4 Description of the Affected Environment

The following chapter presents an overview of the biophysical and socio-economic environment in which the proposed project is located, to:

- Understand the general sensitivity of and pressures on the affected environment;
- Inform the identification of potential issues and impacts associated with the proposed project, which will be assessed during the Impact Assessment Phase;
- Identify gaps in available information to inform specialist study requirements; and
- Start conceptualising practical mitigation measures.

Where site specific information is not available, information is reported on a regional scale, generally the Namaqua District Municipal area. More detailed baseline information will be presented in the EIA Report, based on detailed investigations conducted for specialist studies that will inform the Impact Assessment (see Section 7.3).

4.1 Biophysical Environment

4.1.1 Topography

The topography of the NDM is characterised by mountainous areas, ridges, steep slopes, undulating hills and plateaus, floodplains and coastal dunes. The Kamiesberg mountain range forms an escarpment from Garies in the southeast to Springbok in the northeast and elevation above sea level ranges from about 250m to 750m in this area. The Kamiesberg mountain range is characterised by granite and gneiss rock formations and steep rocky slopes that are separated by sandy plains and lowland areas. The mountain range functions as an important rain catchment area (Chidley et al., 2011).

The lowest lying areas of the NDM are situated along the coastal plain belt to the west of the N7. The coastal areas in the District are relatively narrow with no natural harbours. The area surrounding Volwaterbaai is characterised by a rocky energetic coastline interspersed with sandy beach areas (CNdV, 2012).

4.1.2 Geology

There are five dominant geological formations in the NDM: tillite, sedimentary, shale, gneiss and granite. Of these, the sedimentary, gneiss and tillite formations occur in the project area (Figure 4-1) (Higgs et al, 2010).

Sedimentary formations are formed through a process of erosion and sedimentation. Sedimentary deposits are formed by the accumulation and settling of particles that have been formed by weathering and erosion and transported by wind, water or the mass movement of glaciers. Sedimentary formations generally coincide with river systems and contain the highest concentrations of fossils when compared to any other rock type. Sedimentary formations are often suitable for construction purposes.

Gneiss is a common and widely distributed type of rock that is formed by high-grade regional metamorphic processes from pre-existing formations that were originally either igneous or sedimentary rocks.

Tillite is a sedimentary rock that consists of consolidated masses of unweathered blocks that have formed as a result of glacial movement. Tillite may contain concentrations of gems or other valuable

ore minerals such as diamonds. These concentrations form part of alluvial deposits that were transported by glaciers during their advance.

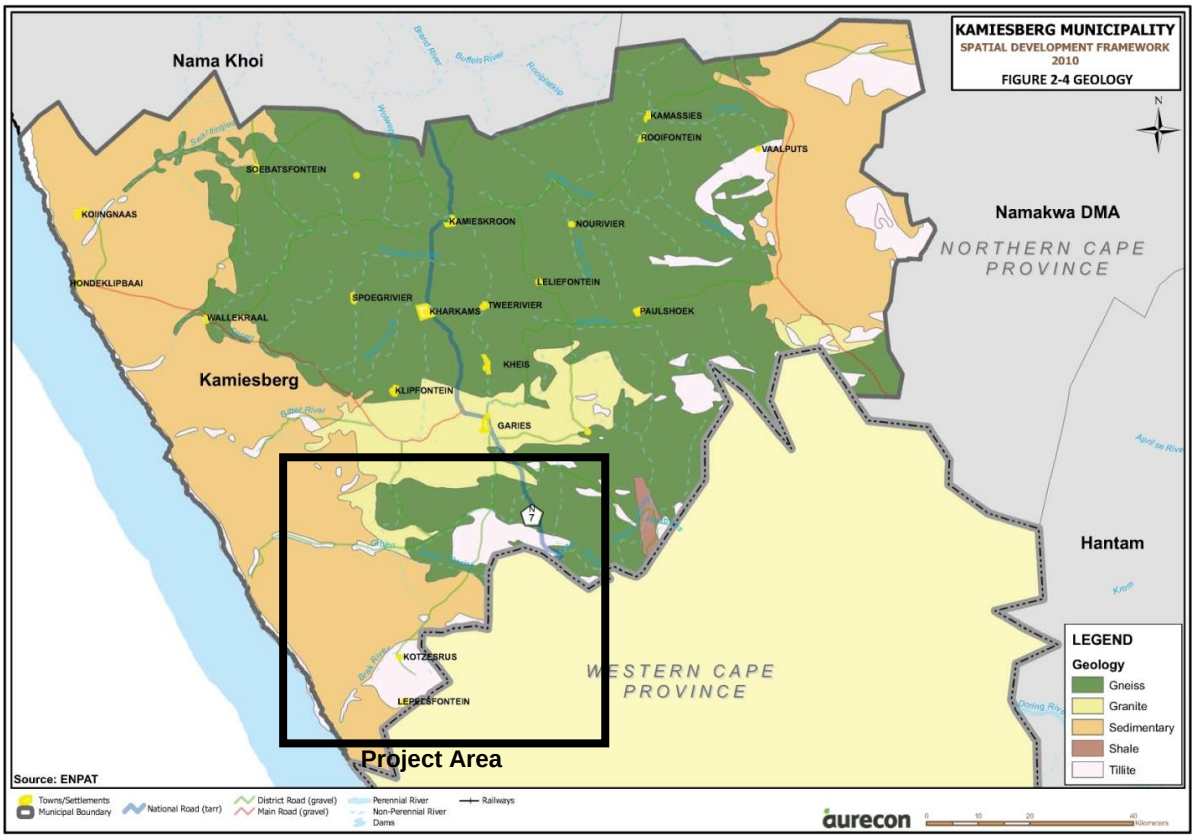


Figure 4-1: Geological Formations of the Kamiesberg Local Municipality

Source: Kamiesberg Local Municipality SDF (Higgs et al., 2010)

A light seismic tremor measuring 1.6 on the Richter Scale occurred in the Springbok area in May 2009. However, the geology of the area is considered to be stable with a very low level of seismic activity. The closest known area of seismic activity is considered to be the Milnerton Fault which is located near Milnerton (in the Cape Town area), 340 km south of Kotzesrus (Higgs et al., 2010).

4.1.3 Climate

4.1.3.1 General Description of Regional Climate

The NDM has a typical arid to semi- arid climate. Rainfall is low and unreliable. Summers have characteristically high temperatures and winters have mild to cold temperatures. The northern areas of the District experience the highest mean annual temperatures, while the cooler areas have the highest level of rainfall. The cold Benguela Current influences the climatic conditions by producing coastal fog and dew during the winter months (Chidley et al, 2011).

4.1.3.2 Rainfall

Rainfall in the District is among the lowest in the country. The western parts of the NDM (the Succulent Karoo, including the Garies area) are characterised by winter rainfall while the Nama Karoo is characterised by late summer rainfall. The south eastern areas of the District, (a band along the escarpment from Sutherland to Nieuwoudtville) receive most rainfall (between 400mm and 600mm per annum). The area around Garies is situated on the west of the escarpment and falls under the same rainfall regime. The majority of the District receives rainfall less than 200mm per annum.

Most rain is recorded between April and August, with the lowest rainfall occurring in September and the highest rainfall in May/ June. Highest monthly rainfall is recorded in Springbok (37.8 mm) followed by Fraserburg (31.5mm) and the lowest monthly rainfall is recorded at Vioolsdrif (0.2mm) followed by Alexander Bay (0.5mm) (CNdV, 2012).

4.1.3.3 Ambient Temperature

The NDM can be divided into a number of climatic regions. The majority of the District has an average annual temperature of less than 18°C. The climatic region surrounding the Garies area is considered to be slightly warmer than the coastal climatic region near Volwaterbaai. The average annual temperature of the Garies area is more than 18°C, while the Volwaterbaai area is cooler with annual average temperatures of less than 18°C (Chidley et al, 2011).

Table 4-1 indicates the annual average minimum and maximum temperatures in the larger towns of the NDM.

Table 4-1: Average Annual Minimum and Maximum Temperatures in Larger Towns in Namakwa District Municipality

Name	Minimum Temperature	Maximum Temperature
Alexander Bay	9°C	19°C
Calvinia	8°C	20°C
Springbok	13°C	18°C
Sutherland	0°C	16°C

Source: Chidley et al., 2011

The average monthly minimum temperatures in the District are experienced between June and August and the lowest temperatures are recorded in July. The town that experiences the lowest temperatures is Fraserburg with temperatures reaching as low as -0.2°C in July.

Higher temperatures are experienced along the Orange River and northern border of the NDM. The highest average monthly maximum temperatures are experienced between December and March and the highest temperatures are recorded in February.

Vioolsdrift experiences the highest temperatures, with a monthly average maximum of 38.8°C in February. The highest average annual temperatures are also recorded at Vioolsdrift (24.7°C) and Pofadder (19.5°C) while the coldest average annual temperatures are recorded at Garies (15.0°C) and Port Nolloth (15.3°C). The colder areas (such as Garies) also experience the highest levels of rainfall (CNdV, 2012).

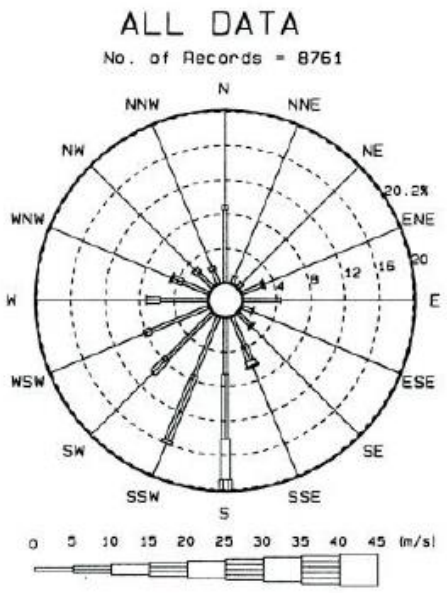
4.1.3.4 Wind

Wind in the District is strongly seasonal, which is typical of the west coast of Southern Africa. Summer and spring are dominated by southerly winds, while north-easterly winds are more common in autumn in winter.

Reliable wind measurements are taken from an automatic station situated at Alexander Bay. The wind rose derived from data collected at this station is shown in Figure 4-2. The wind rose indicates that the predominant wind direction is southerly and that maximum speeds of 20m/s (approximately 39 knots) are experienced in the area.

The measurements at Alexander Bay are considered to be representative of coastal areas within the Namakwa area, but are not entirely representative of inland areas, which would generally experience lower wind speeds. The coastal wind climate is diurnal. Wind speeds are low in the morning, peak in

the afternoon and slacken at night. Easterly berg winds that bring hot and dry conditions occasionally occur (Chidley et al., 2011).



srk consulting	**Figure 4-2: Wind Rose for Alexander Bay**	Project No. 451101

Source: Namakwa District Municipality EMF (Chidley et al., 2011).

4.1.4 Air Quality

There are no significant sources of air pollution in the area. Farming activities generate limited emissions, mainly airborne particulates. It is therefore expected that air quality in the project area is good. The majority of the roads in the development area are dirt roads and small volumes of dust are generated by the movement of vehicles.

4.1.5 Noise

There are no significant sources of noise in the area, and very few noise receptors. Some noise may be propagated by vehicles travelling through Kotzesrus, although levels of traffic are extremely low in this area. Along the coast, noise generated by wave action is likely to result in higher than normal ambient noise levels, especially during rough sea conditions.

4.1.6 Coastal and Marine Environment

The stretch of coastline along which the desalination plant will be situated is generally characterised as a rocky coastline interspersed with sandy beach areas. The coastline consists of a number of small rocky embayments, headlands and reefs, interspersed with small, generally shelly beaches.

The baseline coastal and marine conditions of the Volwaterbaai area are described in detail in the seawater intake feasibility study compiled by WSP Africa Coastal Engineers in 2012 (WSP, 2012a), including a description of the offshore wave conditions, water levels and currents.

4.1.6.1 Currents

The cold Benguela Current flows in a northward direction along the west coast of southern Africa. This current affects the coastal climate and also provides crucial nutrients supporting the fishing industry. The current is generally slow flowing and only contributes marginally to currents closer to the coastline.

The surfzone is defined as the area where waves from the ocean start to break onto the shore. The Volwaterbaai coastline is characterised by strong surfzone currents that are mainly a result of waves breaking onto the shore. Where waves break at an oblique angle to the shoreline, longshore currents are generated. The direction of these currents varies, depending on the angle of the waves. Longshore currents occur in both rocky and sandy areas along the coast. In sandy beach areas, they result in the longshore transportation of sand. They can also result in rapid beach erosion or accretion.

Rip currents occur along the Volwaterbaai shore and are defined as a seaward return flow of water. These currents typically have sufficiently high velocities to transport sand. Rip current can create deep gullies that form close to the shoreline. This in turn results in beach erosion opposite the gully.

Winds generate the flow of water, particularly in the surface layers. Persistent winds can create flow through the entire water column. Strong southerly summer winds generate circulation along the Volwaterbaai coastline, which is related to upwelling (see below) (WSP, 2012a).

4.1.6.2 Bathymetry

There is limited information regarding bathymetry for the area. Admiralty charts indicate that a depth of 100m is reached approximately 10 – 12km offshore. The seabed is considered to be predominantly rocky, with several reefs. Local bathymetry (in close proximity to the brine discharge point) will be determined through a dive survey aimed at confirming the presence or absence of any reefs which may “trap” brine, and will inform the detailed design of marine structures (WSP, 2012a).

4.1.6.3 Upwelling

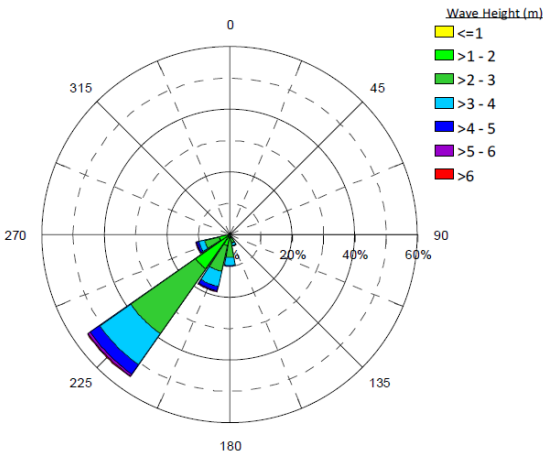
Strong southerly winds displace surface water to the north and away from the coast. This causes water to emerge from deeper layers close to coastal areas, to compensate for displaced surface water. This is known as upwelling and typically occurs in cycles during the spring and summer months.

The water that is upwelled is significantly colder, more turbid, fresher and more nutrient rich than the surface water it replaces. These conditions, particularly the elevated nutrient concentrations, drive increased biological productivity of plankton attracting pelagic and benthic marine organisms. The organic matter of the elevated productivity eventually sinks onto the continental shelf, where this matter decays reducing dissolved oxygen levels. These conditions may extend closer to shore or be mixed into the water column during exceptional climate events causing mass mortality of marine species.

The West Coast frequently experiences ‘red tides’ which are related to the upwelling regime of the area. Red tide consists of an overabundance or a bloom of a species of plankton that explode in numbers during an upwelling event. A red tide with a large enough magnitude and concentration may cause death of pelagic fish by clogging their gills, death of pelagic and benthic organisms due to depleted oxygen levels or poisoning (both direct or indirect) due to toxins produced by certain plankton species (WSP, 2012a).

