CEN INTEGRATED ENVIRONMENTAL MANAGEMENT UNIT

Environmental and Rural Development Specialist

DRAFT BASIC ASSESSMENT REPORT:

PROPOSED COEGA KOP WELLFIELD ON ERF 1, WELLS ESTATE, NELSON MANDELA BAY MUNICIPALITY, EASTERN CAPE

27 February 2017

Project Title:

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PROPOSED COEGA KOP WELLFIELD ON ERF 1, WELLS ESTATE, NELSON MANDELA BAY MUNICIPALITY, EASTERN CAPE

Project Applicant:

NELSON MANDELA BAY MUNICIPALITY

DEDEAT Reference Number:

ECm1/C/LN1&3/M/01-2017

Environmental Assessment Practitioner:

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27 February 2017

Executive Summary

1.1 Introduction

CEN Integrated Environmental Management Unit (CEN IEM Unit) was appointed by Milongani Eco Consulting on behalf of the Nelson Mandela Bay Municipality to undertake the environmental assessment for the Proposed Coega Kop Wellfield on Erf 1, Wells Estate, Nelson Mandela Bay Municipality, in the Eastern Cape.

CEN IEM Unit meets the requirements for an independent Environmental Assessment Practitioner (EAP) in terms of the Environmental Impact Assessment (EIA) Regulations of 4 December 2014 (GN R 982) (in terms of the National Environmental Management Act, Act 107 of 1998 as amended).

The proposed Coega Kop Wellfield entails developing a borehole wellfield, associated pipelines and a Water Treatment Works (WTW) in order to supply potable water to the Coega Industrial Development Zone (IDZ) and Colchester within the Nelson Mandela Bay Municipality.

The proposed Coega Kop Wellfield, WTW and associated borehole pipelines will be located on Erf 1 of Wells Estate in Ward 53, Port Elizabeth, Nelson Mandela Bay Municipality, Eastern Cape Province. The proposed Coega Kop Wellfield will be situated on municipal property next to Coega Kop, in close proximity to the Coega Kop Mine in the Coega area. The proposed WTW will be located at 33°46'24.98"S and 25°36'25.89"E (central point). The bulk water pipeline from the WTW to the Coega Kop Reservoir is located on Erf 1 Wells Estate (SG Code: C07600120000000100000) and Erf 228 of Coega (SG Code: C07600230000022800000). Refer to **Figure 1 – Locality Map.**

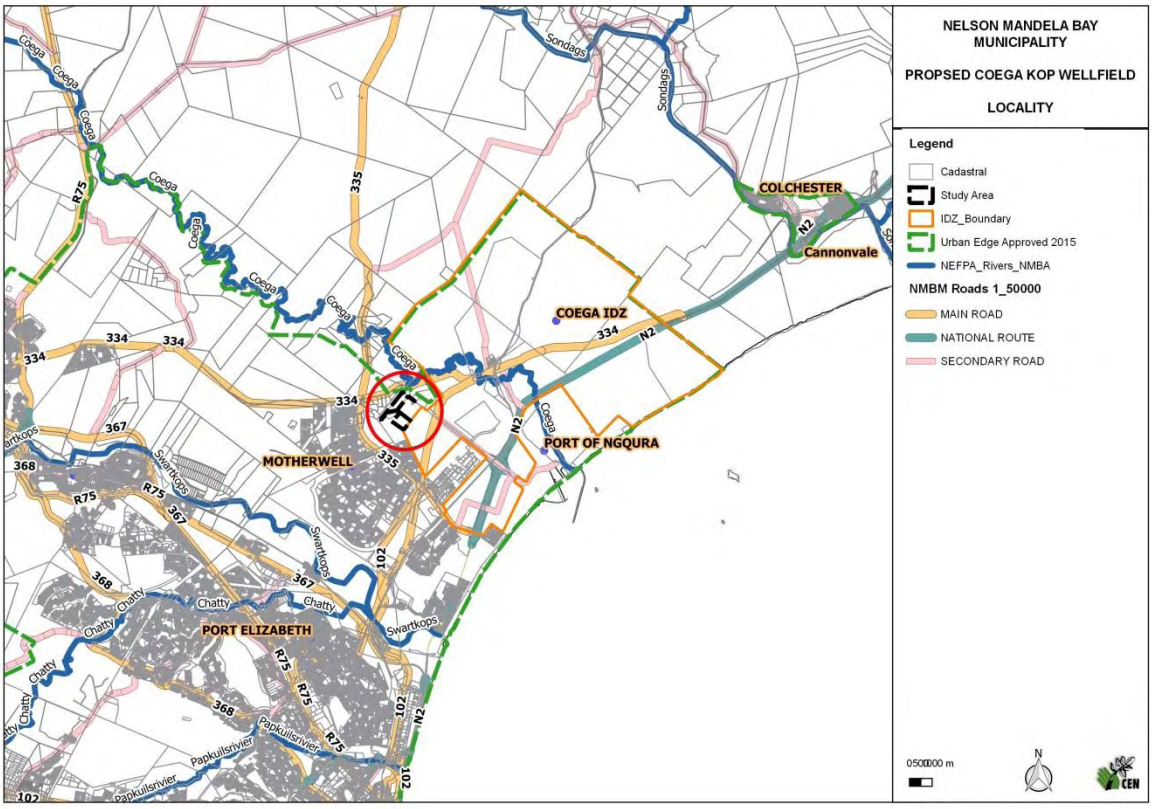

Figure 1: Locality Map

The purpose of the Coega Kop Wellfield is to supply the Coega IDZ and Colchester with groundwater extracted from the Groot Winterhoek to the Coega Ridge Table Mountain Group Aquifer. Due to the high iron and manganese levels in the groundwater, the water would need to be treated before being distributed as potable water.

1.2 Activity Description

The proposed Coega Kop Wellfield will be developed in phases. The layout of the Coega Kop Wellfield is presented in **Appendix A**. Phase 1 will consist of (this EIA Application):

a) A temporary WTW (package plant) with a capacity of 6Ml/day.

b) Sludge from the WTW will be stored in evaporation lagoons on site, where the sludge will dry out. The disposal of the dried sludge will be off site.

c) A 450m^3 reservoir next to the WTW with a small booster pump station (6Mℓ/day) next to the reservoir.

d) The footprint of the temporary WTW, reservoir and booster pump station will be located in area of approximately 2ha.

e) Six production boreholes with head works and pump chambers.

f) Pipelines from the boreholes to the WTW, with pipe diameters between 315mm to 450mm. The total combined length of the borehole pipelines for the wellfield is estimated at 2630m.

g) A pipeline (450mm diameter) between the WTW and the Coega Kop Reservoir, over a distance of approximately 1500m.

h) A discharge pipeline (approximately 850m in length) from the WTW to a non-perennial watercourse / tributary of the Coega River.

Phase 2 will consist of:

a) A permanent WTW with a capacity of 20Ml/day, a footprint size of approximately 0.8ha (to be located within the temporary WTW footprint area).

b) A blending pipeline from the WTW to the Nooitgedacht Low Level Scheme pipeline (in order to supply additional potable water to the Nooitgedacht Low Level Scheme).

The purpose of the proposed well field at Coega Kop is to utilize the groundwater available in the Groot Winterhoek – Coega Ridge Table Mountain Group Aquifer. This aquifer is a fractured-rock aquifer which primarily consists of Peninsula Formation of the Table Mountain Group (TMG). The geological structure of the aquifer is dominated by the Coega Fault System, a collection of semi-parallel faults of varying lengths and offsets, which runs along the entire length of the aquifer. Water from the aquifer gets trapped and travels along fractures in the fault system and is under high pressure in the eastern reach of the fault. The location of the well field near Coega Kop is ideal because the TMG outcrops at Coega Kop.

Exploration of the Coega Fault System at Coega Kop has been completed. Test pumping of all the probe holes identified six probe holes with good sustainable yields. The estimated yield of the aquifer is 40 Ml/day. With the varying extraction at Uitenhage Springs being taken into account, the maximum yield targeted at the Coega Kop Wellfield was set at 17.3 Ml/day. A minimum yield of 6.9 Ml/day would still make the well field an

economically viable venture, therefore 6.9 Ml/day was set as the low yield target. This makes the development of a well field at Coega Kop a feasible option to supply the municipality with water.

The production boreholes will be fitted with head works consisting of a configuration of valves, a flowmeter and a submersible pump. All equipment will be placed in concrete chambers to prevent vandalism. The chambers will be fitted with thick concrete lids which will require removal by crane to gain access to the head works.

Preliminary water quality tests on the probe boreholes indicate that the groundwater consists of high concentrations of iron (Fe) and manganese (Mn) and that these exceed the SANS 241:2011 limits for potable water. Low concentrations of iron and manganese cause a metallic taste in the water and also discolour the water brown/black. This causes staining of household appliances and interferes with industrial wet processes. Iron and manganese in water will also promote the growth of crenoform organisms in a distribution network. These filamentous organisms utilise both iron and manganese in their metabolism, and will deposit within pipelines to form heavy, gelatinous, stringy masses that slough off periodically. The growth of these organisms will impair the hydraulic capacity of the distribution network. Higher concentrations of iron (>1mg/ℓ) and manganese (>0.4mg/ℓ) in drinking water can cause negative health effects. As a result the groundwater requires treatment prior to distribution.

Groundwater will be pumped from the boreholes to the Feed Storage Tank at the WTW. From there, it is pumped through the biofiltration process, where microbes oxidise soluble iron and manganese to form insoluble precipitates which are removed through media (sand) filtration. The filtered water is stored in the Clear Well tank, from where it is pumped by the high-lift pumps through the disinfection and stabilisation units and onto the Coega Kop Reservoir. The biofiltration process relies on careful control of pH conditions, which is afforded by the dosing of sodium hydroxide. Sodium hydroxide is pumped from the Sodium Hydroxide storage tank to the inlet of each of the filters. The WTW will be continuously operated throughout the year, i.e. 24 hours a day, 365 days. The storage of chemicals onsite is based on a 30 day period, and would include: sodium hydroxide, potassium permanganate, chlorine and limestone.

The treatment process relies on dosing of different chemicals for the purposes of:

a) Maintaining favourable conditions for the biological processes to be effective.

b) Disinfecting the product water against pathogens.

c) Stabilising the product water to reduce corrosive attack on downstream infrastructure.

d) Oxidising the iron and manganese in the event that biological treatment proves ineffective.

When the filtering capacity of the filters is reached, these will be backwashed using compressed air and water from the Clear Well tank. During the backwash process, filtered solids are removed from the media and pumped as a slurry to the spent backwash water tank. The spent backwash tank provides adequate retention time to allow suspended solids to settle. Most of the clear supernatant is recovered and pumped back to the head of the treatment works to supplement the supply of water. Excess supernatant will be discharged overland to ultimately flow into a non-perennial tributary of

the Coega River, approximately 0.008Ml/day. Once the spent backwash tanks are full, they will be drained and the residue (mostly iron oxide and manganese dioxide) will be emptied and stockpiled onsite in the evaporation lagoons until there is adequate volume for removal (either for reuse, for application to land, or for discharge to landfill). The total extent of evaporation lagoons would be approximately 1800m^2. It is expected that over the course of a year, the plant will produce approximately 100 – 200 tonnes of dry solids for removal.

The main access to the Coega Kop Wellfield will be from the existing gravel access road which branches off from the paved access road to the Coega Kop quarry. This access is provided from the R102. Existing gravel access roads will be used, to a width of 5m. Where new access roads are required, these will be gravel and 5m in width, and will follow adjacent to the pipelines.

Refer to **Figure 2** for the Layout Plan.

1.3 Construction Phase

The construction of the temporary WTW and associated infrastructure is estimated at 6 months. The construction of the production boreholes and associated infrastructure will be in a phased manner, and would be undertaken over a period of time. A construction width of 20m will be required for the pipeline infrastructure, and 5m access roads will be located adjacent to the pipelines.

1.4 Operational Phase

It is anticipated that the operational phase of the temporary WTW will begin in November 2017. The 5m access roads used during construction will be used during the operational phase for undertaking operational activities.

During commissioning and ramp-up, the flow through the WTW is gradually increased to allow the establishing of the iron and manganese oxidising bacterial cultures within the filter media. The commissioning process will begin with closed-loop circulation of water through the plant, until the quality of effluent is observed to be suitable for delivery to the Coega Kop reservoir. During this time, there is no overflow discharge from the WTW. Slowly the WTW will receive more groundwater and ramp up production to approximately 50% of the capacity throughput (3ML/d). During this time, discharge of supernatant from spent backwash concentration ranks to the non-perennial tributary of the Coega River will be approximately 4m^3/d, but may contain higher concentrations of soluble iron and manganese as the biological treatment process becomes established. This period may last as long as three months depending on the presence of the bacteria in the groundwater, and their effective growth rate (temperature dependent).

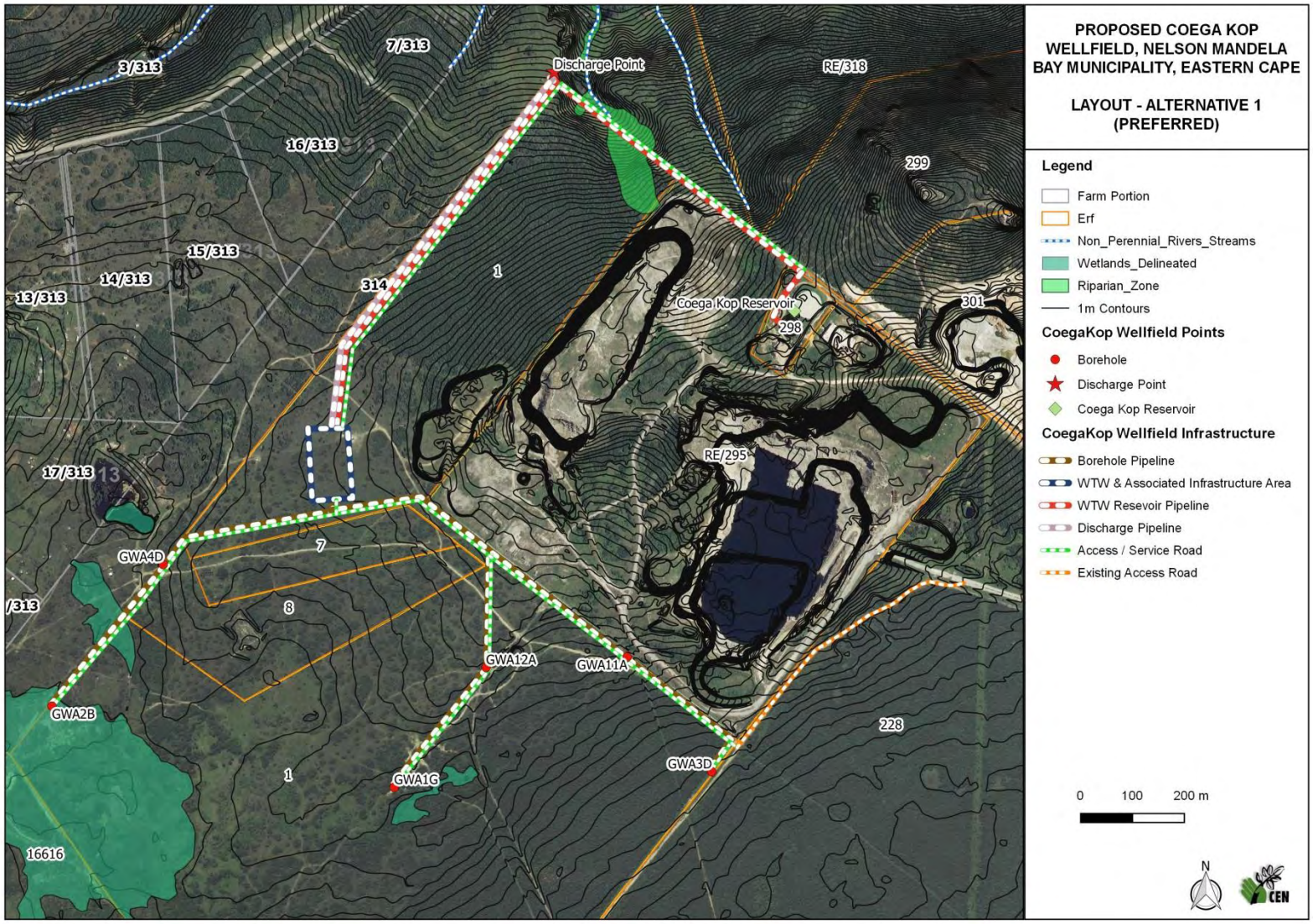

Figure 2: Layout Plan

1.3 Legal Framework

1.3.1 EIA Listed Activities

An application for an integrated Environmental Authorisation and Waste Management Licence was submitted to the Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) on 10 January 2017, in terms of the Environmental Impact Assessment (EIA) Regulations, 2014. The integrated application reference number is ECm1/C/LN1&3/M/01-2017.

In terms of the EIA Regulations, 2014, made under Section 24(5) of NEMA, the following listed activities (**Table 1**) within Government Notice R. 983, and R 985 (of 4 December 2014) are triggered by the proposed development, thereby requiring environmental authorisation from the DEDEAT.

Relevant waste management activities listed in Category A of Government Notice (GN) 921 of 29 November 2013, published in terms of Section 19(1) of the NEM:WA are listed in Table 2.

Table 1: EIA Listed Activities

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant or notice):	Describe each listed activity as per the detailed project description (and not as per wording of the relevant Government Notice):
GN R.983 4 December 2014	9 (i)	The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water— (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; **Pipelines from the boreholes to the WTW, with pipe diameters between 315mm to 450mm. The total length of pipelines for the wellfield is estimated at 2630m.** **A pipeline (450mm diameter) between the WTW and the Coega Kop Reservoir, over a distance of approximately 1500m.** **The activity is applicable.**
GN R.983 4 December 2014	12 (xii)	The development of (xii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs (a) within a watercourse and (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding—(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies. **The footprint associated with pipeline infrastructure and roads for the wellfield would exceed 100m^2 where it traverses watercourses and within 32m of watercourses.** **The activity is applicable, however the exclusion applies as Activity 14 in Listing Notice 3 of 2014 (GNR 985) is applicable.**
GN R.983	14	The development of facilities or infrastructure, for the storage, or

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant or notice) :	Describe each listed activity as per the detailed project description (and not as per wording of the relevant Government Notice):
4 December 2014		for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres. **"Dangerous goods" that are likely to be associated with the proposed project, include the following:** **Fuel stores for construction purposes;** **Chemicals (sodium hydroxide, potassium permanganate, chlorine and limestone) used for the operation of the WTW.** **Approximately 132m^3 of dangerous goods (sodium hydroxide and chlorine) will be stored on site during a 30 day period during operations.** **The activity is applicable.**
GN R.983 4 December 2014	19 (i)	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) a watercourse but excluding where such infilling, depositing , dredging, excavation, removal or moving (b) is for maintenance purposes undertaken in accordance with a maintenance management plan. **The associated pipeline infrastructure and roads for the wellfield where located within a watercourse will require the removal and infilling of more than 5m^3 of material.** **The activity is applicable.**
GN R.983 4 December 2014	27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan **Vegetation clearance will be required for the WTW (package plant) and associated infrastructure, with a footprint of approximately 2ha.** **The activity is applicable.**
GN R.983 4 December 2014	67	**The proposed wellfield, WTW and associated infrastructure will be undertaken in phases.**
GN R.985 4 December 2014	2 (b)(iii)(dd) and (ff)	The development of reservoirs for bulk water supply with a capacity of more than 250 cubic metres. (b) In Eastern Cape: iii. Outside urban areas, in: (dd) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve.

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant or notice):	Describe each listed activity as per the detailed project description (and not as per wording of the relevant Government Notice):
		A 450m³ reservoir next to the WTW with a small booster pump station (6Mℓ/day) next to the reservoir. **The proposed reservoir is located outside an urban area, in an Aquatic Critical Biodiversity Area (CBA2) and Terrestrial Critical Biodiversity Area (CBA1) of the Eastern Cape Biodiversity Conservation Plan (ECBCP). The proposed reservoir site does not fall within a CBA of the NMBM's Bioregional Plan.** **The site is also located within 10km of the Addo Elephant National Park.** **The activity is applicable.**
GN R.985 4 December 2014	4 (b)(ii)(ee) and (gg)	The development of a road wider than 4 metres with a reserve less than 13,5 metres. (b) In Eastern Cape: ii. Outside urban areas, in: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas. **Access roads will be required for the development, and are expected to follow adjacent to the pipelines. It is anticipated that the access roads would be approximately 5m wide.** **The roads (following adjacent to the pipelines) are located outside an urban area, in an Aquatic Critical Biodiversity Area (CBA2) and Terrestrial Critical Biodiversity Area (CBA1) of the Eastern Cape Biodiversity Conservation Plan (ECBCP). The proposed access roads do not fall within a CBA of the NMBM's Bioregional Plan. The site is also located within 10km of the Addo Elephant National Park.** **The activity is applicable.**
GN R.985 4 December 2014	10 (b)(ii)(ee) and (gg)	The development of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. (b) In Eastern Cape: ii. Outside urban areas, in: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve. **"Dangerous goods" that are likely to be associated with the**

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant or notice):	Describe each listed activity as per the detailed project description (and not as per wording of the relevant Government Notice):
		proposed project, include the following: **Fuel stores for construction purposes; chemicals used for the operation of the WTW (including Chlorine).** **It is unlikely that fuel stores during construction will exceed 30m^3.** **The combined capacity of the storage of dangerous goods during the operational phase would exceed 80m^3.** **The activity is not applicable as Activity 14 in GNR983 is applicable.**
GN R.985 4 December 2014	12 (ii)	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. ii. Within critical biodiversity areas identified in bioregional plans. **Vegetation clearance will be required for the WTW (package plant) and associated infrastructure, with a footprint of approximately 2ha.** **The proposed infrastructure falls within an Aquatic Critical Biodiversity Area (CBA2) and Terrestrial Critical Biodiversity Area (CBA1) of the Eastern Cape Biodiversity Conservation Plan (ECBCP).** **The proposed infrastructure does not fall within a CBA of the NMBM's Bioregional Plan.** **The activity is applicable.**
GN R.985 4 December 2014	14 (a) and (c), (ii)(ff) and (hh)	The development of (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse. (c) In Eastern Cape: ii. Outside urban areas, in: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; **The footprint associated with pipeline infrastructure and roads for the wellfield would exceed 10m^2 where it traverses watercourses and within 32m of watercourses.** **The proposed infrastructure falls within an Aquatic Critical Biodiversity Area (CBA2) and Terrestrial Critical Biodiversity Area (CBA1) of the Eastern Cape Biodiversity Conservation Plan (ECBCP).**

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant or notice):	Describe each listed activity as per the detailed project description (and not as per wording of the relevant Government Notice):
		The proposed infrastructure does not fall within a CBA of the NMBM's Bioregional Plan. **The site is also located within 10km of the Addo Elephant National Park.** **The activity is applicable.**
GN R.985 4 December 2014	26	**The proposed wellfield, WTW and associated infrastructure will be undertaken in phases.**

Table 2: Waste Management Activities

No. & Date of the Relevant Notice:	Activity Numbers (as listed in the Waste Management Activity List):	Description of Listed Activity:
GN R. 921 of 29 November 2013	Category A: 3(1)	The storage of general waste in lagoons. **Removed solid particles (inerts as well as iron oxide and manganese dioxide) from the water treatment process will be stored in lagoons. Once the residue is sufficiently dry it will be emptied and stockpiled in a designated storage area, from where it will be periodically collected for reuse or disposal to landfill.**
GN R. 921 of 29 November 2013	Category A: 3(12)	The construction of a facility for a waste management activity listed in Category A of this Schedule (not in isolation to associated waste management activity). **Construction of the lagoons.**

1.3.2 Water Use Activities in terms of the National Water Act

Activities for the water uses in terms of Section 21 of the National Water Act (Act No 36 of 1998) [NWA] associated with the proposed project, include the following:

Section 21 (a) taking water from a water resource

Section 21 (c) impeding or diverting the flow of water in a watercourse

Section 21 (i) altering the bed, banks, course or characteristics of a watercourse

The application for the taking of water from a water resource (Section 21(a)) was submitted to the Department of Water and Sanitation in 2013, with additional information provided in 2016, by Groundwater Africa on behalf of the NMBM.

Section 21 (c) and (i) activities are applicable as the borehole and potable water pipelines traverse watercourses, and the WTW and associated infrastructure are located within the 500m regulated area of wetlands. Proof of the water use authorisation application for Section 21 (c) and (i) activities will be included in the Final Basic Assessment Report.

The discharge of water will not be directly into the non-perennial watercourse or the Coega River, and will be allowed to flow overland prior to flowing into a water resource. It is thus

considered that the discharging of the supernatant will not trigger an activity in terms of Section 21 (f) of the National Water Act.

Proof of the Water Use Licence Application (WULA) submission will be provided in the Final Basic Assessment Report.

1.4 Need and Desirability

The 2010/2011 drought in the Eastern Cape resulted in groundwater being investigated by the Nelson Mandela Bay Municipality (NMBM) as one of the possible solutions for supplying water to the metro in emergency situations. As part of its Emergency Bulk Water Plan, the NMBM applied for a water use licence to extract 25.9 Ml/day from the Groot Winterhoek – Coega Ridge Table Mountain Group Aquifer, which includes the 3.5 - 6 Mℓ/day already being extracted at Uitenhage Springs. The NMBM appointed Aurecon South Africa (Pty) Ltd (Aurecon) to assist with the development of a well field to extract groundwater on municipal property in the Coega Kop area (Aurecon, 2016).

The purpose of the proposed well field at Coega Kop is to utilize the groundwater available in the Groot Winterhoek – Coega Ridge Table Mountain Group Aquifer. This aquifer is a fractured-rock aquifer which primarily consists of Peninsula Formation of the Table Mountain Group (TMG). The location of the well field near Coega Kop is preferred as the TMG outcrops at Coega Kop. The shallow depth of the TMG makes the fault system easy to target from the surface for extracting groundwater. The location is also on municipal property which simplifies legal matters and avoids expropriation of private land (Aurecon, 2016).

Extensive exploration of the Coega Fault System at Coega Kop has been completed. Six probe boreholes have been identified with sustainable yields. This makes the development of a well field at Coega Kop a feasible option to supply the municipality with water (Aurecon, 2016).

Preliminary water quality tests on the probe boreholes have shown that the groundwater is of generally good quality, however the iron (Fe) and manganese (Mn) concentrations are too high and exceed the SANS 241:2011 limits for potable water. The groundwater must therefore be treated first before distribution (Aurecon, 2016).

The NMBM requires that the well field provides 6 ML per day of potable water by the end of November 2017 to the Coega IDZ, and Colchester and potentially to Motherwell. (Aurecon, 2016a).

The NMBM Integrated Development Plan (June 2016, 15th edition) [IDP] includes the development of the Coega Kop well field. The IDP further states that once the well field is fully developed it has the potential to meet 10% of the NMBM's water demand.

The proposed Coega Kop wellfield and WTW is not located within a Critical Biodiversity Area (CBA) of the NMBM's Bioregional Plan (2014). As a result, the proposed well field is also in line with the NMBM's Spatial Development Framework (2015). The proposed Coega Kop well field and WTW is however located within a CBA 1 and 2 of the Eastern Cape Biodiversity Conservation Plan (2007).

The NMBM's Water Master Plan and Water Conservation Demand Management programme includes the maintenance of existing infrastructure. Both this programme and the development of the Coega Kop Wellfield forms part of the NMBM's Master Plan to provide for the water demands of the NMBM. The Coega Kop Wellfield will therefore play a role in both an emergency capacity as well as in a regular (normal) water supply capacity.

1.5 Public Participation

All registered Interested and Affected Parties and other stakeholders were sent a copy of the Executive Summary and notified of the availability of the Draft Basic Assessment Report.

All I&APs were given a 30 day period to review the Draft Basic Assessment Report and submit comments. Comments received during this period will be incorporated into Final Basic Assessment Report.

Draft Basic Assessment Report Review Period

The Draft Basic Assessment Report available for a 30 day review period to state departments and registered I&APs, from **27 February – 30 March 2017** (excluding public holidays).

A copy of the Draft Basic Assessment Report was available on CEN's website: http://www.environmentcen.co.za

Summary of Main Issues and Responses

Table 2 presents a summary of the main issues raised and response. Please refer to **Appendix E** for the Comments and Response Report that details the full comments and responses provided.

