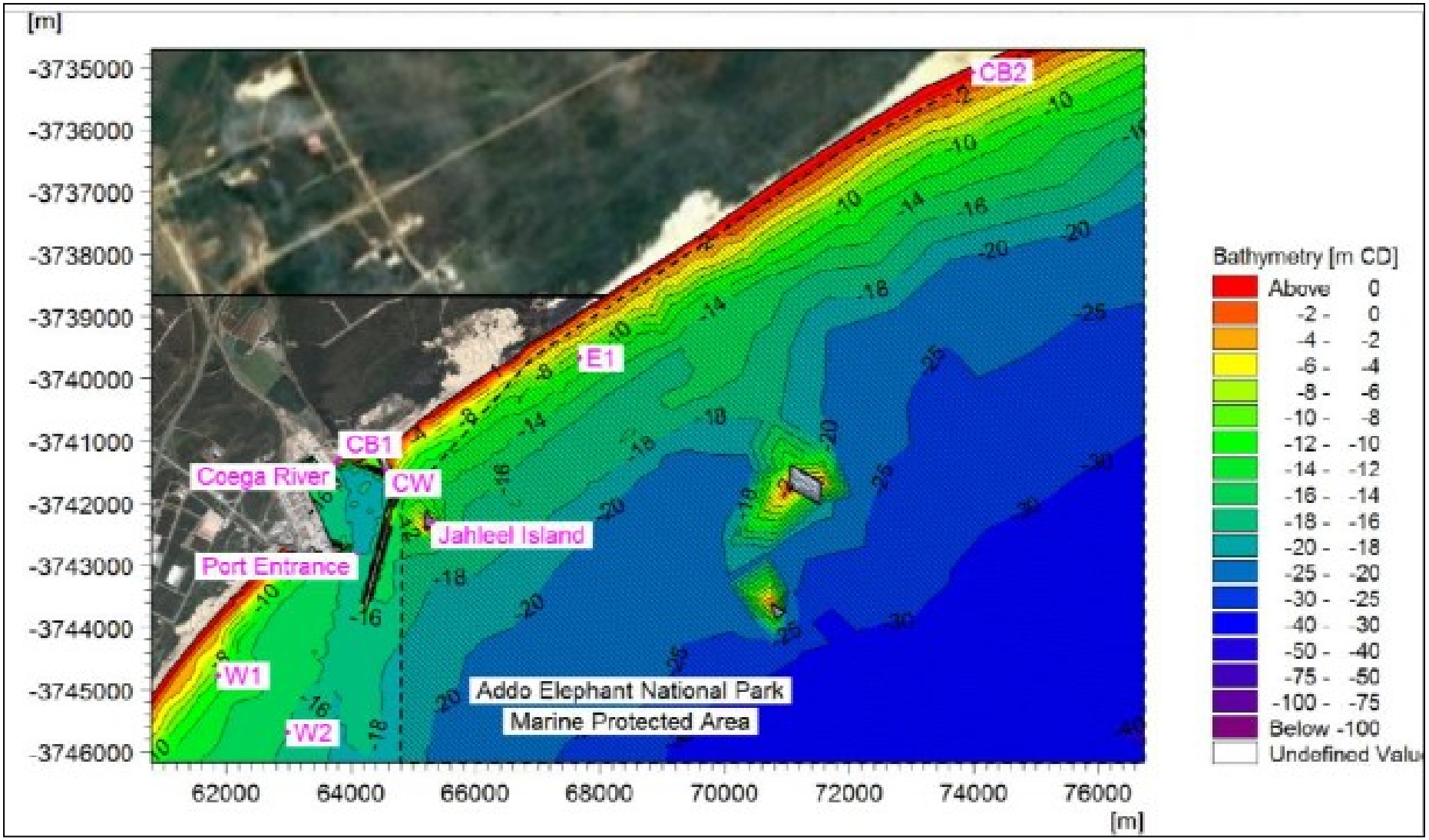

Figure 4.1: Location of intakes and sensitive receptors (PRDW, 2017).

Impact Risk Assessment for Alternative Intake Locations

A high-levelled risk assessment was conducted to assess the six (6) potential seawater intake servitude locations.

The following list of environmental, social and economic impacts or risks were identified and considered with respect to determining the preferred seawater intake locations.

- Geographical location;
- Physical conditions (e.g. water quality);
- Terrestrial ecology;
- Marine ecology;
- Social;
- Socio-economic;
- Economic;
- Heritage & cultural;
- Technical;
- Climate change mitigation; and
- Climate change adaptation.

The risks were also considered with respect to the design, construction operation and decommissioning project phases.

Table 4.1 provides the results of the high-level risk assessment in the form of a screening matrix of the six (6) potential seawater intake servitude locations. It takes into consideration the impact assessment and mitigation hierarchy, including:

- The nature of potential impacts including significance, consequence, extent, duration and probability; and
- Reversible, irreplaceable loss, can be avoided, managed or mitigated.

Table 4.1: High-levelled environmental, social and economic risk assessment screening matrix for alternative seawater intake servitude locations.

ENVIRONMENTAL ATTRIBUTES	SEAWATER INTAKE LOCATION ALTERNATIVES					
	WESTERN INTAKE AT -10 M CD	WESTERN INTAKE AT -16 M CD	COOLING WATER INTAKE INSIDE PORT	CEREBOS INTAKE WITHIN THE PORT	CEREBOS INTAKE SUNDAYS RIVER MOUTH	EASTERN INTAKE AT -10 CD
Geographical location	Not preferred	Not preferred	Preferred	Acceptable	Not preferred	Preferred
Physical conditions (e.g. water quality)	Acceptable	Acceptable	Acceptable	Not preferred	Acceptable	Preferred for aquaculture
Terrestrial ecology	Not preferred	Not preferred	Preferred	Acceptable	Not preferred	Preferred
Marine ecology	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
Social	Not preferred	Not preferred	Acceptable	Acceptable	Not preferred	Acceptable
Socio-economic	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
Economic	Not preferred	Not preferred	Preferred	Acceptable	Not preferred	Preferred
Heritage & cultural	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
Technical	Acceptable	Acceptable	Acceptable for cooling	Acceptable	Acceptable	Acceptable
Climate change mitigation	Not preferred	Not preferred	Preferred	Acceptable	Not preferred	Preferred
Climate change adaptation	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable

Table 4.2 below summarises the results of the risk assessment.

Table 4.2: Results of a high-level risk assessment completed for the six potential locations of the marine intake servitude.

ABSTRACTION LOCATION	CONCLUSION (ADVANTAGES / DISADVANTAGES)	REASONABLE AND FEASIBLE
Western intake at -10 m and -16 m CD	**Geographical location:** Abstraction from the west of the Port is a long distance from the point where the seawater is required in Zone 10. **Terrestrial ecology:** The reticulation of seawater around the Port from the west to the east along the N2 (a distance of about 12 km), poses higher risks to the terrestrial environment along the route, such as disturbance to vegetation and risk of seawater leakages along the route. **Social:** Large volumes of electricity would be required to pump seawater from the west of the Port to Zone 10 east of the Port. Currently the country is experiencing energy crises and any avenues to save energy should be considered. **Economic**: The capital and operational costs associated with conveying large volumes of abstracted seawater a long distance around the Port to the power stations and desalination and aquaculture facilities in Zone 10 (a distance of about 12 km), would not be economically feasible. **Climate change:** The carbon footprint associated with pumping seawater from the west of the Port to Zone 10, would be significant over the life of the project.	**NO**
Cooling water intake inside Port	**Marine ecology:** Since the cooling of the power stations requires the largest volumes of seawater and is not dependent on the quality of the seawater, water for this purpose can be abstracted from the Port, where it would have a lower environmental impact.	**YES** but only for cooling water, as water quality in the Port is not suitable for aquaculture
Cerebos intake within the Port	To ensure that there are no impacts on Cerebos, it was determined that a shared intake between the two industries would not be viable in this instance.	**NO**
Cerebos intake Sundays River Mouth	**Geographical location:** Abstraction from the Sundays River is a long distance from the point where the seawater is required in Zone 10. **Terrestrial ecology:** The reticulation of seawater from the Sundays River to Zone 10 east of the Port, possibly along the N2 (a distance of about 15 km), poses higher risks to the terrestrial environment along the route, such as disturbance to vegetation and risk of seawater leakages along the route. **Social:** Large volumes of electricity would be required to pump seawater between the Sundays River and Zone 10. Currently the	**NO**

ABSTRACTION LOCATION	CONCLUSION (ADVANTAGES / DISADVANTAGES)	REASONABLE AND FEASIBLE
	country is experiencing energy crises and any avenues to save energy must be considered. **Economic**: The capital and operational costs associated with conveying large volumes of abstracted seawater from the Sundays River to the power stations and, desalination and aquaculture facilities in Zone 10 (a distance of about 15 km) would not be economically feasible. **Climate change:** The carbon footprint associated with pumping seawater from Sundays River to Zone 10, would be significant over the life of the project.	
Eastern intake at -10 m CD	**Geographical location:** Abstraction from the east of the Port is geographically closer to the location where the seawater is required. **Water quality:** Aquaculture and desalination require a higher seawater quality and abstraction from the Port would not be a viable option. Hence, an open sea intake in close proximity to the approved aquaculture zone (i.e. east of the breakwater) is preferred. **Terrestrial ecology:** The shorter distance for the reticulation of seawater to the point of use, poses a lower risk to the terrestrial environment along the route, such as disturbance to vegetation and risk of seawater leakages along the route. **Economic**: The capital and operational costs associated with conveying large volumes of abstracted seawater from the east of the Port, would be much lower over the life of the project, compared with pumping seawater around the Port from the west. **Climate change:** The carbon footprint associated with pumping costs from the east of the Port would be much lower over the life of the project, compared with pumping seawater around the Port from the west.	**YES**

Concluding Statement for Location Alternatives

The **preferred alternative for the location of the marine intake servitude** is to construct two (2) separate seawater intake servitudes:

- *Intake servitude 1*: Seawater for Once-Through Cooling and Wet Mechanical Cooling located inside the Port of Ngqura; and
- *Intake servitude 2*: Seawater for aquaculture and desalination located to the east of the Port of Ngqura.

Specific Locations, Length and Width of the Servitudes

This section provides an assessment of the more specific locations of the two intake servitudes identified in Section 2.5.3, namely:

- Intake Servitude 1: Inside the Port of Ngqura for cooling water; and
- Intake Servitude 2: East of the Port of Ngqura for aquaculture and desalination.

Similar to the determination of the preferred broader geographical locations, the layout of the two proposed intake servitudes is informed by the positions of the proposed outfall locations, as the intakes need to be located where there are no risks of recirculation of effluent into the proposed intakes.

The proposed layout of the two seawater intake servitudes is mostly informed by the results of the more recent 2020 PRDW dispersion modelling report, where the layout is significantly based on the effluent discharge modelling for the worst-case discharge scenario. Figure 4.2 shows the proposed servitude positions on the shoreline. It proposed that a maximum servitude width of 200 m is established to accommodate the various abstraction technologies.

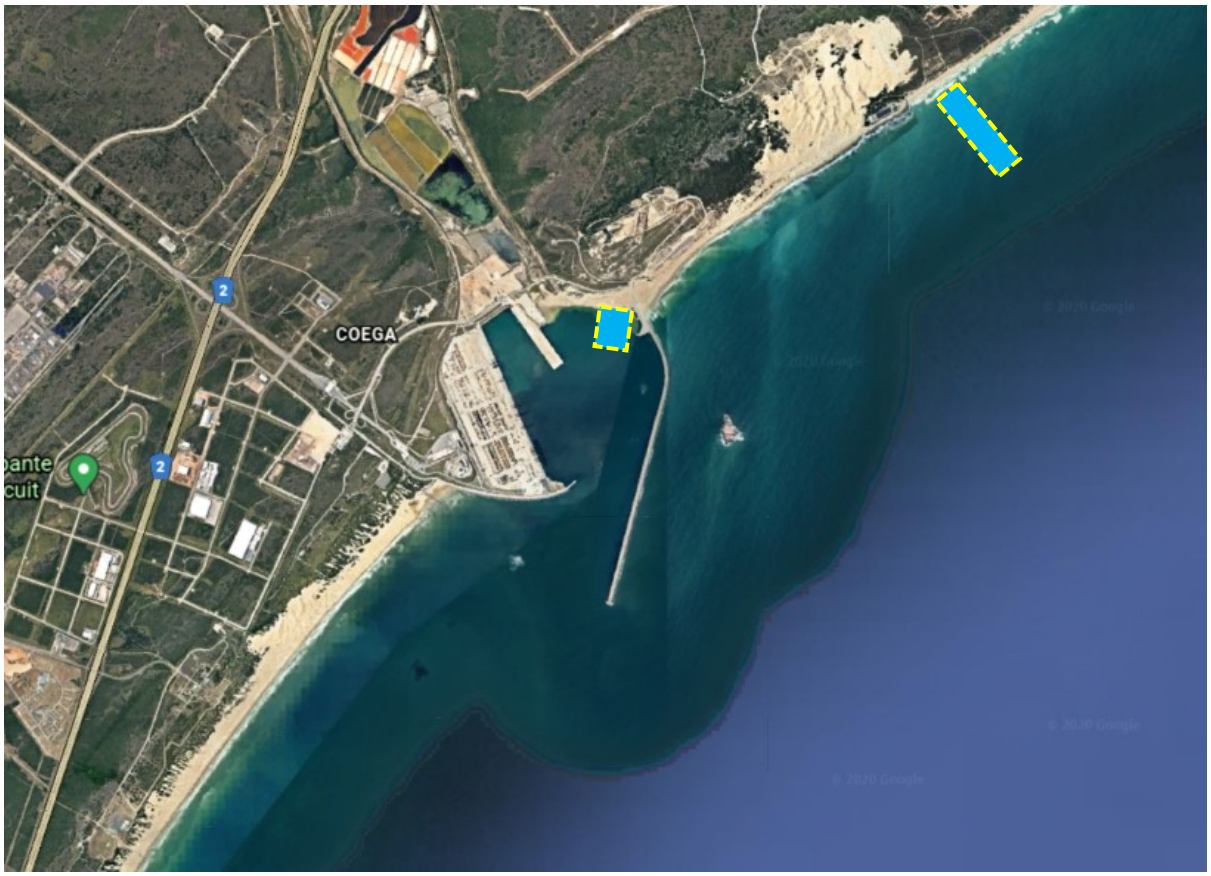

Figure 4.2: Broad locations of the preferred marine intake servitude alternative comprising two (2) intake servitudes.

Concluding Statement

The **preferred alternative for specific locations** of the two intake servitudes based on the worst-case abstraction scenario, includes:

- Intake servitude 1: Inside the Port (for cooling water only) with a servitude radius of 100 m; and
- Intake servitude 2: East of the Port (for combined aquaculture and desalination) with a servitude width of 200 m to a distance of 600 m offshore and to a depth of -10 m CD.

4.3.4 Alternative Design and Technology to be used in the Activity

Cooling water

The different seawater intake infrastructure designs and technologies for the abstraction of cooling water are described in the WSP Technical Report (2020) as also described in the Project Description in Section 2 (i.e. intake basin and pipeline jetty). Within the cooling water intake servitude both technologies will be utilised. These include:

- An intake basin comprising four or more parallel concrete intake channels located inside the Port of Ngqura will be required for the Once-Through Cooling system, requiring large volumes of seawater.
- An intake pipeline comprising a jetty located inside the Port of Ngqura will be required for the Wet Mechanical Cooling system requiring much lower volumes of cooling seawater.

Aquaculture and desalination

Details on designs and technologies that will be used for abstracting seawater for aquaculture and desalination are provided by the PRDW Conceptual Design Report (2016) and CDC personnel, respectively.

The following seawater intake designs and technologies will be utilized for aquaculture and desalination:

- An intake pipeline or pipeline tunnel will be required for high volumes of seawater for desalination and a flow-through system for abalone aquaculture; and
- Vertical beach wells will be required for the finfish aquaculture recirculation system.

A further technology to be included is the WEROP wave pump technology which would be located at the point of intake of the desalination intake pipeline and would facilitate the pumping of seawater to the shoreline.

Concluding Statement regarding Design and Technology Alternatives

The **preferred alternative design and technology,** based on the worst-case abstraction scenario, includes:

- **All** feasible seawater intake infrastructure design and technology options (i.e. intake basin, pipeline, jetty, WEROP wave pumps, pipeline tunnel and vertical beach wells).

Consequently, impacts relating to **All** the “worst-case” intake design and technology options are assessed in this EIR.

4.3.5 Summary of the Preferred Seawater Intake Servitude Alternatives

The following table provides a summary of the **preferred seawater intake servitude alternative**, which includes two separate servitudes. No other alternatives will be assessed (except for the no-go alternative), since there are no other reasonable and feasible alternatives.

ALTERNATIVE CATEGORY	PREFERRED ALTERNATIVE	
SERVITUDE	**INTAKE SERVITUDE 1**	**INTAKE SERVITUDE 2**
Activity	• Abstraction of seawater from the sea for Once-Through and Wet Mechanical Cooling of power stations.	• Abstraction of seawater from the sea for land-based aquaculture and desalination.
Broad geographical location	• Cooling water intake servitude inside the Port located at the root of the eastern breakwater as indicated in PRDW map (Figure 4.3).	• Combined aquaculture and desalination water intake servitude located east of the Port as indicated in PRDW map (Figure 4.3).
Specific location	• Servitude radius of 100 m and a depth of -6 m CD.	• Servitude width of 200 m to a distance of 600 m offshore and a depth of -10 m CD.
Design and Technology	• Once-Through Cooling water intake basin with four concrete channels each 3.5 m wide. • Wet Mechanical Cooling water intake jetty with a 710 mm HDPE pipe.	• Desalination – up to three 1,000 mm diameter HDPE intake pipes; • Aquaculture – up to three 1,600 mm diameter pipeline tunnels; • Vertical beach wells; • WEROP wave pumps.

4.4 Analysis of Effluent Discharge Servitude Alternatives

This section addresses the assessment of the alternatives for effluent discharge servitudes.

4.4.1 Alternative type of Activity

The need for the marine effluent discharge servitudes is mostly driven by a corresponding need of the respective Coega SEZ industries to return effluent seawater back into the offshore marine environment, including cooling water and aquaculture effluent. Other effluent streams include brine from the seawater desalination plant, treated wastewater and stormwater.

The following **maximum** effluent discharge requirements are projected:

Purpose	Type of effluent	Worst-case discharge flow rates
Cooling water: once-through cooling	Seawater at 28°C and 35 ppt	14.70 m^3/sec
Cooling water: wet mechanical cooling	Seawater at 23°C and 53 ppt	0.30 m^3/sec
Aquaculture flow through system for abalone	Seawater with projected concentrations of ammonia, nitrate, nitrite, TSS, COD.	5.00 m^3/sec
Aquaculture recirculation system for finfish	Seawater with projected concentrations of ammonia, nitrate, nitrite, TSS, COD.	0.94 m^3/sec

Purpose	Type of effluent	Worst-case discharge flow rates
Desalination brine	Brine at 60 ppt	1.22 m^3/sec
Wastewater	Treated domestic and industrial wastewater with projected concentrations of ammonia, nitrate, nitrite, TSS, COD, salinity heavy metals and E.coli	0.93 + 0.46 m^3/sec
Stormwater	Rainwater	Uncertain
TOTAL		**23.55 m^3/sec**

The same explanation and rationale provided above for determining the **preferred activity** relating to intake servitudes, is also applicable in informing the need for the effluent discharge servitudes.

Concluding Statement related to Activity Alternatives

The **preferred alternative activity** is the establishment of marine discharge servitudes adjacent to the Coega SEZ. Alternative activities other than the establishment of marine servitudes for the discharge of effluent into the ocean, are not considered to be reasonable or feasible.

4.4.2 Alternative Locations for the proposed Activity

This section addresses the preferred alternative locations for the discharge of various effluent streams into the marine environment adjacent to the Coega SEZ.

The identification and assessment of reasonable or feasible marine servitude alternatives for discharging effluents into the marine environment has been an iterative process over a number of years. Pre-feasibility engineering studies (PRDW 2016, for aquaculture) and site selection risk assessment studies (PRDW, 2017) assessed a number of alternative locations for the proposed marine effluent discharge servitude(s).

PRDW 2016 Concept Design Report

The 2016 PRDW Concept Design Report assessed three (3) broad "*locations*" for the discharge of aquaculture effluent (i.e. it did not consider the power station cooling water requirements, as this project had not been conceptualised at this time). These included:

- East of the Port of Ngqura;
- In the vicinity of the Port; and
- West of the Port.

The conclusion was that locating the effluent discharge servitudes east of the Port of Ngqura was the most feasible alternative mostly due to economic benefits associated with discharging the effluent closer to its source in the aquaculture zone located in Zone 10 of the Coega SEZ, east of the Port.

PRDW Dispersion Modelling 2017

In 2017, PRDW conducted a marine dispersion modelling exercise where 12 marine effluent discharge scenarios were developed and then modelled for the defined range of potential effluents. In addition to these 12 scenarios, 3 more scenarios were inferred from results of the modelled scenarios from six (6) sites (Figure 4.3):

- *Option 1* – Approximately 2 km south-west of the western breakwater, at 10 m depth;
- *Option 2* – Approximately 2 km south-west of the western breakwater, at 16 m depth;
- *Option 3* – Along the seaward side of the eastern breakwater, with the discharge point at the elbow of the breakwater;
- *Option 4* – Along the seaward side of the eastern breakwater, with the discharge point at the end of the breakwater;
- *Option 5* – Approximately 900 m to the north-east parallel to the eastern breakwater, at 10 m depth; and
- *Option 6* – Approximately 900 m to the north-east parallel to the eastern breakwater, at 20 m depth.

Figure 4.3 shows the location of the various discharge options that were modelled.

The dispersion modelling analysed the mixing zones of 100 m and 300 m from the discharge point. Water quality guidelines were also applied at locations of sensitive receptors, including the boundary of the Addo Elephant Marine Protected Area (MPA), 300 m from the boundary of the MPA, Jahleel Island, 100 m from Jahleel Island and the Port of Ngqura entrance.

The results of the dispersion modelling which informs the preferred location for discharging effluents, are summarised below.

Discharge west of the Port of Ngqura

The location of the discharge servitude west of the Port was identified as **'not viable'** for the construction of the proposed servitude for the following reasons:

- Effluent will need to be pumped around the perimeter of the Port which would result in significantly higher capital and operational costs compared with an eastern discharge.
- Although the required dilutions can be achieved, discharges west of the Port at -10 m will enter the Port, which increases the risk of accumulation of particulates with associated nutrients and heavy metals. If the pipeline is extended to -16 m, the achieved dilutions reduce the risk of effluent entering the Port. However, there is still a risk of accumulation of particulates with associated nutrients and heavy metals.

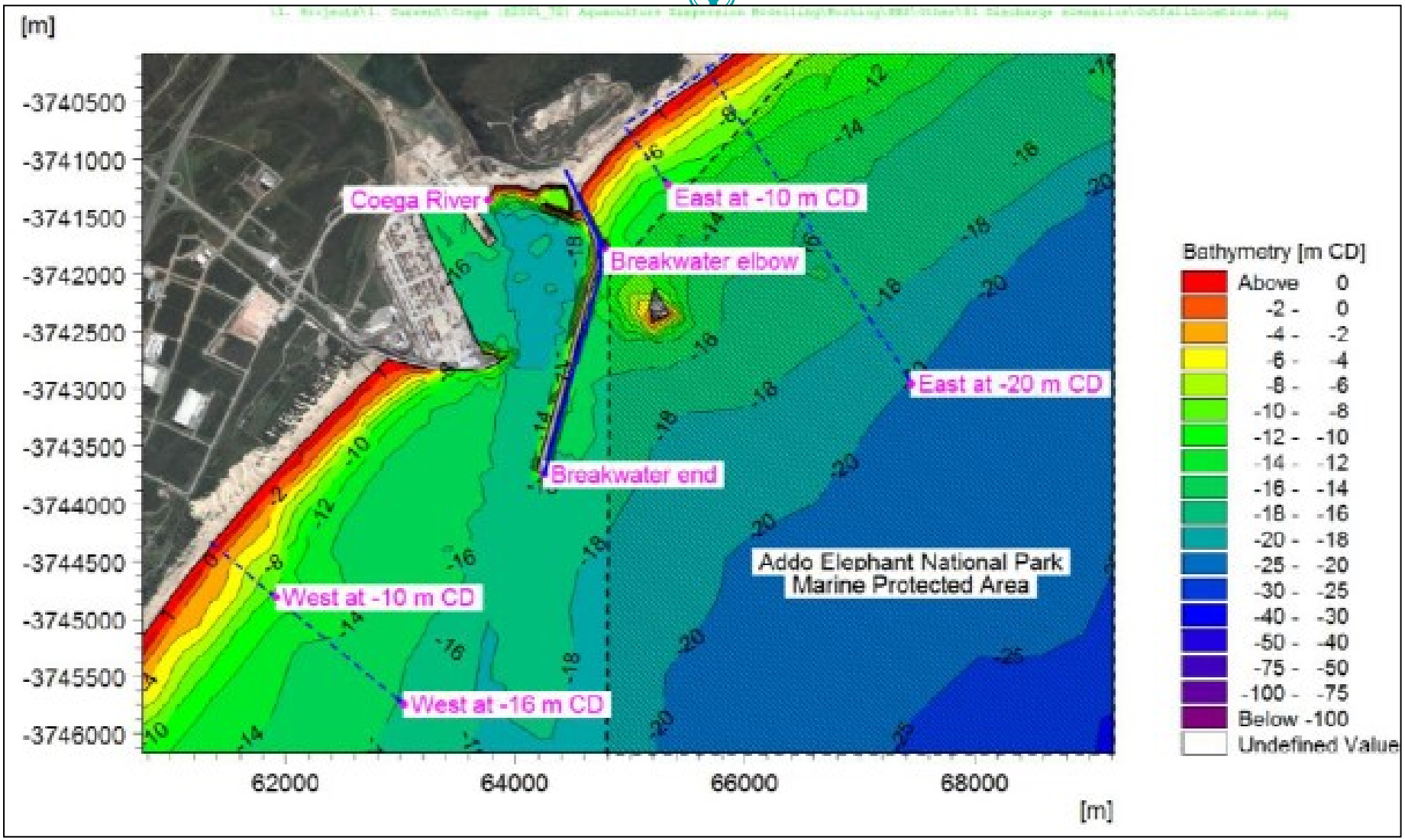

Figure 4.3: Location of modelled discharge outfalls (PRDW, 2017).

Discharge within the Port of Nggura

Discharging of effluent within the Port was identified as **'not viable'** for the following reason:

- Discharges will potentially become trapped in the Port resulting in accumulation of particulates with associated nutrients and heavy metals.
- Disposal of effluent inside the Port may impact on Transnet's ability to meet the permit requirements as per their annual Dredge Disposal Permit. According to the 2019 Dredge Disposal Report, the high mud fraction of sediment in the Port reflects its depositional nature and indicates there is a high propensity for the retention and accumulation of particle reactive contaminants introduced in solution to the Port. In addition, the concentrations of some metals in the sediment at numerous stations did, exceed baseline model upper prediction limits. Copper was the most frequently enriched metal in sediment, followed by zinc and chromium. As such no further discharges can be allowed within the port considering the potential for the effluent to get trapped then and accumulate over time.

Discharge east of the Port of Nggura

Discharge east of the Port was deemed as being **'potentially viable'** for the following reason:

- The required dilutions can be achieved with no risk of effluent entering the Port or unacceptable environmental damage to the Marine Protected Area (MPA). In addition, the National Environmental Management: Protected Areas Act, 2003 (Act No 57 of 2003) and the Regulations for the management of the Addo Elephant National Park Marine Protected Area (23 May 2019) Section 10(2) make allowance for discharges into the Addo MPA.

Impact Risk Assessment for Alternative Effluent Discharge Locations

A high-levelled risk assessment was conducted to assess the three (3) broad potential seawater discharge servitudes locations:

- West of the Port;
- Within the Port; and
- East of the Port.

The following list of environmental, social and economic impacts or risks were identified and considered with respect to determining the preferred effluent discharge servitude locations.

- Geographical location;
- Physical conditions (e.g. water quality);
- Terrestrial ecology;
- Marine ecology;
- Social;
- Socio-economic;
- Economic;
- Heritage & cultural;
- Technical;
- Climate change mitigation; and
- Climate change adaptation.

The risks were also considered with respect to the design, construction operation and decommissioning project phases.

Table 4.3 provides the results of the high-level risk assessment in the form of a screening matrix of the three (3) broad potential effluent discharge servitudes locations. It takes into consideration the impact assessment and mitigation hierarchy, including:

- The nature of potential impacts including significance, consequence, extent, duration and probability; and
- Reversible, irreplaceable loss, can be avoided, managed or mitigated.

Table 4.3: High-levelled risk assessment screening matrix for effluent discharge servitude locations.

ENVIRONMENTAL ATTRIBUTES	EFFLUENT DISCHARGE SERVITUDE LOCATION ALTERNATIVES		
	WEST OF PORT	WITHIN PORT	EAST OF PORT
Geographical location	Not Preferred	Acceptable	Preferred
Physical conditions (e.g. water quality)	Acceptable	Not Preferred	Acceptable
Terrestrial ecology	Not Preferred	Acceptable	Acceptable
Marine ecology	Not Preferred	Not Preferred	Not Preferred
Social	Acceptable	Acceptable	Acceptable
Socio-economic	Acceptable	Acceptable	Acceptable
Economic	Not preferred	Acceptable	Preferred
Heritage & cultural	Acceptable	Acceptable	Acceptable
Technical	Acceptable	Acceptable	Acceptable
Climate change mitigation	Not preferred	Acceptable	Acceptable
Climate change adaptation	Acceptable	Acceptable	Acceptable

Environmental Economic Assessment

According to the Environmental Economic Assessment conducted for the proposed development the significance of the capital and operating costs associated with transporting the effluent streams from the east to the west of the Port of Ngqura, varies between industries. The industries that use greater quantities of seawater are more greatly affected by the additional western discharge costs. Once Through Cooling and abalone aquaculture are the most affected due to their respective high seawater requirements. They contribute about R6 billion (63%) and R2 billion (21%), respectively, to the total R9.5 billion additional direct cost to transport effluent to the west of the Port.

With respect to the impact on the individual industries, the additional direct cost to transport effluent to the west of the Port represents a significant increase in:

- Discharge costs: ranging from 37% for Wet Mechanical Cooling up to 58% for other streams; and
- Discharge cost as a % of total project cost: ranging from 4% for Wet Mechanical Cooling up to over three times (316%) for desalination.

Based on the above, it can be concluded that the additional cost to transport effluent streams will without doubt have a significant impact on the financial viability of the respective industries and other land-based activities such as the Coega SEZ wastewater treatment facility.

Table 4.4 provides a summary of the conclusions made with respect to the preferred discharge servitude locations.

Table 4.4: Results of a high-level risk assessment completed for the three broad potential locations of the effluent discharge servitudes.

ABSTRACTION LOCATION	CONCLUSION (ADVANTAGES / DISADVANTAGES)	REASONABLE AND FEASIBLE
Discharge west of the Port	**Geographical location:** The discharge of effluent to the west of the Port is approximately 12 km from the point where the effluent will be generated in Zone 10 east of the Port. **Terrestrial ecology:** The reticulation of effluent streams around the Port from the east to the west along the N2 (a distance of about 12 km), poses higher risks to the terrestrial environment along the route, such as disturbance to vegetation and risk of effluent leakages along the route. **Social:** Large volumes of electricity would be required in order to pump effluent streams from Zone 10 to the west of the Port. Currently, the Country is experiencing energy crises and any avenues to save energy must be considered. **Economic**: The capital and operational costs associated with conveying large volumes of effluent a long distance around the Port to the west (a distance of about 12 km), from the power stations, and desalination and aquaculture facilities in Zone 10, would not be economically feasible. The total cost for only returning Once-Through cooling water is estimated to amount to be about R5.8 billion over the 20 year life of the project. **Water quality**: Although the required dilutions can be achieved, discharges west of the Port at -10 m will enter the Port, which increases the risk of accumulation of particulates with associated nutrients and heavy metals. If the pipeline is extended to -16 m, the achieved dilutions reduce the risk of effluent entering the Port. However, there is still a risk of accumulation of particulates with associated nutrients and heavy metals. **Climate change:** The carbon footprint associated with pumping effluent from Zone 10 to the west of the Port would be significant over the life of the project. The carbon footprint associated with pumping is projected to be in the region of about 1.9 million tCO2e over the 20 year life of the project.	**NO**
Discharge within the Port	**Water quality and marine ecology:** There is a high risk of effluent becoming trapped within the Port resulting in accumulation of particulates with associated nutrients and heavy metals, consequently impacting on the marine ecology. In addition, any accumulation of particulates within the Port may result in the inability of the Port to meet discharge requirements related to its Dredge Disposal Permit.	**NO**

ABSTRACTION LOCATION	CONCLUSION (ADVANTAGES / DISADVANTAGES)	REASONABLE AND FEASIBLE
Discharge east of the Port	**Geographical location:** Discharge of effluent to the east of the Port is geographically closer to the location where the effluent will be generated in Zone 10. **Economic**: The capital and operational costs associated with conveying large volumes of effluent from Zone 10 to the east of the Port, would be much lower over the life of the project, compared with pumping effluent streams around the Port to the west (a distance of about 12 km). **Water quality and marine ecology:** Effluent discharges east of the Port would be into the proclaimed Addo Elephant Marine Protected Area. However, the results of the dispersion modelling (PRDW, 2020) show that the required dilutions can be achieved for the worst-case effluent scenario. In addition, the Addo Elephant MPA Regulations make allowance for the discharge of effluent streams into the MPA. **Climate change:** The carbon footprint associated with discharging effluent from Zone 10 into the location east of the Port, would be much lower over the life of the project, compared with pumping effluent around the Port to the west.	**YES**

Concluding Statement regarding Alternative Locations

The **preferred alternative location** is for the effluent discharge servitudes to be located to the **east of the Port.**

4.4.3 Specific Locations, Length and Width of the Servitudes

PRDW Dispersion Modelling 2020

In 2017 PRDW undertook marine effluent dispersion modelling for 12 potential discharge scenarios, to inform the movement of the discharge plumes and possible interactions with planned seawater abstraction points (PRDW, 2017). In 2020, PRDW extended their investigation to model additional scenarios based on the updated effluent characterisation and to refine optimal intake and outlet locations.

It is important to note that at this point, abstraction and effluent dispersion modelling was limited to east of the breakwater, due to discharging to the west of the Port and inside the Port having been excluded as viable options.

It should also be noted that 11 of the 12 discharge scenarios tested by PRDW in 2017 comprised only one discharge location and one effluent, with only one scenario having combined effluents, since the focus of this initial dispersion modelling exercise was to compare different broad discharge locations. The 2020 study comprised **worst-case effluent scenarios** and multiple discharge locations with all the effluents being discharged simultaneously in order to test the combined impact.

The following six (6) **worst-case** effluent streams were considered in the 2020 PRDW dispersion modelling study:

PURPOSE	TYPE OF EFFLUENT	WORSE CASE DISCHARGE FLOW RATES
Cooling water: once-through cooling	Seawater at 28°C and salinity of 35 ppt	14.70 m^3/sec
Cooling water: wet mechanical draft cooling	Seawater at 23°C and salinity of 53 ppt	0.30 m^3/sec
Aquaculture flow through system for abalone	Seawater with projected concentrations of ammonia, nitrate, nitrite, TSS, COD.	5.00 m^3/sec
Aquaculture recirculation system for finfish	Seawater with projected concentrations of ammonia, nitrate, nitrite, TSS, COD.	0.94 m^3/sec
Desalination brine	Brine at 60 ppt	1.22 m^3/sec
Wastewater	Treated domestic and industrial wastewater with projected concentrations of ammonia, nitrate, nitrite, TSS, COD, salinity heavy metals and E.coli	0.93 + 0.46 m^3/sec
TOTAL		**23.55 m^3/sec**

The characteristics of each individual effluent were provided by the CDC based on the respective industry specialist input. In addition, the modelling of the worst-case discharge scenario required assigning an intake and discharge location for each of the six effluent streams. The intake and discharge locations were chosen to align with the relevant infrastructure within the SEZ as provided by the CDC.

The worst-case discharge scenario was run for the summer and winter months. The model outputs show the achieved dilutions in each horizontal and vertical element of the computational mesh at 1-hour intervals throughout the simulation period. Figure 4.4 provides an example of the dilution contours for worse-case finfish aquaculture effluent.

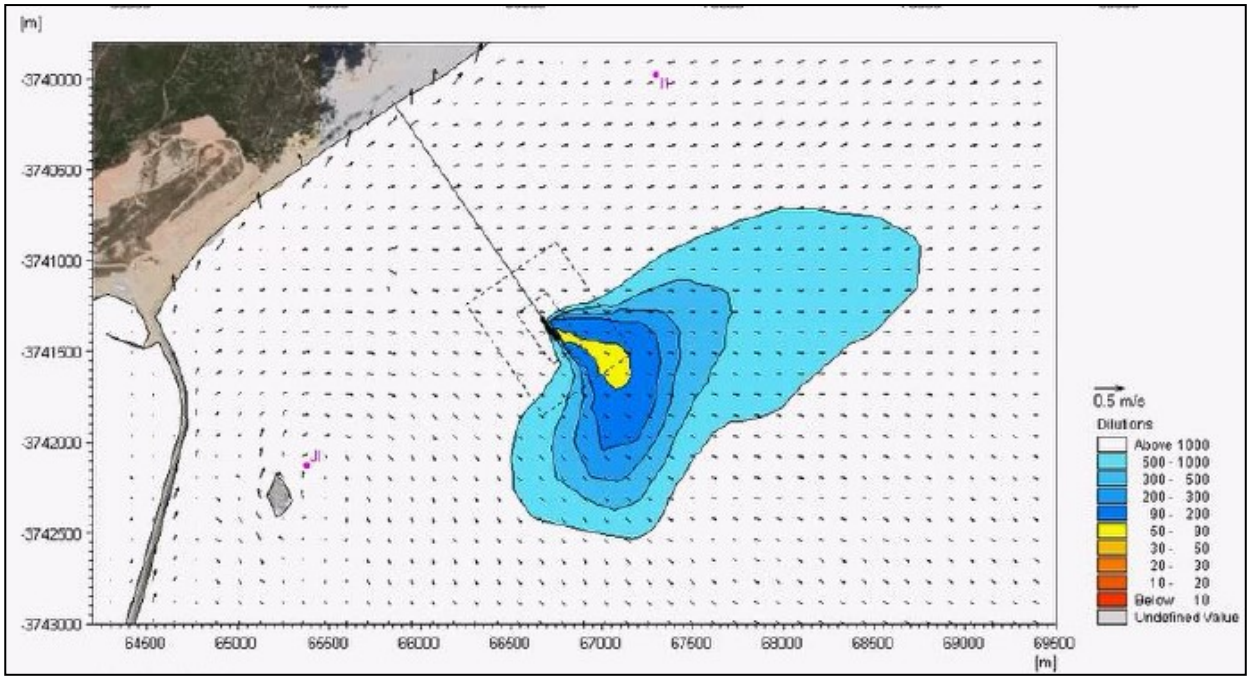

Figure 4.4: Example of dilution contours for finfish aquaculture effluent discharges.

The following conclusions were drawn from the 2020 marine dispersion modelling study:

- All the discharges considered can meet the applicable water quality guidelines (WQGs) (The marine WQGs currently in force are those defined in DWAFF (1995). These have been reviewed and updated in DEA (2019) but these are still in draft form and are not yet gazetted. Therefore, here the DWAFF (1995) version of the guidelines are followed primarily but are augmented by WQGs from other jurisdictions where required, e.g. ANZECC (2000), IFC (2009), along with peer-reviewed toxicity test data) within the 300 m mixing zone, except for wastewater and the combined brine and finfish discharge.
- With respect to wastewater, the maximum allowable effluent concentrations (end of pipe) for *E.coli*, TKN + NH_4 and TSS must be limited in order to meet the Guidelines.
- To ensure compliance, the brine and finfish effluent should be discharged separately.
- Both the cooling water discharges tested meet the guidelines.
- Should additional constituents be added to the effluent streams or identified in future, then the end-of-pipe concentrations of these constituents will need to be limited based on the achieved dilutions from the dispersion model as provided in the modelling report (PRDW, 2020) and the applicable guidelines, using the precautionary principle in cases where marine water quality guidelines for these constituents are not clear.

Figure 4.5 shows in RED the three discharge locations identified by PRDW (2020).

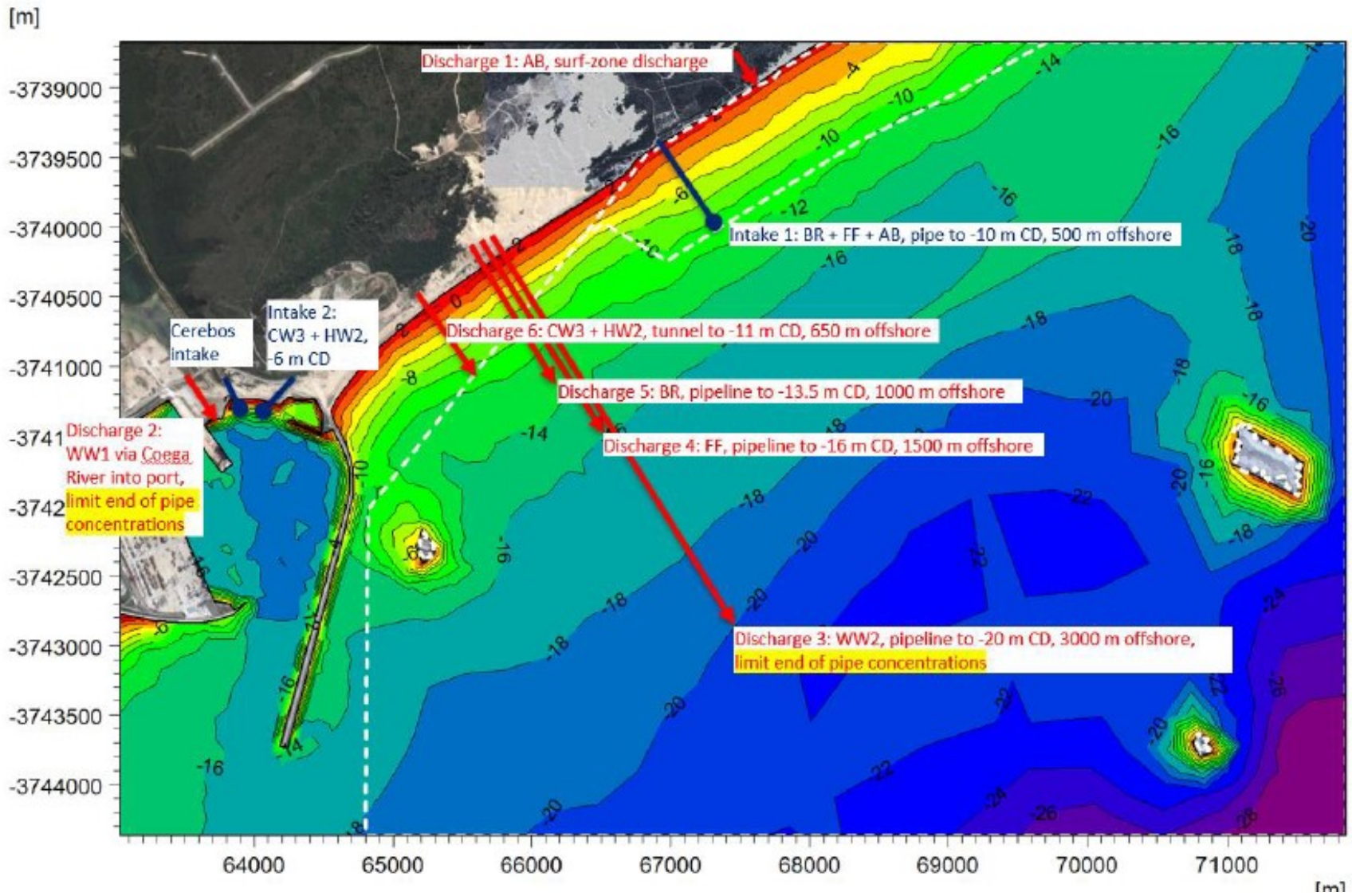

Figure 4.5: Recommended effluent discharge (RED) and intake (BLUE) marine servitude locations (PRDW, 2020).

Concluding Statement

The **preferred specific alternative locations** for the discharge of the various effluent streams are three separate servitudes comprising:

- Discharge servitude 1:
  - Cooling water effluent discharge servitude 200 m wide to a distance of 650 m offshore and a depth of -11 m CD.
- Discharge servitude 2: Combined effluent discharge servitude 200 m wide with the following:
  - Brine discharge 1,000 m offshore, at a depth of -13.5 m CD.
  - Finfish aquaculture recirculation system effluent discharge 1,500 m offshore, at a depth of -16 m CD.
  - Wastewater discharge from Phase 2 of the WWTW at 3,000 m offshore, at a depth of -20 m CD.
- Discharge servitude 3:
  - Abalone aquaculture flow-through system effluent discharge servitude 100 m wide into the surf zone.

4.4.4 Alternative Design and Technology to be used in the Activity

The WSP 2020 technical report investigated two types of infrastructure for the discharge of the Once-Through and Wet Mechanical Cooling water. These included:

- Eight (8) metre wide raceway; and
- Three (3) metre diameter tunnel.

Raceway discharge

The possibility of attaching a raceway to the eastern breakwater of the Port was determined not to be feasible due to risks associated with the structural integrity of the breakwater. An alternative freestanding raceway was also investigated. However, the freestanding raceway option would require significant infrastructure including two lateral breakwaters that would have a large ecological footprint and affect sediment movement. Hence, this option was deemed as being both financially and ecologically unacceptable.

Tunnel discharge

WSP have recommended that a tunnel is the most feasible option for discharging the large volumes of water from a once-through cooling system. A 3,000 mm (3.0 m) outer diameter tunnel will be required for this purpose. The length from the upper beach to offshore would be about 600 m. Beyond this, seabed mounted pipelines may be used for the diffuser section.

The tunnel would consist of a concrete conduit (concrete pipe section installed by means of jacking and a tunnel boring machine from land). The concrete mix design should enable the requisite design life to be realised with the warm seawater flowing inside the tunnel.

The tunnel boring and pipe jacking is a large-scale operation. Pipe jacking would be installed from the land side to the -11 m relief well (offshore retrieval pit) to extract the drilling equipment. It is likely that a marine jack-up barge may be required for this purpose.

The construction of a tunnel is thus the preferred alternative technology for the discharge of large volumes (14 m^3/sec) of effluent cooling water.

Additional technologies required for servitudes

The construction of pipelines will be required for the discharge of brine, aquaculture effluent (finfish and abalone) and treated wastewater from the Coega WWTW. Directional drilling under the surf zone may be feasible for some of the discharge requirements, as opposed to laying a pipeline on the seabed through the surf zone. Other than that, no other technical alternatives will be considered as a pipeline is considered to have the smallest construction footprint.

Concluding Statement relating to Design and Technology Alternatives

The **preferred alternative design and technology** for the three separate discharge servitudes includes:

- Discharge servitude 1:
  - Tunnel (to accommodate large flows from Once-Through and Wet Mechanical Cooling).
- Discharge servitude 2: Separate pipelines for the following:
  - Brine discharge;
  - Finfish aquaculture recirculation system effluent discharge;
  - Treated wastewater for Phase 2 of the WWTW; and
- Discharge servitude 3:
  - Pipeline for abalone aquaculture flow-through system effluent discharge into the surf zone.

Preferred Effluent Discharge Servitude Alternative

The following table provides a summary of the **preferred alternative effluent discharge servitudes** (made up of three servitudes). No other alternatives will be assessed except for the no-go alternative, since there are no other reasonable and feasible alternatives.

ALTERNATIVE CATEGORY	PREFERRED ALTERNATIVE		
Servitude	**DISCHARGE SERVITUDE 1**	**DISCHARGE SERVITUDE 2**	**DISCHARGE SERVITUDE 3**
Activity	Discharge of Once-Through and Wet Mechanical cooling water effluent totalling 15.0 m^3/sec, back into the sea.	Discharge of finfish aquaculture recirculation system effluent (0.94 m^3/sec), brine (1.22 m^3/sec), treated wastewater (1.4 m^3/sec) in three separate pipelines.	Discharge of abalone aquaculture flow-through effluent (5.0 m^3/sec).
Geographical location	East of the Port of Ngqura, as indicated in PRDW map (Figure 4.3).	East of the Port of Ngqura, as indicated in PRDW map (Figure 4.3).	East of the Port of Ngqura, as indicated in PRDW map (Figure 4.3).
Specific location	Servitude of 200 m width to -11 m CD, 650 m offshore	Servitude of 200 m width with: • Brine discharge to -13.5 m CD, 1,000 m offshore.	Pipeline for abalone aquaculture flow-through system effluent

ALTERNATIVE CATEGORY	PREFERRED ALTERNATIVE		
		• Finfish aquaculture discharge to -16 m CD, 1,500 m offshore. • Wastewater from phase 2 of the WWTW to -20 m CD, 3,000 m offshore.	discharge into the surf zone.
Design and layout	Tunnel with diameter of up to 3,000 mm.	Pipelines including: • Brine – 700 mm diameter HDPE pipe; • Finfish – 700 mm diameter HDPE pipe; • Wastewater – up to 700 mm diameter HDPE pipe.	Beach pipeline – 1,600 mm diameter HDPE pipe.

Figure 4.6 shows the preferred locations of the three marine discharge servitudes.

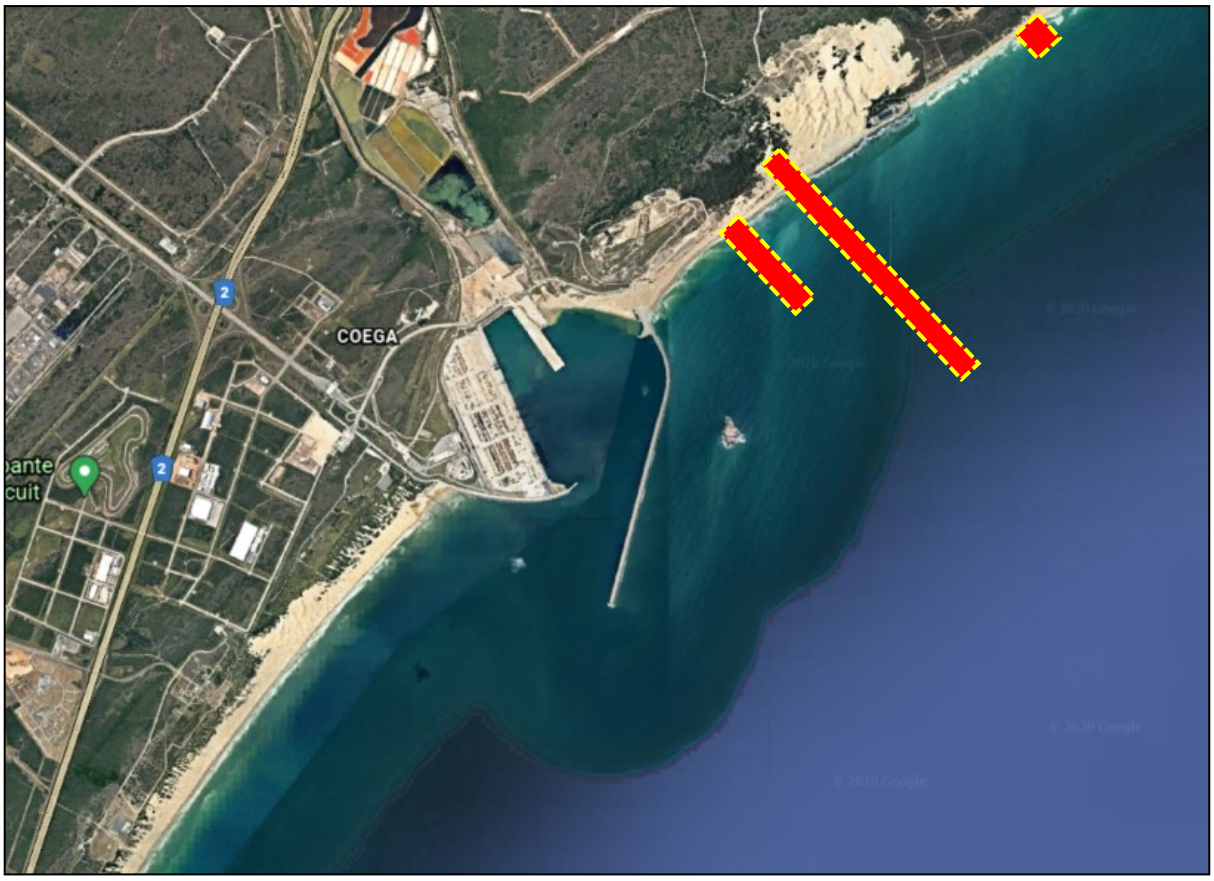

Figure 4.6: Preferred locations of the three proposed effluent discharge (RED)

4.5 Analysis of Land-Based Infrastructure Alternatives

4.5.1 Alternative Type of Activity to be undertaken

Land-based infrastructure is required to connect various servitude(s) to the respective industries, as such, no activity alternatives are deemed to be reasonable / feasible.