4.1.6.4 Offshore Wave Conditions

Offshore wave data were obtained for a deep sea location approximately 130 km west of the Volwaterbaai area, and provide a clear indication of offshore wave conditions (see Figure 4-3). The predominant wave direction is south-west. The median offshore wave height for the area is 2.5m and wave heights exceed 4.3m 5% of the time. The median wave period is 11 seconds and wave periods exceed 6.5 seconds 95% of the time. Wave action can cause significant damage to coastal infrastructure and the predominant wave direction also plays a role in the ideal placement of infrastructure at the coast (WSP, 2012a).



srk consulting	**Figure 4-3: Deep Sea Wave Rose**	Project No. 451101

Source: WSP Coastal Engineers Africa, 2012a.

4.1.6.5 Water Levels

Still water levels in the ocean are influenced by a number of factors, including tides, storm surges and sea level rise.

Tides occur as a result of the gravitational forces that the sun and the moon (and other celestial bodies) exert on the earth. The tides along the South African coastline are semi-diurnal, meaning that two high and low tides occur per day. Differences between high and low tides are greatest during spring tides, which occur approximately at full and new moon. Differences between high and low tides are least during neap tides, which occur approximately at quarter and three-quarter moon.

The estimated HAT for the area is +1.25m in relation to Mean Seawater Level (MSL), while the LAT for the area is -0.9m in relation to MSL. The HAT and LAT are unlikely to occur in any given year. However, these conditions can occur as a result of storm surges, for example.

Storm surges may significantly increase water levels and are a result of physical phenomena such as wind set-up, atmospheric pressure effects and wave set-up.

Strong onshore winds force surface water towards the land, ‘piling-up’ against the shoreline. Along the west coast, strong north-westerly onshore winds typically accompany a winter cold front, elevating water levels which may persist for several hours or even days.

The cause of most storms is an atmospheric low pressure system. The decreased atmospheric pressure is offset by a rising of the water surface.

Wave set-up is the rise in the elevation of the water surface at the shoreline due to onshore mass transport of water by wave breaking action. The degree of set-up depends on the type, size and period of the breaking waves, as well as on the beach slope.

Storm surge, including wave set-up, results in waves breaking higher up the beach than they would under normal conditions. The result is that previously sheltered areas of a coast become exposed to wave action and erosion. The total storm surge for a typical severe winter storm can be in the order of 0.5 m but can be more severe during extreme conditions (WSP, 2012a).

4.1.6.6 Sea Level Rise

The effects of climate change, and particularly sea-level rise, should be taken into account when planning infrastructure that is located close to the shoreline. The Intergovernmental Panel on Climate Change in 2007 predicted that global average sea levels would rise, in response to climate change, by between 0.18 and 0.59 m by the year 2100. Subsequent to these estimates, scientists are in agreement that these figures may be an underestimation and that sea level rise is accelerating. It is suggested that a sea level rise of between 0.5 m and 2.0 m by the year 2100 is appropriate for the southern African coastline (WSP, 2012a).

4.1.7 Hydrology and Surface Water

The NDM is located in the Lower Orange WMA. The Brak River and its tributaries and a number of tributaries of the Groen River flow through the project area. The Brak River runs to the southwest of Kotzesrus while tributaries to the Groen River run to the northeast (see Figure 4-4). The South African National Biodiversity Institute (SANBI) National Wetland Classification system, classifies the Brak River and tributaries to the Groen River as Inland systems falling within the Western Coastal Belt Ecoregion. The systems have a valley floor landscape and are classified as *channeled lowland rivers*. Both river systems are non-perennial.

Although the Brak River is located in close proximity to Kotzesrus, development in the area is minimal. A gravel road crosses the Brak River at a few points and in these areas erosion and disturbance are evident. However, the remainder of the river system is considered to be in a good ecological condition and provides habitat to support indigenous vegetation and fauna.

The area also contains a number of wetland features, classified as *valley bottom wetlands* (occurring on the gently sloping, lowest surface of a valley), *bench* (occurring on mostly level areas on hilltops, crests, saddles, shelves, terraces and ledges), and *slope wetlands* (occurring on stretches of ground on the side of a mountain, hill or valley) (see Figure 4-4). The majority of the wetlands are considered to be in a *moderately modified condition*. According to the National Freshwater Ecosystem Priority Area (NFEPA) database, no wetland features in the project area are considered to be important with regards to biodiversity conservation.

Ephemeral pan features are located in close proximity to the Zandkopsdrift Mine and to the south of Kotzesrus. The ephemeral pan features are classified (according to the SANBI National Wetland Classification system) as Inland systems falling within the Western Coastal Belt Ecoregion. The features have a valley floor landscape and are classified as depression wetlands. The ephemeral pan feature located to the south of the Zandkopsdrift Mine is considered to be in a moderately modified condition while the feature to the south of Kotzesrus is considered to have low ecological sensitivity (van Staden et al., 2013).

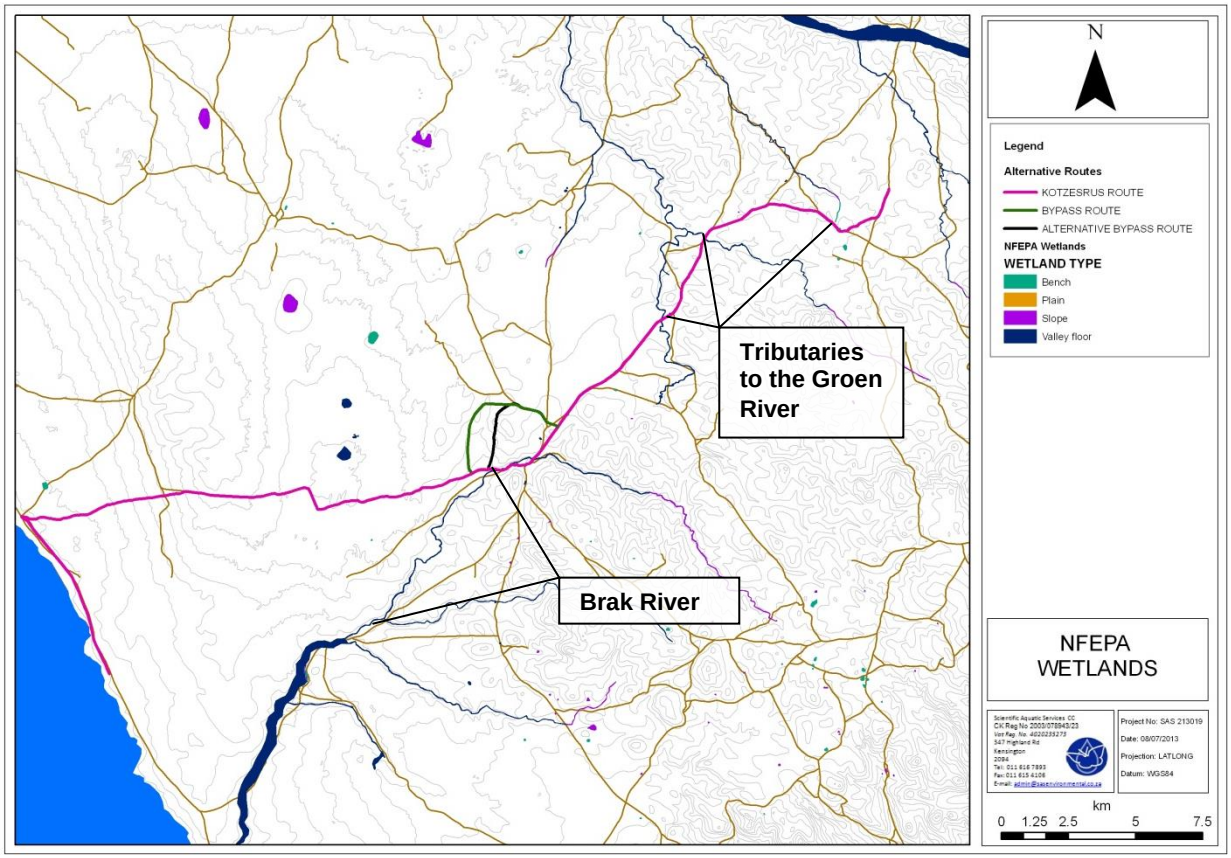


Figure 4-4: NFEPA Wetland Types and Watercourses within the Project Area

Source: van Staden et al., 2013

4.1.8 Hydrogeology

The hydrogeology of the Namakwa area consists of unconsolidated sub-structures that are host to intergranular aquifers. These aquifers have low yield due to the presence of fine and clayey materials and are dependent on rainfall for recharge. Major recharge events generally occur every 15 years and natural draw down occurs between periods of recharge.

Groundwater is one of the most important water sources in the NDM. It plays a major role in the provision of water to urban and rural areas. Groundwater extraction impacts on the natural rate of draw down. Indications are that boreholes at Garies, Kamieskroon, Hondeklipbaai and Koingnaas are at levels lower than observed in 1990. Where aquifers have been de-watered, this may lead to surface instability. The alteration of aquifer structure arising from de-watering could limit the possibility for future recharge.

Groundwater quality in the Lower Orange WMA ranges from good to unacceptable, the latter due to contamination by total dissolved solids, nitrates and fluorides caused by pollution from agriculture, lack of sanitation and algal blooms. Areas of high nitrate concentration have been measured at Garies and the surrounding areas.

Groundwater generally flows towards the coast and there is usually little connection between surface water flows and the groundwater aquifer, mainly due to low quantities of surface water. There are therefore not many aquifer dependent ecosystems in the District and it is likely that groundwater contamination does not pose a major risk to floral and faunal communities (Chidley et al., 2010, Higgs et al., 2010).

4.1.9 Terrestrial Vegetation and Habitats

The study area is located within the *Central Namaqualand Coast* region and the *Succulent Karoo Region of Endemism* in the Northern Cape Province. The *Succulent Karoo Region of Endemism* is considered to be of high vulnerability in terms of biodiversity sensitivity and is listed as a *biodiversity priority area* according to the National Spatial Biodiversity Assessment (NSBA) (2004). The *Central Namaqualand Coast* region is listed as a *geographic priority area* by the Succulent Karoo Ecosystem Programme (SKEP) (2003). However, the study area does not fall within the remaining extent of any threatened terrestrial ecosystem and the vegetation in the area is listed as *Least Threatened*.

Much of the area surrounding the development area is used for agricultural purposes (mainly grazing) and remains largely natural. However, small portions along each of the alternative routes have been transformed for cultivation purposes and urban development.

The vegetation in the study area falls within the *Fynbos* and *Succulent Karoo* biomes and the *North West Fynbos*, *Namaqualand Hardeveld* and *Namaqualand Sandveld* bioregions. The following vegetation types have been identified in the study area: *Namaqualand Strandveld, Namaqualand Sand Fynbos, Namaqualand Klipkoppe Shrubland, Namaqualand Inland Duneveld* and *Namaqualand Heuweltjieveld* (Figure 4-5). At a finer scale, five floral habitat units are identified within the study area. These include: *Sand Fynbos, Succulent Karoo, wetland/riparian, rocky outcrop* and *transformed habitat* units.

The *Namaqualand Sand Fynbos* habitat unit consists primarily of sandy, inland dune areas and extends across all three route alternatives. Namaqualand Sand Fynbos is not listed as a threatened vegetation type, however, species diversity within the vegetation type is known to be high, and the occurrence of Species of Conservation Concern (SCC) is common. Sandy dune areas characteristic of Sand Fynbos occur to the west of Kotzesrus, and may form part of a dune plume system which extends from the Groen River to the Brak River that most likely acts as an ecological corridor and is considered to be sensitive.

The *Succulent Karoo* habitat unit consists of low growing, succulent rich vegetation which occurs on red-brown sands. The sandy dune areas that are characteristic of Sand Fynbos are not present within this habitat unit.

The *wetland/riparian* crossings are characterised by the presence of alluvial soils and are dominated by species including *Salsola aphylla*, *Sarcocornia pillansii* and *Lycium cinereum*. The construction of gravel roads through large portions of riparian areas has impacted on the ecological integrity of the Brak River system and has resulted in the erosion of the system in some areas. *Rocky outcrops* provide important floral and faunal habitat. These areas are normally associated with riparian/ wetland areas and therefore share vegetation characteristic of wetland areas.

The *transformed habitat* unit occurs in areas where vegetation has been transformed through historical clearing for agricultural purposes or the construction of infrastructure associated with the town of Kotzesrus (including the excavation of borrow pits). In these areas little or no natural vegetation remains or the natural vegetation has been significantly disturbed (van Staden et al., 2013).

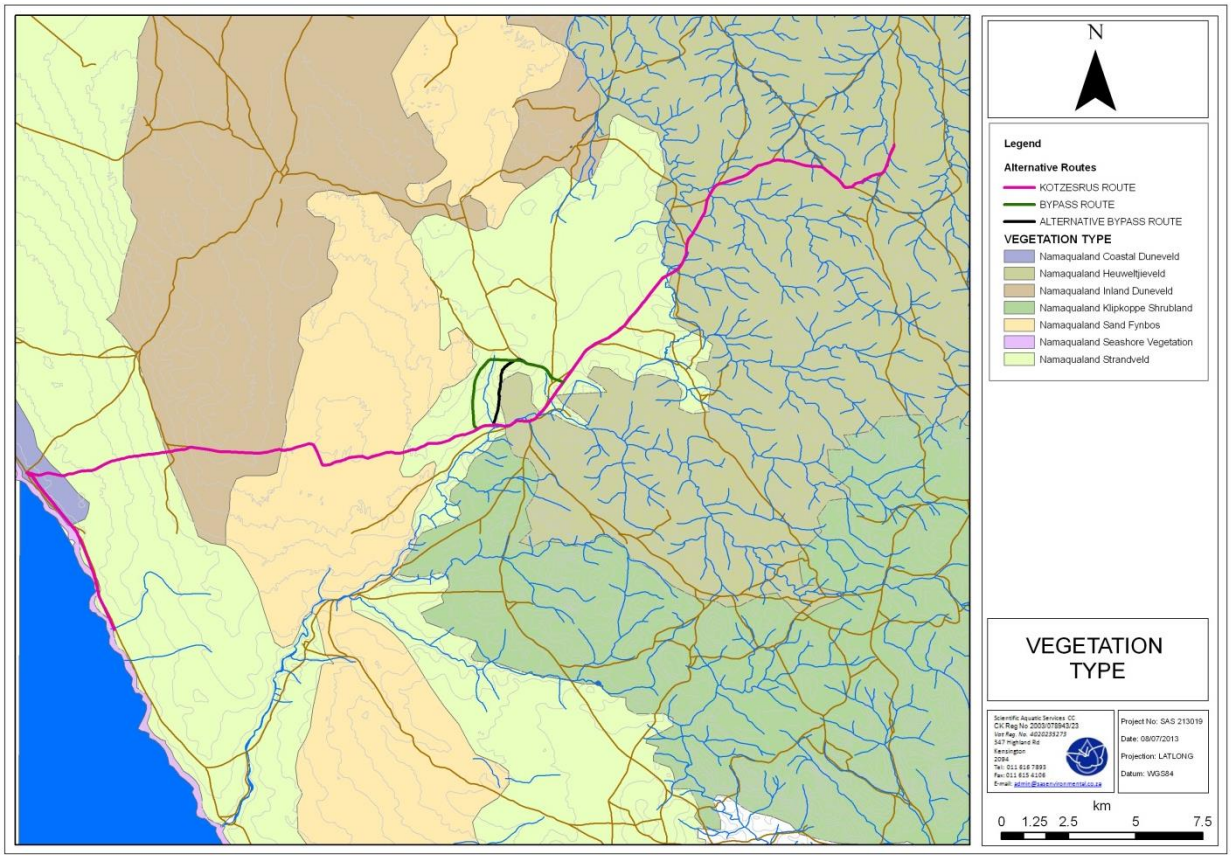


Figure 4-5: Vegetation Types

Source: van Staden et al., 2013

4.1.10 Fauna

Three preliminarily identified faunal habitat units occur within the study area. These include terrestrial (Sand Fynbos and Succulent Karoo), rocky outcrop and riparian habitat units. Both riparian and rocky outcrop habitat units are considered to be of particular importance for the provision of faunal habitat and the creation of migratory corridors through the study area.