Table 3: Summary of Main Issues and Response

Summary of main issues raised by I&APs	Summary of response from EAP
1. Layout plan of the wellfield	A draft layout plan is provided in the Draft Basic Assessment Report
2. Advertisements for public participation	The pre-application notice was advertised in The Herald and Die Burger on 6 May 2016 requesting Interested and Affected Parties to register and comment on the proposed application. The site notice was placed at the nearest access road to the proposed site, as the property boundary is not visible from any road. The site notice was placed on 10 May 2016.
3. Inadequate maintenance on existing water infrastructure and lack of finances.	The alternative of focusing only on maintenance, i.e. fixing water leaks and degraded infrastructure, would in itself not alleviate the water shortages that are experienced due to recurring and persistent drought conditions. Additional water sources are required to supplement the NMBM's water distribution in order to meet future growth needs. Furthermore, the NMBM's Water Master Plan and Water Conservation Demand Management programme includes the maintenance of existing infrastructure. Both this programme and the development of the Coega Kop Wellfield forms part of the NMBM's Master Plan to provide for the water demands of the NMBM. The Coega Kop Wellfield will therefore play a role in both an emergency capacity as well as in a regular (normal) water supply capacity.
4. Strategic groundwater resource, recharge capacity and impact of over draw of groundwater	The purpose of the proposed well field at Coega Kop is to utilize the groundwater available in the Groot Winterhoek – Coega Ridge Table Mountain Group Aquifer. This aquifer is a fractured-rock aquifer which primarily consists of Peninsula Formation of the Table Mountain Group (TMG). The geological structure of the aquifer is dominated by the Coega Fault System, a collection of semi-parallel faults of varying lengths and offsets, which runs along the entire length of the aquifer. Water from the aquifer gets trapped and travels along fractures in the fault system and is under high pressure in the eastern reach of the fault. The location of the well field near Coega Kop is ideal because the TMG outcrops at Coega Kop. An application for the taking of water from a water resource (Section 21(a)) was submitted to the Department of Water and Sanitation in 2013, with additional information provided in 2016, by Groundwater Africa on behalf of the NMBM. All the probe boreholes were test pumped in 2014 and 2015. By abstracting water at a certain rate and monitoring the level of the water in the boreholes the recharge in the boreholes and the sustainable yield can be determined. The proposed rate of abstracting groundwater would not be "mining" the aquifer. The process of establishing the long term yield and recharge rate is still ongoing. The wellfield will be closely monitored during its operation. The Uitenhage Springs (used for municipal bulk supply) is a natural discharge point for groundwater from the Groot-Winterhoe – Coega Ridge TMG Aquifer. A number of boreholes are located

Summary of main issues raised by I&APs	Summary of response from EAP
	between Coega Kop and Uitenhage, however not all of these boreholes are operational. The hydrocensus conducted by Groundwater Africa (2016) identified existing uses of groundwater to be at approximately 8 litres per second, and indicated that the aquifer was underutilized. The mean annual runoff for the proposed site is given as between 10.25 and 23.99 mm/year. The area within 500m of the proposed activities is therefore not considered a Strategic Water Source Area. The groundwater recharge for the relevant sub-quaternary catchments is given as 59% for the sub-quaternary catchment, which is not regarded as significant. The area is therefore not considered important or sensitive from a groundwater recharge perspective (Nel, 2016).
5. Water use licence requirement	The application for the taking of water from a water resource (Section 21(a)) was submitted to the Department of Water and Sanitation in 2013, with additional information provided in 2016, by Groundwater Africa on behalf of the NMBM. Section 21 (c) and (i) activities are also applicable as the borehole and potable water pipelines traverse watercourses, and the WTW and associated infrastructure are located within the 500m regulated area of wetlands
6. Water quality of the groundwater compared to other sources	Preliminary water quality tests on the probe boreholes have shown that the groundwater is of generally good quality, however the iron (Fe) and manganese (Mn) concentrations are too high and exceed the SANS 241:2011 limits for potable water. The water is therefore not suitable for potable and industrial purposes without treatment. The purpose of the Coega Kop Wellfield is to supply the Coega IDZ and Colchester with groundwater extracted from the Groot Winterhoek to the Coega Ridge Table Mountain Group Aquifer. The groundwater requires a different type of treatment which may be less expensive than conventional treatment.
7. End use water quality	The purpose of the proposed Coega Kop Wellfield is to supply potable water to the Coega Industrial Development Zone (IDZ) and Colchester within the Nelson Mandela Bay Municipality. The development of the Coega Kop Wellfield forms part of the NMBM's Master Plan to provide for the water demands of the NMBM.
8. Water within adjacent Transnet Quarry	It is highly unlikely that the water in the Transnet Quarry is connected to the aquifer. The aquifer is largely artesian with pressures up to 6 bar and the water in the quarry does not show the same pressure. The water in the quarry would not be able to be re-cycled through the water treatment works as the water treatment process revolves around treating elevated concentrations of Iron and Manganese. Treatment of the water in the quarry will need a different treatment process.
9. Sludge lagoon requirements, quality, volumes and odours	The residue from the WTW (mostly inerts, iron oxide and manganese dioxide) will be emptied and stockpiled onsite in the evaporation lagoons until there is adequate volume for removal (either for reuse, for application to land, or for discharge to landfill). The total extent of evaporation lagoons would be approximately 1800m^2. It is expected that over the course of a year, the WTW will produce approximately 100 – 200 tonnes of dry solids for

Summary of main issues raised by I&APs	Summary of response from EAP
	removal. The lagoons will be re-used once the solids have been removed, i.e. in rotation. Limited odours may be expected from the lagoons.
10. Water quality for the discharge pipeline, monitoring and mitigation requirements	Discharging of water will occur during the start-up period to establish the microbial culture. The water treatment process will ensure that most of the iron and manganese is oxidized and removed during the biological filtration process, with nearly all remaining iron and manganese precipitating out in the lagoons before being discharged. Once the WTW is fully operational excess supernatant will be discharged at a point above a non-perennial tributary of the Coega River, at approximately 0.008Ml/day. The supernatant is expected to contain very low concentrations of soluble iron and manganese. The discharge water would be further treated as it flows overland prior to reaching the Coega River. The final quality of the discharged water should not have a negative impact aquatic life in the river. The monitoring of the quality of water discharged from the WTW will form part of the monitoring requirements. As the maximum discharges (1.4 l/s) from WTW is probably well exceeded by flows that occur naturally in the non-perennial watercourse for short periods during heavy rainfall events, it is likely that the increased flows will have a minimum negative impact on the ecological functioning of the lower Coega River.
11. Discharging of waste water requirements	The discharge of water will not be directly into the non-perennial watercourse or the Coega River, and will be allowed to flow overland prior to flowing into a water resource. It is thus considered that the discharging of the supernatant will not trigger an activity in terms of Section 21 (f) of the National Water Act.
12. Maintenance and capacity requirements for borehole leaks	During the test pumping, the large flow and high pressure of borehole GWA 2B caused old, unused boreholes from the Department of Water and Sanitation (DWS) to flood the surrounding area. Borehole GWA 2B was subsequently plugged even deeper, which resulted in substantially decreased flooding, however, some flow from old boreholes still persists and causes unnatural wet areas mainly in low lying areas. Once the well field is operational the high pressure in the aquifer will most likely drop to a more manageable level. Monitoring of the boreholes will form part of the monitoring requirements.
13. Security requirements	Site security will be on site during construction. During the operational phase, security measures include fencing of the WTW and associated infrastructure as well as all borehole equipment will be placed in concrete chambers to prevent vandalism. The chambers will be fitted with thick concrete lids which will require removal by crane to gain access to the head works.

1.6 Environmental Impact Statement

Alternative 1 (Preferred Alternative)

With the exception of the large expanses of Sundays Valley Thicket vegetation to the north and south of the study area – which is densely vegetated, spinescent, solid and impenetrable and, therefore, largely untransformed / intact – the remaining habitat types in the study area have experienced, and continue to experience, some level of transformation and / or degradation due to anthropogenic impacts. This ranges from a high significant negative impact in areas that were cleared in the past i.e. at Coega Kop, along fence line servitudes, and the cleared area towards Motherwell Township, to a low to moderate negative impact in Thicket-mosaic vegetation types fragmented by gravel roads and informal pathways, which continue to experience grazing in some places i.e. Motherwell Karroid Thicket, and Grass Ridge Bontveld vegetation. The construction phase would have the greatest impact on the terrestrial biodiversity, due to the clearance of vegetation and related construction activities. The operational phase of the project would have a limited impact on vegetation. Maintenance procedures would include cutting vegetation regrowth, e.g. to keep the discharge outlet clean and to provide access to pipelines. The potential of alien plants spreading is likely if not managed during the site establishment, construction and operational phases. The objective of rehabilitation is to re-establish a native vegetation cover, which is similar in species composition to that which existed before the disturbance, excluding alien and invasive plant species. With the mitigation measures in place, the impact on the terrestrial biodiversity would remain localised resulting in a low negative impact.

The area around Coega Kop is extremely wet and water accumulates in all low-lying areas mainly due to old leaking boreholes. Ten wetlands were identified and delineated that fall within the 500 m radius from proposed infrastructure, some of which are most likely the result of additional (artificial) water sources such as the leaking boreholes. Two non-perennial watercourses (drainage lines) have also been identified in close proximity, but only one natural drainage line and associated riparian zone occurs within 100 m of the proposed pipeline alignment. Of these aquatic systems, two (2) artificial wetlands (namely Wetlands 4 and 5) and one (1) artificial non-perennial watercourse (namely Drainage 1) will be directly impacted upon. Wetlands 4 and 5 were provided with a Low / Marginal Ecological Importance and Sensitivity (EIS) and the Recommended Ecological Category of Class D. No buffer areas are provided for these two wetlands due to being artificial and not ecologically important or sensitive at any scale. Drainage 1 was provided with a Class D Present Ecological State (PES) and a Low / Marginal EIS. It is recommended that a buffer of 50m be maintained around each natural wetland identified (Wetlands 1, 3, 6, 8 & 9) as well as Wetland 10 and a buffer of 32m be implemented around the riparian zone of Drainage 2 (the natural drainage line). Buffers should be treated as no-go areas during the construction phase of the proposed development. During the operational phase, these areas should be kept natural as far as possible and invasive alien species in the buffers should be eradicated on an ongoing basis, if possible. Considering the proposed WTW position and the pipeline alignments, the potential impacts to wetland hydrology of natural wetlands and riparian zones due to permanent structures should be minimal. Man-induced impacts have resulted in a moderate change to the PES of the Study Reach in the lower Coega River

(PES = C). Although the natural habitats and biota have been moderately modified, the basic ecosystem functioning of the affected reach in the Coega River, is still predominantly unchanged. This river reach is considered a critical biodiversity corridor and supports valuable biodiversity, including two indigenous fish species of special conservation concern. Both the Ecological Importance (EI) and the Ecological Sensitivity (ES) of the affected river reach are considered to be high. The raw borehole water appears to pose a moderate to high pollution threat if discharged directly into the Coega River due to the elevated iron and manganese concentrations. However, if this water is (at least) partially treated at the WTW and is further purified as it flows through the wetland prior to reaching the Coega River, the final quality of the discharged water should not have a negative impact on the aquatic life in the river. As the maximum discharges (1.4 l/s) from WTW is probably well exceeded by flows that occur naturally in the watercourse for short periods during heavy rainfall events, it is likely that the increased flows will have minimum negative impact on the ecological functioning of the lower Coega River. All potential aquatic biodiversity impacts identified can be adequately mitigated to a low negative significance by implementing the recommended mitigation measures.

The purpose of the proposed well field at Coega Kop is to utilize the groundwater available in the Groot Winterhoek – Coega Ridge Table Mountain Group Aquifer. The NMBM's Water Master Plan and Water Conservation Demand Management Programme includes the development of the Coega Kop Wellfield to provide for the water demands of the NMBM. The Coega Kop Wellfield will therefore play a role in both an emergency capacity (e.g. droughts) as well as in a regular (normal) water supply capacity. No impact is anticipated during the construction phase, as this impact relates mainly to the operational phase. During the operational phase the supply of potable water may be disrupted due to water leaks on the various pipelines, which would lead to a loss of water and revenue for the NMBM. The impact surrounding the provision of water is considered to be low positive, with appropriate mitigation measures being implemented, during the operational phase.

General safety of persons is a concern due to construction activities, e.g. open excavations and machinery, resulting in potential injury to construction staff; health and safety aspects relate to the potential spread of HIV and STDs. Security aspects relate to potential theft of construction materials and theft within neighbouring properties. The presence of workers on the site for construction related activities, irrespective of whether or not they are local, may create an increased safety and security risk to local households in the area. In addition, any changes in the local crime rates are likely to be attributed to the influx of construction workers, whether such changes can be attributed to their presence or not. The contractor would have security on-site during the construction phase. Veld fires are a potential risk considering the vegetation types occurring within and adjacent to the site. During construction the risk may be attributed to inappropriate construction activities (e.g. hot work, welding) on dry, windy days. The impact can be mitigated to a very low negative impact significance.

Safety and security impacts during the operational phase relate to the maintenance of the pipelines as well as any emergency work that may need to be undertaken. Theft of equipment or materials from the borehole sites and WTW. An additional impact is the use and storage of chlorine gas in the WTW. The WTW staff would be at a greater risk to any accidental release of chlorine gas compared to the surrounding community (located

approximately 350m from the WTW). Risk mitigation measures and the OHS requirements for the storage and management of chlorine gas will need to be strictly followed. The impact can be mitigated to a very low negative impact significance.

Limited opportunities for skilled workers, semi-skilled workers and unskilled labourers could be created during the construction phase of the project (approximately 29 positions). During the operational phase, limited skilled employment will be created for the operation of the WTW (approximately four (4) positions). An adverse effect on this impact may occur in that high expectations are formed regarding construction employment opportunities and that these expectations cannot be sustained. The impact can be mitigated to a low positive impact.

According to the SAHRIS paleontological map (2017), a portion of the site falls within a high sensitive paleontological area. Paleontological sites have been noted in areas to the north and east of the Coega Kop Wellfield site. The closest site is approximately 2km to the north. There are no known graves or historical buildings older than 60 years on the site. The site for the proposed Coega Kop Wellfield development is of low cultural significance and no archaeological sites/materials were observed during the investigation. Although it would seem unlikely that any significant archaeological sites/materials will be exposed during the development, there is always a possibility that human remains and/or other archaeological and historical material may be uncovered during the development. With the mitigation measures in place, the impact during the construction phase would result in a very low impact. There would be no impacts during the operational phase, as any impacts would occur in the construction phase.

Dust and air pollution impacts relate to the generation of dust during construction related activities, poorly maintained construction vehicles and burning materials for warmth during winter by contraction staff. The impact can be mitigated to a low negative impact significance. No dust is anticipated during the operational phase. Limited odours may be experienced during the operational phase from the evaporation lagoons, however this would be limited to the immediate area surrounding the WTW. The impact remains at a very low negative significance.

Impacts relating to ineffective waste management procedures may lead to the dumping of building rubble, littering and pollution of the surrounding areas as well as unsanitary (toilet) conditions. Construction waste will increase the amount of waste disposed to landfill, including cleared vegetation. Excavated material that will not be used in the construction works, should be used as fill material before the option of disposing the material to landfill is undertaken. During operation, waste impacts relate to the residue from the WTW being stored incorrectly in the evaporation lagoons, potential contamination and an increase in the amount of waste disposed to landfill. The solid waste (residue) from the WTW (non-hazardous silt / sedimentation) will be emptied and stockpiled onsite in the evaporation lagoons until there is adequate volume for removal (either for reuse, for application to land, or for discharge to landfill).

Potential traffic impacts relate primarily to the anticipated increase in vehicle usage of municipal roads and to the possible deterioration of the pavement conditions of these roads, by heavy vehicles. This includes material delivery vehicles and vehicles that will travel daily to and from the site. During the construction phase a higher number of vehicles are

anticipated to use the surrounding road network. The impact can be mitigated to a low negative impact significance. During the operational phase a limited number of operational vehicles are anticipated to use the surrounding road. The impact remains at a very low negative significance.

Noise creation from construction workers and vehicles may impact on surrounding landowners during the construction phase. This includes noise emanating from construction machinery, power tools and compressors, construction vehicles and general construction activity. The impact can be mitigated to a low negative impact significance. Limited noise is anticipated from the WTW during the operational phase, however this would be limited to the immediate area surrounding the WTW. The impact remains at a very low negative significance.

The negative impacts identified can be mitigated to a low – very low negative significance if all mitigation measures identified and included in the Environmental Management Programme (EMPr) attached in **Appendix F** are implemented.

No-Go Alternative:

No protected or endangered species will be physically removed, however a risk remains that these species will be lost to animals as a food source. The risk remains that the current alien vegetation may spread into surrounding areas, if not controlled.

Some sedimentation of wetlands and watercourses are probably already occurring due to the ongoing mining-related activities on Coega Kop as well as the many gravel roads within wetland and watercourse catchments. It is likely that these activities would continue, thus no change in status.

The No-Go Alternative entails that the proposed Coega Kop Wellfield is not developed and the existing situation remains the same. The risk of limited potable water remains where water scarcity is experienced. The impact remains at a moderate negative significance.

Employment opportunities will not be created. The impact remains at a low negative significance.

Table 4: Summary of Impacts

	ALTERNATIVE 1		**NO-GO**
Phase	**Construction Phase**	**Operational Phase**	
IMPACT	**TERRESTRIAL BIODIVERSITY**		
Nature	Loss of vegetation and spread of alien invasive species	Spread of alien invasive species	Loss of vegetation due to spreading of alien species
Level of significance **without** mitigation	Moderate (-)	Low (-)	Low (-)
Level of significance **with** mitigation	**Low** (-)	**Low** (-)	**Low** (-)
IMPACT	**AQUATIC BIODIVERSITY**		
Nature	Degradation of water quality in wetlands and watercourses	Pollution of Coega River	No change in status

	ALTERNATIVE 1		NO-GO
Phase	**Construction Phase**	**Operational Phase**	
Level of significance **without** mitigation	Low (-)	Moderate (-)	
Level of significance **with** mitigation	**Low** (-)	**Low** (-)	
IMPACT	**AQUATIC BIODIVERSITY**		
Nature	Erosion and elevated sedimentation	Erosion and elevated sedimentation	No change in status
Level of significance **without** mitigation	Moderate (-)	Moderate (-)	
Level of significance **with** mitigation	**Low** (-)	**Low** (-)	
IMPACT	**AQUATIC BIODIVERSITY**		
Nature	No impact	Increased base flows in Coega River	No change in status
Level of significance **without** mitigation		Low (-)	
Level of significance **with** mitigation		**Low** (-)	
IMPACT	**AQUATIC BIODIVERSITY**		
Nature	Potential destruction of wetland and riparian habitat	Potential destruction of wetland and riparian habitat	No change in status
Level of significance **without** mitigation	Moderate (-)	Low (-)	
Level of significance **with** mitigation	**Low (-)**	**Low** (-)	
IMPACT	**AQUATIC BIODIVERSITY**		
Nature	Change in hydrology	Change in hydrology	No change in status
Level of significance **without** mitigation	Low (-)	Low (-)	
Level of significance **with** mitigation	**Low (-)**	**Low** (-)	
IMPACT	**PROVISION OF WATER RESOURCES**		
Nature	No impact	Potential loss of water due to leaks or pipe bursts	No additional water resource for potable water distribution
Level of significance **without** mitigation		Low (-)	Moderate (-)
Level of significance **with** mitigation		**Low (+)**	**Moderate** (-)
IMPACT	**SOCIAL**		
Nature	Health, Safety and Security	Safety and Security	No change in status
Level of significance **without** mitigation	Low (-)	Low (-)	
Level of significance **with** mitigation	**Very Low** (-)	**Very Low** (-)	

	ALTERNATIVE 1		NO-GO
Phase	**Construction Phase**	**Operational Phase**	
IMPACT	**SOCIAL**		
Nature	Employment Opportunities	Employment Opportunities	Employment Opportunities
Level of significance **without** mitigation	Low (positive +)	Low (positive +)	Low (-)
Level of significance **with** mitigation	**Low** (+)	**Low** (+)	**Low** (-)
IMPACT	**HERITAGE RESOURCES**		
Nature	Loss of heritage resources	No impact	No change in status
Level of significance **without** mitigation	Moderate (-)		
Level of significance **with** mitigation	**Low** (-)		
IMPACT	**AIR QUALITY**		
Nature	Dust and air pollution	Dust and air pollution	No change in status
Level of significance **without** mitigation	Moderate (-)	Very Low (-)	
Level of significance **with** mitigation	**Low** (-)	**Very Low** (-)	
IMPACT	**WASTE MANAGEMENT**		
Nature	Waste management	Waste management	No change in status
Level of significance **without** mitigation	Moderate (-)	Low (-)	
Level of significance **with** mitigation	**Low** (-)	**Very Low (-)**	
IMPACT	**TRAFFIC**		
Nature	Traffic management	Traffic management	No change in status
Level of significance **without** mitigation	Low (-)	Very Low (-)	
Level of significance **with** mitigation	**Low** (-)	**Very Low** (-)	
IMPACT	**NOISE**		
Nature	Noise	Noise	No change in status
Level of significance **without** mitigation	Moderate (-)	Very Low (-)	
Level of significance **with** mitigation	**Low** (-)	**Very Low (-)**	

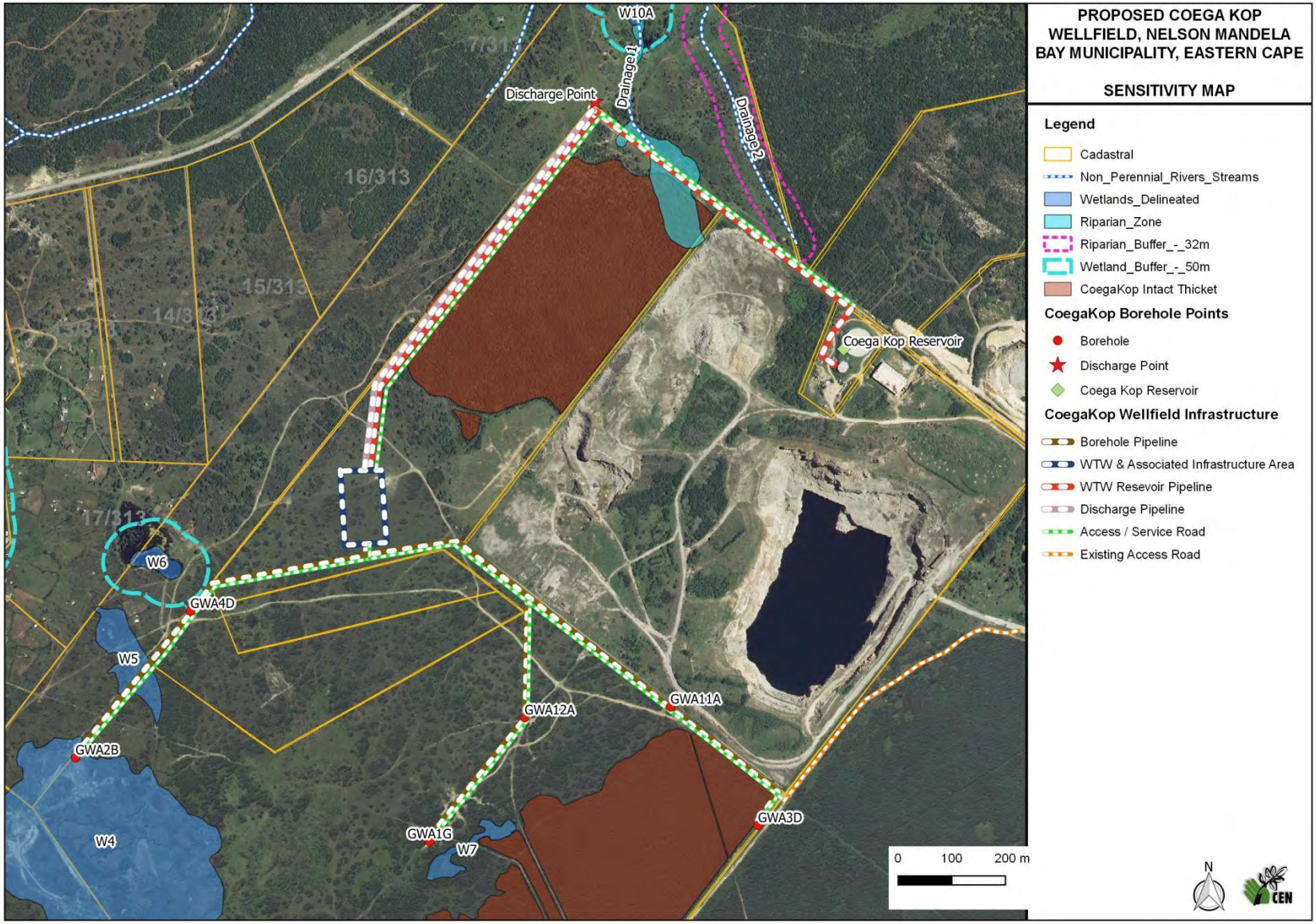

Figure 3: Sensitivity Map

1.7 Recommendations

CEN IEM Unit recommends that the application be authorised by the DEDEAT, with the following conditions:

1) All mitigation measures in the Basic Assessment Report and Environmental Management Programme (EMPr, Appendix F) are implemented.
2) A Contractor's Environmental Officer is appointed by the Contractor and an independent ECO is appointed by the developer to monitor compliance with the EMPr during construction.
3) Alien plant regrowth is to be monitored and managed during the construction phase by the Contractor and operational phase by the developer.
4) Permits must be obtained from the DEDEAT prior to the removal of protected plants and Species of Special Concern (SSCs), and from the DAFF for the removal of protected trees.
5) Clearing of vegetation to be limited to areas for construction works only, i.e. 20m construction width for the pipelines and access / service road, except where these are located adjacent to intact thicket areas then the construction width should be reduced to 10m.
6) Areas with Sundays Valley Thicket should be planted up with Spekboom (Portulacaria afra) truncheons as part of rehabilitation efforts in areas that do not form part of the maintenance servitude area.
7) Watercourse and wetland crossings to be restricted to a 10m construction width. Pipelines in wetlands and watercourses are to be buried. Once backfilled the ground level must be the same as natural levels. The topsoil must be placed back last and only lightly compacted.
8) During the operational phase, the rate and level of water in the boreholes are to be monitored, as well as monitoring of the quality of water discharged from the WTW.
9) Pipelines (groundwater and potable water) to be monitored for any leaks. Water leaks or pipe bursts to be fixed immediately.
10) The quality of the WTW residue is to be tested in order to determine viability of using the residue on agricultural land or to determine other uses prior to being considered for disposal to landfill.

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BASIC ASSESSMENT REPORT

(For official use only)

File Reference Number:	
Application Number:	**ECm1/C/LN1&3/M/01-2017**
Date Received:	

Basic assessment report in terms of the Environmental Impact Assessment Regulations, 2014, promulgated in terms of the National Environmental Management Act, 1998(Act No. 107 of 1998), as amended.

Kindly note that:

1. This **basic assessment report** is a standard report that may be required by a competent authority in terms of the EIA Regulations, 2014 and is meant to streamline applications. Please make sure that it is the report used by the particular competent authority for the activity that is being applied for.
2. The report must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. The report is in the form of a table that can extend itself as each space is filled with typing.
3. Where applicable **tick** the boxes that are applicable or **black out** the boxes that are not applicable in the report.
4. An incomplete report may be returned to the applicant for revision.
5. The use of "not applicable" in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the rejection of the application as provided for in the regulations.
6. This report must be handed in at offices of the relevant competent authority as determined by each authority.
7. No faxed or e-mailed reports will be accepted.
8. The report must be compiled by an independent environmental assessment practitioner (EAP).
9. Unless protected by law, all information in the report will become public information on receipt by the competent authority. Any interested and affected party should be provided with the information contained in this report on request, during any stage of the application process.
10. A competent authority may require that for specified types of activities in defined situations only parts of this report need to be completed.

SECTION A: ACTIVITY INFORMATION

Has a specialist been consulted to assist with the completion of this section?	YES	**NO**

If YES, please complete form XX for each specialist thus appointed:

Any specialist reports must be contained in Appendix D.

1. ACTIVITY DESCRIPTION

Describe the activity, which is being applied for, in detail

1.1 Introduction

The proposed Coega Kop Wellfield entails developing a borehole wellfield, associated pipelines and a Water Treatment Works (WTW) in order to supply potable water to the Coega Industrial Development Zone (IDZ) and Colchester within the Nelson Mandela Bay Municipality.

The proposed Coega Kop Wellfield, WTW and associated borehole pipelines will be located on Erf 1 of Wells Estate in Ward 53, Port Elizabeth, Nelson Mandela Bay Municipality, Eastern Cape Province. The bulk water pipeline from the WTW to the Coega Kop Reservoir is located on Erf 1 Wells Estate (SG Code: C07600120000000100000) and Erf 228 of Coega (SG Code: C07600230000022800000). The proposed Coega Kop Wellfield will be situated on municipal property next to Coega Kop, in close proximity to the Coega Kop Mine in the Coega area. The proposed WTW will be located at 33°46'24.98"S and 25°36'25.89"E (central point).

The purpose of the Coega Kop Wellfield is to supply the Coega IDZ and Colchester with groundwater extracted from the Groot Winterhoek to the Coega Ridge Table Mountain Group Aquifer. Due to the high iron and manganese levels in the groundwater, the water would need to be treated before being distributed as potable water.

1.2. Description

The proposed Coega Kop Wellfield will be developed in phases. The layout of the Coega Kop Wellfield is presented in **Appendix A**. Phase 1 will consist of (this EIA Application):

a) A temporary WTW (package plant) with a capacity of 6Ml/day.

b) Sludge from the WTW will be stored in evaporation lagoons on site, where the sludge will dry out. The disposal of the dried sludge will be off site.

c) A 450m^3 reservoir next to the WTW with a small booster pump station (6Mℓ/day) next to the reservoir.

d) The footprint of the temporary WTW, reservoir and booster pump station will be located in area of approximately 2ha.

e) Six production boreholes with head works and pump chambers.

f) Pipelines from the boreholes to the WTW, with pipe diameters between 315mm to 450mm. The total combined length of the borehole pipelines for the wellfield is estimated at 2630m.

g) A pipeline (450mm diameter) between the WTW and the Coega Kop Reservoir, over a distance of approximately 1500m.

h) A discharge pipeline (approximately 850m in length) from the WTW to a non-perennial watercourse / tributary of the Coega River.