4.5.2 Alternative Locations for the proposed Activity

A desktop screening exercise of available information on land-based sensitive terrestrial and aquatic environments was carried out to identify suitable alignments for the land-based connections to the proposed servitudes. These alignments were then refined based on the outcome of the marine dispersion modelling undertaken in June 2020. In addition, a detailed site-specific terrestrial ecological survey (inclusive of a site visit) of the area was undertaken as part of the specialist phase of the project. The following areas have been avoided, as far as practically possible, when placing land-based infrastructure:

- 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, climate change etc.).
- Mobile dune process areas and/or areas sensitive to coastal erosion.
- Areas that occur within CBAs designated in the Coega Open Space Management Plan (OSMP).
- Known and anticipated habitats used by *Damara terns* (this would correspond with dune field areas and dune slacks).
- 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 from wetlands.
- Areas where sensitive archaeological and paleontological sites have been recorded.
- Areas that would conflict with existing facilities or infrastructure (e.g. Port facilities) and / or rights (e.g. mining rights in the coastal dune fields) and planned expansions/infrastructure reflected on approved development plans (e.g. the Coega development framework plan, Masterplan for east of the Coega River and OSMP that shows the position of stormwater infrastructure).
- As part of the approved rezoning EIA for the Coega SEZ, a services corridor has been designated. The alignment and positioning of required land-based infrastructure should coincide with this corridor as far as practically possible. Further, required infrastructure should be limited to disturbed areas such as within road servitudes and adjacent to the boundary of approved sites.

The proposed land-based servitudes will be 30 m wide.

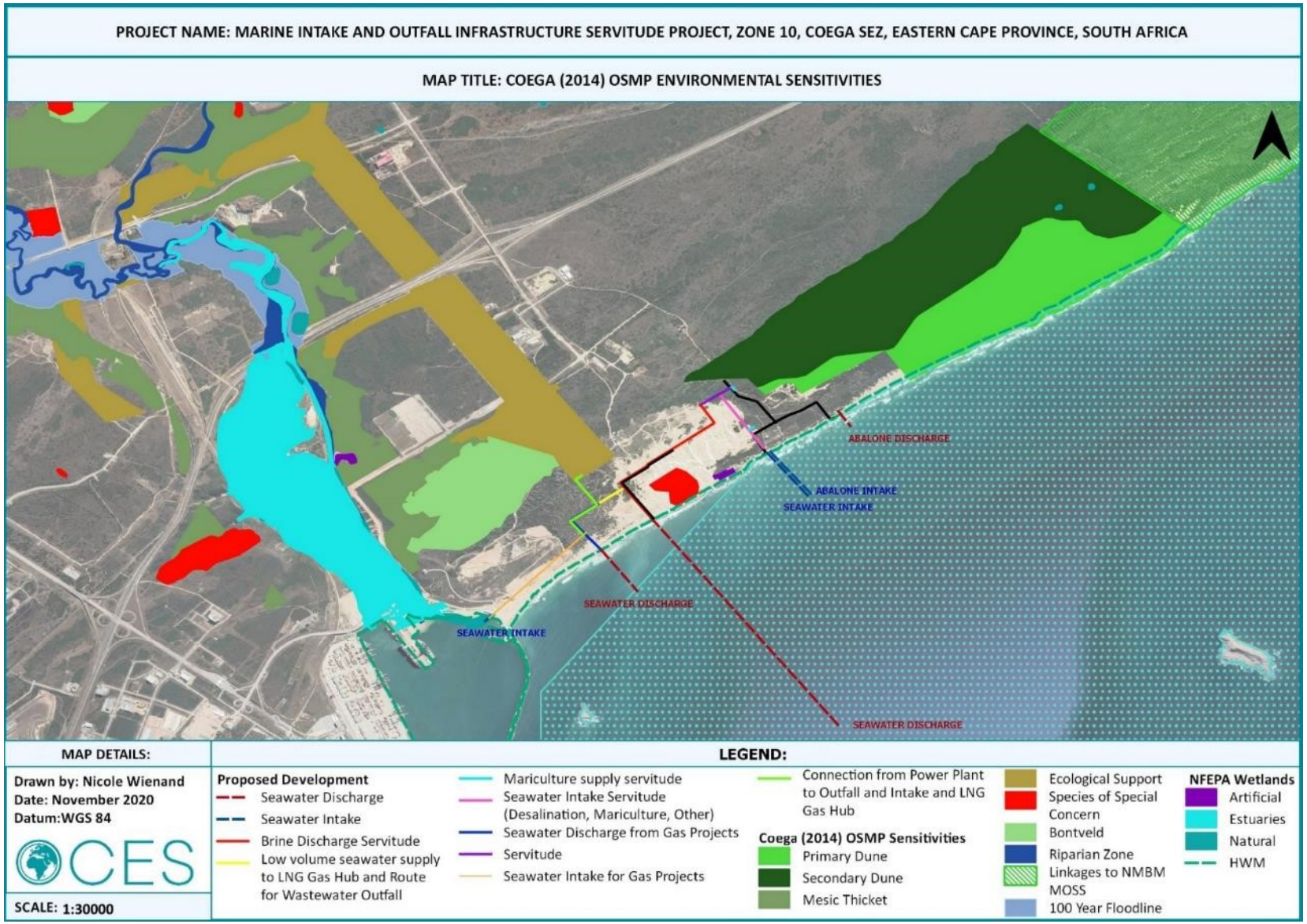

Figure 4.7: Preferred layout, superimposing all terrestrial and marine based sensitive features.

4.5.3 Alternative Design and Technology of the Activity

The land-based seawater intake and effluent discharge pipeline reticulation will comprise HDPE pipes with diameters ranging between 600 mm to 3000 mm. Various pump stations and booster stations will be constructed along the route of the pipeline reticulation.

Alignments and preferred positions will be finalised at EIA stage with input from design engineers to advise on aspects such as topography, pumping requirements, costs, flow rates etc.

4.5.4 Preferred Alternative for Land-Based Infrastructure

ALTERNATIVE CATEGORY	LAND-BASED SERVITUDES
Activity	Land-based infrastructure is required to connect various servitude(s) to the respective industries.
Geographical location	Coastal area of Zone 10
Specific Location	30 m Servitude (Figure 4.7 above).
Design and layout	HDPE pipes with diameters ranging between 600 mm to 3000 mm

4.6 NO DEVELOPMENT ALTERNATIVE

Various industrial activities occur in and are planned for the Coega SEZ. A number of industries will require seawater for their operations (e.g. aquaculture, cooling water for power plants, desalination plants) and/or will have to discharge treated 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 are 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 into the Coega River it will consequently end up in the marine environment.

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. This is of utmost importance as the NMBM is a water stressed area. In September 2020, the NMBM declared Day Zero and a number of areas within the NMBM were left without water and needed to be provided with this basic service via water tankers. This situation is exacerbated by poor maintenance of water infrastructure within the NMBM. It is therefore not only important to reduce the freshwater requirements of industry through the utilisation of seawater, but also to find an alternative means of water provision, such as the desalination of seawater, in addition to improved demand-side of management by the NMBM (e.g. leak detection and repair). This is especially important amidst the crisis brought about by the COVID-19 Pandemic that the country is currently facing, with proper sanitation and hygiene being paramount at preventing the spreading of this Pandemic. The utilisation of desalinated water within the Coega SEZ would further relieve some of the stress on the NMBM to provide the required amount of freshwater for industry within the SEZ.

Considering the vastness of the Coega SEZ and the array of planned industries, the need for servitudes to accommodate seawater 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 as a result of haphazard and multiple discharge points resulting in numerous cumulative impacts. Individual discharges would also make it difficult to control and monitor discharge quality, and to manage associated risks 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 SEZ. In summary, the following potential benefits are anticipated from having common-user abstraction and discharge servitudes 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 treated 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. The effluent dispersion modelling has confirmed that the target dilutions can be achieved.

In addition, having the appropriate infrastructure available to investors will enhance the attractiveness of the Coega SEZ as an investment destination and, therefore, future investment trends. This will result in increased revenue, foreign exchange, increased taxes and royalties. An increase in investment into the area will also lead to more employment, local economic development, skills development, and local procurement. The EIA for the aquaculture zone was approved in February 2018. However, if the SEZ is not able to meet the water requirements for this industry, no further development of this zone would be possible.

There are however 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.

5 NEED AND DESIRABILITY

The following provides the motivation for the establishment of the marine seawater intake and effluent discharge servitudes within and adjacent to the Coega SEZ as included in the accepted Final Scoping Report. This Chapter also focuses on the need and desirability of the preferred alternative (i.e. discharge to the east of the Eastern Breakwater), as required by Section 1(f) of Appendix 3 of the EIA Regulations.

5.1 FURTHER INVESTMENT INTO THE COEGA SEZ

The primary need for the abstraction of seawater is to facilitate the co-ordinated development of infrastructure for a number of possible investors in the Coega SEZ that would require seawater in their processes. The Coega SEZ is currently the largest SEZ in the Southern Hemisphere and is adjoined by a deepwater harbour (Port of Ngqura). According to the Nelson Mandela Bay Municipality (NMBM) Spatial Development Framework (SDF, 2015) the Coega SEZ, under the stewardship of the CDC, has managed to attract billions of Rands of investments into the economy of the Eastern Cape and thus enabling thousands of jobs to be created. In addition, a number of large projects valued at over R75 billion, are currently being considered.

According to the Eastern Cape Provincial Spatial Development Plan (2017 Final Draft), the Coega SEZ, as one of two SEZs in the Province, is seen as having significant economic growth potential for the Eastern Cape Province. Having the appropriate infrastructure available for investors will enhance the attractiveness of the Coega SEZ as an investment destination and, therefore, improve investment attractiveness. This will result in improved revenue generation, foreign exchange, realisation of taxes and royalties. An increase in investment into the area will also result in increased employment, further local economic development, skills development and local procurement.

The EA for the aquaculture zone was approved in February 2018. However, if the SEZ is not able to meet the water requirements for this industry, no further development of this zone would be possible.

5.2 LOWER ENVIRONMENTAL IMPACT

Relevant Government Departments involved in water resource management and coastal management (e.g. DWS and DEFF: Oceans and Coasts), have advised the CDC that it would be beneficial for the SEZ to have dedicated servitudes for the placement of infrastructure needed for the abstraction of seawater and discharge of treated effluent to the marine environment, rather than each industry establishing its own set of infrastructure. This would improve effectiveness and efficiency in the management of the volumes and quality of effluent, would streamline the maintenance of infrastructure, 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.

The Environmental Economic Impact Assessment undertaken for the project (CES, 2021a) has shown that the cost of constructing a discharge servitude from the ADZ to the western side of

the Port will make the project economically unfeasible. This will result in each investor having to establish their own independent dedicated discharge servitude which will likely have a greater negative environmental impact on Algoa Bay, due to the cumulative impacts associated with a greater number of pipelines. As such, discharge to the east of the eastern breakwater is environmentally and economically the preferred option.

Furthermore, depending on the receiving environment and the position and depth of discharge, the release of effluent into the marine environment rather than rivers or estuaries has potentially less environmental impact because of increased assimilative and dispersive capacity.

In addition, even though the preferred option (east of the eastern breakwater) occurs within a Marine Protected Area, dispersion modelling has shown that this is likely to result in a lower environmental impact than placing the required infrastructure in the Port of Ngqura or on the western side of the Port. Discharges will potentially become trapped in the Port resulting in accumulation of particulates with associated nutrients and heavy metals. In addition, disposal of effluent inside the Port may impact on Transnet's ability to meet the requirements of their annual Dredge Disposal Permit. According to the 2019 Dredge Disposal Report, the high mud fraction of sediment in the Port reflects its depositional nature and indicates there is a high propensity for the retention and accumulation of particle reactive contaminants introduced in solution to the Port.

Although the required dilutions can be achieved by discharging to the western side of the Port at -10 m CD, particulates could enter the Port, which increases the risk of accumulation of particulates with associated nutrients and heavy metals. If the pipeline is extended to -16 m CD, the achieved dilutions reduce the risk of effluent entering the Port. However, there is still a risk of particulate accumulation in the Port. This is not the case for discharges to the east, as effluent does not enter the port and/or get trapped, it gets diluted and dispersed to within the required Water Quality Standards.

To demonstrate the effectiveness of the marine servitude approach to impact mitigation, we provide a synopsis here of direct and cumulative impacts. A total of seventeen potential marine environmental impacts were assessed for the discharge of effluent to the East of the Port (preferred option), ranging from habitat loss to operational effects. Impacts that had been assessed in other EIAs and marine specialist studies undertaken for particular industries within the Coega SEZ, such as the bio-active compound and disease risks associated with aquaculture, have not been reassessed in this EIA. The impacts of the proposed development on fisheries in Algoa Bay were assessed separately.

Scenario 1 and Scenario 2 were assessed together for construction impact, as the impacts are identical. Three impacts were rated as 'medium' before mitigation (reduced to 'low' or 'very low' after mitigation), and four impacts were rated as 'low' (reduced to 'very low' after mitigation).

Scenario 1 and Scenario 2 were assessed separately under operational impacts. Under Scenario 1, one impact was rated 'very low' and one was reduced to 'insignificant' rating after mitigation. Three impacts were rated 'low' under Scenario 1 (reduced to 'very low', or remaining of 'low' significance after mitigation), while two impacts were rated medium (reduced to 'low' and 'very low' after mitigation). Three impacts were rated of 'high' significance. These 'high' significance impacts were however reduced to 'low' after the implementation of mitigation measures.

There were two impacts rated 'very low' under Scenario 2 and two as 'low' (reduced to 'low', 'very low' or 'insignificant' after mitigation). Two impacts were assessed to be of 'medium' significance, and three were rated as 'high'. Again, mitigation reduced these 'medium' and 'high' impacts to either 'very low' or 'low' after mitigation. All impacts on fisheries are considered 'low' or 'very low' with mitigation.

In terms of cumulative impacts, we have assessed cumulative impacts on both the marine and terrestrial environments, which we have identified as the two valuable environmental and social components (VECs) which are likely to be affected by cumulative impacts (based on IFC, 2013). We have not assessed the cumulative impacts of the airshed as the only emission to consider is dust which will not affected the overall quality of the site in the long-term. It is our conclusion that by defining various water quality limits or thresholds that cannot be exceeded at 300 m from the end of pipe (the recommended mixing zone – RMZ – define din this EIA), cumulative impacts on marine water quality and marine ecological processes are mitigated.

Likewise the Coega OSMP ensures that there is adequate representation of various vegetation types within the SEZ, and through the establishment of ecological corridors avoids, as far as possible, the cumulative impact associated with habitat loss and fragmentation.

We therefore conclude that the establishment of marine servitudes for the intake of sea water and discharge of effluent effectively mitigates site specific and cumulative impacts to acceptable levels.

5.3 Reduced Costs

The development of integrated servitudes would have economic benefits by confining the placement of infrastructure to a dedicated area with the potential for shared infrastructure, thereby reducing costs associated with a network of pipes and pump stations. Similarly, planning requirements would be reduced. This is of particular relevance to the construction of the proposed servitude to the east of the eastern breakwater (preferred option) as opposed to the option of constructing the proposed servitude to the west of the Port.

According to the Environmental Economic Assessment conducted for the proposed development the significance of the capital and operating costs associated with transporting the effluent streams from the east to the west of the Port of Ngqura, varies between industries. The industries that use greater quantities of seawater are more greatly affected by the additional western discharge costs. Once Through Cooling and abalone aquaculture are the most affected due their respective high seawater requirements. They contribute about R6 billion (63%) and R2 billion (21%), respectively, to the total R9.5 billion additional direct cost to transport effluent to the west of the Port.

With respect to the impact on the individual industries, the additional direct cost to transport effluent to the west of the Port represents a significant increase in:

- Discharge costs: ranging from 37% for Wet Mechanical Cooling up to 58% for other streams; and

- Discharge cost as a percentage of total project cost: ranging from 4% for Wet Mechanical Cooling up to over three times (316%) for desalination.

Based on the above, it can be concluded that the additional cost to transport effluent streams will without doubt have a significant impact on the financial viability of the respective industries and other land-based activities, such as the Coega SEZ wastewater treatment facility and desalination plant.

5.4 COOLING WATER

The largest volumes of seawater are required for the cooling of two proposed 1,000 MW water-cooled power plants in Zone 10 of the SEZ, which will enable the CDC to provide tenants with secure access to energy and contributes to the overall energy security of South Africa.

The NMBM (through Eskom) supplies electricity to over 297 000 customers in the NMBM area, and has an annual turnover of approximately R1.8 billion. Eskom supplies an incoming voltage of 132 kV which is then distributed to industrial, commercial and residential consumers. Due to the growing population, the need for basic services such as electricity continues to increase, and thus the backlog is also increasing. As such there is a need to improve, upgrade and provide additional electricity to the region. In order to achieve universal access to electricity, grid and non-grid technologies have to be implemented in line with the National Energy Vision that "*more than 90 percent of the population should enjoy access to grid-connected or off-grid electricity within 20 years*", as well as to implement any other possible technologies based on cost-effective options in order to address current and future backlogs. The provision of electricity from the two proposed 1,000 MW water-cooled power plants in Zone 10 of the SEZ will not be possible without the construction of cooling water intake and warmed water discharge infrastructure.

5.5 SEAWATER DESALINATION

The NMBM is considered to be a water-stressed area. In September 2020, the NMBM declared Day Zero and a number of areas within the NMBM were left without water and needed to be provided with this basic service via a number of water tankers. This situation is exacerbated by poor maintenance of water infrastructure within the NMBM. Based on this, alternative means of providing water, such as the desalination of seawater, have been considered, especially amidst the crisis brought about by the COVID-19 Pandemic that the country is facing currently, with proper sanitation and hygienic practices being of paramount importance to prevent the spread of this pandemic.

It is important to note that it is exceedingly difficult to attract investments to an area that has a shortage of water and/or electricity. The desalination plant will assist the CDC in providing tenants with secure access to fresh water thereby improving its value proposition as a world-class investment location. The utilisation of desalinated water within the SEZ would relieve some of the stress on the NMBM to provide the required amount of fresh water for CDC tenants and industry within the SEZ. The provision of fresh water from the proposed desalination plant in Zone 10 of the SEZ will not be possible without the construction of a seawater intake pipeline, and a brine discharge pipeline.

5.6 LAND-BASED MARINE AQUACULTURE

The establishment of an Aquaculture Development Zone (ADZ) within Zone 10 of the Coega SEZ has been in planning for a number of years. The economic motivation for the establishment of a 440 Ha aquaculture farm, with long-term production targets of over 40,000 tons per annum (finfish, abalone and shellfish) in the ADZ is well described in the CES feasibility study conducted in 2015. The ADZ will provide significant employment opportunities estimated at over 5000 people in the long-term. Consequently, the CDC progressed the ADZ concept and obtained environmental authorization for the development of the ADZ in 2018. Accessing seawater for land-based marine aquaculture is essential, and without this the ADZ is not viable.

5.7 WASTEWATER TREATMENT WORKS (WWTW)

The NMBM has the highest percentage of households with access to flush/chemical toilets compared to other district municipalities in the Eastern Cape. Over 90% of households have access to proper sanitation services. However, the existing WWTW does not have the capacity to handle the increased volumes of waste associated with this infrastructure, which resulted in the need to upgrade the Fishwater Flats WWTW as well as the additional capacity and infrastructure currently being constructed at the Driftsands WWTW. Additionally, significant untreated waste is entering the natural environment. This situation is exacerbated by poor maintenance of infrastructure within the NMBM. This was evident in September 2020, when a blocked drain resulted in sewage spills encompassing 10 houses in Booysens Park, Port Elizabeth. Consequently, additional sewage capacity is required within the NMBM and this will require the discharge infrastructure for treated effluent.

5.8 STORMWATER

The CDC has developed a stormwater master plan for Zone 10 where the stormwater will discharge to three locations on the shoreline. This plan has been developed in conjunction with SANParks in order to ensure that there is minimal impact on the natural environment, in particular, the MPA. Effective stormwater management reduces the amount of overall runoff and polluted runoff by slowing water velocities and allowing it to soak into the sediment and/or disperse into naturally vegetated areas. This results in lower occurrences of soil erosion and fewer pollutants, including sediment, being transported to surface and marine water bodies. The CDC is establishing a land-based stormwater management system for Zone 10, as described in Chapter 2. This environmentally suitable option has been developed as a result of the EIA process contributing to impact mitigation and avoidance.

5.9 ENERGY EFFICIENCY

The first Energy Efficiency Strategy for South Africa was implemented in the year 2005. It was the first consolidated Governmental document that was "*geared towards the development and implementation of energy efficiency practices in this country*" (DME (now DoE), 2005). The National Energy Efficiency Strategy (NEES) was then reviewed and updated in the year 2008. This document was promulgated on 26 June 2009 (Notice 908 of 2009) with the proviso that it be reviewed every 3 years, and this policy is captured within the National Energy Act, 2008 (Act No. 34 of 2008). The need for this strategy to become a legislated implementing strategy was a result of the increased electricity demand over supply that resulted in load shedding being provoked since early January 2008.

In 1998, the White Paper on Energy Policy was published and was the mandating policy used to compile the National Energy Efficiency Strategy. This policy links socio-economic development plans with plans adopted by the energy sector, while also ensuring that other initiatives adopted by Government departments are considered and included. In addition to the above, "*clear and practical guidelines for the implementation of efficient practices within the South African economy, including the setting of governance structures for activity development, promotion and coordination"* has been catered for (DME, 2009). The NEES (2009) aims at providing immediate implementation of interventions in various cost stages (no-cost, low-cost and high-cost), in order to combat the electricity challenges. These interventions include short, -medium, - and long-term investment opportunities in energy efficiency. The vision of the NEES (2009) is not only geared towards improving the cost of energy - but also to reduce the negative effects of energy usage on the environment and human health. In order to achieve the aim and vision of this strategy the following is encouraged:

- Improve sustainable energy developments by considering environmental, social and economic factors.
- Improve energy usage through efficient practices.

The strategy "*sets a national long term target for energy efficiency improvement of 12% by 2015*", assuming that the energy practices and guidelines set out in this strategy are undertaken (DME, 2009).

The carbon footprint associated with pumping seawater from the west of the Port to Zone 10 would be significant over the life of the project and is not in line with South Africa's strategy to mitigate greenhouse gas emissions. The EEIA projected that the carbon footprint for pumping effluent around the Port would amount to 94,608 tCO2e per annum, or 1,892,160 tCO2e over a 20-year period.

5.10 CLIMATE CHANGE

Most (approximately 90%) of South Africa's energy comes from non-renewable sources like coal, petroleum, natural gas, propane, and uranium. It is estimated that approximately only 9% of the country's electricity is currently generated from renewable energy sources. South Africa's total annual carbon emissions were estimated to be 518.24 million tonnes CO_2 (excluding the mitigation effects of forestry and other land uses) in 2010 (GHG National Inventory for SA 2000-

2010, DEA, November 2014). Approximately 83% of these emissions were associated with energy supply and consumption, 7% from industrial processes, 8% from agriculture, and 2% from waste. Gross emissions in 2015 were estimated at 540.85 million tonnes CO_2. Emissions increased slowly over the 15 year period with an average annual growth rate of 1.43%. The Energy sector was the largest contributor (between 78.1% and 81.2%) to gross emissions and was responsible for 84.8% of the increase over the 15 year period. Gross emissions increased by 1.2% between 2012 and 2015. The increase was due to a 0.05% (0.2 million tonnes CO_2), 9.3% (1.7 million tonnes CO_2) and a 7.5% (2.9 million tonnes CO_2) increase in the emissions from the Energy, Waste and IPPU sectors respectively (GHG National Inventory Report for SA, 2000-2015, DEA, 2018).

The South African Government recognises the need to diversify the mix of energy generation technologies within the country, and to reduce the country's reliance on fossil fuels, which contribute towards climate change and are therefore not environmentally friendly. This is in accordance with the prescriptions of the United Nations Convention on Climate Change 1994 (UNFCCC) and its associated Kyoto protocol of 1997. South Africa has put in place a long-term mitigation scenario (LTMS) by which the country aims to develop a plan of action which is economically viable and internationally aligned to the world effort on climate change. During this period (2003-2050) South Africa will aim to take action to mitigate greenhouse gas emissions by 30% - 40% by the year 2050.

The carbon footprint associated with pumping seawater from the west of the Port to Zone 10 would be significant over the life of the project and is not in line with South Africa's strategy to mitigate greenhouse gas emissions. The EEIA projected that the carbon footprint for pumping effluent around the Port would amount to 94,608 tCO2e per annum, or 1,892,160 tCO2e over a 20-year period.

5.11 Summary of Motivation for the Preferred Development Footprint within the Approved Site

Based on the above section (Section 5.1 - 5.10), placing the intake and outfall infrastructure on the eastern side of the eastern breakwater is the preferred option for the following reasons:

- Reduced capital and operating costs
- Lower environmental impact
    - No risk of effluent being trapped in the Port
    - No risk of the project not being economically viable which ultimately would eliminate the need for each investor having to establish their own independent dedicated discharge servitude which will likely have a greater negative environmental impact on Algoa Bay
- Higher energy efficiency
- Lower carbon emissions

6 PUBLIC PARTICIPATION

6.1 OBJECTIVES OF PUBLIC PARTICIPATION

Public Participation aims to:

- Disclose activities planned by the project proponent.
- Introduce the EIA team.
- Identify concerns and grievances from interested and affected parties.
- Harness local expertise, needs and knowledge from the interested and affected parties.
- Respond to grievances and enquiries from I&APs.
- Identify additional or new stakeholders and people affected by, or interested in, the proposed project.
- Gather perceptions and comments on the proposed terms of reference for the specialist studies.
- Ensure that all issues raised by I&APs have, or will be, adequately assessed.
- Share the findings of the EIR and specialists' studies.
- Include any new concerns or comments that arise.

This information is used to:

- Identify underestimated or unanticipated impacts.
- Alert the project to possible communication breakdowns and emerging problems and concerns.
- Encourage the use of local resources and knowledge in the project.
- Identify development opportunities and community projects.
- Ensure that all issues and concerns raised during scoping and in subsequent engagements are dealt with adequately in the EIA process. This is achieved through the preparation of an Issues and Response Trail, also referred to as a Comments Report.

6.2 LEGISLATIVE CONTEXT

According to Section 41(2) of the National Environmental Management Act, 107 of 1998 as amended (NEMA) "*the person conducting a public participation process must take into account any relevant guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of an application or proposed application which is subjected to public participation by—*

(a) Fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of—
(i) The site where the activity to which the application or proposed application relates is or is to be undertaken; and
(ii) Any alternative site."

Action – A site notice has been displayed on the electronic notice board at the Coega Business Centre. The e-notice will be displayed for the duration of the EIA process. This methodology and approach have been agreed to by both DEDEAT and DEFF. The e-notice replaces the site notice because the area in which the development is proposed, is remote and a site notice will not fulfil the intended purpose of the regulations.

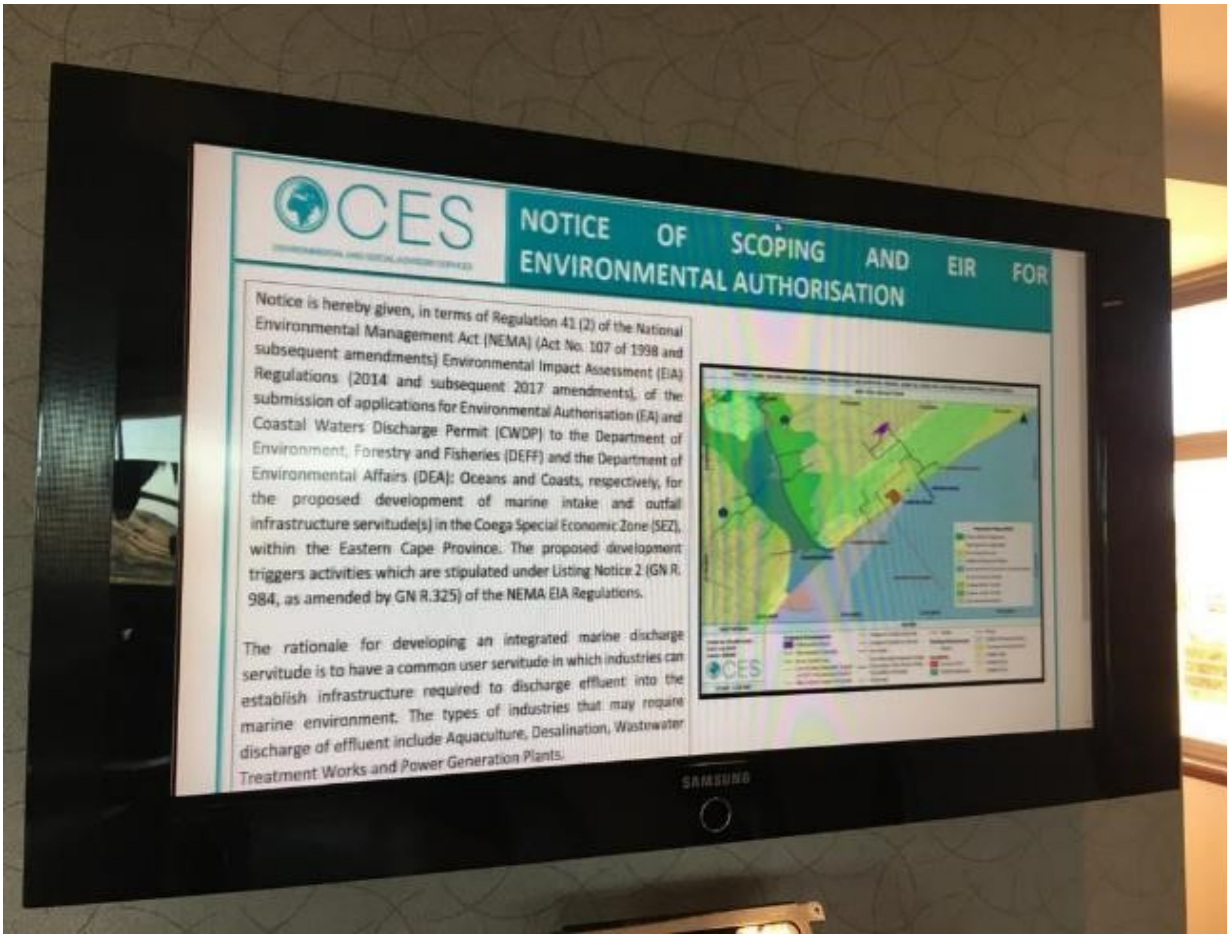

Plate 6.1: Proof of placement of site notice on the electronic notice board at the Coega Business Centre

(b) Giving written notice, in any of the manners provided for in Section 47D of the Act, to—

- *(i) The occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken;*
- *(ii) Owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken;*
- *(iii) The municipal councillor of the ward in which the site and alternative site is situated and any organisation of ratepayers that represent the community in the area;*
- *(iv) The municipality which has jurisdiction in the area;*
- *(v) Any organ of state having jurisdiction in respect of any aspect of the activity; and*

(vi) Any other party as required by the competent authority.

Action -

Landowners and Occupiers:

The CDC (the applicant) owns the majority of the land on which the development is proposed. The names and contact details of those who lease land from the CDC has been provided to CES by the applicant and included in a stakeholder database. These lessee's have been provided with a background information document via e-mail (as all identified I&APs at this stage of the project have access to e-mail). One of the seawater intakes is proposed inside the Port of Ngqura, which is owned by the Transnet National Ports Authority (TNPA). As the application is for a linear activity, written consent is not required. However, the TNPA has been included in the stakeholder database compiled by CES and have been notified of the proposed development via email notification, inclusive of a letter of notification and Background Information Document (BID). The CDC has also notified the TNPA, via its environmental co-management structure, of the project and associated environmental assessment process. TNPA is also a member of the Environmental Liaison Committee (ELC) where environmental applications underway are presented and discussed.

The remainder of the project area forms part of Coastal Public Property and is therefore state owned. DEA: Oceans and Coasts is directly involved with the proposed project as an Application for a Coastal Waters Discharge Permit (CWDP) is required for the discharge of treated effluent into the marine environment. The previous application submitted to DEA: Oceans and Coasts received a reference number (2014/008/EC/Coega IDZ) on the 24th of April 2014. This application number remains valid; however, the application has been updated to reflect the most recent information.

All other stakeholders and Interested and Affected Parties (I&APs) were notified of the development by means of a **phone call, sms and/or email notification**, inclusive of a letter of notification and Background Information Document (BID).

Adjacent Landowners and Occupiers:

As above. Additionally, a newspaper advertisement was placed in a local newspaper (The Herald) on the 13th of November 2020 and an electronic site notice has been displayed on the CDC's electronic notice board in the foyer of the Coega Business Centre.

Municipal councillor of the ward:

Cllr Nomazulu Mthi (Cllr Ward 53) and Cllr Mvuzo Ernest Mbelekane (Cllr Ward 60) of the Nelson Mandela Bay Municipality (NMBM) have been informed of the proposed development **telephonically (via sms) as well as via email notification**, inclusive of a letter of notification and BID.

Municipality:

Ngaba Bhanga (Executive Mayor) and Mandla George (Municipal Manager) of the NMBM were notified of the proposed development **telephonically (via sms) as well as** via email notification, inclusive of a letter of notification and BID. The NMBM is represented on the Coega Environmental Liaison Committee (ELC), the members of which are key stakeholders in all CDC's EIA applications.

Organs of State:

All organs of state applicable to the proposed development have been included in the stakeholder database compiled by CES (refer to Appendix 2 for a detailed list of stakeholders).

The advertisement and electronic site notice provided any additional individuals with the project information and the opportunity to register on the stakeholder database. All documentation (electronic site notice, advertisement, BID, notification e-mails, etc.) included a telephone number, postal address, e-mail address as well as a web address of the EAP in order to ensure that all means possible are available to stakeholders to register on the database and to provide comments on the project.

(c) Placing an advertisement in:
- *(i) One local newspaper; or*
- *(ii) Any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;*

(d) Placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii); and

Action – A Newspaper advertisement was placed in The Herald, a locally and provincially distributed newspaper, on the 13th of November 2020 (Plate 6.2) in order to notify the general public of the submission of the application for Environmental Authorisation, as well as the availability of the Draft Scoping Report for a thirty (30) day public review period. The advertisement included a brief description of the proposed project, the main listed activities which are triggered by the proposed project, and the contact details of the EAP (phone number, e-mail address, web address and postal address). The advertisement also encouraged potential I&APs to register on the project I&AP Database and provide information on how to register as an I&AP (Plate 6.2). A similar newspaper advertisement was placed in The Herald on the 7th of April 2021 to notify all I&APs of the availability of the Draft EIR (Plate 6.3).

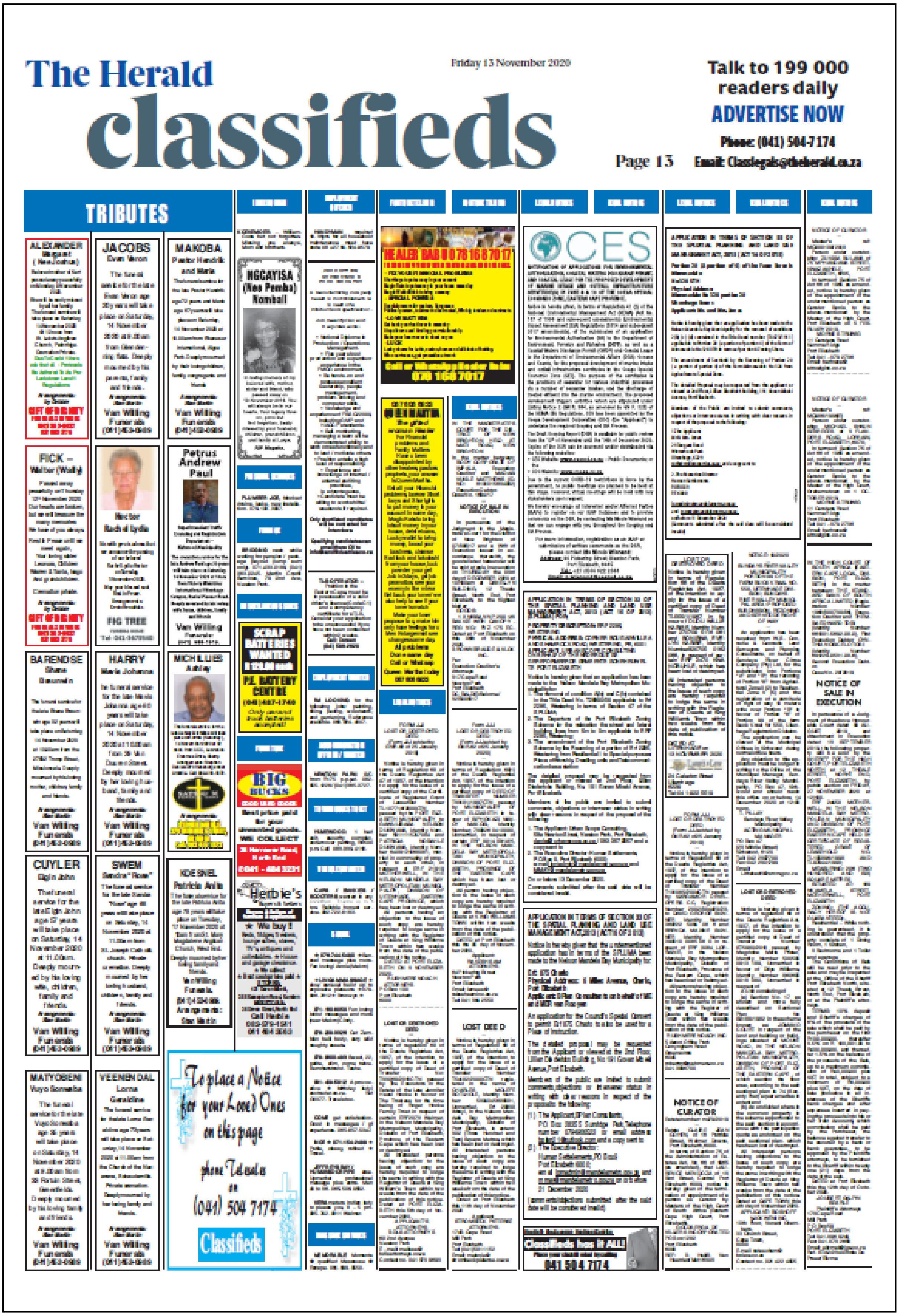
The Herald
classifieds
Friday 13 November 2020
Page 13
Talk to 199 000 readers daily
ADVERTISE NOW
Phone: (041) 504-7174
Email: Classlegals@theherald.co.za
TRIBUTES
CES

Plate 6.2: Newspaper advertisement placed in the Herald on the 13th of November 2020.

The Herald classifieds

Wednesday 7 April 2021

Page 13

Talk to 199 000 readers daily

ADVERTISE NOW

Phone: (041) 504-7174

Classlegals@theherald.co.za

ENGAGEMENTS

STICKELLS — WILLIAMS
Brian and Maree have pleasure in announcing the engagement of their youngest daughter, Jennie to Corbin, son of Charmaine and the late Wayne Williams.

DEATHS

PENFORD — Jack Dougher of Bill and Helen on 24th April, will be sadly missed by family and friends. Good-bye my darling, you were my rock since mom passed away. RIP love dad.

IN MEMORIAM

de Vega
Rhona.
In loving memory of our precious mother, wife and grandmother, 11 Years today.
Miss you always.
William, Tracey, Shaheen, Lavish and Lawyan.

FREEMAN ARTHUR
In loving memory of a wonderful husband, dad and grandpa. Gone 13 years, but forever in our hearts.
Jane and family.

NOTICES

BOAT
Attention: will the owner of a galvanized trailer, with an open boat and license number PVF 176 EC urgently contact:
Johan Botha
082-893-5093

FINANCE

BRIDGING CASH while waiting for pension / package payout! Lump sum only). 071-453-0186, (041) 363-4245. Martin Credit Services, 79 2nd Ave, Newton Park.

FURNITURE

BIG BUCKS
GOOD USED GOODS
Best price paid for your unwanted goods.
WE COLLECT
28 Harrower Road, North End
© 041 - 484 3231

Herbie's
Buyers & Sellers
Furniture & Household Goods & Appliances
★ We buy!! ★
Beds, fridges, freezers, lounge suites, stoves, TV's, antiques and collectibles. ★ House and garage clearance. ★ We collect.
★ Best cash prices paid ★
AUTOPEC
421 Govan Mbeki, 5B Kenyston Road, Korsten
NEW STORE:
36 Green Street, North End
Call Herbie
082-579-1541
041 484 3563

USED CAR SALES

CARS / BAKKIES / SCOOTERS wanted in any condition. Trucks up to 8 ton. Reliable honest service. 082-722-4183.

SOCIAL

★ 071-160-9260 ★ Fun loving blond massages and more (near Makro) Cindy.

★076-744-5460★ Divine sensual massage plus so much more! Ami (Malani).

079-209-9328 Sassy babe very wild naughty, tight assets, kiss, play.

INGE ★ 071-154-2469 ★ Petite, classy, refined ★ Travel.

EMPLOYMENT OFFERED

IMIZI HOUSING

Imizi Housing Utility is a non-profit Social Housing Company dedicated to the provision of affordable rental accommodation in the Nelson Mandela Metro.

CARETAKER

DEPARTMENT: PROPERTY MANAGEMENT
LOCATION: WALMER LINK
REPORT TO: PROPERTY MANAGER

JOB PURPOSE:
To oversee the management of the building including management of relationships with tenants, collection of rentals, leasing of units, maintenance of the building and client service duties.

KEY PERFORMANCE AREAS:
- Assist prospective tenants.
- Facilitate viewing of rental units by prospective tenants.
- Welcome and induct new tenants.
- Complete pre occupation checklist.
- Attend to letting in of new tenants.
- Attend to routine maintenance with maintenance staff.
- Liaise with maintenance service providers.
- Inspect buildings and identify problems.
- Distribute rental statement, demand letters and other related mail.
- Follow up on tenants in arrears.
- Attend and resolve tenant complaints.
- Address any minor social issues in the building.
- Address any minor social issues in consultation with the security service provider.

QUALIFICATIONS & EXPERIENCE:
- Certified copies of matric certificate.
- Certified copies of relevant qualifications in building management will be advantageous.
- Minimum of 2 years' experience in Caretaker role at commercial/retail property or social rental property.

KNOWLEDGE:
The incumbent must have working knowledge of: Asset Management, Default Management, Eviction Management, Lease Agreement Management, Maintenance Management and Safety & Security.

SKILLS:
The incumbent must possess:
Communication skills, facilitation skills, conflict management, relationship management, teamwork & professionalism.

If you believe that you have what it takes to assume this role then please send your CV and covering letter to: admin@imizi.co.za or admin@imizi.co.za.

Only shortlisted candidates will be contacted. No telephonic applications will be considered.

Closing date for applications: 16 April 2021 @ 13h00

MFT
Medical Forum Theatre Day Hospital

Vacancy: Human Resources Officer
Port Elizabeth

Applications are invited from suitably qualified & experienced candidates who would like to become part of our Finance Team at our state-of-the-art Day Hospital.

Minimum Requirements:
- Degree or National Diploma in Human Resources Management
- High Level of Computer Skills: MS Excel, MS Word and Pastel Payroll
- Sound knowledge of Employment and Labour Legislation
- Previous Time and Attendance systems administration is preferable
- Clean and Clear Credit and Criminal Record
- Previous experience in a Private Hospital will be an advantage

Key outputs:
The Human Resources Officer is responsible for the full personnel, payroll, time and attendance administration and employee relationship function:
- Providing advice and assistance to Department Managers and all staff
- Administering all admin processes in terms of Recruitment, Induction, Internal Relations, Training, Leave and Payroll and record keeping including staff files
- Attending to leave administration and return to work interviews
- Attending to quarterly overtime administration and record keeping
- Compiling and submitting reports to external institutions e.g., SETA, SA, Department of Employment and Labour etc. when required
- Attending to Employment Equity and HWSETA matters and annual returns
- Disciplinary processes and related record keeping
- Assisting with Occupational Wellness initiatives
- Review practices to ensure statutory compliance
- Manage daily office duties and any other ad hoc duties as they arise

We offer a highly competitive package including 13th cheque and Company benefits
Closing date: 14 April 2021
Email a brief CV to: liana@eyeandfaceme.com

LEGAL NOTICES

LOST TITLE DEED

Notice is hereby given in terms of Regulation 68 of the Deeds Registries Act, 1937, of the intention to apply for the issue of a certified copy of Deed of Transfer Number T93/2009 CTN passed by FIONA DAWNE TIMM (formerly Porter), Identity Number: 5411 19 0075 08 9 in favour of PETRI PIVARIUS HEIRDEN, Identity Number 5610015048 08 5 as well as VA465/2000 TCTN in respect of certain:
ERF 611 BOKS-MANSRIVIERMOND in the Nelson Mandela Local Municipality, Division of Alexandria, Province of the Eastern Cape.
In extent: 1061 (One Thousand and Sixty One) square metres which has been lost or destroyed.
All persons having objection to the issue of such copy are hereby required to lodge the same in writing with the REGISTRAR OF DEEDS at KING WILLIAMS TOWN within two weeks after the date of the first publication of this notice.
Dated at Port Elizabeth on 1 February 2021.
Applicant
WILHELM MALAN DE KOCK
C/O PAGENING ATTORNEYS
10 Castle Hill, Central
Port Elizabeth
E-mail: lee@pagiens.co.za
Tel: 041-5027200

LEGAL NOTICES

Form JJJ
LOST OR DESTROYED TITLE DEED

Notice is hereby given in terms of Regulation 68 of the Deeds Registries Act, 1937, of the intention to apply for the issue of a certified copy of DEED OF CONSOLIDATED TITLE NUMBER T93/2009 CTN passed by DIE NEDERDUITSE GEREFORMEERDE GEMEENTE POORT ELIZABETH-SON HEUWELS TE WESTERING in respect of certain ERF 2157 WESTERING, IN THE NELSON MANDELA BAY METROPOLITAN MUNICIPALITY, DIVISION OF PORT ELIZABETH, PROVINCE OF THE EASTERN CAPE which has been lost or destroyed.
All person having objection to the issue of such copy are hereby required to lodge the same in writing with the Registrar of Deeds at KING WILLIAMS TOWN within two weeks after the date of the publication of this notice.
DATED at PORT ELIZABETH this the 26th day of MARCH 2021.
PETRUS IGNATIUS VAN ROOYEN
57 Sixth Avenue
Newton Park
Port Elizabeth
6045
Email: lynn@moyen.co.za
Tel: 041 365 2844

LEGAL NOTICES

CES

NOTIFICATION OF APPLICATIONS FOR ENVIRONMENTAL AUTHORISATION, COASTAL WATERS DISCHARGE PERMIT AND COASTAL LEASE FOR THE PROPOSED DEVELOPMENT OF MARINE INTAKE AND OUTFALL INFRASTRUCTURE SERVITUDES IN ZONE 8 & 16 OF THE COEGA SPECIAL ECONOMIC ZONE, EASTERN CAPE PROVINCE.

Notice is hereby given, in terms of Regulation 41 (2) of the National Environmental Management Act (NEMA) (Act No. 107 of 1998 and subsequent amendments) Environmental Impact Assessment (EIA) Regulations (2014 and subsequent 2017 amendments), of the submission of an application for Environmental Authorisation (EA) to the Department of Environment, Forestry and Fisheries (DEFF), as well as a Coastal Waters Discharge Permit (CWDP) and Coastal Lease to the Department of Environmental Affairs (DEA): Oceans and Coasts, for the proposed development of marine intake and outfall infrastructure servitudes in the Coega Special Economic Zone (SEZ). The purpose of the servitudes is the provision of seawater for various industrial processes via a number of seawater intakes, and the discharge of treated effluent into the marine environment. The proposed development triggers activities which are stipulated and/or Listing Notice 2 (GN R. 984, as amended by GN R. 325) of the NEMA EIA Regulations. CES has been appointed by the Coega Development Corporation (CDC) (the "Applicant") to undertake the required Scoping and EIA Process.

The Draft Environment Impact Assessment Report (EIAR) is available for public review from the 7th of April until the 10th of May 2021. Copies of the Draft EIAR can be accessed and/or downloaded via the following websites:

- CES Web site: www.cesnet.co.za – Public Documents; or the
- CDC Web link: www.coega.co.za

Due to the current COVID-19 restrictions in force by the government, no public meetings are planned to be held at this stage. However, virtual meetings will be held with key stakeholders upon request.

We hereby encourage all interested and/or Affected Parties (I&APs) to register on our I&AP Database and to provide comments on the Draft EIAR, by contacting Ms Nicole Wienand so that we can engage with you throughout the EIA Process.

For more information, registration as an I&AP or submission of written comments on the Draft EIAR, please contact Ms Nicole Wienand:
Address: 97 African Street, Grahamstown, 6139
Tel.: +27 (0)46 622 2964 Email: n.wienand@cesnet.co.za

FORTUNE TELLING

THANK YOU
FATHER MATTHEW
083-708-3936

Hello a few years back I was in at a low point in my life. I was broke, alone and unhappy. I couldn't deal with everything life was throwing my way. That all changed when I found a powerful Man of God Mathew. I was sceptical, not sure. If I was on the right path but decided to give him a try. That decision was my Turning Point. The first visit exceeded my expectation, he showed me how to take control of my own destiny and gave me a deeper insight onto my life's path, everything started to fall in place after I began following his instructions and for the first time ever I felt in control of my own destiny. My love life changed, my finances were finally open that now I'm a proud owner of a very lucrative business. I have Joy, Love, Happiness and Wealth. It's because of Father Mathew that I am now in full control of my life. Take action now, call him, he will transform your life.
His results are immediate and effective.

Call FATHER MATTHEW
083-708-3936

CLASSIFIED INFO
Did you know?
For BIG results, go SMALL!
☎ (041) 5047-174

CLASSIFIED (041) 504 7174

LEGAL NOTICES

NOTICE IN RESPECT OF A LICENSE APPLICATION IN TERMS OF THE PETROLEUM PRODUCTS ACT, 1977 (ACT NO 120 of 1977)

This notice serves to inform parties that may be interested or affected that BENTSMART (PTY) LTD, hereinafter referred to as "the applicant", has submitted an application for a RETAIL license, application number:
B/2021/03/29/0001
ERF 2736
11 RINK STREET
CENTRAL
PORT ELIZABETH
The purpose of the application is for the application to be granted a license to undertake petroleum retailing activities as detailed in the application. Arrangements for viewing the application documentation can be made by contacting the Controller of Petroleum Products at:
- Telephone: 043 703 6900; or
- Fax: (086) 603 0963; or
- Email: Labuschagn.Mabena@dtime.gov.za

Any objections to the issuing of a license in respect of this application, which must clearly quote the application number above, must be lodged with the Controller of Petroleum Products within a period of twenty (20) working days from the date of publication of this notice. Such objection must be lodged at the following physical or postal address:
Physical Address:
The Controller of Petroleum Products
Department Mineral Resources & Energy
13 Phillip Frame Road
1st Floor, Chiselhurst
East London, 5247
Postal Address:
The Controller of Petroleum Products
Department Mineral Resources & Energy
Private Bag X13001
Cambridge,
East London, 5206

EMPLOYMENT WANTED

I'M KINNEDY a Malawian guy is looking for any job, cleaning etc. Humble and honest Christian person. Call 087-286-8604.

I'M LOOKING for a job code 14 with PDP and Hazchem long distance and cross border, age 47 years. Call 064-935-7485.

REP met Jane ondersteuning is op soek na werk. Tel. 071-736-6585.

EMPLOYMENT WANTED CONTD

FEMALE is looking for 5 days sleep out. Good with children, honest and hard worker.

EMPLOYMENT OFFERED

ALPHA cable looking for controllers, for more info. contact Alfa at 073-014-6542 / 064-208-3848.

FORTUNE TELLING

RESTART YOUR LIFE
Money problems, Free your self from the Financial stress, Personal Cleansing, Family Issues, Bedroom problems, Bring back lost lover.
DR. JOSEPH
073 793 7588

Sovereign
FULL OF GOODNESS

Sovereign is a nation of supplier of top quality chicken products to various markets traveling to employ the following positions for its operations in the Eastern Cape and Gauteng.

SENIOR PRODUCTION MANAGER: FEEDMILL
PRETORIA & KARIEGA (UITENHAGE)
The Agriculture division is looking to employ a **Senior Production Manager: Feedmill** for its operations in Pretoria and Kariega (Uitenhage). The incumbent will be responsible for the production of feed by applying world class practices. This must be done within specifications and delivered as per order requirements at the lowest cost to achieve the desired feed conversion rate.
Requirements: A relevant tertiary qualification in Animal Poultry Sciences, Feed Production or Feed Production Engineering, Mechanical Engineering or a qualification from a recognised feed milling Institute. Ten years experience in feed production and/or maintenance and a minimum of 5 years experience in a production management position with related plant maintenance and a proven track record of driving efficiencies and increasing production output whilst controlling costs.

DIVISIONAL FINANCIAL MANAGER: AGRICULTURE
KARIEGA (UITENHAGE)
The Agriculture division is looking to employ a **Divisional Financial Manager: Agriculture** for its operations in Kariega (Uitenhage). The incumbent will manage and oversee the financial activities of the Agriculture division through highlighting variances to standard as well as identifying potential areas of improvement across the Agriculture division.
Requirements: A relevant BCom degree plus ACCA, CIMA or equivalent qualification, 7 years experience in financial management, budget processes and cost control at a senior level, including experience in managing a team and a high degree of computer literacy.

IT TECHNICIAN
KARIEGA (UITENHAGE)
The Group Services division is looking to employ a **IT Technician** for its operations in Kariega (Uitenhage). The incumbent will be responsible for responsible for all IT Hardware, Software and Network infrastructure across the company, support and training.
Requirements: A relevant tertiary qualification in Information Technology or related, 2 to 3 years experience in Information Technology support and/or system administration and a valid drivers license. MCSE will be advantageous.