A number of mammal species including Steenbok (*Raphicerus campestris*), Suricate (*Suricata suricatta*), Bat-eared Fox (*Otocyon megalotis*), Yellow Mongoose (*Cynictis penicillata*), Common Mole Rat (*Cryptomys hottentotus*), Porcupine (Hystrix africaeaustralis), African Wildcat (*Felis silvestris lybica*) and the Aardvark (*Ocycteropus afer*) occur within the study area. These mammal species are considered to be of *Least Co*ncern in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red Data List (RDL). No threatened mammal species have been identified in the study area.

A number of avifaunal species that are considered to be threatened in terms of the IUCN may occur in the study are. These include Ludwig's Bustard (*Neotis ludwigii*) and the Black Cormorant (*Phalacrocorax neglectus*), both listed as *Endangered*, the Secretarybird (*Sagittarius serpentarius*) and the Black Harrier (*Circus maurus*), both listed as *Vulnerable*, and the Martial Eagle (*Polemaetus bellicosus*) which is listed as *Near Threatened*.

Although listed as species of *Least Concern*, a number of avifaunal raptor species that have been identified in the study area are considered to be under threat by small stock farmers, particularly the Lanner Falcon (*Falco biarmicus*), Verreauxs Eagle (*Aquila verreauxii*), Black-chested Snake Eagle (*Circaetus pectoralis*) and the Black-winged Kite (*Elanus caeruleus*). This threat along with loss of foraging habitat puts considerable pressure on these bird species.

A number of reptile species occur in the study area including the Cape Cobra (*Naja nivea),* Puff Adder *(Bitis arietans),* Night Adder (*Causus* sp.), Angulate Tortoise (*Chersina angulata*) and Padloper Tortoise (*Homopus sp.*). It is possible that three reptile species that are considered to be *Threatened* in terms of the IUCN may occur in the study area. These include the Namaqua Plated Lizard (*Gerrhosaurus typicus*) which has been identified within the terrestrial habitat unit within the study area, and the Speckled Padloper (*Homopus signatus*), both listed as *Near Threatened* and the Namaqua Dwarf Adder (*Bitis schneider*), which is listed as *Vulnerable* (van Staden et al., 2013).

4.1.11 Conservation Areas

The Namaqua National Park is situated approximately 20 km northwest of Volwaterbaai and is administered by South African National Parks (SANParks). The Park was proclaimed in 2001 for the purposes of conserving succulent plants within the Succulent Karoo biome and has recently been expanded to include the coastal area between the Groen and Spoeg Rivers. The Park covers approximately 141 000 ha and stretches from Kamieskroon in the northeast to the Groen River mouth in the southeast (see Figure 4-6) (Higgs et al., 2010).

The KLM SDF proposes that the Namaqua National Park is extended eastwards to include the Skilpad Wildflower Reserve and further east along the N7 boundary. It is also proposed that the Park is extended to the north of Koingnaas to encompass a section of an existing alluvial mining area. These proposals are in accordance with the Draft Management Plan for the Namaqua National Park (2010) (Higgs et al., 2010).

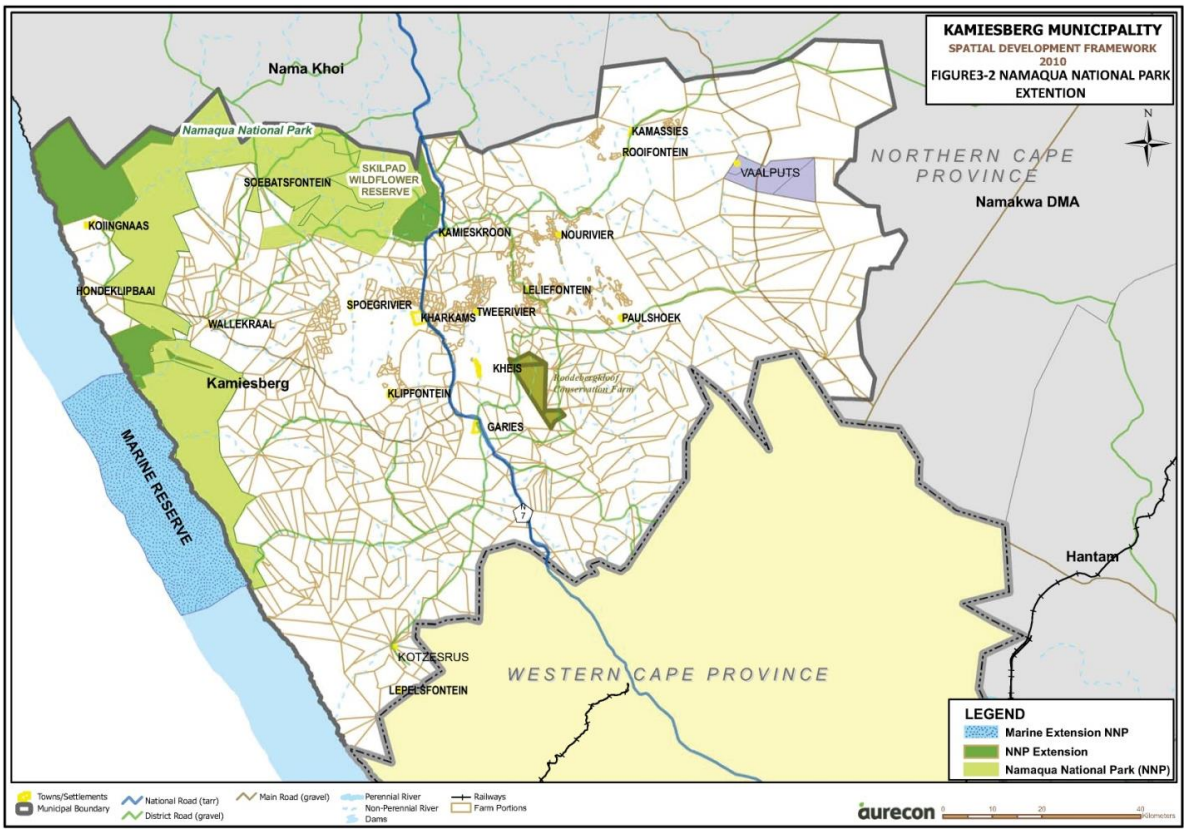


Figure 4-6: Namaqua National Park

Source: Kamiesberg Local Municipality SDF (Higgs et al, 2010)

4.2 Socio-economic Environment

4.2.1 Regional Socio-economic Environment

The study area is located within the NDM, which includes the Local Municipalities (LMs) of Richtersveld, Nama Khoi, Kamiesberg, Hantam, Karoo Hoogland and Khâi-Ma. The NDM has the smallest population in the Northern Cape and the overall population density in the District is estimated at one person per square kilometre (NDM, 2012).

According to Census 2011 data available from Statistics South Africa (StatsSA), the NDM had a population of 115 842, more than 10 000 below the 2007 estimate (NDM, 2012), but more than in 2001. This indicates that the population has not grown as rapidly as anticipated, or declined between 2007 and 2011. Some 8.8% of the population reside in the KLM, 10.3% in the Richtersveld LM, 40.6% in the Nama Khoi LM, 18.6% in the Hantam LM, 10.8% in the Karoo Hoogland LM, and 10.7% in the Khâi-Ma LM (Census, 2011).

The NDM has an economic growth rate of 2.03% per annum, which is lower than the Northern Cape Province growth rate (2.4%) and is less than half of the national growth rate (5%) measured from 1996 to 2007. The NDM has an undiversified economy, heavily reliant on mining. Mining contributes approximately 52% to the Gross Geographic Product (GGP) (CNdV, 2012). In 2007, the Nama Khoi LM made the largest contribution to the GGP (41.7%), followed by the Richtersveld LM (17.3%) (NDM, 2012).

Mining and agriculture are the biggest employers in the NDM. Trade, catering and accommodation contribute 13% to the GGP, while the remaining sectors in total contribute less than 10% (see Figure 4-7). The mining growth rate declined by 0.3% between 2001 and 2007, while trade, catering and accommodation (mainly tourism activities) have significantly increased their contribution to both GGP and employment in the NDM. Figure 4-7 indicates that the economy of NDM has diversified from a vulnerable economy with an over reliance on mining in 1995 to a more diversified economy with reliance on mining, community services and trade in 2007 (CNdV, 2012). However, the increase in the community services sector indicates increased dependence on social assistance within the NDM (NDM, 2012).

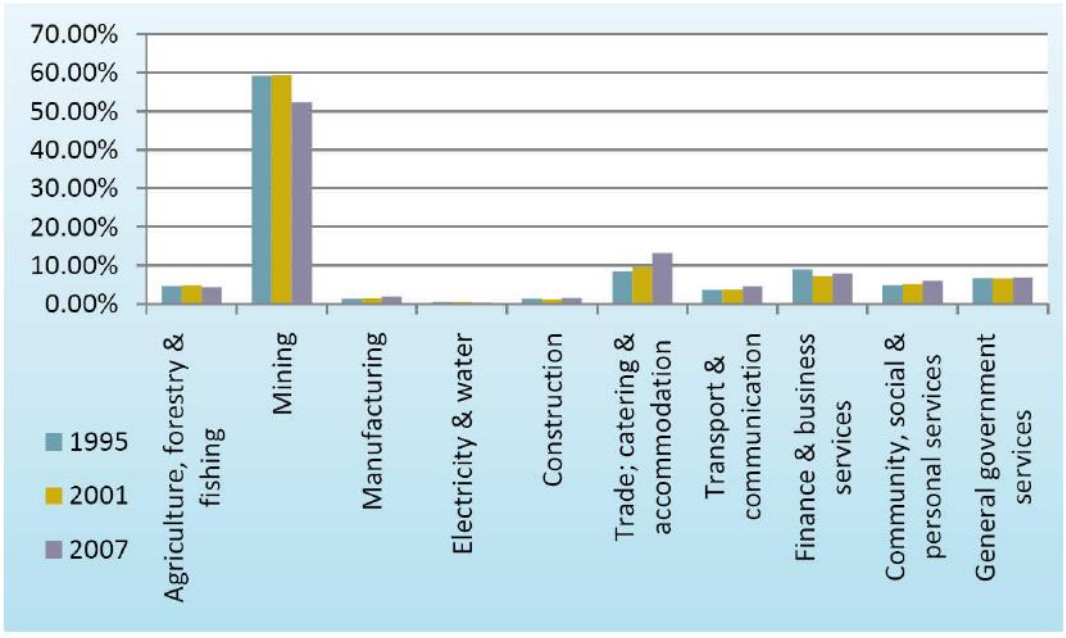


Figure 4-7: Sectoral Contribution to GGP in NDM

Source: Namakwa District Municipality's SDF (CNdV, 2012)

In 2001, 29 279 persons were employed and 11 663 were unemployed in the NDM, with a total (formal) labour force of 40 942 and an unemployment rate of 28% (CNdV, 2012). According to StatsSA (2011), the unemployment rate in the NDM decreased to 20.1% in 2011. However, the NDM economy remains unable to absorb and employ the full complement of job market entrants and participants (CNdV, 2012).

The highest unemployment rate in 2011 was recorded for the Kamiesberg LM (30.8%) and the lowest was for the Hantam LM (11.8%). Unemployment declined most markedly in the Richtersveld LM, from 35.5% in 2001 to 18.6% in 2011, while in the Khâi-Ma LM unemployment increased from 15.3% in 2001 to 22.1% in 2011 (Census, 2011).

In 2011, 6.6% of the population in the NDM had no education, while the highest level of education for 18.8% of the population was matric, with 7.4% of the population having a tertiary education (StatsSA 2011). Indications are that qualified persons leave the District to seek work elsewhere due to the lack of suitable education facilities and employment opportunities in the District (NDM, 2012).

The IDP identifies economic development and job creation as one of the urgent developmental issues in the NDM (NDM, 2012).

The NDM is characterised by unique flora and several nature reserves are located in the area, including the Namaqua National Park. The unspoilt and sparsely inhabited environment make the NDM highly suitable for adventure tourism and outdoor recreational activities, including camping, fishing, hiking, mountain biking and star gazing. The area is also unique in terms of its historical and cultural heritage (Chidley et al., 2012). The potential for energy production, diamond mining and beneficiation, scientific research and development, mainly in the fields of astronomy and biodiversity, tourism and conservation initiates has also been identified. Development in the agricultural sector is challenging due to the scarcity of suitable land, poor transport networks and linkages to markets (CNdV, 2012).

4.2.2 Local Socio-economic Environment: Kamiesberg Local Municipality

4.2.2.1 Demographics

The population in KLM has declined by approximately 5% between 2001 and 2011 from 10 754 in 2001 to 10 187 in 2011 (Census, 2011) (see Figure 4-8). This is likely due to the out-migration of people as a result of the lack of economic opportunities in the area (Higgs et al. 2010). In contrast the population of the NDM increased by 7% and the Northern Cape by 39% (see Figure 4-9).

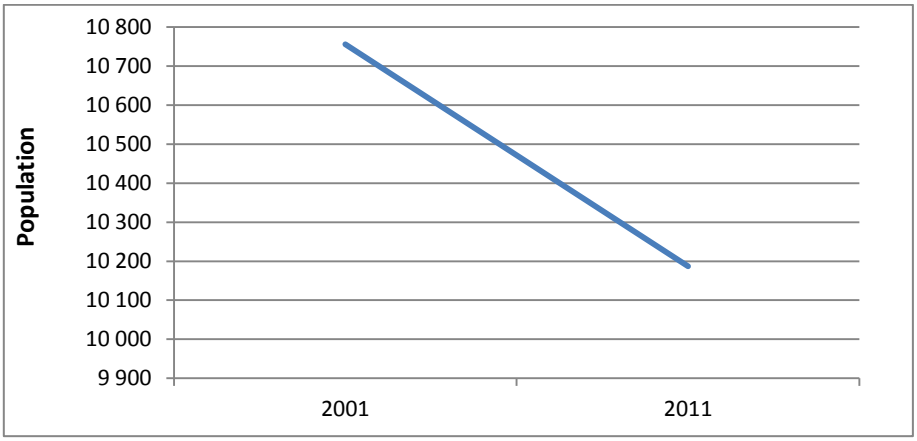


Figure 4-8: Population Decline in the KLM between 2001 and 2011

Source: StatsSA, Census, 2011 and Census, 2001

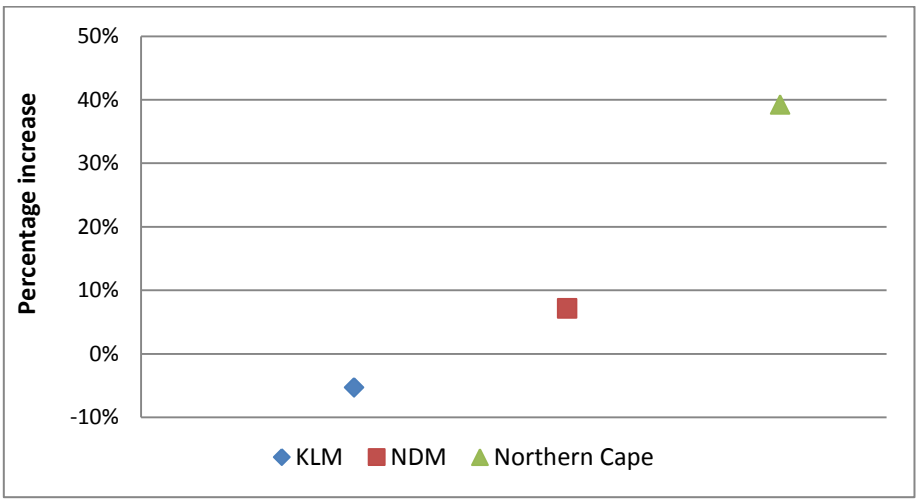


Figure 4-9: Population Growth between 2001 and 2011 in the KLM, NDM and Northern Cape

Source: Census, 2011

Approximately 64% of the KLM population (or approximately 5 193 people) is between 15 and 64 years old (i.e. of working age). The age distribution in the KLM is slightly different to the Northern Cape in general. The KLM has a higher proportion of elderly people (over 65 years) and persons aged between 35 and 64 years old. The KLM also has a lower proportion of individuals aged between 15 and 34 years and 0 and 14 year (see Table 4-2). This confirms the trend of out-migration from the KLM by the younger age bracket.