Phase 2 will consist of:

a) A permanent WTW with a capacity of 20Ml/day, a footprint size of approximately 0.8ha (to be located within the temporary WTW footprint area).

b) A blending pipeline from the WTW to the Nooitgedacht Low Level Scheme pipeline (in order to supply additional potable water to the Nooitgedacht Low Level Scheme).

The purpose of the proposed well field at Coega Kop is to utilize the groundwater available in the Groot Winterhoek – Coega Ridge Table Mountain Group Aquifer. This aquifer is a fractured-rock aquifer which primarily consists of Peninsula Formation of the Table Mountain Group (TMG). The geological structure of the aquifer is dominated by the Coega Fault System, a collection of semi-parallel faults of varying lengths and offsets, which runs along the entire length of the aquifer. Water from the aquifer gets trapped and travels along fractures in the fault system and is under high pressure in the eastern reach of the fault. The location of the well field near Coega Kop is ideal because the TMG outcrops at Coega Kop.

Exploration of the Coega Fault System at Coega Kop has been completed. Test pumping of all the probe holes identified six probe holes with good sustainable yields. The estimated yield of the aquifer is 40 Ml/day. With the varying extraction at Uitenhage Springs being taken into account, the maximum yield targeted at the Coega Kop Wellfield was set at 17.3 Ml/day. A minimum yield of 6.9 Ml/day would still make the well field an economically viable venture, therefore 6.9 Ml/day was set as the low yield target. This makes the development of a well field at Coega Kop a feasible option to supply the municipality with water.

The production boreholes will be fitted with head works consisting of a configuration of valves, a flowmeter and a submersible pump. All equipment will be placed in concrete chambers to prevent vandalism. The chambers will be fitted with thick concrete lids which will require removal by crane to gain access to the head works.

Preliminary water quality tests on the probe boreholes indicate that the groundwater consists of high concentrations of iron (Fe) and manganese (Mn) and that these exceed the SANS 241:2011 limits for potable water. Low concentrations of iron and manganese cause a metallic taste in the water and also discolour the water brown/black. This causes staining of household appliances and interferes with industrial wet processes. Iron and manganese in water will also promote the growth of crenoform organisms in a distribution network. These filamentous organisms utilise both iron and manganese in their metabolism, and will deposit within pipelines to form heavy, gelatinous, stringy masses that slough off periodically. The growth of these organisms will impair the hydraulic capacity of the distribution network. Higher concentrations of iron (>1mg/ℓ) and manganese (>0.4mg/ℓ) in drinking water can cause negative health effects. As a result the groundwater requires treatment prior to distribution.

Groundwater will be pumped from the boreholes to the Feed Storage Tank at the WTW. From there, it is pumped through the biofiltration process, where microbes oxidise soluble iron and manganese to form insoluble precipitates which are removed through media (sand) filtration. The filtered water is stored in the

Clear Well tank, from where it is pumped by the high-lift pumps through the disinfection and stabilisation units and onto the Coega Kop Reservoir. The biofiltration process relies on careful control of pH conditions, which is afforded by the dosing of sodium hydroxide. Sodium hydroxide is pumped from the Sodium Hydroxide storage tank to the inlet of each of the filters. The WTW will be continuously operated throughout the year, i.e. 24 hours a day, 365 days. The storage of chemicals onsite is based on a 30 day period, and would include: sodium hydroxide, potassium permanganate, chlorine and limestone.

The treatment process relies on dosing of different chemicals for the purposes of:

a) Maintaining favourable conditions for the biological processes to be effective.
b) Disinfecting the product water against pathogens.
c) Stabilising the product water to reduce corrosive attack on downstream infrastructure.
d) Oxidising the iron and manganese in the event that biological treatment proves ineffective.

When the filtering capacity of the filters is reached, these will be backwashed using compressed air and water from the Clear Well tank. During the backwash process, filtered solids are removed from the media and pumped as a slurry to the spent backwash water tank. The spent backwash tank provides adequate retention time to allow suspended solids to settle. Most of the clear supernatant is recovered and pumped back to the head of the treatment works to supplement the supply of water. Excess supernatant will be discharged overland to ultimately flow into a non-perennial tributary of the Coega River, approximately 0.008Ml/day. Once the spent backwash tanks are full, they will be drained and the residue (mostly iron oxide and manganese dioxide) will be emptied and stockpiled onsite in the evaporation lagoons until there is adequate volume for removal (either for reuse, for application to land, or for discharge to landfill). The total extent of evaporation lagoons would be approximately 1800m^2. It is expected that over the course of a year, the plant will produce approximately 100 – 200 tonnes of dry solids for removal.

The main access to the Coega Kop Wellfield will be from the existing gravel access road which branches off from the paved access road to the Coega Kop quarry. This access is provided from the R102. Existing gravel access roads will be used, to a width of 5m. Where new access roads are required, these will be gravel and 5m in width, and will follow adjacent to the pipelines.

1.3 Construction Phase

The construction of the temporary WTW and associated infrastructure is estimated at 6 months. The construction of the production boreholes and associated infrastructure will be in a phased manner, and would be undertaken over a period of time. A construction width of 20m will be required for the pipeline infrastructure, and 5m access roads will be located adjacent to the pipelines.

It is anticipated that construction methods will be a conventional method of trench digging and clearing would be undertaken with an excavator.

1.4 Operational Phase

It is anticipated that the operational phase of the temporary WTW will begin in November 2017. The 5m access roads used during construction will be used during the operational phase for undertaking operational activities.

During commissioning and ramp-up, the flow through the WTW is gradually increased to allow the

establishing of the iron and manganese oxidising bacterial cultures within the filter media. The commissioning process will begin with closed-loop circulation of water through the plant, until the quality of effluent is observed to be suitable for delivery to the Coega Kop reservoir. During this time, there is no overflow discharge from the WTW. Slowly the WTW will receive more groundwater and ramp up production to approximately 50% of the capacity throughput (3ML/d). During this time, discharge of supernatant from spent backwash concentration ranks to the non-perennial tributary of the Coega River will be approximately 4m³/d, but may contain higher concentrations of soluble iron and manganese as the biological treatment process becomes established. This period may last as long as three months depending on the presence of the bacteria in the groundwater, and their effective growth rate (temperature dependent).

1.5 EIA Process and Listed EIA & Waste Management Activities

An application for an integrated Environmental Authorisation and Waste Management Licence was submitted to the Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) on 10 January 2017, in terms of the Environmental Impact Assessment (EIA) Regulations, 2014. The integrated application reference number is ECm1/C/LN1&3/M/01-2017.

In terms of the EIA Regulations, 2014, made under Section 24(5) of NEMA, the following listed activities (**Table 1**) within Government Notice R. 983, and R 985 (of 4 December 2014) are triggered by the proposed development, thereby requiring environmental authorisation from the DEDEAT.

Relevant waste management activities listed in Category A of Government Notice (GN) 921 of 29 November 2013, published in terms of Section 19(1) of the NEM:WA are listed in **Table 2**.

Table 1: EIA Listed Activities

Indicate the number and date of the relevant notice:	**Activity No (s) (in terms of the relevant or notice) :**	**Describe each listed activity as per the detailed project description (and not as per wording of the relevant Government Notice):**
GN R.983 4 December 2014	9 (i)	The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water— (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; **Pipelines from the boreholes to the WTW, with pipe diameters between 315mm to 450mm. The total length of pipelines for the wellfield is estimated at 2630m.** **A pipeline (450mm diameter) between the WTW and the Coega Kop Reservoir, over a distance of approximately 1500m.** **The activity is applicable.**
GN R.983 4 December 2014	12 (xii)	The development of (xii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development

		occurs (a) within a watercourse and (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding— (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies. **The footprint associated with pipeline infrastructure and roads for the wellfield would exceed 100m^2 where it traverses watercourses and within 32m of watercourses.** **The activity is applicable, however the exclusion applies as Activity 14 in Listing Notice 3 of 2014 (GNR 985) is applicable.**
GN R.983 4 December 2014	14	The development of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres. **"Dangerous goods" that are likely to be associated with the proposed project, include the following:** **Fuel stores for construction purposes;** **Chemicals (sodium hydroxide, potassium permanganate, chlorine and limestone) used for the operation of the WTW.** **Approximately 132m^3 of dangerous goods (sodium hydroxide and chlorine) will be stored on site during a 30 day period during operations.** **The activity is applicable.**
GN R.983 4 December 2014	19 (i)	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) a watercourse but excluding where such infilling, depositing , dredging, excavation, removal or moving (b) is for maintenance purposes undertaken in accordance with a maintenance management plan. **The associated pipeline infrastructure and roads for the wellfield where located within a watercourse will require the removal and infilling of more than 5m^3 of material.** **The activity is applicable.**
GN R.983 4 December 2014	27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—

		(i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan **Vegetation clearance will be required for the WTW (package plant) and associated infrastructure, with a footprint of approximately 2ha.** **The activity is applicable.**
GN R.983 4 December 2014	67	**The proposed wellfield, WTW and associated infrastructure will be undertaken in phases.**
GN R.985 4 December 2014	2 (b)(iii)(dd) and (ff)	The development of reservoirs for bulk water supply with a capacity of more than 250 cubic metres. (b) In Eastern Cape: iii. Outside urban areas, in: (dd) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve. **A 450m³ reservoir next to the WTW with a small booster pump station (6Mℓ/day) next to the reservoir.** **The proposed reservoir is located outside an urban area, in an Aquatic Critical Biodiversity Area (CBA2) and Terrestrial Critical Biodiversity Area (CBA1) of the Eastern Cape Biodiversity Conservation Plan (ECBCP). The proposed reservoir site does not fall within a CBA of the NMBM's Bioregional Plan.** **The site is also located within 10km of the Addo Elephant National Park.** **The activity is applicable.**
GN R.985 4 December 2014	4 (b)(ii)(ee) and (gg)	The development of a road wider than 4 metres with a reserve less than 13,5 metres. (b) In Eastern Cape: ii. Outside urban areas, in: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in

		bioregional plans; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas. **Access roads will be required for the development, and are expected to follow adjacent to the pipelines. It is anticipated that the access roads would be approximately 5m wide.** **The roads (following adjacent to the pipelines) are located outside an urban area, in an Aquatic Critical Biodiversity Area (CBA2) and Terrestrial Critical Biodiversity Area (CBA1) of the Eastern Cape Biodiversity Conservation Plan (ECBCP). The proposed access roads do not fall within a CBA of the NMBM's Bioregional Plan. The site is also located within 10km of the Addo Elephant National Park.** **The activity is applicable.**
GN R.985 4 December 2014	10 (b)(ii)(ee) and (gg)	The development of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. (b) In Eastern Cape: ii. Outside urban areas, in: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve. **"Dangerous goods" that are likely to be associated with the proposed project, include the following:** **Fuel stores for construction purposes; chemicals used for the operation of the WTW (including Chlorine).** **It is unlikely that fuel stores during construction will exceed 30m^3.** **The combined capacity of the storage of dangerous goods during the operational phase would exceed 80m^3.** **The activity is not applicable as Activity 14 in GNR983 is applicable.**

GN R.985 4 December 2014	12 (ii)	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. ii. Within critical biodiversity areas identified in bioregional plans. **Vegetation clearance will be required for the WTW (package plant) and associated infrastructure, with a footprint of approximately 2ha.** **The proposed infrastructure falls within an Aquatic Critical Biodiversity Area (CBA2) and Terrestrial Critical Biodiversity Area (CBA1) of the Eastern Cape Biodiversity Conservation Plan (ECBCP).** **The proposed infrastructure does not fall within a CBA of the NMBM's Bioregional Plan.** **The activity is applicable.**
GN R.985 4 December 2014	14 (a) and (c), (ii)(ff) and (hh)	The development of (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse. (c) In Eastern Cape: ii. Outside urban areas, in: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; **The footprint associated with pipeline infrastructure and roads for the wellfield would exceed 10m^2 where it traverses watercourses and within 32m of watercourses.** **The proposed infrastructure falls within an Aquatic Critical Biodiversity Area (CBA2) and Terrestrial Critical Biodiversity Area (CBA1) of the Eastern Cape Biodiversity Conservation Plan (ECBCP).** **The proposed infrastructure does not fall within a CBA of the**

		NMBM's Bioregional Plan. **The site is also located within 10km of the Addo Elephant National Park.** **The activity is applicable.**
GN R.985 4 December 2014	26	**The proposed wellfield, WTW and associated infrastructure will be undertaken in phases.**

Table 2: Waste Management Activities

No. & Date of the Relevant Notice:	**Activity Numbers (as listed in the Waste Management Activity List) :**	**Description of Listed Activity:**
GN R. 921 of 29 November 2013	Category A: 3(1)	The storage of general waste in lagoons. **Removed solid particles (inerts as well as iron oxide and manganese dioxide) from the water treatment process will be stored in lagoons. Once the residue is sufficiently dry it will be emptied and stockpiled in a designated storage area, from where it will be periodically collected for reuse or disposal to landfill.**
GN R. 921 of 29 November 2013	Category A: 3(12)	The construction of a facility for a waste management activity listed in Category A of this Schedule (not in isolation to associated waste management activity). **Construction of the lagoons.**

1.6 Water Use Activities in terms of the National Water Act

Activities for the water uses in terms of Section 21 of the National Water Act (Act No 36 of 1998) [NWA] associated with the proposed project, include the following:

Section 21 (a) taking water from a water resource

Section 21 (c) impeding or diverting the flow of water in a watercourse

Section 21 (i) altering the bed, banks, course or characteristics of a watercourse

The application for the taking of water from a water resource (Section 21(a)) was submitted to the Department of Water and Sanitation in 2013, with additional information provided in 2016, by Groundwater Africa on behalf of the NMBM.

Section 21 (c) and (i) activities are applicable as the borehole and potable water pipelines traverse watercourses, and the WTW and associated infrastructure are located within the 500m regulated area of

wetlands. Proof of the water use authorisation application for Section 21 (c) and (i) activities will be included in the Final Basic Assessment Report.

The discharge of water will not be directly into the non-perennial watercourse or the Coega River, and will be allowed to flow overland prior to flowing into a water resource. It is thus considered that the discharging of the supernatant will not trigger an activity in terms of Section 21 (f) of the National Water Act.

2. FEASIBLE AND REASONABLE ALTERNATIVES

"alternatives", in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to—

(a) the property on which or location where it is proposed to undertake the activity;
(b) the type of activity to be undertaken;
(c) the design or layout of the activity;
(d) the technology to be used in the activity;
(e) the operational aspects of the activity; and
(f) the option of not implementing the activity.

Describe alternatives that are considered in this application. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity could be accomplished in the specific instance taking account of the interest of the applicant in the activity. The no-go alternative must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed. The determination of whether site or activity (including different processes etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its environment. After receipt of this report the competent authority may also request the applicant to assess additional alternatives that could possibly accomplish the purpose and need of the proposed activity if it is clear that realistic alternatives have not been considered to a reasonable extent.

a) Property or Location (Site) Alternatives

The proposed activities are property and location specific with no feasible alternatives.

b) Activity Alternatives

There are no feasible alternatives for the type of activity being considered.

c) Design or Layout Alternatives

Alternative 1 (Preferred Alternative)

Alternative 1 is presented in Section A1.2, and the layout is presented in **Figure 1** and **Appendix A**.

This alternative is based on the initial layout and involves changes in the area for the WTW and the position of the pipeline routes.

Advantages:

The location of the WTW and associated infrastructure (e.g. lagoons) is situated in an area with a flatter

topography and would require less hard rock excavations.

The borehole pipelines to the WTW traverse a shorter distance (approximately 2630m in combined length).

The potable pipeline route from the WTW to the Coega Kop Reservoir would require less hard rock excavations.

The pipeline from borehole GWA3D to borehole GWA11A follows adjacent to the existing tracks (for approximately 365m), and would not bisect the thicket.

A discharge pipeline (approximately 850m in length) will be located adjacent to the potable water pipeline from the WTW to the position where the potable water pipeline turns in an easterly direction towards the Coega Kop Reservoir. At this turning point a discharge outlet would be installed for the excess supernatant to flow overland into a non-perennial watercourse / tributary of the Coega River.

Disadvantages: The potable pipeline route from the WTW to the Coega Kop Reservoir is longer (approximately 1500m) and traverses a larger area of the riparian habitat of the non-perennial watercourse.

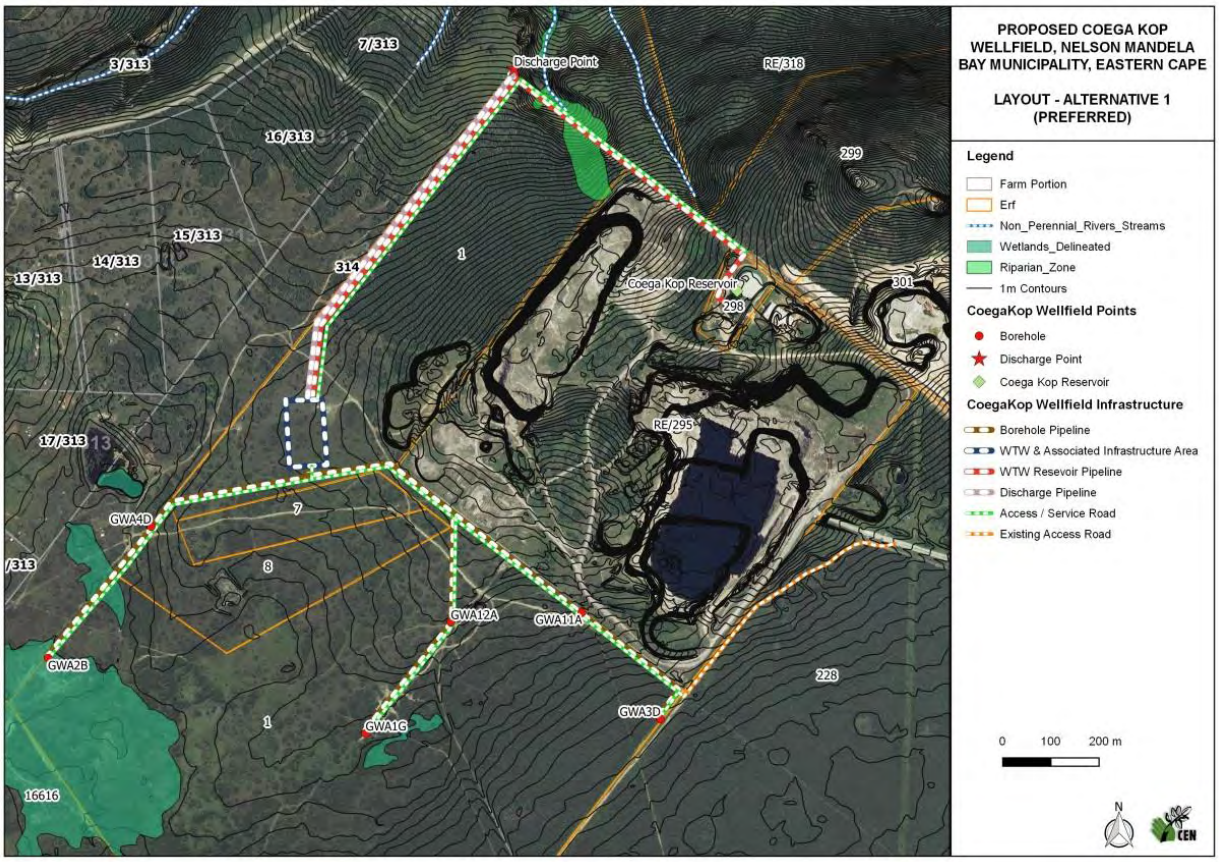

Figure 1: Layout Alternative 1

Alternative 2

Alternative 2 is the initial layout and the layout changes differ to Alternative 1 with regards to the position of

the WTW and pipeline routes. Refer to Figure 2 and Appendix A for the Alternative 2 layout.

Please note Alternative 2 has not been considered further in the basic assessment due to the disadvantages.

Advantages: The potable pipeline route from the WTW to the Coega Kop Reservoir is shorter (approximately 870m) and traverses a smaller area of the riparian habitat of the non-perennial watercourse.

Disadvantages:

The location of the WTW and associated infrastructure is situated in a steeper area with underlying hard rock which would require blasting.

The borehole pipelines to the WTW traverse a longer distance (approximately 2900m in combined length).

The potable pipeline route from the WTW to the Coega Kop Reservoir (adjacent to the western boundary of the Coega Kop Quarry) is situated with underlying hard rock which would potentially require blasting.

The pipeline from borehole GWA3D to borehole GWA11A traverses through the thicket (approximately 300m in length), thereby bisecting the thicket vegetation.

A discharge pipeline (approximately 1500m in length) from the WTW to a non-perennial watercourse located to the north west of the site, in order to discharge excess supernatant.

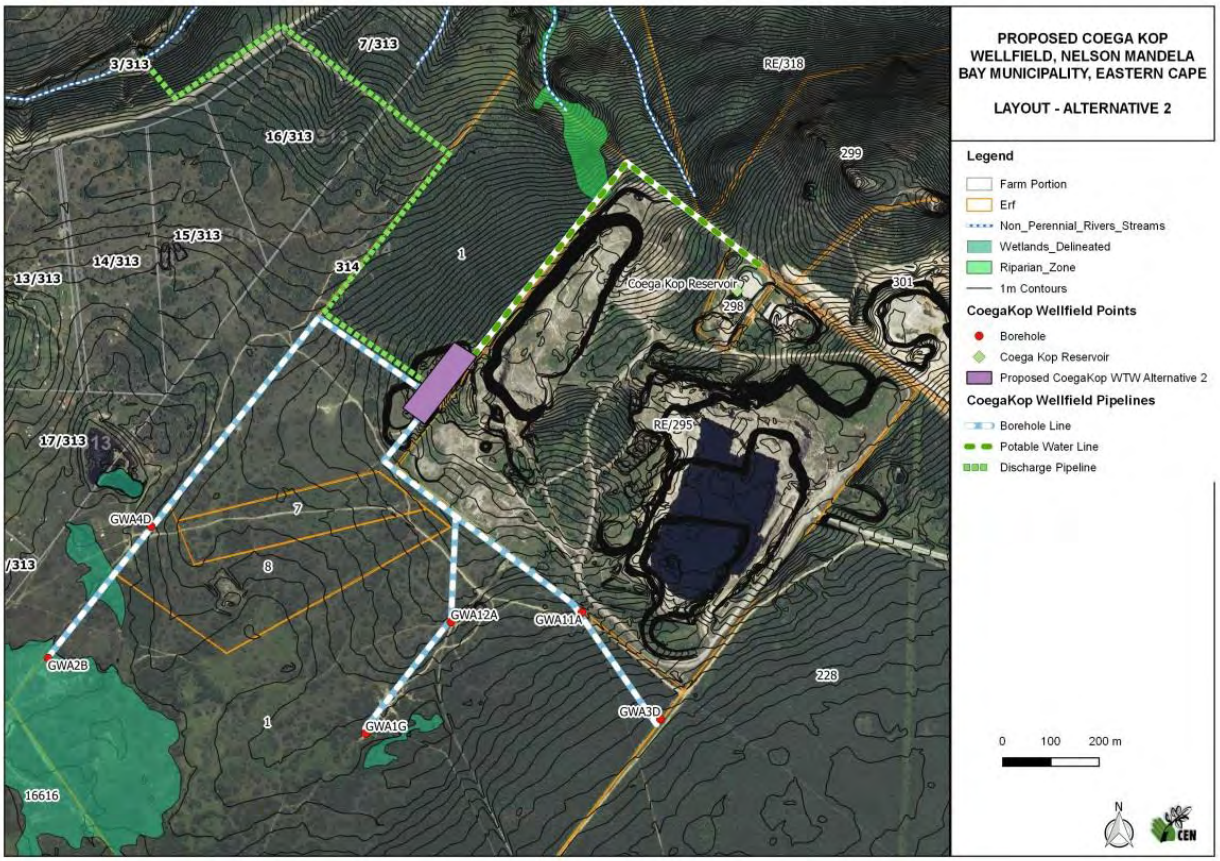

Figure 2: Layout Alternative 2

d) Technology Alternatives

The vegetation will be cleared through a combination of mechanical (i.e. with machinery) means and by-hand. It is not feasible to clear the vegetation entirely by hand and as such this has not been considered as a separate alternative.

Construction of borehole and potable water pipes will be undertaken by the conventional method of trenching. Pipe jacking has not been considered as a separate alternative due to the presence of underlying rock.

e) Operational Alternatives

The purpose is to supply potable water to the Coega Industrial Development Zone (IDZ) and Colchester. The alternative of treating the groundwater to Class 4 Industrial Water is not feasible as the objective is to provide potable water thereby alleviating some pressure from the Nooitgedacht Water Scheme.

The alternative of focusing only on maintenance, i.e. fixing water leaks and degraded infrastructure, would in itself not alleviate the water shortages that are experienced due to recurring and persistent drought conditions. Additional water sources are required to supplement the NMBM's water distribution in order to meet future growth needs. Furthermore, the NMBM's Water Master Plan and Water Conservation Demand Management programme includes the maintenance of existing infrastructure. Both this programme and the development of the Coega Kop Wellfield forms part of the NMBM's Master Plan to provide for the water demands of the NMBM. The Coega Kop Wellfield will therefore play a role in both an emergency capacity as well as in a regular (normal) water supply capacity.

Please note the above alternatives, i.e. Class 4 Industrial Water and improvement on maintenance, have not been assessed further in the Basic Assessment as these alternatives will not meet the need of providing additional water to the NMBM's water network.

f) No-Go Alternative

The No-Go Alternative entails that the proposed Coega Kop Wellfield is not developed and the existing situation remains the same.

Advantages:

No vegetation is cleared and remains in its current state.

No disturbance to the watercourses and wetlands, and these will remain in its current state.

Disadvantages:

Additional water sources to supplement the NMBM's water network will not occur, and water shortages would persist during the recurring and persistent drought conditions.

Future growth within the NMBM would be limited to the current water available.

Even with improving the maintenance programme, i.e. fixing water leaks and degraded infrastructure, water shortages may still be experienced due to the amount of water available, drought conditions and future growth.

Impacts assessed will be compared with impacts of the No-Go Alternative in Section D of this report.

Paragraphs 3 – 13 below should be completed for each alternative.

3. ACTIVITY POSITION

Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees and decimal minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.
List alternative sites if applicable.

Alternative:	**Latitude (S):**		**Longitude (E):**	
Alternative S1[1] (preferred or only site alternative)	33º	46.416‘	25º	36.432‘
WTW and associated infrastructure (e.g. lagoons)	33º	46.730‘	25º	36.911‘
Borehole GWA3D	33º	46.610‘	25º	36.804‘
Borehole GWA11A	33º	46.747‘	25º	36.514‘
Borehole GWA1G	33º	46.622‘	25º	36.627‘
Borehole GWA12A	33º	46.665‘	25º	36.085‘
Borehole GWA2B	33º	46.515‘	25º	36.223‘
Borehole GWA4D	33º	46.001‘	25º	36.708‘
Discharge Point	º	‘	º	‘
Alternative S2 (if any)	º	‘	º	‘
Alternative S3 (if any)				

In the case of linear activities:

Alternative:	**Latitude (S):**		**Longitude (E):**	
Alternative S1 (preferred or only route alternative)				
Borehole Pipeline GWA3D – GWA11A – WTW (~1034m)				
• Starting point of the activity	33º	46.730‘	25º	36.911‘
• Middle point of the activity	33º	46.549‘	25º	36.709‘
• End point of the activity	33º	46.446‘	25º	36.434‘
Borehole Pipeline GWA1G – GWA12A – WTW (~870m)				
• Starting point of the activity	33º	46.747‘	25º	36.514‘
• Middle point of the activity	33º	46.543‘	25º	36.626‘
• End point of the activity	33º	46.446‘	25º	36.434‘
Borehole Pipeline GWA2B – GWA4D – WTW (~726m)				

[1] “Alternative S..” refer to site alternatives.

• Starting point of the activity	33º	46.665‘	25º	36.085‘
• Middle point of the activity	33º	46.515‘	25º	36.223‘
• End point of the activity	33º	46.446‘	25º	36.434‘

Discharge Pipeline WTW – Discharge Point (~850m)

• Starting point of the activity	33º	46.372‘	25º	36.436‘
• Middle point of the activity	33º	46.180‘	25º	36.550‘
• End point of the activity	33º	46.001‘	25º	36.708‘

Potable Water Pipeline WTW – Coega Kop Reservoir (~1500m)

• Starting point of the activity	33º	46.372‘	25º	36.436‘
• Middle point of the activity	33º	46.050‘	25º	36.678‘
• End point of the activity	33º	46.265‘	25º	36.998‘

For route alternatives that are longer than 500m, please provide an addendum with co-ordinates taken every 250 meters along the route for each alternative alignment.

Please refer to **Appendix G-1** for the route co-ordinates.

4. PHYSICAL SIZE OF THE ACTIVITY

Indicate the physical size of the preferred activity/technology as well as alternative activities/technologies (footprints):

Alternative:	**Size of the activity:**
Alternative A1[2] (preferred activity alternative)	20000m^2 (2ha)
Alternative A2 (if any)	m^2
Alternative A3 (if any)	m^2

or, for linear activities:

Alternative:	**Length of the activity:**
Alternative A1 (preferred activity alternative)	4980m
Alternative A2 (if any)	m
Alternative A3 (if any)	m

Indicate the size of the alternative sites or servitudes (within which the above footprints will occur):

Alternative:	**Size of the site / servitude:**
Alternative A1 (preferred activity alternative)	119600m^2 (11.96ha)
Alternative A2 (if any)	m^2
Alternative A3 (if any)	m^2

[2] “Alternative A..” refer to activity, process, technology or other alternatives.

