DESCRIPTION OF THE AFFECTED ENVIRONMENT CHAPTER 5

This chapter provides a description of the environment that may be affected by the proposed Power Station Conversion and Transmission Integration Project. This information is provided in order to assist the reader in understanding the possible effects of the proposed project on the environment. Aspects of the biophysical, social and economic environment that could be affected by, or could affect the proposed development have been described. This information has been sourced largely from existing information available for the area, and aims to provide the overall context within which this environmental impact assessment process is being conducted. A more detailed description of each aspect of the affected environment is included within the specialist scoping reports contained within Appendices J – P.

5.1. Location of the Study Area and Property Description

The study area is located within the Koeberg and Blaauwberg sub-councils of the City of Cape Town Metropolitan Municipality in the Western Cape Province. The existing Ankerlig OCGT Power Station is located in the Atlantis Industrial Township (refer to Figure 5.1), which is located ~40 km from the Cape Town city centre. According to 2006 Municipal Demarcation, Atlantis falls between Ward 29 (north-west) and Ward 32 (south-east) of the Koeberg sub-council. Regardless o fthe alignment selected, the proposed transmission power line would pass through Ward 23 of the Blaauwberg sub-council, through the Klein Zoute River Agricultural Holdings, in the vicinity of the residential areas of Melkbosstrand, Van Riebeeckstrand and Duynefontein.

The Ankerlig Power Station is located within the western portion of the existing proclaimed Industrial Area of Atlantis on the Farm No 1183 and a Portion of Farm Witzand 2, Atlantis, Cape Town, both of which are owned by Eskom. Infrastructure associated with CCGT units will be developed on the site of the existing Ankerlig Power Station, and will not require any additional land take outside of the existing power station boundaries.

The power station site is far removed from major centres, tourist attractions and major roads. It is located next to the R307 (Dassenberg Road) that functions as the primary access route to Atlantis and Mamre (north of Atlantis) from Cape Town. The closest major road is the R27 (about 5 km from the site). The R27 functions as the primary connector between Cape Town, Saldanha and the West Coast National Park.