Women and men are approximately equally represented in the KLM, with a slightly higher proportion of males (50.4%) to females (49.6%). This is the opposite of the gender distribution in the Northern Cape, which has a slightly higher proportion of females (50.7%) to males (49.3%).

Table 4-2: Age Distribution in the KLM and the Northern Cape in 2011

Age group	KLM	Northern Cape
0-14 years	27%	30%
15-34 years	28%	35%
35-64 years	36%	30%
65 years and older	10%	5%

Source: Census, 2011

The predominant population group in the KLM is Coloured (86%), followed by White (8%) and Black African (5%) (Census, 2011). Comparison with the 2001 Census indicates that it is predominantly Black Africans who have moved into the area in recent years, increasing their proportion of the population from 2% in 2001 to 5% in 2011, while the proportion of Coloureds has remained stable and that of Whites has declined from 11% in 2001 to 8% in 2011.

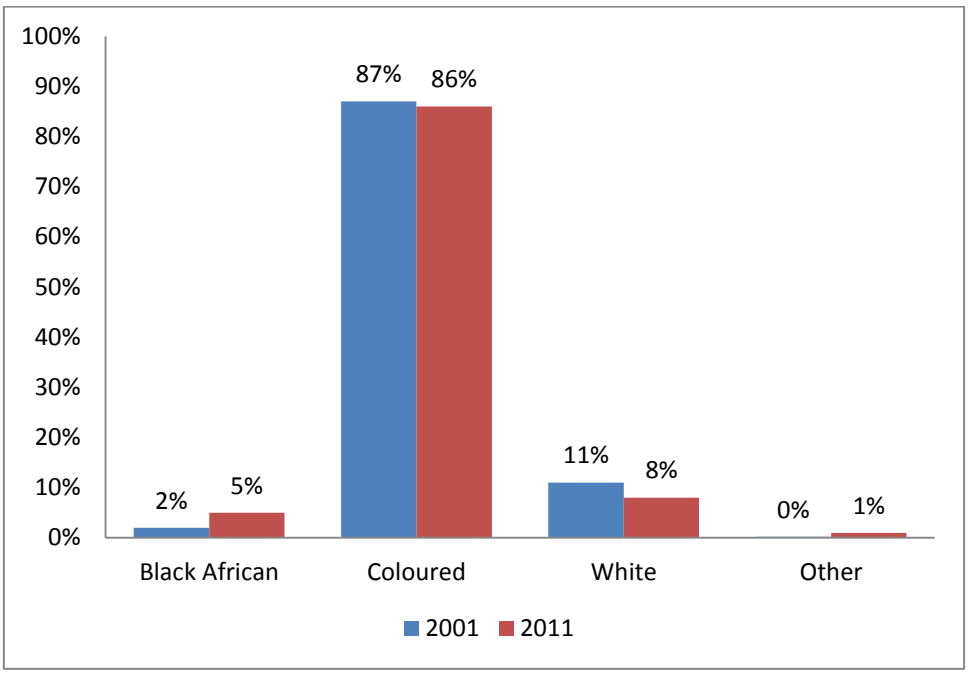


Figure 4-10: Population Structure in the KLM in 2001 and 2011

Source: StatsSA, Census, 2011 and Census, 2001

4.2.2.2 Education

The population of the KLM exhibits a low level of skill. Approximately 4% of the population over 15 years of age have no schooling, 31% have primary school education, 40% have a high school education, 16% have completed Grade 12, 1% have a National Training Centre (NTC) qualification, diploma or certificate and 1% have tertiary education (Census, 2011).

Many of the youth are attracted to larger metropolitan areas by both educational and employment opportunities (KLM IDP, 2013).

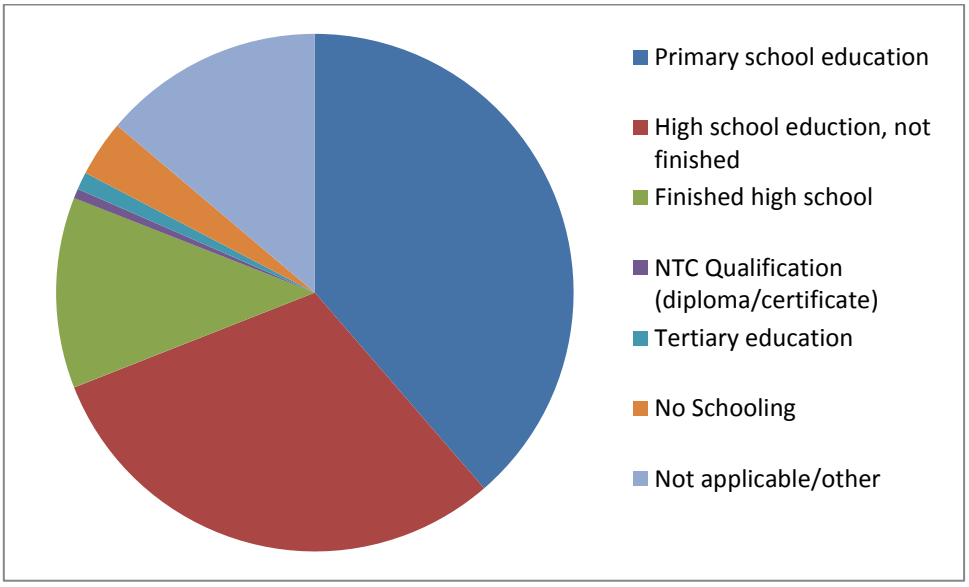


Figure 4-11: Education Level of KLM Population over 15 Years of Age in 2011

Source: StatsSA, Census, 2011 and Census, 2001

4.2.2.3 Economic Sectors and Gross Geographic Product

The average growth rate for GGP in the KLM was 5.4% between 1996 and 2011. This slowed to an average of 4.8% between 2007 and 2011. In 2011 the largest contributor to employment in the local economy was wholesale and retail (21% of total employment in the formal sector). The principal sectors contributing to the GGP of the KLM are also wholesale and retail (including tourism and accommodation) (24%) and finance and business services (25%). Both these sectors have shown a slight proportional increase since 2001. The construction industry has also increased from 7% in 2001 to 12% in 2011 (see Figure 4-12) (KLM IDP, 2013).

The construction sector and tourism industry are seasonal in nature and are susceptible to economic changes and political unrest. The promotion of a diversified economy is important to ensure that over-reliance on these sectors does not occur (KLM IDP, 2013).

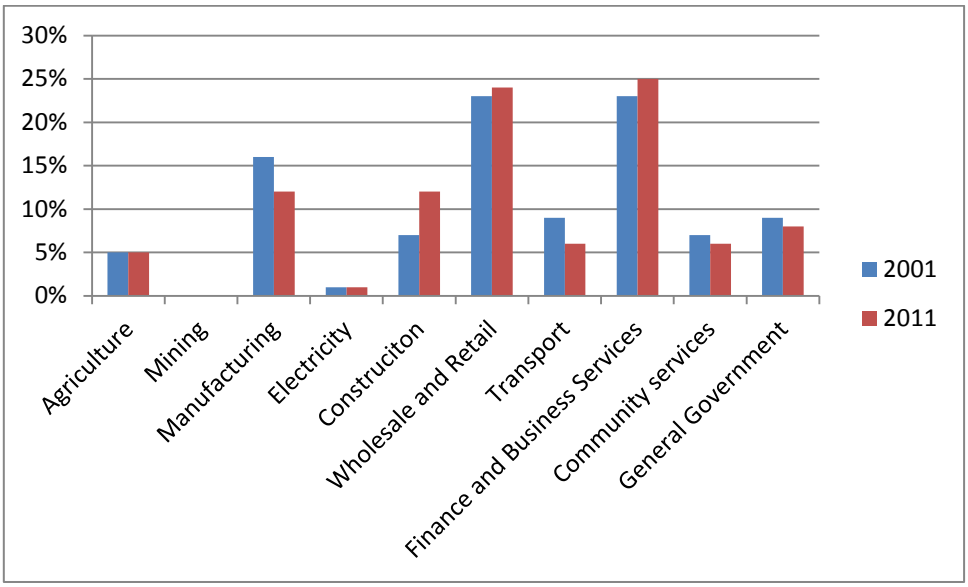


Figure 4-12: Contribution per Sector to GGP in the KLM
Source: KLM IDP (2012)

4.2.2.4 Employment and Income

Approximately 64% of the population in the KLM (6 452 people) is of working age of which 3 185 (49%) actively participated in the labour market in 2011 (Census 2011). An estimated 2 204 people (69% of the population active in the labour market) were employed, while 981 (31%) were unemployed in 2011. Employment rates are lower for Black African and Coloureds than Whites and Indians/ Asians (see Table 4-3).

Total employment figures for persons aged between 15 and 64 years in the KLM are similar to those for the Northern Cape (see Table 4-3), although a larger number of work seekers in the KLM have become discouraged (Census, 2011).

Table 4-3: Employment in the KLM (people aged 15 to 64 years) in 2011

Location	KLM					KLM	NDM	Northern Cape
Population Group Status	Black African	Coloured	Indian/ Asian	White	Other	All	All	All
Employed	30%	33%	45%	52%	46%	34%	44%	38%
Unemployed	11%	16%	15%	8%	20%	15%	11%	15%
Discouraged	9%	12%	15%	6%	3%	11%	5%	5%
Not active	51%	39%	24%	34%	31%	39%	40%	42%

Source: Census 2011

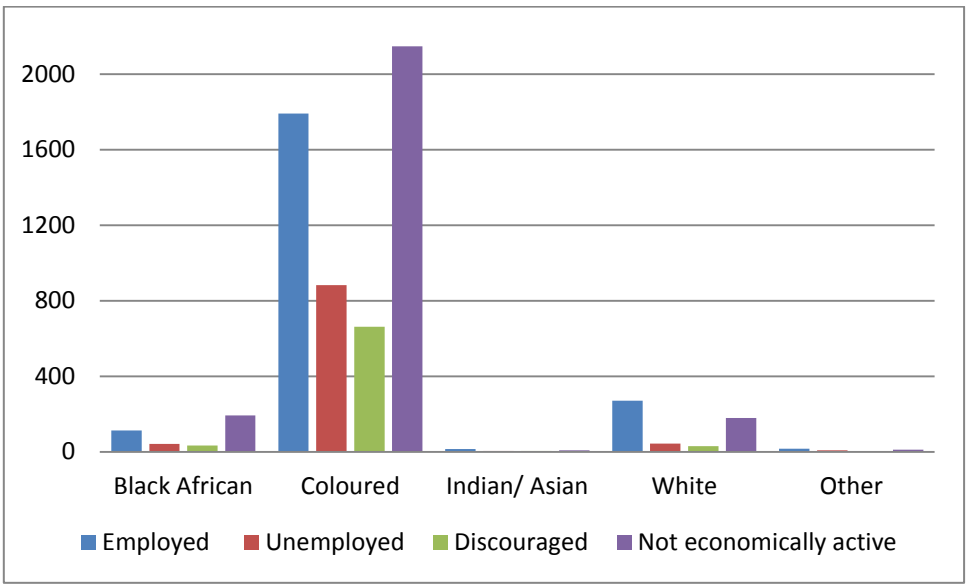


Figure 4-13: Number of Employed People per Population Group in KLM (people aged 15 to 64 years) in 2011

Source: Census, 2011

The income of the KLM population between the ages of 15 and 64 during 2011 is presented in Table 4-4 and Figure 4-14 below[14].

Table 4-4: Monthly Income in the KLM (people aged 15 to 64 years) in 2011

Monthly Income	Number of person	Percentage of income earners
No income	2 662	41%
Less than R800	561	18%
Between R800 and R1600	1 375	43%
Between R1600 and R6400	736	23%
Between R6400 and R12800	236	8%
Over R12800	212	7%

The ability to meet basic needs, such as food, clothing, shelter and basic amenities is largely determined by the level of income earned by households. The low levels of income in the KLM indicate that the majority of the population fall below the poverty level and are eligible for indigent status (and social grants) (Higgs et al., 2010).

[14] Monthly incomes were not specified for 198 people in the survey.

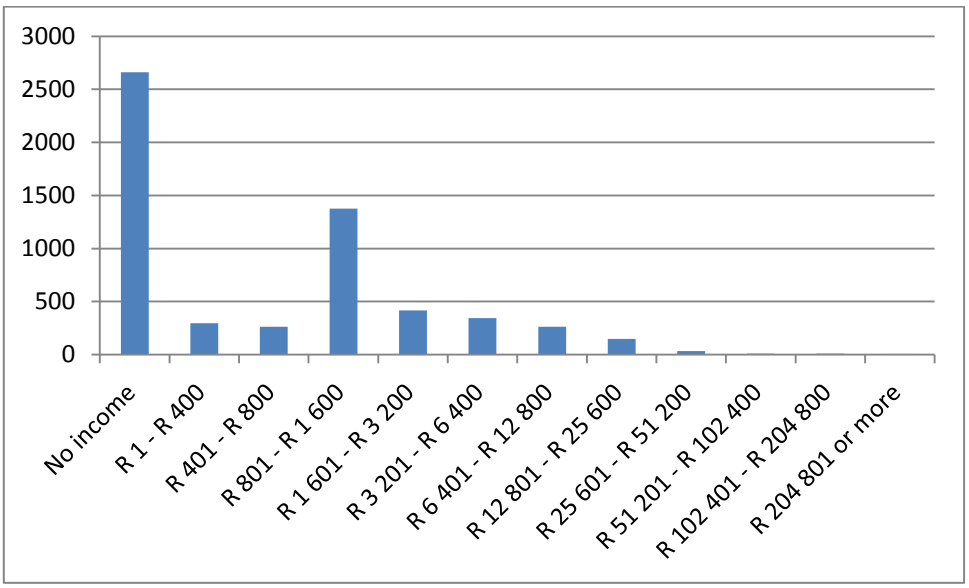


Figure 4-14: Individual Monthly Income in the KLM in 2011

Source: Census 2011

4.2.2.5 Health

According to the NDM Department of Health, there is a shortage of service capacity at both District and Local level. Hypertension, diabetes, HIV/AIDS, tuberculosis, diarrhoea and malnourishment are prevalent within KLM (Higgs et al., 2010).