5. SITE ACCESS

Does ready access to the site exist? The main access to the Coega Kop Wellfield will be from the existing gravel access road which branches off from the paved access road to the Coega Kop quarry. This access is provided from the R102.	**YES**	NO
If NO, what is the distance over which a new access road will be built	4980m	

Describe the type of access road planned:

Existing gravel access roads will be used, where possible, to a width of 5m. Where new internal access / service roads are required, these will be gravel and 5m in width, and will follow adjacent to the pipelines.

Include the position of the access road on the site plan and required map, as well as an indication of the road in relation to the site.

6. SITE OR ROUTE PLAN

A detailed site or route plan(s) must be prepared for each alternative site or alternative activity. It must be attached as Appendix A to this document.

The site or route plans must indicate the following:

6.1 the scale of the plan which must be at least a scale of 1:500;

6.2 the property boundaries and numbers of all the properties within 50 metres of the site;

6.3 the current land use as well as the land use zoning of each of the properties adjoining the site or sites;

6.4 the exact position of each element of the application as well as any other structures on the site;

6.5 the position of services, including electricity supply cables (indicate above or underground), water supply pipelines, boreholes, street lights, sewage pipelines, storm water infrastructure and telecommunication infrastructure;

6.6 all trees and shrubs taller than 1.8 metres;

6.7 walls and fencing including details of the height and construction material;

6.8 servitudes indicating the purpose of the servitude;

6.9 sensitive environmental elements within 100 metres of the site or sites including (but not limited thereto):

- rivers;
- the 1:100 year flood line (where available or where it is required by DWA);
- ridges;
- cultural and historical features;
- areas with indigenous vegetation (even if it is degraded or invested with alien species);

6.9 for gentle slopes the 1 metre contour intervals must be indicated on the plan and whenever the slope of the site exceeds 1:10, the 500mm contours must be indicated on the plan; and

6.10 the positions from where photographs of the site were taken.

Please refer to **Appendix A** for the site plan and related maps.

7. SITE PHOTOGRAPHS

Colour photographs from the centre of the site must be taken in at least the eight major compass directions with a description of each photograph. Photographs must be attached under Appendix B to this form. It must be supplemented with additional photographs of relevant features on the site, if applicable.

Please refer to **Appendix B** for the photographs.

8. FACILITY ILLUSTRATION

A detailed illustration of the activity must be provided at a scale of 1:200 as Appendix C for activities that include structures. The illustrations must be to scale and must represent a realistic image of the planned activity. The illustration must give a representative view of the activity.

Please refer to **Appendix C** for the facility illustrations.

9. ACTIVITY MOTIVATION

9(a) Socio-economic value of the activity

What is the expected capital value of the activity on completion?	R 27 million	
What is the expected yearly income that will be generated by or as a result of the activity?	R 14 million	
Will the activity contribute to service infrastructure?	**YES**	NO
Is the activity a public amenity?	YES	**NO**

How many new employment opportunities will be created in the development phase of the activity?	29
What is the expected value of the employment opportunities during the development phase?	R 4.05 million
What percentage of this will accrue to previously disadvantaged individuals?	25 %
How many permanent new employment opportunities will be created during the operational phase of the activity?	4
What is the expected current value of the employment opportunities during the first 10 years?	R 4.32 million
What percentage of this will accrue to previously disadvantaged individuals?	100 %

9(b) Need and desirability of the activity

Motivate and explain the need and desirability of the activity (including demand for the activity):

The 2010/2011 drought in the Eastern Cape resulted in groundwater being investigated by the Nelson Mandela Bay Municipality (NMBM) as one of the possible solutions for supplying water to the metro in emergency situations. As part of its Emergency Bulk Water Plan, the NMBM applied for a water use licence to extract 25.9 Ml/day from the Groot Winterhoek – Coega Ridge Table Mountain Group Aquifer, which includes the 3.5 - 6 Mℓ/day already being extracted at Uitenhage Springs. The NMBM appointed Aurecon South Africa (Pty) Ltd (Aurecon) to assist with the development of a well field to extract groundwater on municipal property in the Coega Kop area (Aurecon, 2016).

The purpose of the proposed well field at Coega Kop is to utilize the groundwater available in the Groot Winterhoek – Coega Ridge Table Mountain Group Aquifer. This aquifer is a fractured-rock aquifer which primarily consists of Peninsula Formation of the Table Mountain Group (TMG). The location of the well field near Coega Kop is preferred as the TMG outcrops at Coega Kop. The shallow depth of the TMG makes the fault system easy to target from the surface for extracting groundwater. The location is also on municipal property which simplifies legal matters and avoids expropriation of private land (Aurecon, 2016).

Extensive exploration of the Coega Fault System at Coega Kop has been completed. Six probe boreholes have been identified with sustainable yields. This makes the development of a well field at Coega Kop a feasible option to supply the municipality with water (Aurecon, 2016).

Preliminary water quality tests on the probe boreholes have shown that the groundwater is of generally good quality, however the iron (Fe) and manganese (Mn) concentrations are too high and exceed the SANS 241:2011 limits for potable water. The groundwater must therefore be treated first before distribution (Aurecon, 2016).

The NMBM requires that the well field provides 6 ML per day of potable water by the end of November

2017 to the Coega IDZ, and Colchester and potentially to Motherwell. (Aurecon, 2016a).

The NMBM Integrated Development Plan (June 2016, 15th edition) [IDP] includes the development of the Coega Kop well field. The IDP further states that once the well field is fully developed it has the potential to meet 10% of the NMBM's water demand.

The proposed Coega Kop wellfield and WTW is not located within a Critical Biodiversity Area (CBA) of the NMBM's Bioregional Plan (2014). As a result, the proposed well field is also in line with the NMBM's Spatial Development Framework (2015). The proposed Coega Kop well field and WTW is however located within a CBA 1 and 2 of the Eastern Cape Biodiversity Conservation Plan (2007).

The NMBM's Water Master Plan and Water Conservation Demand Management programme includes the maintenance of existing infrastructure. Both this programme and the development of the Coega Kop Wellfield forms part of the NMBM's Master Plan to provide for the water demands of the NMBM. The Coega Kop Wellfield will therefore play a role in both an emergency capacity as well as in a regular (normal) water supply capacity.

Indicate any benefits that the activity will have for society in general:

The groundwater, once treated, would be distributed to the Coega IDZ and Colchester, and with the future phases to provide potable water to Motherwell areas. This would assist with the water demand in these areas, as well as during emergency situations, e.g. extended drought periods.

Indicate any benefits that the activity will have for the local communities where the activity will be located:

The groundwater, once treated, would be distributed to the Coega IDZ and Colchester, and with the future phases to provide potable water to Motherwell areas. This would assist with the water demand in these areas, as well as during emergency situations, e.g. extended drought periods.

Limited temporary work opportunities would be provided for people living in the surrounding area during construction, depending on the skills required.

10. APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES

List all legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA regulations, if applicable:

Title of legislation, policy or guideline:	Administering authority:	Date:
National Environmental Management Act (NEMA, No. 107 of 1998, as amended)	Eastern Cape Department of Economic Development, Environmental Affairs & Tourism (DEDEAT)	1998
GNR 983 of the EIA regulations (2014) promulgated in terms of the National Environmental Management Act, 1998 (Act	DEDEAT	2014

Title of legislation, policy or guideline:	Administering authority:	Date:
No. 107 of 1998) Listed Activities No.: 9, 12, 14, 19, 27 and 67		
GNR 985 of the EIA regulations (2014) promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) Listed Activities No.: 2, 4, 10, 12, 14 and 26	DEDEAT	2014
National Environmental Management: Waste Act (Act No. 59 of 2008) Listed Activities No: GNR 921 Category A3(1) and A3(12)	Department of Environmental Affairs (DEA), DEDEAT	2008
National Environmental Management: Biodiversity Act (Act No. 10 of 2004)	DEA, DEDEAT	2004
National Environmental Management: Air Quality Act (Act No. 39 of 2004) and Regulations	DEA, DEDEAT Nelson Mandela Bay Municipality (NMBM)	2004
Nature & Environmental Conservation Ordinance (No. 19 of 1974)	DEDEAT	1974
National Water Act, 1998 (Act No. 36 of 1998) Section 21 (a), (c) and (i)	Department of Water and Sanitation	1998
Occupational Health and Safety Act (Act No 85 of 1993) and regulations	Department of Labour	1993
Guideline 7: Public Participation in the EIA Process. Integrated Environmental Management Guideline Series, Department of Environmental Affairs (DEA), Pretoria Guideline 5: Companion to the Environmental Impact Assessment Regulations, 2010. Integrated Environmental Management Guideline Series, Department of Environmental Affairs (DEA), Pretoria	DEDEAT	2010
Eastern Cape Biodiversity Conservation Plan	Eastern Cape Department of Economic Development, Environmental Affairs and Tourism	2007
Integrated Development Plan	NMBM	2016
Spatial Development Framework	NMBM	2015
Bioregional Plan	NMBM	2014

Title of legislation, policy or guideline:	Administering authority:	Date:
Noise Control By-Law	NMBM	2010

11. WASTE, EFFLUENT, EMISSION AND NOISE MANAGEMENT

11(a) Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase?	**YES**	NO
If yes, what estimated quantity will be produced per month?	2 m^3	

How will the construction solid waste be disposed of (describe)?

General construction solid waste, e.g. concrete, miscellaneous general waste, and excavated material that will not be re-used as infill, will be removed from the construction site by trucks.

Where will the construction solid waste be disposed of (describe)?

Solid waste that cannot be reused or recycled (e.g. used as infill) will be disposed of (within 14 days) at a licensed waste disposal (landfill) site, namely Koedoeskloof. Spoil that is not re-used as infill within the proposed works, is to be first considered for infill at disturbed areas within close proximity of the construction site (e.g. borrow pits

Will the activity produce solid waste during its operational phase?	**YES**	NO
If yes, what estimated quantity will be produced per month?	6 m^3	

How will the solid waste be disposed of (describe)?

The solid waste (residue) from the WTW (non-hazardous silt / sedimentation) will be emptied and stockpiled onsite in the evaporation lagoons until there is adequate volume for removal (either for reuse, for application to land, or for discharge to landfill). The solid waste will be removed from site by trucks.

Where will the solid waste be disposed if it does not feed into a municipal waste stream (describe)?

The solid waste (residue) from the WTW (non-hazardous silt / sedimentation) will be emptied and stockpiled onsite in the evaporation lagoons until there is adequate volume for removal (either for reuse, for application to land, or for discharge to landfill).

If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Can any part of the solid waste be classified as hazardous in terms of the relevant legislation?	YES	**NO**

If yes, inform the competent authority and request a change to an application for scoping and EIA.

Is the activity that is being applied for a solid waste handling or treatment facility?	YES	**NO**

If yes, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

11(b) Liquid effluent

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?	YES	**NO**
If yes, what estimated quantity will be produced per month?	m^3	
Will the activity produce any effluent that will be treated and/or disposed of on site?	Yes	**NO**

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Will the activity produce effluent that will be treated and/or disposed of at another facility?	YES	**NO**

If yes, provide the particulars of the facility:

Facility name:			
Contact person:			
Postal address:			
Postal code:			
Telephone:		Cell:	
E-mail:		Fax:	

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:

Most of the clear supernatant is recovered and pumped back to the head of the treatment works to supplement the supply of water. Excess supernatant will be decanted to the non-perennial tributary of the Coega River, approximately 0.008Ml/day.

11(c) Emissions into the atmosphere

Will the activity release emissions into the atmosphere?	YES	**NO**
If yes, is it controlled by any legislation of any sphere of government?	**YES**	NO

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

If no, describe the emissions in terms of type and concentration:

The National Dust Control Regulations of 1 November 2013, prescribe acceptable dustfall rates for activities generating dust.

Dust will occur during the construction phase as a result of clearing of vegetation, excavations, stockpiles, construction vehicles and/or equipment movement. Mitigation measures are given in Section D to limit the occurrence and impacts of dust pollution during the construction phase.

Dust levels are not to exceed 1200mg/m^2/day (30 day average) for industrial and rural areas (non-residential areas). In residential areas, dust is not to exceed 600mg/m^2/day (30 day average).

Standard emissions from construction vehicles and generators will be at low levels during construction.

No dust is anticipated during the operational phase, except during maintenance activities.

No emissions are anticipated from the WTW, and no listed activities in terms of Section 21 of the National Environmental Management: Air Quality Act (Act No 39 of 2004) would be applicable.

11(d) Generation of noise

Will the activity generate noise?	**YES**	NO
If yes, is it controlled by any legislation of any sphere of government?	YES	**NO**

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

If no, describe the noise in terms of type and level:

During construction, noise will be generated by generators and construction equipment (e.g. grader), construction vehicles as well as from drilling. This will, however, be limited to daylight hours and will be temporary, i.e. occurring only during construction.

The NMBM's Noise Control By-Law of 24 March 2010 states that no person may use any power tool or power equipment for construction work, drilling work or demolition work, or allow it to be used in or near a residential area during the following hours: (i) Before 06:00 and after 18:00 Monday to Saturday; (ii) Before 08:00 and after 14:00 on a Sunday; or if it causes a noise nuisance or noise disturbance. However this would not be applicable at the proposed Coega Kop Wellfield is located outside of residential areas.

Limited noise is anticipated from the WTW during the operational phase, however this would be limited to the immediate area surrounding the WTW.

12. WATER USE

Please indicate the source(s) of water that will be used for the activity by ticking the appropriate box(es)

Municipal ✓	water	**Groundwater ✓ (Operational**	river, stream, dam or	other	the activity will not use

(Construction Phase)	board	**Phase)**	lake		water

If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate

the volume that will be extracted per month:	180 mega litres	
Does the activity require a water use permit from the Department of Water Affairs?	**YES**	NO

If yes, please submit the necessary application to the Department of Water Affairs and attach proof thereof to this application if it has been submitted.

Activities for the water uses in terms of Section 21 of the National Water Act (Act No 36 of 1998) [NWA] associated with the proposed project, include the following:

Section 21 (a) taking water from a water resource

Section 21 (c) impeding or diverting the flow of water in a watercourse

Section 21 (i) altering the bed, banks, course or characteristics of a watercourse

The application for the taking of water from a water resource (Section 21(a)) was submitted to the Department of Water and Sanitation in 2013, with additional information provided in 2016, by Groundwater Africa on behalf of the NMBM.

Section 21 (c) and (i) activities are applicable as the borehole and potable water pipelines traverse watercourses, and the WTW and associated infrastructure are located within the 500m regulated area of wetlands. Proof of the water use authorisation application for Section 21 (c) and (i) activities will be included in the Final Basic Assessment Report.

The discharge of water will not be directly into the non-perennial watercourse or the Coega River, and will be allowed to flow overland prior to flowing into a water resource. It is thus considered that the discharging of the supernatant will not trigger an activity in terms of Section 21 (f) of the National Water Act.

13. ENERGY EFFICIENCY

Describe the design measures, if any, that have been taken to ensure that the activity is energy efficient:

None

Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

None

SECTION B: SITE/AREA/PROPERTY DESCRIPTION

Important notes:

1. For linear activities (pipelines, etc) as well as activities that cover very large sites, it may be necessary to complete this section for each part of the site that has a significantly different environment. In such cases please complete copies of Section C and indicate the area, which is covered by each copy No. on the Site Plan.

Section C Copy No. (e.g. A): [ ]

2. Paragraphs 1 - 6 below must be completed for each alternative.

3. Has a specialist been consulted to assist with the completion of this section?

YES	NO

If YES, please complete form XX for each specialist thus appointed:

All specialist reports must be contained in Appendix D.

1. GRADIENT OF THE SITE

Indicate the general gradient of the site.

Alternative S1:

Flat	**1:50 – 1:20 WTW & associated infrastructure**	**1:20 – 1:15 Borehole pipelines**	1:15 – 1:10	**1:10 – 1:7,5 Coega Kop Reservoir pipeline**	1:7,5 – 1:5	Steeper than 1:5

Alternative S2 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

Alternative S3 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

2. LOCATION IN LANDSCAPE

Indicate the landform(s) that best describes the site:

2.1 Ridgeline
2.2 Plateau
2.3 Side slope of hill/mountain
2.4 Closed valley

2.5 Open valley
2.6 Plain
2.7 Undulating plain / low hills
2.8 Dune
2.9 Seafront

3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

Is the site(s) located on any of the following (tick the appropriate boxes)?

	Alternative S1:		Alternative S2 (if any):		Alternative S3 (if any):	
Shallow water table (less than 1.5m deep)	**YES**	NO	YES	NO	YES	NO
Dolomite, sinkhole or doline areas	YES	**NO**	YES	NO	YES	NO
Seasonally wet soils (often close to water bodies)	**YES**	NO	YES	NO	YES	NO
Unstable rocky slopes or steep slopes with loose soil	YES	**NO**	YES	NO	YES	NO
Dispersive soils (soils that dissolve in water)	YES	**NO**	YES	NO	YES	NO
Soils with high clay content (clay fraction more than 40%)	YES	**NO**	YES	NO	YES	NO
Any other unstable soil or geological feature	YES	**NO**	YES	NO	YES	NO
An area sensitive to erosion	YES	**NO**	YES	NO	YES	NO

If you are unsure about any of the above or if you are concerned that any of the above aspects may be an issue of concern in the application, an appropriate specialist should be appointed to assist in the completion of this section. (Information in respect of the above will often be available as part of the project information or at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by the Council for Geo Science may also be consulted).

The Groot Winterhoek – Coega Ridge Table Mountain Group Aquifer is a fractured-rock aquifer which primarily consists of Peninsula Formation of the Table Mountain Group (TMG). The TMG outcrops in the Groot Winterhoek Mountains in the west and becomes covered and confined by the younger sediments of the Uitenhage Group in the east, near the Uitenhage Springs. The odd outcrop of the TMG does however occur further east, such as at Coega Kop and St Croix Island. The aquifer recharges in its exposed western areas and the groundwater slowly flows in an easterly direction (becoming confined on the way) towards the coast, where it discharges from springs out into the sea. The geological structure of the aquifer is

dominated by the Coega Fault System, a collection of semi-parallel faults of varying lengths and offsets, which runs along the entire length of the aquifer. Water from the aquifer gets trapped and travels along fractures in the fault system and is under high pressure in the eastern reach of the fault. The reason for the high pressure is because the recharge area of the aquifer in the west is much higher above sea level than the lower confined areas of the aquifer in the east. The location of the well field near Coega Kop was chosen because of the relative shallow depth of the TMG's Peninsula Formation in this area. The cross section (A - B) of the Coega Fault System is illustrated in **Figure 4-3** and shows how the formation outcrops at Coega Kop. The fault system can thus be easily targeted from the surface for extracting groundwater (Aurecon, 2016 and Nel, 2016).

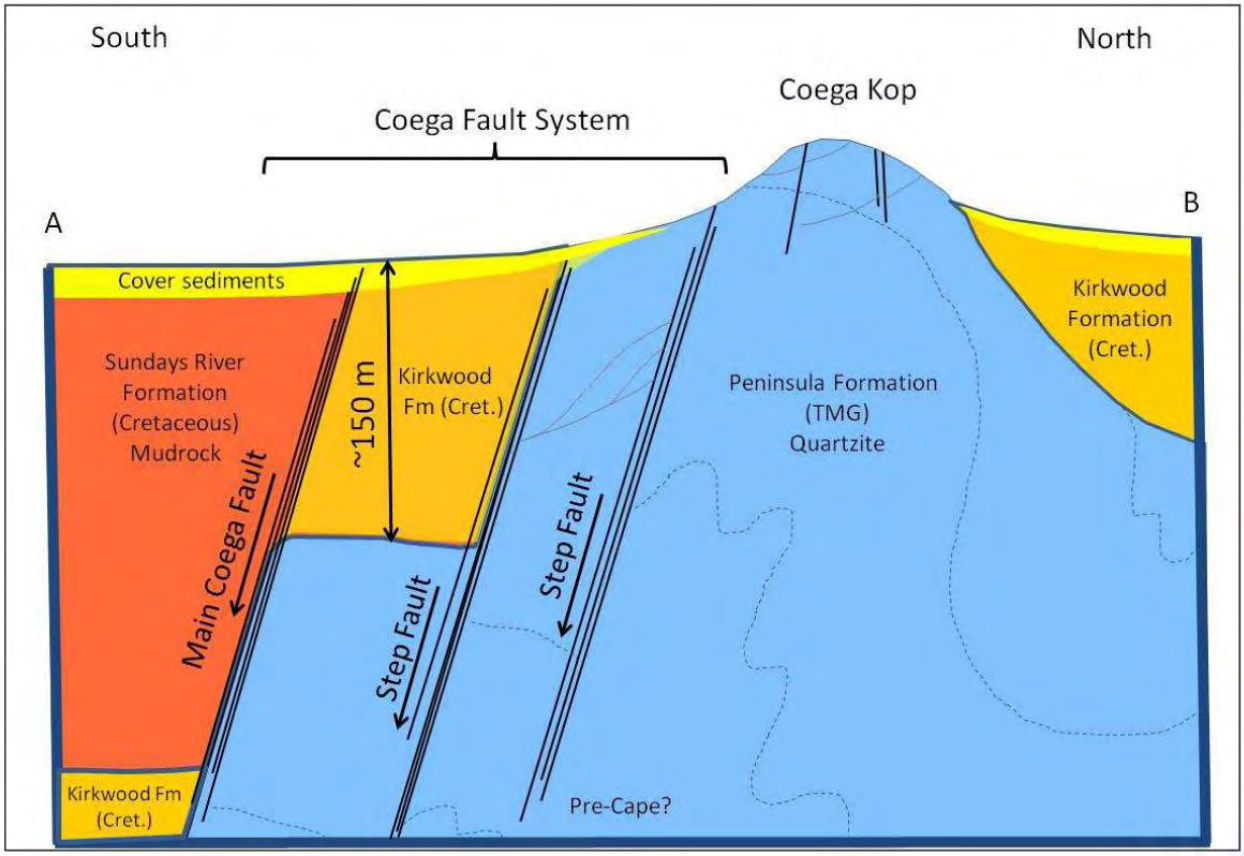

Figure 3: Cross Section of Coega Fault System

During exploration of the Coega Fault System at Coega Kop in 2014-2015, numerous probe holes have been drilled to gather information on the fault system. Many of the drilled probe holes resulted in artesian water strikes, with one borehole (GWA 2B) providing an exceptional estimated yield of 100 L/s (8.64Mℓ/day) at a pressure of 6.5 bar. Test pumping of all the probe holes eventually identified six probe holes with good sustainable yields. All the probe holes have subsequently been plugged after preliminary tests to determine approximate yields and water quality. However, the large flow and high pressure of borehole GWA 2B caused old, unused boreholes from the Department of Water and Sanitation (DWS) to

flood the surrounding area. The flooding extended over a portion of the NMBM's property and eventually continued through the Coega Development Corporation's (CDC's) property to an attenuation pond in the CDC's Zone 4. Borehole GWA 2B was subsequently plugged even deeper, which resulted in substantially decreased flooding, however, some flow from old boreholes still persists and causes unnatural wet areas mainly in low lying areas (Aurecon, 2016 and Nel, 2016).

The Uitenhage Springs (used for municipal bulk supply) is a natural discharge point for groundwater from the Groot-Winterhoe – Coega Ridge TMG Aquifer. A number of boreholes are located between Coega Kop and Uitenhage, however not all of these boreholes are operational. The hydrocensus conducted by Groundwater Africa (2016) identified existing uses of groundwater to be at approximately 8 litres per second, and indicated that the aquifer was underutilized.

The general description for soil on site is 'soils with minimal development, usually shallow, on hard or weathering rock, with or without intermittent diverse soils. Lime generally present in part or most of the landscape'. Soil is classed as 'lithosols (shallow soils on hard or weathering rock)'. A favourable physical property of this soil class is that it may receive water runoff from associated rock. Limitations are that soil may have 'restricted soil depth; associated with rockiness' (Source layer: National soils – soil classes; Biodiversity GIS online interactive maps, 2007) (Louw, 2016).

According to the 1:50 000 Geological Map 3325DC & DD, 3425BA Port Elizabeth (2000) by the Council for Geoscience, the visible geological formations of the proposed development area comprise (from oldest to youngest) the Peninsula Formation of the Table Mountain Group; the Kirkwood Formation of the Uitenhage Group; the Alexandria Formation of the Algoa Group; and Quaternary alluvium (transported soils) and pedogenic gravels, developed from the weathering of the Alexandria Formation (previously known as the Bluewater Bay Formation) (Nel, 2016).

4. GROUNDCOVER

Indicate the types of groundcover present on the site:

4.1 Natural veld – good condition [E]
4.2 Natural veld – scattered aliens [E] - See following description
4.3 Natural veld with heavy alien infestation [E]
4.4 Veld dominated by alien species [E]
4.5 Gardens
4.6 Sport field
4.7 Cultivated land
4.8 Paved surface
4.9 Building or other structure – Capped boreholes
4.10 Bare soil – access tracks and pathways

The location of all identified rare or endangered species or other elements should be accurately indicated on the site plan(s).

Natural veld - good condition[E]	**Natural veld with scattered aliens[E]**	Natural veld with heavy alien infestation[E]	Veld dominated by alien species[E]	Gardens
Sport field	Cultivated land	Paved surface	**Building or other structure**	**Bare soil**

If any of the boxes marked with an "[E] "is ticked, please consult an appropriate specialist to assist in the completion of this section if the environmental assessment practitioner doesn't have the necessary expertise.

Mucina and Rutherford (2006; National Vegetation Map, 2012 version beta2) classifies the vegetation as AT 6 Sundays Thicket vegetation, which falls within the Albany Thicket Biome. Sundays Thicket vegetation is assigned a conservation status of Least Threatened, and a protection status of Poorly Protected [Conservation target: 19%; Protected: 9% (+ 3%); Remaining habitat: 94.5%; Mucina and Rutherford, 2006]. Sundays Thicket is not listed as a threatened ecosystem on the National List of Threatened Terrestrial Ecosystems for South Africa (2011) (Louw, 2016). Refer to **Figure 3** below.

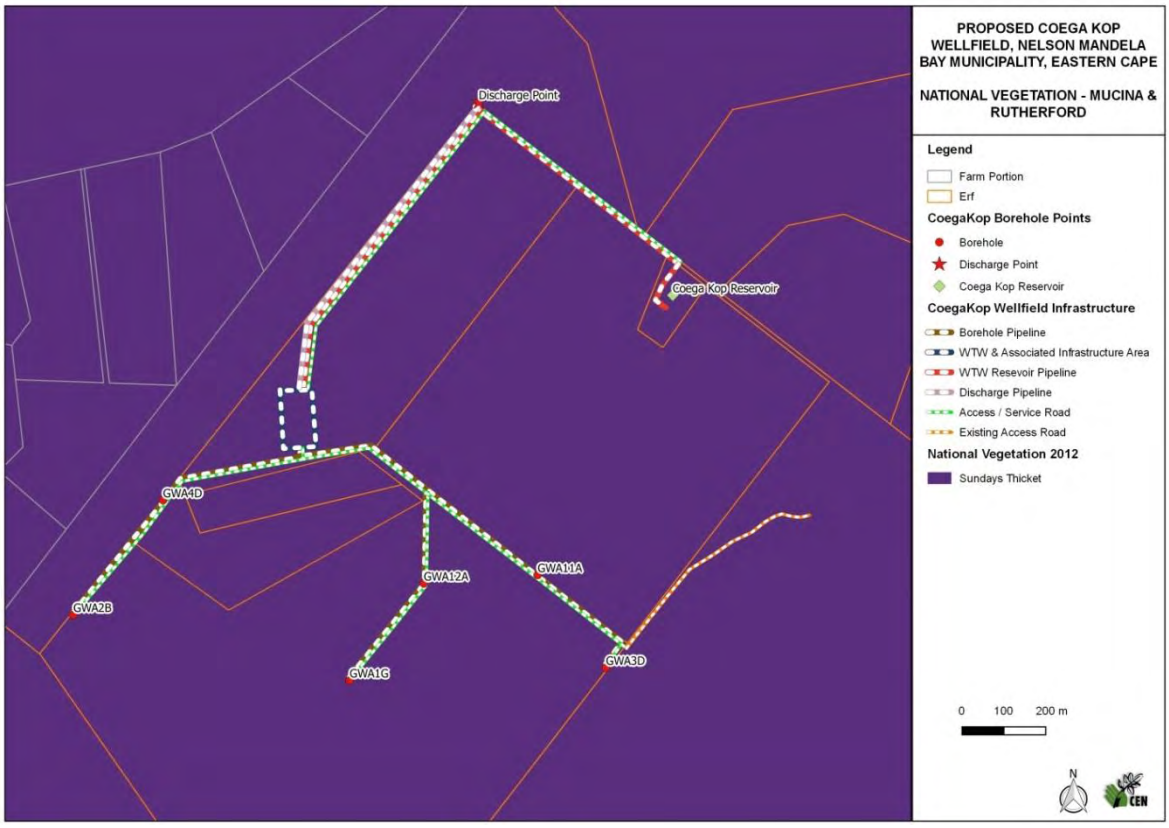

Figure 4: Mucina & Rutherford National Vegetation Types

According to the NMBM's Bioregional Plan (2014), vegetation of the southern / south-western portion of the study area is largely mapped as Motherwell Karroid Thicket vegetation, within the Subtropical Thicket Biome, and is assigned an Ecosystem Threat Status of Endangered. Vegetation of the northern portion of the study area is mapped as Sundays Valley Thicket vegetation, and is assigned an Ecosystem Threat Status of Vulnerable. Vegetation closest to the Coega River floodplain is classified as Sundays Doringveld Thicket vegetation, and is assigned an Ecosystem Status of Endangered. Refer to **Figure 4**. Though not mapped for the study area, vegetation in the western / central section of the study area predominantly consists of Grass Ridge Bontveld, as described by STEP (Vlok and Euston-Brown, 2002), which is assigned an Ecosystem Status of Vulnerable (NMBM Bioregional Plan, 2015) (Louw, 2016).