CLOSING DATE 14 APRIL 2021

As Sovereign is an equal opportunity employer, preference will be given to applicants of designated groups, as defined by the Employment Equity Act. Appropriately qualified and experienced individuals should submit a detailed CV, copies of relevant certificates and a copy ID to the HR Department on avashteam@sovfoods.co.za. If you have not heard from us after 30 days, please consider your application to have been unsuccessful. For more information on Sovereign visit www.sovereignfoods.co.za

SUNDAYS RIVER VALLEY LOCAL MUNICIPALITY

SUPPLY AND DELIVERY OF TWO WATER CARTING TRUCKS
BID INVITATION
SRVM-012/2021

Sundays River Valley Municipality invites bids from interested suitable service providers for the supply and delivery of two water carting trucks.
Completed Bids are to be placed in a sealed envelope endorsed **SUPPLY AND DELIVERY OF TWO WATER CARTING TRUCKS-SRVM-012/2021** and must be deposited in the Bid Box, at the offices of the Sundays River Valley Municipality, Supply Chain Office, 23 Middle Street, Kirkwood not later than **16 April 2021 at 12h00PM.**

NB: The bidders must also attach pictures of the trucks which they will be delivering in their proposals when submitting them.

PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT 2011 (PPPFA) POINTS WILL BE AWARDED AS 80/20 points

SUPPLIERS/SERVICE PROVIDERS SHALL TAKE NOTE OF THE FOLLOWING BID CONDITIONS:
(a) Sundays River Valley Municipality Supply Chain Management Policy will apply;
(b) Sundays River Valley Municipality does not bind itself to accept the lowest BID or any other BID and reserves the right to accept the whole or part of the BID;
(c) Bids which are late, incomplete, unsigned or submitted by facsimile or electronically, may not be accepted.
(d) Price(s) quoted must be valid for at least ninety (90) days from date of your offer.
(e) Price(s) quoted must be firm and must be inclusive of VAT.
(f) A firm delivery period must be indicated.
(g) **The following compulsory documents must be submitted with the tender**
1. Valid Tax Clearance Certificate- OR Status Pin.
2. Original BBBEE Certificate **OR** certified copy.
3. Certified ID Copies of Entity's Director(s)
4. Completed MBD forms -1, 4, 6.1, 8 & 9.
5. Company registration Documents.
6. Municipal statement of Rates or Billing Clearance not older than three months.
(H) Suppliers must be registered on the Central Supplier Database.

Failure to submit any of the above requested documents will invalidate your Bid and it will not be evaluated further.

Technical Enquires related to this Bid can be directed to: vuyanim@srvm.gov.za 066 297 4826

SCM Enquires related to this Bid can be directed to: patuxolob@srvm.gov.za 042 230 7743

A detailed specification and bid forms can be downloaded from the Sundays River Valley Municipality website or E-tender website or can be requested from SCM Office patuxolob@srvm.gov.za or vuyob@srvm.gov.za or scm@srvm.gov.za or zimasatomsar@gmail.com or ngwanepooh1@gmail.com OR 042 230 7777/8/43

Mr. D.M. Pillay
Acting Municipal Manager
06/04/2021

SUNDAYS RIVER VALLEY LOCAL MUNICIPALITY

SUPPLY AND DELIVERY OF HONEY SUCKING AND JETTING TRUCK
BID INVITATION
SRVM-013/2021

Sundays River Valley Municipality invites bids from interested suitable service providers for the supply and delivery of Honey Sucking and Jetting Truck.
Completed Bids are to be placed in a sealed envelope endorsed **SUPPLY AND DELIVERY OF HONEY SUCKING AND JETTING TRUCK -SRVM-013/2021** and must be deposited in the Bid Box, at the offices of the Sundays River Valley Municipality, Supply Chain Office, 23 Middle Street, Kirkwood not later than **16 April 2021 at 10h00AM.**

NB: The bidders must also attach pictures of the trucks which they will be delivering in their proposals when submitting them.

PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT 2011 (PPPFA) POINTS WILL BE AWARDED AS 80/20 points

SUPPLIERS/SERVICE PROVIDERS SHALL TAKE NOTE OF THE FOLLOWING BID CONDITIONS:
(a) Sundays River Valley Municipality Supply Chain Management Policy will apply;
(b) Sundays River Valley Municipality does not bind itself to accept the lowest BID or any other BID and reserves the right to accept the whole or part of the BID;
(c) Bids which are late, incomplete, unsigned or submitted by facsimile or electronically, may not be accepted.
(d) Price(s) quoted must be valid for at least ninety (90) days from date of your offer.
(e) Price(s) quoted must be firm and must be inclusive of VAT.
(f) A firm delivery period must be indicated.
(g) **The following compulsory documents must be submitted with the tender**
1. Valid Tax Clearance Certificate- OR Status Pin.
2. Original BBBEE Certificate **OR** certified copy.
3. Certified ID Copies of Entity's Director(s)
4. Completed MBD forms -1, 4, 6.1, 8 & 9.
5. Company registration Documents.
6. Municipal statement of Rates or Billing Clearance not older than three months.
(H) Suppliers must be registered on the Central Supplier Database.

Failure to submit any of the above requested documents will invalidate your Bid and it will not be evaluated further.

Technical Enquires related to this Bid can be directed to: vuyanim@srvm.gov.za 066 297 4826

SCM Enquires related to this Bid can be directed to: patuxolob@srvm.gov.za 042 230 7743

A detailed specification and bid forms can be downloaded from the Sundays River Valley Municipality website or E-tender website or can be requested from SCM Office patuxolob@srvm.gov.za or vuyob@srvm.gov.za or scm@srvm.gov.za or zimasatomsar@gmail.com or ngwanepooh1@gmail.com OR 042 230 7777/8/43

Mr. D.M. Pillay
Acting Municipal Manager
06/04/2021

nelson mandela bay MUNICIPALITY

TENDERS

Tenders are invited for the following:

Documents for the following tenders can be obtained at the applicable non-refundable amount per set at Supply Chain Management Tender Office, Harrower Road North End, Port Elizabeth 6001, fax 041 5061969, tel. 041 506 7531, or by prior notification from the Uitenhage Supply Chain Management Office, 17 Selkirk Street, Uitenhage, tel. 041 994 1111.

This after payment has been made in Port Elizabeth at the cashiers, Mfanasekhaya Gqobose Building (formerly Eric Tindale Building), Govan Mbeki Avenue or in Uitenhage at the Treasury Office, Market Street.

When payment is made, please quote the following information:

On cash/cheque payment: Vote 10015477 69
On bank transfer payment: Bank account number: 4079533826, Code 632005
Account name: N.M.B.M. – Deposit Account/Primary Deposit account
Bank: ABSA Bank, P.E.
Reference: Vote 10015477 69

Proof of payment must be provided.

TRI-ANNUAL TENDERS

Period: Tenders are invited for a 12 – 36 months' period.

SCM No.	Services/Goods/Other – Value exceeding R1 000 000,00 including VAT	Tender Fee
SCM/19-347/S	SUPPLY, DELIVERY, INSTALLATION AND MAINTENANCE OF A FLOOR STANDING, FRONT LOADING 200L HORIZONTAL AUTOCLAVE Validity period: 90 days	R432
SCM/19-338/S	SUPPLY, DELIVERY, INSTALLATION, COMMISSIONING AND MAINTENANCE OF A LABORATORY GLASSWARE WASHING MACHINE Validity period: 90 days	R432
SCM/20-57/S	PRINTING AND MAILING OF MONTHLY STATEMENTS Validity period: 90 days	R616

All tenderers must be registered on the Municipality's supplier's database through NMBM database. The Municipality reserves the right not to consider the tenders of tenderers not registered on the Nelson Mandela Bay Municipality's supplier's database. Please phone NMBM database 041 – 5063274/3266 to register, if not yet registered.

Tenderers arriving 10 minutes late will not be allowed into a clarification meeting.

SUBMISSION AND OPENING OF TENDERS

Tenders must reach the Municipality by not later than 11:00 on THURSDAY, 03 JUNE 2021.

The tenders in sealed envelopes, clearly stating the contract number and description, must be placed in the tender box at either the Supply Chain Management Offices, Harrower Road, North End, or at the Municipal Offices, Market Street, Uitenhage between 8:00 and 16:00 weekdays.

Tenders will be publicly opened simultaneously in the boardroom, Supply Chain Management Office, Harrower Road, North End, Port Elizabeth and the Conference Room, first floor, Municipal Offices, Market Street, Uitenhage, shortly after 11:00 on Thursday, 03 June 2021.

The Council does not bind itself to accept the lowest or any tenders and late tenders will not be accepted.

The Council promotes the use of previously disadvantaged small and medium contractors. Details of the preference formula appear in the Supply Chain Management Policy of the Municipality and can be obtained from the Director: Supply Chain Management, Harrower Road, North End, Port Elizabeth.

As per Section 22(1)(b)(i) of the SCM Policy, bids may be submitted only on the original stamped bid documentation provided by the NMBM, and the date, time and venue of any compulsory site meeting or briefing session as per Section 22(1)(b)(ii) of the SCM Policy and Section 22(1)(b)(iv), a bid from a prospective bidder who did not attend a prescribed compulsory site meeting or briefing session referred to in subparagraph (ii) will not be considered.

ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS PROVIDED BY THE MUNICIPALITY – NOT TO BE RE-TYPED OR COPIED.

MEMBERS OF THE PUBLIC MUST PLEASE NOTE THAT ACCESS TO THE OPENING OF TENDERS WILL BE LIMITED, TO ALLOW FOR PRESCRIBED SOCIAL DISTANCING PROTOCOL IN TERMS OF LOCKDOWN REGULATIONS.

Ref. 63 – 07 April 2021

Under the hand of the Acting City Manager, Mr. Mandla George

THE CITY IS DRY! SAVE WATER TO BEAT COVID-19!

BUZZ PROJECTS 0137

Plate 6.3: Newspaper advertisement placed in the Herald on the 7th of April 2021.

(e) Using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desirous of but unable to participate in the process due to-

(i) Illiteracy;
(ii) Disability; or
(iii) Any other disadvantage.

Action –

Based on information available to date, all stakeholders can be notified either telephonically or via e-mail or both. Due to the current COVID19 restrictions in force by the government no public meetings are planned to be held at this stage. However, **virtual meetings have been held with key stakeholders upon request** (such as the virtual meeting conducted with SANParks on the 8th of December 2020 and the 3rd of May 2021; Oceans and Coasts on the 11th of April 2021.). Virtual platforms such as Zoom and Microsoft Teams are currently being used successfully to conduct virtual meetings. Both of these applications allow for the recording of these meetings, and these recordings are then available for download. In addition, five (5) Environmental Liaison Committee (ELC) meetings have been conducted successfully on a virtual platform. In addition, to ensure full coverage of potential I&APs a number of Background Information Documents were delivered to the Ward Councillor's offices for distribution amongst the community. No radio advertisements have been run on local news stations as this is not required, since the closest community to the CDC is approximately 7 km to the west (Motherwell).

In accordance with Section 42 of the EIA Regulations "*a proponent or applicant must ensure the opening and maintenance of a register of interested and affected parties and submit such a register to the competent authority, which register must contain the names, contact details and addresses of-*

(a) All persons who, as a consequence of the public participation process conducted in respect of that application, have submitted written comments or attended meetings with the proponent, applicant or EAP;
(b) All persons who have requested the proponent or applicant, in writing, for their names to be placed on the register; and
(c) All organs of state which have jurisdiction in respect of the activity to which the application relates."

Action - Contact details of all stakeholders who have been identified, and/or who have registered as I&APs on the proposed project, are provided in Appendix 2.

6.3 PUBLIC PARTICIPATION TO DATE

6.3.1 Notification of interested and affected parties

At the commencement of the project CES conducted a WINDEED search to compile a list of all landowners within the site, and landowners adjacent to the site. In addition, CES compiled an extensive stakeholder database based on the two previous applications conducted for the proposed project, legislative requirements and correspondence with the applicant (CDC). All landowners, adjacent landowners, stakeholders and previously registered I&APs were notified

of the proposed development via phone calls, sms and/or e-mail correspondence. This notification was accompanied by a background information document.

Members of CES attended two ELC meetings to present the proposed project.

6.3.2 Draft Scoping Report Public Review

Scoping was initiated using the stakeholders identified above as a starting point. Public participation during the Draft Scoping Report review period focused on providing information on the new project and gathering stakeholders' views on the proposed terms of reference for the EIA specialist studies, to identify additional or new I&APs, and to gather perceptions and comments on the proposed terms of reference for the specialist studies.

An advertisement was placed in The Herald on the 13th of November 2020 (refer to Plate 6.2 included above) announcing the availability of the draft scoping report for public review as well as a brief description of the proposed project, the main listed activities which are triggered by the proposed project, and the contact details of the EAP (phone number, e-mail address, web address and postal address).

Notification emails, as well as cell phone messages (sms) and/or phone calls were sent/made to registered I&APs as well as key stakeholders on the 13th of November 2020 (Appendix 2). These notifications informed I&APs that the Draft Scoping Report was available for review and that it could be found on both the CES and the CDC websites. The notifications also stipulated that the review period for comment was from 13 November until 14 December 2020. All comments received to date, either via emails, SMS's or as written correspondence have been included in an Issue and Response Trail (inclusive of responses thereto) and were incorporated into the Final Scoping Report that was submitted to DEFF for decision making purposes on the 15th of January 2021 and was approved by the authorities on the 24th of February 2021. Comments from the DEFF, in regard to what needed to be included in the EIAR have been incorporated into Table 6.1.

Consultations were held with a range of I&APs at national, provincial, district and local level (at an additional ELC meeting). In addition, a virtual meeting was conducted with SANParks on the 8th of December 2020 to discuss their comments, queries and the recommendations made in the Draft Scoping Report. A site visit was also conducted on the 4th of February 2021 with SANParks representatives, the CDC and their engineers, as well as the EAP in order to discuss alternative stormwater options. This was deemed essential as SANParks are a key IAP and role-player in the area. All efforts were made to follow a broad and inclusive consultation process to ensure that new I&APs are identified and included in the EIA process.

Comments received thus far (inclusive of historical comments on previous applications) were incorporated into an Issues and Response trail included as Appendix 3 to this application.

In addition, all I&APs were notified of the submission of the Final Scoping Report to the authorities and of the availability of this report on the CDC and CES websites. No additional comments were received.

6.3.3 Draft EIA Report Public Review

The EIR phase was initiated using the stakeholders identified above as a starting point. Public participation during the Draft EIR review period focussed on providing information on the project and gathering stakeholders' views on the Draft EIR, Draft EMPrs and Specialist Assessments, to gather perceptions and comments on the results of the specialist studies, and the content of both the EIAR and EMPrs.

An advertisement was placed in The Herald on the 7th of April 2021, announcing the availability of the Draft EIR for public review.

Notification emails, as well as cell phone messages (sms) and/or phone calls were sent/made to registered I&APs as well as key stakeholders to inform I&APs that the Draft EIR and associated documents were available for review. The notifications also stipulated the dates of the review period. All comments received, either via emails, SMS's or as written correspondence have been included in an Issue and Response Trail (inclusive of responses thereto) which has been included in this Final EIAR (refer to Table 6.1 for comments received on the Draft EIR and Appendix 3 for comprehensive table inclusive of all comments received to date on the application). Amendments and corrections to the draft Specialist Reports, EIAR and EMPr have been made to address comments on the draft documents received from IAPs. No substantial changes were required. The EIR was also presented at two ELC meetings on the 11th of February and the 20th of May 2021 as well as to SANParks on the 3rd of May 2021.
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Table 6.1: Issues and Response Trail – Draft EIR

I&AP	COMMENT	RESPONSE
COMMENTS RECEIVED FROM ELC MEMBERS ON THE 18TH OF FEBRUARY 2021		
Andries Struwig (DEDEAT)	Why is it necessary to blast? Where and to what extent will blasting be required	The beaches around the Coega SEZ consist of a combination of sandy and rocky shores. There are also a number of subtidal (< 10 m) and deeper reefs (> 10 m) off the coast of Algoa Bay. A number of different servitude widths have been proposed for the project, and these range from 100-200 m wide. Depending on the geotechnical conditions, pipelines are either anchored firmly to the seabed and shoreline, or embedded within excavated trenches. Typically, pipelines would be buried in trenches in the high impact beach and surf zone, and then anchored to the seabed beyond the high active surf zone. Suitable anchoring / weighting is required to ensure the pipeline is stable on the seabed during storm conditions (see Plate 2.7). Further work is required to determine whether these pipelines need to be buried or anchored, and how they might be anchored to the seabed. In the case of a buried pipeline, and depending on the results of the Geotechnical assessments, a channel will be blasted into the rocky shore from above the spring high water mark to below the spring low water mark, or excavated on a sandy shoreline. Thus depending on where within the proposed servitude the infrastructure will be placed, blasting may / may not be required. Blasting will be avoided as far as practically possible and as such the extent of blasting cannot be determined at this stage.
Andries Struwig (DEDEAT)	Where does the reference to St Francis Dune Thicket come from?	Mucina and Rutherford
Andries Struwig (DEDEAT)	It would seem that some of the infrastructure on your layout maps transects the proposed power plant presented for a different application.	The proposed positions of the infrastructure was obtained from the CDC, who has designed the detailed base plan for the Coega SEZ Zone 10 (refer to Figure 6.1 included below). The proposed development will connect to the proposed power stations in Zone 10, but will not transect them.

I&AP	COMMENT	RESPONSE
Lyndon Mardon (DEDEAT)	Where does the 1 km exclusion zone for blasting come from?	There is a large amount of literature on impacts of noise on marine animals, mostly cetaceans. A lot of this has been cited in the Marine Ecological Assessment and is not repeated here. Recommendations on the size of exclusion zones vary widely for different activities and species for reasons such as intensity of the sound/blast wave and sensitivity of the species in question being most important. In the case of this project, we have a good idea of the species involved but not the levels of noise that will be produced, which makes it difficult to accurately define safe exclusionary zones for the species in question. The latter (exclusion zones) are usually defined or derived from the results of noise modelling studies which have not been conducted for this project. Different rules are formulated for different zones (observation, exclusion and suspension) around a construction or operational site which are again derived from the modelling studies referred to above. In the absence of any detailed modelling work this approach is difficult to justify, and can lead to confusion and poor compliance unless it is implemented by skilled professionals. For this reason we adopted a precautionary approach, and recommended a 1 km exclusionary buffer for blasting. **Observation Zone** – This is the radius cetaceans and their movements should be monitored. Within the distance set for piling activities, a partial capacity strike or warning will occur before commencement. **Exclusion Zone** – If a whale moves within this radius; piling, dredging or spoil disposal work will not commence until the animal has moved outside this zone. **Suspension Zone** – Within this zone, piling activities will be suspended until the animal moves outside the exclusion zone. Where practical dredging will be suspended or vessel speeds/direction adjusted. Spoil disposal will not be suspended once commenced.

I&AP	COMMENT	RESPONSE
Lyndon Mardon (DEDEAT)	What is the back-up plan in case effluent to be discharged will not meet the required WQG?	For finfish effluent, the CDC will ensure that an inline screening system is hard-wired into investor operations to ensure that the solids are separated from the effluent prior to discharge, as it's the solids (TSS) that present the main problem. The intention is to reduce the levels of TSS in the effluent. Examples of inline screening systems include settlement ponds or swirl operators. Once the effluent has been through the screening system, e.g. a swirl operator, the solids fall to the bottom and can be collected and disposed of, whereas the supernatant (liquid) will be discharged to the marine pipeline. It is the supernatant effluent that will need to comply with the CDC's CWDP conditions. The investor will need to test the quality of this supernatant effluent to prove that it meets the requirements. If it doesn't, then the CDC would have to stipulate (in their lease agreements), that additional treatment must take place. Each ADZ investor must compile their own site- and activity-specific EMP, which would have to include a detailed section on how they will be ensuring that their effluent meets the Water Quality Guidelines and permit requirements. For abalone effluent, the CDC will ensure that each operation incorporates an inline screening system to trap / capture any solids (organic or inorganic); e.g. seaweed ponds. Experience is that plastic litter will still need to be screened out, despite seaweed ponds in use. Each operator must monitor their effluent quality once it's been through the screening system. In terms of wastewater, the WWTW treatment technology and design of the WWTW must ensure that all effluent (from Phases 1 and 2) from the WWTW must meet the relevant guidelines before it leaves the WWTW.
APPROVAL OF THE FINAL SCOPING REPORT BY DEFF ON THE 24TH OF FEBRUARY 2021		
DEFF	The Listed Activities represented in the EIAR and the application form must be the same and correct.	The listed activities within the Draft EIR corresponds to those submitted in the application form submitted to DEFF.
DEFF	The EIAR must assess the correct sub listed activity for each listed activity applied for.	Only the sub listed activities relevant to the project have been included in both the DEIR and the Application Form.

I&AP	COMMENT	RESPONSE
DEFF	The EIAR must provide an assessment of the impacts and mitigation measures for each of the listed activities applied for.	The section below provides the relevant listed activities and the impacts considered to be relevant to each activity, which has been included in Chapter 8 of the EIAR: <u>Listing Notice 1: Activity 10:</u> • Reduced water quality in the marine environment • Impacts of elevated temperature in the marine environment • Impacts of changes to salinity in the marine environment • Impacts of elevated nutrients in the marine environment • Impacts of elevated suspended solids in the marine environment • Impacts of elevated trace metal and inorganic compound concentrations in the marine environment • Impacts of reduced dissolved oxygen <u>Listing Notice 1: Activity 15:</u> • Reduced water quality in the marine environment • Hazardous substance spills • Erosion • Impacts on topography (terrestrial environment) • Impacts on bathymetry (marine environment) • Loss of sandy beach, intertidal and subtidal habitat and biota • Disturbance of pelagic open water habitat • Barotrauma impacts on marine fauna as a result of blasting • Noise disturbance to marine fauna <u>Listing Notice 1: Activity 17:</u> • Reduced water quality in the marine environment • Hazardous substance spills • Erosion • Impacts on topography (terrestrial environment) • Impacts on bathymetry (marine environment) • Loss of sandy beach, intertidal and subtidal habitat and biota • Disturbance of pelagic open water habitat • Barotrauma impacts on marine fauna as a result of blasting • Noise disturbance to marine fauna <u>Listing Notice 1: Activity 18:</u> • Impacts to the Coastal Dune System <u>Listing Notice 1: Activity 19A:</u>

I&AP	COMMENT	RESPONSE
		• Reduced water quality in the marine environment • Impacts of elevated suspended solids in the marine environment • Impacts on bathymetry (marine environment) • Barotrauma impacts on marine fauna as a result of blasting • Noise disturbance to marine fauna <u>Listing Notice 2: Activity 6:</u> • Reduced water quality in the marine environment • Impacts of elevated temperature in the marine environment • Impacts of changes to salinity in the marine environment • Impacts of elevated nutrients in the marine environment • Impacts of elevated suspended solids in the marine environment • Impacts of elevated trace metal and inorganic compound concentrations in the marine environment • Impacts of reduced dissolved oxygen <u>Listing Notice 2: Activity 14:</u> • Reduced water quality in the marine environment • Hazardous substance spills • Erosion • Impacts on bathymetry (marine environment) • Disturbance of pelagic open water habitat • Barotrauma impacts on marine fauna as a result of blasting • Noise disturbance to marine fauna <u>Listing Notice 2: Activity 26:</u> • Reduced water quality in the marine environment • Hazardous substance spills • Erosion • Impacts on bathymetry (marine environment) • Disturbance of pelagic open water habitat • Barotrauma impacts on marine fauna as a result of blasting • Noise disturbance to marine fauna <u>Listing Notice 3: Activity 12:</u> • Loss of Indigenous Vegetation (Cape Seashore Vegetation and St Francis Dune Thicket) • Loss of Biodiversity / Encroachment into Priority Biodiversity Areas • Spread of Alien Plant Species

I&AP	COMMENT	RESPONSE
		• Habitat Loss/ • Fragmentation • Possible loss of the following plant species: *Brunsvigia litoralis*, *Euryops ericifolius*, *Erica chloroloma*, *Psoralea repens* • Possible loss of the following plant species: *Cotyledon adscendens*, *Rapanea gilliana*, *Gymnosporia elliptica*, *Agathosma stenopetala*, *Erica glumiflora*, *Othonna rufibarbis*, *Salvia obtusata* • Loss of mammal SCC • Disturbance to Damara tern population / Loss of habitat • Loss of *Chlorotalpa duthiae* (Duthie's Golden Mole) and/or associated habitat
DEFF	From the information presented in the FSR, it is noted that there are concerns from SANParks with regards to, inter alia, discharges in close proximity to St Croix Island, Addo Elephant National Park and Marine Protected Area (MPA) and how this may impact seabirds, notably penguins, dependant on this area of the ocean, and their prey species. SANParks is concerned about several possible risks and long-term impacts from this project on water quality, marine biodiversity, the pelagic food chain, and pelagic fish species serving as prey for the penguins, the island ecosystems, and disease risks amongst others. You are required to address these concerns adequately. The preferred alternative intake servitudes and preferred alternative discharge servitudes to be presented in the EIA Phase must meet both the Coega Development Corporation (CDC) requirements and it must address concerns raised by I&APs, including SANParks during the environmental impact assessment phase.	All comments received from SANParks related to the marine environment were submitted to the Marine Ecologist and incorporated in the Marine Ecological Impact Assessment. The Draft EIAR in conjunction with all the specialist assessments will be submitted to SANParks as well as all other registered I&APs for comment. Any additional comments received from SANParks on these reports will be incorporated into the Final EIAR and specialist assessment, inclusive of responses from the EAP, the Applicant, the various specialists and engineers. Interaction with SANParks has been ongoing. For example, based on comments received from them on the storm water discharge infrastructure a site meeting was held, and this infrastructure was redesigned to accommodate SANParks concerns.

I&AP	COMMENT	RESPONSE
DEFF	Please ensure that all comments from all relevant stakeholders are submitted to the Department with the EIAR. Further ensure that all issues raised and comments received during the circulation of the Draft EIAR from registered I&APs and Organs of State, including the Branch: Oceans and Coasts with DEFF which have jurisdiction in respect of the proposed activity are adequately addressed and responded to in the Final EIAR. Proof of correspondence with the various stakeholders must be included in the Final EIAR. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments.	The mandatory public review period on the Draft EIAR (i.e. 30 days) will take place in April and May 2021. All comments received during this period as well as comments received the during the Scoping Phase as well as historical comments received on previous applications will be incorporated into a separate Comments and Response Report to be submitted as part of the Final EIR submission. The Draft EIR (this document) contains a separate Comments and Response Report (inclusive of all historical comments and comments on the Scoping Phase) as Appendix 3 to this report. Any new comments received (i.e. not included in the FSR) have been included in Table 6.1 of the Draft EIR. Proof of PPP, inclusive of correspondence with various stakeholders are included in Appendix 2 of this document.
DEFF	A Comments and Response Trail Report (C&R) must be submitted with the final EIAR. The C&R report must incorporate all comments for this development. The C&R Report must be a separate document from the main report and the format must be in table format. All comments from I&APs must be responded to adequately. A response such as “noted” is not regarded as an adequate response to I&AP’s comments. Comments from each submission must be responded to individually. The dates on which comments were received must be recorded in the C&R.	As above.
DEFF	The Public Participation Process must be conducted in terms of Regulation 39, 40, 41, 42, 43 and 44 of the EIA Regulations, 2014, as amended.	The PPP process has been conducted in line with these regulations (refer to Chapter 6 of the Draft EIAR) and the approved PPP Plan.

I&AP	COMMENT	RESPONSE
DEFF	The EAP is requested to contact the Department to make the necessary arrangements to conduct a site inspection prior to the submission of the Final EIAR.	Correspondence related to a request for a site visit was submitted to the case officer, Ms Constance Musemburi, on the 29th of March 2021, via e-mail correspondence.
DEFF	Please ensure that a description of each of the preferred alternative type and a detailed motivation on why it is preferred is provided.	All alternatives as requested have been incorporated into Chapter 4 of the Draft EIAR.
DEFF	The EIAR must provide the four corner co-ordinate points for the proposed development site (note that if the site has numerous bend points, at each bend point co-ordinates must be provided) as well as start, middle and end points of all linear infrastructure.	This information has been included as Appendix 16 to the DEIR.
DEFF	The EIAR must provide a clear indication of the envisioned area for the proposed development and all associated infrastructure which should be mapped at an appropriate scale. A clear description of all associated infrastructure must also be provided.	A full project description, including maps have been included in Chapter 2 of the DEIR. In addition, a sensitivity map (project infrastructure overlaying sensitive sites) has been included as Figure 10.2.
DEFF	An environmental sensitivity map indicating environmental sensitive areas and features identified during the assessment process.	A sensitivity map (project infrastructure overlaying sensitive sites) has been included as Figure 10.2.
DEFF	A map combining the final layout map superimposed (overlain) on the environmental sensitivity map.	A sensitivity map (project infrastructure overlaying sensitive sites) has been included as Figure 10.2.
DEFF	The EAP must ensure that the terms of reference for all identified specialist studies must include the following:	All specialists have been made aware of these requirements.

I&AP	COMMENT	RESPONSE
	• A detailed description of the study's methodology, indication of the locations and descriptions of the development footprint, and all other associated infrastructure that they have assessed and are recommending for authorisation. • Provide a detailed description of all limitations to the studies. All specialist studies must be conducted in the right season and indicating that as a limitation will not be allowed. • Please note that the Department considers a "no-go" area, as an area where no development of any infrastructure is allowed; therefore, no development of associated infrastructure including access roads is allowed in the "no-go" areas. • Should the specialist definition of "no-go" area differ from the Department's definition, this must be clearly indicated. The specialist must also indicate the "no-go" area's buffer if applicable. • All specialist studies must be final, and provide detailed/practical mitigation measures for the preferred alternative and recommendations, and must not recommend further studies to be completed post EA.	

I&AP	COMMENT	RESPONSE
	• Should a specialist recommend specific mitigation measures, these must be clearly indicated. Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons, and where necessary, include further expert advice.	
DEFF	In regard to cumulative impacts: • Please ensure that cumulative impacts are clearly defined and where possible the size of the identified impact must be quantified and indicated, i.e. hectares of cumulatively transformed land. • A detailed process flow to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusions and mitigation measures were drafted for this project. • Identified cumulative impacts associated with the proposed development must be rated with the significance rating methodology used in the process. • The significance rating must also inform the need and desirability of the proposed development.	• It has not been possible to include the size off the identified cumulative impact, due to the nature of the project. The rationale behind establishing servitudes is to consolidate the marine infrastructure within defined footprints and thus avoid an ad hoc approach to constructing marine infrastructure. By clearly defining servitudes cumulative impacts are avoided. • The location for the development is a special economic zone, and one of the principles of establishing these was to consolidate industrial infrastructure to specific geographical areas to encourage similar industries with synergies between them, hence reducing waste streams. This approach also allowed for improved management of cumulative impacts, which at Coega has been achieved through the establishment of the Coega Open Space Management Plan, which ensures that there is adequate representation of various vegetation types in the area, and through the establishment of ecological corridors avoids, as far as possible, the cumulative impact associated with habitat fragmentation. • Refer to Table 9.6 in Chapter 9 of this report • Refer to Table 9.6 in Chapter 9 of this report

I&AP	COMMENT	RESPONSE
	• A cumulative impact environmental statement on whether the proposed development must proceed or not.	• There is considerable debate and disagreement amongst academics and practitioners about whether cumulative impact assessment (CIA) should be part of the EIA or be undertaken as a separate stand-alone process. The IFC's good practice manual on CIA nevertheless draws attention to the importance of determining whether a project may contribute to cumulative impacts on valued environmental and social components. We have concluded that this will not be the case because the rationale behind defining marine servitudes is to specifically deal with cumulative impacts (refer to Chapter 10)
DEFF	Should a Water Use Licence, Coastal Waters Discharge Permit (CWDP) or any other licence be required, proof of application for a licence needs to be submitted.	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 effluent into the marine environment) was submitted to the DEA: Oceans and Coasts. A reference number (2014/008/EC/Coega IDZ) for this application was issued on the 24th of April 2014. Based on personal communication with DEFF: Oceans and Coasts, the reference number issued for the Coastal Waters Discharge Permit in 2014 remains valid, but the application needs to be updated to reflect the most recent information. This revised application will be submitted to DEFF: Oceans and Coasts prior to the submission of the Final EIR.
DEFF	A construction and operational phase EMPr that includes mitigation and monitoring measures must be submitted with the Final EIAR.	Noted, both the Draft and Final EIARs will be accompanied by both a Construction and an Operational EMPr.
DEFF	The EAP is requested to add the name together with the Appendix number when uploading the files on the Department's system.	Noted, all appendices have been appropriately named.
DEFF	The applicant is hereby reminded to comply with the requirements of Regulation 45 of GN R982 of 4 December 2014, as amended, with	Based on our calculations the Final EIR is due to the Department on the 17th of June 2021.

I&AP	COMMENT	RESPONSE
	regard to the time period allowed for complying with the requirements of the Regulations.	Regulation 23 (1) states that "The applicant must within 106 days of the acceptance of the scoping report submit to the competent authority….." Regulation 3 (5) states that: "Where a prescribed timeframe is affected by one or more public holidays, the timeframe must be extended by the number of public holiday days falling within that timeframe." There are 7 public holidays during that period: 21 March – Human Rights Day 22 March – Public Holiday as Human Rights Day Fall on a Sunday 2 April – Good Friday 5 April – Family Day 27 April – Freedom Day 1 May – Workers Day 16 June – Youth Day The 26th of April is a school holiday as Freedom Day falls on the Tuesday, as this is a school holiday this has not been factored this into our calculations. The approval of the Scoping Report was dated 24th of February 2021 (Received by the EAP on the 1st of March). We have started the count from the 25th as Regulation 3 (1) states: Subject to subregulations (2) and (3), when a period of days must in terms of these Regulations be reckoned from or after a particular day, that period must be reckoned as from the start of the day following that particular day to the end of the last day of the period, but if the last day of the period falls on a Saturday, Sunday or public holiday, that period must be extended to the end of the next day which is not a Saturday, Sunday or public holiday.

I&AP	COMMENT	RESPONSE
DEFF	You are hereby reminded of Section 24F of the National Environmental Management Act, Act No. 107 of 1998, as amended, that no activity may commence prior to an environmental authorisation being granted by the Department.	Noted, no activity will commence prior to any EA received from the Department.
COMMENTS RECEIVED FOLLOWING THE NOTIFICATION OF THE AVAILABILITY OF THE DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT		
DFFE	Dear Chantel 14/12/16/3/3/2/2036 ACKNOWLEDGEMENT OF RECEIPT OF THE DRAFT ENVIRONMENTAL IMAPCT ASSESSMENT REPORT FOR THE PROPOSED MARINE INTAKE AND OUTFALL INFRASTRUCTURE SERVITUDE PROJECT, ZONE 10, COEGA SEZ, EASTERN CAPE PROVINCE. The Department confirms having received the Draft Environmental Impact Assessment Report for the abovementioned project on 06 April 2021. You have submitted these documents to comply with the National Environmental Management Act, 1998(Act No. 107 of 1998) and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended You are hereby reminded of Section 24F of the National Environmental Management Act 1998 (Act No. 107 of 1998), as amended, that	Thank you

I&AP	COMMENT	RESPONSE
	no activity may commence prior to an Environmental Authorisation being granted by the Department. Kindly quote the abovementioned reference number in any future correspondence in respect of the application. Yours in admin EIA Applications Integrated Environmental Authorisations Department of Environment, Forestry and Fisheries	
Aulicia Maifo **DFFE: Biodiversity**	Good day Sir/Madam Hope you are well. DFFE Directorate: Biodiversity Conservation hereby acknowledge receipt of the invitation to review and comment on the Draft Environmental Impact Assessment Report for the proposed Coega Marine Intake and Outfall Infrastructure Project. Kindly note that the project has been allocated to the officers, Ms. Portia Makitla (copied on this email) and myself. Please note that all Public Participation Process documents related to Biodiversity EIA review and any other Biodiversity EIA queries must be submitted to the Directorate: Biodiversity Conservation at Email:	Portia Makitla was added as the DFFE: Biodiversity Case Officer on the Stakeholder/ I&AP Database during the Scoping Phase and has been copied into all notifications regarding the availability of reports for public review and comment.

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	BCAdmin@environment.gov.za for attention of Mr Seoka Lekota. Kind regards, Ms. Aulicia Maifo	
Andrea Shirley **CDC**	Afternoon ladies, Please include Nontsasa onto the stakeholder database for the Marine Pipeline EIA. She and Rueben are from Oceans & Coasts.	Nontsasa Tonjeni was added to the Stakeholder/ I&AP Database and the notification of the availability of the Draft EIAR for public review was subsequently forwarded to her.
Nelson Coelho **Marine and Coastal Construction**	Greetings Dr Chantel Bezuidenhout, Your colleague at Cape Town branch of CES advised me to contact you via this address concerning the Marine Intake and Outfall Infrastructure Servitude Project you are currently working on. The company I represent is involved in marine works such as the laying of these pipelines and we are trying to understand what is the status of this project at this moment. We understand the consultancy job was awarded to CES back in 2019 and your colleague mentioned a draft environmental scoping report had been prepared last year; but she also suggested asking you for further clarification on whether/when the EIA was completed and delivered to the client.	The notification email regarding the status of the project and the availability of the Draft EIAR for public review was subsequently forwarded to Nelson Coelho.

I&AP	COMMENT	RESPONSE
	In particular we would like to know the expected dimensions of this infrastructure and whether it is foreseeable that the execution would require the participation of marine contractors. Thank you for your time and consideration. With kind regards, MARINE AND COASTAL CONSTRUCTION Tel. + 44 20 3290 7180 www.marineandcoastal.com	
Ane Oosthuizen **SANParks**	Good afternoon Ane, I hope you are well. Would SANParks like for us to arrange a meeting regarding the Draft Environmental Impact Assessment (EIAR) Report for the Coega Marine Intake and Outfall Infrastructure Project? Will SANParks be submitting comments on the Draft EIAR? I look forward to hearing from you. Kind regards Nicole	Hi Nicole, Thank you for the offer of a meeting, yes SANParks will be submitting comments. We are available for a meeting after 12pm on the 3rd. Apologies for the single date, but this is a particularly busy time for SANParks.
Nicole Wienand to Wayne Hector and Constance Musemburi **(DFFE)**	Good afternoon, I trust you are well.	DFFE submitted comments of the Draft EIAR on the 11th of May 2021.

I&AP	COMMENT	RESPONSE
	Please could you kindly indicate whether the DFFE will be submitting comments on the Draft Environmental Impact Assessment Report (EIAR) for the Proposed Coega Marine Intake and Outfall Infrastructure Project? Thank you and kind regards, Nicole	
Seoka Lekota **DFFE: Biodiversity Conservation**	The Directorate: Biodiversity Conservation has reviewed and evaluated the aforementioned report. According to the information provided in the Draft Environmental Impact Assessment Report (DEIAR) and the specialists report, the proposed development is located within the coastal protection zone (defined as any urban land unit that is completely or partly within 100 m of the High-Water Mark (HWM). Majority of the impacts are rated as moderate and high negative which will be reduced to a moderate to low negative significance. Notwithstanding the above the following recommendation must be considered in order to minimise further loss of biodiversity:	The information provided in the Draft EIAR and associated specialist reports regarding the location of the proposed development within the coastal protection zone (defined as any urban land unit that is completely or partly within 100 m of the High-Water Mark (HWM) is correct. The recommendations outlined within the letter from DFFE: Biodiversity Conservation were incorporated into the relevant sections of the Draft EIAR and the Terrestrial Ecological Impact Assessment and are outlined below.
Seoka Lekota **DFFE: Biodiversity Conservation**	High sensitive areas in close proximity to the development footprint must be demarcated as no-go areas i.e. IBA.	Highly sensitive areas, including the Damara Tern habitat, have been identified and delineated in Section 7.1 of the Terrestrial Ecological Impact Assessment. No-go areas have been specified in Section 9.1.3. Due to the findings of the modelling and the dispersion requirements, one (1) of the proposed discharge servitudes extends into the boundary of the Algoa Bay Islands: Addo Elephant National Park IBA (refer to section 5.7.1 on Page 49 of the Terrestrial Ecological Impact Assessment). Due to the location of

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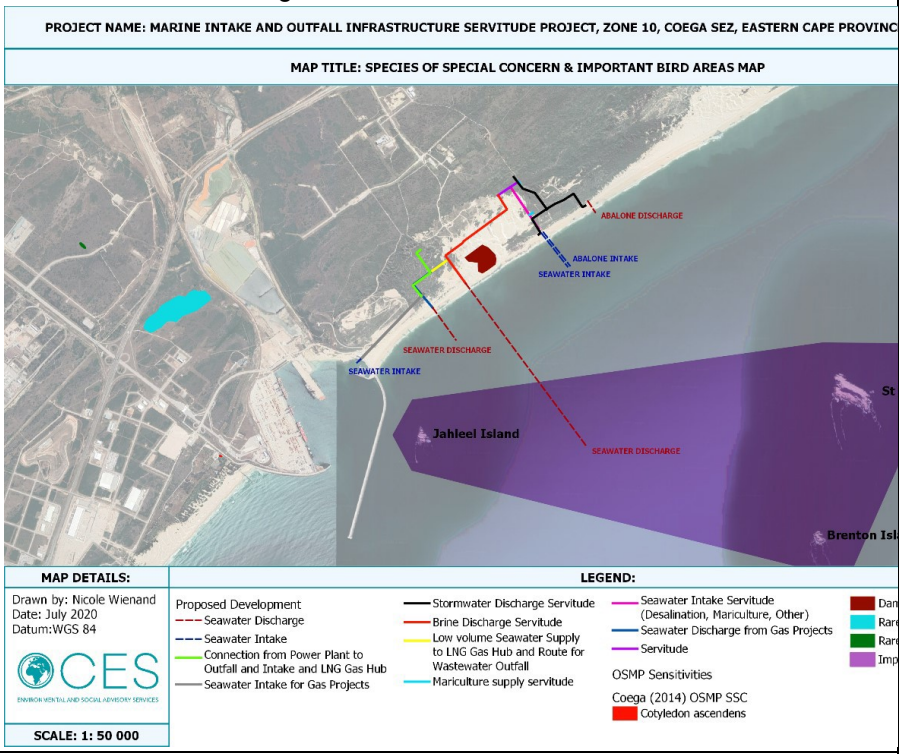
		the discharge servitude within the IBA (as determined by dispersion modelling), this area has not been proclaimed a no-go area. However, strict monitoring of these discharge servitudes has been recommended as conditions of the EA, if granted. 
Seoka Lekota **DFFE: Biodiversity Conservation**	Vegetation clearing must be limited to the approved areas.	This mitigation measure has been included under *Impact 2: Loss of Indigenous Vegetation (Cape Seashore Vegetation and St Francis Dune Thicket)* within the Terrestrial Ecological Impact Assessment. The mitigation measure reads as follows: "*Except to the extent necessary for the carrying out of construction works, flora shall not be removed, damaged or disturbed.* ***The clearance of vegetation at any given time should be kept to a minimum and vegetation clearance must be strictly limited***

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		to the development footprint". This recommendation was also included in Table 9.5 of the EIR and Table 3.1 of the Construction Phase EMPr.
Seoka Lekota **DFFE: Biodiversity Conservation**	A final walk-through with the relevant specialist must be undertaken to identify the Species of Conservation Concern (SCC) that needs protection.	This mitigation measure has been included under Impact 2: Loss of Indigenous Vegetation (Cape Seashore Vegetation and St Francis Dune Thicket) within the Terrestrial Ecological Impact Assessment. The mitigation measure reads as follows: "*The search and rescue of rare, endemic or threatened species, prior to site clearance must be carried out in accordance with the Project Vegetation Specification (PVS), by a competent and qualified service provider*". This recommendation was also included in Table 9.5 of the EIR and Table 3.1 of the Construction Phase EMPr.
Seoka Lekota **DFFE: Biodiversity Conservation**	Alien Invasive Plant (AIP) Management and Control Plan must be designed and implemented to prevent further loss of floral habitat and diversity as AIPs displace native species.	The spread/establishment of Alien Invasive Plant (AIP) species was assessed under Impact 8 (construction phase) and Impact 11 (operational phase) in the Terrestrial Ecological Impact Assessment. An Alien Vegetation Management Plan has already been developed for the Coega SEZ. As such, the following mitigation measures relating to the spread of Alien Plant Species has been specified: • The Alien Vegetation Management Plan developed for the Coega SEZ must be implemented and managed to prevent the further spread of alien invasive species within Zone 10 of the Coega SEZ (Construction and Operational Phase); • Any alien vegetation which establishes during the construction phase should be removed from site and disposed of at a registered waste disposal site. Continuous monitoring for seedlings should take place throughout the construction phase (Construction Phase). • Implement a Rehabilitation Plan in accordance with the specifications outlined within the OSMP (2014) and the CDC's Project Vegetation Specifications (Operational Phase). These recommendations were also included in Table 9.5 of the EIR and Table 3.1 of the Construction Phase EMPr and Table 3.1 of the Operational EMPr.
Seoka Lekota	Erosion management, maintenance and rehabilitation plans of natural vegetation must be developed to mitigate on habitat	The impact of erosion was also assessed in the Draft EIAR for which the following mitigation measures were identified:

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DFFE: Biodiversity Conservation	degradation and consider all phase on the development.	• The seawater abstraction and discharge pipeline infrastructure should be designed to limit risks of erosion. • During construction, disturbance and clearing of natural vegetation should be kept to the minimum required for construction; • Newly cleared and exposed areas must be promptly rehabilitated with indigenous vegetation to avoid soil erosion. • Where necessary, temporary stabilization measures must be used until vegetation re-establishes; • Plan and design for the worst case, that is, for heavy rainfall and runoff events, or high winds; • Care must be taken to ensure that runoff is well dispersed so as to limit erosion. These recommendations are included in Table 9.5 of the EIR and Table 3.1 of the Construction Phase EMPr.
Seoka Lekota **DFFE: Biodiversity Conservation**	NB: The Public Participation Process documents related to Biodiversity EIA for review and queries should be submitted to the Directorate: Biodiversity Conservation at Email: BCAdmin@environment.gov.za for attention of Mr. Seoka Lekota.	The email notification regarding the availability of the Draft EIAR was submitted on the 6th and again on the 13th of April 2021 to the Case officer Ms Portia Makitla, Ms. Aulicia Maifo, with BCAdmin@environment.gov.za cc'd into the email. The relevant persons will also be notified of the submission of the Final EIAR.
COMMENTS ON THE DEIR RECEIVED FROM SANPARKS		
Andre Riley **SANParks**	SANParks comment follows several meetings between the consultant CES, and the developer CDC and a team from SANParks. This project proposes both intake and outfall infrastructure to service a range of industries, including land-based aquaculture, a Municipal wastewater treatment plant, two proposed LNG Power stations, a Desalination plant, associated stormwater outfalls and other possible future developments in the Special Economic Zone (SEZ).	Statement: No response necessary.

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	Most of the proposed sea-based infrastructure falls within the footprint of the Addo Elephant National Park MPA, which will also be the receiving environment for all the proposed outfall effluent, associated impacts and some seawater abstraction (Fig 1).	
Andre Riley **SANParks**	**General Risks and concerns** SANParks remains concerned over the potential long-term impacts of this project on water quality, pelagic fish species serving as prey for the penguins, the island ecosystems and species they support.	Please note that three meetings have been conducted with SANParks, a virtual meeting was conducted on the 8th of December 2020 to discuss comments, queries and the recommendations made in the Draft Scoping Report. A site visit was also conducted on the 4th of February 2021 with SANParks representatives, the CDC and their engineers, as well as the EAP in order to discuss alternative stormwater options. In addition, a meeting was held on the 3rd of May 2021 to discuss comments, queries and the recommendations made in the Draft EIAR and relevant specialist reports. In addition, all issued raised by SANParks on the Draft Scoping Report was forwarded to the Marine Ecological Specialist, who then incorporated these issues into the Draft Marine Ecological Report in order to ensure that all comments have been adequately addressed and that SANParks have all the relevant information in order to make an informed-decision on the project. However, we acknowledge SANParks concerns related to the residual long-term impacts on the marine ecosystem, as that is their mandate. We confirm that a range of mitigation measures have been recommended to reduce impact significance to acceptable levels. Nevertheless, it is acknowledged that there will be residual impacts and risks to the marine environment, but the specialists and the EAP have concluded that these are acceptable.
Andre Riley **SANParks**	**Mitigating impacts** 1. It is critical that the recommendations of the Final Marine Ecological Assessment report on the discharge scenarios, (Scenario 1 with adjustments) be implemented to achieve maximum dispersion, and minimum environmental impact;	CES can confirm that the mitigation measures will be legally binding on the applicant. In terms of the EA, the applicant will be legally bounded to implement all mitigation measures as stipulated in the EA as well as the EMPrs. In terms of the CWDP, the applicant will be legally bounded to ensure that the relevant water quality parameters as set by DEFF: Oceans and Coasts are adhered to.

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	2. It is critical that the "end of pipe limits" be adhered to, in order to safeguard the integrity of Algoa Bay, the Addo Elephant National Park MPA and other bay users. Following the "end of pipe" recommendations of PRDW 2020 and Lwandle 2020, as per Marine Ecological Assessment report; 3. It is critical that the applicant, the Coega Development Corporation (CDC) convey the end of pipe requirements, and hold accountable for these requirements, the tenants/investors who will be discharging effluent via the outfall infrastructure; 4. Mitigations measures as listed in the Final Marine Ecological Assessment report, (page v-vii) must be implemented; 5. Impact Management Outcomes, as per Draft EIR (pages 222-228) must be adhered to.	
Andre Riley **SANParks**	**Environmental monitoring** 1. Monitoring of the site should take place before construction, as a baseline, and sub sequent to completion of construction, to monitor recovery of the site and biodiversity; 2. Monitoring requirements during the construction and operational phase as per the draft EMPr should be implemented; 3. All personnel and vessels conducting monitoring within the footprint of the MPA, must adhere to the regulations of the Addo Elephant National Park MPA Gazette no 42479, R no 777 of 23 May 2019.	1. Noted and agreed. The Operational EMPr states that: "*A monitoring program at the edge of each RMZ must be implemented **prior** to construction to better determine ambient water quality and to ensure that required Water Quality Guidelines (WQGs) are being met at the edge of the RMZ. This can be achieved by mooring a data logging instrument capable of measuring conductivity (i.e. salinity), temperature at a depth (CTD) 1 m above the ocean bottom for **a period of one month pre- and one year after operations commences**. This monitoring is required in order to validate parameters used in the dispersion modelling. Monitoring must also be undertaken to assess dissolved oxygen levels, microbiological indicators (Enterococci sp. and/or E. coli) turbidity, ammonia, nitrate and pH (refer to measurable variable in Table 3.1). Monitoring for salinity and temperature must take place continuously (via the moored instrument), while the other*

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		environmental water quality parameters should be assessed quarterly (i.e. four times per year) by the CDC." 2. CES can confirm that the mitigation measures will be legally binding on the applicant. 3. Noted and agreed. This mitigation measures has been incorporated into the FEIR.
Andre Riley **SANParks**	**Draft Environmental Management Program reports (DEMPr) – Operational and Construction** Conditions to include in the draft EMPs: 1. SANParks is recognised as the management authority of the Protected Area in which most of the sea based development will take place, and the area in which all of the effluent will be received; 2. CDC to set up a joint implementation and monitoring team for construction and operational activities within the Addo Elephant National Park MPA; 3. CDC to consult SANParks in the development of a monitoring plan and evaluation and reporting of results; 4. CDC to communicate each new user of the infrastructure to SANParks prior to/at the start of the EIA, as SANParks is the direct receiver of the output of the servitude user; 5. CDC to communicate any incident/failure of infrastructure to SANParks with immediate effect; 6. CDC to develop an Emergency response plan for incidences of failure or accidents, and need to consult SANParks in such a plan;	SANParks is recognised as the management authority in terms of the legal chapter included in the EIR. The mitigation measures outlined under points 2-7 have been incorporated into Table 9.5 of the FEIR and Table 3.1 of the Construction and Operational EMPr (whichever is relevant). In addition, a high level project specific emergency response plan has been developed by the CDC. This plan (included as Table 7.1 in the Operational EMPr), outlines the proposed infrastructure, possible failure scenarios and the contingency plans in the event of failure. The plan has also been circulated to SANParks.

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	7. All personnel and vessels used in the construction and operational phase, within the footprint of the MPA, to adhere to the regulations of the Addo Elephant National Park MPA Gazette no 42479, R no 777 of 23 May 2019.	
Andre Riley **SANParks**	Addo Elephant National Park MPA is the last stronghold of the African Penguin in the world and any further cumulative impacts can add to the pressures on this species.	Please note that a comprehensive list of impacts (i.e. increased water temperature and nutrients on the persistence of harmful algal blooms, impact of effluent on water turbidity and turbidity dispersion, temperature and turbidity impacts on plankton, the pelagic food web and small pelagic fish species, accumulation of discharge elements in the sediments and benthic habitats and associated impacts, amongst others) were assessed in the marine ecological assessment conducted for the proposed project. This document is an integral part of the EIA process.
COMMENTS ON THE DRAFT EIAR RECEIVED FROM DFFE		
DFFE	The Application for Environmental Authorisation and draft Environmental Impact Assessment Report (EIAR) received by the Department on 13 November 2020 and 06 April 2021, respectively, refer. This letter serves to inform you that the following information must be included in the final EIAR:	Statement: No response necessary. Specific issues dealt with below.
DFFE	**(a)Specific comments** In discussing the uncertainty and the impacts associated with the water quality and measures that will be put in place should the minimum requirements in terms of the Coastal Waters Discharge Permit (CWDP) measure are not met or prove unsuccessful, the draft EIA report refers to monitoring. The Environmental Assessment Practitioner (EAP) states that "investors conduct regular	Please note that while the DEIR does include the mitigation measure of implementing a water quality monitoring programme to validate the hydrodynamic modelling study, this is not the only mitigation measure included. The DEIR and FEIR and the respective specialist studies include specific parameters for each industry that may not be exceeded. These include but are not limited to the following: • Wastewater 1 outfall effluent must have a maximum end of pipe effluent salinity of 17 PSU.