A formal clinic and community health centre is located in Garies and there are 5 clinics and 10 mobile clinics within the KLM. The satellite clinics are understaffed and full time medical professionals are often not available. The large distances between towns limit the frequency with which clinic services can be provided (Higgs et al., 2010).

4.2.2.6 Service Provision

KLM provides services to the towns and settlements of Garies, Hondeklipbaai, Kamassies, Kamieskroon, Kharkams, Kheis, Klipfontein, Leliefontein, Lepelsfontein, Nourivier, Paulshoek, Rooifontein, Soebatsfontein, Spoegrivier, and Tweerivier. KLM does not provide services to Kotzesrus, Stofkraal, Molsvlei or Rietpoort (KLM IDP, 2013).

Water

KLM has a total of 16 water schemes, including desalination, boreholes and surface water schemes. Water is supplied to all formal households, businesses and farms that are serviced by KLM. The majority of informal households receive water via communal standpipes (KLM IDP, 2013). In 2011, 42% of households in KLM had piped water inside their homes, 53% had piped water inside their yards, while 4% of households had access to Municipal water from a community standpipe less than 200m from their home (Census, 2011).

Most water use in KLM is recorded for domestic purposes, followed by the industrial sector and agriculture. The KLM is challenged in its provision of water by various factors including drought, poor groundwater quality, water losses and general water scarcity. Water supply is often strained during the holiday season (December to February) and water management initiatives have had to be implemented in the past to ensure water supply during this time (KLM IDP, 2013).

A number of small towns within the KLM rely on groundwater. Lepelsfontein previously relied on groundwater which required treatment through desalination. The desalination plant at Lepelsfontein

had limited capacity and was only able to provide water twice a week in 2010, through communal standpipes (Higgs et al., 2010).

The upgrading of water networks in Lepelsfontein was identified as a priority in the KLM SDF. KLM's target was to provide 100% of households in Lepelsfontein with access to water by December 2010. The need to upgrade the desalination plant as well as the bulk water supply through a proposed bulk water pipeline between Garies and Lepelsfontein was identified for the 2009/2010 financial year (Higgs et al., 2010). No municipal water is supplied to Kotzesrus which relies on other sources including groundwater abstraction.

Sanitation

In 2011, approximately 46% of households in KLM had access to flush toilets, flush septic tanks or chemical toilets, while 47% made use of Ventilated Improved Pit (VIP) latrines or Urine Diversion Systems (UDS) (KLM IDP, 2013).

In 2010, 100% of residents in Lepelsfontein used non-waterborne sanitation (50% VIP latrines and 50% UDS toilets) (Higgs et al., 2010). Kotzesrus is not provided with sanitation services by the KLM and makes use of alternative sewage disposal methods including septic tanks.

Electricity

In 2011, 88% of households serviced by KLM had access to electricity, 4% used gas and 8% had no access to electricity. According to the IDP, KLM has adequate capacity to deliver bulk electrical services to existing and future residential and commercial development in the area (KLM IDP, 2013).

Lepelsfontein had no access to electricity in 2008, and the electrification of the town was identified as a priority in the KLM SDF (Higgs et al., 2010). The provision of bulk electrical supply to Lepelsfontein was prioritised for the 2009/2010 financial year, while the provision of household electrical connections was identified for the 2011/2012 financial year, with the aim of providing 100% access to electricity to the households of Lepelsfontein (KLM IDP, 2013).

Kotzesrus has no access to municipal electrical services and make use of alternative sources of energy.

Solid Waste Management

In 2011, approximately 78% of households in KLM had their household refuse removed at least once a week by the Municipality. Only 2% of households had no access to waste disposal facilities, while the remainder relied on communal/ private refuse dumps or removal by private companies or KLM on a less frequent basis (KLM IDP, 2013).

4.2.3 Cultural and Historical Environment

4.2.4 Historical Context

The Namaqua area was historically occupied by the San (Bushmen) and Khoenkhoen herders. The San are known to have occupied the area within the last 10 000 years and were displaced following the arrival of the Khoenkhoen herders and colonial settlers (Hart, 2006).

The Namaqualand interior was historically occupied by a Khoenkhoen pastoralist group named the Little Namaqua. The group lived in temporary encampments and moved seasonally to find better grazing for their herds of cattle and sheep. Indications are that livestock was moved between the Kamiesberg area in the summer and the Sandveld in the winter (Webley & Halkett, 2010, Webley, 2012).

The colonial Trekboers were able to settle in the area as the Khoenkhoen had no clearly demarcated territorial boundaries and the first loan farms in the area were granted after 1750. These were in the

vicinity of the Groen and Doorn Rivers (Webley & Halkett, 2010). The arrival of the colonial settlers resulted in the displacement of the San and Khoenkhoen herders.

Early colonial settlements in the Namaqua area were historically located near sources of water. The area is characterised by a distinct architectural vernacular and unfired mud brick was used as the primary construction material for early colonial buildings (Hart, 2006, Webley & Halkett, 2010). Kotzesrus developed around the Brak River and has a number of historic buildings and structures older than 60 years, including a church and graveyard.

4.2.4.1 Archaeological Context

The arid areas of the Namaqualand coastline are considered to be archaeologically rich (Hart, 2006). The rocky and sandy coastal areas were attractive to early San hunter-gatherers due to the rich abundance marine foods, particularly shellfish. In excess of 1 500 archaeological sites, including shell middens and wind-deflation sites have been documented along the rocky shoreline and adjacent to dune ridges and sandy beaches of the Namaqua coast (ACRM 2013).

Parts of the Namaqualand area were occupied by Early Stone Age (EStA) inhabitants more than one million years ago. It is also estimated that Middle Stone Age (MSA) inhabitants have been exploiting the Namaqua coastline for the past 120 000 years. However, the majority of archaeological sites discovered in the area are relate to the history of the San hunter-gatherers and Khoenkhoen herders during the Late Stone Age (LSA) (ACRM, 2013, Hart, 2006, Webley & Halkett, 2010, Webley 2012, Van der Ryst & Küsel, 2012).

Diffuse scatters of LSA sites that contain shellfish, bone, stone tools, pottery and artefacts are associated with small archaeological heuweltjies located near coastal areas. Archaeological areas of significance that are located inland from the coast are mostly associated with the occurrence of water sources and floodplains and rocky outcrops. Several rock shelters containing archaeological deposits including stone tools, pottery, shellfish, ostrich eggshell and rock art have been documented in the area near Kotzesrus and along the Groen River (ACRM, 2013).

A memorial is located in the vicinity of the proposed brine discharge site. There are no human remains located near the memorial site, nor is it older than 60 years and negotiations for the potential re-establishment of the memorial site in an alternative location are currently underway.

4.2.4.2 Palaeontological Context

The discovery of fossils in the coastal area surrounding Hondeklipbaai and Kleinzee during mining activities has provided valuable insights into the geological history of southern Africa and the coastal plain marine and Aeolian deposits of the Namaqua coastline are considered to be sensitive from a palaeontological perspective.

The West Coast Fossil Park at Langebaanweg, approximately 225km south of Volwaterbaai, in the Western Cape provides an indication of the importance of palaeontological material in the area. The Park is world-renowned for the excellent preservation of ancient fossils from the rapid carbonate cementation of sediments in which bone has been buried in the calcareous aeolianites (fossil dunes) and shallow marine silts.

Fossils date to the late Miocene/early Pliocene period (circa 5.2 million years ago). A remarkable number of different fossil animal species (and families) are represented at West Coast Fossil Park, making Langebaanweg one of the most diverse Mio-Pliocene occurrences in the world (www.fossilpark.org.za).

4.2.5 Visual and Aesthetic Environment

The study area is characterised by a number of broad-scale landscape types, briefly described below and illustrated in Figure 4-15.

The proposed Zandkopsdrift Mine is located on the Zandkopsdrift Farm, on the foothills of the Kamiesberg mountain range. The area is characteristic of the Sandveld region of central Namaqualand, with low succulent Karoo scrubland vegetation within a moderately undulating landscape that is dotted with rocky outcrops and koppies. The succulent vegetation in the area is suitable for livestock grazing and provides habitat to a number of indigenous faunal species, including Steenbok, which is often seen in the area. The undulating landscape at Zandkopsdrift gradually flattens out towards the coastal plain and rocky shoreline at Volwaterbaai.

The proposed route between the Zandkopsdrift Mine and Volwaterbaai passes through Kotzesrus, which is located approximately 15 km southwest of the Zandkopsdrift Farm. The town was established on the Brak River in a sheltered valley between two rocky koppies. It is a distinct feature on the route and is characterised by a unique sense of place due to its isolated location in the desolate and arid Karoo environment, although other towns/settlements in the region display similar characteristics. The gravel road leading through the town emphasises the geological formations of the surrounding koppies and asserts the rural character of the town.

The town was established approximately 100 years ago and historic buildings in the town are representative of the unique architectural vernacular and construction techniques of the region. Although there are a limited number of buildings in the town, buildings were constructed using various techniques and buildings include mud brick gabled farmhouses and corrugated iron and wooden frame cottages. The town includes a church, school building, small shop and graveyard. However, the population of the town has decreased significantly over the last 50 years and institutional and commercial facilities in the town are now seldom in use. The town remains isolated, but attracts a very small number of tourists from the surrounding area during the Namaqualand flowering season and the December holiday period.

The vegetation changes along the route between Kotzesrus and Volwaterbaai from low Succulent Karoo scrubland to unpalatable Sand Fynbos dominated by restios and low succulent Namaqua Seashore Vegetation. The coastal plain at Volwaterbaai is slightly undulating and, at the coastline, dips down steeply towards the shoreline in places. The area is characterised by rocky protrusions interspersed with sandy beach areas and the cold Benguela Current supports the rich marine ecosystem. However, the coast is isolated and uninhabited and the windswept, arid environment is harsh and unforgiving.

A gravel track runs along the coast at Volwaterbaai and provides access to the coastline for tourists fishermen and kelp harvesters. In some areas natural vegetation has been cleared for kelp harvesting and sorting. SANParks has recently erected a number of beacons in the area serving as markers for otherwise unidentified beaches and rocky inlets in an effort to enhance the tourism potential of the area.

Area in vicinity of the Zandkopsdrift Mine

Kotzesrus

Example of local architectural vernacular at Kotzesrus

Example of local architectural vernacular at Kotzesrus

The Namaqua Coastline near Volwaterbaai

Memorial located near intake site

srk consulting	**Figure 4-15: Visual and Aesthetic Environment**	Project No. 451101

Source: SRK

5 Stakeholder Engagement

Stakeholder engagement forms a key component of the S&EIR process. The objectives of stakeholder engagement are outlined in this section, followed by a summary of the approach to be followed.

5.1 Objectives and Approach to Stakeholder Engagement

The overall aim of stakeholder engagement is to ensure that all IAPs have adequate opportunity to provide input into the process and raise their comments and concerns. More specifically, the objectives of stakeholder engagement are to:

- Identify IAPs and inform them about the proposed development and S&EIR process;
- Provide stakeholders with the opportunity to participate effectively in the process and identify relevant issues and concerns; and
- Provide stakeholders with the opportunity to review documentation and assist in identifying mitigation and management options to address potential environmental issues.

5.2 Stakeholder Engagement Activities

The activities undertaken and proposed during the Initiation and Scoping Phases of the assessment are outlined in Table 5-1.

Table 5-1: Activities Planned during the Scoping Phases

Task	Objectives	Dates
Advertise commencement of EIA process and release Scoping Report for public comment period	To notify IAPs of the commencement of the EIA process and to provide a description of the proposed project and the affected environment, as well as a description of potential environmental issues, and the proposed approach to the Impact Assessment Phase.	29 August 2013
Public comment period	To provide stakeholders with the opportunity to review and comment on the results of the Scoping Phase.	2 September to *21 October 2013*
Public Open Days	To present the findings of the Scoping Report to stakeholders and provide an opportunity for questions and discussion.	27 to 28 September 2013
Finalise Scoping Report	To record all issues and concerns raised and collate these comments in the final report which provides NCDENC with information for decision-making.	*December 2013*
Notify stakeholder of the availability of Final Scoping Report (including Comments and Responses Report) for a second public comment period	To provide stakeholders with the opportunity to review responses to comments and minor changes to the Scoping Report (if any).	*February 2014*

The key activities (that will be) undertaken in the stakeholder engagement process during the Scoping Phase are described further below.

5.2.1 Identification of Key Stakeholders

In line with the requirements of the EIA Regulations, 2010, relevant local, provincial and national authorities, conservation bodies, local forums and representatives and surrounding land owners and occupants have been notified of the EIA and the release of the Scoping Report for comment.

Relevant authorities (Organs of State) have been automatically registered as IAPs. In accordance with the EIA Regulations, 2010 all other persons must request in writing to be placed on the register, submit written comments or attend meetings in order to be registered as stakeholders and included in future communication regarding the project. As specified in GN R 543: 55(1), all persons who submit written comments, attend meetings or request in writing to be placed on the register will be registered as IAPs, and advertisements advise that IAPs register as such.

A list of stakeholders that were initially notified of the process is provided in Appendix 5A. The stakeholder database will be updated throughout the process. *The database of registered stakeholders at the end of the Scoping Phase is provided in Appendix 5B.*

5.2.2 Notification of the EIA Process and Scoping Report for Public Comment

Newspaper advertisements announcing the commencement of the S&EIR process, the availability of the Scoping Report for stakeholder review and inviting IAPs to register on the project database were placed in:

- One regional newspapers (in Afrikaans):
  - Die Burger;
- Two local papers (in Afrikaans and English):
  - Ons Kontrei; and
  - Plattelander.

Copies of the advertisements placed are provided in Appendix 5B.

The project extends over a considerable area. As such, posters with details of the project and EIA process and EAP contact details were placed in English and Afrikaans at the desalination plant site and central public locations in the following towns:

- Springbok;
- Vredendal;
- Bitterfontein;
- Garies;
- Molsvlei, Rietpoort, Stofkraal, Lepelsfontein and Kotzesrus.

Details of locations at which site and community notices were placed, a copy of the notice and photographs of these notices are provided in Appendix 5B.

Hard copies of the full report *were made* available for viewing at the following venues:

- Kotzesrus Cash Store;
- Municipal Service Points in:
  - Lepelsfontein,
  - Stofkraal;
  - Rietpoort; and
  - Molsvlei;
- Garies Public Library;
- Security office at Zandkopsdrift Mine; and

- SRK's office in Rondebosch.

An electronic version of the report *could* also be accessed on SRK's website **www.srk.co.za** (via the 'Recent Publications' and 'Public Documents' links).

All stakeholders on the initial stakeholder database (Appendix 5A) were notified in writing – via e-mail, fax or post - of the availability of the Scoping Report for public comment, the need to register as a stakeholder and were provided with a copy of the executive summary of the Scoping Report, a registration and comment sheet as well as details of the proposed Open Days. A copy of the correspondence sent to all stakeholders, as well as proof that such correspondence was sent is included in Appendix 5B.

Stakeholders *were* provided with a comment period *exceeding* 40 days *(from 1 September to 21 October 2013), with an extension until end November 2013 to accommodate outstanding comments from organs of state.*

5.2.3 Public Open Day and Focus Group Meetings

A Public Open Day is a public forum at which the findings of the Scoping Phase are presented for discussion. A number of Public Open Days *were* held during the comment period to provide stakeholders with the opportunity to discuss concerns related to the proposed project that they may have. This will help to guide the assessment of potential impacts during the Impact Assessment Phase.