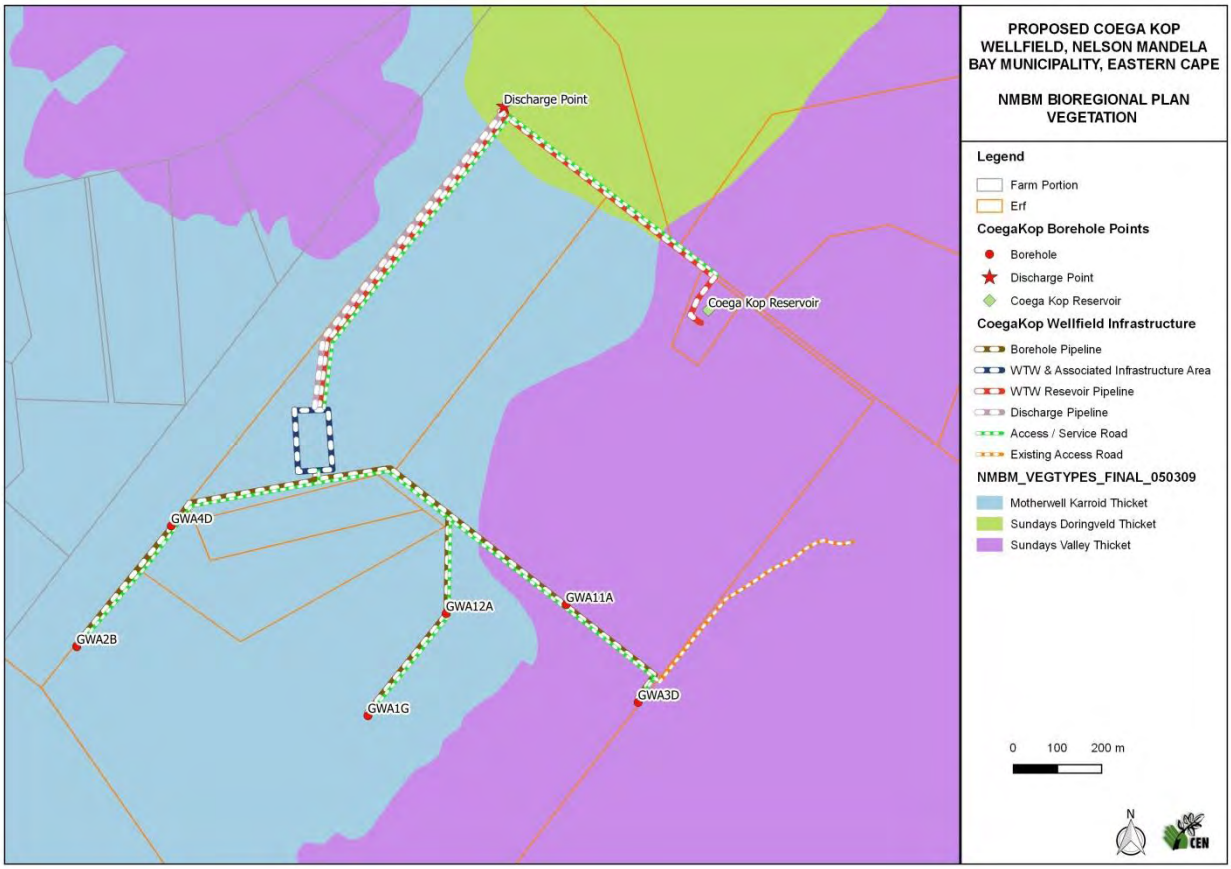

Figure 5: NMBM Bioregional Plan Vegetation

Five vegetation and / or habitat types were identified in the study area. Boundaries between these habitat types are not very distinct in the study area (except along fence line servitudes, or areas changed due to anthropogenic impacts – as is evident from aerial imagery), and changes appear to be ecotonal – as is often seen in Thicket-mosaic vegetation types. Changes in vegetation / habitat types are due to anthropogenic impacts i.e. past clearing and grazing, causing degradation and transformation of vegetation, and water leakages around test boreholes; changes in geology i.e. calcareous vs. deep, red clayey soils, and changes in aspect and topography (Louw, 2016).

With the exception of the large expanses of Sundays Valley Thicket vegetation to the north and south of the study area – which is densely vegetated, spinescent, solid and impenetrable and, therefore, largely untransformed / intact – the remaining habitat types in the study area have experienced, and continue to experience, some level of transformation and / or degradation due to anthropogenic impacts – ranging from a high significant negative impact in areas that were cleared in the past i.e. at Coega Kop, along fence line servitudes, and the cleared area towards Motherwell Township, to a low to moderate negative impact in Thicket-mosaic vegetation types fragmented by gravel roads and informal pathways, which continue to experience grazing in some places i.e. Motherwell Karroid Thicket, and Grass Ridge Bontveld vegetation (Louw, 2016).

Wetlands and tributaries in the study area, as well as areas where test boreholes are leaking to create 'new', temporary wetlands, are dominated by grasses i.e. Kikuyu Grass (*Pennisetum clandestinum*), Quick Grass (*Cynodon dactylon*) and *Sporobolus virginicus*, as well as wetland-type plants i.e. *Cotula coronopifolia, Juncus sp., Phragmites australis* and *Typha capensis*. Standing water around test boreholes in the west contain the aquatic pest plant, *Azolla filiculoides* (Louw, 2016).

A total of 137 plant species were identified on site, of which ten are listed as declared weeds and / or invaders i.e. Categories 1 and 2 under the Conservation of Agricultural Resources Act No. 43 of 1983, and Category 1b under the National Environmental Management: Biodiversity Act 10 of 2004 – National Invasive Terrestrial and Fresh-water Plant Species List (published August 2014).

No species listed as threatened on the Red List of South African Plants (version 2015.1) was identified on site.

Twenty-five species of protected plants listed under the Eastern Province Nature and Environmental Conservation Ordinance of 1974 and the Draft Eastern Cape Environmental Conservation Act of 2003, were identified on site. Protected plants require permits from the relevant authorities i.e. DEDEAT, prior to their disturbance (which includes trimming of the branches of protected trees), removal, and / or transplantation.

One protected tree species listed under the National Forests Act No. 43 of 1983 was identified on site i.e. Sideroxylon inerme (White Milkwood). It occurs consistently in Thicket clumps across the study area.

5. LAND USE CHARACTER OF SURROUNDING AREA

Indicate land uses and/or prominent features that currently occur within a 500m radius of the site and give description of how this influences the application or may be impacted upon by the application:

5.1 Natural area - Natural (undeveloped) areas are located within and surrounding the proposed wellfield site.

5.2 Low density residential

5.3 Medium density residential

5.4 High density residential

5.5 Informal residential - Informal residences (low density) are located to the west of the proposed wellfield site.
5.6 Retail commercial & warehousing
5.7 Light industrial
5.8 Medium industrial [AN]
5.9 Heavy industrial [AN]
5.10 Power station
5.11 Office/consulting room
5.12 Military or police base/station/compound
5.13 Spoil heap or slimes dam[A]
5.14 Quarry, sand or borrow pit - The Coega Kop Quarry is located on the eastern boundary of the proposed wellfield site.
5.15 Dam or reservoir - The Coega Kop Reservoirs are located to the east of the proposed wellfield site.
5.16 Hospital/medical centre
5.17 School
5.18 Tertiary education facility
5.19 Church
5.20 Old age home
5.21 Sewage treatment plant[A]
5.22 Train station or shunting yard [N]
5.23 Railway line [N]
5.24 Major road (4 lanes or more) [N]
5.25 Airport [N]
5.26 Harbour
5.27 Sport facilities
5.28 Golf course
5.29 Polo fields
5.30 Filling station [H]
5.31 Landfill or waste treatment site
5.32 Plantation
5.33 Agriculture - An agricultural facility is located on the edge of the 500m area, to the south west of the proposed wellfield site.
5.34 River, stream or wetland - The Coega River is located on the northern edge of the 500m area. Non-perennial drainage lines are located to the north of the proposed wellfield site. Ten wetlands have been identified and delineated that fall within the 500 m radius from proposed infrastructure, some of which are most likely the result of leaking boreholes. Refer to **Figure 6** and a detailed description on each wetland and drainage line is provided hereafter.
5.35 Nature conservation area
5.36 Mountain, koppie or ridge - Coega Kop is located to north east of the proposed wellfield site.
5.37 Museum
5.38 Historical building
5.39 Protected Area
5.40 Graveyard - The Motherwell Cemetery is located on the southern edge of the 500m area.

5.41 Archaeological site

5.42 Other land uses (describe) - Salt pans are located on the western border of the 500m area.

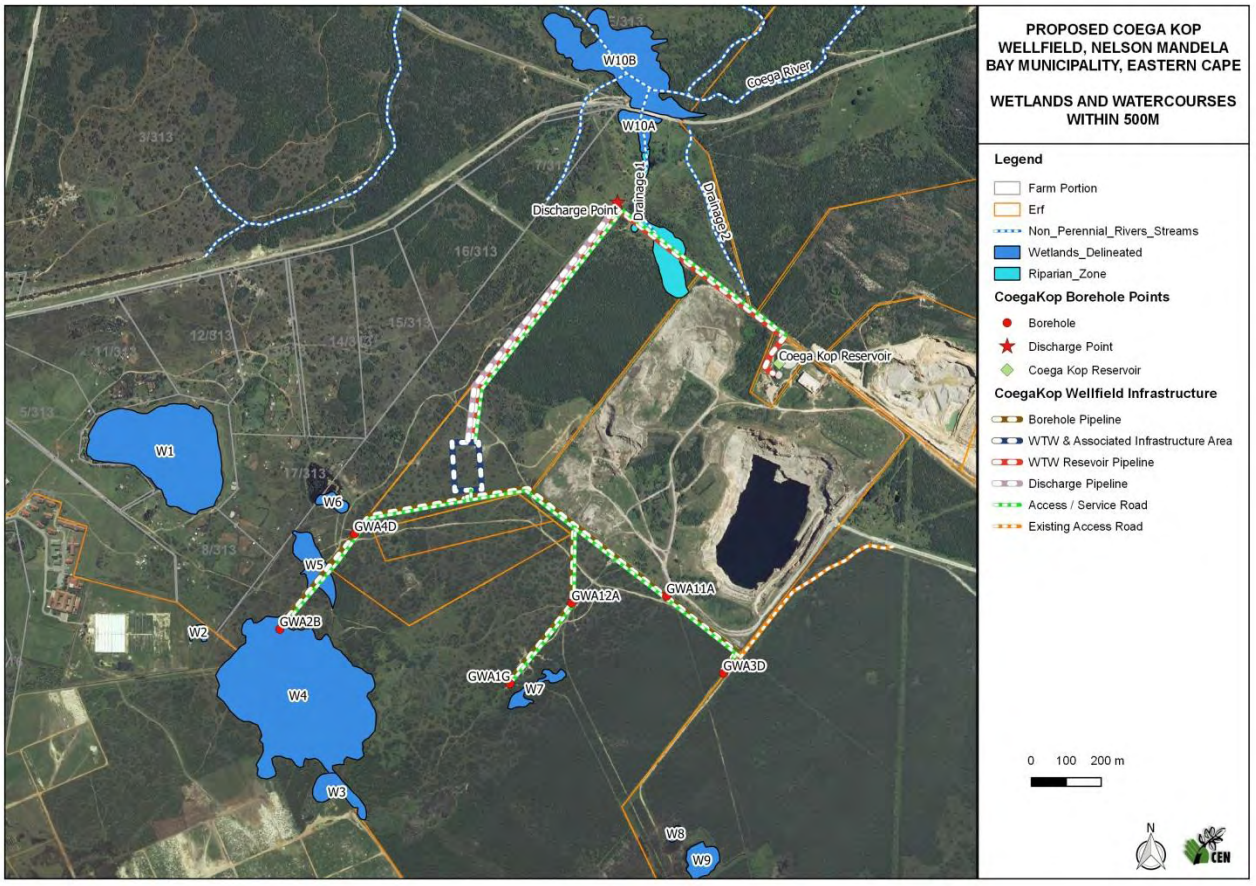

Figure 6: Wetlands and Watercourses within 500m

Wetland 1 (W1) is a natural salt pan at between 74 and 76 masl. Little is known about the functioning of these systems, but the common understanding seems to be that they are related to groundwater intrusion, i.e. where the pan is connected with elevated water table of a brackish groundwater system. This seems substantiated by the fact that this wetland and other salt pans in the area (mainly modified salt pans) share similar mean heights above sea levels (73 – 77 mamsl), within an area that is known for its brackish groundwater. A number of informal low-cost settlements occur around Wetland 1 and the pan appears to be informally used for salt production. This has led to a number of modification and impacts to the pan over the years such as the construction of a low soil berm and use of bricks and other materials in the pan. Vegetation in and around the pan is sparse, but species present are typical of salt pans such as *Sarcocornia sp*, *Atriplex sp. (Cape Salt Bush)*, *A. semibaccata* and *Juncus Rigidus*. Birds were observed at the site. Soil augering in and around this as well as other wetlands, revealed mainly gley2, clayey soils (Nel, 2016).

Wetland 2 (W2) is an artificial system that appears, on available aerial photography, to have formed during 2014. The area is low lying (between 76 and77 masl) and water impounds on the upstream side of a large wall that was constructed in 2013. The relatively sudden formation of a wetland in this area is most probably related to the old DWS boreholes leaking under pressure in the surrounding area as described previously. Wetland vegetation, wetland soils and birds were evident at Wetland 2. Pumping of the boreholes in the well field should reduce the pressure in the groundwater aquifer which should stop the leaking of the old boreholes (Aurecon, 2016). It is likely that Wetland 2 will disappear over time if this water source dries up (Nel, 2016).

Wetland 3 (W3) could have been a natural depression (wetland) many years ago. It is situated in a natural low-lying area (between 76 and 77 masl), but has been modified to a large degree through infilling and other groundworks. The south-eastern section of the depression has been filled in and levelled while soil stockpiles were dumped in the remaining section of the wetland. A large channel/ drain has been dug on the north-eastern boundary of this wetland which was probably done to drain the large area that was flooded due to the leaking boreholes. This channel connects Wetland 3 and Wetland 4 which are described and assessed individually as they most likely had been separate systems historically. Vegetation in and around the wetland is also not typical of a natural depression but rather that of a disturbed area: *Typha capensis* and alien species such as *Cirsium vulgare*, *Acacia cyclops* and *Pennisetum clandestinum* (kikuyu) (Nel, 2016).

The large area delineated as **Wetland 4 (W4)** most probably used to be smaller separate wetlands in the past as indicated on the NMBM wetland database. The old boreholes that have been leaking for a number of years (approximately 2 years), have flooded this low-lying area (between 76 and 77 masl) and created a large artificial wetland in an area where natural depression(s) most probably occurred. Hydrophytic vegetation (plants adapted to wet soils) has established due to flooding for a prolonged period and signs of wetness are visible in soil samples from this area. Terrestrial vegetation typical of the area (e.g. *Senecio burchellii, Sideroxylon inerme, Gymnosporia heterophylla, Euclea undulata* etc.) still occurs in this large area which indicates that large parts of this area were historically dry. These areas could potentially become drier again over time if the water source dries up (aquifer pressure is reduced and boreholes stop leaking). As mentioned previously, this wetland is connected to Wetland 3 via an artificially created drain/ channel which appears to be permanently inundated (Nel, 2016).

Even though **Wetland 5 (W5)** is located on a flat low-lying area (located between 76 and 77 masl), it doesn't appear from older aerial photographs as if a natural wetland occurred in this area. It is therefore assumed that water from the leaking boreholes also accumulates in this area and formed an artificial wetland flat over approximately the last two years. In fact, water was observed flowing from a borehole located more or less in the centre of the wetland. The water has also flooded some gravel roads and a small building/ house. Again wetland vegetation has established in this area and soils are indicative of prolonged saturation. Terrestrial vegetation is also visible throughout the wetland and an island of mostly terrestrial vegetation occurs in the middle of the wetland with species such as *Euphorbia ledienii, Gymnosporia heterophylla, Aloe Africana, Sideroxylon inerme,* etc (Nel, 2016).

Wetland 6 (W6) occurs at 73 to 74 masl and appears to be a natural salt pan (depression) that was modified by excavations in the wetland and vegetation clearing in the immediate vicinity prior to 2004 (oldest aerial photos available). In its current condition, it can be described as a relatively deep dam with

steep slopes on the north-eastern and south-eastern sides. *Ceratophyllum demersum* was observed in the water, which is now more freshwater due to the modifications to the wetland, with plants typical of a salt pan in the temporary zone and on the boundary of the wetland (e.g. *Atriplex semibaccata* and *Juncus rigidus*). Birds also frequent this area (Nel, 2016).

Similar to Wetland 5, **Wetland 7 (W7)** doesn't appear on older aerial photographs as if a natural wetland occurred in this area and is most probably flooded due to the leaking boreholes. This wetland is located on a flat area which appears to have been cleared in two areas which were previously separated by a gravel road. Mainly terrestrial vegetation was observed (such as *Sideroxylon inerme, Podocarpus spp, Carissa spp, opuntia ficus-indica* etc.) some of which have died due to prolonged inundation. It is likely that Wetland 7 will disappear over time if the borehole leaks dry up (Nel, 2016).

Both **Wetland 8 (W8)** and **Wetland 9 (W9)** appear to be modified natural depressions (possibly salt pans) which have been modified in terms of its geomorphology as well as hydrology over the last 8 years. From old aerial photographs, it appears that Wetland 9 has been completely transformed in 2008/2009 during clearing for the development of CDC roads as well as the Business Process Outsourcing Park approximately 530 m to the south. The wetland and area around the wetland right up to Wetland 8 and a strip towards the development was cleared. A channel was excavated at a later stage (in 2013) most probably to drain this area towards lower lying areas to the south. The exact reason(s) for of these impacts are unclear. Both wetlands were completely flooded due to the leaking boreholes (this is clearly visible on older aerial photos), but after the second plugging of borehole GWA 2A the area seems to be less wet. Signs of previous flooding are still visible in the areas around and between Wetlands 8 & 9 and even into the informal settlement to the southwest (Ikamvelihle) (Nel, 2016).

Wetland 10 (W10) occurs in a large flat area where three watercourses (tributaries) meet before they flow into the Coega River. From older aerial photography, it appears that some wet areas occurred to the north of the drainage lines and possible natural depressions occurred on the western boundary as indicated on the NFEPA and NMBM databases, however, the wetland has grown to encompass the depressions and an area of approximately 55,050 m² (5.5 ha) around the drainage lines to form a very large wetland that is dominated by *Typha capensis* (bulrush) and *Phragmites australis* (common reed). A section of the wetland to the south is separated from the rest by a large gravel road, however, culverts in the road connect the wetlands to the north and south of the road. The explanation for wetland growth is not confirmed, but is most likely also related to the aquifer that is under pressure and groundwater therefore reaches this low-lying area (28-32 masl) via drainage lines and subsurface flows. Another source of water is the leaking Coega Kop water reservoir directly up-gradient from Wetland 10. This wetland is regarded as artificial since it didn't exist in this form before, but has naturalised over time. Should additional water sources dry up, the wetland could probably persist but may shrink with time (Nel, 2016).

One non-perennial drainage line that flows into the Coega River has been identified on the 1:50 year topographical map to occur within 100 m of the proposed well field infrastructure (DWS regulated area), more specifically the pipeline from the proposed WTW towards the Coega Reservoir. This drainage line was labelled **Drainage 2** and was observed approximately 30m north of the proposed pipeline alignment/ boundary of the Coega Reservoir site. It can be described as a narrow non-perennial stream in the upper foothills zone which occurs on a moderately steep slope (±0.005) in a mostly natural and undisturbed setting. No definite channel banks can be distinguished and riparian vegetation is mostly only visible where

flatter areas or some pooling occur. Vegetation found that are typical of riparian areas include *Cotula sp., Isolepsis sp., Typha capensis., Atriplex semibaccata var. semibaccata* and other *Atriplex sp*. A riparian zone of two metres on both sides of the preferential flow path is indicated as this would encompass the riparian area for the largest part of the drainage line which is quite diverse and sometimes are limited to the drainage line incision (Nel, 2016).

The area identified as **Drainage 1** historically only occurred approximately 150 m from the proposed Coega Reservoir pipeline/ site boundary, but due to water flowing from the site, probably due to a leak in the Coega Reservoir, has formed a relatively large wet area from the site boundary and down gradient for about 180 m and towards the Coega River. Water flowing continuously from a leaking borehole at a point in the drainage line also contributes to this drainage line being very wet with continuous flow. Flatter areas in the drainage line have formed wetland-like features which occur on the northern and western boundaries of the delineated riparian zone. However, these areas seem to have formed more recently as the soils don't show the signs of wetness typical of wetlands. These areas seem to have formed in relation to the water coming from the reservoir site as well as possibly another leaking borehole towards the northwest of the reservoir site. The area where hydrophytic vegetation occurs has been delineated, however should the additional water source (leak) be fixed, this wet area is likely to reduce in size and disappear in some areas (Nel, 2016).

Wetlands 1, 3, 6, 8 & 9 would be classified as natural even though a degree of modification has occurred. Drainage 2 is classified as natural. Wetlands 2, 4, 5, 7 & 10 and Drainage 1 are classified as artificial (Nel, 2016).

If any of the boxes marked with an "N "are ticked, how will this impact / be impacted upon by the proposed activity.

If any of the boxes marked with an "An" are ticked, how will this impact / be impacted upon by the proposed activity.
If YES, specify and explain:

If YES, specify:

If any of the boxes marked with an "H" are ticked, how will this impact / be impacted upon by the proposed activity.
If YES, specify and explain:

If YES, specify:

6. CULTURAL/HISTORICAL FEATURES

Are there any signs of culturally or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including	YES	**NO**

Archaeological or palaeontological sites, on or close (within 20m) to the site?	Uncertain
If YES, explain:	According to the SAHRIS paleontological map (2017), a portion of the site falls within a high sensitive paleontological area. Paleontological sites have been noted in areas to the north and east of the Coega Kop Wellfield site. The closest site is approximately 2km to the north.

If uncertain, conduct a specialist investigation by a recognised specialist in the field to establish whether there is such a feature(s) present on or close to the site.

Briefly explain the findings of the specialist:	The site for the proposed Coega Kop Wellfield development is of low cultural significance and no archaeological sites/materials were observed during the investigation. Refer to **Appendix D-4** for the Archaeological Report.

Will any building or structure older than 60 years be affected in any way?	YES	**NO**
Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?	YES	**NO**

If yes, please submit or, make sure that the applicant or a specialist submits the necessary application to SAHRA or the relevant provincial heritage agency and attach proof thereof to this application if such application has been made.

SECTION C: PUBLIC PARTICIPATION

1. ADVERTISEMENT

The person conducting a public participation process must take into account any 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 the application which is subjected to public participation by—

(a) fixing a notice board (of a size at least 60cm by 42cm; and must display the required information in lettering and in a format as may be determined by the competent authority) at a place conspicuous to the public at the boundary or on the fence of—
  (i) the site where the activity to which the application relates is or is to be undertaken; and
  (ii) any alternative site mentioned in the application;

An A2-sized site notice board (in English) was placed on site on the 10th May 2016 at 33°46'31.99"S, 25°37'13.12"E. The site notice was placed at the nearest access road to the proposed site, as the property boundary is not visible from any road (**Figure 7 and 8**).

Refer to **Appendix E-1** for details of the site notice.

Figure 7: Placement of Site Notice


NOTICE OF ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

PROPOSED COEGA KOP WELLFIELD

Notice is hereby given that the **Nelson Mandela Bay Municipality** (NMBM) will be applying for an Environmental Authorisation for the **Proposed Coega Kop Wellfield**, in terms of the Environmental Impact Assessment Regulations, 2014 published in Government Notice R.982 of 4 December 2014. The application will be done in terms of activities listed in Government Notice R.983 and 985 of 2014, published in terms of Section 24(5) of the National Environmental Management Act, 1998 (Act No.107 of 1998) as amended. The proposed activities require that a Basic Assessment be submitted to the Eastern Cape Provincial Department of Economic Development, Environmental Affairs and Tourism (DEDEAT). The NMBM will also apply for a General Authorisation/Water Use Licence for water uses under Section 21, in terms of the National Water Act, 1998 (Act No. 36 of 1998).

Proposed Activity:
The proposed Coega Kop Wellfield entails developing a borehole wellfield in order to supply potable water within Port Elizabeth, and includes a Water Treatment Works (WTW) and associated pipelines. The purpose of the Coega Kop Wellfield is to supply the municipality with groundwater extracted from the Groot Winterhoek to the Coega Ridge Table Mountain Group Aquifer.

Locality:
The proposed Coega Kop Wellfield will be located on Erf 1 of Wells Estate in Ward 53, Port Elizabeth, Nelson Mandela Bay Municipality, Eastern Cape Province. The wellfield will be situated on municipal property next to Coega Kop, in close proximity to the Coega Kop Mine in the Coega / Motherwell area. The WTW will be located at 33°46'21.13"S and 25°36'36.79"E (central point) and pipelines will cross a number of properties.

Environmental Consultant:
CEN Integrated Environmental Management Unit – Dr Mike Cohen / Lucille Behrens
36 River Road, Walmer, Port Elizabeth, 6070
Telephone: (041) 581 2983 / Fax: 086 504 2549
E-mail: steenbok@aeroseat.co.za / lucille@cenconsultancy.co.za

Registration of Interested and Affected Parties
Interested and Affected Parties are invited to participate in the process by registering and submitting detailed written comment on the proposed development within 30 days of the notice (i.e. by 9 June 2016) to the contact details above.

Date of notice: 9 May 2016

Figure 8: Site Notice

(b) giving written notice to—
- (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
- (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
- (iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
- (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
- (v) the municipality which has jurisdiction in the area;
- (vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
- (vii) any other party as required by the competent authority;

The Applicant is the landowner.

Written notices were provided to the municipality, organs of state, ward councillors and to land owners (via email, or post). The notifications included a Background Information Document.

The Pre-Application Public Participation announced the proposed application and a 30 day comment and registration period was from 10 May to 9 June 2016.

Refer to **Appendix E-2** for the pre-application notifications.

See **Appendix E-3** for the Stakeholder and Interested and Affected Parties (I&APs) Database

(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 local 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 subregulation 54(c)(ii); and

Newspaper advertisements were placed in The Herald (English) and Die Burger (Afrikaans), on 6 May 2016, as part of the 30 day pre-application public participation.

Refer to **Figure 9** for the copy of the newspaper advertisements. Refer to **Appendix E-1** for details of the newspaper advertisement.

The proposed activity will not extend beyond or have an impact beyond the boundary of the local municipality.

Publication	Publication Date
DBOOS (Die Burger Oos)	06/05/2016

The Herald 6-5-16

KENNISGEWING VAN OMGEWINGSEVALUASIEPROSES

Kennisgesk ed hiermee dat die Nelson Mandela Bay Munisipaliteit (NMBM) aansoek sal doen vir 'n Omgewingsmagtiging vir die voorgestelde Coega Kop Boorgatveld, kragtens die Omgewingsimpakstudie-regulasies, 2014, gepubliseer in Staatskennisgewing R.982 van 4 Desember 2014. Hierdie aansoek word gedoen kragtens aktiwiteite gelys in Staats-kennisgewingregulasie (GNR) 983 en 985 van 2014, gepubliseer kragtens Artikel 24(5) van die Wet op Nasionale Omgewingsbestuur, 1998 (Wet nr. 107 van 1998) soos gewysig. Die voorgestelde aktiwiteite vereis dat 'n Basiese Evaluasie by die Oos-Kaapse Provinsiale Departement van Ekonomiese Ontwikkeling, Omgewingsake en Toerisme (DEDEAT) ingedien word. Die NMBM sal ook aansoek doen vir 'n Algemene Magtiging/ Watergebruiklisensie vir watergebruik onder Artikel 21, kragtens die Nasionale Waterwet, 1998 (Wet nr. 36 van 1998).

Die voorgestelde Coega Kop Boorgatveld behels die ontwikkeling van 'n boorgatveld tenemende drinkbare water binne Port Elizabeth te ewer, en sluit 'n Waterbehandelingswerke (WTW) en verwante pypyne in. Die doel van die Coega Kop Boorgatveld is om die munisipaliteit van grondwater te voorsien wat uit die Groot Winterhoek tot die Coega Ridge Tafelberg Groep Waterdraerontrekkers.

Die voorgestelde Coega Kop Boorgatveld sal op Erf 1 van Wells Estate in Wyk 53, Port Elizabeth, Nelson Mandela Bay Munisipaliteit, Provinsie Oos-Kaap geleë wees. Die boorgatveld sal op munisipale eiendom langs Coega Kop, naby die Coega Kop Myn in die Coega/Motherwell-gebied geleë wees. Die WTW sal by 33°46'21.13"S en 25°36'36.79"O (sentrale punt) geleë wees, en pypyne vir afvoer ing en drinkbare water sal 'n hele aantal eiendomme kruis.