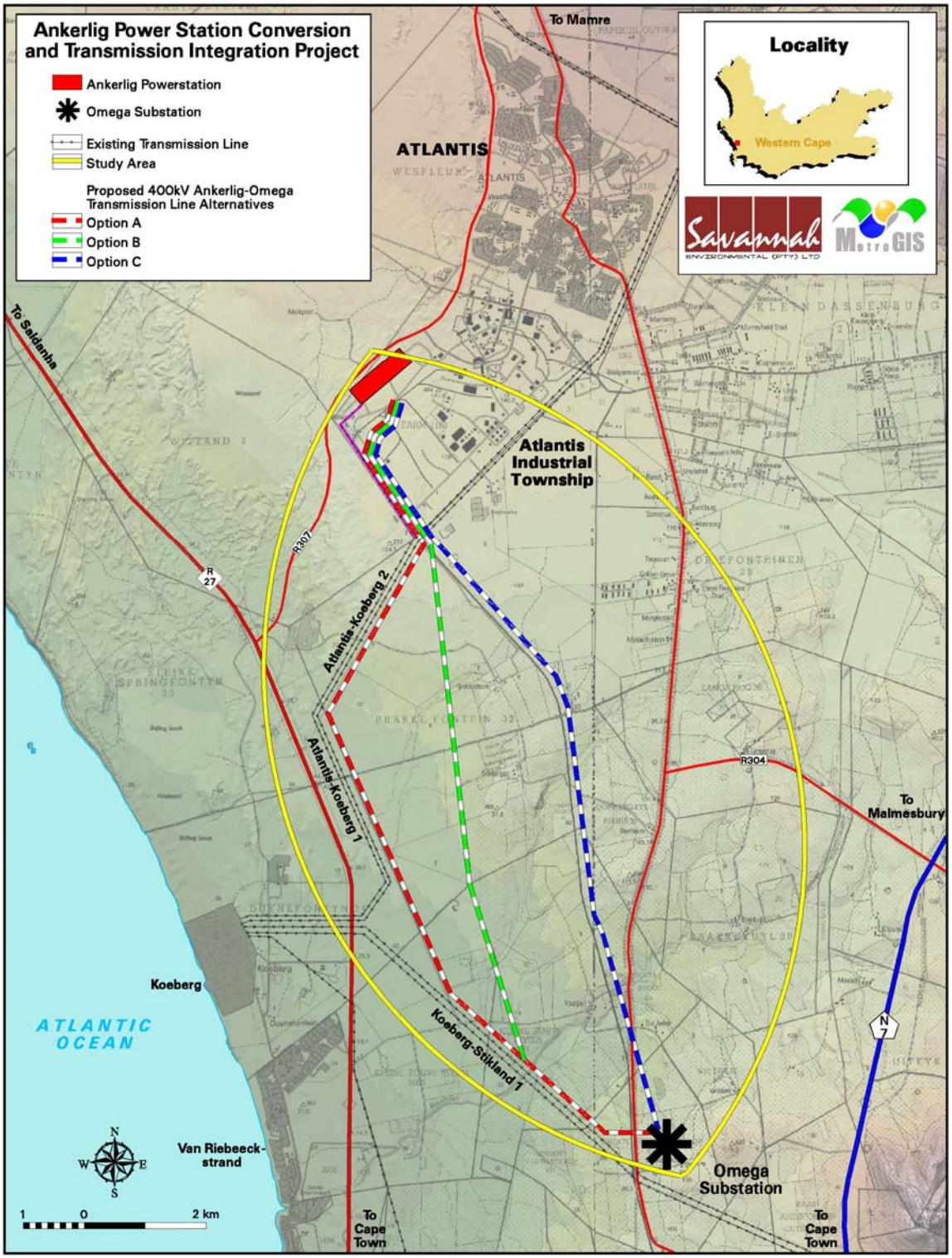

Figure 5.1: Locality map showing the location of the existing Ankerlig Power Station, the study area and the proposed transmission power line corridor alternatives between Ankerlig and Omega Substation

In accordance with the requirements of Section 16(2) of the NEMA EIA Regulations, potentially affected landowners have been given notice of the proposed activity and have been provided with the opportunity to participate within the EIA process.

5.2. Social Characteristics of the Study Area

Atlantis Industria and its adjoining residential suburb Wesfleur are located 7 km inland on the Cape West Coast, some 40 km north of Cape Town. Significant landmarks in the wider area are the existing Ankerlig Power Station, Koeberg Nuclear Power Station located ~9 km to the south-west, and the town of Mamre located ~3 km to the north. Arterial access to the area is provided by the West Coast road (R27) and the N7 national road, and locally by the R307.

The Atlantis Industrial Zone was established as an industrial growth point in the mid-1970s and set up with adequate infrastructure and services to support future growth in the area. The Atlantis industrial area is already served by a tarred industrial road network and essential services (including stormwater, municipal sewer and water supply services and street lighting) which support most of the industrial area. A railway spur is located south of the Ankerlig Power Station site. This railway line is currently not in use.

The residential townships of Atlantis and the informal settlement of Witzand are located between 3-6 km to the north-east and approximately 1 km south of the Ankerlig Power Station site respectively (refer to Figure 5.2). Open farmlands are present to the north, south and east of the site. The area surrounding the power station site is visually dominated by the presence of various types of industrial stacks and buildings located within the surrounding industrial area, and the existing transmission power lines associated with the Ankerlig and Koeberg power stations. The power station site is zoned for industrial use.

The population potentially affected by the proposed power station conversion and transmission integration project include:

» Residents of Atlantis, particularly the suburbs of Avondale, Wesfleur, Protea Park, Beacon Hill and Robinvale, and the nearby informal settlement of Witzand, situated in close proximity to the industrial area.
» Residents of Atlantis non-urban[11]
» Residents of Melkbosstrand, Duynefontein and Van Riebeeckstrand

[11] Comprised of the rural area surrounding Atlantis to the north, south, east and west stretching South to include the Klein Zoute Rivier and Morning Star Agricultural Holdings, as well as the regions indicated as 'Malmesbury non-urban' and 'Koeberg' on the City of Cape Town Census suburb map (refer to Appendix L).