Public Open Days *were* held in:

- Lepelsfontein at 9:00 on Friday 27 September 2013;
- Kotzesrus at 14:00 on Friday 27 September 2013; and
- Garies at 9:00 on Saturday 28 September 2013.

Copies of the posters presented at the Public Open Days, attendance registers and photographs of Open Days are provided in Appendix 5B.

5.2.4 Next Steps

Following initial review of the Scoping Report, issues raised by authorities and the public *have been* summarised and responded to in a Comments and Responses Report, which *is* appended to the Scoping Report *(Appendix 5B)*. The Scoping Report will *now be released to the public for a further 21 day public review period. All additional comments received will be submitted to NCDENC along with the Final Scoping Report and* where applicable will be addressed during the Impact Assessment Phase. The Impact Assessment Phase will commence on submission of this Final Scoping Report in anticipation of the acceptance of the report and Plan of Study for EIA by NCDENC.

The Final Scoping Report will be *made available at the following locations for review by stakeholders:*

- *Kotzesrus Cash Store;*
- *Municipal Service Points in Lepelsfontein;*
- *Garies Public Library; and*
- *Security office at Zandkopsdrift Mine; and*
- *SRK's office in Rondebosch.*

The document can also be accessed on SRK's website. All registered stakeholders will be notified in writing of the second public comment period, from 6 to 27 February 2014.

5.3 Stakeholder Comments

Key comments and concerns raised by stakeholders can be summarised as follows (in no particular order):

- ***Economic benefits:*** *The project is seen as facilitating economic benefits to local communities through the provision of jobs (also those associated with the proposed Mine for which water is required). Provision of water to local communities (if possible) would be an additional economic benefit;*
- ***Impacts on affected landowners*** *and resident of Kotzesrus, including nuisance and security issues associated with construction activities through the centre of Kotzesrus**;***
- ***Visual and aesthetic impacts:*** *particularly associated with the construction of power lines and pipelines through Kotzesrus, and the preference for these to be routes around the town;*
- ***Status of the existing road:*** *which is believed by one property owner to be a private rather than a proclaimed public road;*
- ***Traffic****: the increase in traffic on existing roads some of which are already in a poor condition, and further deterioration of road;,*
- ***Heritage:*** *Impacts on heritage resources, including the sense of place and historical buildings in Kotzesrus; and*
- ***Tourism****: impacts on access to the coast and the informal camping and recreation in the coastal zone.*

6 Potential Environmental and Social Impacts

6.1 Factors Informing the Assessment

The impacts of a project are mostly linked to the sensitivity of the receiving environment and proximity of receptors, the extent or footprint and nature of the development, expected emissions and discharges and stakeholders' perceptions. These factors, as well as the elements of the environment affecting the proposed development are briefly summarised below.

- **Sensitivity of the terrestrial biophysical environment:** The western portion of the proposed Kotzesrus route passes through a CBA associated with sensitive Sand Fynbos vegetation which is considered to be botanically sensitive. In addition, the proposed route and bypass alternatives cross a number of watercourses and wetland features that could be considered ecologically sensitive. It is also possible that a number of threatened avifaunal species may occur in the study area.
- **Sensitivity of the coastal region and marine environment:** The isolated coastal and marine environment is considered to be rich in biodiversity and relatively pristine. Seawater extraction and the discharge of treated brine effluent into the ocean may impact negatively on marine biota (fauna and flora), and the design and location of infrastructure in the coastal zone thus need to be informed by the local oceanographic conditions including current and wave climates and potential sea-level rise. A portion of the route follows an existing gravel road along the coast from the desalination plant for approximately 6.5km in a northerly direction. Cumulative impacts as well as disturbances to unique marine or coastal systems or features are expected to be limited given the current lack of development along the coastal stretch.
- **Sensitivity of the social environment:** The KLM is characterised by low employment and education levels. Kotzesrus is located approximately midway between the desalination plant and the Zandkopsdrift Mine and receptors in the town will likely be affected by the development of the proposed infrastructure either passing through or bypassing the town (depending on the selected route alternative). The desalination plant is remote and only a limited number of receptors will be affected by the desalination plant at Volwaterbaai, including tourists and residents in the area. Construction of the desalination plant and associated infrastructure may create some employment opportunities in the short term, while the operation of the desalination plant may create only a limited number of long term employment opportunities.
- **Development footprint:** The development will include 40km of linear infrastructure, stretching from the coast at Volwaterbaai to the Zandkopsdrift Mine. Sections of this infrastructure will follow existing 4 x 4 tracks while other sections are currently on undisturbed stretches of land. Some infrastructure, notably the power lines and pipelines are likely to be positioned on relatively undisturbed land adjacent to existing roads (either in or adjacent to the road reserves). The footprint of the desalination plant and associated infrastructure in the coastal zone is relatively significant given the current absence of structures in the area, with some infrastructure (seawater intake and discharge facilities) positioned below the HMW of the sea. The consideration of various alternatives and further assessment of viable alternatives will facilitate the optimal placement and design of project components.
- **Emissions, discharges and run-off:** Emissions from the proposed development will be limited to the emissions of construction vehicles and plant during the construction phase (including dust and noise emissions) and very limited emissions from the operational desalination plant. Runoff will increase as a result of the hardening of permeable surfaces and it is possible that contaminants may be inadvertently released during construction activities. Brine will be

discharged from the temporary (during construction) and permanent desalination plants (during operations) into the sea and impacts related to the disposal of brine into the coastal environment will need to be mitigated. The proposed use of chemicals (e.g. chlorine[15]) in the desalination process, and the possibility of some of these being discharged along with brine is a concern if not properly managed.

- **Scarcity of water:** Namaqualand is a water scarce area, constraining development in the region.
- **Stakeholders perceptions:** While much of the project infrastructure is relatively remote and is likely to raise little concern by stakeholders, a number of private properties in Kotzesrus would be directly affected by the project. These property owners are particularly concerned about disruptions to their farming activities and impacts on economic value of their land as well as security and nuisance impacts due to construction activities.

6.2 Key Environmental Issues

Based on the above considerations as well as the professional experience of the EAP, the following *key* environmental issues – potential negative impacts and potential benefits of the project in its proposed setting – have been identified. Other less significant impacts are discussed in Section 7.8.

- **Terrestrial and wetland ecology** – Due to the botanical and ecological sensitivity of portions of the development area and the presence of sensitive vegetation types and wetland features, the proposed project may negatively impact threatened species and habitats. Portions of the proposed route traverse undisturbed areas, some of which fall within CBAs and the installation of infrastructure within or adjacent to existing road reserves will also disturb these (potentially undisturbed) areas;
- **Terrestrial fauna** – Construction activities may affect terrestrial and avifauna in and around the project, as well as faunal habitats. In addition linear infrastructure could create barriers to the migration of certain faunal species;
- **Marine and coastal ecology** – The construction of infrastructure in the marine and coastal environments may disturb marine biota and coastal ecosystems, particularly blasting, excavation and concrete works below the HMW of the sea, and the movement of construction vehicles in the coastal zone. The abstraction of seawater and the discharge of treated brine (and potential co-discharges) into the ocean may result in the entrainment and impingement of biota (fauna and flora) and more intense impacts on marine biota in a sacrificial area characterised by elevated salinity levels and the presence of co-discharge. This impact could be exacerbated should local bathymetry and inadequate design of discharge infrastructure promote the accumulation of brine, rather than rapid mixing and dispersion; and
- **Heritage** – It is possible that sites of archaeological or palaeontological significance are located in the vicinity of the development area; in addition to which a number of historic buildings are located in Kotzesrus. A memorial stone is also located in the vicinity of the proposed seawater intake for the desalination plant. Possible impacts on heritage (archaeological, palaeontological and architectural) resources may thus occur.

[15] Chlorine is a highly toxic and relatively long-lived biocide/poison, which could lead to the loss of marine plant and animal diversity and biomass if discharged with bring in sufficient concentrations.

The potential direct, indirect and cumulative impacts (negative and positive) of the project and the no-go option, based on the key issues listed above, will be addressed in the Impact Assessment Phase of the EIA. Specialist studies and inputs will be commissioned during the Impact Assessment Phase to address these issues (see Section 7.3).

Certain impacts, while important, are considered likely to be less significant than those discussed above. It is proposed that these potential impacts be assessed by the EAP, with specialist input where required, rather than a full specialist study. These include **air quality, noise, socio-economic, traffic and visual (or sense of place) aspects** – see Section 7.8.

7 Plan of Study for the EIA

The proposed Plan of Study for the Impact Assessment Phase of the EIA is presented below.

7.1 Description of the Proposed EIA Process

The Impact Assessment Phase can be divided into key steps, namely:

- Consultation with relevant authorities;
- Specialist studies;
- Compilation of an EIA Report and an Environmental Management Programme (EMP);
- Stakeholder engagement; and
- Submission of the Final EIA Report and EMP to the competent authorities, in this case NCDENC.

These are outlined in more detail below.

7.2 Consultation with the Relevant Authorities

Consultation will be conducted with NCDENC and other relevant authorities to clarify their requirements for the Impact Assessment Phase of the proposed development, other permit and licence applications for the project and to ensure that comments from the key authorities can be received in time to allow for them to be addressed in the EIA. The authorities (and other organs of state) that will be consulted include:

- National DWA: Lower Orange WMA;
- National DEA: O&C;
- NCDENC;
- Northern Cape: Department of Agriculture and Land Affairs;
- Northern Cape: Department of Minerals and Energy;
- SAHRA;
- CapeNature[16];
- South African National Parks (SANParks);
- NDM; and
- KLM.

7.3 Specialist Studies

Specialist assessments will be undertaken as part of the Impact Assessment Phase to investigate the key potential environmental issues and impacts identified during Scoping. These key issues and impacts have been identified based on:

- The legal requirements (Chapter 2);
- The nature of the proposed activity (Chapter 3)
- The nature of the receiving environment (Chapter 4); and

[16] In the absence of a similar body operating in the Northern Cape, CapeNature has agreed to comment on the application.

- The professional experience of the EIA team.

The following **specialist studies** are proposed for the Impact Assessment Phase:

- Terrestrial and Wetland Ecology (including terrestrial fauna) Impact Assessment;
- Marine Modelling Specialist Study;
- Marine and Coastal Ecology Impact Assessment;
- Heritage Impact Assessment; and
- Palaeontology Impact Assessment.

Draft ToR for these studies are presented in Section 7.7 below.

7.4 Compilation of the Environmental Impact Report

The compilation of the EIA Report and EMP will include the following tasks:

- Assimilation of the specialist studies / input into the EIA Report and EMP;
- Identification and assessment of environmental impacts based on the results of the specialist studies / input and professional judgment of the EIA team. This will entail an assessment of the duration, extent, probability and intensity of the impacts to determine their significance (see Section 7.7.1 below);
- Identification of mitigation measures and recommendations for the management of the proposed project to avoid and minimise environmental impacts and maximise benefits; and
- Collation of the above information into an EIA Report and EMP for the design, construction and operation phases of the project.

7.5 Stakeholder Engagement

The stakeholder engagement process that will be initiated during the Scoping Phase (see Section 5.2) will continue in the Impact Assessment Phase of the EIA. The key activities planned during the Impact Assessment Phase are outlined in Table 7-1.

Table 7-1: Stakeholder Engagement Activities Planned during the Impact Assessment Phase

Task	Objectives	Dates
Update stakeholder database	To register additional stakeholders identified throughout the S&EIR process	Throughout S&EIR process
Compile and release EIAR for public comment period	To assess the impacts of the project and formulate mitigation measures and management plans.	Impact Assessment Phase
Public comment period	To provide stakeholders with the opportunity to review and comment on the results of the Impact Assessment Phase.	Impact Assessment Phase
Public open day/focus group meetings with key stakeholder groups	To discuss potential impacts of the project and findings of the studies. Key stakeholder groups will be identified based on findings of specialist studies and interest from stakeholders and include groups that might be significantly affected by the project as well as local and regional authorities.	Before and/or after the release of the EIA Report for public comment
Finalise EIA Report	To present the findings of the EIA process and incorporate stakeholder comment in the final report which provides DEA&DP and DEA with information for decision-making.	Impact Assessment Phase

Release Final EIA Report for public review	To provide stakeholders with the opportunity to review responses to comments changes to the EIA Report (if any).	Prior to submission of EIA Report to NCDENC

7.6 Submission of the Final EIA Report and EMP to NCDENC

All comments received will be incorporated into a Comments Report which will be appended to the Final EIA Report. The Final EIA Report (including the EMP) will then be submitted to NCDENC to inform their decision on the environmental authorisation of the proposed development.

7.7 Specialist Study Terms of Reference

The assessment of impacts will be based on the professional judgment of the specialists, fieldwork and desktop analysis, as required. General ToR applicable to all specialists, as well as specific ToR for each specialist study are set out below. The general ToR may not apply equally to all specialists but are included to provide a comprehensive guideline. Specialists will be instructed to disregard those elements of the general ToR that are not applicable to them.

7.7.1 General Terms of Reference

In June 2005 DEA&DP issued several guidelines for involving specialists in EIA processes. SRK expects that specialists will be aware of and utilise these guidelines to more precisely determine methods and approaches to specialist studies and will reference these guidelines accordingly.

The specialist studies shall be based on the procedure outlined below.

Approach to the Study

Provide an outline of the approach used in the study. Assumptions, limitations and sources of information must be clearly identified. The knowledge of local people should, where possible, be incorporated in the study. The description of the approach shall include a short discussion of the appropriateness of the methods used in the specialist study. The assessment of the data shall, where possible, be based on accepted scientific techniques, failing which the specialist is to make judgments based on professional expertise and experience.

Description of the Affected Environment or Baseline

A description of the affected environment must be provided, both at a site-specific level and for the wider region, the latter to provide an appropriate context and cumulative impact analysis. The focus of this description shall be relevant to the specialists' field of expertise.

It is essential that the relative uniqueness or irreplaceability of the area be understood in the context of the surrounding region at a local, regional (and, if necessary, national) scale. This will largely be based on a comparison to existing data sources, where available.

The baseline should provide an indication of the sensitivity of the affected environment. Sensitivity, in this instance, refers to the ‘ability’ of an affected environment to tolerate disturbance (given existing and expected cumulative impacts).

Lastly, the baseline should provide a sufficiently comprehensive description of the existing environment in the study area to ensure that a detailed assessment of the potential impacts of the proposed development can be made. The baseline should include data collected through a thorough literature review as well as field surveys (where applicable).

Impact Identification and Assessment

Clear statements identifying the potential environmental impacts of the proposed project must be presented. This includes potential impacts of the upgrade and operation of the project. The

specialist shall clearly identify the suite of potential **direct, indirect and cumulative environmental impacts**[17] in his/her study. The assessment of these impacts should take into account any other existing proposals in the surrounding area.

Direct impacts require a quantitative assessment which must follow the impact assessment methodology laid out in Section 7.7.2. The significance of impacts must be assessed both without and with assumed effective mitigation. Indirect and cumulative impacts should be described qualitatively.

The specialist shall comparatively assess environmental impacts of the development (and each alternative if applicable), and shall indicate any fatal flaws, i.e. very significant adverse environmental impacts which cannot be mitigated and which will jeopardise the project and/or activities in a particular area. All conclusions will need to be thoroughly backed up by scientific evidence.