Omgewingskonsultant:
CEN Integrated Environmental Management Unit – Dr. Mike Cohen / Lucille Behrens
Riverweg 36, Walmer, Port Elizabeth, 6070
Telefoon: 041 581 2983 / Faks: 086 504 2549
E-pos: steenbok@aerosat.co.za/lucille@environmentcen.co.za

Registrasie van Belangstellende en Geaffekteerde Partye
Belangstellende en Geaffekteerde Partye word genooi om aan die proses deel te neem deur te registreer en gedetaileerde geskrewe kommentaar rakende die voorgestelde ontwikkeling binne 30 dae vanaf hierdie kennisgewing (d.w.s. teen 6 June 2016) aan die bogenoemde kontakbesonderhede te rig.
Datum van kennisgewing: 6 Mei 2016

2967530(1RD2)(09) 6/5

NOTICE OF ENVIRONMENTAL ASSESSMENT PROCESS

Notice is hereby given that the Nelson Mandela Bay Municipality (NMBM) will be applying for an Environmental Authorisation for the proposed Coega Kop Wellfield, in terms of the Environmental Impact Assessment Regulations, 2014, published in Government Notice R.982 of 4 December 2014. This application will be done in terms of activities listed in Government Notice Regulation (GNR) 983 and 985 of 2014, published in terms of Section 24(5) of the National Environmental Management Act, 1998 (Act No 107 of 1998) as amended. The proposed activities require that a Basic Assessment be submitted to the Eastern Cape Provincial Department of Economic Development, Environmental Affairs and Tourism (DEDEAT). The NMBM will also apply for a General Authorisation/Water Use Licence for water uses under Section 21, in terms of the National Water Act, 1998 (Act No. 36 of 1998).

The proposed Coega Kop Wellfield entails developing a borehole wellfield in order to supply potable water within Port Elizabeth, and includes a Water Treatment Works (WTW) and associated pipelines. The purpose of the Coega Kop Wellfield is to supply the municipality with groundwater extracted from the Groot Winterhoek to the Coega Ridge Table Mountain Group Aquifer.

The proposed Coega Kop Wellfield will be located on Erf 1 of Wells Estate in Ward 53, Port Elizabeth, Nelson Mandela Bay Municipality, Eastern Cape Province. The wellfield will be situated on municipal property next to Coega Kop, in close proximity to the Coega Kop Mine in the Coega / Motherwell area. The WTW will be located at 33°46'21.13"S and 25°36'36.79"E (central point), and pipelines for discharge and potable water will cross a number of properties.

Environmental Consultant:
CEN Integrated Environmental Management Unit – Dr Mike Cohen / Lucille Behrens
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E-mail: steenbok@aerosat.co.za/lucille@environmentcen.co.za

Registration of Interested and Affected Parties
Interested and Affected Parties are invited to participate in the process by registering and submitting detailed written comment on the proposed development within 30 days of this notice (i.e. by 6 June 2016) to the contact details above.

Figure 9: Newspaper Advertisements in The Herald and Die Burger, 6 May 2016

(e) using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desiring of but unable to participate in the process due to—
  (i) illiteracy;
  (ii) disability; or
  (iii) any other disadvantage.

2. CONTENT OF ADVERTISEMENTS AND NOTICES

A notice board, advertisement or notices must:

(a) indicate the details of the application which is subjected to public participation; and
(b) state—
  (i) that the application has been submitted to the competent authority in terms of these Regulations, as the case may be;
  (ii) whether basic assessment or scoping procedures are being applied to the application, in the case of an application for environmental authorisation;
  (iii) the nature and location of the activity to which the application relates;
  (iv) where further information on the application or activity can be obtained; and
  (iv) the manner in which and the person to whom representations in respect of the application may be made.

Refer to **Appendix E-1** for details of the site notice and newspaper advertisement.

3. PLACEMENT OF ADVERTISEMENTS AND NOTICES

Where the proposed activity may have impacts that extend beyond the municipal area where it is located, a notice must be placed in at least one provincial newspaper or national newspaper, indicating that an application will be submitted to the competent authority in terms of these regulations, the nature and location of the activity, where further information on the proposed activity can be obtained and the manner in which representations in respect of the application can be made, unless a notice has been placed in any *Gazette* that is published specifically for the purpose of providing notice to the public of applications made in terms of the EIA regulations.

Advertisements and notices must make provision for all alternatives.

The proposed activity will not extend beyond or have an impact beyond the boundary of the local municipality.

Newspaper advertisements were placed in The Herald (English) and Die Burger (Afrikaans), on 6 May 2016, as part of the 30 day pre-application public participation.

An A2-sized site notice board (in English) was placed on site on the 10th May 2016 at 33°46'31.99"S, 25°37'13.12"E. The site notice was placed at the nearest access road to the proposed site, as the property boundary is not visible from any road.

4. DETERMINATION OF APPROPRIATE MEASURES

The practitioner must ensure that the public participation is adequate and must determine whether a public meeting or any other additional measure is appropriate or not based on the particular nature of each case. Special attention should be given to the involvement of local community structures such as Ward Committees, ratepayers associations and traditional authorities where appropriate. Please note that public concerns that emerge at a later stage that should have been addressed may cause the competent authority to withdraw any authorisation it may have issued if it becomes apparent that the public participation process was inadequate.

5. COMMENTS AND RESPONSE REPORT

The practitioner must record all comments and respond to each comment of the public before the application is submitted. The comments and responses must be captured in a comments and response report as prescribed in the EIA regulations and be attached to this application. The comments and response report must be attached under Appendix E.

Refer to **Appendix E-4** for the Comments and Response Report.

6. AUTHORITY PARTICIPATION

Authorities are key interested and affected parties in each application and no decision on any application will be made before the relevant local authority is provided with the opportunity to give input. The planning and the environmental sections of the local authority must be informed of the application at least 30 (thirty) calendar days before the submission of the application.

List of authorities informed:

Department of Economic Development, Environmental Affairs and Tourism (DEDEAT)

National Department of Agriculture

Nelson Mandela Bay Municipality Public Health

Nelson Mandela Bay Municipality Infrastructure & Engineering

Nelson Mandela Bay Municipality Human Settlements

Nelson Mandela Bay Municipality Electricity

Department of Agriculture, Forestry and Fisheries (DAFF)

Department of Water and Sanitation (DWS)
Eastern Cape Department of Roads and Public Works
Eastern Cape Provincial Heritage Resources Authority (ECPHRA)

List of authorities from whom comments have been received:

None

7. CONSULTATION WITH OTHER STAKEHOLDERS

Note that, for linear activities, or where deviation from the public participation requirements may be appropriate, the person conducting the public participation process may deviate from the requirements of that subregulation to the extent and in the manner as may be agreed to by the competent authority.

Any stakeholder that has a direct interest in the site or property, such as servitude holders and service providers, should be informed of the application at least 30 (thirty) calendar days before the submission of the application and be provided with the opportunity to comment.

Has any comment been received from stakeholders?	**YES**	NO

If "YES", briefly describe the feedback below (also attach copies of any correspondence to and from the stakeholders to this application):

Mr Paul Martin, the Independent Environmental Control Officer for the Coega IDZ, provided comments and concerns regarding water resources and the operations of the WTW. Please refer to **Appendix E-4** for the Comments and Response Report, and **Appendix E-5** for the correspondence with stakeholders.

SECTION D: IMPACT ASSESSMENT

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2010, and should take applicable official guidelines into account. The issues raised by interested and affected parties should also be addressed in the assessment of impacts.

1. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

List the main issues raised by interested and affected parties.

The following presents a list of the main issues raised by Interested and Affected Parties:

1. Layout plan of the wellfield
2. Advertisements for public participation
3. Inadequate maintenance on existing water infrastructure and lack of finances.
4. Strategic groundwater resource, recharge capacity and impact of over draw of groundwater
5. Water use licence requirement
6. Water quality of the groundwater compared to other sources
7. End use water quality
8. Water within adjacent Transnet Quarry
9. Sludge lagoon requirements, quality, volumes and odours
10. Water quality for the discharge pipeline, monitoring and mitigation requirements
11. Discharging of waste water requirements
12. Maintenance and capacity requirements for borehole leaks
13. Security requirements

Refer to **Appendix E-4** for the detailed Comments and Response Register.

Response from the practitioner to the issues raised by the interested and affected parties (A full response must be given in the Comments and Response Report that must be attached to this report):

1. A draft layout plan is provided in the Draft Basic Assessment Report.
2. The pre-application notice was advertised in The Herald and Die Burger on 6 May 2016 requesting Interested and Affected Parties to register and comment on the proposed application. The site notice was placed at the nearest access road to the proposed site, as the property boundary is not

visible from any road. The site notice was placed on 10 May 2016.

3. The alternative of focusing only on maintenance, i.e. fixing water leaks and degraded infrastructure, would in itself not alleviate the water shortages that are experienced due to recurring and persistent drought conditions. Additional water sources are required to supplement the NMBM's water distribution in order to meet future growth needs. Furthermore, the NMBM's Water Master Plan and Water Conservation Demand Management programme includes the maintenance of existing infrastructure. Both this programme and the development of the Coega Kop Wellfield forms part of the NMBM's Master Plan to provide for the water demands of the NMBM. The Coega Kop Wellfield will therefore play a role in both an emergency capacity as well as in a regular (normal) water supply capacity.

4. The purpose of the proposed well field at Coega Kop is to utilize the groundwater available in the Groot Winterhoek – Coega Ridge Table Mountain Group Aquifer. This aquifer is a fractured-rock aquifer which primarily consists of Peninsula Formation of the Table Mountain Group (TMG). The geological structure of the aquifer is dominated by the Coega Fault System, a collection of semi-parallel faults of varying lengths and offsets, which runs along the entire length of the aquifer. Water from the aquifer gets trapped and travels along fractures in the fault system and is under high pressure in the eastern reach of the fault. The location of the well field near Coega Kop is ideal because the TMG outcrops at Coega Kop.

   An application for the taking of water from a water resource (Section 21(a)) was submitted to the Department of Water and Sanitation in 2013, with additional information provided in 2016, by Groundwater Africa on behalf of the NMBM.

   All the probe boreholes were test pumped in 2014 and 2015. By abstracting water at a certain rate and monitoring the level of the water in the boreholes the recharge in the boreholes and the sustainable yield can be determined. The proposed rate of abstracting groundwater would not be "mining" the aquifer. The process of establishing the long term yield and recharge rate is still ongoing. The wellfield will be closely monitored during its operation. The Uitenhage Springs (used for municipal bulk supply) is a natural discharge point for groundwater from the Groot-Winterhoe – Coega Ridge TMG Aquifer. A number of boreholes are located between Coega Kop and Uitenhage, however not all of these boreholes are operational. The hydrocensus conducted by Groundwater Africa (2016) identified existing uses of groundwater to be at approximately 8 litres per second, and indicated that the aquifer was underutilized.

   The mean annual runoff for the proposed site is given as between 10.25 and 23.99 mm/year. The area within 500m of the proposed activities is therefore not considered a Strategic Water Source Area. The groundwater recharge for the relevant sub-quaternary catchments is given as 59% for the sub-quaternary catchment, which is not regarded as significant. The area is therefore not considered important or sensitive from a groundwater recharge perspective (Nel, 2016).

5. The application for the taking of water from a water resource (Section 21(a)) was submitted to the Department of Water and Sanitation in 2013, with additional information provided in 2016, by Groundwater Africa on behalf of the NMBM. Section 21 (c) and (i) activities are also applicable as the borehole and potable water pipelines traverse watercourses, and the WTW and associated

infrastructure are located within the 500m regulated area of wetlands.

6. Preliminary water quality tests on the probe boreholes have shown that the groundwater is of generally good quality, however the iron (Fe) and manganese (Mn) concentrations are too high and exceed the SANS 241:2011 limits for potable water. The water is therefore not suitable for potable and industrial purposes without treatment. The purpose of the Coega Kop Wellfield is to supply the Coega IDZ and Colchester with groundwater extracted from the Groot Winterhoek to the Coega Ridge Table Mountain Group Aquifer. The groundwater requires a different type of treatment which may be less expensive than conventional treatment.
7. The purpose of the proposed Coega Kop Wellfield is to supply potable water to the Coega Industrial Development Zone (IDZ) and Colchester within the Nelson Mandela Bay Municipality. The development of the Coega Kop Wellfield forms part of the NMBM's Master Plan to provide for the water demands of the NMBM.
8. It is highly unlikely that the water in the Transnet Quarry is connected to the aquifer. The aquifer is largely artesian with pressures up to 6 bar and the water in the quarry does not show the same pressure. The water in the quarry would not be able to be re-cycled through the water treatment works as the water treatment process revolves around treating elevated concentrations of Iron and Manganese. Treatment of the water in the quarry will need a different treatment process.
9. The residue from the WTW (mostly inerts, iron oxide and manganese dioxide) will be emptied and stockpiled onsite in the evaporation lagoons until there is adequate volume for removal (either for reuse, for application to land, or for discharge to landfill). The total extent of evaporation lagoons would be approximately 1800m^2. It is expected that over the course of a year, the WTW will produce approximately 100 – 200 tonnes of dry solids for removal. The lagoons will be re-used once the solids have been removed, i.e. in rotation. Limited odours may be expected from the lagoons.
10. Discharging of water will occur during the start-up period to establish the microbial culture. The water treatment process will ensure that most of the iron and manganese is oxidized and removed during the biological filtration process, with nearly all remaining iron and manganese precipitating out in the lagoons before being discharged. Once the WTW is fully operational excess supernatant will be discharged at a point above a non-perennial tributary of the Coega River, at approximately 0.008Ml/day. The supernatant is expected to contain very low concentrations of soluble iron and manganese. The discharge water would be further treated as it flows overland prior to reaching the Coega River. The final quality of the discharged water should not have a negative impact aquatic life in the river. The monitoring of the quality of water discharged from the WTW will form part of the monitoring requirements. As the maximum discharges (1.4 l/s) from WTW is probably well exceeded by flows that occur naturally in the non-perennial watercourse for short periods during heavy rainfall events, it is likely that the increased flows will have a minimum negative impact on the ecological functioning of the lower Coega River.
11. The discharge of water will not be directly into the non-perennial watercourse or the Coega River, and will be allowed to flow overland prior to flowing into a water resource. It is thus considered that the discharging of the supernatant will not trigger an activity in terms of Section 21 (f) of the

National Water Act.

12. During the test pumping, the large flow and high pressure of borehole GWA 2B caused old, unused boreholes from the Department of Water and Sanitation (DWS) to flood the surrounding area. Borehole GWA 2B was subsequently plugged even deeper, which resulted in substantially decreased flooding, however, some flow from old boreholes still persists and causes unnatural wet areas mainly in low lying areas. Once the well field is operational the high pressure in the aquifer will most likely drop to a more manageable level. Monitoring of the boreholes will form part of the monitoring requirements.
13. Site security will be on site during construction. During the operational phase, security measures include fencing of the WTW and associated infrastructure as well as all borehole equipment will be placed in concrete chambers to prevent vandalism. The chambers will be fitted with thick concrete lids which will require removal by crane to gain access to the head works.

2. IMPACTS THAT MAY RESULT FROM THE PLANNING AND DESIGN, CONSTRUCTION, OPERATIONAL, DECOMMISSIONING AND CLOSURE PHASES AS WELL AS PROPOSED MANAGEMENT OF IDENTIFIED IMPACTS AND PROPOSED MITIGATION MEASURES

List the potential direct, indirect and cumulative property/activity/design/technology/operational alternative related impacts (as appropriate) that are likely to occur as a result of the planning and design phase, construction phase, operational phase, decommissioning and closure phase, including impacts relating to the choice of site/activity/technology alternatives as well as the mitigation measures that may eliminate or reduce the potential impacts listed.

Please refer to **Appendix G-2** for the Impact Assessment Methodology

Alternative (preferred alternative)

1. TERRESTRIAL BIODIVERSITY IMPACTS

Impacts include the following due to vegetation clearance for construction areas:

a) Loss of vegetation
b) Loss of habitats containing protected species or species of special concern
c) Potential spread of alien vegetation.

Other construction activities that may impact on flora, fauna and avifauna are:

a) Heavy construction vehicles and machinery may disturb or kill fauna, especially reptiles, and potentially avifauna.
b) Cooking on open fires creates a fire risk, which could impact on flora and fauna.

The majority of the Coega Kop Wellfield falls within a Terrestrial Critical Biodiversity Area (CBA) in terms of the Eastern Cape Biodiversity Conservation Plan (ECBCP, 2007). The infrastructure located on the eastern section falls within a Terrestrial CBA 1 due to the presence of Endangered ecosystems and Vulnerable

South African vegetation types (as described by STEP, 2002; Mucina and Rutherford, 2006), and areas that are required to be conserved in order to meet representation targets for biodiversity features i.e. 'irreplaceable sites'. The infrastructure on the western and northern section falls within a Terrestrial CBA 2 classified as a BLMC2, near natural landscapes. The borehole pipeline (GWA1G to GWA12A) in the southern section falls within a Terrestrial CBA 3 or functional landscape.

According to the Nelson Mandela Bay Bioregional Plan, the Coega Kop Wellfield does not fall into any CBA.

Mucina and Rutherford (2006; National Vegetation Map, 2012 version beta2) classifies the vegetation as Sundays Thicket vegetation, which falls within the Albany Thicket Biome. The Mucina Rutherford (2006) description for Sundays Thicket vegetation is largely fitting for vegetation present in the southern / south-western and northern sections of the study area as intact thicket. The remaining areas have been cleared previously or present patchy thicket vegetation and are more characteristic of Coega Bontveld vegetation. Sundays Thicket and Coega Bontveld are not listed as a threatened ecosystem on the National List of Threatened Terrestrial Ecosystems for South Africa (2011). *No works* will be undertaken in the floodplain area of the Coega River, which falls within the Albany Alluvial vegetation type, classified as a Threatened Ecosystem.

Five vegetation and / or habitat types were identified in the study area. Boundaries between these habitat types are not very distinct in the study area (except along fence line servitudes, or areas changed due to anthropogenic impacts – as is evident from aerial imagery), and changes appear to be ecotonal – as is often seen in Thicket-mosaic vegetation types. Changes in vegetation / habitat types are due to anthropogenic impacts i.e. past clearing and grazing, causing degradation and transformation of vegetation, and water leakages around test boreholes; changes in geology i.e. calcareous vs. deep, red clayey soils, and changes in aspect and topography (Louw, 2016).

With the exception of the large expanses of Sundays Valley Thicket vegetation to the north and south of the study area – which is densely vegetated, spinescent, solid and impenetrable and, therefore, largely untransformed / intact – the remaining habitat types in the study area have experienced, and continue to experience, some level of transformation and / or degradation due to anthropogenic impacts – ranging from a high significant negative impact in areas that were cleared in the past i.e. at Coega Kop, along fence line servitudes, and the cleared area towards Motherwell Township, to a low to moderate negative impact in Thicket-mosaic vegetation types fragmented by gravel roads and informal pathways, which continue to experience grazing in some places i.e. Motherwell Karroid Thicket, and Grass Ridge Bontveld vegetation (Louw, 2016).

A total of 137 plant species were identified on site, of which ten are listed as declared weeds and / or invaders i.e. Categories 1 and 2 under the Conservation of Agricultural Resources Act No. 43 of 1983, and Category 1b under the National Environmental Management: Biodiversity Act 10 of 2004 – National Invasive Terrestrial and Fresh-water Plant Species List (published August 2014).

No species listed as threatened on the Red List of South African Plants (version 2015.1) was identified on site.

Twenty-five species of protected plants listed under the Eastern Province Nature and Environmental Conservation Ordinance of 1974 and the Draft Eastern Cape Environmental Conservation Act of 2003, were identified on site.

One protected tree species listed under the National Forests Act No. 43 of 1983 was identified on site i.e. Sideroxylon inerme (White Milkwood). It occurs consistently in Thicket clumps across the study area.

The site does not fall within an Important Bird Area (BGIS).

The western and southern sections of the site are possibly utilized by the local community as a grazing area for domestic animals.

The construction phase would have the greatest impact on the terrestrial biodiversity, due to the clearance of vegetation and related construction activities. The operational phase of the project would have a limited impact on vegetation. Maintenance procedures would include cutting vegetation regrowth, e.g. to keep the discharge outlet clean and to provide access to pipelines. The potential of alien plants spreading is likely if not managed during the site establishment, construction and operational phases. The objective of rehabilitation is to re-establish a native vegetation cover, which is similar in species composition to that which existed before the disturbance, excluding alien and invasive plant species.

With the mitigation measures in place, the impact on the terrestrial biodiversity would remain localised resulting in a low impact.

Mitigation Measures – Construction Phase:

a) Permits are required for removal/destruction of protected species from the DEDEAT for plant species and from the DAFF for protected trees.
b) The site camp to be located in the footprint area for the WTW and associated infrastructure.
c) Clearing of vegetation to be limited to areas for construction works only, i.e. 20m construction width for the pipelines and access / service road, except where these are located adjacent to intact thicket areas then the construction width should be reduced to 10m.
d) Only shrubs are to be removed for the construction camp area and laydown areas. Grass is to be left in place.
e) Alien plant regrowth is to be monitored on-site by the Contractor's Environmental Officer and any such species to be removed physically by the Contractor.
f) An active Alien Plant Monitoring and Removal Programme to be implemented by the Contractor to ensure no further spreading of alien plants occur.
g) Alien and noxious plant species to be removed physically (prior to the seed bearing stage) by the Contractor.
h) All construction vehicles must stay on single demarcated access tracks.
i) Rehabilitation of disturbed areas to be done with indigenous plants and in a progressive manner.
j) Work areas must be clearly demarcated, e.g. with droppers and/or orange netting but not with danger tape, so that construction workers limit their impact to these areas alone.
k) Topsoil and subsoil should be conserved and returned once development is complete, to encourage recruitment from the soil-stored seed bank. Areas with Sundays Valley Thicket should be planted up with Spekboom (Portulacaria afra) truncheons as part of rehabilitation efforts in areas that do not form part of the maintenance servitude area.
l) Soil level / landscape contours should be restored to its original state, in order to encourage encroachment of neighbouring vegetation / bush clumps into disturbed areas, and allow wind-blown seed establishment i.e. all topsoil, subsoil and gravel stockpiles should be levelled to blend into the

landscape upon completion.

m) Reseeding of disturbed soil with grass species i.e. *Cynodon dactylon* (Quick Grass), will likely be required as part of rehabilitation efforts in order to restrict soil erosion, and encourage succession in areas that will not be actively replanted or landscaped as part of the development.

n) Given the high availability of plant species suitable for rehabilitation and landscaping e.g. Spekboom, Aloes, mesembs, geophytic bulbs etc., on site – use should be made of these plants during 'search and rescue', rehabilitation and landscaping efforts.

Mitigation Measures – Operational Phase:

a) Alien plant growth to be monitored by the NMBM and area to be kept free of alien invasive and noxious plants through physical removal.

No-Go Alternative: No protected or endangered species will be physically removed, however a risk remains that these species will be lost to animals as a food source. The risk remains that the current alien vegetation may spread into surrounding areas, if not controlled.

	Terrestrial Biodiversity		
Phase	**Construction Phase**	**Operational Phase**	**"No go"**
Nature	Loss of vegetation and spread of alien invasive species due to construction and associated activities	Spread of alien invasive species	Loss of vegetation due to spreading of alien species
Status	Direct, Negative	Direct, Negative	Direct, Negative
Extent	Local (2)	Local (2)	Local (2)
Duration	Short Term (1)	Long Term (3)	Long Term (3)
Intensity	Medium (6)	Medium (6)	Medium (6)
Probability	Definite (4)	Probable (2)	Probable (2)
Confidence	High		
Level of significance	(2+1+6)*4=36	(2+3+6)*2=22	(2+2+6)*2=20
	Moderate (-)	Low (-)	Low (-)
Reversibility	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes
Cumulative	Low	Low	Low
Level of significance with mitigation	**Low** (-)	**Low** (-)	**Low** (-)

2. IMPACTS ON AQUATIC BIODIVERSITY

The site falls within the Fish to Tsitsikamma Water Management Area (WMA) and the Algoa Sub-Water Management Area. The quaternary catchment applicable to the area is M30B (within the Coega River catchment). The study area falls within the South Eastern Coastal Belt Ecoregion (ID – 20) (Nel, 2016).

The study area largely falls within an Aquatic CBA 2 area with the associated BLMC of ABLMC 2a, which recommends that the catchment should be kept in a near natural state (ECBCP, 2007). The Coega River forms part of an Riverine Ecological Process Corridor in terms of the NMBM Bioregional Plan (2014).

The source of the Coega River lies on the eastern slopes of the Groot Winterhoekberge mountain range north of Uitenhage and the river meanders in a south-easterly direction for approximately 68km before discharging into the Coega Deepwater Harbour in Algoa Bay. Flow in the Coega River at Amanzi Estates (some 25km upstream of the Study Area) is described as "flashy" and very erratic, with no flows for periods of over a year, being a common occurrence. The permanent pools found in this section of the river appear to be filled via groundwater. This section of the Coega River normally flows for only two or three months during an "average' year after good rains in the catchment, while floods occur roughly every 2 to 7 years. The lower Coega River in the Study Area, however, appears to be almost perennial, probably due to elevated groundwater contribution to base flows in this reach, which presently is thought to include flows from leaking boreholes and leaks in the water reticulation system in Motherwell Township flowing down the Motherwell Stream (Bok, 2016).

Water quality data supplied for the Coega River at the R102 crossing shows that the water is highly saline, with totals dissolved solid (TDS) concentrations ranging from 1805 to 6568 mg/l between April 2014 and November 2015. This elevated salinity appears to be due to the underlying geology (marine sediments) of the Kirkwood and Sundays River formations of the Uitenhage Group (Toerien and Hill 1989) within the Coega River catchment. The large natural variation in TDS (or salinity) observed is considered to be related to variations in river flow and evaporation rates. Water quality data from monitoring points in the Coega River within the Coega Industrial Development zone (i.e. downstream of the Study Area) give high nutrient levels (ca. 10 mg/l for N02+N03-N), which reflect the organic rich sediment found in the pools. Although no recent data on phosphate or nitrate levels in the Study Area were available, the excess growth of algae in the pools sampled indicate elevated levels of these nutrients, probably from sewage discharges and agricultural return flows upstream (Bok, 2016).

Historically five fish species have been recorded in the middle and lower reaches of the Coega River. The fish species include the translocated Banded Tilapia (*Tilapia sparrmanii*) and indigenous species such as Chubbhead Minnow (*Barbus anoplus)*, River Goby (*Glossogobius callidus*), Cape Kurper (*Sandelia capensis*) and the Goldie Barb (*Barbus pallidus*). Three fish species were recorded during the specialist survey. These include *Sandelia capensis* (IUCN status: data deficient; Species of Special Concern, Threatened status)*, Barbus pallidus* (IUCN status: least concern; Species of Special Concern) and *Tilapia sparrmanii* (IUCN status: not listed; Alien) (Bok, 2016).

The presence of these two fish species of conservation importance in the lower Coega River, ensures a **HIGH** rating for the Ecological Importance and Sensitivity (EIS) for the Study Area. The habitat integrity for the Coega River is Class C due to the poor water quality (nutrient enrichment and elevated sediment input) and destruction of riparian vegetation (Bok, 2016).

The National Freshwater Ecosystems Priority Areas (NFEPA) project categorized the sub-quaternary catchment of the Coega River System as a Phase 2 FEPA. These are catchments that are moderately modified (C or D ecological category) but where valuable biodiversity still exists and where there are no similar rivers available in good condition (i.e. A or B category) that can be managed to meet biodiversity targets. In terms of management options, Phase 2 FEPAs should not be further degraded and should be considered for rehabilitation in the future. The PES on a sub-quaternary catchment level for the Coega River system is Class D (largely modified) and the EIS is rated as Moderate (Bok, 2016).

According to the National Freshwater Ecosystem Priority Areas (NFEPA) database, three wetland features

occur within 500m from the proposed activities. All three these wetlands are also included in a wetland cluster, which contains a total of 35 wetlands. As 89% of the wetland units in the cluster are coded as 'majority natural', the cluster was identified as a FEPA. However, ground-truthing of these wetlands has shown that they have been largely modified which will have an implication on the conservation importance. According to the NMBM wetlands database, nine wetland features occur within 500m from the proposed activities which includes the three wetlands identified in the NFEPA database. The NMBM database identifies a wetland about 200m to the northeast of Coega Kop Reservoir. Ground truthing of this area revealed that no wetland occurs in that location which has been used for soil dumping. Vegetation has re-established well in this area since the disturbance (Nel, 2016).

The mean annual runoff for the proposed site is given as between 10.25 and 23.99 mm/year. The area within 500 m of the proposed activities is therefore not considered a Strategic Water Source Area. The groundwater recharge for the relevant sub-quaternary catchments is given as 59% for the sub-quaternary catchment, which is not regarded as significant. The area is therefore not considered important or sensitive from a groundwater recharge perspective (Nel, 2016).