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	effluent quality monitoring to ensure an understanding of their effluent quality'. Monitoring per se is not a mitigation measure but is only an action to determine (monitor) if the impact predictions and mitigation measures is consistent with the findings of the EIA Report. What will be the impact of to the operations if they cannot discharge water? It is reported that Ecoli tests takes about 3 days to get the results, where will water be stored and treated while they are waiting for test results? Are there provisions to store water onsite while they are treating it before they discharge the water?	• Wastewater 1 outfall to limit the maximum allowable effluent concentrations (end of pipe) for TKN + NH4 to below 5 mg/l (wastewater must be treated on land to meet appropriate standards prior to discharge). • The brine and fin fish effluents are to be discharged separately; otherwise, the ammonia, nitrate and nitrate end of pipe concentrations must be reduced to below 13.37 mg/l. • Wastewater 1 outfall to limit the maximum allowable effluent concentrations (end of pipe) for TSS to below 50 mg/l (wastewater must be treated on land to meet appropriate standards prior to discharge). • Wastewater 1 outfall to limit the maximum allowable effluent concentrations (end of pipe) for sulphide to below 0.21 mg/l; for Hg to below 0.062 mg/l, Co to below 0.21 mg/l; Cu to below 1.04 mg/l, and Cd to below 0.83 mg/l. • Wastewater 1 outfall to limit the maximum allowable effluent concentrations (end of pipe) for COD to below 3110 mg/l (wastewater must be treated on land to meet appropriate standards prior to discharge). • The dosing of sodium metabisulphate must be at levels low enough to avoid an “oxygen sag” in the marine environment receiving the effluent. Environmental best-practise is to ensure aeration of the effluent prior to discharge. The reason that the mitigation measures specifically reference the effluent from the WWTW is because dispersion modelling has shown that all other effluent to be discharged (i.e. cooling and heating water, brine, finfish and abalone effluent) meet the required dilutions and water quality standards at the 300 m RMZ and as such no additional treatment or mitigation for these effluent streams are required, other than the relevant required monitoring. In addition, a high-level project specific emergency response plan has been developed by the CDC. This plan (included as Table 7.1 in the Operational EMPr), outlines the proposed infrastructure, possible failure scenarios and the contingency plans in the event of failure. The plan has also been circulated to SANParks.

I&AP	COMMENT	RESPONSE
		In terms of the design of the WWTW, the following has been included: • Phase 1: Treated effluent to be put through reed beds after discharge from the WWTW, then discharged to Coega River, then into the Port of Ngqura. • Phase 2: Treated effluent to meet Municipal and Industrial effluent quality guidelines prior to discharge into marine pipeline. • Preferred option is that all return effluent be reused within industrial operations in the SEZ. Alternatively, planned design in accordance with the recommendations of the marine dispersion modelling report Rev 01, PRDW, 12 Oct 2020. • The EIA still to be done for the WWTW will address the technology and design of infrastructure. Please note that the potential for *E. coli* is only associated with the WWTW, none of the other industries will have levels of *E. coli* in the effluent. A separate EIA will have to be undertaken for the proposed WWTW, this EIA will have to incorporate the need for effluent storage facilities, where effluent can be stored until such time as the relevant testing has been conducted prior to discharge. The EAP appointed to undertake the EIA Process will have to ensure that all mitigation measures, monitoring protocols, etc. is catered for within their EIA.
	What are the baseline and thresholds of acceptable change against which monitoring will take place, and what actions are proposed if the monitoring results detect change?	All the discharges considered must meet the applicable water quality guidelines (WQGs) (The marine WQGs currently in force are those defined in DWAFF (1995). These have been reviewed and updated in DEA (2019) but these are still in draft form and are not yet gazetted. Therefore, here the DWAFF (1995) version of the guidelines are followed primarily, but are augmented by WQGs from other jurisdictions where required, e.g. ANZECC (2000), IFC (2009), along with peer-reviewed toxicity test data) within the 300 m mixing zone.

I&AP	COMMENT	RESPONSE
	What are the socio-economic and ecological implications should the proposed mitigation measure not be successful?	If the mitigation measures fail to be affective, the resultant marine impacts assessed in the EIR and the relevant specialist reports will be at pre-mitigation significance ratings. Four (out of a possible 17) of which are considered to be HIGH (without mitigation), these include: • Elevated nutrients from aquaculture effluent and wastewater effluent • Increased trace metal and inorganic constituent concentrations • Pathogens present in effluent • Impact on linefish fisheries No further additional impacts to those already assessed will occur.
	The EAP added that "The requirements of the CWDP would need to be met by each investor prior to discharge of effluent from individual investor sites. It is recommended that this be a condition of the Environmental Authorisation.' Please note that the competent authority must be able to apply its mind to all the potential risks and the mitigation/corrective measures thereto associated with the impacts on the water quality prior to decision-making. Deferring decision-making subject to a condition in a EA that investors must meet requirements of the CWDP, constitutes conditional and incremental decision-making, which results in the competent authority not applying its mind to all the potential risks and the mitigation measures, All the potential risks and mitigation measures associated with the impacts on the water quality must, therefore, be fully assessed and be addressed in the	Please note that the following statement quoted by the Case Officer: “The requirements of the CWDP would need to be met by each investor prior to discharge of effluent from individual investor sites. It is recommended that this be a condition of the Environmental Authorisation”, was a statement made by the CDC (i.e. the applicant) in the ELC meetings and has been minuted as such. The EIAR does not make reference to this. The EIAR does however state that the applicant must apply for a CWDP from DFFE: Oceans and Coasts and that they will be legally obligated to comply with the relevant conditions of the permit. If standards are exceeded this will have to reported to Oceans and Coasts by the CDC as they will no longer be compliant with the relevant conditions from the CWDP. The actions to be taken as a result will be determined by the relevant authorities, i.e. Oceans and Coasts and management authorities, SANParks. Please note that all gaps, uncertainties and assumptions have been included in the EIR in Section 12.3, and include the following: • The magnetometer picks up magnetic anomalies in and below the seabed. All the hits may not be Maritime and Underwater Cultural Heritage (MUCH) sites, in addition, searches may not find the

I&AP	COMMENT	RESPONSE
	final EIA report so that the competent authority can make decisions based on a full understanding of the risks involved and the controls that are available. In addition, consideration needs to be given as to how realistic and practical the mitigation measures are and what costly commitment and assurances have been provided by the applicant to implement these measures. Gaps, uncertainties, and assumptions must be clearly reported. Long-term maintenance burden must also be adequately considered and reported on.	cause. Their status may only be revealed during the development process. The process gives the developers an idea of where MUCH sites may be uncovered. • Some anomalies may be obvious shipwreck material while others may be covered in conglomerate and/or sand. The inshore area within Algoa Bay is very rocky and there are only sandy patches on the deeper anomalies. The rocks hamper circular searches. The Impact Zone, where the most anomalies were noted is very close to the shore, the bathymetry of the seabed is steep, within 3 km it drops from c.3m to 23m. This caused a big surge which hampered searches for MUCH sites. • The EIAR and associated specialist studies are based on the project description and the site layout provided to CES by the Proponent. • Descriptions of the natural and social environments are based on limited fieldwork and available literature. However, the time available in the field was sufficient to provide enough information to conclude on the status of the affected area, and there is a large body of knowledge available. • A detailed faunal survey was not conducted. The faunal survey was limited to a desktop study, using information from previous ecological surveys conducted in the area, supplemented by opportunistic observations of animal species encountered during the site survey. • It should be emphasised that terrestrial ecological sampling could only be carried out at one stage in the annual or seasonal cycle – in this case late winter (August). Therefore, it is possible that some spring or summer flowering plant species may have gone undetected. • Species of Conservation Concern (SCC) are difficult to find and identify, thus species described in this report do not comprise an exhaustive list. • The information, as presented in this document, only has reference to the study site as indicated on the project maps. Therefore, this information cannot be applied to any other area without a detailed investigation being undertaken. • The following assumptions were made with respect to the current

I&AP	COMMENT	RESPONSE
		EEIA: ○ It is assumed that the significance of environmental economic impacts (impacts to ecosystem goods and services) is directly linked to the significance of environmental impacts as determined by the: ✓ Final Scoping Report; and ✓ Specialist Marine Impact Assessment (Anchor, 2021). ○ The time value of money and discounted future cashflows, was not considered. ○ VAT is excluded. ○ Pumping capacity of 15,000 Kw for the western routing of effluent is based on the WSP assessment of the capacity required to pump water to Zone 13 in the SEZ at a height of 70 Metres ASL. ○ There are inherent uncertainties and gaps in knowledge with respect to the valuation of ecosystem goods and services. It is still a developing discipline and attaching values to less tangible goods and services that have no material benefit to which one can attach a monetary value. Subjective estimates or ranges, and qualitative descriptions may be necessary. Long-term maintenance burden has also been considered in the EIR, a mitigation measure to this effect has been included in the EIR as well as the operational EMPr, it states the following: • Ensure that there are regular maintenance inspections As the CDC will be legally bound to the implementation of the EMPr, the responsibility for this will fall on them.
DFFE	**(b) Listed Activities** Please ensure that all relevant listed activities are applied for, are specific and can be linked to the development activity or infrastructure as described in the project description. Only	The listed activities applied for are specific and can be linked to the development activity or infrastructure as described in the project description. Only activities applicable to the development have been applied for and assessed. The listed activities presented in the EIR are the same as those presented in the application form and the approved Final Scoping Report.

I&AP	COMMENT	RESPONSE
	activities applicable to the development must be applied for and assessed.	
DFFE	If the activities applied for in the application form differ from those mentioned in the final EIAR, an amended application form must be submitted. Please note that the Department's application form template has been amended and can be downloaded from the following link https://www.environment.gov.za/documents/forms.	Noted, the listed activities included in the EIR are the same as those included in the application form and the approved FSR, as such no amended application will be submitted to the DFFE.
DFFE	It is imperative that the relevant authorities are continuously involved throughout the environmental impact assessment process as the development property possibly falls within geographically designated areas in terms of numerous GN R, 985 activities. Written comments must be obtained from the relevant authorities and submitted to this Department	Comments have been obtained from SANParks (managing authority), DFFE: Biodiversity and Conservation, SAHRIS as well as DFFE. A meeting was held with Oceans and Coasts on the 11th of April 2021. Two ELC meetings have been conducted on the EIR. All comments received to date as well as the minutes of meetings held with relevant authorities are included in Appendix 2 of this report. A detailed issues and response trail are included as a separate document, labelled Appendix 3.
DFFE	(c) Public Participation Process From the information presented in the draft EIAR, it is noted that there are concerns from interested and Affected Parties (I&APs) with regards to, inter-alia, the impact of discharges on the water quality, impact of blasting on the marine environment and the storm water management. You are required to adequately address these concerns. The preferred alternative intake servitudes and preferred alternative discharge servitudes to be presented in the final EIA phase must meet both the Coega Development Corporation (CDC) requirements as well as addressing concerns raised by I&APs, (including	CES is confident at all I&AP concerns have been adequately addressed. Please refer to Appendix 3 for a comprehensive Issues and Response Trail. Please note that some of the issues previously submitted by SANParks on the Scoping Report has been re-visited and the responses updated with the relevant information from the Marine Ecological Assessment which was not available at that time.

I&AP	COMMENT	RESPONSE
	SANParks) during the environmental authorisation process.	
DFFE	Please ensure that all comments from all relevant stakeholders are submitted to the Department with the final EIAR. Further ensure that all issues raised, and comments received during the circulation of the draft EIAR from registered I&APs and organs of state which have jurisdiction in respect of the proposed activity are adequately addressed and responded to in the final EIAR. Proof of correspondence with the various stakeholders must be included in the final EIAR. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments.	CES is confident at all I&AP concerns have been adequately addressed. Please refer to Appendix 3 for a comprehensive Issues and Response Trail. In addition, please refer to Appendix 2 for proof of correspondence.
DFFE	A Comments and Response trail report (C&R) must be submitted with the final EIAR. The C&R report must incorporate all comments for this development. The C&R report must be a separate document from the main report and the format must be in the table format. All comments from I&APs must be responded to adequately. A response such as "noted" is not regarded as an adequate response to I&AP's comments. Comments from each submission must be responded to individually. The dates in which comments were received must be recorded in the C&R.	All comments received during the mandatory public participation period on the DEIR as well as comments received the during the Scoping Phase as well as historical comments received on previous applications have been incorporated into a separate Comments and Response Report (Appendix 3).
DFFE	The Public Participation Process must be conducted in terms of Regulation 39, 40, 41, 42,43 & 44 of the EIA Regulations,2014, as amended,	The PPP process has been conducted in line with these regulations (refer to Chapter 6 of the EIAR) and the approved PPP Plan.

I&AP	COMMENT	RESPONSE
DFFE	**(d) Cumulative Assessment** Should there be any other similar projects within a 30km radius of the proposed development site, the cumulative impact assessment for all identified and assessed impacts must be refined to indicate the following: Identified cumulative impacts must be clearly defined, and where possible the size of the identified impact must be quantified and indicated, i.e. hectares of cumulatively transformed land.	By definition, cumulative marine environmental impacts emanating from the proposed project are related to the overlap with various other sources of anthropogenic disturbance in the vicinity of the proposed servitudes. The "zone of impact" where cumulative impacts may be of concern has been defined by the dispersion modelling results (i.e. the zone size was determined by analysing the figures produced by the dispersion model and measuring the largest plume size on Google Earth by the Marine Ecological Specialist). Under the worst-case scenario, this zone of impact extents some 10 km along shore, and ~ 3 km offshore. Cumulative impacts are only of concern within this "zone of impact". Anthropogenic disturbances outside this zone of impact will have no influence on the extent or significance rating of the impact and are therefore not relevant to this assessment i.e. impacts occurring outside of this zone of impact but within the 30 km radius are not applicable to this assessment because they will not take place. There are three identified anthropogenic impacts within the zone of impact as defined by the dispersion modelling: 1) the impacts of the simultaneous operation of the multiple pipeline servitudes described in the proposed development; 2) the impacts of the Port of Ngqura, and 3) the development of the Algoa 7 fin-fish aquaculture. This section has been updated in both the Marine Ecological Assessment as well as the EIR.
DFFE	Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project.	As above

I&AP	COMMENT	RESPONSE
DFFE	The cumulative impacts significance rating must also inform the need and desirability of the proposed development.	Cumulative impacts have been considered for the needs and desirability.
DFFE	A cumulative impact environmental statement on whether the proposed development must proceed.	This is included in Section 10.1 of the EIR.
DFFE	**(e) Specialist Declaration of Interest** Specialist Declaration of Interest forms must be attached to the final EIAR. You are therefore requested to submit original signed Specialist Declaration of Interest forms for each specialist study conducted. The forms are available on Department's website (please use the Department's template).	Specialist declarations has been included in Appendix 15 of the Final EIR, with the exception of the Wetland Assessment and the Archaeological Assessment that was conducted previously for the greater CDC. The forms are scanned versions of the original signed specialist declaration forms to allow for electronic submission.
DFFE	**(f) Undertaking of an Oath** • Please note that the final EIAR must have an undertaking under oath/ affirmation by the EAP. • Based on the above, you are therefore required to include an undertaking under oath or affirmation by the EAP (administered by a Commissioner of Oaths) as per Appendix 3 of the NEMA EIA Regulations, 2014, as amended, which states that the EIAR must include: "an undertaking under oath or affirmation by the EAP in relation to: i. the correctness of the information provided in the reports; ii. the inclusion of comments and inputs from stakeholders and I&APs; iii. the inclusion of inputs and recommendations from the specialist reports where relevant; and	An undertaking of an Oath has been included in the FEIR as Appendix 17.

I&AP	COMMENT	RESPONSE
	(M any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties'.	
DFFE	**(g) Details and Expertise of the EAP** Please ensure that the Final EIAR includes the details and expertise of the EAP, including a curriculum vitae, in order to comply with the requirements of Appendix 3 of the NEMA EIA Regulations, 2014, as amended.	The EAP for the project is Dr Alan Carter. This is outlined in Section 1.6 of the EIR. Section 6.1 also provides a short overview of his expertise, as well as the expertise for the remaining project team. A CV for Dr Carter is included in Appendix 1 of this document.
DFFE	**h) Environmental Management Programme** The EMPr must also include the following: All recommendations and mitigation measures recorded in the EIAR and the specialist studies conducted.	We have gone through all the relevant documents and double checked that all recommendations and mitigation measures recorded in the EIAR and the relevant specialist studies have been incorporated into both the Construction and Operation EMPrs.
DFFE	An environmental sensitivity map indicating environmental sensitive areas and features identified during the assessment process.	The preferred layout, superimposing all terrestrial and marine based sensitive features have been included as Figure 1.2 in the Construction EMPr as well as the Operational EMPr.
DFFE	In addition to the above, the EMPr must comply with Appendix 4 of the EIA Regulations, 2014, as amended.	Both the Construction and the Operational EMPrs include a Table (Table 1.1), which outlines the requirements of the EMPr as set out in Appendix 4 of the NEMA EIA Regulations (2014 and subsequent 2017 amendments) and this has been cross-referenced it to where those specific requirements are addressed in the documents.
DFFE	**(i) General** Please ensure that the final EIAR includes the period for which the Environmental Authorisation is required and the date on which the activity will be concluded as per Appendix 3 of the NEMA EIA Regulations, 2014, as amended.	The EAP has included that the activity will commence within 5 years of receiving the EA, with an option to apply for an extension for a further 5 years. This is in line with other EA's received from DFFE in regard to projects within the SEZ. Appendix 3, Section (r) of the EIA Regulations state: "Where the proposed activity **does not** include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised". The operational aspects of this project have been

I&AP	COMMENT	RESPONSE
		included in the EIR and thus this is not considered to be relevant to this project.
DFFE	You are further reminded to comply with Regulation 23(1)(a) of the NEMA EIA Regulations, 2014, as amended, which states that'. "The applicant must within 106 days of the acceptance of the scoping report submit to the competent authority - {a) an environmental impact assessment report inclusive of any specialist reports, and an EMPr, which must have been subjected to a public participation process of at least 30 days and which reflects the incorporation of comments received, including any comments of the competent authority."	CES can confirm that the Draft EIAR, specialist studies and EMPrs have been subjected to the required 30 day I&AP comment period from 7 April – 10 May 2021 (refer to Chapter 6 of this document). All comments received during this period have been incorporated here, as well as in a stand-alone IRT inclusive of all comments received on the project to date. This report is available as Appendix 3. Based on our calculations the Final EIR is due to the Department on the 17th of June 2021. Regulation 23 (1) states that "The applicant must within 106 days of the acceptance of the scoping report submit to the competent authority….." Regulation 3 (5) states that: "Where a prescribed timeframe is affected by one or more public holidays, the timeframe must be extended by the number of public holiday days falling within that timeframe." There are 7 public holidays during that period: 21 March – Human Rights Day 22 March – Public Holiday as Human Rights Day Fall on a Sunday 2 April – Good Friday 5 April – Family Day 27 April – Freedom Day 1 May – Workers Day 16 June – Youth Day The 26th of April is a school holiday as Freedom Day falls on the Tuesday, as this is a school holiday this has not been factored this into our calculations.

I&AP	COMMENT	RESPONSE
		The approval of the Scoping Report was dated 24th of February 2021 (Received by the EAP on the 1st of March).
DFFE	Should there be significant changes or new information that has been added to the final EIAR or EMPr which changes or information was not contained in the reports or plans consulted on during the initial public participation process, you are required to comply with Regulation 23(1)(b) of the NEMA EIA Regulations, 2014, as amended, which states: "The applicant must within 106 days of the acceptance of the scoping report submit to the competent authority - (b) a notification in writing that the reports, and an EMPr, will be submitted within 156 days of acceptance of the scoping report by the competent authority, or where regulation 21(2) applies, within 156 days of receipt of application by the competent authority, as significant changes have been made or significant new information has been added to the environmental impact assessment report or EMP4 which changes or information was not contained in the reports or plans consulted on during the initial public participation process contemplated in sub regulation (1)(a) and that the revised environmental impact assessment report or EMPr will be subjected to another public participation process of at least 30 days'. Should you fail to meet any of the timeframes stipulated in Regulation 23 of the NEITIA EIA Regulations, 2014, as amended, your application will lapse. You are hereby	CES can confirm that there have not been any significant changes or inclusion of new information other than: • Additional mitigation measures proposed by SANParks with respect to mitigation and monitoring; and • Details on potential infrastructure failure scenarios for the various effluent streams, and proposed contingency plans.

<table>
<tr><th>I&AP</th><th>COMMENT</th><th>RESPONSE</th></tr>
<tr><td></td><td>reminded of Section 24F of the National Environmental Management Act, Act No. 107 of 1998, as amended, that no activity may commence prior to an Environmental Authorisation being granted by the Department.</td><td></td></tr>
<tr><td>Maxhoba-ayakhawuleza Jezile Environmental Officer Directorate: Sustainable Aquaculture Management Department of Environment, Forestry and Fisheries</td><td>Department of Forestry, Fisheries and the Environment, Branch Fisheries Management is the only Department with Marine Aquaculture monitoring and development. The Department has undertaken an Environment Impact Assessment for a sea-based Aquaculture Development Zone and a positive Environmental Authorisation was granted in the beginning of 2020 and the project is under appeals. The ADZ has 3 precents one of them being in front of the Port of Ngqurha (Coega). We would like to know who was part of the I&APs from Branch Fisheries? How far is the process? We would like to receive the document so that we can review and submit comments if there is still time to engage on this process.</td><td>The Coega Development Corporation (CDC) intends to develop marine intake and outfall infrastructure servitude(s), the purpose of which is the provision of seawater for various industries (aquaculture, power provision and desalination) via a number of seawater intakes, and the discharge of treated effluent into the marine environment. As such, infrastructure related to this project needs to be constructed along the coast.

A short description of the proposed infrastructure is included below:

Intake Infrastructure
The rationale for developing combined marine intake servitudes is to have a common user servitude in which a number of possible industries can establish infrastructure required to abstract seawater from the marine environment for their specific purposes. The types of industries that will require seawater can be grouped as follows:
• Aquaculture (Finfish)
• Aquaculture (Abalone)
• Desalination
• Power stations (cooling water)
• LNG Gas hub

The following maximum (worst-case) seawater intake requirements are projected:
<table>
<tr><th>Purpose</th><th>Worse case intake flo rates</th></tr>
<tr><td>Cooling Water: Once-through Cooling</td><td>14.70 m^3/sec</td></tr>
</table>
</td></tr>
</table>

I&AP	COMMENT	RESPONSE

Cooling Water: Wet Mechanical Draft Cooling	0.42 m^3/sec
Aquaculture flow through system for abalone	5.00 m^3/sec
Aquaculture recirculation system for finfish	0.94 m^3/sec
Desalination	2.03 m^3/sec
Total	**23.09 m^3/sec**

There will be two seawater abstraction servitudes with associated infrastructure:

1. Inside the Port of Ngqura for Once-through and Wet Mechanical power station cooling water requirements; and
2. East of the Port of Ngqura to meet the more specific water quality requirements of the aquaculture industries, and for desalination.

Within each servitude, a number of different seawater abstraction technologies will be utilised, depending on industry requirements. Therefore, ALL the following types of abstraction technologies will be implemented:

- Abstraction basin with concrete intake channels (within the Port);
- Seawater abstraction pipelines;
- Vertical beach wells;
- Onshore pump stations and screening facilities; and
- WEROP wave pumps.

Detailed descriptions of these technologies are provided in the Draft Environmental Impact Assessment Report.

OUTFALL Infrastructure

The rationale for developing an integrated marine discharge servitude is to have a common user servitude in which a number of possible industries can establish infrastructure required to discharge effluent into the marine

<table>
<tr><th>I&AP</th><th>COMMENT</th><th>RESPONSE</th></tr>
<tr><td></td><td></td><td>environment. The types of industries that may require discharge of effluent can be grouped as follows:

• Aquaculture (Finfish)
• Aquaculture (Abalone)
• Brine from desalination
• Discharge for power stations
• Discharge for LNG Gas hub
• Waste water from Waste Water Treatment Works (WWTW)

The following maximum (worst-case) effluent discharge requirements are projected:
<table>
<tr><th>Purpose</th><th>Type of effluent</th><th>Worse case discharg</th></tr>
<tr><td>Cooling water: once through cooling</td><td>Seawater at 28°C and salinity of 35 ppt</td><td>14.70 m^3/sec</td></tr>
<tr><td>Cooling water: wet mechanical draft cooling</td><td>Seawater at 23°C and salinity of 53 ppt</td><td>0.30 m^3/sec</td></tr>
<tr><td>Aquaculture flow through system for abalone</td><td>Seawater with projected concentrations of ammonia, nitrate, nitrite, TSS, COD.</td><td>5.00 m^3/sec</td></tr>
<tr><td>Aquaculture recirculation system for finfish</td><td>Seawater with projected concentrations of ammonia, nitrate, nitrite, TSS, COD.</td><td>0.94 m^3/sec</td></tr>
<tr><td>Desalination brine</td><td>Brine at 60 ppt</td><td>1.22 m^3/sec</td></tr>
</table>
</td></tr>
</table>

I&AP	COMMENT	RESPONSE

Wastewater	Treated domestic and industrial wastewater with projected concentrations of ammonia, nitrate, nitrite, TSS, COD, salinity heavy metals and E.coli	0.93 + 0.46 m^3/sec	
Stormwater	Rainwater	Uncertain	
TOTAL		**23.55 m^3/sec**	

ALL the following technologies will be implemented to discharge the various effluent streams from the various proposed land-based uses into the sea:

- Tunnel discharge;
- Pipeline discharge; and
- Surf zone discharge.

Detailed descriptions of these technologies are provided in the Draft Environmental Impact Assessment Report (Draft EIAR).

STORMWATER

Stormwater derived from Zone 10 will be attenuated on land behind the foredune area, approximately 40-50 m from the HWM. The stormwater outlet channel will run parallel to the HWM but behind the foredune, and will comprise of gabions and reno mattresses to break the flow of water before it enters a gently sloping lined channel (0%-0.5% slope). This will attenuate the stormwater and allow for the infiltration of water into the underlying sandy substrate. The stormwater structures have been designed to attenuate the 1:5 year storm event. Three outlet channels will be constructed. A berm surrounding the outlet channel will prevent the overflow of stormwater into the surrounding beach environment. A large reno mattress and associated gabions on the far end of the outlet channel will extend to the rocky shoreline to ensure the system can accommodate major

I&AP	COMMENT	RESPONSE
		rainfall events (>1:5 year) which may result in the overflow of water from the stormwater outlet channel. **FURTHER DETAILS** The proposed Marine Intake and Outfall Infrastructure Servitude Project triggers a Scoping and EIA Process in terms of the 2014 EIA Regulations (as amended in 2017) due to the proposed development triggering Listing Notice (LN) 2 activities, including LN 2 GNR. 984: Activities 6, 14 and 26. In addition to the aforementioned LN 2 activities, the proposed development will trigger numerous activities in LN 1 (GNR. 983) and LN 3 (GNR. 985). Coastal & Environmental Services (Pty) Ltd, trading as CES, has been appointed to undertake the required Scoping and EIA Process on behalf of the proponent. The Marine Intake and Outfall Infrastructure Servitude Project Draft EIAR was available for public review from the 7TH of April until the 10th of May 2021. We are currently in the process of finalising the Final EIAR. However, a copy of the Draft EIAR can still be accessed and/or downloaded via the following links: • CES website: http://www.cesnet.co.za/marine-intake-and-outfall-infrastructure-servitude • CDC website: https://www.coega.co.za/DocumentList.aspx?cmd=browse&objID=80&catID=51 Please note that you have now been registered as an I&AP on the Stakeholder Database for the abovementioned project. As such, you will be notified of the submission of the Final EIAR to the Department of Forestry, Fisheries and Environment (DFFE). Comments on the Final EIAR can still be submitted to the case officer, Ms Constance Musemburi (email: CMusemburi@environment.gov.za).

I&AP	COMMENT	RESPONSE
		Please do not hesitate to contact me should you have any queries. Please note that the following officials from DFFE were notified of the proposed development: Milicent Solomons, Luyanda Veto, Wayne Hector, Constance Musemburi, Masina Litsoane, Rose Masela, Stanley Tshitwamulomoni, Yazeed Peterson, Reuben Molale, Tandiwe Njajula, Mulalo Tshikotshi and Mpho Ligudu. As far as we are aware, this sub-unit is responsible for aquaculture environmental interactions, which entails commenting on the impact to the environment assessments associated with aquaculture activities. Please note that the aquaculture component of this application has already been approved (EA received on the 7th of February 2018). This application only deals with discharge infrastructure from the various industries (inclusive of cooling and heating water from power plants, land based abalone and finfish aquaculture, brine from desalination plant, stormwater), which is the mandate of Oceans and Coasts.

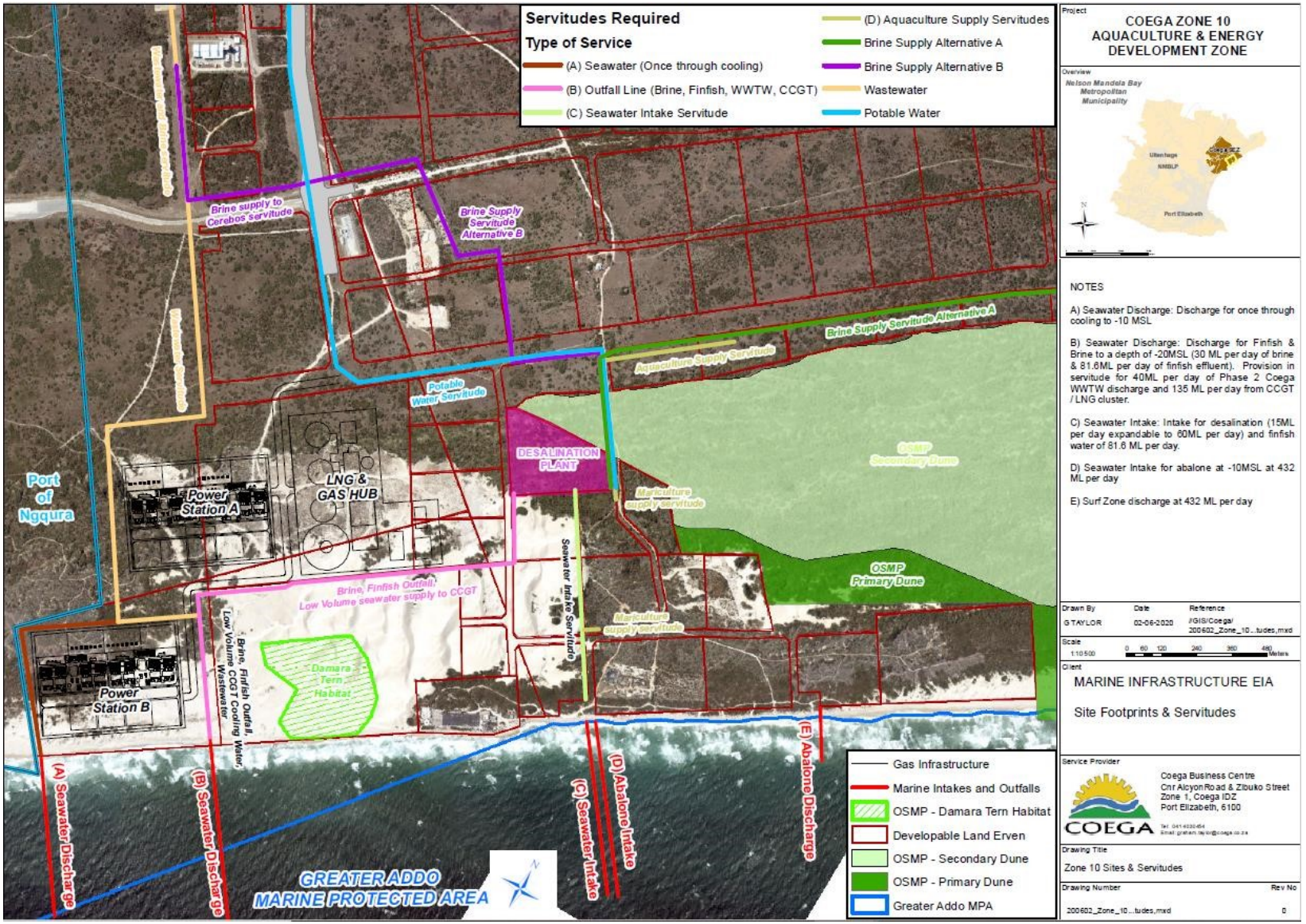

Figure 6.1: Detailed baseline plan for the Coega SEZ Zone 10 Aquaculture and Energy Development Zone.

6.3.4 Public Participation Tasks

The Public Participation Process was divided into four phases which allowed for initial (pre-application) stakeholder identification, as well as engagement during the Scoping Phase, the EIA Phase and the Environmental Authorisation Phase. The tasks which were carried out at each phase are described in the table below:

DATE	PHASE	MEETING AND/OR DELIVERABLE	OBJECTIVE/STATUS
1 July 2020	Initiation	E-notice placed at CDC Business Centre	Compliant with Section 41 of NEMA
06 November 2020		Pre-assessment notifications were distributed.	Compliant with Section 41 of NEMA
13 November 2020	Scoping Phase	Notifications of the availability of the Draft Scoping Report for public review were distributed to all IAPs, and its availability advertised in The Herald.	Compliant with Section 40 of NEMA
15 December 2020		A Comments and Response Trail was compiled and incorporated into the Final Scoping Report	All issues and/or comments raised by registered interested and affected parties have been documented in writing and responded to by the EAP.
7 April 2021	EIA Phase	Notifications drawing attention to the availability of the Draft EIAR for public review were drafted and sent to all registered IAPs and a newspaper advertisement placed in The Herald.	To comply with Section 40 of NEMA
10 May 2021		A Comments and Response Trail was compiled and been incorporated into the Final EIAR, and amendments to this document, the Specialist Reports and the EMPr were made in response to IAP comments.	As per legal requirements all issues and/or comments raised by registered interested and affected parties need to be documented in writing and responded to by the EAP

7 KEY FINDINGS OF SPECIALIST ASSESSMENTS

The following Specialist Studies were conducted as part of the EIA Process:

1. Marine and Underwater Cultural and Archaeological Impact Assessment;
2. Environmental Economic Impact Assessment;
3. Marine Dispersion Modelling and Environmental Risk Assessment;
4. Review of existing Baseline Marine Ecology Report;
5. Geotechnical Assessment;
6. Ecological Impact Assessment;
7. Aquatic Impact Assessment – Existing study findings incorporated into the EIA; and
8. Heritage Impact Assessment – Existing study findings incorporated into the EIA.

The Key Findings for the above-mentioned studies are provided below:

7.1 MARINE AND UNDERWATER CULTURAL AND ARCHAEOLOGICAL IMPACT ASSESSMENT

The Archaeological Impact Assessment (AIA) was required to identify sensitive cultural heritage sites in the affected environment. The aim of the survey was to attempt to locate, identify, evaluate and document potential underwater and cultural heritage sites within the designated area.

To conduct the study, a Geometrics G-882 cesium-vapor marine magnetometer was towed behind a 7.8m fibreglass rigid inflatable boat (RIB), with a layback of 15 meters, at an average speed of 3 - 6 knots/hour, utilising 15m run-lines. The magnetometer data collected by MagLog® software was analysed twice. The first or field analysis was performed as the magnetometer is towed. Possible sites are tabulated and analysed according to the environmental conditions in the field. These conditions include:

- Shipping
- Weather / Sea conditions
- Channel marker buoys and markers
- Other metal objects in the vicinity

The post-field analysis was interpreted with geophysical software (Surfer), with knowledge of the environmental conditions. The analyses were compared and a final analysis completed.

A number of small magnetic anomalies were identified during the magnetometer survey. The majority of these were in the surf zone. Generally, shipwrecks, even wooden ones represent as larger magnetic signatures. However, in the interests of thoroughness, dives were undertaken on accessible sites. Only one metal object was found, a metal pipe, which confirmed the reliability magnetometer data.

The specialist assessment concluded that due to the small size of the anomalies, their location close to the shoreline and what was found on the diver searches, that the anomalies probably represent construction debris from the old oyster farm on the beach and from the port's construction.

While there is an extremely low probability that shipwrecks will be found underwater, there exists a chance that shipwreck material and/or pre-colonial sites (shell middens and stone tools) may be found in the dunes during construction. If such materials are found, the following mitigation measures must be implemented:

- An archaeologist must be appointed for the duration of the construction phase of the project. An alternative is for an archaeologist to be appointed on retainer, to be available at short notice during the construction phase, to visit the site in the event that any possible artifacts are discovered.
- The appointed archaeologist must have the requisite experience and knowledge to recognise both maritime and coastal cultural heritage that may be found in the beach/dune area.
- The appointed archaeologist must present a short induction to familiarise the contractors and workers, including divers, of the potential to find heritage material artefacts that may be exposed during work. This includes Stone Age, Early Farming Communities, Colonial Period and Shipwreck artefacts and burials. These need to be described during the induction, and pictures provided to aid their identification by the ECO and other personnel.
- Should any heritage artefacts be exposed during marine excavations, work in the immediate area where the artefacts were discovered shall cease immediately and the archaeologist notified as soon as possible.
- All discoveries shall be reported immediately to the archaeologist so that an investigation and evaluation of the finds can be made. The archaeologist will advise the necessary actions to be taken, including notifying SAHRA. If the artefacts are below the high water mark, SAHRA's MUCH Unit must be contacted.
- Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and
- Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or paleontological artefacts, as set out in the NHRA (Act No. 25 of 1999), Section 51. (1).

The Marine and Underwater Cultural and Archaeological Impact Assessment was submitted to SAHRA and a response was received on the 15th of December 2020, which stated that SAHRA supported the mitigation / recommendations made in the report (please refer to official letter included below).

MARINE SERVITUDES FOR THE COEGA SEZ, PORT ELIZABETH

Our Ref:

an agency of the
Department of Arts and Culture

T: +27 21 462 4502 | F: +27 21 462 4509 | E: info@sahra.org.za
South African Heritage Resources Agency | 111 Harrington Street | Cape Town
P.O. Box 4637 | Cape Town | 8001
www.sahra.org.za

Enquiries: Briege Williams
Tel: 021 462 4502
Email: bwilliams@sahra.org.za
CaseID: 15838

Date: Tuesday December 15, 2020
Page No: 1

Interim Comment

In terms of Section 38(8) of the National Heritage Resources Act (Act 25 of 1999)

Attention: Dr Chantel Bezuidenhout
Coastal & Environmental Services - Port Elizabeth

The Coega Development Corporation (CDC) plans to establish marine pipeline servitudes in which current and future investors in the Coega Special Economic Zone (SEZ) can establish infrastructure to abstract seawater and discharge treated effluent as required by various industrial processes. More than one servitude will be established, based on the findings of the marine dispersion modelling that has been done. The project entails the selection of the servitude areas, as well as the construction and establishment of associated infrastructure in the marine environment and on land, including pipelines, pump stations, holding reservoirs (PRDW 2020). As part of the Environmental Impact Assessment (EIA), an Underwater Archaeological Impact Assessment (UAIA) needed to be undertaken to identify sensitive cultural heritage sites in the affected environment. The aim of the survey was to attempt to locate, identify, evaluate and document potential underwater and cultural heritage sites within the designated area.

The South African Heritage Resources Agency (SAHRA) would like to thank you for submitting the Draft Environmental Scoping Report for the Marine Intake and Outfall Infrastructure Servitude Project, Zone 10, Coega SEZ, Eastern Cape Province, South Africa.

The purpose of the marine intake and outfall infrastructure and servitudes project is for the provision of seawater to various industries (aquaculture, power provision and desalination) via a number of seawater intakes and the discharge of treated effluent into the marine environment. As such, infrastructure related to this project needs to be constructed along the coast adjacent to the Coega SEZ.

The Draft Scoping report notes that a Maritime Heritage Impact Assessment (MHIA) is needed, SAHRA supports this and is pleased to see that an MHIA has been submitted as part of the supporting documents.

The MHIA consists of a desk-based assessment of the area as well as a magnetometer and divers survey. While the desk-based research noted that Algoa Bay has historically been a busy area with lots of reported wrecks, none are reported as being directly within the survey area, thought the co-ordinates are not always

an agency of the
Department of Arts and Culture

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accurate. The magnetometer survey picked up a few anomalies which were investigated by divers but these were either modern debris or could not be located. The poor conditions also meant that the anomalies closer into the shore could not be inspected. There was no evidence of cultural resources recorded during the survey.

The recommended management measures in Section 10 of the MUCHIA are supported by SAHRA and must be implemented during the project. The Scoping Report and subsequent Environmental Impact Assessment must make reference to the MUCHIA and the potential for previously unknown maritime heritage resources to be uncovered during the works. The Scoping Report and subsequent Environmental Impact Assessment must be submitted to SAHRA via the South African Heritage Resources Information System (SAHRIS) for comment.

SAHRA has noted a few inaccuracies in the Draft Scoping Report which need to be addressed in any subsequent documents.

The table under Section 6.3 Assessment of Issues lists potential issues and possible mitigation measures. In the table on page 138 under the Issue of Impacts on Archaeological, Palaeontological and Cultural Sites, the mitigation measure reads

- "*Should any archaeological or cultural sites or objects be located during the construction of the proposed project, it should immediately be reported to the National Heritage Council. Failure to report a site or object of archaeological* and/or cultural sig*nificance is a contravention of the National Heritage Act (Act No. 25 of 1999)*"

The responsible agency is SAHRA and not the National Heritage Council so this section needs to be revised to reflect that any discoveries must be reported to SAHRA.

7.2 ENVIRONMENTAL ECONOMIC IMPACT ASSESSMENT

The overall objectives of the EEIA were to:

- Describe the costs and engineering requirements of required infrastructure to transport effluent to the western and eastern side of Port; and
- Quantify and compare the engineering costs with environmental costs of discharging to the east, and the impact of western discharge on viability of various industries

7.2.1 Direct capital and operating costs

The study determined that it will cost an additional R9.5 billion to transport and discharge all six effluent streams to the west of the Port. This represents an increase of 25% in combined total project costs over a 20 year period, and an increased cost as a percentage of total project costs ranging from 21% to 37% (Table 7.1).

Table 7.1: Comparison of the direct capital and operational costs between discharging effluent streams to the east versus the west of the Port of Ngqura.

COST CATEGORY	R' MILLION	R' MILLION
	EAST	WEST
Total project capital cost	38 053	38 053
Reticulation to west	-	9 499
Sub Total	38 053	47 552
% increase in total cost		25%
Abstraction and discharge to east or west		
Capital cost	2 439	2 439
Total annual ops costs over 20 years	5 495	5 495
Sub Total	7 934	7 934
Additional reticulation to west		
Capital cost	-	1 956
Total annual ops costs over 20 years	-	7 543
Sub Total	-	9 499
Combined Total	7 934	17 433
Discharge cost as % of total project cost	21%	37%

7.2.2 Impact of western discharge on viability of various industries

The study determined that the significance of the capital and operating costs associated with transporting the effluent streams from the east to the west of the Port of Ngqura, varies between industries. The industries that use greater quantities of seawater are more greatly affected by the additional western discharge costs. Once Through Cooling and abalone aquaculture are the most affected due their respective high seawater requirements. They

contribute about R6 billion (63%) and R2 billion (21%), respectively, to the total R9.5 billion additional direct cost to transport effluent to the west of the Port (Table 7.2).

Table 7.2: Summary of the direct individual industry capital and operating costs associated with transporting effluent streams from the east to the west of the Port of Ngqura.

EFFLUENT STREAMS	ONCE THROUGH	WET MECHANICAL	ABALONE	FINFISH	DESALINATION	WASTEWATER	TOTAL
	R million	R million	R million	R million	R million	R million	R million
Total project capital cost	14 100	12 735	3 000	7 000	450	768	38 053
Abstraction and discharge							
Capital cost	1 041	164	354	64	142	675	2 439
Total annual ops costs over 20 years	3 340	120	1 136	204	454	240	5 495
TOTAL CAP AND OPS COST OVER 20 YEARS	4 381	284	1 490	268	596	915	7 934
Discharge cost as % of total project cost	31%	2%	50%	4%	132%	119%	21%
ADDITIONAL COST FOR RETICULATION FROM EAST TO WEST							
Capital cost pipelines	1 250	34	425	77	170	119	1 956
Total annual ops costs over 20 years	4 821	131	1 640	295	656	459	7 543
TOTAL CAP AND OPS COST OVER 20 YEARS	6 071	165	2 065	372	826	578	9 499
	63%	2%	21%	3%	6%	5%	
TOTAL COST TO DISCHARGE WEST	10 452	449	3 555	640	1 422	1 493	17 433
Discharge cost as % of total project cost	74%	4%	119%	9%	316%	194%	46%
% increase in discharge cost	58%	37%	58%	58%	58%	39%	54%

With respect to the impact on the individual industries, the additional direct cost to transport effluent to the west of the Port represents a significant increase in:

- Discharge costs: ranging from 37% for Wet Mechanical Cooling up to 58% for other streams; and
- Discharge cost as a percentage of total project cost: ranging from 4% for Wet Mechanical Cooling up to over three times (316%) for desalination.

Based on the above, it can be concluded that the additional cost to transport effluent streams will without doubt have a significant impact on the financial viability of the respective industries and other land-based activities such as the Coega SEZ wastewater treatment facility.

7.2.3 Direct, indirect and external environmental and social costs

The EEIA has attempted to systematically identify and assess the overall economic significance of the impact of the proposed effluent discharges on the ecosystem goods and services provided by the affected terrestrial and marine ecosystems. This was achieved by identifying all the relevant ecosystem goods and services associated with the affected terrestrial and marine environments, attaching where possible an economic value, and assessing the likely economic impact based on the impact ratings provided in the Final Scoping Report and specialist Marine Impact Assessment (Anchor, 2021).

A very important assumption was that the significance of the environmental and social economic impacts (impacts to ecosystem goods and services) is directly proportional to the significance of environmental impacts as determined by the:

- Final Scoping Report; and
- Specialist Marine Impact Assessment (Anchor, 2021).

In addition, there are inherent uncertainties and gaps in knowledge with respect to the valuation of ecosystem goods and services. Attaching values to less tangible goods and services that have no material benefit to which one can attach a monetary value, can be difficult and subjective.

Table 7.3 and Table 7.4 below summarises this information including whether there are likely to be any impacts, the nature of the associated ecosystem goods and services and whether there is any potential economic value associated with the ecosystem goods and services.

Table 7.3: Summary of terrestrial environment.

ENVIRONMENT	POTENTIAL IMPACT	DESCRIPTION OF ENVIRONMENT	ECOSYSTEM SERVICES	POTENTIAL ECONOMIC VALUE
PHYSICAL ENVIRONMENT				
Topography	**YES**	Describes topography	Biological habitat	Unable to attach value.
Surface Hydrology	**YES**	Describes hydrology including waster courses and wetlands	Biological habitat and water resources	Cost to remediate surface water resource R1 to R10 million.
Groundwater	**YES**	Describes groundwater resources	Water resources	Cost to remediate ground water R1 to R10 million.
Climate	**NO**			
Geology and soils	**NO**			
BIOLOGICAL ENVIRONMENT				
Flora	**YES**	Describes floral biota including: Cape Seashore Vegetation and St Francis Dune Thicket. Both classified as 'least threatened'.	Biological habitat, cognitive and non-use value	Unable to attach value.
Fauna	**YES**	Describes faunal biota including amphibians, reptiles, mammals and birds including the critically endangered Damara Tern.	Biological habitat, cognitive and non-use value	Unable to attach value.
Conservation planning	**YES**	Provincial – Eastern Cape Biodiversity Conservation Plan entire Coega SEZ area located in an Ecosystem Support Area (ESA) 1.	Biological habitat, cognitive and non-use value	Unable to attach value.
SOCIO-ECONOMIC				
Education	**YES**	Describes educational levels in the area.	Cognitive values	Possible value of research projects within MPA R1 to R10 million PA.
Health	**NO**			
Economic Profile	**NO**			
Land Use	**NO**			
Cultural Heritage	**YES**	Describes heritage assets including shipwrecks	Cultural and heritage	Damage to shipwrecks R1-R10 million.
Noise	**YES**	Noise during construction	Recreation and leisure	Unable to attach value
Visual	**YES**		Recreation and leisure	Unable to attach value

Table 7.4: Summary of marine environment.

ENVIRONMENT	POTENTIAL IMPACT	DESCRIPTION OF ENVIRONMENT	ECOSYSTEM SERVICES	POTENTIAL ECONOMIC VALUE
PHYSICAL OCEANOGRAPHY				
Currents	NO			
Waves and tides	NO			
Water quality	YES	Algoa Bay does not generally have elevated concentrations of nutrients and trace metals.	Bioremediation of waste	Same as cost to treat on land to ambient standards. Could amounts to R billions.
Offshore pelagic region	NO			
MARINE ECOLOGY				
Regional biogeography	NO			
Rocky intertidal shores	YES	Describes associated floral and faunal biota.	Biological habitat, cognitive and non-use value	Unable to attach value.
Sandy shores and surf zones	YES	Describes associated floral and faunal biota.	Biological habitat, cognitive and non-use value	Unable to attach value.
Estuaries	YES	Coega estuary listed as critically modified with almost complete loss of floral and faunal biota.	No value	No value
Subtidal habitats	YES	Describes associated floral and faunal biota.	Biological habitat, cognitive and non-use value	Unable to attach value.
Birds	YES	Describes birds in the region with particular emphasis on the African penguin colony on St Croix Island listed as “Endangered”.	Biological habitat, cognitive and non-use value	No value attached to possible extinction risk to African penguin.
Cetaceans	YES	Describes distribution and migration of various whale and dolphin species in Algoa Bay.	Biological habitat, cognitive and non-use value	Unable to attach value.
Seals and sharks	YES	Describes distribution and migration of Cape fur seal and various shark species in Algoa Bay including	Biological habitat, cognitive and non-use value	Unable to attach value.

ENVIRONMENT	POTENTIAL IMPACT	DESCRIPTION OF ENVIRONMENT	ECOSYSTEM SERVICES	POTENTIAL ECONOMIC VALUE
		Great White which attracts tourists.		
Alien and invasive species	NO			
HUMAN USES AND INFLUENCES				
Recreational users	YES	Describes various recreational activities that may be affected by the Coega pipeline servitudes, including: shore-based fishing, scuba diving, beach use, motorised and non-motorised water sports.	Leisure and recreation	Value estimated at R1 to R10 million PA.
Commercial users				
Tourism	YES	Marine eco-tourism such as whale and shark watching.	Leisure and recreation	Shark viewing industry – possible value up R1 to R10 million PA, based on study done on Aliwal Shoal MPA (Dicken and Hosking, 2009).
Wild caught commercial fisheries				
• Small pelagic	YES	Pilchard only targeted species in Algoa Bay. Annual effort within Ngqura area a very small proportion of National catch but 12% of Eastern Cape average catch.	Food provision	Value estimated at R10 to R100 million PA.
• Squid jig fishery	YES	Catch effort from Plettenberg Bay to the Wild Coast.	Food provision	Value estimated at R350 to R600 million PA.
• Traditional line fishery	YES	Total catch in Algoa Bay of about 500 tons PA.	Food provision	Value in the order of R12 million PA.

ENVIRONMENT	POTENTIAL IMPACT	DESCRIPTION OF ENVIRONMENT	ECOSYSTEM SERVICES	POTENTIAL ECONOMIC VALUE
• Shark longline	YES	Describes targeted species and near-shore concession blocks in Algoa Bay including Ngqura area which overlaps with the pipeline servitude. About 5% of annual catch in Ngqura area blocks.	Food provision	Value estimated at R10 to R100 million PA.
Aquaculture				
• Sea-based	YES	Describes the proposed sea-based aquaculture precincts. Algoa 7 close to Coega and adjacent to MPA projected to produce 8,500 tons PA.	Food provision	Potential value: R400 million PA.
• Land-based	YES	Describes the proposed land-based Coega aquaculture development zone. Potential production of finfish, 30,000 tons PA, abalone, 3,200 tons PA.	Food provision	Valuation: Finfish – R2.5 billion PA. Abalone – R1.7 billion PA.

Based on the assessment, it is concluded that the environmental and social economic impacts associated with the discharge of the proposed effluent streams into the marine environment and the Addo MPA, will not be significant and probably not material. In addition, the impacts (limited as they are) are likely to be the same or not materially different whether discharging in the east (within the Addo MPA) compared with discharging to the west of the Port.

It must be emphasised, however, that the low projected environmental and social economic impacts are contingent on the mitigation measures proposed by the Marine Impact Assessment which reduces the impacts to LOW, VERY LOW and INSIGNIFICANT. The most critical mitigation measure is treating all effluent streams to the end of pipe concentrations specified by PRDW (2020).

7.2.4 Economic benefits of the project

The EEIA has not provided a detailed assessment of the economic and social benefits that the proposed industries associated with the six effluent streams, will potentially provide. However, these are briefly described relating to:

- Energy security
- Water security
- Aquaculture

The EEIA also projected that the carbon footprint for pumping effluent around the Port would amount to 94,608 tCO_2e per annum or 1,892,160 tCO_2e over a 20 year period.

7.2.5 Overall conclusion

Overall, it is concluded that the additional cost to transport the six effluent streams from the proposed industries located in Zone 10 located east of the Port, to the west of the Port, will without doubt have a significant impact on the financial viability of the respective industries and other land-based activities, such as the Coega SEZ wastewater treatment facility.

It is suggested that environmental and social economic impacts, whether the effluent streams are discharged to the east (including the Addo MPA) or to the west of the Port, will not be significant or material compared with the overall investment opportunity and contribution to the local and National economy.

The following mitigation measures are proposed:

- The end of pipe effluent concentration limits stipulated by the dispersion modelling report (PRDW, 2020 and Lwandle, 2020) must be adhered to;
- Appropriate technologies must be thoroughly researched and implemented to ensure end of pipe concentrations are achieved;
- The reuse of effluent water from the wastewater treatment facility must be investigated; and
- A comprehensive monitoring programme of the receiving marine environment must be developed and implemented, especially relating to the potential impacts on endangered species such as the African penguin.