Mitigation Measures

Specialists must recommend practicable **mitigation measures** or management actions that effectively minimise or eliminate negative impacts, enhance beneficial impacts, and assist project design. If appropriate, specialists must differentiate between essential mitigation and optimisation measures (i.e. implicit in the 'assuming mitigation' rating), and best practice measures (which do not affect the impact rating).

Specialists are also required to recommend appropriate monitoring and review programmes to track the efficacy of mitigation measures (if appropriate).

Specialists must indicate the environmental acceptability of the proposal (and alternatives if applicable), i.e. whether the impacts are acceptable or not. A comparison between the No-Go alternative and the proposed development alternative(s) must also be included.

7.7.2 Terrestrial and Wetland Ecology Specialist Study

The following ToR are proposed for the terrestrial and wetland ecology study:

- Undertake an ecological investigation based on desktop research as well as seasonal field assessments (where required) focusing on the faunal and floral integrity of the area as well as Red Data list (RDL) species of concern in the area;
- Undertake an investigation of the wetlands, rivers and other aquatic features on the property;
- Describe the baseline terrestrial and aquatic ecology of the area, making specific reference to RDL species occurring in the areas as well as the conservation value of the areas proposed for development;
- Identify and assess the impacts of the proposed development on the terrestrial and aquatic biodiversity of the project area during the construction and operational phases of the project, using SRK's standard impact assessment methodology;
- Summarise, categorise and rank all identified impacts on terrestrial and aquatic ecology in appropriate Impact Assessment tables, to be incorporated in the overall EIA. Present the assessment of impacts associated with various alternatives in separate tables where applicable;

[17] An **indirect** impact is an effect that is related to but removed from a proposed action by an intermediate step or process. **Cumulative** impacts occur when: Different impacts of one activity or impacts of different activities on the natural and social environment take place so frequently in time or so densely in space that they cannot be assimilated; or impacts of one activity combine with the impacts of the same or other activities in a synergistic manner.

- Recommend practicable management measures to avoid and mitigate and/or optimise impacts;
- Compile a monitoring plan to monitor impacts, if required;
- Assist the EIA team in responding to any comments received from stakeholders as they relate to terrestrial and aquatic ecology impacts; and
- Provide technical input required for the submission of applications to the DWA in terms of the NWA.

7.7.3 Marine Modelling Specialist Study

The purpose of the Marine Modelling Study is to inform the identification and assessment of impacts by the Marine and Coastal Ecology Specialists (see below). The following ToR are proposed for the marine modelling study:

- Determine and describe the baseline physical coastal processes including waves, currents and tides;
- Undertake a desktop assessment of coastal processes and dispersion characteristic at the proposed site of the desalination plant, intake and discharge points and provide guidance on the expected environmental issues and possible fatal flaws early on in the project;
- Undertake the require numerical modelling (if required) to evaluate the dispersion of brine from the desalination plant and associated impacts;
- Provide an interpretation of the outputs/findings of the modelling studies to inform the assessment of impacts on marine ecology by the Marine Ecologists;
- Provide recommendations for mitigation and monitoring of impacts;
- Assist the EIA team in responding to any comments received from stakeholders as they relate to physical marine impacts; and
- Provide technical input required for the submission of applications to DEA in terms of the ICMA.

7.7.4 Marine and Coastal Ecology Specialist Study

The following ToR are proposed for the marine and coastal ecology study:

- Undertake a site visit to inspect the immediate and surrounding area associated with the marine infrastructure of the project in order to gather general information on the sandy beach and rocky intertidal ecology of the area;
- Provide a description of baseline marine biology in the project area, emphasising but not limited to sensitive and threatened habitats, and threatened or rare marine fauna and flora;
- Describe pertinent characteristics of the marine environment including, amongst others, the following components:
    - Marine baseline conditions;
    - Waves, tides and currents;
    - Surf-zone currents and processes;
    - Upwelling;
    - Nutrients;
    - Turbidity;
    - Organic inputs;

- Low oxygen events;
- Rocky shore communities;
- Sandy beach communities;
- Pelagic communities;
- Marine mammals and seabirds;
- Extractive and non-extractive users of the area;
- Future use scenarios;

- Review and provide an expert interpretation of all the relevant, local and international publications and information sources on the disturbances and risks associated with hypersaline effluent;
- Identify and describe all factors resulting from the construction and operation of the desalination plant and associated infrastructure that may influence the marine and coastal environments in the region, based on existing information and data collected during the site visit;
- Assess the impacts of the proposed development on the marine biology of the project area during the construction and operational phases of the project using SRK's standard impact assessment methodology;
- Summarise, categorise and rank all identified marine and coastal impacts in appropriate EIA tables, to be incorporated in the overall EIA;
- Provide recommendations for mitigation and monitoring of impacts; and
- Compile an EMP (or relevant sections of the EMP) for the marine aspects of the construction and operational phases of the intake structure and brine disposal systems.

7.7.5 Heritage Specialist Study

The following ToR are proposed for the heritage study:

- Identify any areas of concern associated with the proposed layout of project infrastructure and alternative road and pipeline route alignments as early on in the project as possible;
- Provide a description of the baseline environment in terms of heritage and archaeology, based on a desktop review of existing information;
- Undertake a field trip to investigate the alternative road and pipeline routes and the locations of the desalination plant;
- Record all Heritage Sites and features photographically and provide GPS coordinates for all features of interest;
- Identify, describe and assess the impacts of the proposed development on the Heritage resources in the area, including Stone Age and historical archaeology, the built environment, the cultural landscape and graves and burials;
- Summarise, categorise and rank all identified impacts on heritage resources in appropriate Impact Assessment tables, to be incorporated in the overall EIA. Present the assessment of impacts associated with various alternatives in separate tables where applicable;
- Recommend practicable management measures to mitigate and/or optimise impacts;
- Compile a monitoring plan to monitor impacts, if required;
- Assist the EIA team in responding to any comments received from stakeholders as they relate to

heritage impacts;

- Ensure that reports meet the requirements of the SAHRA; and
- Advise on and provide technical input required for the submission of applications to SAHRA in terms of the NHRA.

7.7.6 Palaeontology Specialist Study

The following ToR are proposed for the palaeontology study:

- Undertake a desktop study to describe the expected palaeontological resources in the areas of the proposed development (including all alternatives) and place this in a regional context;
- Map the potential occurrence of palaeontological resources in the area;
- Identify and assess potential impacts on the palaeontological resources as a result of the proposed development, using the prescribed impacts assessment methodology;
- Recommend practicable management measures to mitigate and/or optimise impacts;
- Recommend and draft a monitoring campaign to ensure the correct implementation and adequacy of recommenced mitigation measures, if applicable;
- Assist the EIA team in responding to any comments received from stakeholders as they relate to palaeontological impacts.

7.8 Less Significant Impacts

Certain impacts, while important, are considered likely to be less significant and will be assessed by the EAP with input of in-house specialists, rather than a full specialist study, where required. These include:

- **Air Quality** – Limited emissions (dust) may be generated by drilling and blasting during construction, construction vehicles and plant during the construction phase of the project. Emissions from the plant during operation, as well as from vehicles transporting supplies and staff are likely to be limited;
- **Noise** – The number of sensitive receptors in the area is limited, however, construction activities increase noise levels in the area and blasting may be necessary. The number of receptors is expected to be higher in the vicinity of Kotzesrus and these receptors will be exposed to noise impacts during construction. It is likely that noise generated during the operation phase of the desalination plant may exceed current ambient noise levels at the coast; but is likely to be minimal;
- **Socio-economic** – Employment opportunities will arise from both the construction and operation phases of the project. A limited number of (permanent) employment opportunities will be provided during the maintenance and operation of the desalination plant, while construction may generate more temporary employment opportunities for local residents. The project will provide water to the Zandkopsdrift Mine, which could in turn provide employment opportunities for the local communities and promote economic development in the area. The desalination plant and associated infrastructure may therefore impact on the economy of the wider area. The project will also improve the existing road infrastructure in the region;
- **Traffic** – The number of vehicles on the isolated roads within the project area will increase during the construction phase. However, traffic in the area is minimal and it is considered highly unlikely that increased traffic volumes will result in increased congestion on the roads. Construction activities may, however, have impacts on road safety and may affect the condition

of roads, particularly in the rainy season. Only a limited number of vehicles will be used during the operation phase to transport equipment and staff to and from the desalination plant; and

- **Visual aspects** –The proposed location of the desalination plant is visually exposed, while Kotzesrus is considered to have an interesting sense of place and character. Some relatively undisturbed areas of the undulating Karoo landscape will also be impacted by the development. However, the project area is relatively isolated and a limited number of receptors will be impacted by the proposed development.

7.9 Impact Rating Methodology

The **significance** of an impact is defined as a combination of the **consequence** of the impact occurring and the **probability** that the impact will occur.

The criteria used to determine impact consequence are presented in Table 7-2 below.

Table 7-2: Criteria Used to Determine the Consequence of the Impact

Rating	Definition of Rating	Score
A. *Extent* *– the area over which the impact will be experienced*		
Local	Confined to project or adjacent areas	1
Regional	Affecting the region (e.g. District Municipality or Province)	2
(Inter) national	Affecting areas beyond the Province	3
B. ***Intensity*** *– the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources*		
Low	Site-specific and wider natural and/or social functions and processes are negligibly altered	1
Medium	Site-specific and wider natural and/or social functions and processes continue albeit in a modified way	2
High	Site-specific and wider natural and/or social functions or processes are severely altered	3
C. ***Duration*** *– the timeframe over which the impact will be experienced and its reversibility*		
Short-term	Up to 2 years	1
Medium-term	2 to 15 years	2
Long-term	More than 15 years	3

The combined score of these three criteria corresponds to a **Consequence Rating**, as follows:

Table 7-3: Method Used to Determine the Consequence Score

***Combined Score* (A+B+C)**	3 – 4	5	6	7	8 – 9
Consequence Rating	Very low	Low	Medium	High	Very high

Once the consequence is derived, the probability of the impact occurring is considered, using the probability classifications presented in Table 7-4 below.

Table 7-4: Probability Classification

Probability*– the likelihood of the impact occurring*	
Improbable	< 40% chance of occurring
Possible	40% - 70% chance of occurring
Probable	> 70% - 90% chance of occurring
Definite	> 90% chance of occurring

The overall **significance** of impacts is determined by considering consequence and probability using the rating system prescribed in Table 7-5 below.

Table 7-5: Impact Significance Ratings

		Probability			
		Improbable	Possible	Probable	Definite
Consequence	Very Low	**INSIGNIFICANT**	**INSIGNIFICANT**	**VERY LOW**	**VERY LOW**
	Low	**VERY LOW**	**VERY LOW**	**LOW**	**LOW**
	Medium	**LOW**	**LOW**	**MEDIUM**	**MEDIUM**
	High	**MEDIUM**	**MEDIUM**	**HIGH**	**HIGH**
	Very High	**HIGH**	**HIGH**	**VERY HIGH**	**VERY HIGH**

Finally the impacts are also considered in terms of their status (positive or negative impact) and the confidence in the ascribed impact significance rating. The prescribed system for considering impacts status and confidence (in assessment) is laid out in Table 7-6 below.

Table 7-6: Impact Status and Confidence Classification

Status of impact	
Indication whether the impact is adverse (negative) or beneficial (positive).	+ ve (positive – a 'benefit')
	– ve (negative – a 'cost')
Confidence of assessment	
The degree of confidence in predictions based on available information, SRK's judgment and/or specialist knowledge.	Low
	Medium
	High

The impact significance rating should be considered by authorities in their decision-making process based on the implications of ratings ascribed below:

- **Insignificant:** the potential impact is negligible and will not have an influence on the decision regarding the proposed activity.
- **Very Low:** the potential impact is very small and should not have any meaningful influence on the decision regarding the proposed activity.
- **Low:** the potential impact may not have any meaningful influence on the decision regarding the proposed activity.
- **Medium:** the potential impact should influence the decision regarding the proposed activity.
- **High:** the potential impact will affect the decision regarding the proposed activity.
- **Very High:** The proposed activity should only be approved under special circumstances.

Practicable mitigation and optimisation measures are recommended and impacts are rated in the prescribed way both without and with the assumed effective implementation of mitigation and optimisation measures. Mitigation and optimisation measures are either:

- **Essential**: measures that must be implemented and are non-negotiable; and
- **Best Practice:** recommended to comply with best practice, with adoption dependent on the proponent's risk profile and commitment to adhere to best practice, and which must be shown to have been considered and sound reasons provided by the proponent if not implemented.

7.10 Cumulative Impacts

Anthropogenic activities can result in numerous and complex effects on the natural and social environment. While many of these are direct and immediate, the environmental effects of individual activities (or projects) can combine and interact with other activities in time and space to cause incremental or aggregate effects. Effects from disparate activities may accumulate or interact to

cause **additional** effects that may not be apparent when assessing the individual activities one at a time (Canadian Environmental Protection Agency, no date). Cumulative effects can also be defined as the total impact that a series of developments, either present, past or future, will have on the environment within a specific region over a particular period of time (DEAT IEM Guideline 7, Cumulative effects assessment, 2004).

The International Finance Corporation (IFC) states that environmental assessment should include consideration of *"… cumulative impacts of existing projects, the proposed project and anticipated future projects."* For the purposes of this report, cumulative impacts are defined as 'direct and indirect impacts that act together with current or future potential impacts of other activities or proposed activities in the area/region that affect the same resources and/or receptors'.

Cumulative impacts can be distinguished as follows:

- **Cumulative Impacts of Existing Activities:** It is reasonably straightforward to identify significant past and present projects and activities that may interact with the project to produce cumulative impacts, and in many respects, these are taken into account in the descriptions of the biophysical and socio-economic baseline; and
- **Potential Cumulative Impacts of Future Activities:** Relevant future projects that will be included in the assessment are defined as those that are 'reasonably foreseeable', i.e. those that have a high probability of implementation in the foreseeable future; speculation is not sufficient reason for inclusion. Such projects may include those for which EAs have already been granted, that are currently subject to EA applications or that have been identified in an IDP of the relevant local municipality.

To define the level of cumulative impact, it is critical to look beyond the geographical boundaries and environmental impacts of a single development on the environment and consider the area of influence of the specific project as well as other developments currently in or proposed in the area and their understood impacts and area of influence. It may be that impacts experienced as a result of a single development are not considered to be significant, but when considered as part of a cumulative impact assessment, these require mitigation.