It is important to take note of the history of the area specifically with regards to groundwater and boreholes. During exploration of the Coega Fault System at Coega Kop in 2014-2015, numerous probe holes have been drilled to gather information on the fault system. Many of the drilled probe holes resulted in artesian water strikes, with one borehole (GWA 2B) providing an exceptional estimated yield of 100 L/s (8.64Mℓ/day) at a pressure of 6.5 bar. Test pumping of all the probe holes eventually identified six probe holes with good sustainable yields. All the probe holes have subsequently been plugged after preliminary tests to determine approximate yields and water quality. However, the large flow and high pressure of borehole GWA 2B caused old, unused boreholes from the Department of Water and Sanitation (DWS) to flood the surrounding area. The flooding extended over a portion of the NMBM's property and eventually continued through the Coega Development Corporation's (CDC's) property to an attenuation pond in the CDC's Zone 4. Borehole GWA 2B was subsequently plugged even deeper, which resulted in substantially decreased flooding, however, some flow from old boreholes still persists and causes unnatural wet areas mainly in low lying areas. The area around Coega Kop is extremely wet and water accumulates in all low-lying areas. Ten wetlands have been identified and delineated that fall within the 500m radius from proposed infrastructure, some of which are most likely the result of the above scenario (leaking boreholes) (Aurecon, 2016 and Nel, 2016).

The following table presents a summary of the identified aquatic systems, with those highlighted in bold as being directly impacted upon by the Coega Kop Wellfield infrastructure **(**Nel, 2016).

Table 3: Summary of Wetlands and Drainage Lines

Watercourse ID	Natural / Artificial	Present Ecological State (PES)	Ecological Importance and Sensitivity (EIS)	Recommended Ecological Category (REC)
Wetland 1	Natural (modified)	Class C	Moderate	C
Wetland 2	Artificial	N/A	Low / Marginal	D
Wetland 3	Natural (modified)	Class E	Low / Marginal	D
Wetland 4	**Artificial**	**N/A**	**Low / Marginal**	**D**
Wetland 5	**Artificial**	**N/A**	**Low / Marginal**	**D**

Wetland 6	Natural (modified)	Class C	Moderate	C
Wetland 7	Artificial	N/A	Low / Marginal	D
Wetland 8	Natural (modified)	Class C	Moderate	C
Wetland 9	Natural (modified)	Class C	Moderate	C
Wetland 10	Artificial	N/A	Low / Marginal	D
Drainage 1	**Artificial**	**Class D**	**Low / Marginal**	**N/A**
Drainage 2	Natural	Class D	Moderate	N/A

2.1. Degradation of Aquatic Systems due to Decreased Water Quality / Pollution

Construction Phase

Construction activities could cause contamination of wetlands, nearby streams and rivers, and groundwater if proper management is not practiced. Accidental spills of hydrocarbons (oils, diesel, etc.) or leakage of such substances from construction machinery may enter wetlands directly, through surface runoff during rainfall events or subsurface movement (through groundwater) and then migrate to downstream systems. Such chemicals, fuels or pollutants would alter the water quality within the wetland, having an effect on wetland ecology in the form of biodiversity loss, i.e. the loss of vegetation and wetland fauna that are sensitive to changes in water quality (especially from toxicant inputs). Solid waste in the form of general litter left by labourers such as construction materials (gloves, excess materials, cement, etc.) can also affect the wetlands in close proximity and downstream. This can establish a barrier to water movement and may also alter the quality of water within the resource negatively (Nel, 2016).

Wetlands 4, 5, 6 & 7 as well as the delineated riparian areas could be affected by contaminated runoff from the construction sites as they occur on or in close proximity to the proposed pipelines alignments. Contaminated water from uphill could reach these watercourses via overland runoff, subsurface seepage or via groundwater. This could lead to a potential decrease in water quality and associated impacts (described above) in the systems, which could indirectly impact on groundwater quality. Wetland 10 and the Coega River could indirectly be affected if contamination reaches these systems via the watercourse from Coega Kop or subsurface flows. It is not anticipated that runoff from the site could affect Wetlands 1, 3, 8 & 9 mainly due to the distance between the construction activities and the wetland catchment areas (Nel, 2016). The impact can be mitigated to a low negative impact.

Mitigation Measures: – Construction Phase

a) The construction camp and laydown areas for stockpiles etc. should be located on higher ground and not within 50m of any wetlands and watercourses;

b) The proper storage and handling of hazardous substances (hydrocarbons and chemicals) needs to be administered on site and at the construction camp site. If hazardous liquids are stored/ used on site, spill kits must be available;

c) Operation, storage and maintenance of machinery and construction-related equipment in close proximity to wetlands and watercourses must be limited as far as possible;

d) No wash water from washing of mechanical plant or equipment to be discharged to any

watercourse or wetland;

e) Appropriate solid waste disposal facilities must be provided on-site during construction and adequate signage be provided;

f) Spillages should be cleaned up immediately and contaminants properly drained and disposed of using appropriate waste facilities (not to be disposed of within the natural environment). Any contaminated soil from the construction site must be removed and disposed of appropriately;

g) Spill kits must be available on site;

h) Any cement batching activities should occur in the construction camp and conducted on an impermeable surface. Cement products/ wash may not be disposed of into the natural environment;

i) Drip-trays must be provided beneath standing vehicles and machinery, and routine checks should be done to ensure that these are in a good condition;

j) Portable toilets must be provided where construction is occurring. Workers need to be encouraged to use these facilities and not the natural environment; and

k) All construction plant equipment, general waste, surplus rock, and other foreign materials must be completely removed from site once construction has been completed.

Operational Phase

Man-induced impacts have resulted in a moderate change to the present ecological status (PES) of the Study Reach in the lower Coega River (PES = C). Although the natural habitats and biota have been moderately modified, the basic ecosystem functioning of the affected reach in the Coega River, is still predominantly unchanged. This river reach is considered a critical biodiversity corridor and supports valuable biodiversity, including two indigenous fish species of special conservation concern. Both the ecological importance (EI) and the ecological sensitivity (ES) of the affected river reach are considered to be high (Bok, 2016).

The raw borehole water in the Coega Kop Wellfield has high levels of iron and manganese. The water treatment process will ensure that most of the iron and manganese is oxidized and removed during the biological filtration process, with nearly all remaining iron and manganese precipitating out in the sludge lagoons before being discharged. Water to be discharged from the WTW which will flow ultimately to the Coega River will be the supernatant from the sludge lagoons and is expected to contain very low concentrations of soluble iron and manganese, namely iron = 250 µg/l and Manganese = 50 µg/l. Iron has limited toxicity for aquatic organisms, although at high concentrations the dense layers of iron precipitate (mainly Ferric Hydroxide) can settle on the streambed and smother benthic aquatic organisms, reducing productivity. The anticipated levels of manganese in the discharge water given above are well below the Chronic Effect Value (CEV) 370 µg/l, provided in the South African Water Quality Guidelines for aquatic ecosystems. The raw borehole water appears to pose a moderate to high pollution threat if discharged directly into the Coega River due to the elevated iron and manganese concentrations. However, if this water is (at least) partially treated at the WTW and is further purified as it flows through the wetland prior to reaching the Coega River, the final quality of the discharged water should not have a negative impact on the aquatic life in the river (Bok, 2016). The impact can be mitigated to a low negative impact.

Mitigation Measures: – Operational Phase

a) All partially-treated water leaving the WTW which may have high Fe and Mn levels should first be aerated (oxidised) and passed through the sedimentation/sludge lagoons to ensure most of the Fe and Mn precipitate is allowed to settle out before being discharged.

b) The excess and backwash water from the WTW should be discharged via an appropriately designed outlet structure near the upper end of the natural drainage line and wetland. This should ensure that and remaining iron and manganese can precipitate and settle out and will also enable the wetland to absorb and filter out any remaining contaminants before the water reaches the Coega River.

c) The quality of water discharged from the WTW should be closely monitored and appropriate remedial actions taken if necessary.

d) It is recommended that water samples for analyses be taken from a) the discharge structure receiving water discharged from the proposed WTW and b) at the R334 road crossing of the wetland some 350m downstream of the discharge structure. This will allow the quality of the discharge water to be determined before and after it has passed through the natural wetland.

e) The fish populations in the Study Reach within the lower Coega River could be used to indicate any negative (or positive) changes of aquatic habitat integrity associated with the project. After base-line data have been obtained, bi-annual fish sampling (summer and winter) should take place at the R102 bridge crossing (CR 1) and just downstream of the junction of the wetland/drainage line bisected by the R334 (CR 2). Data on fish species composition, relative abundance, catch per unit effort and population dynamics at these two sites should be obtained and any changing trends analysed.

No-Go Alternative: No change in status.

	Aquatic Biodiversity		
Phase	**Construction Phase**	**Operational Phase**	**"No go"**
Nature	Degradation of water quality in wetlands and watercourses	Pollution of Coega River	No change in status
Status	Indirect, Negative	Indirect, Negative	
Extent	Regional (3)	Regional (3)	
Duration	Short term (1)	Long term (3)	
Intensity	Medium (6)	High (8)	
Probability	Probable (2)	Highly Probable (3)	
Confidence	High		
Level of significance	(3+1+6)*2=20	(3+3+8)*3=42	No change in status
	Low (-)	Moderate (-)	
Reversibility	No	No	
Replaceability	Yes	Yes	
Cumulative	Low	Low	
Level of significance with mitigation	**Low** (-)	**Low** (-)	

2.2. Erosion and Elevated Sediment input into Wetlands and Watercourses

Vegetation in the wetland or watercourse catchment area not only stabilises soils, but also reduces surface water runoff velocities when rainfall occurs. Attenuation of surface water encourages permeation of the soils and reduces surface water runoff. During the construction phase when vegetation is cleared, large quantities of loose earth may easily be washed from the construction zone or be transported down slope during high rainfall events, resulting in increased sedimentation of aquatic systems occurring downstream. This would impact on aquatic biota, but could also influence the geomorphology of wetlands and overall functioning in severe circumstances. Construction of the proposed pipeline and access road from the WTW towards the Coega Kop Reservoir is planned directly upstream of Drainage 1 and Drainage 2 and sedimentation of these systems could also affect Wetland 10 and the Coega River downstream (±630 m). It is however likely that any sedimentation will be attenuated in Wetland 10 and will not reach the Coega River. Considering the topography of the site, construction of the remaining infrastructure components is most likely to affect the wetlands in close proximity to the activities, such as Wetlands 4, 5, 6 & 7. Other wetlands identified should not be directly affected by sedimentation in runoff. It is noted that no infrastructure is proposed within any buffers recommended for natural wetlands (Wetlands 1, 3, 6. 8 & 9), which reduces the potential impact of sedimentation and subsequent impacts on biota and geomorphology of these systems (with higher EIS) (Nel, 2016).

The excess borehole water and backwash water discharged via a pipeline from the WTW to the natural drainage line and wetland which has a steep gradient, may cause erosion and sediment input into the Coega River. The drainage line already has well-developed wetland areas along its length due to on-going seepage from old boreholes and possibly from the Coega Reservoir. The maximum volume of water to be discharged (approximately 1.4 l/s during start-up) would be far exceeded by stormflows that occur naturally in the drainage line for short periods during heavy rainfall events. A well designed outlet structure and possibly gabion retention walls, should ensure that scouring and erosion does not occur during the operational phase (Bok, 2016).

With the mitigation measures in place, the impact relating to Increased Erosion and Sedimentation of Aquatic Systems would remain localised resulting in a low impact during both the construction and operational phases.

Mitigation Measures: – Construction Phase

a) Clearing of vegetation should be kept to 10m width within the aquatic areas;

b) Excavated or spoil material (including any foreign materials) as well as topsoil stockpiles should not be placed within close proximity (at least 50 m) of wetlands or watercourses (including shallow non-perennial drainage lines) in order to reduce the possibility of material being washed downstream;

c) Disturbed areas should be rehabilitated immediately after construction in the relevant area (with indigenous vegetation or using topsoil);

d) Rehabilitated areas should be monitored well and measures must be implemented to ensure that topsoil does not wash away, e.g. using swales; and

e) Any erosion gullies/ channels created during construction should be filled immediately to ensure silt does not drain into aquatic systems and the area revegetated.

f) The outlet structure at the WTW discharge point should be designed to reduce flow velocities and disperse the discharged water over a wide area to prevent concentrated flows causing erosion. In addition, the construction of leaking gabion walls in the drainage line to reduce flow velocities and form small retention ponds to facilitate growth of wetland plants such as reeds and bulrushes, should also be considered, if necessary.

g) Silt fences to be installed adjacent to wetland and watercourses where construction works are being undertaken.

Mitigation Measures: – Operational Phase

a) Maintenance of gravel access and maintenance roads should be ongoing to prevent formation of erosion gullies/ channels in or on the side of the roads; and

b) Any erosion gullies/ channels leading downslope should be filled and stabilised as soon as possible. Also, disturbed and bare ground surfaces should be rehabilitated with suitable indigenous vegetation to stabilise soils.

c) The outlet structure at the WTW discharge point should be designed to reduce flow velocities and disperse the discharged water over a wide area to prevent concentrated flows causing erosion. In addition, the construction of leaking gabion walls in the drainage line to reduce flow velocities and form small retention ponds to facilitate growth of wetland plants such as reeds and bulrushes, should also be considered, if necessary.

No-Go Alternative: Some sedimentation of wetlands and watercourses are probably already occurring due to the ongoing mining-related activities on Coega Kop as well as the many gravel roads within wetland and watercourse catchments. It is likely that these activities would continue, thus no change in status.

	Aquatic Biodiversity		
Phase	**Construction Phase**	**Operational Phase**	**"No go"**
Nature	Erosion and elevated sedimentation	Erosion and elevated sedimentation	No change in status
Status	Indirect, Negative	Indirect, Negative	
Extent	Regional (3)	Regional (3)	
Duration	Medium term (2)	Long term (3)	
Intensity	Medium (6)	Medium (6)	
Probability	Highly Probable (3)	Highly Probable (3)	
Confidence	High		
Level of significance	(3+2+6)*3=33	(3+3+6)* 3=36	No change in status
	Moderate (-)	Moderate (-)	
Reversibility	No	No	
Replaceability	Yes	Yes	
Cumulative	Low	Low	
Level of significance with mitigation	**Low** (-)	**Low** (-)	

2.3. Increased base flows in Coega River

There is little information regarding possible differences between present-day flows compared to natural or virgin flows in the lower Coega River. However, it is apparent that historically the presence of a number of natural artesian springs in the lower Coega River catchment, particularly on Amanzi Estates, ensured that under natural conditions the lower Coega River remained perennial or near perennial with permanent surface water in refuge pools. Although most of this water from artesian springs is now diverted away from the river for agricultural use, the inflow of water from old boreholes in the Study Area and water leaking from the Motherwell water reticulation and waterborne sewage systems, appears to have compensated for any upstream flow reduction. The discharges from the proposed WTW, will add to these "artificial" compensation flows and may even have a beneficial impact. As the maximum discharges (1.4 l/s) from WTW is probably well exceeded by flows that occur naturally in the watercourse for short periods during heavy rainfall events, it is likely that the increased flows will have minimum negative impact on the ecological functioning of the lower Coega River (Bok, 2016).

No impact is anticipated during the construction phase, as this impact relates mainly to the operational phase. The impact can be mitigated to a low negative impact.

Mitigation Measures: – Operational Phase

a) Short-term high volume discharges from the WTW should be avoided if possible to prevent unnatural flow peaks.

b) All water should be discharged to the upper reaches of the drainage line and through the existing wetland system which will tend to release the water slowly and dampen potential peak flows to the Coega River.

No-Go Alternative: No change in status.

	Aquatic Biodiversity		
Phase	**Construction Phase**	**Operational Phase**	**"No go"**
Nature	No impact	Increased base flows in Coega River	No change in status
Status		Indirect, Negative	
Extent		Regional (3)	
Duration		Long term (3)	
Intensity		Medium (6)	
Probability		Probable (2)	
Confidence	High		
Level of significance	No impact	(3+3+6)*2=24	No change in status
		Low (-)	
Reversibility		Yes	
Replaceability		Yes	
Cumulative		Low	
Level of significance with mitigation		**Low** (-)	

2.4. Potential Destruction of Wetland and Riparian Habitat

The proposed pipeline from borehole GWA 2B crosses Wetland 5 (79m) and extends into Wetland 4 (30m) where the borehole is located. Both wetlands are artificial and mainly exist due to leaking boreholes in the area and would likely reduce in size or disappear once these additional water inputs ends. Therefore, the pipelines planned in these wetlands are not considered a fatal flaw. However, if construction related activities occur within or near the natural wetlands and riparian zones, the wetland/ riparian vegetation and habitats could be disturbed and the soil compacted. These activities include construction on and around the proposed WTW site adjacent to Wetland 6, installation of the pipeline adjacent to the Coega Kop Reservoir site boundary to the north within the riparian zone buffer and when construction vehicles drive over these areas or use wetland and buffer areas for stockpiling or spoil sites. Indiscriminate fires may change vegetation communities and affect the availability of faunal habitat (Nel, 2016).

During the operational phase, maintenance activities may require the clearing riparian and wetland habitat / vegetation. These activities would be limited to the area immediately surrounding the infrastructure.

With the mitigation measures in place, the impact relating to the potential destruction of wetland and riparian habitat would remain localised resulting in a low impact during both the construction and operational phases.

Mitigation Measures: – Construction Phase

a) Delineated wetlands, including proposed buffers, should be identified as no-go areas, except where pipeline alignments are currently proposed to borehole GWA 2B and towards the Coega Kop Reservoir;

b) Where pipeline alignments are proposed on or near delineated wetlands, riparian zones or buffers, construction work areas should be kept to a minimum and demarcated before the start of construction;

c) No construction vehicles should be allowed within the demarcated area and other no-go areas and construction activities should avoid wetland habitat and soils should not be compacted;

d) The construction camp and laydown areas for stockpiles etc. should be located on higher ground and not in close proximity (50m) to any wetlands or drainage lines; and

e) No fires (for cooking) should be allowed outside the construction site camp (if at all).

f) Watercourse and wetland crossings to be restricted to a 10m construction width.

g) Pipeline in wetlands are to be buried. Once backfilled the ground level must be the same as natural levels. The topsoil must be placed back last and only lightly compacted.

Mitigation Measures: – Operational Phase

a) Disturbed and bare ground surfaces should be rehabilitated with suitable indigenous vegetation to stabilise soils.

b) Ensuring 80% of vegetation is established and covers the disturbed areas (i.e. areas not forming

part of the infrastructure site / operations).

c) Maintenance activities to be restricted to a 10m area surrounding the infrastructure.

No-Go Alternative: No change in status.

	Aquatic Biodiversity		
Phase	**Construction Phase**	**Operational Phase**	**"No go"**
Nature	Potential destruction of wetland and riparian habitat	Potential destruction of wetland and riparian habitat	No change in status
Status	Direct, Negative	Direct, Negative	
Extent	Local (2)	Local (2)	
Duration	Permanent (4)	Long term (3)	
Intensity	Low (4)	Low (4)	
Probability	Definite (4)	Probable (2)	
Confidence	High		
Level of significance	(2+4+4)*4=40	(2+3+4)*2=18	No change in status
	Moderate (-)	Low (-)	
Reversibility	Yes	Yes	
Replaceability	Yes	Yes	
Cumulative	Low	Low	
Level of significance with mitigation	**Low (-)**	**Low** (-)	

2.5. Wetland Alteration due to a change in Wetland Hydrology and Zonation

Changes to wetland hydrology will over time affect the zonation of a wetland and the biota communities associated to the various zones. Freshwater additions to saltpan will understandably alter biodiversity of the wetland to a large extent. The exploration for a good water resource in the Coega Fault System, which has led to additional pressure in the groundwater aquifer underlying the study area and resulted in leaking boreholes, has caused changes to wetland hydrology of some of the study wetlands and also created new wetlands or expanded existing ones. Pumping of the planned new boreholes should relieve the pressure (as indicated by the study hydrogeologist) and it is anticipated that the new or expanded wetlands should over time reduce in size or disappear. The timeframe for these expected changes is however very uncertain, but these changes are not viewed as negative impacts as it will probably result in changes more similar to the original condition (before 2014). The construction of structure and installation of infrastructure in a wetland or wetland catchment can influence wetland hydrology by the compaction of soil (inhibiting subsoil flows) or acting as a berm which prevents surface water flows towards to wetlands. Surface water needs to permeate into shallow, as well as deeper groundwater systems. This is essential to maintain the important surface water – groundwater linkages in wetlands as well as to maintain riparian associated vegetation dependent on subsurface flows (Nel, 2016).

Considering the proposed WTW position and the pipeline alignments, the potential impacts to wetland hydrology of natural wetlands and riparian zones due to permanent structures should be minimal. Indiscriminate spoiling of construction waste and driving in the wetland and riparian buffer areas could

however also affect hydrology and should be managed specifically near Wetland 6 and Drainage 2. Consideration was also given to the potential impact to natural wetland systems when boreholes are pumped in the vicinity with the associated changes to the groundwater profile. However, the aquifer targeted for pumping is a deep confined aquifer, which is most probably not linked to the existing natural wetlands and pumping of this aquifer should therefore not affect the hydrology and natural vertical water interactions of these wetlands (Nel, 2016).

Mitigation Measures: – Design & Construction Phase

a) The potential leak in the Coega Kop Reservoir should be investigated and repaired as soon as possible should this be the source of water flowing from Coega Kop;

b) Stormwater should not be directed directly into any wetland or watercourse, but should be released at an area where it can disperse and then flow into the natural drainage system of the area;

c) Delineated wetlands, including proposed buffers, should be identified as no-go areas, except where pipeline alignments are currently proposed to borehole GWA 2B and towards the Coega Kop Reservoir.

d) Where pipeline alignments are proposed on or near delineated wetlands, riparian zones or buffers, construction work areas should be kept to a minimum and demarcated before the start of construction;

e) No construction vehicles should be allowed within the demarcated area and other no-go areas and construction activities should avoid wetland habitat and soils should not be compacted; and

f) The construction camp and laydown areas for stockpiles etc. should be located on higher ground and not in close proximity (50m) to any wetlands or drainage lines.

g) Watercourse and wetland crossings to be restricted to a 10m construction width.

h) Pipeline in wetlands are to be buried. Once backfilled the ground level must be the same as natural levels. The topsoil must be placed back last and only lightly compacted.

Mitigation Measures: – Operational Phase

a) Monitoring of the rate and level of water in the boreholes

b) Pipelines (groundwater and potable water) to be monitored for any leaks.

c) Water leaks or pipe bursts to be fixed immediately.

No-Go Alternative: No change in status

	Aquatic Biodiversity		
Phase	**Construction Phase**	**Operational Phase**	**"No go"**
Nature	Change in hydrology	Change in hydrology	No change in status
Status	Direct, Negative	Direct, Negative	
Extent	Regional (3)	Regional (3)	
Duration	Long term (3)	Long term (3)	
Intensity	Low (4)	Low (4)	

Probability	Probable (2)	Probable (2)	
Confidence	High		
Level of significance	(3+3+4)*2=20	(3+3+4)*2=20	No change in status
	Low (-)	Low (-)	
Reversibility	Yes	Yes	
Replaceability	Yes	Yes	
Cumulative	Low	Low	
Level of significance with mitigation	**Low (-)**	**Low** (-)	

3. PROVISION OF WATER RESOURCES

The purpose of the proposed well field at Coega Kop is to utilize the groundwater available in the Groot Winterhoek – Coega Ridge Table Mountain Group Aquifer. The aquifer recharges in its exposed western areas and the groundwater slowly flows in an easterly direction (becoming confined on the way) towards the coast, where it discharges from springs out into the sea. The mean annual runoff for the proposed site is given as between 10.25 and 23.99 mm/year. The area within 500 m of the proposed activities is therefore not considered a Strategic Water Source Area. The groundwater recharge for the relevant sub-quaternary catchments is given as 59% for the sub-quaternary catchment, which is not regarded as significant. The area is therefore not considered important or sensitive from a groundwater recharge perspective (Nel, 2016).

Extensive exploration of the Coega Fault System at Coega Kop has been completed. Six probe boreholes have been identified with sustainable yields. This makes the development of a well field at Coega Kop a feasible option to supply the municipality with water. The NMBM's Water Master Plan and Water Conservation Demand Management programme includes the maintenance of existing infrastructure. Both this programme and the development of the Coega Kop Wellfield forms part of the NMBM's Master Plan to provide for the water demands of the NMBM. The Coega Kop Wellfield will therefore play a role in both an emergency capacity (e.g. droughts) as well as in a regular (normal) water supply capacity.

No impact is anticipated during the construction phase, as this impact relates mainly to the operational phase.

During the operational phase the supply of potable water may be disrupted due to water leaks on the various pipelines, which would lead to a loss of water and revenue for the NMBM. The impact surrounding the provision of water is considered to be low positive, with appropriate mitigation measures being implemented, during the maintenance phase.

Mitigation Measures: – Operational Phase

a) Monitoring of the rate and level of water in the boreholes

b) Monitoring of the quality of water discharged from the WTW

c) Pipelines (groundwater and potable water) to be monitored for any leaks.

d) Water leaks or pipe bursts to be fixed immediately.

No-Go Alternative: The No-Go Alternative entails that the proposed Coega Kop Wellfield is not developed and the existing situation remains the same. The risk of limited potable water remains where water scarcity is experienced. The impact remains at a moderate negative significance.

	Water Resources		
Phase	**Construction Phase**	**Operational Phase**	**"No go"**
Nature	No impact	Potential loss of water due to leaks or pipe bursts	No additional water resource for potable water distribution
Status		Direct, Negative	Direct, Negative
Extent		Regional (3)	Regional (3)
Duration		Long term (3)	Long term (3)
Intensity		Medium (6)	High (8)
Probability		Probable (2)	Highly Probable (3)
Confidence	Medium		
Level of significance	No impact	(3+3+6)*2=24	(3+3+8)*3=42
		Low (-)	Moderate (-)
Reversibility		Yes	Yes
Replaceability		Yes	Yes
Cumulative		Low	Low
Level of significance with mitigation		**Low (+)**	**Moderate** (-)

4. SOCIAL IMPACTS: HEALTH, SAFETY AND SECURITY IMPACTS

4.1. Public Health, Safety and Security

General safety of persons is a concern due to construction activities, e.g. open excavations and machinery, resulting in potential injury to construction staff; health and safety aspects relate to the potential spread of HIV and STDs. Security aspects relate to potential theft of construction materials and theft within neighbouring properties. The presence of workers on the site for construction related activities, irrespective of whether or not they are local, may create an increased safety and security risk to local households in the area. In addition, any changes in the local crime rates are likely to be attributed to the influx of construction workers, whether such changes can be attributed to their presence or not. The contractor would have security on-site during the construction phase. Veld fires are a potential risk considering the vegetation types occurring within and adjacent to the site. During construction the risk may be attributed to inappropriate construction activities (e.g. hot work, welding) on dry, windy days. The impact can be mitigated to a very low negative impact significance.

Safety and security impacts during the operational phase relate to the maintenance of the pipelines as well as any emergency work that may need to be undertaken. Theft of equipment or materials from the borehole sites and WTW. An additional impact is the use and storage of chlorine gas in the WTW. The WTW staff would be at a greater risk to any accidental release of chlorine gas compared to the surrounding community (located approximately 350m from the WTW). Risk mitigation measures and the OHS requirements for the

storage and management of chlorine gas will need to be strictly followed. The impact can be mitigated to a very low negative impact significance.

Mitigation Measures: – Construction Phase

a) A general STD and HIV/AIDS awareness programme should be provided to all workers.

b) Construction vehicles must adhere to speed limits and must be made aware of people walking and living in close proximity to the site.

c) Signage is to be displayed regarding construction activities.

d) Excavations to be demarcated with barriers.

e) General risks associated with the construction activities should be addressed through compliance with the relevant health and safety procedures and regulations.

f) Security to be provided after hours to protect equipment in the construction camp.

g) No construction workers, apart from security personnel, should be allowed to overnight at the construction site.

h) Access to and from the construction site(s) should be closely monitored and contractors should be required to make the necessary arrangements for the transport of workers to and from the site on a daily basis.

i) The construction area must be demarcated and access controlled for the duration of the construction period.

j) Visitors to report to the Site Office, and appropriate Protective Personal Equipment to be worn by visitors.

k) Fire-fighting equipment in proportion to the fire risk that is presented by the type of construction and other on-site activities and materials used on site is to be available and kept in good operating order at all times.

l) Any sources of heating of materials must be done in a controlled environment, under appropriate supervision, in such a manner as to minimise the risk of fires and/or injury to staff.

m) No “hot work” is to be undertaken on days where the Fire Danger Index is “orange” or “red”.

n) Smoking will not be permitted in those areas where there is a fire hazard. These areas include the fuel storage areas and any area where the vegetation or other material may support the rapid spread of an initial flame. These areas (e.g. at the chemical and hazardous substances storage area) are to be demarcated with no-smoking signs.

Mitigation Measures: – Operational Phase

a) OHS requirements for the storage and management of chlorine gas will be strictly followed.

b) Firefighting equipment (according to the fire risk) to be available on site at all times.

c) WTW and associated infrastructure (lagoons) to be fenced.

d) Borehole equipment placed in concrete chambers at each borehole site.

No-Go Alternative: No change in status.

	Social: Health, Safety and Security		
Phase	**Construction Phase**	**Operational Phase**	**"No go"**
Nature	Health, Safety and Security	Safety and Security	No change in status
Status	Direct, Negative	Direct, Negative	
Extent	Local (2)	Local (2)	
Duration	Short term (1)	Long term (3)	
Intensity	Medium (6)	Medium (6)	
Probability	Probable (2)	Probable (2)	
Confidence	High		
Level of significance	(2+1+6)*2=18	(2+3+6)*2=22	No change in status
	Low (-)	Low (-)	
Reversibility	Yes	Yes	
Replaceability	Yes	Yes	
Cumulative	Low	Low	
Level of significance with mitigation	**Very Low** (-)	**Very Low** (-)	

4.2. Employment Opportunities

Limited opportunities for skilled workers, semi-skilled workers and unskilled labourers could be created during the construction phase of the project (approximately 29 positions). During the operational phase, limited skilled employment will be created for the operation of the WTW (approximately four (4) positions). An adverse effect on this impact may occur in that high expectations are formed regarding construction employment opportunities and that these expectations cannot be sustained. The impact can be mitigated to a low positive impact.