Based on the results of the EEIA, the specialist is of the opinion that Alternative 1 (preferred alternative) involving the discharge of the six effluent streams into the marine environment and Addo MPA located east of the Port of Ngqura, should be approved provided that the proposed recommended mitigation measures are included as conditions in the Environmental Authorisation.

7.3 Marine Dispersion Modelling and Environmental Risk Assessment

The far field hydrodynamic dispersion and behaviour of the effluent discharged from the Coega SEZ was assessed using the three-dimensional MIKE 3 Flow Flexible Mesh Model by PRDW (2020). Near field plume behaviour and diffuser assessment was undertaken by coupling a near-field jet model to the hydrodynamic model (PRDW 2020). Nearshore wave transformation was simulated with the MIKE 21 Spectral Waves (SW) Flexible Mesh model.

Model set-up and calibration are detailed in PRDW (2020). A range of environmental conditions were assessed, with the model run over a period of well-mixed winter conditions (June), and

stratified summer conditions (December). The model performance is adequate, although the model is slightly conservative in the reproduction of dominant current directions and reproduces measured temperature time series (including the well-mixed winter conditions and summer upwelling) (PRDW 2020). This model assessed the dilutions of key water quality parameters (such as temperature, salinity, suspended solids and a conservative tracer) in relation to legislated water quality guidelines at a stipulated mixing zone. Six effluent profiles were modelled under two Scenarios (see Table 7.5). Here, a "scenario" refers to a specific intake and outfall location for each of the six effluent types discussed above, chosen to align with relevant infrastructure within the SEZ. Each effluent was modelled independently for each Scenario.

The main difference between Scenario 1 and 2 is that in Scenario 2 finfish and brine were modelled as one effluent stream. In addition, Scenario 1 consisted of once through cooling (Zone 10S) plus air cooling (Zone 10N) and the vaporisers for the LNG Facility use the warm cooling water from the power plant (only possible for once through cooling). Scenario 2, consisted of wet mechanical cooling for both power stations in Zone 10 and the vaporisers for the LNG facility use sea water from an intake in the Port of Ngqura (Table 7.5)

Effluent constituent characterisation as well as required dilutions and diffuser geometry are detailed in PRDW (2020). It is noted that power plant and desalination co-discharges (such as biocides, like chlorine) were not explicitly modelled, and PRDW (2020) specifies that designers of these plants must ensure that end of pipe water quality guideline limits are met (i.e. 0.2 mg/l pipe end for chlorine).

Table 7.5: Effluent profiles and scenarios modelled by PRDW (2020)

EFFLUENT STREAM	EFFLUENT TYPE AND DISCHARGE	SCENARIO MODELLED	
		1	2
1	Land based **abalone** aquaculture effluent, discharged into the surf zone	√	√
2	**Wastewater 1 (WW1)**: domestic and industrial waste effluent discharged into the Coega River which in turn discharges into the Port of Ngqura	√	√
3	**Wastewater 2 (WW2)**: domestic and industrial effluent discharged offshore via a submarine pipeline (-20 m CD, 3000 m offshore)	√	√
4	**Finfish** effluent from land-based aquaculture discharged offshore via a submarine pipeline (-16 m CD, 1500 m offshore)	√	√
5	Desalination **brine** from a 60 MLD Reverse Osmosis desalination plant discharged offshore via a submarine pipeline (-13.5 m CD, 1000 m offshore)	√	
6	**Cooling water** from the two Liquefied Natural Gas (LNG) power plants discharged offshore via a subterranean tunnel (-11 m CD, 650 m offshore). Combined with heating water from LGN vaporiser (effluent stream 7). Three separate cooling water options: • CW1: Once through cooling (Zone 10S) plus wet mechanical cooling (Zone 10N).	CW2+HW1	CW3+HW2

EFFLUENT STREAM	EFFLUENT TYPE AND DISCHARGE	SCENARIO MODELLED	
		1	2
	• CW2: Once through cooling (Zone 10S) plus air cooling (Zone 10N). • CW3: Wet mechanical cooling (Zone 10S) plus wet mechanical cooling (Zone 10N).		
7	**Heating water** from LNG vaporiser discharged offshore via a subterranean tunnel (-11 m CD, 650 m offshore). Combined with cooling water from LGN power plants (effluent stream 6). Two separate cooling water options: • HW1: The vaporisers use the warm cooling water from the power plant (only possible for once through cooling). • HW2: The vaporisers use sea water from an intake in the Port of Ngqura	CW2+HW1	CW3+HW2

PRDW (2020) and Lwandle (2020) have recommended a 300 m mixing zone for all outfalls. Under ordinary conditions however, a 300 m mixing zone for the proposed Wastewater 1 discharge into the Port of Ngqura via the Coega River would be considered unacceptable. The Assessment Framework for Effluent Discharged from Land Based Sources requires that such a discharge into an estuary meet water quality guidelines at pipe end. However, the Coega Estuary has been assessed by the National Biodiversity Assessment (2018 and 2011) as being irreversibly modified, with an almost complete loss of natural habitat and biota, and that the basic ecosystem functions and processes of the system have been destroyed. As such, a 300 m mixing zone is considered acceptable in this case, on condition that Wastewater 1 effluent does not contain excessively high levels of trace metals (ostensibly from industrial effluent) as per PRDW (2020).

The far field modelling results indicate the following:

- Required dilutions of all parameters measured for the land-based abalone aquaculture met the required dilutions at the 100 m and 300 m Recommended Mixing Zone (RMZ) under both Scenario 1 and Scenario 2, despite the surf zone discharge causing the effluent to become trapped in the nearshore environment.
- Required dilutions were not achieved at the 300 m RMZ under Scenario 1 or Scenario 2 for any of the constituents of Wastewater 1 that were modelled (*E. coli*, TKN + NH4, total suspended solids, salinity). This is because, "*the river discharge into the port results in low dilutions due to the stagnant currents in the port and the plume buoyancy which inhibits vertical mixing*" (PRDW 2020). End of pipe effluent quality must be improved, given that a diffuser is not feasible at the proposed site (see Table 7.6 for required end of pipe values).
- Required dilutions were not achieved at the 300 m RMZ under Scenario 1 or Scenario 2 for any of the trace metals modelled for Wastewater 2, including Hg, Co, Cu, Cd as well as sulphides and Chemical Oxygen Demand (COD). In contrast, *E. coli*, TKN + NH4, total suspended solids and salinity dilutions all met required targets at the 100 m and 300 m RMZ for WW2 discharge for both Scenarios. While dilution is improved due to the diffuser placement at 20 m depth, end of pipe effluent quality must still be improved (see Table

7.2 for required end of pipe values).

- Required dilutions were met for land-based finish aquaculture effluent at the 300 m RMZ under Scenario 1. Adequate dilution was achieved through the diffuser and the 20 m water depth. The required dilutions were not met for ammonia, nitrates and nitrites at the 100 m RMZ. Under Scenario 2 (finfish effluent and brine effluent combined), the diffuser and high jet velocities result in moderate dilutions of the dense mixed effluent, but the required dilutions were not met for ammonia, nitrates and nitrites at the 300 m RMZ. PRDW (2020) state that "*the achieved dilutions are worse in the near-field for the combined effluent (Scenario 2) compared to the separate effluents (Scenario 1)*". PRDW (2020) therefore recommended that the brine and finfish effluent are discharged separately (under Scenario 1), where the required dilutions for all constituents are met.
- Required dilutions were met for the brine effluent at the 100 m and 300 m RMZ under Scenario 1, as a result of the mixing facilitated by the diffuser and high jet velocities (PRDW 2020).
- Required dilutions for the Scenario 1 mix of Cooling Water 2 and Heating Water 1 were met at the 300 m RMZ, with the diffuser at 10 m water depth resulting in moderate dilutions. PRDW (2020) noted that blending the heating and cooling water reduces the difference in temperature, and thus the required dilutions.
- Required dilutions for the Scenario 2 mix of Cooling Water 3 and Heating Water 2 were met at the 300 m RMZ, with an improvement in dilutions achieved over the Scenario 1 mix of Cooling Water 2 = Heating Water 1. PRDW (2020) does note that, should Cooling Water 1 be selected instead of Cooling Water 2 there will be minimal change in the results, i.e. Cooling Water 2 + Heating Water 1 can be changed to Cooling Water 1 + Heating Water 1.

PRDW (2020) therefore recommends Scenario 1, with the following adjustments:

- ***Wastewater 1***: limit the maximum allowable effluent concentrations (end of pipe) for E.coli, TKN + NH4 and TSS (Table 7.2).
- ***Wastewater 2***: limit the maximum allowable effluent concentrations (end of pipe) for heavy metals and COD (Table 7.2).
- Although both ***Cooling Water + Heating Water*** mix options meet the guidelines, the Scenario 2 option of Cooling Water 3 + Heating Water 2 is preferred over the Scenario 1 option of Cooling Water 2 + Heating Water 1.
- Lwandle (2020) notes that both Scenario 1 and Scenario 2 generally meet the DWAF (1995) receiving environment WQGs at realistic RMZ for all discharges except for the Wastewater 1 and Wastewater 2 discharges. Under these discharge scenarios, TSS, nitrogen, trace metals, salinity and COD "*are predicted to be concentrated in the nearfield of the Wastewater 1 discharge but extend into the far-field for Wastewater 2 (especially in the case of Hg)*" (Lwandle 2020).

Of particular concern was the exceedingly high trace metal concentrations present in the wastewater 2 effluent: Lwandle (2020) recommends reduction in end of pipe levels of these metals to prevent the exceedance of acute (lethal effect) toxicity thresholds. Within the dedicated mixing zone, these levels are too high to be permitted. Beyond the 300 m RMZ, Lwandle (2020) notes "*low-risk levels primarily to planktonic organisms*", due to "*short duration of exposure*" before the plumes are dispersed in the far field.

Table 7.6: Required end of pipe concentrations for containments of concern within various effluents, as stipulated by PRDW (2020).

EFFLUENT STREAM	CONSTITUENT	UNIT	MAXIMUM END OF PIPE CONCENTRATION
Wastewater 1	Salinity TKN + NH4 TSS *E.coli*	PSU mg/l mg/l Cfu/100 ml	17 5 55 4500
Wastewater 2	Sulphides Hg Co Cu Cd	mg/l	0.21 0.062 0.21 1.04 0.83
Brine + Finfish	Ammonia, Nitrates, Nitrites	mg/l	13.37

7.4 MARINE ECOLOGICAL ASSESSMENT

7.4.1 Affected Environment

The proposed marine pipeline servitude project will be constructed in Algoa Bay. Algoa Bay falls within the warm temperate Agulhas ecoregion, one of four inshore ecoregions spanning the coast of South Africa.

Temperature and current dynamics are complex and vary over small spatial scales within the bay due to periodic upwelling that may occur near the rocky headlands during easterly winds, which causes sharp drops in temperature. Wave climate in Algoa Bay is predominantly from the south west with swells of less than 2 m most common and occurring approximately 80% of the time. Generally, winter water temperatures in Algoa Bay range from 14-22°C and the water column is generally homogenous. In summer, temperatures can reach 27°C, with a strong thermocline often evident in water deeper than 15 m.

Due to the localised upwelling, high concentrations of nitrate (>10 µmol/ℓ) have been reported in offshore waters (outer shelf and shelf edge), and off Cape Padrone and Cape Recife. However, within the bay itself, nitrate concentrations are much lower (around 1 µmol/l or less). Turbidity levels (i.e. measure of the suspended solids in the water column) in surface waters during both summer and winter were mostly low (<10 NTU), which is indicative of clear water, with elevated levels towards the bottom where values exceeded 10 NTU. Concentrations of most trace metals in Port waters were low or below detection limits aside from mercury, zinc, arsenic, and copper (the latter exceeded guideline levels). Hydrocarbon concentrations were very low both inside and outside the Port.

Algoa Bay is known to support a high biodiversity of marine life, particularly reef-associated invertebrates and fish, as well as several breeding colonies of endangered or vulnerable seabirds and a suite of cetaceans. For these reasons, 1200 km^2 of Algoa Bay has been protected within the Addo Elephant National Park Marine Protected Area (MPA) as of 2019. This MPA extends the protection of the land based Addo Elephant National Park to include marine species such as

the great white shark and several whale species that frequent the Algoa Bay coastline (Bryde's, Minke, Humpback and Southern Right whales). In addition, the MPA protects the breeding and important feeding grounds of two endangered bird species, namely African penguin and Cape gannet, which breed on the St Croix and Bird Island groups located within the MPA.

Recreational non-motorized water sports such as swimming, surfing, kayaking, and kite surfing take place far to the south-west of the proposed servitude project; while the shallow reef in Algoa Bay provides sites for recreational SCUBA diving, three of which are located in close proximity to the Coega SEZ. Key commercial fisheries within the bay include the commercial line fishery, the small pelagic purse seine fishery, the squid fishery and the shark longline fishery. The proposed marine pipeline servitude project area offshore of the Port of Ngqura overlaps with a squid fishing ground which accounts for nearly 1% of average annual fishing effort, and approximately 12% of the Eastern Cape annual average for the small pelagics fishery. The Coega SEZ also lies in close proximity to the Algoa 7 precinct (refer to Figure 7.1), an area within the Algoa Bay Aquaculture Development Zone (ADZ) set aside for finfish farming (Environmental Authorization for the ADZ currently in the appeals phase). An application for environmental authorisation for the development of a land-based ADZ in the Coega Industrial Development Zone was granted in 2018.

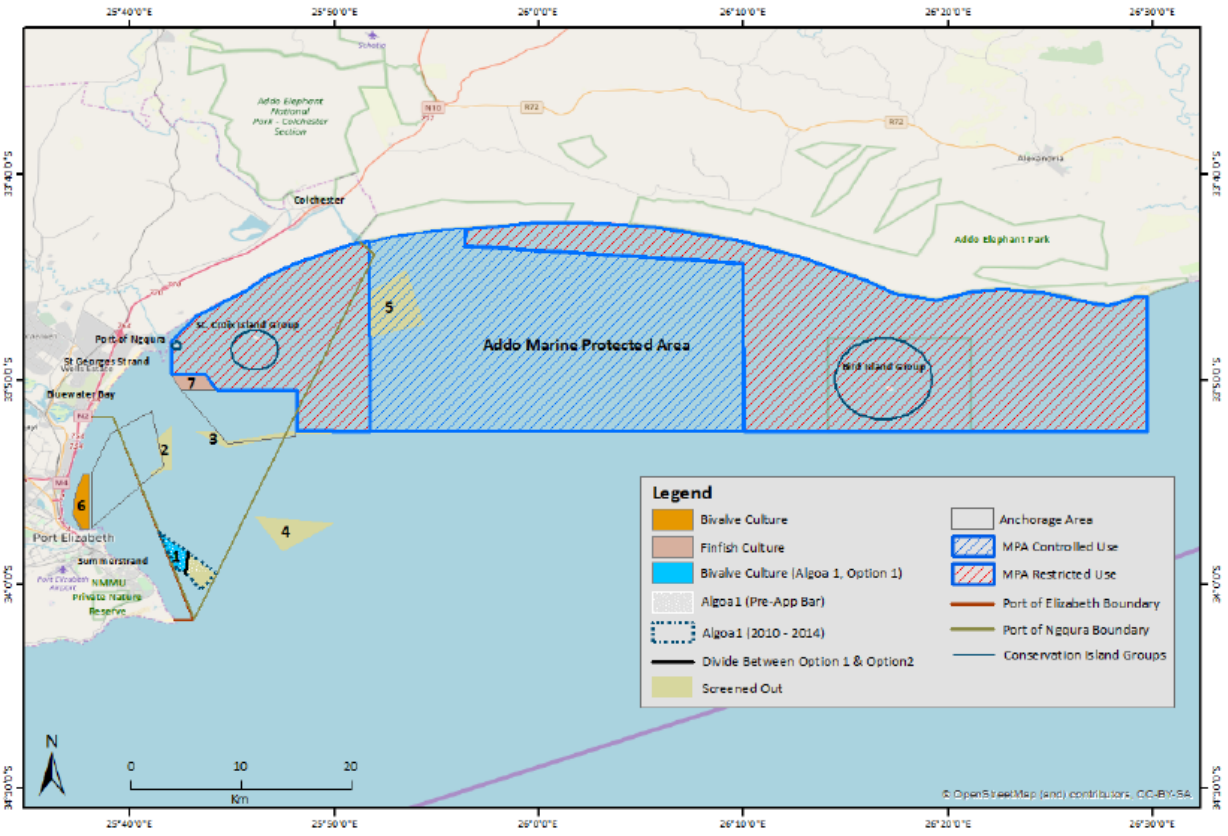

Figure 7.1. Precincts considered during the 2010-2014 and current application for environmental authorisation for a sea-based Aquaculture Development Zone in Algoa Bay, Eastern Cape. Precincts 2, 3, 4 and 5 were found to be unfeasible and were screened out. The southern portion of Algoa 1 (Option 2) has been screened out to reduce impacts on the chokka squid fishing industry. Precincts 1 Option 1, 6 and 7 constitute feasible sites and have been considered during the present Basic Assessment process (Massie et al. 2019).

7.4.2 Impact Assessment

The Marine Ecological Assessment identified and assessed a total of seventeen potential marine environmental impacts, ranging from habitat loss to operational effects (refer to Chapter 9 of this report). The impacts of the proposed development on fisheries in Algoa Bay were assessed separately. Scenario 1 and Scenario 2 were assessed together for construction impacts, with three impacts rated as 'moderate' before mitigation (reduced to 'low' or 'very low' after mitigation), and four impacts were rated as 'low' (reduced to 'very low' after mitigation).

Scenario 1 and Scenario 2 were assessed separately under operational impacts. Under Scenario 1, one impact was rated 'very low' and one was reduced to 'insignificant' rating after mitigation. Three impacts were rated 'low' under Scenario 1 (reduced to 'very low', or remaining of 'low' significance after mitigation), while two impacts were rated moderate (reduced to 'low' and 'very low' after mitigation), and three impacts were rated as of 'high' significance'. These 'high' significance impacts were however reduced to 'low' after the implementation of mitigation measures.

There were two impacts rated 'very low' under Scenario 2 and two as 'low' (reduced to 'low', 'very low' or 'insignificant' after mitigation). Two impacts were assessed to be of 'medium' significance, and three were rated as 'high'. Again, mitigation reduced these 'medium' and 'high' impacts to either 'very low' or 'low' after mitigation. All impacts on fisheries are considered 'low' or 'very low' with mitigation.

By definition, cumulative marine environmental impacts emanating from the proposed project are related to the overlap in use with various other sources of anthropogenic disturbance in the vicinity of the proposed servitudes. This as area of impact has been defined by the dispersion modelling results. There are three identified anthropogenic impacts within this zone of impact as defined by the dispersion modelling: 1) the impacts of the simultaneous operation of the multiple pipeline servitudes described in the proposed development; 2) the impacts of the Port of Ngqura, and 3) the development of the Algoa 7 fin-fish aquaculture.

As sea-based finfish farms tend to be significant sources of nitrogenous waste (i.e. nutrients), there is particular concern about the cumulative impacts of increased nutrient concentrations arising from both the sea based finfish aquaculture in the Algoa 7 finfish ADZ, and the nutrients discharges by the wastewater and finfish pipelines of the Coega SEZ. However, dispersion modelling results suggest that it is unlikely that there will be significant interaction between these nutrient sources, especially if the recommended scenario is implemented (PRDW 2020), and end of pipeline requirements are met.

Shipping and port operations with the Port of Ngqura may result in elevated heavy metal concentrations in both the water column and sediment (particularly copper and zinc). Dispersion model results indicate unacceptably high levels of Hg, Co, Cu and Cd entering the Port of Ngqura through in the Wastewater 1 effluent under both Scenario 1 and Scenario 2. Mitigation measures included following the recommended Scenario presented by PRDW (2020), which requires the Wastewater 1 outfall to limit the maximum allowable effluent concentrations (end of pipe) for metals and sulphides.

It is critical that end of pipe limits stipulated by the dispersion modelling report be adhered to so as to safeguard the marine environment of Algoa Bay and mitigate impacts on other water users. Based on the impacts assessed in the Marine Ecological Assessment, it is recommended that the proposed development proceed with the implementation of strict environmentally responsible practices as outlined in Chapters 9 and 11 of the EIAR. This assessment is based on the results presented by PRDW (2020), under a 300 m RMZ for all outfalls. This is considered acceptable, given the status of the receiving environment (and in particular, that of the Coega estuary). However, this assessment is only valid on condition that Wastewater 1 effluent does not contain excessively high levels of trace metals (ostensibly from industrial effluent) as per PRDW (2020).

7.4.3 Monitoring

On receipt of Coastal Waters Discharge Permits (CWDPs), the end of pipe concentrations for each outfall as published in the permit conditions must be met to ensure compliance at the edge of the Recommended Mixing Zone (RMZ). Compliance monitoring of the effluent before discharge should be performed to minimise environmental impacts. If discharged effluent exceeds the end of pipe values at any time, the operation will be in violation of the CWDP and the cause of poor effluent quality must be identified, reported and rectified immediately.

A monitoring program at the edge of each RMZ should be implemented prior to construction to better determine ambient water quality and to ensure that required Water Quality Guidelines (WQGs) are being met at the edge of the RMZ. This can be achieved by mooring a data logging instrument capable of measuring conductivity (i.e. salinity), temperature and depth (CTD) 1 m above the ocean bottom for a period of one month pre- and one year after operations commences. Monitoring should also be undertaken to assess dissolved oxygen levels, microbiological indicators (*Enterococci* sp. and/or *E. coli*), turbidity, ammonia, nitrate and pH. Monitoring for salinity and temperature should take place continuously (via the moored instrument), while the other environmental water quality parameters should be assessed quarterly (i.e. four times per year).

It is also recommended that benthic macrofaunal samples be collected and analysed both pre- and post-discharge. Benthic macrofauna biological indicators, such as species abundance, biomass, and diversity, provide a direct measure of the state of the ecosystem in space and time and tend to be directly affected by pollution/disturbance. It is recommended that a minimum of six sites be monitored in the vicinity of each outfall with three samples collected per site. Two control sites should be included to assess potential impacts relative to broader changes within Algoa Bay. These samples must be accompanied by an assessment of sediment granulometry and organic content to permit correct interpretation of the macrofauna results, because sediment particle size, Total Organic Carbon (TOC) and Total Organic Nitrogen (TON) within the sediment influence macrofaunal community structure in marine systems. These factors must therefore be controlled for to correctly interpret changes in community structure, should such changes be detected. These benthic samples should be collected and assessed annually. Sediments from control and impacts sites must also be analysed for trace metal content in order to detect potential enrichment due to effluent discharges.

7.5 GEOTECHNICAL INVESTIGATIONS

SRK completed the following activities:

- Six test pits were excavated using a tractor-loader backhoe (TLB) excavator to a depth ranging from 2.4 mbgl to 3.1 mbgl.
- The soil horizons were described and logged according to the Guidelines for Soil and Rock Logging in South Africa (2002, 2nd Impression).
- Bulk disturbed soil samples were collected from representative soil horizons and submitted for the following tests:
    - In situ moisture content
    - Particle size distribution
    - Atterberg Limits
    - Moisture: density relationship at optimum moisture content
    - Saturated California Bearing Ratio (CBR) test.
- Incorporated the findings of a previous geotechnical investigation conducted by Strata Lab (Geotechnical Investigation: - CDC/526/19 - Construction of Bulk Infrastructure for Zone 10 in the Coega SEZ, (Reference 3139/19) within an area that covers the proposed marine pipeline servitude alignments currently being investigated.

Note that the geotechnical investigation was restricted to the land-based portion of the study area. No marine geotechnical investigations were undertaken.

The profile typically consists of aeolian sand overlying calcrete capping the underlying Salnova Formation. An important feature of the profile is the thickness of the aeolian sand which is misleading in the profiles as the test pits were excavated within inter dune areas with one single exception. Typically, the height of the sand dunes ranges from a few of metres to tens of metres.

These soil types could be problematic for the following reasons:

Aeolian sand: The sand is highly mechanically erodible and is thus considered to be problematic with respect to the long-term stability of the pipelines, specifically in areas that are not vegetated. The erodibility of the sand is the main geotechnical constraint for a pipeline constructed at the surface as the pipe may be susceptible to undercutting during erosion. A buried pipeline could also be potentially compromised if no erosion mitigation measures are put in place, as the pipeline could be exposed over time. This can be mitigated by either excavating out sections of the dune field or using trenchless construction techniques through these areas. Both options are estimated to come with a significant cost. The simplest solution would be for the CDC to re-align the sections of the pipeline that cross the existing dune field to a position further north (inland), as shown on Figure 7.2.

Calcrete Pedogenic horizons: whether it be silcrete, ferricrete or the calcrete/coquinite intersected during the current investigation, all are characterised by variations in the degree of cementation both laterally and vertically in the profile. This makes predicting and quantifying the percentage of excavation category extremely difficult to determine without a large margin of error.

No seepage was present during the excavation of the test pits. However, the calcrete layer is an indicator of an historical, fluctuating water table with a variable, upper contact ranging from surface to 1.6 mbgl. The depth to calcrete intersected during the previous investigation is similar i.e. 0.3 mbgl to 2.9 mbgl. As such, ground water may prove problematic on a seasonal basis with

seepage estimated to occur along the aeolian sand/pedogenic contact.

The site is classified as soft excavation to a depth ranging from 1.7 m to 3.1 mbgl according to the specification outlined in SANS 1200D for restricted excavations. This indicates that the excavatability to a planned depth of 2 mbgl is unlikely to prove problematic. However, it is recommended to allow for the establishment of a large tracked excavator to excavate through any hardpan calcrete/coquinite which may be present from place to place along the alignment other than that intersected in the test pits. Suitable bedding material will need to be imported from a commercial source.

Stability of the trenches is considered to be problematic given the ready collapse of the excavation sidewalls which occurred during the excavation of some of the test pits. Trenches excavated within unconsolidated, loose sand (aeolian and Salnova Formation) will either need to be supported or battered back to a safer slope angle. Sections of the profile that have undergone partial to complete pedogenesis (soil cementation) are considered stable provided there is no significant overburden adjacent to the crest whether it be man-made stockpiles or natural material (high sand dune). Should this condition be identified during the design phase of the project, it is recommended that a stability analysis be conducted to assess the stability of the trench sidewalls.

The dunes in these areas have been cleared by mining activities and construction of the pipeline below ground level within the more stable, partially calcretised Salnova Formation will be more viable and cost-effective. The proposed new pipeline servitude is indicated in blue in Figure 7.2. This would also lower the risk with regards to sidewall stability of the trenches. Should the sand be mined out before construction, the current alignment is considered adequate. This being said, and irrespective of whether the pipeline is above ground or buried, the CDC will need to consider the potential for the dune field re-establishing over time. This will create accessibility issues should this particular section of the pipeline need to be maintained and/or repaired.

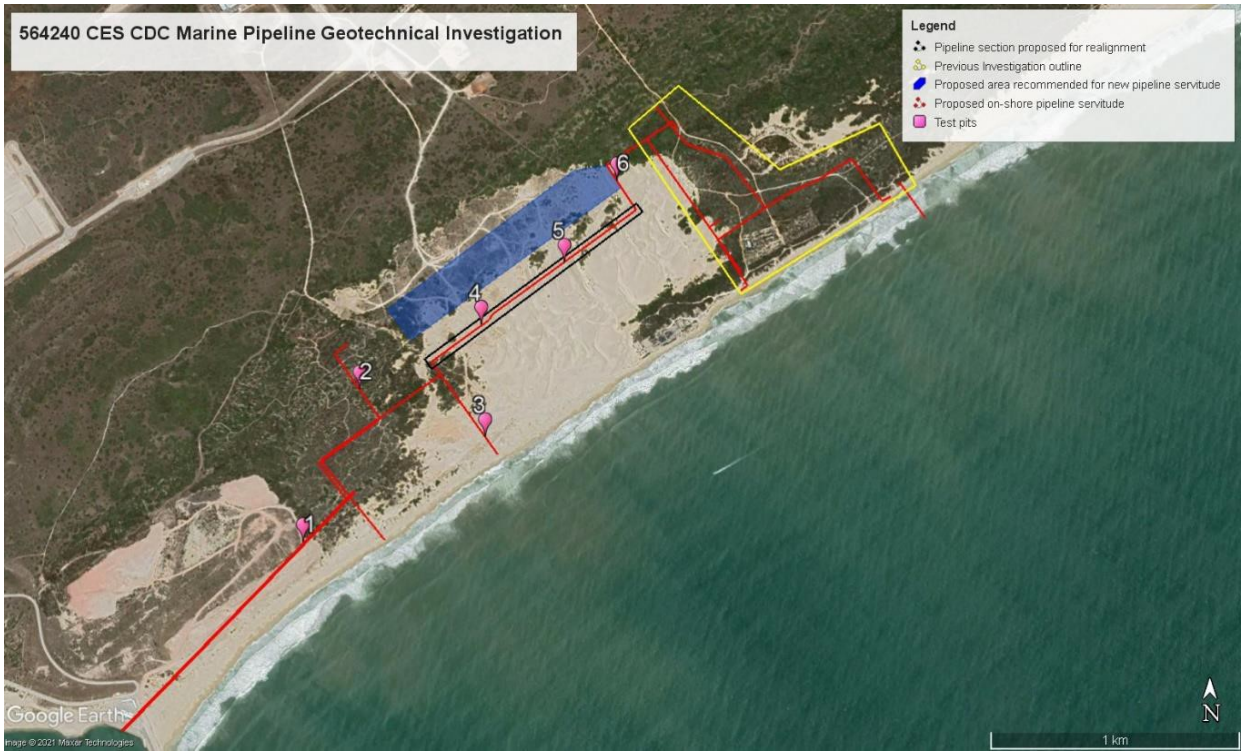

Figure 7.2: Proposed alternative pipeline alignment.

7.6 ECOLOGICAL IMPACT ASSESSMENT

The vegetation of the study site, as determined by the desktop analysis was confirmed by the site visit to include Cape Sea Shore Vegetation and St Francis Dune Thicket.

Much of the study site is located within the coastal protection zone (defined as any urban land unit that is completely or partly within 100m of the High-Water Mark (HWM)). The beach is relatively wide, rising from the HWM located at the toe of the foredune, and dipping slightly along a calcrete platform, before rising in a series of mobile transverse dunes, over a distance of approximately 800 m to a relatively flat plane at an altitude of 60 m.a.sl. The mobile transverse dunes are moving in a north-easterly direction and are characterised by pronounced steep slip-faces and dune slacks or rocky flats. The rocky flats / dune slacks between the dunes provide specialised habitat for a range of plant species, including *Carpobrotus sp*., *Passerina rigida, Chironia baccifera*, *Psoralea repens Cladoraphis cyperoides,* and *Helichrysum* spp. amongst others.

The mobile dunes are vegetated with typical pioneer species such as *Tetragonia decumbens, Gazania rigens, Scaevola plumierii* and *Arctotheca populifolia*.

On dunes beyond the influence of salt spray, particularly in the north-western and north-eastern portion of the study area, much of the St Francis Dune Thicket vegetation delineated by the SA VEGMAP (2018) actually consists of dense stands of *Acacia cyclops* which have clearly outcompeted the indigenous vegetation of the study site. Species diversity in these areas is low. The *A. cyclops* stands are believed to have been planted here a number of years ago by surrounding landowners to stabilise the dune field and prevent the encroachment of the dune on the nearby farmlands.

The *A. cyclops* in the study area is being actively harvested/cleared by local community members. However, where cleared vegetation has not been removed, it has resulted in dense stands of dead branches. Few indigenous species occur here, most likely due to the lack of seed source (there are very few indigenous species in the immediate surrounds). Other existing anthropogenic impacts in the project area include sand mining and access by transport vehicles.

Indigenous vegetation patches within the mobile dunes are dominated by typical pioneer species that can withstand inundation by sand such as *Searsia crenata, Morellla cordifolia* and *Gomphocarpus physocarpus*.

In areas where the natural St Francis Dune Thicket prevails, particularly in the area near the Secondary Dune outlined in the Coega OSMP, species such as *Sideroxylon inerme, Searsia glauca, Tarchonanthus maritimus, Brachylaena discolour, Morella cordifolia, Osteospermum moniliferum, Passerina rigida*, and *Olea exasperata* dominate.

A number of plant SCC were recorded during the site survey including *Gomphocarpus physocarpus, Sideroxylon inerme, Cynanchum* spp., *Mesembryanthemum aitonis, Carpobrotus* spp. and *Psoralea repens*. While *S. inerme* was mainly associated with the remaining St Francis Dune Thicket, the remaining SCC were distributed throughout the project area, particularly within the Cape Seashore Vegetation community.

Observations of faunal species during the site visit were limited to flash sightings of hares and antelope species. However, numerous tracks were observed within the dunes. A pair of White-Fronted Plover were observed within the dunes close to the Port and several pairs of African Black Oystercatcher were observed along the shoreline. A pair of Sacred Ibis were also observed near to the Port.

The following faunal SCC are known to occur / is likely to occur within the Coega SEZ:

- Opal Copper
- Coega Copper
- Eastern Cape Golden Baboon Spider
- Black Harrier
- Damara Tern
- African Penguin
- African Black Oystercatcher
- Blue Crane
- Knysna Woodpecker
- Duthie's Golden Mole
- African Wild Cat
- African hedgehog
- Pygmy Hairy Footed Gerbil
- Mountain Reedbuck

The proposed site was mapped in terms of the ecological sensitivity. The sensitivity ratings and reasons therefore have been provided below. The recommended mitigation measures that need to be implemented in order to minimise the ecological impacts of the development are described in Chapter 9 and 11 of this EIAR.

Low Sensitivity

Low sensitivity was allocated to the exposed dune areas with sparse vegetation cover and pioneer species, including the Cape Seashore Vegetation (Least Concern). Scattered SCC, including *Carpobrotus* spp., *Psoralea repens, and Gomphocarpus physocarpus,* amongst others, must be considered HIGH sensitivity.

Moderate Sensitivity

Although a significant portion of the site consists of dense stands of *A. cyclops*, pockets of indigenous vegetation supporting SCC still occur and provide valuable habitat to a range of faunal species. As such, moderate sensitivity was allocated to the relatively intact St Francis Dune Thicket (Least Concern) within the project area.

High Sensitivity

High sensitivity was allocated to priority biodiversity areas outlined within the Coega OSMP, including the Damara Tern habitat (and the associated 200 m buffer) located within the dune slacks, Ecological Support Areas, as well as the Primary and Secondary Dunes as these areas still provide a valuable contribution to biodiversity and ecosystem functioning, support relatively high number of indigenous plant species (including SCC) and provide habitat to a range of faunal species. Stringent management and mitigation measures as outlined in this report as well as the approved OSMP, must be implemented and adhered to in all areas classified as HIGH sensitivity.

Figure 7.3: Sensitivity map of the project area for the Marine Servitude Project.

The Ecological Assessment classified the majority of the impacts as moderate and high negative which will be reduced to a moderate to low negative significance if the mitigation measures as proposed in Chapters 9 and 11 are implemented and adhered to. Therefore, the implementation of the recommended mitigation measures and monitoring, especially during construction is critical to ensure a development that is environmentally sound. Specific mitigation measures, including the Search and Rescue and relocation of both faunal and floral SCC to the nearest appropriate habitat, must be implemented and adhered to.

It is important that the Alien Vegetation Management Plan developed for the Coega SEZ is implemented and adhered to during the construction and operational phase of the proposed development to prevent the further spread of alien invasive species within Zone 10 of the Coega SEZ.

The development footprint of the proposed Marine Servitude Project must be demarcated to prevent any encroachment of construction activities into surrounding natural areas, and vegetation clearance must be kept to the absolute minimum footprint required for the establishment and construction of the Marine Servitudes and associated infrastructure. Minor location deviations from the proposed works are deemed acceptable within the 30 m servitude. Additionally, it is recommended that servitudes are rehabilitated using indigenous vegetation.

The proposed Marine Servitude Project is **NOT considered to be Fatally Flawed.**

The no-go option refers to the proposed Marine Servitude not being developed. This option will have a moderately positive outcome for the indigenous vegetation and surrounding natural environment relative to the proposed development, but the existing disturbed areas will remain, and the benefits associated with the construction of a common user marine servitude will be lost. This could have a negative impact for future investment within the Coega SEZ, an area specifically zoned for industry and development.

7.7 AQUATIC IMPACT ASSESSMENT

In September 2016, the Coega Development Corporation (CDC) appointed Scherman Colloty & Associates (SC&A) to assess and delineated all wetlands located within the Coega SEZ. This study identified three wetlands within Zone 10 of the SEZ, none of which are situated within 500 m of the proposed development (refer to Figure included below), except the Coega River/Estuary (port). As per the NFEPA (2011) spatial data set, the artificial wetland located along the coast, in the centre of the proposed development, is Coega Marine Growers and as such not a natural wetland. Therefore, since the development will not take place within a wetland and/or surface water feature or within 500 m of a wetland and/or surface water feature no additional aquatic impact assessment was undertaken for the proposed development.

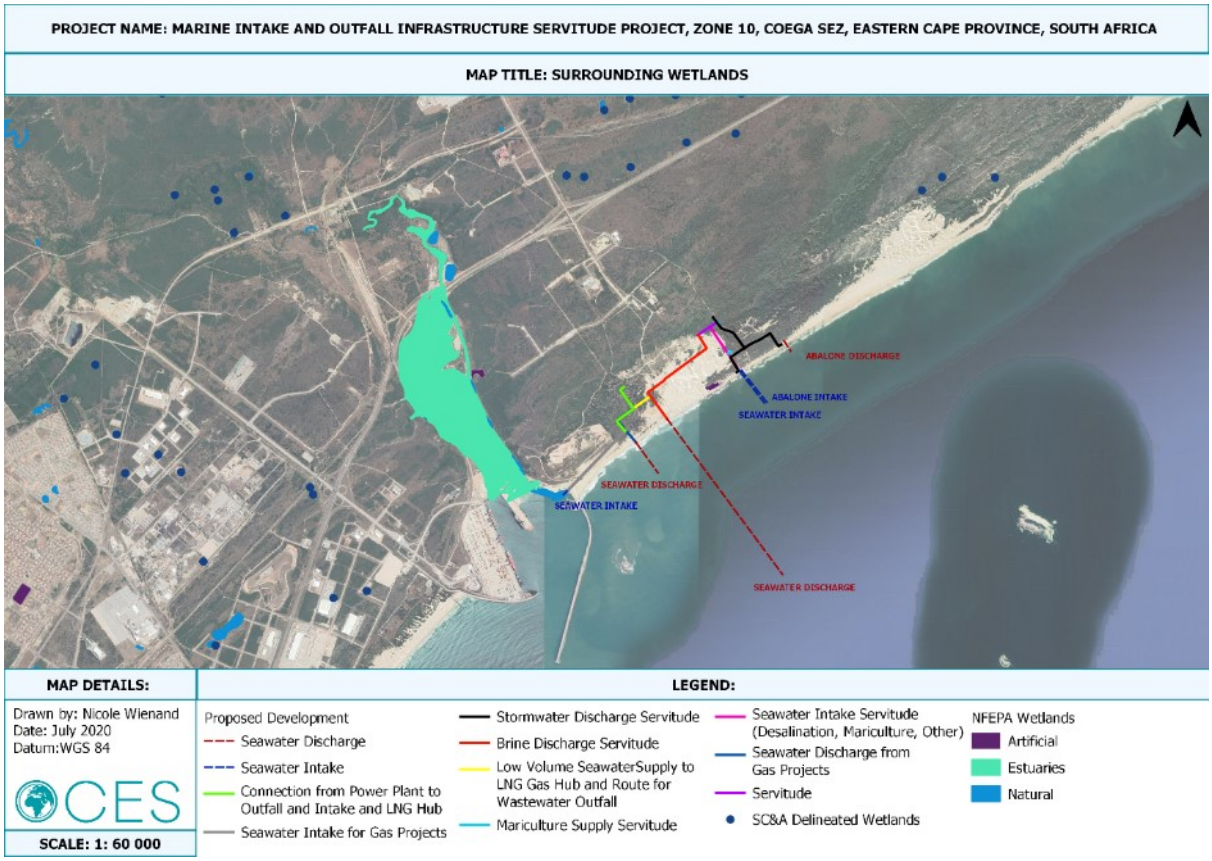

Figure 7.4: Infrastructure overlain on the identified wetlands within the SEZ.

7.8 TERRESTRIAL HERITAGE, ARCHAEOLOGICAL AND PALEONTOLOGICAL ASSESSMENT

An Archaeological, Palaeontological and Cultural Heritage Assessment was conducted for the SEZ in 2010. The overall findings of the proposed study were as follows:

- SAHRA needs to be informed of any alterations to buildings, viaducts or other built structures older than 60 years in the Coega SEZ.
- Any shipwrecks, or parts thereof, found in the inter-tidal zone or dunes need to be reported and all work, when excavating prospective vulnerable sites, should stop until a proper investigation is launched by SAHRA or the Port Elizabeth Museum.
- Zones 1, 7 and **10** along the coast are deemed sensitive and might reveal sections of shipwrecks. Activities in these areas should be monitored by a maritime archaeologist.
- Hougham Park, the small 19th century cottage next to the main homestead, the mud and brick cottage near the Coega railway station, the viaduct and most of the grave sites identified in the Terrestrial Heritage, Archaeological and Paleontological Assessment conducted for the Coega SEZ in 2010 need to be preserved and conserved.
- A policy needs to be developed which will allow for monitoring and reviewing significant heritage sites.

Since the submission of the above mentioned report, the CDC has drafted and implemented a Heritage Management Plan. In addition, guidelines from SAHRA are in place to ensure that all aspects of heritage are managed. The CDC's Environmental Specifications for Construction include detailed requirements for the management of heritage in the SEZ, amongst others, the appointment of an archaeologist and palaeontologist during the construction phase of a project. In addition, a marine archaeological and heritage assessment was undertaken, and specific recommendations related to marine heritage have been included in this EIAR.

8 CLIMATE CHANGE

This chapter deals with climate change as it relates to the proposed project. Climate generally induces change to physical and biological systems and the adverse change in the global and regional climate scenarios can exert considerable stress on a country and region's vulnerable sector, specifically those who rely heavily on ecological resources. This chapter will describe the climate change scenario in South Africa and assess the potential contribution of the proposed project to climate change and the impacts thereof on local ecological and social systems.

8.1 CLIMATE CHANGE: CAUSE AND EFFECT

Climate change is a long-term change in the statistical distribution of weather patterns over periods of time that range from decades to millions of years. Fluctuations in the weather patterns in periods shorter than a few decades, such as El Niño, do not represent climate change. According to the Intergovernmental Panel on Climate Change (IPCC), climate change refers to any change in climate over time, whether due to natural variability or as a result of anthropogenic activity. This usage differs from that in the UN Framework Convention on Climate Change (UNFCCC), where climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods (IPCC Summary for Policymakers, 2007).

The change in climate is generally attributed to the change in the atmospheric gaseous composition and this could be enhanced by anthropogenic sources of greenhouse gas (GHG). The increased concentrations of GHG (including water vapour, carbon dioxide, methane, nitrous oxide, and ozone) produce global warming that affects long-term climate, with potential impacts, both negative and positive, on humanity in the foreseeable future.

Concern over the anthropogenic factors relates primarily to emissions from fossil fuel combustion and the removal of vegetation due to land use changes. Vegetation can provide an important sink for atmospheric carbon as physiological processes performed by the plants convert atmospheric carbon dioxide into plant tissue. In the case of longer-lived tree species, this process can result in large amounts of carbon being sequestered ("locked away") for a number of years. Based on this process, protection of vegetation or afforestation can help to mitigate the potential impact of anthropogenic atmospheric releases on climate change. However, conversely, destruction of vegetation (such as would be associated with clearing of land) could result in the release of significant quantities of carbon dioxide and, potentially, other GHG to the atmosphere.

Based on available information, climate change may influence key climate variables such as temperature, precipitation, sea level and the frequency of extreme weather events. This, in turn, may manifest as changes to rainfall patterns, increased frequency of flooding and droughts and loss of coastal land as a result of higher sea levels. Such changes may have significant ecological and socio-economic consequences.

It should be noted, however, that not all impacts of climate change will have adverse effects. While some parts of the world experience more frequent or severe droughts, floods or significant

sea level rise, in other places such as the sub-arctic, which may become more habitable, crop yields may increase due to the fertilising effects of CO_2 and longer growing seasons. However, the likely fast rate of change will result in an increased pressure on diminishing natural resources creating problems such as substantial damage to infrastructure and extinction of indigenous life forms with slow adaptation rates.

Globally, the implementation of a low carbon economy is proposed as a means to avoid catastrophic climate change, and as a precursor to an ideal, zero carbon society.

8.2 Predicted Manifestations of Climate Change in South Africa

South Africa is a Non-Annex I country and is not required to reduce its emissions of greenhouse gases. However, its economy is heavily dependent on fossil fuel and the country can be judged to be a significant emitter due to the relatively high values that can be derived for emissions intensity and emissions per capita. Such calculations put South Africa as one of the world's top 15 most energy intensive economies, with a significant contribution to greenhouse emissions at a continental level and as such contributing to climate change impacts.

According to the 17th Conference of the Parties (COP17 2011), predictable measurable Climate Change manifestations in South Africa may include:

- Warming of the coastal regions by around 1-2°C by about 2050 and around 3-4°C by about 2100;
- Warming of the interior regions by around 3-4°C by about 2050 and around 6-7°C by about 2100;
- Significant changes in rainfall patterns coupled with increased evaporation will result in significant changes in respect of water availability, e.g. the western side of the country is likely to experience significant reductions in the flow of streams in the region;
- Biodiversity will be severely impacted, especially the grasslands, fynbos and succulent Karoo where a high level of extinction is predicted;
- Small scale and homestead farmers in dry lands are most vulnerable to climate change and although intensive irrigated agriculture is better off than these farmers, irrigated lands remain vulnerable to reductions in available water;
- Some predictions suggest that maize production in summer rainfall areas and fruit and cereal production in winter rainfall areas may be badly affected;
- Commercial forestry is vulnerable to an increased frequency of wildfires and changes in available water in south-western regions;
- Alien invasive plant species are likely to spread more and have an ever-increasing negative impact on water resources;
- Increase in the vulnerability and exacerbated health threats resulting from climate change;
- There will be an increase in the frequency and severity of extreme weather events. Damage costs due to extreme weather-related events (flooding, fire, storms and drought) have already been conservatively estimated at being roughly 1 billion rand per year between 2000 and 2009.

Measurable changes in climate can be expected to have significant effects on various sectors of South African society and the economy. These potential impacts have been explored in the South African Country Studies for a time horizon of 50 years, using a series of general circulation model (GCM) simulations (DEAT 2004). According to the findings, health impacts can be expected from increases in temperature and changes in rainfall patterns. These include an increase in the occurrence of strokes, skin rashes, dehydration and the incidence of non-melanoma skin cancers. As a result of ecosystem changes, climate change may also bring about indirect health impacts such as an increase in the incidence of water-borne diseases. The occurrence of vector-borne diseases such as malaria could also increase if there is a significant extension of the malaria prone areas, as has been predicted in the projected climate change scenarios for South Africa as presented in the first national communication.

With regard to water resources, South Africa's rainfall is already highly variable in spatial distribution and unpredictable, both within and between years. Much of the country is arid or semi-arid and the whole country is subject to droughts and floods. Bulk water supplies are largely provided via a system of large storage dams and inter-basin water transfer schemes and such infrastructure takes years to develop. Thus a reduction in the amount or reliability of rainfall, or an increase in evaporation would exacerbate the already serious lack of surface and ground water resources. Water availability in the arid and semi-arid regions, which cover nearly half of South Africa, is particularly sensitive to changes in precipitation. Desertification, which is already a problem in South Africa, could be exacerbated by climate change. Furthermore, climate change may alter the magnitude, timing and distribution of storms that produce flood events.

Biodiversity is important for South Africa because of its key role in maintaining ecosystem functioning, its proven economic value for tourism and its role in supporting subsistence lifestyles. Climate change modelling suggests a reduction of the area covered by the current biomes by up to 55% in the next 50 years. The largest losses are predicted to occur in the western, central and northern parts of the country. Species composition is expected to change, which may also lead to significant changes in the vegetation structure in some biomes, and, in some extreme cases, even leading to total species loss. With regard to animal taxa, climate modelling predicts that most animal species will become increasingly concentrated in the proximity of the higher altitude eastern escarpment regions, with significant losses in the arid regions of the country. Some species are predicted to become extinct.

Marine biodiversity is not expected to be impacted by the predicted ranges for rise in sea level. However, the predicted rise in sea surface temperature would result in the migration of species residing along the coast. Further, the changes in sea temperature may increase the intensity and frequency of upwelling events. This would cause alterations of near-shore currents, which can be expected to have the most significant impact on rocky shore ecosystems in South Africa. The nutrient and larval supply to the coast would be affected, thus influencing the community structures. In addition, studies have indicated that there would be an increase in the occurrences of the harmful 'red tide' events on the west coast which cause mass mortalities of fish, shellfish, marine mammals, seabirds and other animals, and can result in illness and death in persons who eat contaminated seafood.

8.3 CLIMATIC ISSUES POSSIBLY EXACERBATED BY THE PROPOSED PROJECT

Climate change issues are of global concern and all anthropogenic activities contribute to climate change. Due to the global nature of climate change, it is not possible to describe climate change impacts in the same way as other impacts to be described in chapter 9. The purpose of this section is therefore to discuss the potential impacts of global climate change on the study area, and how the proposed project could contribute to climate change as well as exacerbate or mitigate expected manifestations thereof. Where possible, mitigation measures to counter negative impacts or enhance positive impacts are suggested.

8.3.1 Issue 1: Loss of ecosystem goods and services

Vegetation can act as an important carbon sink. When vegetation is cleared this eliminates any future carbon storage potential of these plants. If they are either burned or allowed to decompose, the carbon stored within the plant material will be released as carbon dioxide, thereby releasing additional carbon dioxide to the atmosphere.

The following mitigation measures should be implemented by the proposed project to mitigate against the climate change impacts of the loss of vegetation and its carbon sequestration ability:

- As far as possible, minimise clearing of vegetation;
- Educate employees about conservation of vegetation resources;
- Maintain vegetation in drainage lines to reduce loss of soil by erosion in the event of increased rainfall; and
- Prepare a detailed rehabilitation strategy that takes into consideration the likely impacts of climate change.

8.3.2 Issue 2: Energy Consumption

In addition to the potential climate change-related impacts associated with the clearing of vegetation, the consumption of fossil fuels, whether directly as fuel or indirectly through the use of electricity from non-renewable sources, will also contribute to climate change.

According to the IFC's Performance Standard 3 (2012), the production of more than 25 000 tonnes of CO_2-equivalents annually by a development should be regarded as significant. The EEIA projected that the carbon footprint for pumping effluent west around the Port would amount to 94,608 tCO_2e per annum. For the eastern option, levels for intake are projected to be 46,808 tCO_2e per annum, whereas levels for discharge will be close to 0 as this is likely to be gravity fed.

Potential mitigation measures could include:

- Committing to efficient use of energy through the environmental policy;
- Correctly sizing motors and pumps and use of adjustable speed drives in applications with highly variable load requirements;
- Actively considering and, where practical, implementing measures to reduce energy consumption of the development, such as the proposed installation of WEROP pumps;
- Ensuring that all machinery, including vehicles, are well maintained;

- An Operating Procedure for carbon management, including key performance targets, should be designed and implemented. This should include the management of re-vegetated areas (as carbon sink) for carbon offsetting measures;
- Development and implementation of an Energy Management Plan for the project; and
- Consideration of carbon sequestration potential when developing the rehabilitation strategy for the project.

8.3.3 Issue 3: Health Impacts

It has been predicted that climate change will influence the prevalence of certain diseases such as an increase in the occurrence of strokes, skin rashes, dehydration and the incidence of non-melanoma skin cancers. As a result of ecosystem changes, climate change may also bring about indirect health impacts such as an increase in the incidence of water-borne diseases. The occurrence of vector-borne diseases such as malaria could also increase if there is a significant expansion of the malaria prone areas, as has been predicted in the projected climate change scenarios for South Africa as presented in the first national communication.

Potential mitigation measures could include:

- Take steps to improve awareness of vector-borne health risks amongst employees and local communities;
- Develop an integrated pest management plan for the project that includes vectors for disease;
- Implement necessary procedures to minimise the presence of stagnant water on the site.

9 IDENTIFICATION OF POTENTIAL IMPACTS

9.1 EIA METHODOLOGY

CES has developed a methodology for evaluating impact significance that is in accordance with the requirements outlined in Appendix 3 of the EIA Regulations (2014, as amended). This methodology takes into consideration the following variables:

9.1.1 Nature

Negative or positive impact on the environment.

9.1.2 Type

Direct, indirect and/or cumulative effect of impact on the environment.

9.1.3 Significance prior to mitigation

Four factors need to be considered when assessing the significance of impacts, namely:

- Relationship of the impact to temporal scales - the temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.
- Relationship of the impact to spatial scales - the spatial scale defines the physical extent of the impact.
- The severity of the impact - the severity/beneficial scale is used in order to scientifically evaluate how severe negative impacts would be, or how beneficial positive impacts would be on a particular affected system or a particular affected party. The severity of impacts can be evaluated with and without mitigation in order to demonstrate how serious the impact is when nothing is done about it. The word '*mitigation*' means not just '*compensation*', but includes concepts of containment and remedy. For beneficial impacts, optimization means anything that can enhance the benefits. However, mitigation or optimization must be practical, technically feasible and economically viable.
- The likelihood of the impact occurring - the likelihood of impacts taking place as a result of project actions differs between potential impacts. There is no doubt that some impacts could occur (e.g. loss of vegetation), but other impacts are not as likely to occur (e.g. vehicle accident), and may or may not result from the proposed development. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.

Each criterion (Table 9.1) is ranked with scores to determine the overall significance of an activity. The criterion is then considered in two categories, viz. effect of the activity and the likelihood of the impact. The total scores recorded for the effect and likelihood are then read off the matrix presented in Table 9.2, to determine the overall significance of the impact (Table 9.3). The overall significance is either negative or positive.