The assessment methodology proposed in this section of the report seeks to provide a practical means of assessing cumulative impacts as part of the environmental impact assessment and minimises deviations from the methodology proposed for the project specific impact assessment. Key considerations for the application of this methodology are:

- The cumulative impact assessment will need to be undertaken with consideration given to developments that may have contributed to cumulative effects in the past, may be contributing or are anticipated to contribute in the foreseeable future. This needs to be relevant to the timeframe within which impacts are to be experienced as a result of the project itself (i.e. all phases for which the project specific impact assessment is being undertaken - this will need to include post closure activities and monitoring). Given that the baseline environment will already be impacted on by the historical and current contributors to the cumulative impact, it is only necessary when undertaking the cumulative impact assessment to place an emphasis on an identified future cumulative baseline environment;
- Cumulative impacts may not be applicable to all specialist disciplines. Specialists will advise and justify where they believe the project related impacts will be confined to the project area and not subject to or contributing to impacts in the broader area of influence as a whole. For example, if the project area is confined to a water catchment which is not anticipated to be impacted on by other developments (past, present or foreseeable future) then a cumulative impact assessment need not be considered for this environmental aspect;

- A cumulative impact assessment will need to be undertaken for a specific area of influence which will be determined by the impact itself and the baseline environment in which it is proposed e.g. if project specific biodiversity impacts are similar in nature to those experienced 40 km away, but the two areas are linked in terms of biodiversity functioning and/or the cumulative impact will be a significant depletion of a particular species, then the area under consideration for the biodiversity cumulative impact assessment must address the entire area between the two sites. This will vary across specialist disciplines and therefore a single area of influence for the cumulative impact assessment cannot be set and will be advised by the specialist concerned;
- The baseline environment for the cumulative impact assessment differs from that of the project specific baseline e.g. the air quality baseline for the project will differ from the air quality baseline that is considered for a cumulative impact assessment where a number of mines are likely to be developed within a region in the future and all contributing to a cumulative ambient air quality. While a difference in defining the cumulative baseline is noted, the impact assessment methodology to be employed will remain unchanged; and
- The cumulative impact assessment can only be undertaken where information is readily available to do so and as such will only be an initial assessment of the likely cumulative impact in terms of knowledge available at the time of the assessment. As it is critical to understand the information sources and limitations that exist, each specialist will be required to provide an outline on what their information sources are for the assessment and where limitations exist.

It is anticipated that for the Volwaterbaai desalination plant and associated infrastructure project, the following specialist disciplines may need to consider and assess cumulative impacts: terrestrial and wetland ecology, marine and coastal ecology, heritage and palaeontology.

For the most part, cumulative effects or aspects thereof are too uncertain to be quantifiable, due to mainly lack of data availability and accuracy. This is particularly true of cumulative effects arising from potential or future projects, the design or details of which may not be finalised or available and the direct and indirect impacts of which have not yet been assessed. Given the limited detail available regarding such future developments, the analysis will be of a more generic nature and focus on key issues and sensitivities for the project and how these might be influenced by cumulative impacts with other activities. The proposed approach for each specialist discipline for the cumulative impact assessment will be as follows:

- From the specialists' knowledge of the project area and anticipated impacts associated with the project, the likely geographical extent that needs to be considered for the cumulative impact assessment for the particular discipline will be identified. This may be refined as additional information becomes available through the life of the study and/or through a better understanding of linked impacts between various disciplines. This activity will be undertaken by all specialists.
- Sources of cumulative change will be identified – what is important to note here, is that this can be done historically and with consideration of the present state (which will be done as part of the project specific baseline data collection, unless a larger area of influence needs to be considered) and then further information with regard to proposed developments in the area (applicable to each specialists' area of influence identified above) will be considered. The future developments that will need to be incorporated into each study are:
    - Those for which EAs have already been granted;
    - Those that are currently subject to environmental authorization applications and for which there is currently information available;

  - Those identified as part of the Integrated Development Planning of the relevant Local Municipality;
  - Those forming part of Provincial initiatives e.g. agricultural projects planned for the area
  - Plans of adjacent landowners/users; and
  - Activities identified through the use of aerial photography.
- Where further developments are identified, but are not yet at the stage of planning as detailed above, these will be noted as excluded from the current cumulative impact assessment.
- The cumulative baseline environment will be defined.
- In most cases only qualitative assessments of cumulative impacts will be presented, i.e. they will not be formally rated.

8 Findings and Recommendations

8.1 Key Findings

In order to apply for EA for the Volwaterbaai proposed desalination plant and associated infrastructure, a Scoping Study is being undertaken in terms of the EIA Regulations, 2010, promulgated in terms of NEMA. The objectives of the study are to:

- Identify stakeholders and inform them of the proposed activity and the S&EIR process;
- Provide stakeholders with the opportunity to participate effectively in the process and identify any issues and concerns associated with the proposed activity;
- Identify areas of likely impact and environmental issues that will require further investigation during the Impact Assessment Phase; and
- Develop ToR for specialist studies to be undertaken.

The key findings of the Scoping Study are as follows:

Sedex Minerals intends to mine a Rare Earth Element deposit and beneficiate the ore to produce a mixed rare earth salt at the Zandkopsdrift Mine, 30 km south of Garies in the Northern Cape Province. Due to the lack of suitable water resources to supply the mine, Sedex Desalination, a subsidiary of Sedex Minerals proposes to construct a 4 Mm^3/annum seawater desalination plant, including associated infrastructure and services at Volwaterbaai, near Abraham Villiers Bay in the Northern Cape and to transfer demineralised water by pipeline to the mine. In additional to the desalination plant and pipeline, roads and power lines will be constructed between the desalination plant and the mine.

The desalination plant will be located on an undeveloped stretch of the coast on Farm Strandfontein 559, which is owned by the applicant. The proposed road will largely follow existing roads and 4 x 4 tracks, although in some areas it will pass over undeveloped land, some of which is classified as a CBA and is thus likely to be botanically sensitive. The power lines and pipelines will follow the same route as the road, and be situated either in the road reserve or adjacent to the road reserve.

Various alternatives have been considered during the early planning stages of the project. Feasible and reasonable alternatives for assessment in the EIA phase of the project include:

- Three potential **routes** for the infrastructure between the desalination plant and the mine, two of which bypass the town of Kotzesrus, the third passing through the town;
- Five potential **positions for** the desalination plant on Farm Strandfontein 559, at Volwaterbaai; as well as
- Various **process and design** alternatives, including chemicals used in the desalination process and the above or below ground installation of pipelines.

The following key environmental issues associated with the desalination plant and associated infrastructure have been identified through the Scoping process:

- **Terrestrial and wetland ecology** – potential loss of vegetation and habitat and disturbance to CBAs, sensitive or protected species and habitats;
- **Terrestrial fauna** – disturbance of terrestrial and avifauna by construction activities, and the potential creation of barriers to the migration of certain faunal species;

- **Marine and coastal ecology** – disturbance to the coastal environment during construction and loss of marine biota and resources due to construction of infrastructure below the HMW and the abstraction of seawater and discharge of brine;
- **Heritage and Palaeontology** – potential impacts on archaeological and paleontological resources during the construction phase;
- **Visual aspects** – deterioration of sense of place and aesthetic value, particularly in the town of Kotzesrus and along the currently undeveloped stretch of coast;
- **Air Quality** – increased dust and associated nuisance impacts associated with the increased movement of heavy vehicles on dirt roads, particularly through residential areas (e.g. Kotzesrus);
- **Noise** – increased noise levels and associated nuisance impacts associated with the increased movement of heavy vehicles close to residences, particularly during the construction phase of the project;
- **Socio-economic** – benefits of increased employment, investment in the local and regional economy, contribution to local economic development as well as the provision of water to local communities and improved road network in the region; and
- **Traffic** – increased traffic volumes on the local road network causing potential disruption to existing road users and damage to dirt roads.

8.2 Recommendations

Based on the findings of the Scoping Study, the following specialist studies are proposed for the Impact Assessment Phase:

- Terrestrial and Wetland Ecology[18] Impact Assessment;
- Marine Modelling Specialist Study;
- Marine and Coastal Ecology Impact Assessment;
- Heritage Impact Assessment; and
- Palaeontology Impact Assessment.

8.3 Way Forward

The stakeholder engagement process has given IAPs the opportunity to assist with the identification of issues and potential impacts. All submissions and comments will inform and be considered in the Impact Assessment Phase.

Although no substantial amendments have been made to the Scoping Report in response to public and authority comments, the Final Scoping Report will available for a second 21 day comment period, closing on 27 February 2014.

The Final Scoping Report will be available at the following venues from 6 February 2014:

- *Kotzesrus Cash Store;*
- *Municipal Service Points in Lepelsfontein;*
- *Garies Public Library; and*

[18] Including fauna

- *Security office at Zandkopsdrift Mine; and*
- *SRK's office in Rondebosch.*

The document can also be accessed on SRK's website.

All additional comments received by 27 February 2014 will be submitted to NCDENC together with the Final Scoping Report. After the Scoping Phase, the EIA phase will commence. IAPs will be kept informed of developments and further formal opportunities for comment.

Prepared by

Sharon Jones

Principal Environmental Consultant

Reviewed by

Chris Dalgliesh

Partner

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional environmental practices.

9 References

ACRM 2013. Heritage Impact Assessment for Proposed Mining on the Remainder of the Farm Dikdoorn no 535 near Garies, Northern Cape. Prepared for Site Plan on behalf of Group Five Civil Engineering (Pty) Ltd. Prepared by Agency for Cultural Resource Management (ACRM), March 2013. Available online: http://www.sahra.org.za/sites/default/files/heritagereports/Report%20Site%20Plan%20Dikdoorn%20quarry%20-%20HIA.pdf, accessed June 2013.

AGES, 2012. Zandkopsdrift Rare Earth Element Mine: Groundwater supply options analyses and identification of water supply resources, Phase A. Technical Report: AS-R-G11-127.

AGES, 2013. Zandkopsdrift Rare Earth Element Mine: Determination of Regional Groundwater Potential for Purposes of Supplementary Mine Water Supply. Technical Report AS-R-2013-01-11.

BGIS, 2010. Biodiversity GIS Online Mapping Tool. South African National Biodiversity Institute (SANBI). Available online: http://bgis.sanbi.org, accessed December 2012.

Chidley, C., Le Roux, R., and Holton, E. 2011. Environmental Management Framework and Strategic Environmental Management Plan for the Namakwa District Municipality. Prepared by Nemani Consulting CC. Prepared for the Department of Environment and Nature Conservation. Available online: http://nc.spisys.gov.za/docs.html, accessed May 2013.

CNdV, 2012. Namakwa District Municipal Spatial Development Framework: Settlement and Infrastructure Development and Management Plan. Prepared for Namakwa District Municipality and Department of Rural Development and Land Reform. Prepared by CNdV Africa Planning and Design CC. Available online: http://nc.spisys.gov.za/docs.html, accessed May 2013.

DEA, 2010. Companion to the EIA Regulations 2010, Integrated Environmental Management Guideline Series 5, Department of Environmental Affairs. Department of Environmental Affairs and Tourism (DEAT), Pretoria.

DEA&DP. 2011. Information Document of the Interpretation of the Listed Activities, EIA Guideline and Information Document Series. Western Cape Department of Environmental Affairs & Development Planning (DEA&DP).

DEA&DP. 2013. EIA Guideline and Information Document Series. Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) Available online: http://www.capegateway.gov.za/eadp, accessed June 2013.

DEA (Department of Environmental Affairs) (2010). Companion to the EIA Regulations 2010, Integrated Environmental Management Guideline Series 5, Department of Environmental Affairs

DEAT, 2004. Overview of Integrated Environmental Management, Integrated Environmental Management, Information Series. Department of Environmental Affairs and Tourism (DEAT), Pretoria.

Hart, T. 2006. Initial Heritage Scoping Assessment of a Proposed Eskom Transmission Line Route from Gariep River to Vredendal (Eskom Kudu Integration Project). Prepared for SEF (Pty) Ltd (as part of a scoping EIA). Prepared by Archaeology Contracts Office, February 2006. Available at http://eskom.ensight-cdn.com/content/Heritagereport.pdf, accessed June 2013.

Higgs, M. Francke, E and Kotze, P. 2010. Kamiesberg Local Municipality Spatial Development Framework: Land Development Plan 2010 – 2015. Prepared by Aurecon and Koplan Consultants CC. Prepared for Kamiesberg Local Municipality. Available online: http://nc.spisys.gov.za/docs.html, accessed June 2013.

Kantey & Templer, 2013. Sunset Cruise – Site Walkover. 15 January 2013 Ref 14026GG/001

KLM IDP 2013. Kamiesberg Local Municipality Integrated Development Plan, 2013-2014. Unpublished report, available from Kamiesberg Municipality, July 2013.

Middleton Geometrics, 2012. Land Surveyors Certificate, Strandfontein No. 559, Namaqualand. September 2012.

NCPG, 2012. Northern Cape Provincial Spatial Development Framework (NCPSDF). Prepared by the Northern Cape Department of Cooperative Governance, Human Settlements and Traditional Affairs. Available online: http://northerncapepsdf.co.za/, accessed May 2013.

NDM, 2012. Namakwa District Municipality's Integrated Development Plan (2012- 2016). Prepared by Namakwa District Municipality. Available online: http://www.namakwa-dm.gov.za/wp-content/uploads/2011/08/Namakwa-District-Approved-IDP-2012-20161.pdf, accessed June 2013.

Royal Haskonging DHV, 2013a. 2.0 Mm^3/a Seawater Desalination Plant and Associated Infrastructure at Volwaterbaai, Kotzesrus, Northern Cape: Final Project Inception Report and Associated Annexures.

Shotmaster, 2013. Drilling and Blasting: Sunset Cruise – West Coast. 6 March 2013.

SSI, 2012. Power Supply Trade Off Study for the proposed Zandkopsdrift Desalination Plant. April 2012.

StatsSA, 2011. Census 2011 Municipal fact sheets. Available online: http://www.statssa.gov.za/Census2011/Products/Census_2011_Municipal_fact_sheet.pdf, accessed June 2013

Van der Ryst, M. And Küsel, S. 2012. Phase 2 Specialist Study of Middle Stone Age Localities on the Farm Zandkopsdrif 357, Garies District, Northern Cape Province. Prepared for Sedex Minerals (Pty) Ltd, and AGES (Pty) Ltd (Gauteng). Prepared by Habitat Landscape Architects, May 2012. Available online: http://www.sahra.org.za/sites/default/files/additionaldocs/PHASE%202%20REPORT_SAHRA%20PERMIT%2080%2011%2012%20003%2051_MMVANDERRYST_ZANDKOPSDRIFT_17%20MAY%202012.pdf, accessed June 2013.

Van Staden, S., van der Haar, N. Zdanow, L. 2013. Ecological Sand and Route Sensitivity Report: Volwaterbaai Desalination Plant near Abraham Villiers Bay, Northern Cape Province. Prepared for SRK Consulting, April 2013.

Veolia Water, 2013. Preliminary Effluent Report: Temporary Plant. Prepared for Royal Haskoning DHV, July 2013.

Webley, L. 2012. Desktop Heritage Impact Assessment: Proposed 1.5 ha gravel mine, portion 4 of the farm Brakfontein 431, Namaqualand Magisterial District, Northern Cape Province. Prepared for Greenmined Environmental. Prepared by Lita Webley, ACO Associates, December 2012. Available online:http://www.sahra.org.za/sites/default/files/heritagereports/HIA%20Brakfontein%20Garies%20%20gravel%20mining.pdf, accessed June 2013.

Webley, L. and Halkett, D. 2010. Archaeological (including Heritage) Impact Assessment: Proposed Prospecting on Portion 2 and Remainder Portion of the Farm Zandkopsdrift 537, Garies, Northern Cape. Prepared for Sedex Minerals (Pty) Ltd. Prepared by Archaeology Contracts Office, October 2010. Available online: http://www.sahra.org.za/sites/default/files/heritagereports/AIA_Zandkopsdrift_537_Garies_Webley_LE_Oct10_0.pdf, accessed June 2013.

WSP Africa Coastal Engineers, 2012a. Marine Intake Site Selection Report – Draft. Report No. 14830/1. October 2012.

WSP Africa Coastal Engineers, 2012b. Record of Decision: Subsurface beach well intakes vs open water intakes for Sedex Desalination Plant. 23 October 2012.

WSP Africa Coastal Engineers, 2012c. Sedex Desalination – Report on Vist to naorthern Cape for Open water Intake Site Selection. 31 October 2012.