Mitigation Measures: – Construction Phase

a) Local labour from the surrounding community to be used for unskilled positions.

b) Materials should be sourced from local suppliers, where possible.

c) Transport should be provided for labour to-and-from site on a daily basis.

Mitigation Measures: – Operational Phase

a) Local labour from the surrounding community to be used for unskilled positions.

No-Go Alternative: Employment opportunities will not be created. The impact remains at a low negative significance.

	Social: Employment Opportunities		
Phase	**Construction Phase**	**Operational Phase**	**"No go"**
Nature	Employment Opportunities	Employment Opportunities	Employment Opportunities

Status	Indirect, Positive	Indirect, Positive	Indirect, Negative
Extent	Regional (3)	Regional (3)	Regional (3)
Duration	Short term (1)	Long term (3)	Long term (3)
Intensity	Low (4)	Low (4)	Low (4)
Probability	Probable (2)	Probable (2)	Probable (2)
Confidence	High		
Level of significance	(3+1+4)*2=16	(3+3+4)*2=20	(3+3+4)*2=20
	Low (positive +)	Low (positive +)	Low (-)
Reversibility	Yes	Yes	Yes
Replaceability	Yes	Yes	Yes
Cumulative	Low	Low	Low
Level of significance with mitigation	**Low** (+)	**Low** (+)	**Low** (-)

5. HERITAGE RESOURCE IMPACTS

The loss of heritage resources relates to the possible loss of cultural heritage resources, including archaeological and paleontological artefacts.

According to the SAHRIS paleontological map (2017), a portion of the site falls within a high sensitive paleontological area. Paleontological sites have been noted in areas to the north and east of the Coega Kop Wellfield site. The closest site is approximately 2km to the north. There are no known graves or historical buildings older than 60 years on the site. The site for the proposed Coega Kop Wellfield development is of low cultural significance and no archaeological sites/materials were observed during the investigation. Although it would seem unlikely that any significant archaeological sites/materials will be exposed during the development, there is always a possibility that human remains and/or other archaeological and historical material may be uncovered during the development. With the mitigation measures in place, the impact during the construction phase would result in a very low impact.

There would be no impacts during the operational phase, as any impacts would occur in the construction phase.

Mitigation Measures: – Construction Phase

a) The Contractor and Contractor's Environmental Officer to be informed before construction starts on the possible types of heritage sites (e.g. palaeontological) they may encounter and the procedures to follow when they find sites.

b) The Contractor's Environmental Officer is to monitor all construction areas for any archaeological or palaeontological materials. This includes monitoring of the clearing of the dense vegetation, excavations for pipelines and other underground/buried infrastructure and all above ground construction activities.

c) The Contractor's Environmental Officer is to record all archaeological or fossil localities by means of photographs, GPS readings and written in a log book with the date, locality, photograph number and short description of the site.

d) If any concentrations of archaeological or palaeontological material are exposed during construction, all work in that area must cease immediately and it must be reported to the Eastern Cape Provincial Heritage Resources Authority (043 6422811), so that a systematic and professional investigation can be undertaken.

e) The area will be fenced off with a radius of 20m around the unearthed item, demarcated as a no-go area and access will be prohibited.

f) Sufficient time should be allowed to investigate and to remove/collect such material.

No-Go Alternative: No change in status

	Heritage Resources		
Phase	**Construction Phase**	**Operational Phase**	**"No go"**
Nature	Loss of heritage resources	No impact	No change in status
Status	Direct, Negative		
Extent	Regional (3)		
Duration	Permanent (4)		
Intensity	High (8)		
Probability	Probable (2)		
Confidence	High		
Level of significance	(3+4+8)*2=30	No impact	No change in status
	Moderate (-)		
Reversibility	No		
Replaceability	No		
Cumulative	Low		
Level of significance with mitigation	**Low** (-)		

6. AIR QUALITY IMPACTS

Dust and air pollution impacts relate to the generation of dust during construction related activities, poorly maintained construction vehicles and burning materials for warmth during winter by contraction staff. The impact can be mitigated to a low negative impact significance, from a moderate negative impact.

No dust is anticipated during the operational phase. Limited odours may be experienced during the operational phase from the evaporation lagoons, however this would be limited to the immediate area surrounding the WTW. The impact remains at a very low negative significance.

Mitigation Measures: – Construction Phase

a) Dust suppression techniques (e.g. wetting of areas) to be used on all dust generating surfaces. Potable and contaminated water not to be used as a dust-suppressing agent.

b) All work must stop during high wind conditions (i.e. when wind speeds exceed 35km/h).

c) The speed of construction vehicles to be restricted to 25km/h within the construction area or near stockpiles.

d) Trucks transporting any form of soil or fine building materials should be covered with a tarpaulin.

e) Soil stockpiles to be covered with hessian or chip/mulch from cleared shrubs/trees to prevent dust generation.

f) Until vegetation used in rehabilitation efforts has established, temporary stabilization methods should be used (e.g. protecting exposed soils with coarse granular materials, mulches, or straw).

g) Contact details (e.g. telephone number) should be located at the entrance of the site for reporting of excessive dust after hours.

h) Vehicles and machinery will be maintained in good running condition.

i) No materials shall be burnt or waste materials buried.

Mitigation Measures: – Operational Phase

No mitigation measures identified.

No-Go Alternative: No change in status.

	Air Quality Impacts		
Phase	**Construction Phase**	**Operational Phase**	**"No go"**
Nature	Dust and air pollution	Dust and air pollution	No change in status
Status	Direct, Negative	Direct, Negative	
Extent	Local (2)	Local (2)	
Duration	Short term (1)	Long term (3)	
Intensity	Medium (6)	Very Low (2)	
Probability	Definite (4)	Improbable (1)	
Confidence	High		
Level of significance	(2+1+6)*4=36	(2+3+2)*1=7	No change in status
	Moderate (-)	Very Low (-)	
Reversibility	Yes	Yes	
Replaceability	Yes	Yes	
Cumulative	Low	Low	
Level of significance with mitigation	**Low** (-)	**Very Low** (-)	

7. WASTE MANAGEMENT IMPACTS

Impacts relating to ineffective waste management procedures may lead to the dumping of building rubble, littering and pollution of the surrounding areas as well as unsanitary (toilet) conditions. Construction waste will increase the amount of waste disposed to landfill, including cleared vegetation. Excavated material that will not be used in the construction works, should be used as fill material before the option of disposing the material to landfill is undertaken.

During operation, waste impacts relate to the residue from the WTW being stored incorrectly in the evaporation lagoons, potential contamination and an increase in the amount of waste disposed to landfill.

The solid waste (residue) from the WTW (non-hazardous silt / sedimentation) will be emptied and stockpiled onsite in the evaporation lagoons until there is adequate volume for removal (either for reuse, for application to land, or for discharge to landfill).

Mitigation Measures: – Construction Phase

a) Cleared vegetation to be mulched or disposed of at a licensed landfill site. Stockpiles of vegetation not to be left on site.

b) Good housekeeping to be undertaken at all times.

c) No illegal dumping or burning of waste allowed. Waste is not to be buried.

d) Awareness raising to be undertaken with the construction workers regarding health and environmental impacts from illegal dumping.

e) Any excess excavated material that is not reused, to be disposed of at a licenced landfill site.

f) Waste bins are to be located at the construction camp and construction site. Bins are to have secured lids to prevent waste from being blown into the surrounding area and to prevent animals scavenging in the bins.

g) Domestic and general construction waste to be disposed of at a licensed landfill site. The Contractor may not utilise the municipal waste collection services. Proof of disposal must be kept at the site office by the Contractor.

h) Chemical toilet facilities to be provided at construction areas and secured to the ground, cleaned at least weekly. Water should be provided for washing and sanitary bins for women.

i) No hazardous waste material to be disposed of as general waste. Hazardous waste to be stored separately in impermeable (i.e. leak proof) containers, and if possible sent for recycling.

Mitigation Measures: – Operational Phase

a) The WTW staff to be trained regarding the procedures for the WTW and evaporation lagoons.

b) The properties of the WTW residue and the natural surrounding soil to be analysed to monitor the impacts of silt leakage and disposal.

c) The quality of the residue is to be tested in order to determine viability of using the residue on agricultural land. If proven to be acceptable, the residue should be reused e.g. provided to local farmers.

d) Residue that is not able to be reused is to be disposed of at a licenced waste disposal site.

No-Go Alternative: No change in status.

	Waste Management Impact		
Phase	**Construction Phase**	**Operational Phase**	**"No go"**
Nature	Waste management	Waste management	No change in status
Status	Direct, Negative	Direct, Negative	
Extent	Regional (3)	Regional (3)	
Duration	Short term (1)	Long term (3)	

Intensity	Low (4)	Low (4)	
Probability	Definite (4)	Probable (2)	
Confidence	High		
Level of significance	(3+1+4)*4=32	(3+3+4)*2=20	No change in status
	Moderate (-)	Low (-)	
Reversibility	Yes	Yes	
Replaceability	Yes	Yes	
Cumulative	Low	Low	
Level of significance with mitigation	**Low** (-)	**Very Low (-)**	

8. TRAFFIC IMPACTS

Potential traffic impacts relate primarily to the anticipated increase in vehicle usage of municipal roads and to the possible deterioration of the pavement conditions of these roads, by heavy vehicles. This includes material delivery vehicles and vehicles that will travel daily to and from the site.

During the construction phase a higher number of vehicles are anticipated to use the surrounding road network. The impact can be mitigated to a low negative impact significance.

During the operational phase a limited number of operational vehicles are anticipated to use the surrounding road. The impact remains at a very low negative significance.

Mitigation Measures: – Construction Phase

a) Construction vehicles must adhere to the speed limits.

b) Signage is to be displayed regarding construction activities.

c) The developer should be responsible for the condition of the road during construction phase within reasonable measures – i.e. any damage caused as a result of construction vehicles must be rectified by the developer. Roads must be monitored for signs of erosion, especially after wet periods.

Mitigation Measures: – Operational Phase

No mitigation measures identified.

No-Go Alternative: No change in status.

	Traffic Impacts		
Phase	**Construction Phase**	**Operational Phase**	**"No go"**
Nature	Traffic management	Traffic management	No change in status
Status	Direct, Negative	Direct, Negative	
Extent	Regional (3)	Regional (3)	
Duration	Short term (1)	Long term (3)	
Intensity	Low (4)	Very Low (2)	
Probability	Highly Probable (3)	Improbable (1)	

Confidence	High		
Level of significance	(3+1+4)*3=24	(3+3+2)*1=8	No change in status
	Low (-)	Very Low (-)	
Reversibility	Yes	Yes	
Replaceability	Yes	Yes	
Cumulative	Low	Low	
Level of significance with mitigation	**Low** (-)	**Very Low** (-)	

9. NOISE IMPACTS

Noise impacts relates to potential changes in the nuisance impacts from noise generation from the site.

Noise creation from construction workers and vehicles may impact on surrounding landowners during the construction phase. This includes noise emanating from construction machinery, power tools and compressors, construction vehicles and general construction activity. The impact can be mitigated to a low negative impact significance.

The NMBM's Noise Control By-Law of 24 March 2010 states that no person may use any power tool or power equipment for construction work, drilling work or demolition work, or allow it to be used in or near a residential area during the following hours: (i) Before 06:00 and after 18:00 Monday to Saturday; (ii) Before 08:00 and after 14:00 on a Sunday; or if it causes a noise nuisance or noise disturbance. However this would not be applicable at the proposed Coega Kop Wellfield is located outside of residential areas.

Limited noise is anticipated from the WTW during the operational phase, however this would be limited to the immediate area surrounding the WTW. The impact remains at a very low negative significance.

Mitigation Measures: – Construction Phase

a) Limit intrusive construction activity to daylight hours and normal working days; i.e. weekdays between 07:00 and 17:00; and Saturdays until 13:00. Construction not to occur on Sundays or public holidays.

b) No construction staff to be housed on site.

c) All construction vehicles must be in sound working order with the prescribed mufflers and silencers.

Mitigation Measures: – Operational Phase

No mitigation measures identified and there are no sensitive receptors within 100m of the WTW site.

No-Go Alternative: No change in status.

	Noise		
Phase	**Construction Phase**	**Operational Phase**	**"No go"**
Nature	Noise	Noise	No change in status
Status	Direct, Negative	Direct Negative	
Extent	Local (2)	Footprint / Site (1)	
Duration	Short term (1)	Long term (3)	

Intensity	Medium (6)	Very Low (2)	
Probability	Definite (4)	Improbable (1)	
Confidence	High		
Level of significance	(2+1+6)*4=36	(1+3+2)*1=6	No change in status
	Moderate (-)	Very Low (-)	
Reversibility	Yes	Yes	
Replaceability	Yes	Yes	
Cumulative	Low	None	
Level of significance with mitigation	**Low** (-)	**Very Low (-)**	

3. ENVIRONMENTAL IMPACT STATEMENT

Taking the assessment of potential impacts into account, please provide an environmental impact statement that summarises the impact that the proposed activity and its alternatives may have on the environment after the management and mitigation of impacts have been taken into account, with specific reference to types of impact, duration of impacts, likelihood of potential impacts actually occurring and the significance of impacts.

ALTERNATIVE A (PREFERRED ALTERNATIVE)

With the exception of the large expanses of Sundays Valley Thicket vegetation to the north and south of the study area – which is densely vegetated, spinescent, solid and impenetrable and, therefore, largely untransformed / intact – the remaining habitat types in the study area have experienced, and continue to experience, some level of transformation and / or degradation due to anthropogenic impacts. This ranges from a high significant negative impact in areas that were cleared in the past i.e. at Coega Kop, along fence line servitudes, and the cleared area towards Motherwell Township, to a low to moderate negative impact in Thicket-mosaic vegetation types fragmented by gravel roads and informal pathways, which continue to experience grazing in some places i.e. Motherwell Karroid Thicket, and Grass Ridge Bontveld vegetation. The construction phase would have the greatest impact on the terrestrial biodiversity, due to the clearance of vegetation and related construction activities. The operational phase of the project would have a limited impact on vegetation. Maintenance procedures would include cutting vegetation regrowth, e.g. to keep the discharge outlet clean and to provide access to pipelines. The potential of alien plants spreading is likely if not managed during the site establishment, construction and operational phases. The objective of rehabilitation is to re-establish a native vegetation cover, which is similar in species composition to that which existed before the disturbance, excluding alien and invasive plant species. With the mitigation measures in place, the impact on the terrestrial biodiversity would remain localised resulting in a low negative impact.

The area around Coega Kop is extremely wet and water accumulates in all low-lying areas mainly due to

old leaking boreholes. Ten wetlands were identified and delineated that fall within the 500 m radius from proposed infrastructure, some of which are most likely the result of additional (artificial) water sources such as the leaking boreholes. Two non-perennial watercourses (drainage lines) have also been identified in close proximity, but only one natural drainage line and associated riparian zone occurs within 100 m of the proposed pipeline alignment. Of these aquatic systems, two (2) artificial wetlands (namely Wetlands 4 and 5) and one (1) artificial non-perennial watercourse (namely Drainage 1) will be directly impacted upon. Wetlands 4 and 5 were provided with a Low / Marginal Ecological Importance and Sensitivity (EIS) and the Recommended Ecological Category of Class D. No buffer areas are provided for these two wetlands due to being artificial and not ecologically important or sensitive at any scale. Drainage 1 was provided with a Class D Present Ecological State (PES) and a Low / Marginal EIS. It is recommended that a buffer of 50m be maintained around each natural wetland identified (Wetlands 1, 3, 6, 8 & 9) as well as Wetland 10 and a buffer of 32m be implemented around the riparian zone of Drainage 2 (the natural drainage line). Buffers should be treated as no-go areas during the construction phase of the proposed development. During the operational phase, these areas should be kept natural as far as possible and invasive alien species in the buffers should be eradicated on an ongoing basis, if possible. Considering the proposed WTW position and the pipeline alignments, the potential impacts to wetland hydrology of natural wetlands and riparian zones due to permanent structures should be minimal. Man-induced impacts have resulted in a moderate change to the PES of the Study Reach in the lower Coega River (PES = C). Although the natural habitats and biota have been moderately modified, the basic ecosystem functioning of the affected reach in the Coega River, is still predominantly unchanged. This river reach is considered a critical biodiversity corridor and supports valuable biodiversity, including two indigenous fish species of special conservation concern. Both the Ecological Importance (EI) and the Ecological Sensitivity (ES) of the affected river reach are considered to be high. The raw borehole water appears to pose a moderate to high pollution threat if discharged directly into the Coega River due to the elevated iron and manganese concentrations. However, if this water is (at least) partially treated at the WTW and is further purified as it flows through the wetland prior to reaching the Coega River, the final quality of the discharged water should not have a negative impact on the aquatic life in the river. As the maximum discharges (1.4 l/s) from WTW is probably well exceeded by flows that occur naturally in the watercourse for short periods during heavy rainfall events, it is likely that the increased flows will have minimum negative impact on the ecological functioning of the lower Coega River. All potential aquatic biodiversity impacts identified can be adequately mitigated to a low negative significance by implementing the recommended mitigation measures.

The purpose of the proposed well field at Coega Kop is to utilize the groundwater available in the Groot Winterhoek – Coega Ridge Table Mountain Group Aquifer. The NMBM's Water Master Plan and Water Conservation Demand Management Programme includes the development of the Coega Kop Wellfield to provide for the water demands of the NMBM. The Coega Kop Wellfield will therefore play a role in both an emergency capacity (e.g. droughts) as well as in a regular (normal) water supply capacity. No impact is anticipated during the construction phase, as this impact relates mainly to the operational phase. During the operational phase the supply of potable water may be disrupted due to water leaks on the various pipelines, which would lead to a loss of water and revenue for the NMBM. The impact surrounding the provision of water is considered to be low positive, with appropriate mitigation measures being implemented, during the operational phase.

General safety of persons is a concern due to construction activities, e.g. open excavations and machinery,

resulting in potential injury to construction staff; health and safety aspects relate to the potential spread of HIV and STDs. Security aspects relate to potential theft of construction materials and theft within neighbouring properties. The presence of workers on the site for construction related activities, irrespective of whether or not they are local, may create an increased safety and security risk to local households in the area. In addition, any changes in the local crime rates are likely to be attributed to the influx of construction workers, whether such changes can be attributed to their presence or not. The contractor would have security on-site during the construction phase. Veld fires are a potential risk considering the vegetation types occurring within and adjacent to the site. During construction the risk may be attributed to inappropriate construction activities (e.g. hot work, welding) on dry, windy days. The impact can be mitigated to a very low negative impact significance.

Safety and security impacts during the operational phase relate to the maintenance of the pipelines as well as any emergency work that may need to be undertaken. Theft of equipment or materials from the borehole sites and WTW. An additional impact is the use and storage of chlorine gas in the WTW. The WTW staff would be at a greater risk to any accidental release of chlorine gas compared to the surrounding community (located approximately 350m from the WTW). Risk mitigation measures and the OHS requirements for the storage and management of chlorine gas will need to be strictly followed. The impact can be mitigated to a very low negative impact significance.

Limited opportunities for skilled workers, semi-skilled workers and unskilled labourers could be created during the construction phase of the project (approximately 29 positions). During the operational phase, limited skilled employment will be created for the operation of the WTW (approximately four (4) positions). An adverse effect on this impact may occur in that high expectations are formed regarding construction employment opportunities and that these expectations cannot be sustained. The impact can be mitigated to a low positive impact.

According to the SAHRIS paleontological map (2017), a portion of the site falls within a high sensitive paleontological area. Paleontological sites have been noted in areas to the north and east of the Coega Kop Wellfield site. The closest site is approximately 2km to the north. There are no known graves or historical buildings older than 60 years on the site. The site for the proposed Coega Kop Wellfield development is of low cultural significance and no archaeological sites/materials were observed during the investigation. Although it would seem unlikely that any significant archaeological sites/materials will be exposed during the development, there is always a possibility that human remains and/or other archaeological and historical material may be uncovered during the development. With the mitigation measures in place, the impact during the construction phase would result in a very low impact. There would be no impacts during the operational phase, as any impacts would occur in the construction phase.

Dust and air pollution impacts relate to the generation of dust during construction related activities, poorly maintained construction vehicles and burning materials for warmth during winter by contraction staff. The impact can be mitigated to a low negative impact significance. No dust is anticipated during the operational phase. Limited odours may be experienced during the operational phase from the evaporation lagoons, however this would be limited to the immediate area surrounding the WTW. The impact remains at a very low negative significance.

Impacts relating to ineffective waste management procedures may lead to the dumping of building rubble, littering and pollution of the surrounding areas as well as unsanitary (toilet) conditions. Construction waste

will increase the amount of waste disposed to landfill, including cleared vegetation. Excavated material that will not be used in the construction works, should be used as fill material before the option of disposing the material to landfill is undertaken. During operation, waste impacts relate to the residue from the WTW being stored incorrectly in the evaporation lagoons, potential contamination and an increase in the amount of waste disposed to landfill. The solid waste (residue) from the WTW (non-hazardous silt / sedimentation) will be emptied and stockpiled onsite in the evaporation lagoons until there is adequate volume for removal (either for reuse, for application to land, or for discharge to landfill).

Potential traffic impacts relate primarily to the anticipated increase in vehicle usage of municipal roads and to the possible deterioration of the pavement conditions of these roads, by heavy vehicles. This includes material delivery vehicles and vehicles that will travel daily to and from the site. During the construction phase a higher number of vehicles are anticipated to use the surrounding road network. The impact can be mitigated to a low negative impact significance. During the operational phase a limited number of operational vehicles are anticipated to use the surrounding road. The impact remains at a very low negative significance.

Noise creation from construction workers and vehicles may impact on surrounding landowners during the construction phase. This includes noise emanating from construction machinery, power tools and compressors, construction vehicles and general construction activity. The impact can be mitigated to a low negative impact significance. Limited noise is anticipated from the WTW during the operational phase, however this would be limited to the immediate area surrounding the WTW. The impact remains at a very low negative significance.

The negative impacts identified can be mitigated to a low – very low negative significance if all mitigation measures identified and included in the Environmental Management Programme (EMPr) attached in **Appendix F** are implemented.

NO-GO ALTERNATIVE (COMPULSORY)

No protected or endangered species will be physically removed, however a risk remains that these species will be lost to animals as a food source. The risk remains that the current alien vegetation may spread into surrounding areas, if not controlled.

Some sedimentation of wetlands and watercourses are probably already occurring due to the ongoing mining-related activities on Coega Kop as well as the many gravel roads within wetland and watercourse catchments. It is likely that these activities would continue, thus no change in status.

The No-Go Alternative entails that the proposed Coega Kop Wellfield is not developed and the existing situation remains the same. The risk of limited potable water remains where water scarcity is experienced. The impact remains at a moderate negative significance.

Employment opportunities will not be created. The impact remains at a low negative significance.

The following table presents a summary of the impacts assessed:

	ALTERNATIVE 1		NO-GO
Phase	**Construction Phase**	**Operational Phase**	
IMPACT	**TERRESTRIAL BIODIVERSITY**		
Nature	Loss of vegetation and spread of alien invasive species due to construction and associated activities	Spread of alien invasive species	Loss of vegetation due to spreading of alien species
Level of significance **without** mitigation	Moderate (-)	Low (-)	Low (-)
Level of significance **with** mitigation	**Low** (-)	**Low** (-)	**Low** (-)
IMPACT	**AQUATIC BIODIVERSITY**		
Nature	Degradation of water quality in wetlands and watercourses	Pollution of Coega River	No change in status
Level of significance **without** mitigation	Low (-)	Moderate (-)	
Level of significance **with** mitigation	**Low** (-)	**Low** (-)	
IMPACT	**AQUATIC BIODIVERSITY**		
Nature	Erosion and elevated sedimentation	Erosion and elevated sedimentation	No change in status
Level of significance **without** mitigation	Moderate (-)	Moderate (-)	
Level of significance **with** mitigation	**Low** (-)	**Low** (-)	
IMPACT	**AQUATIC BIODIVERSITY**		
Nature	No impact	Increased base flows in Coega River	No change in status
Level of significance **without** mitigation		Low (-)	
Level of significance **with** mitigation		**Low** (-)	
IMPACT	**AQUATIC BIODIVERSITY**		
Nature	Potential destruction of wetland and riparian habitat	Potential destruction of wetland and riparian habitat	No change in status
Level of significance **without** mitigation	Moderate (-)	Low (-)	
Level of significance **with** mitigation	**Low (-)**	**Low** (-)	
IMPACT	**AQUATIC BIODIVERSITY**		
Nature	Change in hydrology	Change in hydrology	No change in status
Level of significance **without** mitigation	Low (-)	Low (-)	

	ALTERNATIVE 1		NO-GO
Phase	**Construction Phase**	**Operational Phase**	
Level of significance **with** mitigation	**Low (-)**	**Low** (-)	
IMPACT	**PROVISION OF WATER RESOURCES**		
Nature	No impact	Potential loss of water due to leaks or pipe bursts	No additional water resource for potable water distribution
Level of significance **without** mitigation		Low (-)	Moderate (-)
Level of significance **with** mitigation		**Low (+)**	**Moderate** (-)
IMPACT	**SOCIAL**		
Nature	Health, Safety and Security	Safety and Security	No change in status
Level of significance **without** mitigation	Low (-)	Low (-)	
Level of significance **with** mitigation	**Very Low** (-)	**Very Low** (-)	
IMPACT	**SOCIAL**		
Nature	Employment Opportunities	Employment Opportunities	Employment Opportunities
Level of significance **without** mitigation	Low (positive +)	Low (positive +)	Low (-)
Level of significance **with** mitigation	**Low** (+)	**Low** (+)	**Low** (-)
IMPACT	**HERITAGE RESOURCES**		
Nature	Loss of heritage resources	No impact	No change in status
Level of significance **without** mitigation	Moderate (-)		
Level of significance **with** mitigation	**Low** (-)		
IMPACT	**AIR QUALITY**		
Nature	Dust and air pollution	Dust and air pollution	No change in status
Level of significance **without** mitigation	Moderate (-)	Very Low (-)	
Level of significance **with** mitigation	**Low** (-)	**Very Low** (-)	
IMPACT	**WASTE MANAGEMENT**		
Nature	Waste management	Waste management	No change in status
Level of significance **without** mitigation	Moderate (-)	Low (-)	
Level of significance **with** mitigation	**Low** (-)	**Very Low (-)**	
IMPACT	**TRAFFIC**		
Nature	Traffic management	Traffic management	No change in status

	ALTERNATIVE 1		NO-GO
Phase	**Construction Phase**	**Operational Phase**	
Level of significance **without** mitigation	Low (-)	Very Low (-)	
Level of significance **with** mitigation	**Low** (-)	**Very Low** (-)	
IMPACT	**NOISE**		
Nature	Noise	Noise	No change in status
Level of significance **without** mitigation	Moderate (-)	Very Low (-)	
Level of significance **with** mitigation	**Low** (-)	**Very Low (-)**	

SECTION E. RECOMMENDATIONS OF PRACTITIONER

Is the information contained in this report and the documentation attached hereto sufficient to make a decision in respect of the activity applied for (in the view of the environmental assessment practitioner)?	**YES**	NO
Is an EMPr attached?	**YES**	NO

The EMPr must be attached as Appendix F.

If "NO", indicate the aspects that should be assessed further as part of a Scoping and EIA process before a decision can be made (list the aspects that require further assessment):

N/A

If "YES", please list any recommended conditions, including mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application:

It is recommended that the activity (Alternative 1) is granted with the following recommendations:

1) All mitigation measures in the Basic Assessment Report and Environmental Management Programme (EMPr, Appendix F) are implemented.
2) A Contractor's Environmental Officer is appointed by the Contractor and an independent ECO is appointed by the developer to monitor compliance with the EMPr during construction.
3) Alien plant regrowth is to be monitored and managed during the construction phase by the Contractor and operational phase by the developer.
4) Permits must be obtained from the DEDEAT prior to the removal of protected plants and Species of Special Concern (SSCs), and from the DAFF for the removal of protected trees.
5) Clearing of vegetation to be limited to areas for construction works only, i.e. 20m construction width for the pipelines and access / service road, except where these are located adjacent to intact thicket areas then the construction width should be reduced to 10m.
6) Areas with Sundays Valley Thicket should be planted up with Spekboom (Portulacaria afra) truncheons as part of rehabilitation efforts in areas that do not form part of the maintenance servitude area.
7) Watercourse and wetland crossings to be restricted to a 10m construction width. Pipelines in wetlands and watercourses are to be buried. Once backfilled the ground level must be the same as natural levels. The topsoil must be placed back last and only lightly compacted.
8) During the operational phase, the rate and level of water in the boreholes are to be monitored, as well as monitoring of the quality of water discharged from the WTW.
9) Pipelines (groundwater and potable water) to be monitored for any leaks. Water leaks or pipe bursts to

be fixed immediately.

10) The quality of the WTW residue is to be tested in order to determine viability of using the residue on agricultural land or to determine other uses prior to being considered for disposal to landfill.

SECTION F: APPENDICES

The following appendixes must be attached as appropriate:

Appendix A: Site plan(s)

Appendix B: Photographs

Appendix C: Facility illustration(s)

Appendix D: Specialist reports

Appendix E: Comments and responses report

Appendix F: Environmental Management Programme (EMPr)

Appendix G: Other information