The environmental significance scale is an attempt to evaluate the importance of a particular impact. This evaluation needs to be undertaken in the relevant context, as an impact can either be ecological or social, or both. The evaluation of the significance of an impact relies heavily on

the values of the person making the judgment. For this reason, impacts of especially a social nature need to reflect the values of the affected society.

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9.1.4 Prioritising

The evaluation of the impacts, as described above is used to prioritise which impacts require mitigation measures.

Negative impacts that are ranked as being of “VERY HIGH” and “HIGH” significance will be investigated further to determine how the impact can be minimised or what alternative activities or mitigation measures can be implemented. These impacts may also assist the decision-makers i.e. numerous HIGH negative impacts may bring about a negative decision.

For impacts identified as having a negative impact of “MODERATE” significance, it is standard practice to investigate alternate activities and/or mitigation measures. The most effective and practical mitigations measures will then be proposed.

For impacts ranked as “LOW” significance, no investigations or alternatives will be considered. Possible management measures will be investigated to ensure that the impacts remain of low significance.

Table 9.1: Criterion used to rate the significance of an impact.

EFFECT	**TEMPORAL SCALE**		
	Short term	Less than 5 years	
	Medium term	Between 5 and 20 years	
	Long term	Between 20 and 40 years (a generation) and from a human perspective almost permanent.	
	Permanent	Over 40 years and resulting in a permanent and lasting change that will always be there	
	SPATIAL SCALE		
	Localised	At localised scale and a few hectares in extent	
	Study area	The proposed site and its immediate environs	
	Regional	District and Provincial level	
	National	Country	
	International	Internationally	
	SEVERITY		**BENEFIT**
	Slight / Slightly Beneficial	Slight impacts on the affected system(s) or party (ies)	Slightly beneficial to the affected system(s) or party (ies)
	Moderate / Moderately Beneficial	Moderate impacts on the affected system(s) or party(ies)	An impact of real benefit to the affected system(s) or party (ies)

	Severe / Beneficial	Severe impacts on the affected system(s) or party (ies)	A substantial benefit to the affected system(s) or party (ies)
	Very Severe / Very Beneficial	Very severe change to the affected system(s) or party(ies)	A very substantial benefit to the affected system(s) or party (ies)
LIKELIHOOD	LIKELIHOOD		
	Unlikely	The likelihood of these impacts occurring is slight	
	May Occur	The likelihood of these impacts occurring is possible	
	Probable	The likelihood of these impacts occurring is probable	
	Definite	The likelihood is that this impact will definitely occur	

Table 9.2: Matrix used to determine the overall significance of the impact based on the effect and likelihood of occurrence.

LIKELIHOOD	EFFECT		
		LOW	HIGH
	Unlikely	LOW	
	May Occur	MODERATE	
	Probable	HIGH	
	Definite		VERY HIGH

Table 9.3: Environmental Significance Scale.

SIGNIFICANCE RATE		DESCRIPTION
LOW –	LOW +	An acceptable impact for which mitigation is desirable but not essential. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in either positive or negative medium to short term effects on the social and/or natural environment.
MODERATE –	MODERATE +	An important impact which requires mitigation. The impact is insufficient by itself to prevent the implementation of the project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in either a positive or negative medium to long-term effect on the social and/or natural environment.
HIGH –	HIGH +	A serious impact, if not mitigated, may prevent the implementation of the project (if it is a negative impact). These impacts would be considered by society as constituting a major and usually a long-term change to the (natural &/or social) environment and result in severe effects or beneficial effects.
VERY HIGH –	VERY HIGH +	A very serious impact which, if negative, may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. Very often these impacts are unmitigable and usually result in very severe effects, or very beneficial effects.

9.1.5 Significance post mitigation

Once mitigation measures are proposed, the following criteria are used to determine the overall significance (i.e. post mitigation significance) of the impact.

- Reversibility: The degree to which an environment can be returned to its original/partially original state.
- Irreplaceable loss: The degree of loss which an impact may cause.
- Mitigation potential: The degree of difficulty of reversing and/or mitigating the various impacts ranges from very difficult to easily achievable. The four categories used are listed and explained in Table 9.4 below. Both the practical feasibility of the measure, the potential cost and the potential effectiveness is taken into consideration when determining the appropriate degree of difficulty.

Table 9.4: Criteria considered post mitigation

REVERSIBILITY	
Reversible	The activity will lead to an impact that can be reversed provided appropriate mitigation measures are implemented.
Irreversible	The activity will lead to an impact that is permanent regardless of the implementation of mitigation measures.
IRREPLACEABLE LOSS	
Resource will not be lost	The resource will not be lost/destroyed provided mitigation measures are implemented.
Resource will be partly lost	The resource will be partially destroyed even though mitigation measures are implemented.
Resource will be lost	The resource will be lost despite the implementation of mitigation measures.
MITIGATION POTENTIAL	
Easily achievable	The impact can be easily, effectively and cost effectively mitigated/reversed.
Achievable	The impact can be effectively mitigated/reversed without much difficulty or cost.
Difficult	The impact could be mitigated/reversed but there will be some difficultly in ensuring effectiveness and/or implementation, and significant costs.
Very Difficult	The impact could be mitigated/reversed but it would be very difficult to ensure effectiveness, technically very challenging and financially very costly.

These criteria are applied using the logic represented in the flow chart below (Figure 9.1).

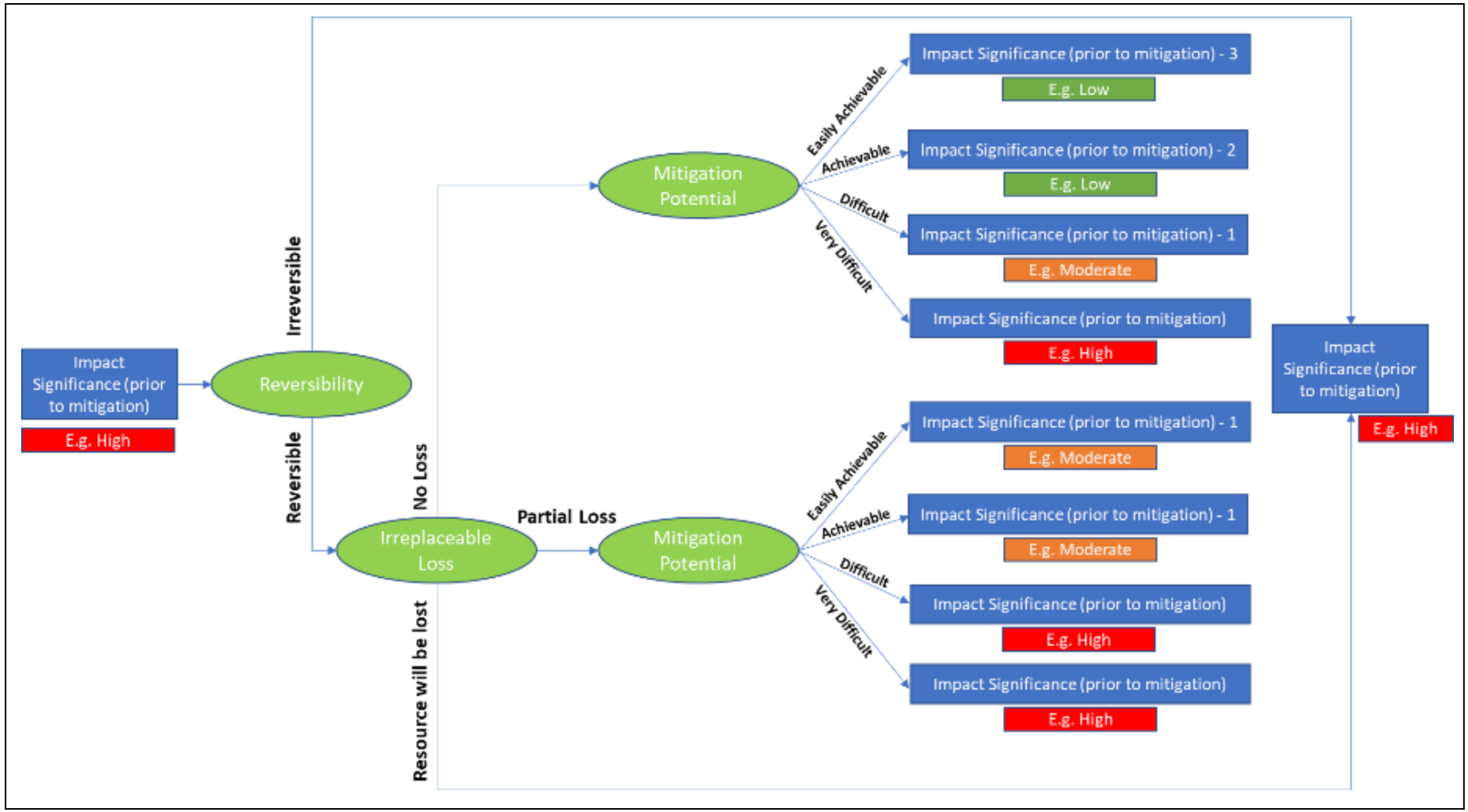

Figure 9.1: Logic used to rate overall significance post mitigation

9.2 ASSESSMENT OF IMPACTS

The table below shows the impacts identified for the **preferred alternative** described in the Alternatives Section (Chapter 4) of this EIAR and presents the results of the assessment using the approach described above. It also presents possible mitigation measures as provided by the individual specialists, and the residual impacts.

Table 9.5 presents the design and construction phase impacts. Table 9.6 presents the operational phase impacts.

Table 9.5: Assessment of the construction phase impacts related to the proposed project

IMPACT	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	SEVERITY OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
DESIGN / PLANNING PHASE										
Alignment with planning instruments	Preferred alternative	The proposed project is in line with the NMBM SDF and the IDP and the Coega SEZ development plans. It is also in line with all relevant legislation and planning tools (please refer to Chapter 3)	**MODERATE +**	Beneficial	Regional	Long Term	Definite	Easily Achievable	• No mitigation required	**MODERATE +**
	No-Go	The Coega SEZ would still continue being developed in line with all planning documents, but not proceeding would delay the development process, as there would be no ADZ and no other investment reliant on this infrastructure.	**LOW –**	Slightly severe	Regional	Long Term	Possible	N/A	N/A	**LOW –**
Excavation of Test Pits for Geotechnical Study	Preferred alternative	Six test pits were excavated using a tractor-loader backhoe (TLB) excavator to a depth ranging from 2.4 mbgl to 3.1 mbgl. This was conducted in line with the current EMPr for the CDC and a number of approved EAs such as the EA for clearing of vegetation within the Coega SEZ.	**LOW –**	Slight	Localised	Short Term	Probable	Easily Achievable	• All excavations must be in line with the CDC's approved EMPr and EAs	**LOW –**
	No-Go	A number of test pits have been excavated in the Coega SEZ in order to determine the suitability of the site for a number of other developments and the alignment of infrastructure.	**LOW –**	Slight	Localised	Short Term	Probable	N/A	N/A	**LOW –**
Legal and Policy Compliance	Preferred Alternative	Failure to obtain and adhere to the necessary permits and/or authorisations, as well as failure to adhere to existing policies and legal obligations relating to the ecological environment, could lead to the project conflicting with local, provincial and national policies, legislation, etc. This could result in a lack of institutional support for the project, overall project failure and	**HIGH -**	Severe	Regional/ National	Long Term	Possible	Achievable	• All necessary permitting and authorisations must be obtained prior to the commencement of any vegetation clearance and/or construction activities. • Ensure that all relevant legislation and policy is consulted and further ensure that the project is compliant with such legislation and policy. • All existing authorisations, permits, and policies for Zone 10 of the SEZ must be implemented and adhered to.	**LOW –**

IMPACT	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	SEVERITY OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
		undue disturbance to the natural environment.							• The independent Environmental Control Officer (ECO) appointed by the CDC must undertake regular monitoring to ensure compliance with authorisations, permits, and management plans. • Planning for the construction and operation of the proposed development should consider available best practice guidelines.	
	No-Go Alternative	The no-go alternative would not require the clearance of vegetation of the undertaking of Listed Activities specified in environmental legislation. As such, no permitting or authorisation would be required.	**N/A**							
CONSTRUCTION PHASE										
GEOGRAPHICAL IMPACTS										
Overall impacts of the Coega Marine Servitude Project on the Addo MPA	Preferred Alternative	The overall or cumulative effects of the marine environmental impacts from the construction of the proposed project related to impacts that could cause reduced health or increased mortality of species, or their movement away from the MPA. The most significant of these impacts include: • Barotrauma and noise disturbance on marine fauna as a result of blasting, • Reduced water quality as a result of sediment disturbance and the introduction of pollutants such as plastics and hazardous substances. • Cumulatively these impacts could result in the reduced health of the marine populations and in the worst cases, the death of individuals. • The movement of mobile species, such as marine mammals, birds and fish, away from the MPA to avoid	**MODERATE –**	Moderate	Regional	Short Term	Definite	Achievable	• All the mitigation measures in this EIAR must be implemented to reduce the significance of this impact to low. • All personnel and vessels conducting monitoring within the footprint of the MPA, must adhere to the regulations of the Addo Elephant National Park MPA Gazette no 42479, R no 777 of 23 May 2019. • CDC to set up a joint implementation and monitoring team with SANParks for construction activities within the Addo Elephant National Park MPA; • CDC to consult SANParks in the development of a monitoring plan and evaluation and reporting of results.	**LOW –**

IMPACT	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	SEVERITY OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
		noise, increased turbidity and pollutants. • This loss of species will disrupt the food-web, changing the composition of species present in the MPA and resulting in a loss of ecosystem biodiversity. • Given that the MPA protects the breeding and important feeding grounds of two endangered bird species, the African penguins and Cape gannets, which breed on the St Croix and Bird Islands located within the MPA, the mortality or emigration of these species away from the MPA during the construction phase could have further cascading effects on these bird populations as they will be required to travel further to feed.								
	No-Go	This section of Algoa Bay has been significantly altered by the development of the Port of Ngqura. A large section of the coastline has already been disturbed and a significant portion of coastal public property has been lost. Should the proposed development not go ahead, alternative options may be used for abstraction of seawater and discharge of effluent, which may require additional disturbance of the coastal zone and, potentially, the loss of additional coastal public property.	**MODERATE –**	Slightly severe	Study Area	Permanent	Definite	N/A	• N/A	**MODERATE –**
Possible loss of the following plant species: Euryops ericifolius, Erica chloroloma, Psoralea	Preferred Alternative	Although *Psoralea* (recorded) and *Erica* (suitable habitat available) have a high likelihood of occurring on site, neither of these species are listed as endangered and both are more widespread than the species listed in the impact below. *Euryops* is listed as Endangered, however there is only a moderate likelihood	**HIGH –**	Severe	Regional	Permanent	Possible	Achievable	• A botanical walkthrough of the final layout must be undertaken by a qualified botanist and populations of SCC recorded. • If populations of endangered species are recorded, where feasible, the servitudes must be shifted to avoid populations of endangered species.	**MODERATE –**

IMPACT	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	SEVERITY OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
repens		of it occurring on site due to the fact that is occurs in a highly restricted area between Motherwell and Coega and has an EOO of 119km^2.							• Except to the extent necessary for the carrying out of construction works, flora shall not be removed, damaged or disturbed nor shall any vegetation be planted. • The search and rescue of endangered species, prior to site clearance must be carried out in accordance with the Project Vegetation Specification (PVS), by a competent and qualified service provider. • The removal and stockpiling of topsoil must also be carried out in accordance with the Project Vegetation Specification.	
	No-Go	These species have likely been impacted on by existing developments within the Port and Coega SEZ, and although future impacts are likely, in the short-term no further impacts will occur.	**MODERATE –**	Moderate	Regional	Long Term	Definite	N/A	• N/A	**MODERATE –**
Possible loss of the following plant species: *Brunsvigia litoralis, Cotyledon adscendens, Rapanea gilliana, Gymnosporia elliptica, Agathosma stenopetala, Erica glumiflora, Othonna rufibarbis, Salvia obtusata*	Preferred Alternative	These species have a higher likelihood of occurring on site, are highly fragmented, with a very small area of extent and are generally known from less than 10 locations within South Africa.	**VERY HIGH –**	Very Severe	Global	Permanent	Unlikely	Achievable	• A botanical walkthrough of the final layout must be undertaken by a qualified botanist and populations of SCC recorded. • If populations of vulnerable and near threatened species are recorded, where feasible, the servitudes must be shifted to avoid populations of vulnerable and near threatened species. • Except to the extent necessary for the carrying out of construction works, flora shall not be removed, damaged or disturbed nor shall any vegetation be planted. • The search and rescue of other SCC (VU; NT; rare, endemic) prior to site clearance must be carried out in accordance with the Project Vegetation Specification (PVS), by a competent and qualified service provider. • The removal and stockpiling of topsoil must also be carried out in accordance with the Project Vegetation Specification.	**MODERATE –**

IMPACT	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	SEVERITY OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
	No-Go	These species have likely been impacted on by existing developments within the Port and Coega SEZ and although future impacts are likely, in the short-term no further impacts will occur.	**MODERATE –**	Moderate	Regional	Long Term	Probable	N/A	• N/A	**MODERATE –**
Loss of mammal SCC	Preferred Alternative	During the construction phase, the clearance of vegetation using heavy plant/machinery could result in the disturbance to nearby mammal populations or the mortality or displacement of a mammal SCC likely to occur within the project area due to vehicle collisions and construction activities with earth-moving equipment.	**HIGH –**	Moderately Severe	Localised	Permanent	Possible	Achievable	• Vehicle speed must be limited to 30km/hr to reduce faunal collision mortality; • All staff on site must receive training with regards to the proper management and response should animals be encountered; • An ECO must walk the site immediately prior/ in front of earth moving machinery and any slow-moving species must be moved out of harm's way and placed nearby in similar habitat. Any SCC found must be recorded (photograph and GPS location) and loaded onto iNaturalist; • The ECO must check any trenches daily and remove any faunal species that may have fallen in. SCC found must be recorded (photograph and GPS location) and loaded onto iNaturalist and relocated at least 50m away. If faunal SCC are found during earth works, these species must be relocated to the nearest appropriate habitat within Open Spaces areas; and • The CDC's Environmental Specification for Construction relating to the Search and Rescue of faunal SCC must be implemented and adhered to.	**MODERATE –**
	No-Go	N/A								

IMPACT	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	SEVERITY OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
Disturbance to Damara tern population / Loss of habitat	Preferred Alternative	Damara Terns are sensitive to disturbance in the vicinity of their nests (Martin, 2018; Martin, 2019). Construction activities, including increased noise and activity within the beach and dune area, could cause disturbance to the Damara Tern population nesting within the dune slacks. Additionally, uncontrolled construction activities could result in encroachment into Damara Tern habitat which is likely to affect the terns breeding success and return to site.	**HIGH –**	Severe	Localised	Permanent	Possible	Achievable	• An expert with previous experience monitoring this species (e.g. Paul Martin) must be appointed to determine the Damara Tern habitat and a 200m buffer from the delineated Damara Tern habitat must be established. Continued monitoring of the Damara Tern population must be implemented. • The habitat and buffer must be demarcated and declared a No-Go area. This must be communicated and acknowledged by all staff and contractors. Failure to do so should result in immediate dismissal from site and an appropriate fine. • The CDC must establish a Management Program inclusive of specialist monitoring and annual reporting on the status of the Damara Tern population within the project area. • No fires are permitted within the project area. • No machinery that is noisier than what is currently being used during mining operations should be deployed. • Drivers of vehicles authorised to drive on the beach need to be aware of the presence of Damara Terns during the breeding season (October to March) and should keep below the high-water mark. • Management actions such as litter picking need to be carefully planned to minimise disturbance to breeding pairs.	**HIGH –**
	No-Go	N/A								
Loss of Chlorotalpa duthiae (Duthie's Golden Mole) and/or	Preferred Alternative	Duthie's Golden Mole is listed as Vulnerable. It is possible that this species occurs in the project footprint. This species is likely to be impacted by the loss of habitat and direct mortality such as collisions/road kills.	**MODERATE –**	Moderate	Localised	Permanent	May Occur	Achievable	• Implement a faunal search and rescue plan directly prior to construction. If any individuals of this species are found, they should be relocated to the nearest appropriate habitat within Open Space areas;	**LOW –**

IMPACT	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	SEVERITY OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
associated habitat									• It is imperative to have a comprehensive road mitigation plan to prevent roadkill on the access roads during the construction phase; • The CDC's Environmental Specifications relating to the Search and Rescue of faunal SCC must be implemented and adhered to .	
	No-Go	N/A								
Climate Change	Preferred Alternative	Loss of carbon stock, use of energy including electricity generated from non-renewable resources can result in an increase in carbon emissions	**MODERATE –**	Moderately severe	Global	Long Term	Definite	Achievable	• As far as possible, minimise clearing of vegetation. • Educate employees about conservation of vegetation resources; • Maintain vegetation in drainage lines to reduce loss of soil by erosion in the event of increased rainfall; and • Committing to efficient use of energy through the CDC's environmental policy; • Correctly sizing motors and pumps and use of adjustable speed drives in applications with highly variable load requirements; • Actively considering and, where practical, implementing measures to reduce energy consumption of the development; • Ensuring that all machinery, including vehicles, are well maintained; • Consideration of carbon sequestration potential when developing the rehabilitation strategy for the project.	**LOW –**
	No-Go	There are a number of industries within the Coega SEZ and the Port that already results in carbon emissions.	**MODERATE –**	Moderate	Global	Long Term	Definite	N/A	• N/A	**MODERATE –**
IMPACTS ON THE PHYSICAL ENVIRONMENT										
Reduced water quality in the marine environment	Preferred Alternative	• Construction activities such as drilling and blasting are likely to generate sediment plumes that will increase the turbidity of the water and settle on the surrounding seafloor. • Increased erosion and sedimentation may occur during the construction phase	**LOW –**	Moderate	Regional	Short Term	Possible	Achievable	• A monitoring programme should be implemented to monitor water quality in the vicinity of the construction site. Six monitoring stations, three on either side of the pipeline at 10, 15 m and 18 m depth, respectively, should be identified for this purpose. Measurements should be collected daily for 20-30 days prior to the commencement of construction	**VERY LOW –**

IMPACT	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	SEVERITY OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
		when heavy duty vehicles will be moving sediment. • Loose sediment may be washed down with rainfall, leading to increased turbidity and sedimentation. • Dredging activities will cause the resuspension of sediment into the water column, causing increases in turbidity. • Sessile organisms, particularly those that filter-feed are most likely to be impacted as material suspended by dredging and other construction activities is likely to be largely inorganic resulting in feeding difficulties. They generally ingest high levels of inorganic material filtered from the water, resulting in lower growth rates, starvation and, in the worst cases, mortality. • For autotrophic organisms such as microphytobenthos and phytoplankton, suspended material blocks light, the higher the suspended solids the more light is attenuated. This is likely to cause a temporary decrease in the productivity of autotrophic microphytobenthos and phytoplankton. • However, given that the area surrounding the construction site is exposed, it is anticipated that sand particles suspended by construction will be readily dispersed by wave action. In addition, sand movement in the nearshore marine environment occurs naturally both in coastal zone and intertidally. Consequently, nearshore biota are resilient to sand movement and additional sediment input to the marine environment during construction is unlikely to be detrimental. • Dredging activities may also result in the suspension of							operations (to develop an appropriate baseline) and should continue as long as construction continues. • The median TSS concentration in monitoring data should not exceed the threshold limit which is set as the greater of the 80th percentile of the baseline monitoring data, or ten percent (10%) greater than the natural background turbidity. • If the TSS approaches the threshold limit set above at any of the surveillance monitoring stations, mitigation measures are to be put in place to prevent any further increase in suspended solid concentration (e.g. reduce rate of construction activities). If median turbidity levels (calculated from measured values in any one and a half hour period) exceed the threshold, construction activities are to be suspended until measured levels drop below the threshold.	

IMPACT	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	SEVERITY OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
		sediment associated pollutants such as trace metals. 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. A geological survey of the area northeast of the Port of Ngqura showed that approximately 65% of the seafloor area consists of rocks with unconsolidated sediment cover of less than 0.5 m (CSIR 2010a). • Superficial sediments within the Port of Ngqura were found to be very muddy, indicating that the Port is a depositional area for fine sediments (CSIR 2010b). It can be inferred that the Port area is thus 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 have been positioned far enough away from the Port entrance to prevent entrainment within the Port.								
	No-Go	There is currently discharge of treated and untreated effluent occurring at several locations along the Algoa Bay coastline. Should the proposed marine infrastructure servitude not be developed, the various industries within the Coega SEZ could apply for separate discharge pipelines, which is likely to result in numerous cumulative seawater impacts.	**HIGH –**	Very Severe	Study Area	Long term	Probable	N/A	• N/A	**HIGH –**
Pollution generated during construction	Preferred Alternative	• The problem of litter entering the marine environment has escalated dramatically in recent decades, with an ever-increasing proportion of litter consisting of non-	**LOW –**	Slight	Regional	Medium Term	Probable	Achievable	• Check vehicles for hydrocarbon leaks daily. • Protocols for dealing with accidental spills must be in place. • Emergency equipment to isolate spills	**VERY LOW –**

IMPACT	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	SEVERITY OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
		biodegradable plastic materials. South Africa has laws against littering, both on land and in the coastal zone, but unfortunately these laws are seldom rigorously enforced. • Objects which are particularly detrimental to aquatic fauna include plastic bags and bottles, pieces of rope and small plastic particles. Large numbers of aquatic organisms are killed or injured daily by becoming entangled in debris or because of the ingestion of small plastic particles (Gregory 2009, Wright et al. 2013). • If allowed to enter the ocean, solid waste may be transported by currents for long distances out to sea and around the coast. Thus, unlike fuel or sewage contamination, the extent of the damage caused by solid waste is potentially large. The impact of floating or submerged solid materials on aquatic life (especially birds and fish) can be lethal and can affect rare and endangered species.							must be accessible. • Provide suitable containers for the disposal of all waste, including recycling. • The ECO must ensure that the CDC's Waste Management Plan is being implemented by all contractors at all times. • All recommendations related to solid waste management presented below must also be implemented.	
	No-Go	The CDC has a waste management plan in place, as such there is currently no evidence of littering on site.	**LOW –**	Moderate	Study Area	Permanent	Definite	N/A	• N/A	**LOW –**
Hazardous substance spills	Preferred Alternative	The risk of spillage of a variety of hazardous substances may occur during the use of heavy machinery, construction vehicles and construction vessels. For example, spillage may occur as a result of fuel leaks, refuelling, or collision. Hydrocarbons are toxic to aquatic organisms and precautions must be taken to prevent them from contaminating the environment.	**LOW –**	Moderate	Local	Medium Term	Possible	Easily Achievable	• Intentional disposal of any substance into the environment is strictly prohibited, while accidental spillage must be prevented, contained and reported immediately. • Implementation of a rigorous environmental management and control plan (including procedures for remediation). • All fuel and oil are to be stored with adequate spill protection. • No leaking vehicles are permitted on site. • All hazardous substances must be accompanied by a permit, a hazard report sheet, and a first aid treatment	**VERY LOW –**

IMPACT	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	SEVERITY OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
									protocol and may only be handled by suitably trained operators. • Protocols for dealing with accidental spills must be in place. • Emergency equipment to isolate spills must be accessible.	
	No-Go	N/A								
Erosion	Preferred Alternative	The construction of the land-based infrastructure associated with the proposed servitude will require the clearing of vegetation which will result in exposed soil surfaces and thus the potential for soil erosion.	**LOW –**	Moderate	Localised	Short Term	May Occur	Achievable	• The seawater abstraction and discharge pipeline infrastructure should be designed to limit risks of erosion. • During construction, disturbance and clearing of natural vegetation should be kept to the minimum required for construction; • Newly cleared and exposed areas must be promptly rehabilitated with indigenous vegetation to avoid soil erosion. Where necessary, temporary stabilization measures must be used until vegetation re-establishes; • Plan and design for the worst case, that is, for heavy rainfall and runoff events, or high winds; • Care must be taken to ensure that runoff is well dispersed so as to limit erosion;	**LOW –**
	No-Go	N/A								
Impacts on topography (terrestrial environment)	Preferred alternative	It is envisaged that changes to the terrestrial topography of certain localities within the study area will be required during the construction of the land-based activities associated with the proposed project, especially along areas of the coastline where intake and outfall infrastructure will be constructed.	**MODERATE –**	Slight	Study Area	Permanent	Definite	Very Difficult	• The seawater abstraction and discharge pipeline infrastructure should be designed to limit impacts on topography. • Excavations and changes to the topography of the site should be kept to the minimum required for construction; • Previously disturbed areas must be utilised wherever possible; and • The general profile of the landscape must be retained as far as practically possible.	**MODERATE –**
	No-Go	N/A								
Impacts on bathymetry (marine environment)	Preferred alternative	There are likely to be minor changes to the bathymetry of the intertidal and subtidal areas following the proposed infrastructure to be constructed on	**MODERATE –**	Slight	Study Area	Permanent	Definite	Very Difficult	• The seawater abstraction and discharge pipeline infrastructure should be designed to limit impacts on bathymetry. • Excavations and changes to the bathymetry of the site should be kept to the minimum required for	**MODERATE –**

IMPACT	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	SEVERITY OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
		the sea bed.							construction; and • The general profile of the seabed must be retained as far as practically possible.	
	No-Go	N/A								
Soil Contamination	Preferred alternative	The utilisation of construction vehicles and other construction machinery during the construction phase could result in soil contamination within the area.	**LOW –**	Moderate	Localised	Short Term	May Occur	Achievable	• Construction vehicles and equipment must be inspected for leaks on a daily basis. Any leaks must be immediately repaired at an offsite location; • All hydrocarbons and chemicals must be stored on impermeable surfaces with appropriately-sized containment bunds; and • Spill kits must be available at all locations where chemicals of hydrocarbons are stored, handled or used, and spills must be cleaned up immediately in accordance with an established protocol appropriate to the material in question.	**LOW –**
	No-Go	N/A								
Impacts on Surface and Groundwater Resources	Preferred alternative	• Various substances may result in the pollution of surface and groundwater resources. • Construction activities may lead to sediment being deposited into drainage lines, wetlands and other water bodies, including the potential for seepage into groundwater resources. • Pollution from litter and general construction waste may occur due to improper site management. • Washing of vehicles and equipment may result in the pollution of drainage lines, and other water bodies. • Pollution may occur as a consequence of poor vehicle maintenance and improper storage of hazardous materials such as fuel, etc.	**MODERATE –**	Moderately Severe	Study Area	Long Term	May Occur	Achievable	• All chemicals of all types must be stored on impermeable surfaces in secure, bunded and designated storage areas; • Cement must be stored on impermeable storage areas protected from the rain and mixed only in designated areas. Concrete residues must be cleaned up immediately; • Vehicle repairs, servicing, refuelling and washing must be done only in designated areas underlain by impermeable surfaces with appropriately-sized containment bunds and grease traps; and • Where it is necessary to service, repair or refuel a vehicle or item of plant on site, drip trays must be used to catch drips, spills and leaks.	**LOW –**
	No-Go	N/A								

IMPACT	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	SEVERITY OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
Impacts to the Coastal Dune System	Preferred alternative	Development within the coastal dune system will alter the natural dynamic processes characteristic of the coastal zone, including sediment dynamics and longshore sediment transport, ultimately resulting in the modification of the dune system and possible changes to the aeolian coastal sediment budget in the region.	**HIGH –**	Moderate	Regional	Permanent	Possible	Achievable	• Should the development require the permanent stabilisation/removal of the mobile dune fields within the region, then the regional effects of the stabilisation of the mobile dunes must be determined. This must include an assessment of the potential impacts on the sand budget for this coastline, inclusive of potential impacts on the marine ecosystems, as well as any possible effects this would have on the Port of Ngqura; • Should stabilisation of the dunes, landward of the HWM, be required only indigenous dune vegetation typical of St Francis Dune Thicket must be used to establish a stable state; • Construction in the area shall be in strict accordance with the recommendations contained in the OSMP; • National and provincial legislation relating to development within the coastal zone should be consulted.	**MODERATE –**
	No-Go	N/A								
Waste Management	Preferred alternative	Solid waste associated with construction activities such as building rubble, (e.g. excavated material, brick off cuts, packaging, waste concrete etc.). Littering on site may result in non-biodegradable material entering the marine environment. Plastic bags, bottles, rope and other litter could have a direct impact on marine fauna resulting in the death of marine life.	**MODERATE –**	Severe	Study Area	Long Term	May Occur	Difficult	• Construction material must be reused or recycled wherever possible; • Waste that must be reused or recycled should be disposed of in the correct manner at the nearest registered waste disposal site; • Any hazardous materials (e.g. paint, fuel or oil) must be disposed of immediately and in the correct manner; • General good house-keeping should be practiced on site; • Topsoil and spoil is to be managed in accordance with the CDC's Environmental Specifications for Construction. • Litter must be controlled during construction (e.g. adequate bins must be made available on site at all times); and • Construction materials stored as part of the project must be secured (i.e. plastics must be covered to prevent being blown off site). Skips must be regularly emptied and must be	**LOW –**

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	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
									covered.	
	No-Go	The CDC has a waste management plan in place, as such there is currently no evidence of littering on site.	**LOW –**	Moderate	Study Area	Permanent	Definite	N/A	N/A	**LOW –**
Traffic	Preferred alternative	During the construction phase, large construction vehicles will be utilising the existing road network and establishing new access ways to get to the proposed development site. This may result in the impeding of traffic flow and damage to the existing roads. In addition, the construction within the marine environment will require the transportation of materials in and out of the Port of Ngqura.	**LOW –**	Slight	Localised	Short Term	Probable	Easily Achievable	• Large slow moving construction vehicles such as front end loaders must not be permitted to utilize public roads during peak hours; • Damage to public roads caused by large construction vehicles must be repaired immediately; and • The port authorities must be notified and consulted prior to the commencement of construction.	**LOW –**
	No-Go	N/A								
Air Quality	Preferred alternative	Impacts on air quality during the construction phase will primarily result from increased dust levels associated with the required excavation, vegetation clearing, grading and other construction activities.	**LOW –**	Slight	Study Area	Short Term	Probable	Easily Achievable	• Wet suppression techniques should be used to control dust emissions, especially in areas where dry material is handled or stockpiled. No potable water must be used for dust suppression. • Exposed soils and other erodible materials should be re-vegetated or covered promptly. • Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rates.	**LOW –**
	No-Go	N/A								
Visual Impact	Preferred alternative	Construction vehicles and equipment will be evident in the existing landscape during the construction phase. Generation of dust will increase the visibility of the project and may become an eyesore if not managed correctly.	**LOW –**	Slight	Study Area	Long Term	Possible	Achievable	• Waste must be removed from site regularly and disposed of at a registered landfill site in order to avoid unnecessary litter being viewed on site; and • General good housekeeping must be maintained at all times.	**LOW –**
	No-Go	None of these activities will take place and the impact is not applicable.	**MODERATE –**	Moderate	Study Area	Permanent	Definite	N/A	N/A	**MODERATE –**
IMPACTS ON THE BIOLOGICAL ENVIRONMENT										

IMPACT	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	SEVERITY OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
Loss of sandy beach, intertidal and subtidal habitat and biota	Preferred Alternative	• Intake and outfall infrastructure will be constructed intertidally and subtidally, mostly on sandy beach habitat, over an ~4 km stretch of coastline. • This infrastructure will extend to a maximum length of 3,000 m into the ocean. • Intake and outfall seawater pipelines are likely to be buried in trenches in the beach and surf zone and anchored to the sea floor beyond the high active surf zone. This will require excavation or dredging activities. • The proposed Wet Mechanical Cooling water intake jetty will also disturb/remove sandy beach, intertidal and subtidal habitat within the Port. • The outfall structure for the wet mechanical cooling system would be about 600 mm diameter HDPE pipeline for each plant. The pipeline would lie on the seabed and be weighed down by concrete collars. • In addition, pipeline construction will involve traffic on the beach by heavy vehicles and machinery. Vessels will sail within the surf zone and offshore to transport sections of pipe. • Beach well abstraction points may also be used, and these will impact on the sandy beach system. • The construction of these pipelines and tunnels will result in disturbance of the sandy and rocky intertidal and subtidal surfaces, and associated macrofauna and flora will experience displacement and mortality. • Sessile biota along the infrastructure length will become smothered and mobile fauna will be disturbed.	**MODERATE –**	Moderate	Local	Long Term	Definite	Achievable	• Minimise vehicle and pedestrian traffic on the beach and sandy shore. • Minimise the surface area impacted by bolting the pipeline directly to the rocky substratum. • Minimise the use of blasting. • Rehabilitate the disturbed area immediately following construction by removing all artificial structures or beach modifications created during construction from above and within the intertidal zone. • No accumulated beach sediments should be left above the high-water mark, and any substantial sediment accumulations below the high water mark should be levelled. • Undertake baseline and comparative monitoring of biota in the construction footprint. Monitoring should focus on physical habitat variables (sediment particle size composition and organic content) and biota (e.g. benthic infaunal soft sediment communities). The latter have been shown to provide a good indication of habitat recovery following physical disturbance. Surveys should be done once prior to construction and again approximately 12 months after construction is complete.	**LOW –**

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	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
		• A significant, short-term decrease in macrofaunal abundance and biomass will occur as a result of the proposed construction operations. • Sub-tidally, it is likely that the pipe will be laid on the sediment surface and will become gradually buried by shifting sand. • Any birds feeding and/or roosting in the area will also be disturbed and displaced for the duration of construction activities. • In the case of an embedded pipeline, a channel would be blasted into the rocky shore from above the spring high water mark to below the spring low water mark. This will result in the direct mortality of intertidal biota but will also create new artificial hard substrate habitat in the intertidal zone. • Soft sediment beach habitat will also be lost to the use of beach wells, and the construction of concrete intake channels inside the Port of Ngqura. • Should pipelines be laid over subtidal reefs, direct mortality of reef associated species will occur in the short term, but the hard substrate created will be similar to the reef habitat lost and is likely to be recolonized. • Species of particular concern that are associated with subtidal reef habitats include abalone (overexploitation has resulted in abalone becoming rare around the South African coastline). However, pipeline construction over such a small section of reef is unlikely to displace a high enough number of individuals to affect the population. • Subtidal reef has been identified as a biodiversity hotspot and is a priority for conservation (Chalmers 2012, Laird et al. 2016). Commercial and								

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		recreational fishers depend on these reefs which support a number of important fish species. • However, as the construction footprint of the proposed development is adjacent to the Addo MPA, the impact of habitat loss will be completely offset by the benefits of the protected area. • In the case of an aboveground pipeline, it is expected that the structure will be recolonized by benthic biota over time and will constitute artificial habitat similar to the reef habitat lost. • The construction of an intake basin inside the Port of Ngqura constitutes a substantial, permanent disturbance to subtidal and intertidal habitat, resulting in severe disturbance of the sandy and rocky intertidal and subtidal surfaces. Associated macrofauna and flora will probably experience high levels of mortality. • Construction traffic on the beach will likely cause mortality of resident infauna, especially if excavation is required. • Sandy beaches are highly dynamic environments, and the animals that inhabit them are adapted to this dynamic ecosystem. Recovery of sandy beach assemblages will occur rapidly, and primarily through immigration from adjacent areas. • Birds feeding and/or roosting in the area will be disturbed and displaced for the duration of construction activities, but are expected to return on completion of construction activities. • The disturbance of sandy beach biota on the upper shore is not significant as the majority of these organisms are able to move away from the source of								

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	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
		disturbance. • Intertidal and subtidal species are likewise adapted to highly dynamic environments. While intertidal sand habitat is not uncommon the permanent loss of habitat through the construction of concrete intake channels inside the Port of Ngqura is of significance. • Because the subtidal reef around all offshore outfall pipelines is within an area of conservation priority (Chalmers 2012, Laird et al. 2016), best practice mitigation measures are recommended under the mitigation section here.								
	No-Go	N/A								
Disturbance of pelagic open water habitat	Preferred Alternative	Construction of the proposed infrastructure will result in the temporary disturbance of deep pelagic habitat within the construction footprint and surrounds. However, mobile fish and elasmobranchs (sharks, rays and skates) that utilise the habitat will be able to move to adjacent areas. Seabirds of the islands within the Bay are of particular concern — a large scale disturbance of pelagic habitat may have significant consequences to the islands. It should be noted however that the area is already disturbed by constant vessel movement and that the impact will be limited to the duration of the construction phase, and that the pelagic habitat affected will be relatively small in comparison to adjacent areas of similar habitat in Algoa Bay.	**LOW –**	Low	Local	Short Term	Definite	Achievable	• The spatial extent and duration of construction must be limited as far as possible (construction of the different infrastructure should be undertaken sequentially to minimise disturbance on pelagic habitat).	**VERY LOW –**
	No-Go	The continued operation of the Port of Ngqura implies that marine fauna and flora within (and in close proximity to) the port are constantly	**MODERATE –**	Moderate	Study Area	Permanent	Definite	N/A	N/A	**MODERATE –**

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		disturbed. Should the proposed development not go ahead, alternative options may be used for abstraction of seawater and discharge of effluent, which may result in further disturbance of marine biota.								
Barotrauma impacts on marine fauna as a result of blasting	Preferred Alternative	• Fauna likely to be at risk from blasting activities at the proposed site include coastal fish species, marine birds, sharks and mammals. • 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 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. These 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. • 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); and ruptures of air bladders, organs and intestines as well as broken ribs in fish (Aplin 1947, Yelverton et al. 1975, Wright 1982). • Marine invertebrates do not possess gas filled cavities; therefore, the direct impacts of shockwaves produced by blasting are predicted to be	**MODERATE –**	Moderate	Regional	Short Term	Definite	Achievable	• A visual survey of the area (both the immediate vicinity of the construction footprint and within a 1000 m radius) should be conducted by trained marine mammal observers (MMO's) 30 minutes before the blasting is to commence. • Permission to blast must be delayed until all marine mammals are outside the 1 km radius form the blast site. Similarly, all blasting should be halted once marine mammals are seen entering the 1 km radius. Blasting should not commence when environmental conditions, such as darkness, mist, rain, fog or high sea states greater than Beaufort 4 prohibit adequate monitoring of the 1 km safety zone. • No blasting may take place during the annual sardine run (May-June) and should only be undertaken during daylight hours. • No blasting should be undertaken in the early mornings (6h00-10h00) or late afternoons (15h00-19h00) due to coastal dolphin activity in inshore waters. Ideally, blasting should only be undertaken between 12h00 and 14h00. • Blasting should be restricted to where alternative construction technologies are found to be unfeasible. Alternatives to the use of explosives could be the use of cutting techniques, such as wire, abrasive-, mechanical-, and torch cutting, which produce sound levels that are 80 dB less than the sound levels produced by normal blasting (TSB 2000, Spence et al. 2007, Transnet 2014).	**LOW –**

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		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. • 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 Addo MPA). Thus, fish kills that may result from blasting are unlikely to result in an irreplaceable loss of biodiversity or resources, as recruitment from adjacent areas should be sufficient to compensate for any mortalities. 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.							• Acoustic deterrent devices (ADDs) may be utilised if the effectiveness of candidate devices on the key marine mammal species can be demonstrated prior to the start of construction (Transnet 2014). • The charge weights required for the blasting should be carefully evaluated, and shape charges and shock wave focusing charges could be employed to reduce the charge weight by 90%. It is recommended that a number of small test blasts be conducted by the blasting contractor to measure the sound outputs at set distances from the source, both inside and outside the breakwater. This will allow adjustment of the charge weight and associated reduction in noise output as well as establish the impact that the breakwaters (both eastern and western) have on the propagation of underwater sound. Extensive monitoring should be done in this respect, both pre-and during construction (Transnet 2014). • Sound containment measures should be implemented during blasting as they pose the best mitigation measure, since they aim to partially enclose the produced sound within a certain area around the blast site. Potential mitigation measures could include the use of blasting mats (Spence et al. 2007) or bubble curtains, which is the main mitigation technique employed in the USA and Europe, or other technical measures for sound absorption. The reduction in sound should be such that it does not exceed 160 dB MSP (as per Southall et al. 2007, Transnet 2014).	
	No-Go	N/A								

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Noise disturbance to marine fauna	Preferred Alternative	• 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. • High densities of southern right whales are 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. 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 increased noise in the construction area during this period are potentially considerable and mitigation measures must be taken.	**MODERATE –**	Moderate	Regional	Short Term	Probable	Achievable	• A visual survey of the area (both the immediate vicinity of the construction footprint and within a 1000 m radius) should be conducted by trained marine mammal observers (MMO's) 30 minutes before the blasting is to commence. Permission to blast must be delayed until all marine mammals are outside the 1 km radius form the blast site. Similarly, all blasting should be halted once marine mammals are seen entering the 1 km radius. Blasting should not commence when environmental conditions, such as darkness, mist, rain, fog or high sea states greater than Beaufort 4 prohibit adequate monitoring of the 1 km safety zone. • No blasting may take place during the annual sardine run (May-June). • No blasting should be undertaken in the early mornings (6h00-10h00) or late afternoons (15h00-19h00) due to coastal dolphin activity in inshore waters. Blasting should only be undertaken between 12h00 and 14h00. • Blasting should be restricted to where alternative construction technologies are found to be unfeasible. Alternatives to the use of explosives could be the use of cutting techniques, such as wire, abrasive-, mechanical-, and torch cutting, which produce sound levels that are 80 dB less than the sound levels produced by normal blasting (TSB 2000, Spence et al. 2007, Transnet 2014).A soft-start (i.e. gradual ramping up of piling/ drilling power) period of at least 20 minutes is recommended. If an animal enters the safety zone during soft-start, the power should not be increased until the animal exits and remains outside of the zone for 20 minutes (Transnet 2014). • Acoustic deterrent devices (ADDs) may be utilised if the effectiveness of candidate devices on the key marine mammal species can be demonstrated prior to the start of construction (Transnet 2014).	**LOW –**

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									• The charge weights required for the blasting should be carefully evaluated, and shape charges and shock wave focusing charges could be employed to reduce the charge weight by 90%. It is recommended that a number of small test blasts be conducted by the blasting contractor to measure the sound outputs at set distances from the source, both inside and outside the breakwater. This will allow adjustment of the charge weight and associated reduction in noise output as well as establish the impact that the breakwaters (both eastern and western) have on the propagation of underwater sound. Extensive monitoring should be done in this respect, both pre-and during construction (Transnet 2014). • Sound containment measures should be implemented during blasting as they pose the best mitigation measure, since they aim to partially enclose the produced sound within a certain area around the blast site. Potential mitigation measures could include the use of blasting mats (Spence et al. 2007) or bubble curtains, which is the main mitigation technique employed in the USA and Europe, or other technical measures for sound absorption. The reduction in sound should be such that it does not exceed 160 dB MSP (as per Southall et al. 2007, Transnet 2014). • Drilling, piling and dredging activities are to be carried out the lowest possible power levels known to contribute to ocean noise pollution (ACCOBAMS 2010, JNCC 2010, EPBCA 2012). Power limits can be restricted by shutting down the power of operational systems prior as well as after usage to avoid leaving them idling (EPBCA 2012).	

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									• Platforms should use thrusters, fibre glass insulation, or damping techniques, such as the use of damping tiles, around machinery to reduce vibration noise. Ramming and drilling piles and machinery should be enclosed with acoustically-insulating material, such as fibreglass, mineral wool, and plastic; in addition, modified drilling caps could be used.	
	No-Go	As the proposed development site is within an industrial zone, there is existing increased noise levels within the project boundaries.	**LOW –**	Slight	Study Area	Permanent	Definite	N/A	N/A	**LOW –**
Loss of Indigenous Vegetation (Cape Seashore Vegetation and St Francis Dune Thicket)	Preferred Alternative	Vegetation clearance for the construction of the proposed Marine Servitude Project will result in the loss of a maximum of 8.5 ha of Cape Seashore Vegetation and a maximum of 10.7 ha of St Francis Dune Thicket vegetation (both classified as Least Concern). However, it should be noted that much of the indigenous vegetation of the project area has been invaded by dense stands of *A. cyclops.* As such, the resultant loss of indigenous vegetation is anticipated to be minimal.	**MODERATE –**	Moderate	Study Area	Permanent	Definite	Achievable	• Except to the extent necessary for the carrying out of construction works, flora shall not be removed, damaged or disturbed. The clearance of vegetation at any given time should be kept to a minimum and vegetation clearance must be strictly limited to the development footprint; • The search and rescue of rare, endemic or threatened species, prior to site clearance must be carried out in accordance with the Project Vegetation Specification (PVS), by a competent and qualified service provider; • The removal and stockpiling of topsoil must also be carried out in accordance with the Project Vegetation Specification; • Employees must be prohibited from making fires and harvesting plants; • As far as practically possible, existing access roads should be utilised; and • The Alien Vegetation Management Plan developed for the Coega SEZ must be implemented and managed to prevent the further spread of alien invasive species within Zone 10 of the Coega SEZ.	**MODERATE -**
	No-Go	The site is already invaded with *Acacia cyclops* which has resulted in habitat loss and displacement of indigenous species. If the project does not go ahead, the infestation is likely to continue displacing natural species.	**MODERATE –**	Moderate	Regional	Long Term	Definite	N/A	N/A	**N/A**

IMPACT	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	SEVERITY OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
Loss of Biodiversity / Encroachment into Priority Biodiversity Areas	Preferred Alternative	During the construction phase, vegetation clearance coincides with the loss of faunal habitats, SCC, and plant species, and consequently biodiversity. Accidental encroachment into the delineated CBA and priority areas during construction activities could result in the loss of valuable biodiversity, SCC, and faunal habitat.	**MODERATE –**	Moderate	Localised	Permanent	Definite	Achievable	• To ensure the protection of the priority areas delineated within the OSMP and to prevent potential encroachment of construction activities, the boundaries of the construction area must be demarcated according to the methodology developed and implemented by the CDC: o Demarcation of the Open Space will be done according to the approved Coega Open Space Management Plan (OSMP), dated July 2014.Demarcation of the Open Space will be done using wooden survey poles. o The top 30cm of the wooden survey poles must be painted with weatherproof white paint, followed by the next 30cm painted green, with the following RGB/HEX codes: ▪ White paint – RGB/HEX code (255, 255, and 255) (#FFFFFF) ▪ Green paint – RGB/HEX code (0, 128, 0) (#008000) o Wooden survey poles will be a minimum width of 50mm. o Wooden survey poles will be between 1.5 and 2.1m in height and spaced accordingly, depending on the density of the vegetation, with a maximum distance of 10m apart. o Signage to indicate the boundaries of the Open Space System in the Coega SEZ will be erected in various locations in the SEZ. • The search and rescue of rare, endemic or threatened species, prior to site clearance must be carried out in accordance with the Project Vegetation Specification (PVS), by a competent and qualified service provider. • Search and clear the area of faunal species prior to vegetation clearance. • The clearance of vegetation at any given time should be kept to a minimum and vegetation clearance must be strictly limited to the development footprint. • Employees must be prohibited from making fires and harvesting plants.	**LOW –**

IMPACT	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	SEVERITY OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
									• Should rehabilitation or stabilisation of the dunes, landward of the HWM, be required only indigenous dune vegetation typical of St Francis Dune Thicket must be used to establish a stable state; and • As far as practically possible, existing roads should be utilised.	
	No-Go	N/A								
Spread of Alien Plant Species	Preferred Alternative	The removal of existing natural vegetation creates 'open' habitats which favours the establishment of undesirable vegetation in areas that are typically very difficult to eradicate and could pose a threat to surrounding ecosystems.	**MODERATE –**	Moderate	Localised	Long Term	Probable	Achievable	• The Alien Vegetation Management Plan developed for the Coega SEZ must be implemented and managed to prevent the further spread of alien invasive species within Zone 10 of the Coega SEZ • Any alien vegetation which establishes during the construction phase should be removed from site and disposed of at a registered waste disposal site. Continuous monitoring for seedlings should take place throughout the construction phase.	**LOW –**
	No-Go	The site is already invaded with Acacia cyclops which has resulted in habitat loss and displacement of indigenous species. If the project does not go ahead, the infestation is likely to continue displacing natural species.	**MODERATE –**	Moderate	Localised	Long-Term	Definite	N/A	N/A	**MODERATE –**
Habitat Loss/ Fragmentation	Preferred Alternative	During the construction phase, the loss of vegetation coincides with the loss of faunal habitat, reducing breeding and rearing locales. Faunal populations could become locally extinct or diminish in size. It should be noted that the development is linear in nature and that sufficient habitat surrounding the proposed servitude is available.	**MODERATE –**	Moderate	Localised	Permanent	Definite	Achievable	• As far as practically possible, existing access roads must be utilised. • Particular attention must be afforded to the Damara Tern habitat located within the dune slacks in close proximity to proposed development. A wide buffer of 200 m should be demarcated and maintained around this area to prevent encroachment of construction activities, particularly heavy machinery which could cause a disturbance to the population. Continued monitoring of the Damara Tern population must be implemented. • Mitigation measures related to geographical impact on both fauna and flora must be implemented for the project.	**LOW –**
	No-Go	The site is already invaded with *Acacia cyclops* which has resulted in habitat loss and displacement of	**MODERATE –**	Moderate	Regional	Long Term	Definite	N/A	N/A	**MODERATE –**

IMPACT	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	SEVERITY OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
		indigenous faunal species. If the project does not go ahead, the infestation is likely to continue displacing faunal species.								
IMPACTS ON THE SOCIAL ENVIRONMENT										
Impacts on land use	Preferred Alternative	• The land-based activities associated with the proposed project fall within an existing industrial zone (the Coega SEZ) and thus are in line with the proposed land use of the area. • Zone 10 of the Coega SEZ is earmarked for aquaculture and, because the proposed development is essential to the functionality of the aquaculture development zone (ADZ), the development and operation of the proposed marine infrastructure servitude will be highly beneficial to the land use of the area.	**HIGH +**	Beneficial	Study Area	Long Term	Definite	Not Applicable	None Required	**HIGH +**
	No-Go	The no-go option will result in land allocated for aquaculture not being utilised for this purpose as a result of insufficient (or lack of) intake water.	**HIGH –**	Moderate	Study Area	Permanent	Definite	Not Applicable	N/A	**HIGH –**
Health and Safety	Preferred alternative	Health and safety aspects will mostly pertain to activities defined under the Occupational Health and Safety Act (Act No. 85 of 1993). Work occurring throughout the proposed construction phase could cause health and safety risks.	**MODERATE –**	Slight	Localised	Short Term	May Occur	Easily Achievable	• All aspects of the Occupational Health and Safety Act (Act No. 85 of 1993), must be adhered to at all times.	**LOW –**
	No-Go	Within an industrial area there is potential for accidents and health impacts.	**LOW –**	Slight	Study Area	Long Term	May Occur	N/A	N/A	**LOW –**
ECONOMIC IMPACTS										
Employment Creation	Preferred alternative	The proposed development will create a number of temporary employment opportunities during the construction phase of the	**MODERATE +**	Beneficial	Study Area	Short Term	Definite	Easily Achievable	• Utilise local labour as far as possible; and • Construction material must be sourced locally wherever possible.	**HIGH +**

IMPACT	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	SEVERITY OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
		proposed development								
	No-Go	Should the project not proceed, no further employment opportunities will be realised.	**HIGH –**	Low	Study Area	Short Term	Definite	N/A	N/A	**HIGH –**
Trench Stability	Preferred Alternative	Stability of the trenches is considered to be problematic given the ready collapse of the excavation sidewalls which occurred during the excavation of some of the test pits.	**MODERATE –**	Moderate	Localised	Short Term	May Occur	Achievable	• Trenches excavated within unconsolidated, loose sand (aeolian and Salnova Formation) will either need to be supported or battered back to a safer slope angle, which will increase construction costs. • Sections of the profile that have undergone partial to complete pedogenesis (soil cementation) are considered stable provided there is no significant overburden adjacent to the crest, whether it be man-made stockpiles or natural material (high sand dune). Should this condition be identified during the design phase of the project, it is recommended that a stability analysis be conducted to assess the stability of the trench sidewalls.	**LOW –**
	No-Go	N/A								
HERITAGE AND CULTURAL ASPECTS										
Impacts on maritime cultural heritage	Preferred Alternative	A number of small magnetic anomalies were identified during the magnetometer survey. The majority of these were in the surf zone. Dives were undertaken on accessible sites, and only one metal object was found, a metal pipe. According to the maritime heritage assessment, due to the small size of the anomalies, their location close to the shoreline and what was found on the diver searches, the anomalies probably represent construction debris from the old oyster farm on the beach and from the port's construction.	**NO EFFECT**	N/A	N/A	N/A	N/A	N/A	Mitigation provided below.	**NO EFFECT**
	No-Go	N/A								

IMPACT	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	SEVERITY OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
Chance Finds	Preferred Alternative	According to the marine heritage assessment, while there is an extremely low probability that shipwrecks will be found underwater, there exists a chance that shipwreck material and/or pre-colonial sites (shell middens and stone tools) may be found in the dunes during construction. If such materials are found, the mitigation measures outlined here will need to be implemented.	**LOW –**	Slight	Study Area	Permanent	May Occur	Easily Achievable	• An archaeologist must be appointed for the duration of the construction phase of the project. • The appointed archaeologist must have the requisite experience and knowledge to recognise maritime cultural heritage that may be found in the beach/dune area. • The appointed archaeologist must do a short induction to familiarise the contractors and workers, including divers, to the potential heritage material artefacts that may be exposed during work. This includes Stone Age, Early Farming Communities, Colonial Period and Shipwreck artefacts and burials. • Should any heritage artefacts be exposed during marine excavations, work in the immediate area where the artefacts were discovered, shall cease immediately and the on-site archaeologist shall be notified as soon as possible. • All discoveries shall be reported immediately to the on-site archaeologist so that an investigation and evaluation of the finds can be made. The archaeologist will advise the necessary actions to be taken, including notifying SAHRA and if the artefacts are below the high-water mark, SAHRA's MUCH Unit must be contacted. • Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and • Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA (Act No. 25 of 1999), Section 51. (1).	**LOW –**
	No-Go	If any archaeological and cultural heritage sites are present, these would not be disturbed but would also not be uncovered and therefore not make any contribution to the understanding of the archaeological or cultural heritage	**LOW –**	Slight	Localised	Permanent	Definite	N/A	N/A	**LOW –**

IMPACT	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	SEVERITY OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
		of the area.								
Terrestrial Heritage Impacts	Preferred Alternative	• According to the Archaeological, Palaeontological and Cultural Heritage Assessment conducted for the SEZ in 2010, the most important archaeological sites were found along the coast (on TNPA property • The CDC has a Heritage Management Plan, and guidelines from SAHRA in place to ensure that all aspects of heritage are managed. • The CDC's Environmental Specifications for Construction include detailed requirements for the management of heritage in the SEZ, amongst others, the appointment of an archaeologist and palaeontologist during the construction phase of a project.	**LOW –**	Slight	Localised	Permanent	Definite	Achievable	• Should any archaeological or cultural sites or objects be located during the construction of the proposed project, it should immediately be reported to the SAHRA and ECPHRA; and • All construction site staff must be briefed to immediately report any sites or objects, which are located during the construction of the facility. • In the event of finding what appears to be an archaeological site or a cultural and/or historic site or object, work should be terminated until a qualified archaeologist or historian can examine the item or find.	**LOW –**
	No-Go	If any archaeological and cultural heritage sites are present, these would not be disturbed but would also not be uncovered and therefore not make any contribution to the understanding of the archaeological or cultural heritage of the area.	**LOW –**	Slight	Localised	Permanent	Definite	N/A	N/A	**LOW –**

Table 9.6: Assessment of the operational phase impacts related to the proposed project

ISSUE	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
OPERATIONAL PHASE										
GEOGRAPHICAL IMPACTS										
Overall impacts of the Coega Marine Servitude Project on the Addo MPA	Preferred Alternative	○ Impacts from the operational phase of the proposed project are primarily related to the impacts that cause reduced water quality within the Bay, which in turn affects the biodiversity of the MPA. ○ Operational phase impacts with the highest negative significance on the MPA include: ○ elevated nutrients, trace metals and inorganic substances. Elevated levels of trace metals are toxic to marine organisms and have been shown to decrease aquatic species abundance and diversity. ○ Elevated levels of pathogens (micro-organisms such as Escherichia coli) constitute a threat to water users and may result in a drop in the recreational use and the attraction of the MPA as a tourist attraction. ○ Increases in, or excessive nutrient loading resulting in the development of harmful algal blooms and eutrophication events which can cause changes in community composition and biodiversity.	**HIGH –**	High	Localised	Long Term	Probable	Achievable	• All the mitigation measures in this EIAR must be implemented to reduce the significance of this impact to low. • All personnel and vessels conducting monitoring within the footprint of the MPA, must adhere to the regulations of the Addo Elephant National Park MPA Gazette no 42479, R no 777 of 23 May 2019. • CDC to set up a joint implementation and monitoring team with SANParks for operational activities within the Addo Elephant National Park MPA; • CDC to consult SANParks in the development of a monitoring plan and evaluation and reporting of results; • CDC to communicate each new user of the infrastructure to SANParks prior to/at the start of the EIA, as SANParks is the direct receiver of the output of the servitude user; • CDC to communicate any incident/failure of infrastructure to SANParks with immediate effect; • CDC to develop an Emergency response plan for incidences of failure or accidents, and need to consult SANParks in such a plan.	**LOW –**
	No-Go	This section of Algoa Bay has been significantly altered by the development of the Port of Ngqura. Should the proposed development not go ahead, alternative options may be used for abstraction of seawater and discharge of effluent, which may require additional disturbance of the coastal zone and marine environment, with similar impacts on marine water quality.	**MODERATE –**	Slight	Study Area	Permanent	Definite	N/A	N/A	**MODERATE –**

ISSUE	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
Climate Change	Preferred Alternative	Loss of sequestration, use of energy including electricity generated from non-renewable resources can result in an increase in carbon emissions.	**MODERATE –**	Moderate	Global	Long Term	Definite	Achievable	• Committing to efficient use of energy through the CDC's environmental policy; • Correctly sizing motors and pumps and use of adjustable speed drives in applications with highly variable load requirements; • Actively considering and, where practical, implementing measures to reduce energy consumption of the development; • Ensuring that all machinery, including vehicles, are well maintained; • An Operating procedure for carbon management, including key performance targets, should be designed and implemented. This should include the management of re-vegetated areas (as carbon sink) for carbon offsetting measures; • Development and implementation of an Energy Management Plan for the facility.	**LOW –**
	No-Go	N/A								
IMPACTS ON THE PHYSICAL ENVIRONMENT										
Impacts on marine sediments	Preferred Alternative	• Scouring of sediment around the discharge outlet can become a serious design issue for poorly designed pipe ends discharging into shallow receiving water bodies (Carter & van Ballegooyen 1998). • Outfall design must maximise dilution potential while simultaneously minimising erosion of the sandy seabed. • There could be a potential shift in sediment movement and transport due to the installation of the four pipelines >500 m in length under Scenario 1, and the three >500 m under Scenario 2. However, it is likely that these pipelines will eventually be buried by sediment, resulting in minimal long-term impacts to sediment movement. • The proposed Wet Mechanical Cooling water intake jetty will likely consist of numerous	**LOW –**	Low	Local	Long Term	Probable	Achievable	• Implement the preferred Scenario recommended by PRDW (2020). • Should the proposed Wet Mechanical Cooling water intake jetty be constructed outside of the Port, a sediment transport study must be undertaken to assess the impacts on sediment transport patterns in the area. This modelling study must be undertaken prior to construction outside of the Port, and this impact must be reassessed based on the results of this modelling study.	**LOW –**

ISSUE	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
		concrete caissons anchored to the seafloor. However, this will be within the Port and thus won't have an impact on marine sediments.								
	No-Go	This section of Algoa Bay has been significantly altered by the development of the Port of Ngqura. The existence of the Port's breakwaters as well as the marine traffic in the surrounding area currently has a significant influence on the marine sediment dynamics. Should the development not go ahead, alternative options may be used for abstraction of seawater and discharge of effluent, resulting is additional changes to the sediment dynamics in the area.	**MODERATE –**	Slight	Regional	Permanent	Probable	N/A	N/A	**MODERATE –**
Impact of increased bio-active compound use and disease transmission	Preferred Alternative	The impacts of enhanced disease risk and use of bio-active compounds have however already been assessed in the Biosecurity and Biodiversity Risk Assessment Specialist reports for the Coega ADZ (Aquatic Ecosystem Services 2017b) and is as such not repeated here.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	No-Go	N/A								
Soil Contamination	Preferred alternative	During the operational phase, any leaks derived from the infrastructure associated with the discharge of effluent, such as pump stations, could result in soil contamination within the study area.	**MODERATE –**	Moderate	Study Area	Long Term	May Occur	Achievable	• The pump stations must have a built-in safety mechanism in the event of loss of pressure. • Regular maintenance inspections	**LOW –**
	No-Go	Due to the nature of the Coega SEZ (an industrial development area), there are a number of areas that have previously been contaminated as the result of the operation of various industries.	**MODERATE –**	Slight	Study Area	Permanent	Probable	N/A	N/A	**MODERATE –**
Impacts on Surface and Groundwater	Preferred alternative	Operational activities could result in the pollution of surface and groundwater resources following the	**MODERATE –**	Severe	Study Area	Long Term	May Occur	Achievable	• Effluent discharge must be continuously monitored to ensure that water quality meets the required national and international standards (whichever is	**LOW –**

ISSUE	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
Resources		discharge of treated effluent, leakages from discharge infrastructure and hazardous chemical spill during maintenance activities.							more stringent); • The pump stations must have a built-in safety mechanism in the event of loss of pressure. • Regular maintenance inspections	
	No-Go	Due to the nature of the Coega SEZ (an industrial development area), surface and groundwater pollution has potentially occurred as a result of other existing industrial activities within the area.	**LOW –**	Severe	Study Area	Permanent	May Occur	N/A	N/A	**LOW –**
Waste Management	Preferred alternative	Solid waste from the operational phase could be derived from maintenance activities and could include dead organic material from the intake infrastructure and inlet screens. Liquid waste will be discharged into the marine environment via the discharge infrastructure and incorrect treatment of the waste could impact seawater quality.	**MODERATE –**	Severe	Study Area	Long Term	May Occur	Difficult	• Litter must be controlled during construction (e.g. adequate bins must be made available on site at all times); and • All industries that will be utilising the discharge infrastructure must undergo rigorous monitoring of treated effluent in order to ensure that the discharge water meets the minimum regulatory standards and permit requirements (e.g. CWDP) prior to entering the discharge infrastructure. • The pump stations must have a built-in safety mechanism in the event of loss of pressure. • Regular maintenance inspections	**LOW –**
	No-Go	The CDC has a waste management plan in place, as such there is currently no evidence of littering on site.	**LOW –**	Moderate	Study Area	Permanent	Definite	N/A	N/A	**LOW –**
Visual Impact	Preferred alternative	The visibility of the proposed development may be noticeable and will have a visual impact on the coastal area that is currently undeveloped. However, in relation to the nature of the surrounding industrial zone, it will not be a significant visual transformation to the general landscape of the Coega SEZ.	**LOW –**	Slight	Study Area	Long Term	Possible	Achievable	• Infrastructure finishes should be of appropriate design and quality in keeping with the CDC's Architectural Guidelines; • Infrastructure should be designed in such a way that it fits/blends into the surrounding environment; • Waste must be removed from site regularly and disposed of at a registered landfill site to avoid unnecessary litter being viewed on site; and • General good housekeeping must be maintained at all times.	**LOW –**
	No-Go	N/A								
IMPACTS ON THE BIOLOGICAL ENVIRONMENT										

ISSUE	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
Impacts of seawater abstraction on marine biota as a result of beach wells	Preferred Alternative	Entrainment and associated mortality of marine organisms by the intake pumps of beach wells is not expected as the subsurface seawater is naturally filtered by the beach sand before entering the intake wells.	**VERY LOW –**	Low	Localised	Long Term	May Occur	Achievable	• No mitigation is required.	**VERY LOW –**
	No-Go	N/A								
Impacts of seawater abstraction on marine biota as a result of intake pipelines	Preferred Alternative	• The impacts of seawater abstraction on marine life can include entrainment and impingement. Entrainment occurs when organisms pass through intake structures and into the processing equipment (Pankratz 2004). • Organisms small enough to pass through most intake screens include holoplanktonic organisms (permanent members of the plankton, such as copepods, diatoms and bacteria) and meroplanktonic organisms (temporary members of the plankton, such as juvenile shrimps and the planktonic eggs and larvae of invertebrates and fish). • Impingement occurs when larger marine organisms are trapped against intake screens by the velocity of the water flow. These organisms may suffer mortality due to starvation, suffocation or exhaustion. While some studies estimated a 100% mortality rate of entrained organisms in power plant cooling systems (California Coastal Commission 2004), a study by Bamber & Seaby (2004) demonstrated mortalities ranging from 10 to 20%. Although some hardy species may survive impingement, the 24 h survival rate of less robust species is probably less than 15% (Pankratz 2004).	**LOW –**	Low	Localised	Long Term	May Occur	Achievable	• Intake velocities should be kept below 0.15 m/s to ensure that fish and other mobile organisms can escape the intake current. Intake velocities can be reduced to the requisite 0.15 m/s through the use of footer valves. • Intake structures should be positioned away from sensitive environments or areas with high species diversity or abundance, like rocky reefs, and should not draw in water from the upper meter of the water column. • Intake structures should ensure the horizontal intake of water.	**VERY LOW –**
	No-Go	N/A								

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	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
Impacts of elevated temperature in the marine environment	Preferred Alternative	• 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). This includes impacts on plankton and the pelagic food web. • South African WQGs recommend that the maximum acceptable variation in ambient temperature should not exceed 1°C at the edge of the RMZ. This is a conservative value considering the negligible effects of thermal plumes on benthic assemblages reported for a change in temperature of 5°C or less (van Ballegooyen et al. 2007). • Far field modelling results indicate that effluent temperature under both Scenario 1 and 2 achieve the required dilutions at the edge of the stipulated RMZ. • PRDW (2020) recommends Scenario 2 because there is better performance in terms of temperature dilutions, and a larger "margin of safety" (4 dilutions required vs 25 dilutions achieved) which allows the option of reducing number of ports and/or the port exit velocities.	**LOW – (Scenario 1) VERY LOW – (Scenario 2)**	Low	Localised	Long Term	Probable	Achievable	• Implement the preferred Scenario recommended by PRDW (2020); • A water quality monitoring programme must be implemented to validate the predictions of the hydrodynamic modelling study and monitor constituents of the effluent. Adaptive management, informed by monitoring results must be implemented to ensure compliance with water quality guidelines.	**VERY LOW –**
	No-Go	N/A								
Impacts of changes to salinity in the marine environment	Preferred Alternative	• All marine organisms have a range of tolerance to salinity, which is related to their ability to regulate the osmotic balance of their individual cells and organs to maintain positive turgor pressure. Aquatic organisms are commonly classified in relation to their range of tolerance as stenohaline (able to adapt to only a narrow range of	**VERY LOW –**	Low	Localised	Medium Term	Probable	Achievable	• Implement the preferred Scenario recommended by PRDW (2020); • Wastewater 1 outfall effluent must have a maximum end of pipe effluent salinity of 17 PSU.	**INSIGNIFICANT**

ISSUE	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
		salinities) or euryhaline (able to adapt to a wide salinity range), with most organisms falling into the first category. • The South African WQG (DWAF 1995) set an upper target value for salinity of 36 PSU. At levels exceeding 40 PSU, significant negative effects are expected, including possible disruptions to the recruitment of molluscan bivalves (e.g. mussels, oysters and clams), crustaceans, and possibly fish (Clarke 1992). • Far field modelling results indicate that elevated effluent salinity (i.e. brine from the desalination plant) under both Scenario 1 and 2 achieves the required dilutions at the edge of the stipulated RMZ. • However, release of a considerable amount of freshwater into the marine environment from the wastewater outfalls may lower the salinity in the receiving environment and could negatively impact the fauna and flora in the immediate vicinity of the impact site. Indeed, model results indicate that Wastewater 1 salinity does not meet the required dilutions (under Scenario 1 or 2).							• A water quality monitoring programme must be implemented to validate the predictions of the hydrodynamic modelling study and monitor constituents of the effluent. Adaptive management, informed by monitoring results must be implemented to ensure compliance with water quality guidelines.	
	No-Go	N/A								
Impacts of elevated nutrients in the marine environment	Preferred Alternative	• Increased nutrient levels in receiving waters can encourage plant growth, which may lead to algal blooms and local eutrophication. Prolific seaweed growth on intertidal rocky shores and foulsmelling subtidal sediments are often indications of enrichment. • There are three forms of nitrogen that are commonly measured in water bodies. • Organic nutrients include nitrogen, ammonia (NH3) and ammonium (NH4+), while	**HIGH –**	High	Localised	Long Term	Probable	Achievable	• Implement the preferred Scenario recommended by PRDW (2020); • Wastewater 1 outfall to limit the maximum allowable effluent concentrations (end of pipe) for TKN + NH4 to below 5 mg/l (wastewater must be treated on land to meet appropriate standards prior to discharge). • The brine and fin fish effluents are to be discharged separately; otherwise, the ammonia, nitrate and nitrate end of pipe concentrations must be reduced to below 13.37 mg/l.	**LOW –**

ISSUE	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
		inorganic nutrients include nitrates (NO3) and nitrite (NO2). • Organic nutrients need to be broken down into inorganic nutrients before being absorbed by organisms; therefore, inorganic nutrients can be readily available sources of energy. • 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 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							• A water quality monitoring programme must be implemented to validate the predictions of the hydrodynamic modelling study and monitor constituents of the effluent. Adaptive management, informed by monitoring results must be implemented to ensure compliance with water quality guidelines.	

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		phosphate can result in an increased abundance of certain algal species and may facilitate the generation of harmful algal blooms. • Under natural conditions, high concentrations of nitrate (>10 µmol/l) are present in offshore waters (outer shelf and shelf edge), and off Cape Padrone and Cape Recife, but much lower concentrations (around 1 µmol/l or less) occur within Algoa Bay itself. • Modelling indicates that nutrient concentrations (specifically, TKN and NH4) within the Wastewater 1 effluent stream do not achieve the required dilutions at the 300 m RMZ under Scenario 1 or Scenario 2. • PRDW (2020) recommends that the end of pipe effluent quality must be improved, given that a diffuser is not feasible at the proposed site. The maximum permitted end of pipe concentrations of TKN and NH4 for this effluent under Scenario 1 are defined by PRDW (2020) as 5 mg/l. With Wastewater 2, however, the longer pipe length and deeper discharge allows the required TKN and NH4 dilutions to be met under both Scenario 1 and 2 (PRDW 2020). • Other nutrients modelled are ammonia, nitrates and nitrates, from the finfish discharge (Scenario 1), and the combined brine and finish discharge (Scenario 2). Required dilutions were met for land-based finish aquaculture effluent at the 300 m RMZ under Scenario 1 due to the use of a diffuser and adequate depth of discharge. • In contrast however, the Scenario 2 combined finfish and brine effluent does not meet the required dilutions for ammonia, nitrates and nitrates. PRDW								

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		(2020) therefore recommends that the brine and finfish effluent are discharged separately (under Scenario 1), where the required dilutions for all constituents are met.								
	No-Go	N/A								
Impacts of elevated suspended solids in the marine environment	Preferred Alternative	• 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 (such as plankton and small pelagic fish species). • Elevated turbidity also impacts negatively on squid fishing catch rates and the popularity of reefs for SCUBA diving. • It should be noted that while coastal water TSS concentrations in the vicinity of Algoa Bay rivers increases naturally during flood events, in general, the water within Algoa Bay has low levels of suspended solids (i.e. turbidity) at the surface, increasing slightly towards the seafloor. • Dispersion modelling results show that required dilutions for the end of pipe TSS concentrations in the Wastewater 1 effluent were not achieved at the 300 m RMZ under Scenario 1 or Scenario 2. • PRDW (2020) states that end of pipe effluent quality must be improved, given that a diffuser is not feasible at the proposed site. • As such, the end of pipe TSS value for the Wastewater 1 effluent must not exceed 55 mg/l	**MODERATE –**	Moderate	Localised	Long Term	Probable	Achievable	• Implement the preferred Scenario recommended by PRDW (2020); • Wastewater 1 outfall to limit the maximum allowable effluent concentrations (end of pipe) for TSS to below 50 mg/l (wastewater must be treated on land to meet appropriate standards prior to discharge). • A water quality monitoring programme must be implemented to validate the predictions of the hydrodynamic modelling study and monitor constituents of the effluent. Adaptive management, informed by monitoring results must be implemented to ensure compliance with water quality guidelines.	**LOW –**

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		(PRDW 2020). • Required dilutions for TSS are however achieved for Wastewater 2 effluent under Scenario 1 and 2, the finish discharge under Scenario 1, and the combined brine and finish effluent under Scenario 2.								
	No-Go	N/A								
Impacts of elevated trace metal and inorganic compound concentrations in the marine environment	Preferred Alternative	• Trace or heavy metals occur naturally in the marine environment, and some are important in fulfilling key physiological roles. Unlike most organic substances, metals are neither created nor destroyed by biological or chemical processes. Rather, they are transformed from one chemical form to another. • Many abiotic and biotic processes can modify the availability of metals, even rendering them unavailable for uptake. This means that the toxic fraction may be a very small part of the total metal present. • Bioavailability may be affected by a range of physio-chemical parameters such as the pH, hardness of water and the Dissolved Organic Carbon (DOC). • Trace metals are normally found in low concentrations in the environment and include elements such as mercury, cadmium, arsenic, lead, chromium, zinc and copper. These metals occur naturally in the earth's crust and are released through chemical weathering processes at very slow rates. • Mining and the use of these metals as catalysts in industrial processes, however, can result in discharges of trace metals at levels that are far greater than those associated with the 'normal' chemical weathering processes.	**HIGH –**	High	Localised	Long Term	Probable	Achievable	• Implement the preferred Scenario recommended by PRDW (2020); • Wastewater 1 outfall to limit the maximum allowable effluent concentrations (end of pipe) for sulphide to below 0.21 mg/l; for Hg to below 0.062 mg/l, Co to below 0.21 mg/l; Cu to below 1.04 mg/l, and Cd to below 0.83 mg/l. • A water quality monitoring programme must be implemented to validate the predictions of the hydrodynamic modelling study and monitor constituents of the effluent. Adaptive management, informed by monitoring results must be implemented to ensure compliance with water quality guidelines.	**LOW –**

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		• While some trace metals are known to provide important micronutrients for living organisms (e.g. iron, zinc, manganese, copper, cobalt, molybdenum and nickel), others (e.g. lead, silver and mercury) are biological inhibitors which are not known to assist with any metabolic functions (Sunda 1989, Roesijadi & Robinson 1994). • At elevated levels, however, all trace metals and even important micronutrients, can become toxic (Sunda 1989 • Trace metals variably influence growth and productivity of phytoplankton and as a result, bioavailable trace metal composition and concentration can determine community composition (Sunda 1989). • Disturbance to the environment by either anthropogenic or natural factors can lead to an increase in metal concentrations above established safety thresholds, which can result in negative impacts on marine organisms, especially filter feeders such as mussels that tend to accumulate metals in their flesh (Andersen et al. 1996, Pérez-López et al. 2003, Rainbow 1997). High concentrations of metals can render these species unsuitable for human consumption which has resulted in the implementation of measures to reduce trace metal input into the environment (Fowler 1983). Elevated trace metal concentrations also decrease aquatic diversity (Andersen et al. 1996). • Dispersion model results indicate unacceptably high levels of Hg, Co, Cu and Cd entering the marine environment through the Wastewater 1 effluent under both Scenario 1 and Scenario 2. • Lwandle (2020) recommends								

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		reduction in end of pipe levels of these metals to prevent the exceedance of acute (lethal effect) toxicity thresholds because, within the dedicated mixing zone, these levels are too high to be permitted. • While not a metal, sulphide end of pipe concentrations were also flagged by PRDW (2020) as being too high to achieve the required dilutions at the edge of the RMZ. • Hydrogen sulphide (H2S) is a poisonous gas which readily dissolves in water. Solubility decreases with increasing temperature and salinity (Douabul & Riley 1979). No heterotrophic life can exist in water containing hydrogen sulphide, and affected areas are transformed into oceanic 'deserts' (Grasshoff et al. 1976). • Sulphide is harmful to aquatic organism health but is not considered toxic to human health. Although H2S is usually not directly introduced to the marine environment through anthropogenic sources, habitats with high oxygen demand can favour conditions for the formation of this gas (US EPA 1986). • In many environments, it reacts with iron to form insoluble iron sulphide, an abundant constituent of anaerobic organic rich sediments. Much of the sulphide that is not immobilised is oxidised by bacteria as soon as it reaches the aerobic level of the water profile to form sulphate (SO_4^{2-}) (Hutzinger 1980). • Typical water quality problems that may be associated with acute exposure to hydrogen sulphide include failure of fish eggs to hatch, reduced fish egg deposition, mortalities of biota and growth deficiencies (US EPA								

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		1986). • The recommended guideline for sulphide (as hydrogen sulphide) in the marine environment is 2 µg/L (Massie et al. 2017). To meet this required target, PRDW (2020) specifies a maximum pipe end concentration of 0.21 mg/l for sulphides within Wastewater 1 effluent.								
	No-Go	N/A								
Impacts of reduced dissolved oxygen	Preferred Alternative	• Sufficient dissolved oxygen (DO) in sea water is essential for the survival of the majority of marine organisms. Excessive discharge of organic effluent 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 large plankton blooms sink and decompose. Occasionally this results in mass mortality of numerous marine species. • DO levels were not modelled in this study as waves, wind and storm events 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, including those species targeted in Algoa Bay. • DO levels along the coastline within the study area are expected to be high as a result of high wave action. Because oxygen is a gas, its solubility in seawater is dependent on salinity and temperature. Increases in these parameters (as a result of	**MODERATE –**	Moderate	Localised	Long Term	Probable	Achievable	• Implement the preferred Scenario recommended by PRDW (2020); • Wastewater 1 outfall to limit the maximum allowable effluent concentrations (end of pipe) for COD to below 3110 mg/l (wastewater must be treated on land to meet appropriate standards prior to discharge). • The dosing of sodium metabisulphate must be at levels low enough to avoid an “oxygen sag” in the marine environment receiving the effluent. Environmental best-practise is to ensure aeration of the effluent prior to discharge. • A water quality monitoring programme must be implemented to validate the predictions of the hydrodynamic modelling study and monitor constituents of the effluent. Adaptive management, informed by monitoring results must be implemented to ensure compliance with water quality guidelines.	**VERY LOW –**

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		cooling water or brine discharge) may result in a decline of dissolved oxygen levels. • For example, saturation levels of dissolved oxygen in seawater decrease with rising salinity from 5.84 ml/l- at 15 ˚C and 35 PSU, to 4.90 ml/l at 63 PSU (DWAF 1995). • In addition, oxygen depletion in brine effluent might also occur through the addition of sodium metabisulfite, an oxygen scavenger, should it be used as a neutralizing agent for chlorine to protect the RO membranes (Lattemann & Höpner 2003). Chlorine is used to dose the abstraction line to restrict marine growth. If the dosing of sodium metabisulphate is well-managed, the levels of sodium metabisulphate in the effluent should be low enough to avoid an "oxygen sag" in the marine environment receiving the effluent. Environmental best-practise is to ensure aeration of the effluent prior to discharge. • The South African Water Quality Guidelines for Coastal Marine Waters (DWAF 1995) state that for the west coast, dissolved oxygen should not fall below 10% of the established natural variation at the edge of the RMZ. • Whilst not directly modelled, PRDW (2020) did assess Chemical Oxygen Demand (COD) in the brine outfall under Scenario 1, and in the brine and finfish combined effluent under Scenario 2. In both scenarios, COD levels met the required dilutions at the RMZ. However, required COD dilutions were not met for Wastewater 1 under either Scenario.								
	No-Go	N/A								

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Impacts of introduction of alien and invasive species into the marine environment	Preferred Alternative	• The impacts due to introduction of alien and invasive species has already been assessed in the Marine Ecological Specialist and Biosecurity and Biodiversity Risk Assessment Specialist reports for the Coega ADZ (Aquatic Ecosystem Services 2017a, b) and is as such not repeated here.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	No-Go	N/A								
Spread of Terrestrial Alien Plant Species	Preferred Alternative	During the operational phase, failure to remove and manage alien vegetation during construction could result in the permanent establishment of alien vegetation in the study area. Furthermore, the poor maintenance and/or rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow invasion by alien plant species.	**MODERATE –**	Moderate	Localised	Long Term	Possible	Achievable	• The Alien Vegetation Management Plan developed for the Coega SEZ must be implemented and managed to prevent the further spread of alien invasive species within Zone 10 of the Coega SEZ; • Implement a Rehabilitation Plan in accordance with the specifications outlined within the OSMP (2014) and the CDC's Project Vegetation Specifications.	**LOW –**
	No-Go	The site is already invaded with *Acacia cyclops* which has resulted in habitat loss and displacement of indigenous species. If the project does not go ahead, the infestation is likely to continue displacing natural species. The current impact under the no-go alternative is therefore of moderate significance.	**MODERATE –**	Moderate	Localised	Long Term	Definite	N/A	N/A	**MODERATE –**
IMPACTS ON THE SOCIAL ENVIRONMENT										
Impacts of elevated pathogen levels in the marine environment	Preferred Alternative	• Faecal pollution contained in, for example, untreated sewage or stormwater 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, ABYC etc.) and consumptive (fishers) coastal water users, it is critical that contamination of near shore	**HIGH –**	High	Localised	Long Term	Probable	Achievable	• Implement the preferred Scenario recommended by PRDW (2020); • Wastewater 1 outfall to limit the maximum allowable effluent concentrations (end of pipe) for E. coli to below 4500 cfu/100 ml (wastewater must be treated on land to meet appropriate standards prior to discharge).	**LOW –**

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		water is prevented. • Additionally, the Blue Flag status of the beaches may be threatened if contamination occurs. Bacterial indicators such as *Escherichia coli* are used to detect the presence of faecal pollution. Recreational users of the Bay that are in contact with the water over the outfalls (such as divers, or the ABYC members) may be at risk should effluent contain high levels of these pathogens. • Modelling indicates that pathogens (specifically, *E. coli*) within the Wastewater 1 effluent stream do not achieve the required dilutions at the 300 m RMZ under Scenario 1 or Scenario 2. • As such, PRDW (2020) recommends that the end of pipe effluent quality must be improved, given that a diffuser is not feasible at the proposed site. The maximum permitted end of pipe concentrations of *E. coli* for this effluent under Scenario 1 are defined by PRDW (2020) as 4500 cfu/100ml. With Wastewater 2, the longer pipe length and deeper discharge allows the required *E. coli* dilutions to be met under both Scenario 1 and 2 (PRDW 2020).							• A water quality monitoring programme must be implemented to validate the predictions of the hydrodynamic modelling study and monitor constituents of the effluent. Adaptive management, informed by monitoring results must be implemented to ensure compliance with water quality guidelines.	
	No-Go	N/A								
Impacts on fisheries – Small Pelagics	Preferred Alternative	• Small pelagic species are known to be sensitive to temperature, with the upper limit of 20°C for sardine and 21°C for anchovy (Van der Lingen et al. 2001). • These are highly mobile, migratory populations, that move in and out of the Bay as conditions allow. • Given that far field modelling results indicate that effluent temperature under both Scenario 1 and 2 achieve the required dilutions at the edge of the	**LOW –**	Low	Localised	Long Term	Probable	Achievable	• Implement the preferred Scenario recommended by PRDW (2020); • A water quality monitoring programme must be implemented to validate the predictions of the hydrodynamic modelling study and monitor constituents of the effluent. Adaptive management, informed by monitoring results must be implemented to ensure compliance with water quality guidelines.	**VERY LOW –**

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		stipulated RMZ and given that summer water temperatures in Algoa Bay can reach 27°C the impact of the proposed development on small pelagic fisheries is considered to be 'low'.								
	No-Go	N/A								
Impacts on fisheries – Linefish	Preferred Alternative	• Linefish species actively avoid low oxygen waters, and should persistent low oxygen conditions develop around the proposed outfalls, these species are likely to move elsewhere. • However, the area of the modelled plume for the outfalls that may result in low oxygen conditions has little overlap with areas where linefish are targeted. For example, the primary line fishery effort is concentrated to the southwest near Cape Recife, some 25 km from the proposed development. • As such, and given that the areas affected represents a relatively small portion of the total area where linefish are targeted in Algoa Bay, the impact of the development operations on the fishery is expected to be of low significance. • However, of significant concern is the potential for heavy metal accumulation in linefish species, given that dispersion model results indicate unacceptably high levels of Hg, Co, Cu and Cd entering the marine environment through the Wastewater 1 effluent under both Scenario 1 and Scenario 2. Bioaccumulation of toxic metals in fish causes serious threats to the human when they are consumed (Rajeshkumar & Li 2018).	**HIGH –**	High	Localised	Long Term	Probable	Achievable	• Implement the preferred Scenario recommended by PRDW (2020); • A water quality monitoring programme must be implemented to validate the predictions of the hydrodynamic modelling study and monitor constituents of the effluent. Adaptive management, informed by monitoring results must be implemented to ensure compliance with water quality guidelines. • Wastewater 1 outfall to limit the maximum allowable effluent concentrations (end of pipe) for TSS to below 50 mg/l (wastewater must be treated on land to meet appropriate standards prior to discharge). • Wastewater 1 outfall to limit the maximum allowable effluent concentrations (end of pipe) for sulphide to below 0.21 mg/l; for Hg to below 0.062 mg/l, Co to below 0.21 mg/l; Cu to below 1.04 mg/l, and Cd to below 0.83 mg/l.	**LOW –**
	No-Go	N/A								
Impacts on fisheries –	Preferred Alternative	• Squid are particularly sensitive to high turbidity levels and water	**LOW –**	Low	Localised	Long Term	Probable	Achievable	• Implement the preferred Scenario recommended by PRDW (2020);	**VERY LOW –**

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Squid		temperature (Sauer 1994). As such, elevated turbidity and suspended solids in the receiving environment as a result of the outfall operation may impact this fishery. • Although there tend to be high catches of squid near the proposed development, these catches tend to be concentrated below 20 m depth, and therefore do not overlap significantly with the proposed infrastructure (the deepest proposed outfall is some 20 m below MSL).							• A water quality monitoring programme must be implemented to validate the predictions of the hydrodynamic modelling study and monitor constituents of the effluent. Adaptive management, informed by monitoring results must be implemented to ensure compliance with water quality guidelines. • Wastewater 1 outfall to limit the maximum allowable effluent concentrations (end of pipe) for TSS to below 50 mg/l (wastewater must be treated on land to meet appropriate standards prior to discharge).	
	No-Go	N/A								
Impacts on fisheries – Sharks	Preferred Alternative	The shark longline fishery in Algoa Bay do not deploy significant numbers of shark long line sets in the area of the proposed development, and therefore, the significance of this impact is assessed as 'very low' given the lack of overlap in spatial use, the relatively small area of impact within the Bay and the availability of other, preferred grounds for this fishery in Algoa Bay	**VERY LOW –**	Low	Localised	Long Term	Possible	Achievable	• Implement the preferred Scenario recommended by PRDW (2020);	**VERY LOW –**
	No-Go	N/A								
Impacts on land use	Preferred Alternative	• The land-based activities associated with the proposed project will fall within an existing industrial zone (the Coega SEZ) and thus is in line with the proposed land use of the area. • Zone 10 of the Coega SEZ is earmarked for aquaculture and, because the proposed development is essential to the functionality of the aquaculture development zone (ADZ), the development and operation of the proposed marine infrastructure servitude will be beneficial to the land use of the area.	**HIGH +**	Beneficial	Study Area	Long Term	Definite	Not Applicable	None Required	**HIGH +**
	No-Go	N/A								

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Health and Safety	Preferred alternative	Health and safety aspects will mostly pertain to activities defined under the Occupational Health and Safety Act (Act No. 85 of 1993). Work occurring throughout the proposed development will consist of health and safety risks.	**LOW –**	Slight	Localised	Short Term	May Occur	Easily Achievable	• All aspects of the Occupational Health and Safety Act (Act No. 85 of 1993), must be adhered to at all times.	**LOW –**
	No-Go	Within an industrial area there is potential for accidents and health impacts.	**LOW –**	Slight	Study Area	Long Term	May Occur	N/A	N/A	**LOW –**
ECONOMIC IMPACTS										
Direct Employment Creation	Preferred alternative	The proposed development will create a number of permanent employment opportunities during operation for the maintenance of infrastructure.	**MODERATE +**	Beneficial	Study Area	Short Term	Definite	Easily Achievable	• Utilise local labour as far as possible.	**HIGH +**
	No-Go	Should the project not proceed, no further employment opportunities will be realised.	**HIGH –**	High	Study Area	Short Term	Definite	N/A	N/A	**HIGH –**
Indirect Economic Impacts	Preferred alternative	In addition to the incomes earned from employment on the servitude, many local residents will be able to gain additional employment from the industries that will be utilising the proposed infrastructure, such as investors in the ADZ.	**MODERATE +**	Beneficial	Study Area	Short Term	Definite	Easily Achievable	Utilise local labour as far as possible.	**HIGH +**
	No-Go	Should the project not proceed, no further employment opportunities will be realised.	**HIGH –**	High	Study Area	Short Term	Definite	N/A	N/A	**HIGH –**
Provision of seawater and freshwater for industrial developments	Preferred alternative	The proposed development will result in the abstraction of seawater, which is required for the proposed ADZ, the Gas to Power (G2P) projects and the desalination plant, as well as several other future developments in the Coega SEZ. This will reduce the consumption of municipal water for existing industries and provide some relief to the water scarce area.	**HIGH +**	Beneficial	Regional	Long Term	Definite	N/A	None required	**HIGH +**

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	No-Go	The current water scarcity in the region will continue placing pressure on the municipality and is likely to give rise to limited attractiveness of the Coega SEZ to investments. The development of the approved ADZ will not be possible should the seawater abstraction not materialise.	**HIGH –**	Moderate	Regional	Permanent	Definite	N/A	N/A	**HIGH –**
Provision of discharge infrastructure for industrial developments	Preferred alternative	• The rationale for developing an integrated marine discharge servitude is to have a common user servitude in which a number of possible industries can establish infrastructure required to discharge effluent into the marine environment. • The management of the volumes and quality of effluent would be far easier than having several different effluent discharge developments and would streamline the maintenance of infrastructure. T • The position and depth of the discharge, as well as the release of effluent to the marine environment rather than rivers or estuaries, has potentially less environmental impact due to the increased assimilative and dispersive capacity of the coastal waters.	**HIGH +**	Beneficial	Regional	Long Term	Definite	N/A	None required	**HIGH +**
	No-Go	The no-go option could result in two possible scenarios namely (1) the establishment of a number of separate different discharge pipelines and infrastructure or (2) a lack of investment in the Coega SEZ as a result of the costs associated with having to establish separate outfall options.	**HIGH –**	Moderate	Regional	Permanent	Definite	N/A	N/A	**HIGH –**
HERITAGE AND CULTURAL ASPECTS										
NONE IDENTIFIED AS NO EXCAVATIONS WILL BE CONDUCTED DURING THE OPERATIONAL PHASE OF THE PROJECT										
DECOMMISSIONING PHASE										

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	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
NO DECOMMISSIONING PROCEDURES OR RESTORATION PLANS HAVE BEEN COMPILED AT THIS STAGE, ALTHOUGH IMPACTS ARE EXPECTED TO BE SIMILAR (IF NOT LESS) THAN THOSE ASSESSED DURING THE CONSTRUCTION PHASE. THE POTENTIAL IMPACTS DURING THE DECOMMISSIONING PHASE ARE EXPECTED TO BE LOW IN COMPARISON TO THOSE OCCURRING DURING THE OPERATIONAL PHASE, AND NO KEY ISSUES RELATED TO THE MARINE AND/OR TERRESTRIAL ENVIRONMENT HAVE BEEN IDENTIFIED AT THIS STAGE. THE SAME MITIGATION PROCEDURES AS THOSE EXPLAINED IN THE CONSTRUCTION PHASE SHOULD BE ADHERED TO IN THE DECOMMISSIONING PHASE IN ORDER TO MITIGATE FOR ANY OF THE IMPACTS LISTED ABOVE.									
CUMULATIVE IMPACTS ANTHROPOGENIC ACTIVITIES CAN RESULT IN NUMEROUS AND COMPLEX EFFECTS ON THE NATURAL ENVIRONMENT. WHILE MANY OF THESE ARE DIRECT AND IMMEDIATE, THE ENVIRONMENTAL EFFECTS OF INDIVIDUAL ACTIVITIES OR PROJECTS CAN INTERACT WITH EACH OTHER IN TIME AND SPACE TO CAUSE INCREMENTAL OR AGGREGATE EFFECTS. IMPACTS FROM UNRELATED ACTIVITIES MAY ACCUMULATE OR INTERACT TO CAUSE ADDITIONAL EFFECTS THAT MAY NOT BE APPARENT WHEN ASSESSING THE ACTIVITIES INDIVIDUALLY. CUMULATIVE EFFECTS ARE DEFINED AS THE TOTAL IMPACT THAT A SERIES OF DEVELOPMENTS, EITHER PRESENT, PAST OR FUTURE, WILL HAVE ON THE ENVIRONMENT WITHIN A SPECIFIC REGION OVER A PARTICULAR PERIOD OF TIME (DEAT IEM GUIDELINE 7, CUMULATIVE EFFECTS ASSESSMENT 2004). BY DEFINITION, CUMULATIVE MARINE ENVIRONMENTAL IMPACTS EMANATING FROM THE PROPOSED PROJECT ARE RELATED TO THE OVERLAP WITH VARIOUS OTHER SOURCES OF ANTHROPOGENIC DISTURBANCE IN THE VICINITY OF THE PROPOSED SERVITUDES. THE "ZONE OF IMPACT" WHERE CUMULATIVE IMPACTS MAY BE OF CONCERN HAS BEEN DEFINED BY THE DISPERSION MODELLING RESULTS (I.E. THE ZONE SIZE WAS DETERMINED BY ANALYSING THE FIGURES PRODUCED BY THE DISPERSION MODEL AND MEASURING THE LARGEST PLUME SIZE ON GOOGLE EARTH BY THE MARINE ECOLOGICAL SPECIALIST). UNDER THE WORST-CASE SCENARIO, THIS ZONE OF IMPACT EXTENTS SOME 10 KM ALONG SHORE, AND ~ 3 KM OFFSHORE. CUMULATIVE IMPACTS ARE ONLY OF CONCERN WITHIN THIS "ZONE OF IMPACT". ANTHROPOGENIC DISTURBANCES OUTSIDE THIS ZONE OF IMPACT WILL HAVE NO INFLUENCE ON THE EXTENT OR SIGNIFICANCE RATING OF THE IMPACT AND ARE THEREFORE NOT RELEVANT TO THIS ASSESSMENT I.E. IMPACTS OCCURRING OUTSIDE OF THIS ZONE OF IMPACT BUT WITHIN THE 30 KM RADIUS ARE NOT APPLICABLE TO THIS ASSESSMENT BECAUSE THEY WILL NOT TAKE PLACE. THERE ARE THREE IDENTIFIED ANTHROPOGENIC IMPACTS WITHIN THE ZONE OF IMPACT AS DEFINED BY THE DISPERSION MODELLING: 1) THE IMPACTS OF THE SIMULTANEOUS OPERATION OF THE MULTIPLE PIPELINE SERVITUDES DESCRIBED IN THE PROPOSED DEVELOPMENT 2) THE IMPACTS OF THE PORT OF NGQURA AND 3) THE DEVELOPMENT OF THE ALGOA 7 FIN-FISH AQUACULTURE.									
Cumulative Impacts on the Marine Environment	Preferred Alternative	• As sea-based finfish farms tend to be significant sources of nitrogenous waste (i.e. nutrients), there is particular concern about the cumulative impacts of increased nutrient concentrations arising from both the sea based finfish aquaculture in Algoa 7, and the nutrient discharges by the wastewater and finfish pipelines. • However, dispersion modelling by PRDW (2020) shows that required dilutions of TKN + NH4 from Wastewater 1 achieve dilutions of ~1 870 at Algoa 7 (required dilution to meet WQG is 120), and that the finfish + brine effluent combination under Scenario 2 archives dilutions of ~580 at Algoa 7 (required dilution to meet WQG is 39.1). • As such, it is considered unlikely that there will be significant interaction between these nutrient sources, especially if the recommended scenario is implemented (PRDW 2020), and	**HIGH –**	High	Localised	Long Term	Probable	Achievable	• Implement these maximum recommended effluent end of pipe constituent limits. • A water quality monitoring programme must be implemented to validate the predictions of the hydrodynamic modelling study and monitor constituents of the effluent to ensure compliance with water quality guidelines. • Implement the preferred Scenario recommended by PRDW (2020), see Section 4. Wastewater 1 outfall to limit the maximum allowable effluent concentrations (end of pipe) for sulphide to below 0.21 mg/l; for Hg to below 0.062 mg/l, Co to below 0.21 mg/l; Cu to below 1.04 mg/l, and Cd to below 0.83 mg/l.	**LOW –**

ISSUE	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
		end of pipeline requirements are met. • Shipping and port operations with the Port of Ngqura may result in elevated heavy metal concentrations in both the water column and sediment (particularly copper and zinc. • Dispersion model results indicate unacceptably high levels of Hg, Co, Cu and Cd entering the marine environment via the Wastewater 1 effluent under both Scenario 1 and Scenario 2. The zone of impact for these high levels of metals falls within the Port itself. • The cumulative impacts of increased trace metal and inorganic constituent concentrations are rated as 'high' without mitigation. The same mitigation measures follow, namely, to implement the recommended Scenario presented by PRDW (2020), which requires the Wastewater 1 outfall to limit the maximum allowable effluent concentrations (end of pipe) for metals and sulphides to below 0.21 mg/l. This mitigation reduced the impact to one of 'low' significance.								
	No-Go	N/A								
Loss of Indigenous Vegetation (Cape Seashore Vegetation and St Francis Dune Thicket)	Preferred Alternative	Vegetation clearance for the construction of the proposed Marine Servitude Project will result in the loss of a maximum of 8.5 ha of Cape Seashore Vegetation and a maximum of 10.7 ha of St Francis Dune Thicket vegetation (both classified as Least Concern). However, much of the indigenous vegetation of the project area has been invaded by dense stands of *A. cyclops*. As such, the resultant contribution to the cumulative loss of these indigenous vegetation due to the proposed	**NO EFFECT**	N/A	N/A	N/A	N/A	N/A	• The OSMP for the Coega SEZ has specifically been developed in order to mitigate any potential cumulative impacts from the clearing of vegetation within the SEZ.	**NO EFFECT**

ISSUE	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY AND/OR MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
		development is anticipated to be minimal. It should be noted that the resultant loss of vegetation due to the proposed development, although minimal, could also impact on the cumulative loss of biodiversity associated with the loss of habitats and habitat fragmentation.								
	No-Go	N/A								
Loss of Plant SCC	Preferred Alternative	Vegetation clearance for the construction of the proposed Marine Servitude Project will result in the loss of plant SCC, contributing to the cumulative loss of plant SCC within the region.	**NO EFFECT**	N/A	N/A	N/A	N/A	N/A	• The OSMP for the Coega SEZ has specifically been developed in order to mitigate any potential cumulative impacts from the clearing of vegetation within the SEZ. The removal and stockpiling of topsoil must also be carried out in accordance with the Project Vegetation Specification.	**NO EFFECT**
	No-Go	N/A								
Social benefits from the project	Preferred Alternative	The functionality of the proposed marine abstraction and discharge servitude will also enable the development of a number of other industries (e.g. G2P, WWTW and the ADZ), which will in the short term result in a number of construction jobs and employment opportunities.	**HIGH +**	Beneficial	Study Area	Short Term	Definite	Easily Achievable	• Utilise local labour as far as possible; and • Construction material must be sourced locally wherever possible.	**HIGH +**
	No-Go	This may also result in a number of investments (e.g. aquaculture companies) not taking off, thus resulting in the loss of several additional potential employment opportunities.	**HIGH –**	Low	Study Area	Short Term	Definite	N/A	N/A	**HIGH –**

10 ENVIRONMENTAL IMPACT STATEMENT

10.1 SUMMARY OF THE KEY FINDINGS OF THE EIA

The main areas of concern are:

- The ecological sensitivity of the proposed coastal and marine development site;
- That the servitudes discharge into a Marine Protected Area;
- Whether or not the constituents proposed to be discharged can consistently meet the legislated discharge standards;
- Whether there will be sufficient mixing of the discharge plumes at the recommended discharge depths for the various effluents.

Algoa Bay is known to support a high biodiversity of marine life, particularly reef-associated invertebrates and fish, as well as several breeding colonies of endangered or vulnerable seabirds and a range of cetacean species (dolphins, whales). For these reasons, 1,200 km^2 of Algoa Bay is protected as part of the Addo Elephant National Park Marine Protected Area (MPA) (Figure 10.1). This MPA extends the protection of the land based Addo Elephant National Park to include marine species such as the great white shark and several whale species that frequent the Algoa Bay coastline (Bryde's, Minke, Humpback and Southern Right whales). In addition, the MPA protects the breeding and important feeding grounds of two endangered bird species, namely African penguin and Cape gannet, which breed on the St Croix and Bird Islands located within the MPA.

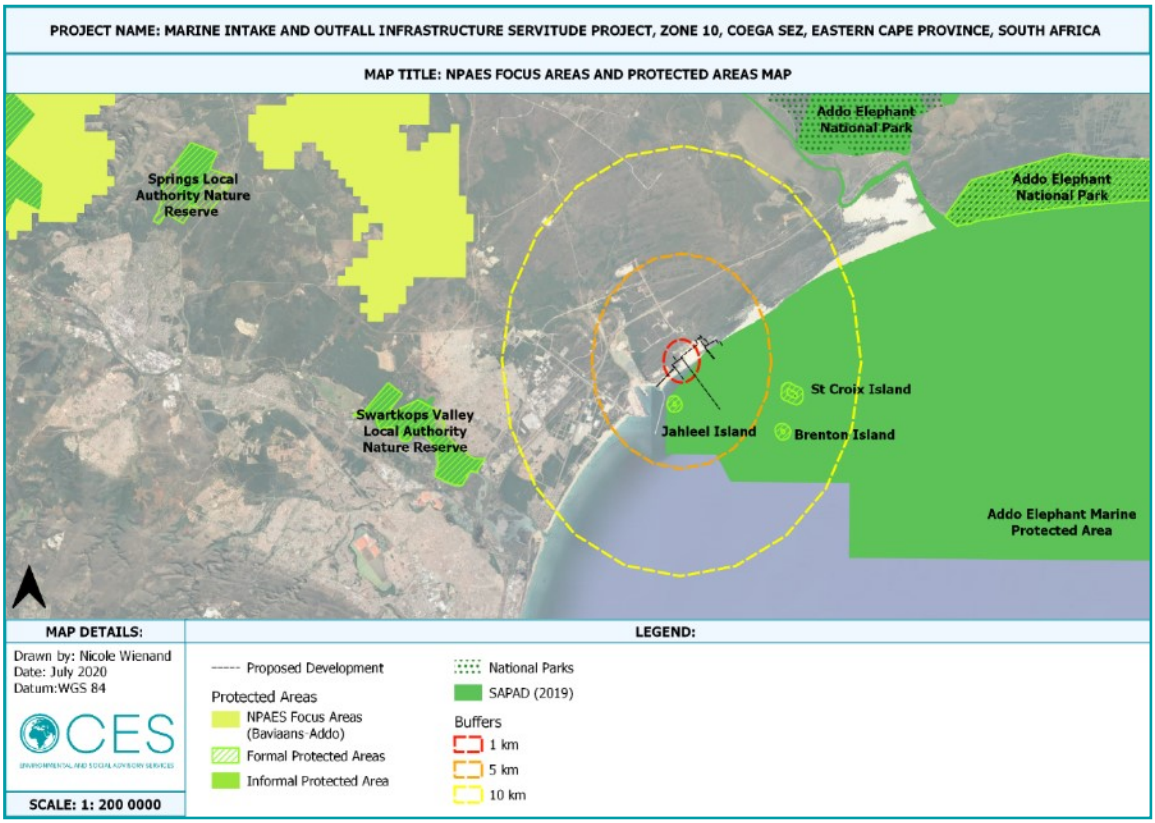

Figure 10.1: Map showing the project site in relation to the nearby protected areas and national protection Expansion Strategy (NPAES) areas.

In addition, the following terrestrial sensitive sites also occur within the proposed development site.

- Areas below the coastal management line and/or within 100 m of the high-water mark of the sea.
- Mobile dune process areas and/or areas sensitive to coastal erosion.
- Areas that occur within CBAs designated in the Coega Open Space Management Plan (OSMP).
- Known and anticipated habitats used by *Damara terns* (the dune field areas and dune slacks).
- 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 from wetlands.
- Areas where sensitive archaeological and paleontological sites have been recorded.

All efforts have been made to avoid these habitats where possible, including the MPA. Options for placing infrastructure in alternative locations were assessed, including within the port and west of the Port. Where possible, intake infrastructure has been located within the Port, because the water for cooling the power plant is not water quality dependent. Abstraction of water for the ADZ and desalination plant cannot be located in the port because the water for the ADZ must be of high quality, and thus water from within the Port is not suitable.

To avoid discharging effluent into the MPA, discharge would need to occur on the western side of the Port. This requires pumping effluent around the perimeter of the Port, and this would result in an additional capital expenditure and additional operational costs over a 20 year period of approximately R9.5 billion rand. This makes the project economically unfeasible.

A further limitation of discharging effluent to the west of the Port is that effluent will re-enter the Port, which increases the risk associated with particulates accumulating in the port, and especially risks associated with nutrients and heavy metals. If the pipeline is extended to a greater depth (-16 m), the achieved dilutions and mixing reduces the risk of effluent entering the Port, but despite the additional costs associated with this, there is still a risk of particulates accumulating in the port.

For this reason, discharging directly into the Port is also not feasible, as various particulates will become trapped in the Port, resulting in a significant reduction in water quality, thus preventing the Port Authority from meeting their environmental water quality standards and the permit requirements of their annual Dredge Disposal Permit. The high mud fraction of sediment in the Port results in contaminants introduced into the water being retained and accumulating in the sediment to the Port. This is a serious issue for the port, as the concentrations of some metals (copper, zinc and chromium) in the sediment already exceed upper limits. No further discharges should be allowed within the port, especially given the potential for the effluent to get trapped and accumulate over time.

Because of these environmental complexities and economic realities, there is no other viable option other than discharging effluent to the east of the eastern breakwater. To ensure that this could be done in an environmentally responsible manner, additional dispersion modelling was undertaken by coastal engineers in 2020, and an Environmental Risk Assessment was conducted by marine specialists. These two studies determined that the required dilutions would

not always be achieved at a water depth of 10 m, achieved at a distance of 300 m offshore. This means that any wastewater discharged must first be treated on land, and must be monitored prior to discharging it into the marine environment. This is required to ensure compliance with the Water Quality Guidelines defined in the Environmental Risk Assessment. In addition, some of the effluents must be discharged at greater depths. Brine must be discharged directly at about 1,000 m offshore at a depth of about -14 m CD. Recirculated finfish aquaculture effluent must be discharged at a distance of about 1,500 m offshore, at a depth of about -16 m CD. Seawater effluent from the flow-through abalone farms can be discharged directly into the surf zone.

The above measures (treatment of effluent and increasing the disposal depth offshore by increasing pipeline length) have resulted in discharges meeting the required dilutions. This means that the 17 impacts associated with these discharges into the MPA have been reduced to low significance.

In terms of cumulative impacts, we have assessed cumulative impacts on both the marine and terrestrial environments, which we have identified as the two valuable environmental and social components (VECs) which are likely to be affected by cumulative impacts (IFC, 2013). We have not assessed the cumulative impacts of the airshed as the only emission to consider is dust which will not affected the overall quality of the site in the long-term. It is our conclusion that by defining various water quality limits that cannot be exceeded at 300 m from the end of pipe, cumulative impacts on marine water quality and hence marine ecological processes are mitigated. Likewise the Coega OSMP ensures that there is adequate representation of various vegetation types within the SEZ, and through the establishment of ecological corridors avoids, as far as possible, the cumulative impact associated with habitat loss and fragmentation.

Based on the above, we conclude that with appropriate mitigation, impacts related to the proposed development can be mitigated efficiently and as such, **it is the opinion of the EAP that environmental authorisation for this project should be granted under certain conditions (mitigation measures)**, included in Chapter 7, 10 and more specifically Chapter 11, Section 11.2 of this report.

The recommendations made in both the Construction and Operational Environmental Management Programmes must be followed.

10.2 SENSITIVITY MAP

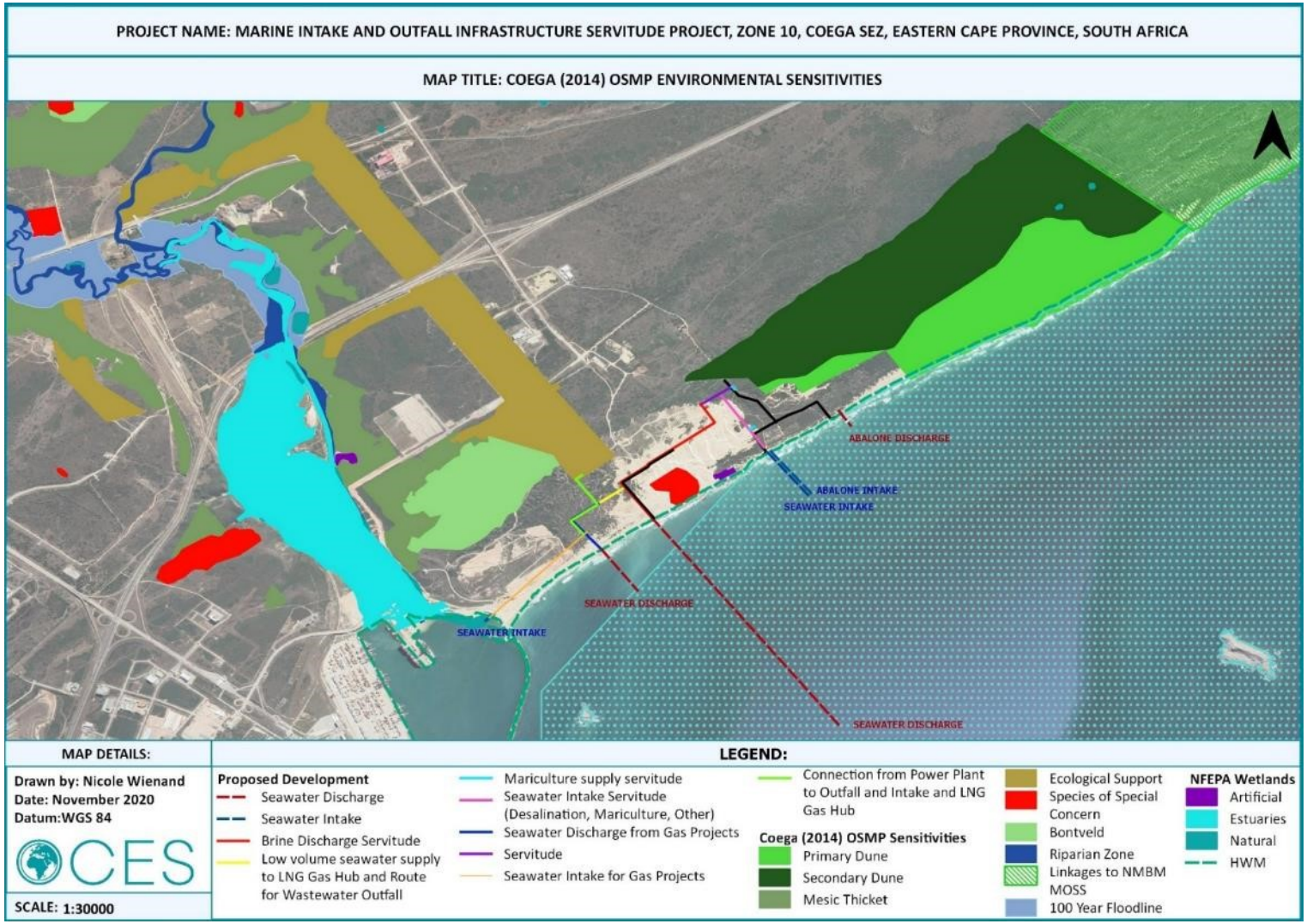

Figure 10.2: Preferred layout, superimposing all terrestrial and marine based sensitive features.

Figure 10.3: Terrestrial sensitivities and their buffers delineated in the Terrestrial Ecological Impact Assessment.

10.3 SUMMARY OF POSITIVE AND NEGATIVE IMPACTS AND RISKS IDENTIFIED FOR THE PROPOSED DEVELOPMENT

ISSUE	PREFERRED ALTERNATIVE		NO-GO ALTERNATIVE
	IMPACT	RESIDUAL IMPACT	IMPACT
DESIGN / PLANNING PHASE			
Alignment with planning instruments	MODERATE +	MODERATE +	LOW -
Excavation of Test Pits for Geotechnical Study	LOW -	LOW -	LOW -
Legal and Policy Compliance	HIGH -	LOW -	N/A
CONSTRUCTION PHASE			
GEOGRAPHICAL IMPACTS			
Overall impacts of the Coega Marine Servitude Project on the Addo MPA	MODERATE -	LOW -	MODERATE -
Loss of Euryops ericifolius, Erica chloroloma, Psoralea repens	HIGH -	MODERATE -	MODERATE -
Loss of Brunsvigia litoralis, Cotyledon adscendens, Rapanea gilliana, Gymnosporia elliptica, Agathosma stenopetala, Erica glumiflora, Othonna rufibarbis, Salvia obtusata	VERY HIGH -	MODERATE -	MODERATE -
Loss of mammal SCC	HIGH -	MODERATE -	N/A
Disturbance to Damara tern population / Loss of habitat	HIGH -	HIGH -	N/A
Loss of Chlorotalpa duthiae (Duthie's Golden Mole) and/or associated habitat	MODERATE -	LOW -	N/A
Climate Change	MODERATE -	LOW -	MODERATE -
PHYSICAL ENVIRONMENT			
Reduced water quality in the marine environment	LOW -	VERY LOW -	HIGH -
Pollution generated during construction	LOW -	VERY LOW -	LOW -
Hazardous substance spills	LOW -	VERY LOW -	N/A
Erosion	LOW -	LOW -	N/A
Impacts on topography (terrestrial environment)	MODERATE -	MODERATE -	N/A
Impacts on bathymetry (marine environment)	MODERATE -	MODERATE -	N/A
Soil Contamination	LOW -	LOW -	N/A
Impacts on Surface and Groundwater Resources	MODERATE -	LOW -	N/A
Impacts to the Coastal Dune System	HIGH -	MODERATE -	N/A

ISSUE	PREFERRED ALTERNATIVE		NO-GO ALTERNATIVE
	IMPACT	RESIDUAL IMPACT	IMPACT
Waste Management	MODERATE -	LOW -	LOW -
Traffic	LOW -	LOW -	N/A
Air Quality	LOW -	LOW -	N/A
Visual Impact	LOW -	LOW -	MODERATE -
IMPACTS ON THE BIOLOGICAL ENVIRONMENT			
Loss of sandy beach, intertidal and subtidal habitat and biota	MODERATE -	LOW -	N/A
Disturbance of pelagic open water habitat	LOW -	VERY LOW -	MODERATE -
Barotrauma impacts on marine fauna as a result of blasting	MODERATE -	LOW -	N/A
Noise disturbance to marine fauna	MODERATE -	LOW -	LOW -
Loss of Indigenous Vegetation (Cape Seashore Vegetation and St Francis Dune Thicket)	MODERATE -	MODERATE -	MODERATE -
Loss of Biodiversity / Encroachment into Priority Biodiversity Areas	MODERATE -	LOW -	N/A
Spread of Alien Plant Species	MODERATE -	LOW -	MODERATE -
Habitat Loss/Fragmentation	MODERATE -	LOW -	MODERATE -
IMPACTS ON THE SOCIAL ENVIRONMENT			
Impacts on land use	HIGH +	HIGH +	HIGH -
Health and Safety	MODERATE -	LOW -	LOW -
ECONOMIC IMPACTS			
Employment Creation	MODERATE +	HIGH +	HIGH -
Trench Stability	MODERATE -	LOW -	N/A
HERITAGE AND CULTURAL ASPECTS			
Impacts on maritime cultural heritage	NO EFFECT	NO EFFECT	LOW -
Chance Finds	LOW -	LOW -	LOW -
Terrestrial Heritage Impacts	LOW -	LOW -	LOW -
OPERATIONAL PHASE			
GEOGRAPHICAL IMPACTS			
Overall impacts of the Coega Marine Servitude Project on the Addo MPA	HIGH -	LOW -	MODERATE -
Climate Change	MODERATE -	LOW -	N/A
IMPACTS ON THE PHYSICAL ENVIRONMENT			
Impacts on marine sediments	LOW -	LOW -	MODERATE -
Impact of increased bio-active compounds use and disease transmission	N/A		
Soil Contamination	MODERATE -	LOW -	MODERATE -
Impacts on Surface and Groundwater Resources	MODERATE -	LOW -	LOW -
Waste Management	MODERATE -	LOW -	LOW -
Visual Impact	LOW -	LOW -	N/A

ISSUE	PREFERRED ALTERNATIVE		NO-GO ALTERNATIVE
	IMPACT	RESIDUAL IMPACT	IMPACT
IMPACTS ON THE BIOLOGICAL ENVIRONMENT			
Impacts of seawater abstraction on marine biota as a result of beach wells	VERY LOW -	VERY LOW -	N/A
Impacts of seawater abstraction on marine biota as a result of intake pipelines	LOW -	VERY LOW -	N/A
Impacts of elevated temperature in the marine environment	LOW -	VERY LOW -	N/A
Impacts of changes to salinity in the marine environment	VERY LOW -	INSIGNIFICANT	N/A
Impacts of elevated nutrients in the marine environment	HIGH -	LOW -	N/A
Impacts of elevated suspended solids in the marine environment	MODERATE -	LOW -	N/A
Impacts of elevated trace metal and inorganic compound concentrations in the marine environment	HIGH -	LOW -	N/A
Impacts of reduced dissolved oxygen	MODERATE -	VERY LOW -	N/A
Impacts of introduction of alien and invasive species into the marine environment	N/A		
Spread of Terrestrial Alien Plant Species	MODERATE -	LOW -	MODERATE -
IMPACTS ON THE SOCIAL ENVIRONMENT			
Impacts of elevated pathogen levels in the marine environment	HIGH -	LOW -	N/A
Impacts on fisheries – Small Pelagics	LOW -	VERY LOW -	N/A
Impacts on fisheries – Linefish	HIGH -	LOW -	N/A
Impacts on fisheries – Squid	LOW -	VERY LOW -	N/A
Impacts on fisheries – Sharks	VERY LOW -	VERY LOW -	N/A
Impacts on land use	HIGH +	HIGH +	N/A
Health and Safety	LOW -	LOW -	LOW -
ECONOMIC IMPACTS			
Direct Employment Creation	MODERATE +	HIGH +	HIGH -
Indirect Economic Impacts	MODERATE +	HIGH +	HIGH -
Provision of seawater for industrial developments	HIGH +	HIGH +	HIGH -
Provision of discharge infrastructure for industrial developments	HIGH +	HIGH +	HIGH -
HERITAGE AND CULTURAL ASPECTS			

ISSUE	PREFERRED ALTERNATIVE		NO-GO ALTERNATIVE
	IMPACT	RESIDUAL IMPACT	IMPACT
NONE IDENTIFIED AS NO EXCAVATIONS WILL BE CONDUCTED DURING THE OPERATIONAL PHASE OF THE PROJECT			
DECOMMISSIONING PHASE			
NO DECOMMISSIONING PROCEDURES OR RESTORATION PLANS HAVE BEEN COMPILED AT THIS STAGE, ALTHOUGH IMPACTS ARE EXPECTED TO BE SIMILAR (IF NOT LESS) THAN THOSE ASSESSED DURING THE CONSTRUCTION PHASE. THE POTENTIAL IMPACTS DURING THE DECOMMISSIONING PHASE ARE EXPECTED TO BE LOW IN COMPARISON TO THOSE OCCURRING DURING THE OPERATIONAL PHASE, AND NO KEY ISSUES RELATED TO THE MARINE AND/OR TERRESTRIAL ENVIRONMENT HAVE BEEN IDENTIFIED AT THIS STAGE. THE SAME MITIGATION PROCEDURES AS THOSE EXPLAINED IN THE CONSTRUCTION PHASE SHOULD BE ADHERED TO IN THE DECOMMISSIONING PHASE IN ORDER TO MITIGATE FOR ANY OF THE IMPACTS LISTED ABOVE.			
CUMULATIVE IMPACTS			
Cumulative Impacts on the Marine Environment	**HIGH -**	**LOW -**	**N/A**
Loss of Indigenous Vegetation (Cape Seashore Vegetation and St Francis Dune Thicket)	**NO EFFECT**	**NO EFFECT**	**N/A**
Loss of Plant SCC	**NO EFFECT**	**NO EFFECT**	**N/A**
Social benefits from the project	**HIGH +**	**HIGH +**	**HIGH -**

The pie charts below provide a summary of the construction phase impacts pre (Figure 10.4) and post (Figure 10.5) mitigation. During construction there is potential for 32 negative impacts (one very high, 4 high 16 moderate and 11 low impacts). This has been mitigated to zero very high impacts, one high impacts, 6 moderate impacts, 21 low impacts and 4 very low impacts. The remainder of the impacts are considered to be positive, with one listed as no effect.

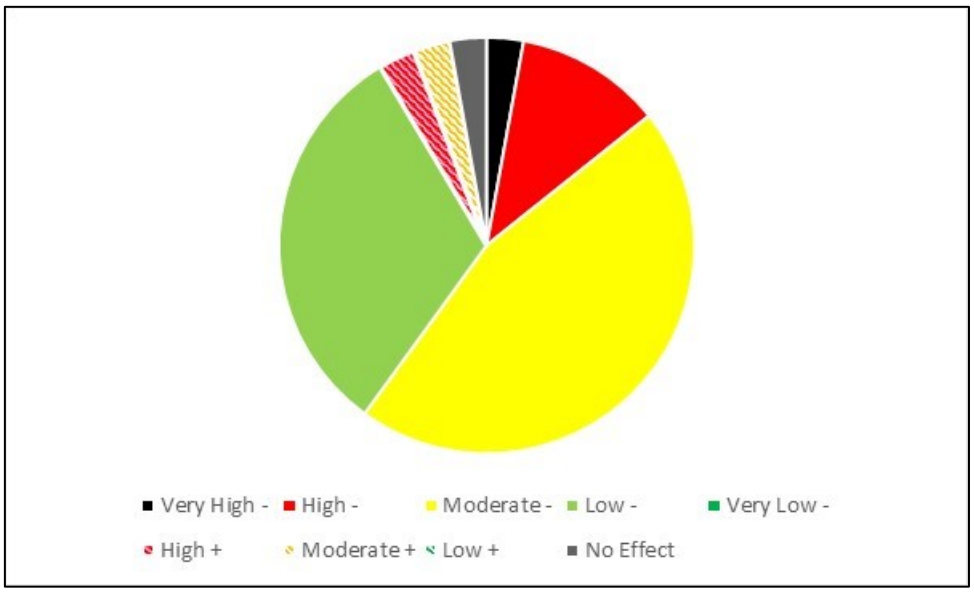

Figure 10.4: Construction Phase impacts pre-mitigation.

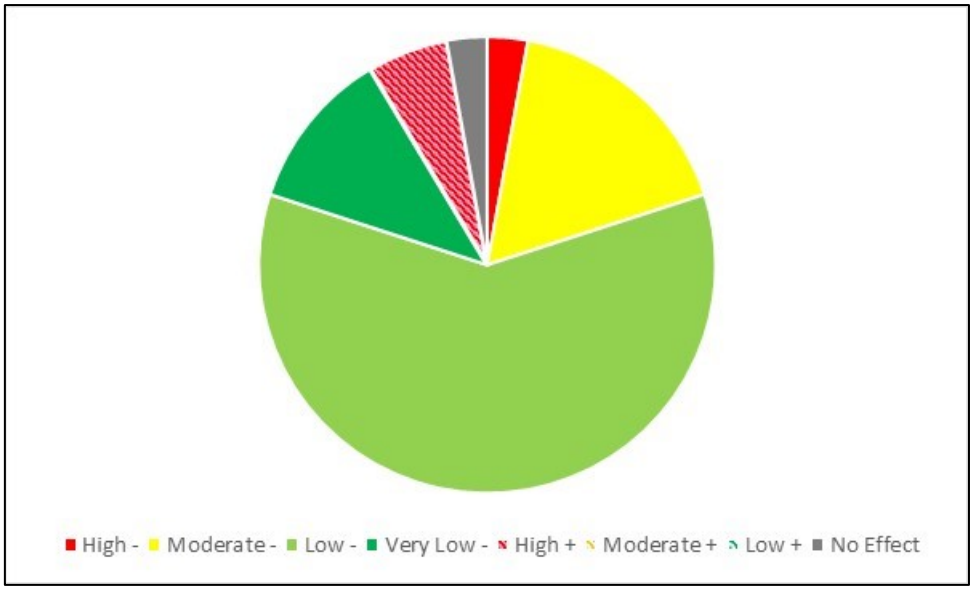

Figure 10.5: Construction Phase impacts post-mitigation.

The pie charts below provide a summary of the operational phase impacts pre (Figure 10.6) and post (Figure 10.7) mitigation. During the operational phase there are the potential for 22 negative impacts (zero very high, 5 high, 7 moderate, 7 low and 3 very low impacts). This has been mitigated to zero high impacts, zero moderate impacts, 14 low impacts and 8 very low impacts. The remainder of the impacts are considered to be positive.

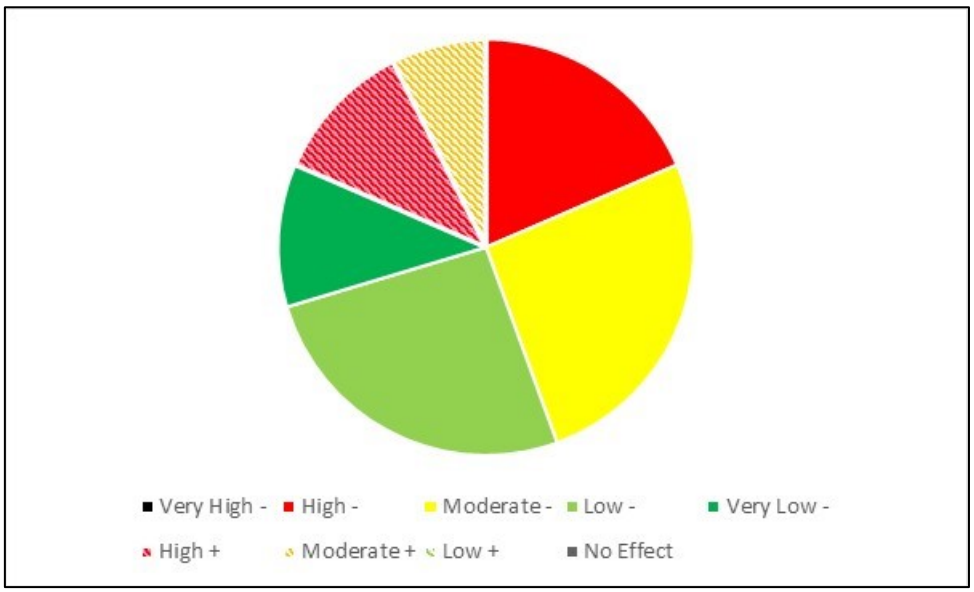

Figure 10.6: Operational Phase impacts pre-mitigation.

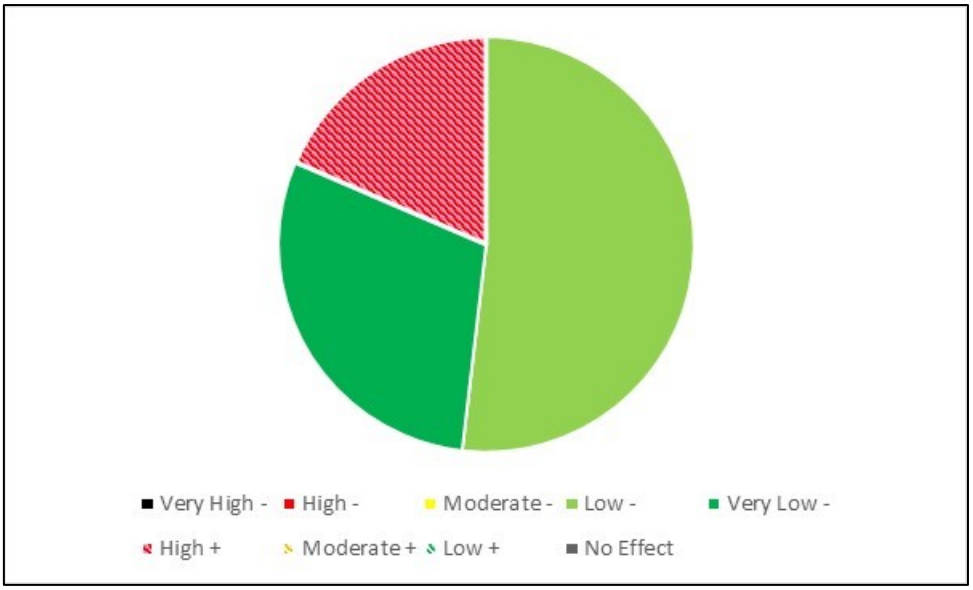

Figure 10.7: Operational Phase impacts post-mitigation.

11 IMPACT MANAGEMENT OUTCOMES

11.1 CONSTRUCTION PHASE

The following mitigation measures **must** be implemented for the construction phase of the proposed development:

11.1.1 Design Aspects:

- The seawater abstraction and discharge pipeline infrastructure must be designed to limit impacts on topography and bathymetry.
- Excavations and changes to the topography and bathymetry of the site must be kept to the minimum required for construction.
- Previously disturbed areas must be utilised for laydown areas wherever possible.
- The general profile of the landscape and / or the seabed must be retained as far as practically possible.
- Infrastructure finishes should be of appropriate design and quality in keeping with the CDC's Architectural Guidelines.
- Infrastructure should be designed in such a way that it fits/blends into the surrounding environment, especially in terms of colour. Neutral shades are preferred.
- Intake structures should be positioned away from sensitive environments or areas with high species diversity or abundance, like rocky reefs, and should not draw in water from the upper meter of the water column.
- Intake structures should ensure the horizontal intake of water.

11.1.2 Construction Activity Impact Management:

- The port authorities must be notified and consulted prior to the commencement of construction.
- Wet suppression techniques should be used to control dust emissions, especially in areas where dry material is handled or stockpiled. No potable water to be used for dust suppression.
- Exposed soils and other erodible materials should be re-vegetated or covered promptly.
- Strict speed limits should be imposed to reduce entrained emissions and fuel consumption rates.
- All aspects of the Occupational Health and Safety Act (Act No. 85 of 1993), must be adhered to at all times.
- All hydrocarbons and chemicals must be stored on impermeable surfaces with appropriately sized containment bunds.
- Spill kits must be available at all locations where chemicals and hydrocarbons are stored, handled or used, and spills must be cleaned up immediately in accordance with an established protocol appropriate to the material in question.
- Cement must be stored on impermeable storage areas protected from the rain and mixed only in designated areas. Concrete residues must be cleaned up immediately.
- Vehicle repairs, servicing, refuelling and washing must be done only in designated areas underlain by impermeable surfaces with appropriately sized containment bunds and grease traps.
- Where it is necessary to service, repair or refuel a vehicle or item of plant on site, drip trays must be used to catch drips, spills and leaks.
- Construction material must be reused or recycled wherever possible.

- Waste that must be reused or recycled should be disposed of in the correct manner at the nearest registered waste disposal site.
- Any hazardous materials (e.g. paint, fuel or oil) must be disposed of immediately and in the correct manner.
- General good housekeeping should be practiced on site.
- Topsoil and spoil to be managed in accordance with the CDC's Environmental Specifications for Construction.
- Litter must be controlled during construction (e.g. adequate bins must be made available on site at all times).
- Construction materials stored as part of the project must be secured (i.e. plastics must be covered to prevent being blown off site). Skips must be regularly emptied and must be covered.
- Suitable bedding material will need to be imported from a commercial source.
- The test pits excavated indicate that the excavatability to a planned depth of 2 mbgl is unlikely to prove problematic. However, it is recommended to allow for the establishment of a large tracked excavator to excavate through any hardpan calcrete/coquinite which may be present from place to place along the alignment other than that intersected in the test pits.

11.1.3 Traffic And Vehicle Movement Impact Management:

- Large slow moving construction vehicles such as front-end loaders must not be permitted to utilize public roads during peak hours.
- Construction vehicles and equipment must be inspected for leaks daily. Any leaks must be immediately repaired at an offsite location.

11.1.4 Archaeology And Heritage Impact Management:

- An archaeologist must be appointed on retainer for the duration of the construction phase of the project.
- The appointed archaeologist must have the requisite experience and knowledge to recognise maritime cultural heritage that may be found in the beach/dune area.
- The appointed archaeologist must do a short induction to familiarise the contractors and workers, including divers, to the potential heritage material artefacts that may be exposed during work. This includes Stone Age, Early Farming Communities, Colonial Period and Shipwreck artefacts and burials.
- Should any heritage artefacts be exposed during marine excavations, work in the immediate area where the artefacts were discovered shall cease immediately and the on-site archaeologist shall be notified as soon as possible.
- All discoveries shall be reported immediately to the on-site archaeologist so that an investigation and evaluation of the finds can be made. The archaeologist will advise the necessary actions to be taken, including notifying SAHRA and if the artefacts are below the high-water mark, SAHRA's MUCH Unit must be contacted.
- Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and
- Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA (Act No. 25 of 1999), Section 51. (1).
- During the course of any development, the discovery of any previously unknown graves or burial sites must result in the immediate cessation of activities and the discovery must be reported to the responsible heritage resources authority who in turn with the South African Police service will carry out an investigation for the purpose of obtaining information on whether or not such a grave is protected in terms of the Act or is of

significance to any community. If it is, assistance must be given to any person or community to make arrangements for exhumation and re-interment of the contents of such graves or in the absence of any such person or community make arrangements as it deems fit.

11.1.5 Ecological Impact Management:

- All necessary permitting and authorisations must be obtained prior to the commencement of any vegetation clearance and/or construction activities.
- Ensure that all relevant legislation and policy is consulted and further ensure that the project is compliant with such legislation and policy.
- All existing authorisations, permits, and policies for Zone 10 of the SEZ must be implemented and adhered to.
- The independent Environmental Control Officer (ECO) appointed by the CDC must undertake regular monitoring to ensure compliance with authorisations, permits, and management plans.
- Planning for the construction and operation of the proposed development should consider available best practice guidelines.
- Except to the extent necessary for the carrying out of construction works, flora shall not be removed, damaged or disturbed. The clearance of vegetation at any given time should be kept to a minimum and vegetation clearance must be strictly limited to the development footprint.
- The search and rescue of rare, endemic or threatened species prior to site clearance must be carried out in accordance with the Project Vegetation Specification (PVS), by a competent and qualified service provider.
- The removal and stockpiling of topsoil must also be carried out in accordance with the Project Vegetation Specification.
- Employees must be prohibited from making fires and harvesting plants.
- As far as practically possible, existing access roads should be utilised.
- The Alien Vegetation Management Plan developed for the Coega SEZ must be implemented and managed to prevent the further spread of alien invasive species within Zone 10 of the Coega SEZ.
- To ensure the protection of the priority areas delineated within the OSMP and to prevent potential encroachment of construction activities, the boundaries of the construction area must be demarcated according to the methodology developed and implemented by the CDC:
    - Demarcation of the Open Space will be done according to the approved Coega Open Space Management Plan (OSMP), dated July 2014.
    - Demarcation of the Open Space will be done using wooden survey poles.
    - The top 30cm of the wooden survey poles must be painted with weatherproof white paint, followed by the next 30cm painted green, with the following RGB/HEX codes:
        - White paint – RGB/HEX code (255, 255, and 255) (#FFFFFF)
        - Green paint – RGB/HEX code (0, 128, 0) (#008000)
    - Wooden survey poles will be a minimum width of 50mm.
    - Wooden survey poles will be between 1.5 and 2.1m in height and spaced accordingly, depending on the density of the vegetation, with a maximum distance of 10m apart.
    - Signage to indicate the boundaries of the Open Space System in the Coega SEZ will be erected in various locations in the SEZ.
- Search and clear the area of faunal species prior to vegetation clearance.
- Should rehabilitation or stabilisation of the dunes, landward of the HWM, be required only indigenous dune vegetation typical of St Francis Dune Thicket must be used to establish a stable state.

- A botanical walkthrough of the final layout must be undertaken by a qualified botanist and populations of SCC recorded.
- If populations of endangered species are recorded, where feasible, the servitudes must be shifted to avoid populations of vulnerable and near threatened species.
- Vehicle speed must be limited to 30km/hr to reduce faunal collision mortality.
- All staff on site must receive training with regards to the proper management and response should animals be encountered.
- An ECO must walk the site immediately prior/ in front of earth moving machinery and any slow-moving species must be moved out of harm's way and placed nearby in similar habitat. Any SCC found must be recorded (photograph and GPS location) and loaded onto the iNaturalist database.
- The ECO must check any trenches daily and remove any faunal species that may have fallen in. SCC found must be recorded (photograph and GPS location) and loaded onto iNaturalist and relocated at least 50m away. If faunal SCC are found during earth works, these species must be relocated to the nearest appropriate habitat within Open Spaces areas.
- The CDC's Environmental Specification for Construction relating to the Search and Rescue of faunal SCC must be implemented and adhered to.
- An expert with previous experience monitoring this species (e.g. Paul Martin) must be appointed to determine the Damara Tern habitat and a 200m buffer from the delineated Damara Tern habitat must be established. Continued monitoring of the Damara Tern population must be implemented.
- The habitat and buffer must be demarcated and declared a No-Go area, this must be communicated and acknowledged by all staff and contractors. Failure to do so should result in immediate dismissal from site and an appropriate fine.
- The CDC must establish a Management Program inclusive of specialist monitoring and annual reporting on the status of the Damara Tern population within the project area.
- No fires are permitted within the project area.
- No machinery that is noisier than what is currently being used during mining operations should be deployed.
- Drivers of vehicles authorised to drive on the beach need to be aware of the presence of Damara Terns during the breeding season (October to March) and should keep below the high-water mark.
- Management actions such as litter picking need to be carefully planned to minimise disturbance to breeding pairs.
- Implement a faunal search and rescue plan directly prior to construction. If any individuals of this species (*Chlorotalpa duthiae*) are found, they should be relocated to the nearest appropriate habitat within Open Space areas.
- It is imperative to have a comprehensive road mitigation plan to prevent roadkill on the access roads, and during the construction phase. This needs to focus on speed limits and reduce night-time driving.
- The CDC's Environmental Specifications relating to the translocation of wild animals must be adhered to.
- Any alien vegetation which establishes during the construction phase should be removed from site and disposed of at a registered waste disposal site. Continuous monitoring for seedlings should take place throughout the construction phase.
- Should the development require the permanent stabilisation/removal of the mobile dune fields within the study area, then the regional effects of the stabilisation of the mobile dunes must be determined. This must include an assessment of the potential impacts on the sand budget for this coastline, inclusive of potential impacts on the marine ecosystems, as well as any possible effects this would have on the Port of Ngqura.
- Construction in the Coastal Dune System shall be in strict accordance with the recommendations contained in the OSMP.

- National and provincial legislation relating to development within the coastal zone should be consulted.
- Implement a Rehabilitation Plan in accordance with the specifications outlined within the OSMP (2014) and the CDC's Project Vegetation Specifications.

11.1.6 Marine and Coastal Impact Management

- Should the development require the permanent stabilisation/removal of the mobile dune fields within the region, then the regional effects of the stabilisation of the mobile dunes must be determined. This must include an assessment of the potential impacts on the sand budget for this coastline, inclusive of potential impacts on the marine ecosystems, as well as any possible effects this would have on the Port of Ngqura.
- Construction in the area shall be in strict accordance with the recommendations contained in the OSMP.
- National and provincial legislation relating to development within the coastal zone should be consulted.
- Rehabilitate the disturbed area immediately following construction by removing all artificial structures or beach modifications created during construction from above and within the intertidal zone. No accumulation of excavated beach sediments should be left above the high-water mark, and any substantial sediment accumulations below the high water mark should be levelled.
- Undertake baseline and comparative monitoring of marine biota in the construction footprint. Monitoring should focus on physical habitat variables (sediment particle size composition and organic content) and biota (e.g. benthic infaunal soft sediment communities). The latter have been shown to provide a good indication of habitat recovery following physical disturbance. Surveys should be done once prior to construction and again approximately 12 months after construction is complete.
- Minimise vehicle and pedestrian traffic in the coastal zone.
- Minimise the surface area impacted by bolting the pipeline directly to the rocky substratum.
- Minimise the use of blasting.
- The spatial extent and duration of construction must be limited as far as possible (construction of the different infrastructure should be undertaken sequentially to minimise disturbance on pelagic habitat).
- A visual survey of the area (both the immediate vicinity of the construction footprint and within a 1000 m radius) should be conducted by trained marine mammal observers (MMO's) 30 minutes before the blasting is to commence. Permission to blast must be delayed until all marine mammals are outside the 1 km radius form the blast site.
- All blasting should be halted once marine mammals are seen entering the 1 km radius. Blasting should not commence when environmental conditions, such as darkness, mist, rain, fog or high sea states greater than Beaufort 4 prohibit adequate monitoring of the 1 km safety zone.
- No blasting may take place during the annual sardine run (May-June).
- No blasting should be undertaken in the early mornings (6h00-10h00) or late afternoons (15h00-19h00) due to coastal dolphin activity in inshore waters. Blasting should only be undertaken between 12h00 and 14h00.

- A soft-start (i.e. gradual ramping up of piling/ drilling power) period of at least 20 minutes is recommended. If an animal enters the safety zone during soft-start, the power should not be increased until the animal exits and remains outside of the zone for 20 minutes.
- Blasting should be restricted to where alternative construction technologies are found to be unfeasible. Alternatives to the use of explosives could be the use of cutting techniques, such as wire, abrasive-, mechanical-, and torch cutting, which produce sound levels that are 80 dB less than the sound levels produced by normal blasting (TSB 2000, Spence et al. 2007, Transnet 2014).
- Acoustic deterrent devices (ADDs) may be utilised if the effectiveness of candidate devices on the key marine mammal species can be demonstrated prior to the start of construction (Transnet 2014).
- The charge weights required for the blasting should be carefully evaluated, and shape charges and shock wave focusing charges could be employed to reduce the charge weight by 90%.
- It is recommended that a number of small test blasts be conducted by the blasting contractor to measure the sound outputs at set distances from the source, both inside and outside the breakwater. This will allow adjustment of the charge weight and associated reduction in noise output as well as establish the impact that the breakwaters (both eastern and western) have on the propagation of underwater sound.
- Sound containment measures should be implemented during blasting as they present the best mitigation measure, since they aim to partially enclose the produced sound within a certain area around the blast site. Potential mitigation measures could include the use of blasting mats (Spence et al. 2007) or bubble curtains, which is the main mitigation technique employed in the USA and Europe, or other technical measures for sound absorption. The reduction in sound should be such that it does not exceed 160 dB MSP (as per Southall et al. 2007, Transnet 2014).
- Drilling, piling and dredging activities are to be carried out the lowest possible power levels known to contribute to ocean noise pollution (ACCOBAMS 2010, JNCC 2010, EPBCA 2012). Power limits can be restricted by shutting down the power of operational systems prior as well as after usage to avoid leaving them idling (EPBCA 2012).
- Platforms should use thrusters, fibre glass insulation, or damping techniques, such as the use of damping tiles, around machinery to reduce vibration noise. Ramming and drilling piles and machinery should be enclosed with acoustically insulating material, such as fibreglass, mineral wool, and plastic; in addition, modified drilling caps could be used.
- A monitoring programme should be implemented to monitor water quality in the vicinity of the construction site. Six monitoring stations, three on either side of the pipeline at 10, 15 m and 18 m depth, respectively, should be identified for this purpose. Measurements should be collected daily for 20-30 days prior to the commencement of construction operations (to develop an appropriate baseline) and should continue as long as dredging continues. The median TSS concentration in monitoring data should not exceed the threshold limit which is set as the greater of the 80th percentile of the baseline monitoring data, or ten percent (10%) greater than the natural background turbidity. If the TSS approaches the threshold limit set above at any of the surveillance monitoring stations, mitigation measures are to be put in place to prevent any further increase in suspended solid concentration (e.g. reduce rate of construction activities). If median turbidity levels (calculated from measured values in any one and a half hour period) exceed the threshold, construction activities are to be suspended until measured levels drop below the threshold.

- Trenches excavated within unconsolidated, loose sand (aeolian and Salnova Formation) will either need to be supported or battered back to a safer slope angle. Sections of the profile that have undergone partial to complete pedogenesis (soil cementation) are considered stable provided there is no significant overburden adjacent to the crest whether it be man-made stockpiles or natural material (high sand dune). Should this condition be identified during the design phase of the project, it is recommended that a stability analysis be conducted to assess the stability of the trench sidewalls.
- The erodible nature of the fine-grained sand, particularly the recently deposited sand of the dune field, is considered the most problematic constraint for the site. This can be mitigated by either excavating out sections of the dune field or using trenchless construction techniques through these areas. Both options are estimated to come with a significant cost. The simplest solution would be for the CDC to re-align the sections of the pipeline that cross the existing dune field to a position further north.
- Check vehicles for hydrocarbon leaks daily. No leaking vehicles are permitted on site.
- Protocols for dealing with accidental spills must be in place.
- Emergency equipment to isolate spills must be accessible.
- Provide suitable containers for the disposal of all waste, including recycling.
- All hazardous substances must be accompanied by a permit, a hazard report sheet, and a first aid treatment protocol and may only be handled by suitably trained operators.
- Intentional disposal of any substance into the environment is strictly prohibited, while accidental spillage must be prevented, contained and reported immediately.
- Implementation of a rigorous environmental management and control plan (including procedures for remediation).
- All fuel and oil are to be stored with adequate spill protection.

11.1.7 Social Responsibility:

- Utilise local labour as far as possible.
- Construction material must be sourced locally wherever possible.
- No machinery that is noisier than what is currently being used during construction operations should be deployed.

11.2 Operational Phase

The following mitigation measures **must** be implemented for the operational phase of the proposed development:

- The pump stations must have a built-in safety mechanism in the event of loss of pressure.
- Regular maintenance inspections are required.
- Effluent discharge must be continuously monitored to ensure that water quality meets the conditions of the CWDP.
- Litter must be controlled during construction (e.g. adequate bins must be made available on site at all times).
- All industries that will be utilising the discharge infrastructure must undergo rigorous monitoring of treated effluent in order to ensure that the discharge water meets the minimum regulatory standards and permit requirements (e.g. CWDP) prior to entering the discharge infrastructure.
- Waste must be removed from site regularly and disposed of at a registered landfill site in

order to avoid unnecessary litter being viewed on site; and
- General good housekeeping must be maintained at all times.
- All aspects of the Occupational Health and Safety Act (Act No. 85 of 1993), must be adhered to at all times.
- Utilise local labour as far as possible.
- For finfish effluent, ensure that an inline screening system is hard-wired into investor operations to ensure that the solids are separated from the effluent prior to discharge in order to reduce the levels of TSS in the effluent. Examples of inline screening systems include settlement ponds or swirl operators.
- All supernatant finfish effluent must comply with conditions of the CWDP.
- The investor must monitor the quality of supernatant effluent to prove that it meets the required Water Quality Guidelines.
- For abalone effluent each operation must incorporate an inline screening system to trap / capture any solids (organic or inorganic); e.g. seaweed ponds.
- All discharge infrastructure must be maintained.
- Each operator must monitor their effluent quality once it's been through the screening system.
- The Alien Vegetation Management Plan developed for the Coega SEZ must be implemented and managed to prevent the further spread of alien invasive species within Zone 10 of the Coega SEZ;
- Implement a Rehabilitation Plan in accordance with the specifications outlined within the OSMP (2014) and the CDC's Project Vegetation Specifications.
- Intake velocities should be kept below 0.15 m/s to ensure that fish and other mobile organisms can escape the intake current. Intake velocities can be reduced to the requisite 0.15 m/s using footer valves.
- Intake structures should be positioned away from sensitive environments or areas with high species diversity or abundance, like rocky reefs, and should not draw in water from the upper meter of the water column.
- Implement the preferred Scenario recommended by PRDW (2020).
- A water quality monitoring programme must be implemented to validate the predictions of the hydrodynamic modelling study and monitor constituents of the effluent. Adaptive management, informed by monitoring results must be implemented to ensure compliance with water quality guidelines.
- Ensure end of pipe limits for discharges not included in the model (i.e. biocides) do not exceed water quality guideline limits (i.e. 0.2 mg/l pipe end for chlorine).
- End of pipe concentrations recommended by PRDW (2020) be adhered to. Wastewater must be treated on land to meet appropriate standards prior to discharge. These end of pipe concentrations should be reflected in any awarded Coastal Waters Discharge Permit.
- Wastewater 1 outfall effluent must have a maximum end of pipe effluent salinity of 17 PSU.
- Wastewater 1 outfall to limit the maximum allowable effluent concentrations (end of pipe) for TKN + NH4 to below 5 mg/l (wastewater must be treated on land to meet appropriate standards prior to discharge).
- The brine and fin fish effluents are to be discharge separately; otherwise, the ammonia, nitrate and nitrite end of pipe concentrations must be reduced to below 13.37 mg/l.
- Wastewater 1 outfall must limit the maximum allowable effluent concentrations (end of pipe) for TSS to below 50 mg/l (wastewater must be treated on land to meet appropriate standards prior to discharge).
- Wastewater 1 outfall must limit the maximum allowable effluent concentrations (end of pipe) for sulphide to below 0.21 mg/l; for Hg to below 0.062 mg/l, Co to below 0.21 mg/l; Cu to below 1.04 mg/l, and Cd to below 0.83 mg/l.
- Wastewater 1 outfall must limit the maximum allowable effluent concentrations (end of pipe) for COD to below 3110 mg/l (wastewater must be treated on land to meet appropriate standards prior to discharge).

- Sodium metabisulfite is an oxygen scavenger chemical that is typically used to neutralise the oxidising potential of the residual chlorine from the biocide dosing of the abstracted seawater before being processed through the RO plant. The dosing levels of sodium metabisulphate need to be well-managed, and the levels of the effluent should be low enough to avoid an “oxygen sag” in the marine environment receiving the effluent. Environmental best-practise is to ensure aeration of the effluent prior to discharge.
- Wastewater 1 outfall must limit the maximum allowable effluent concentrations (end of pipe) for E. coli to below 4500 cfu/100 ml (wastewater must be treated on land to meet appropriate standards prior to discharge).
- Intake structures should ensure the horizontal intake of water and be positioned away from sensitive environments or areas with high species diversity or abundance, like rocky reefs, and should not draw in water from the upper meter of the water column.
- Should the proposed Wet Mechanical Cooling water intake jetty be constructed outside of the Port, a sediment transport study must be undertaken to assess the impacts of on sediment transport patterns in the area. This modelling study must be undertaken prior to construction outside of the Port, and this impact must be reassessed based on the results of this modelling study.

11.3 Decommissioning Phase

No decommissioning procedures or restoration plans have been compiled at this stage, although impacts are expected to be similar (if not less) than those assessed during the construction phase. The potential impacts during the decommissioning phase are expected to be low in comparison to those occurring during the operational phase, and no key issues related to the marine and/or terrestrial environment have been identified at this stage. The same mitigation procedures as those explained for the construction phase in Section 10.1 should be adhered to in the decommissioning phase in order to mitigate for any of the impacts listed above.

12 CONCLUSION

12.1 FINAL PROPOSED ALTERNATIVES

12.1.1 Intake Infrastructure

Two seawater abstraction servitudes will be required:

(1) Inside the Port of Ngqura for the Once-through and Wet Mechanical power station cooling water requirements; and
(2) East of the Port of Ngqura to meet the more specific water quality requirements of the aquaculture industries, and for desalination.

The following types of seawater abstraction technologies will be located within the servitudes:

- Abstraction basin with concrete intake channels (within the Port);
- Abstraction pipeline and intake jetty (within the Port);
- Seawater abstraction pipelines;
- Vertical beach wells;
- Onshore pump stations and screening facility; and
- WEROP wave pumps.

12.1.2 Discharge Infrastructure

Three discharge servitudes will be required:

- Discharge servitude 1:
  - Cooling water effluent discharge servitude 200 m wide to a distance of 650 m offshore and a depth of -11 m CD.
- Discharge servitude 2: Combined effluent discharge servitude 200 m wide with the following:
  - Brine discharge 1,000 m offshore, at a depth of -13.5 m CD.
  - Finfish aquaculture recirculation system effluent discharge 1,500 m offshore, at a depth of -16 m CD.
  - Wastewater discharge from Phase 2 of the WWTW at 3,000 m offshore, at a depth of -20 m CD.
- Discharge servitude 3:
  - Abalone aquaculture flow-through system effluent discharge servitude 100 m wide into the surf zone.

The following technologies will be implemented to discharge the various effluent streams from the various proposed land-based uses into the sea:

- Tunnel discharge;
- Pipeline discharge;
- Surf zone discharge

12.1.3 Stormwater Infrastructure

Stormwater derived from Zone 10 will be attenuated on land behind the foredune area, approximately 40-50 m from the HWM. The stormwater outlet channels will run parallel to the

HWM but behind the foredune, and will comprise of gabions and reno mattresses to break the flow of water before it enters a gently sloping lined channel (0%-0.5% slope). This will attenuate the stormwater and allow for the infiltration of water into the underlying sandy substrate. The stormwater strictures have been designed to attenuate the 1:5 year storm event. Three stormwater outlet channels will be constructed. A berm surrounding the outlet channel will prevent the overflow of stormwater into the surrounding beach environment. A large reno mattress and associated gabions on the far end of the outlet channel will extend to the rocky shoreline to ensure the system can accommodate major rainfall events (>1:5 year) which may result in the overflow of water from the stormwater outlet channel.

12.2 Aspects conditional to the findings of the EIR and/or the specialist assessments which must be included as conditions in the EA

It is recommended that an ECO be appointed to ensure all recommendations in the EMP as well as mitigation measures (Chapter 10) are adhered to. The most important mitigation measures are related to the construction and operational phases of the project and are included in Sections 11.1 and 11.2 above.

12.3 Assumptions, Uncertainties and Gaps

The following assumptions, uncertainties and gaps have been identified by the EAP and the various specialists:

- The magnetometer picks up magnetic anomalies in and below the seabed. All the hits may not be Maritime and Underwater Cultural Heritage (MUCH) sites, in addition, searches may not find the cause. Their status may only be revealed during the development process. The process gives the developers an idea of where MUCH sites may be uncovered.
- Some anomalies may be obvious shipwreck material while others may be covered in conglomerate and/or sand. The inshore area within Algoa Bay is very rocky and there are only sandy patches on the deeper anomalies. The rocks hamper circular searches. The Impact Zone, where the most anomalies were noted is very close to the shore, the bathymetry of the seabed is steep, within 3 km it drops from c.3m to 23m. This caused a big surge which hampered searches for MUCH sites.
- The EIAR and associated specialist studies are based on the project description and the site layout provided to CES by the Proponent.
- Descriptions of the natural and social environments are based on limited fieldwork and available literature. However, the time available in the field was sufficient to provide enough information to conclude on the status of the affected area, and there is a large body of knowledge available.
- A detailed faunal survey was not conducted. The faunal survey was limited to a desktop study, using information from previous ecological surveys conducted in the area, supplemented by opportunistic observations of animal species encountered during the site survey.
- It should be emphasised that terrestrial ecological sampling could only be carried out at one stage in the annual or seasonal cycle – in this case late winter (August). Therefore, it is possible that some spring or summer flowering plant species may have gone undetected.

- Species of Conservation Concern (SCC) are difficult to find and identify, thus species described in this report do not comprise an exhaustive list.
- The information, as presented in this document, only has reference to the study site as indicated on the project maps. Therefore, this information cannot be applied to any other area without a detailed investigation being undertaken.
- The following assumptions were made with respect to the current EEIA:
    - It is assumed that the significance of environmental economic impacts (impacts to ecosystem goods and services) is directly linked to the significance of environmental impacts as determined by the:
        - ✓ Final Scoping Report; and
        - ✓ Specialist Marine Impact Assessment (Anchor, 2021).
    - The time value of money and discounted future cashflows, was not considered.
    - VAT is excluded.
    - Pumping capacity of 15,000 Kw for the western routing of effluent is based on the WSP assessment of the capacity required to pump water to Zone 13 in the SEZ at a height of 70 Metres ASL.
    - There are inherent uncertainties and gaps in knowledge with respect to the valuation of ecosystem goods and services. It is still a developing discipline and attaching values to less tangible goods and services that have no material benefit to which one can attach a monetary value. Subjective estimates or ranges, and qualitative descriptions may be necessary.

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