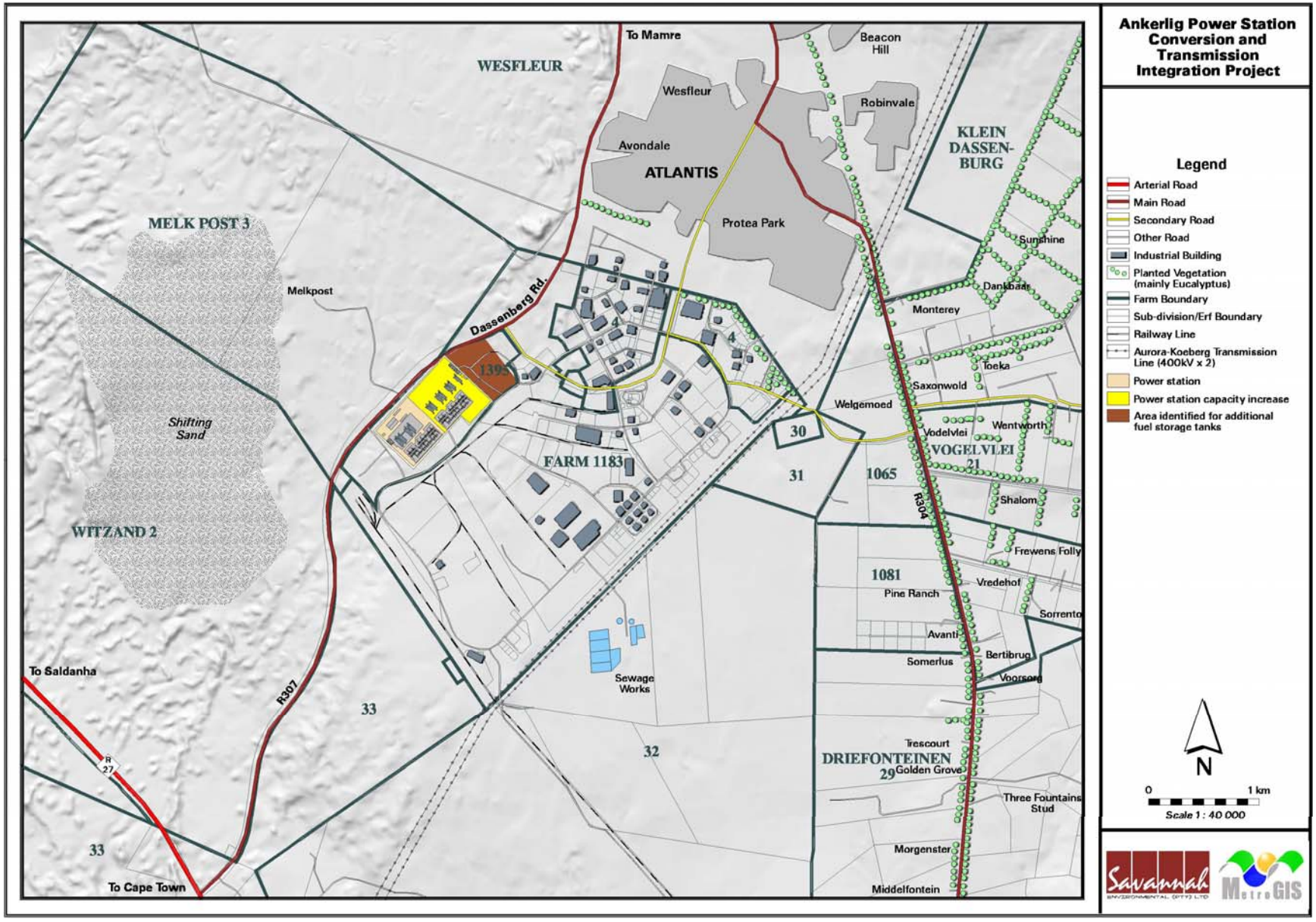

Figure 5.2: Map showing Ankerlig Power Station and surrounding areas

» Users of land which could be affected by the proposed power line, including:
  * Users of the Delta 200 Airstrip (used as a drop zone for members of the sky diving club)
  * Users of the Corobrick Four Wheel Drive Challenge site
  * Residents of Klein Zoute River Agricultural Holdings
  * Landowners of farms situated in the Malmesbury non-urban area immediately south of the Atlantis Industrial Area.

Land uses which may be affected by the proposed power line alternatives between the Ankerlig power station and the Omega substation include (refer to Figure 5.3):

» Brakkefontein shooting range
» Brakkefontein Clay Products Pty/Apollo Bricks (existing works and proposed expansions)
» The new Regional landfill site
» Delta 200 Airstrip
» Wesfleur Wastewater Treatment Works

The existing noise environment in the Atlantis communities is typical of a suburban residential area next to an industrial zone. The noise environment is affected by localised vehicular traffic, human activities and the industrial activities in the Atlantis Industrial Zone. There is, however, an adequate buffer zone between the industries and the Atlantis communities in order to maintain the noise levels within the recommended guidelines for suburban residential areas.

5.2.1 Demographic Profile

According to the 2001 Census, the total population of the City of Cape Town was approximately 2.9 million. Within the study area, the Atlantis population comprised of just under 55 000 people, while the surrounding non-urban areas (Atlantis non-urban according to suburb profiles) housed just over 4 000 people, and just under 6 500 people resided in the Melkbosstrand area.

5.2.2. Population Groups

The Atlantis population is predominantly Coloured (92.6%), with a small percentage (6.6%) being Black African and less than 1% respectively White and Indian. It is worth noting that population projections for the Western Cape show significantly larger growth amongst the Black African population than other groups (Romanovsky 2006). It can therefore be expected that this group may have increased proportionately within Atlantis and surrounding areas.

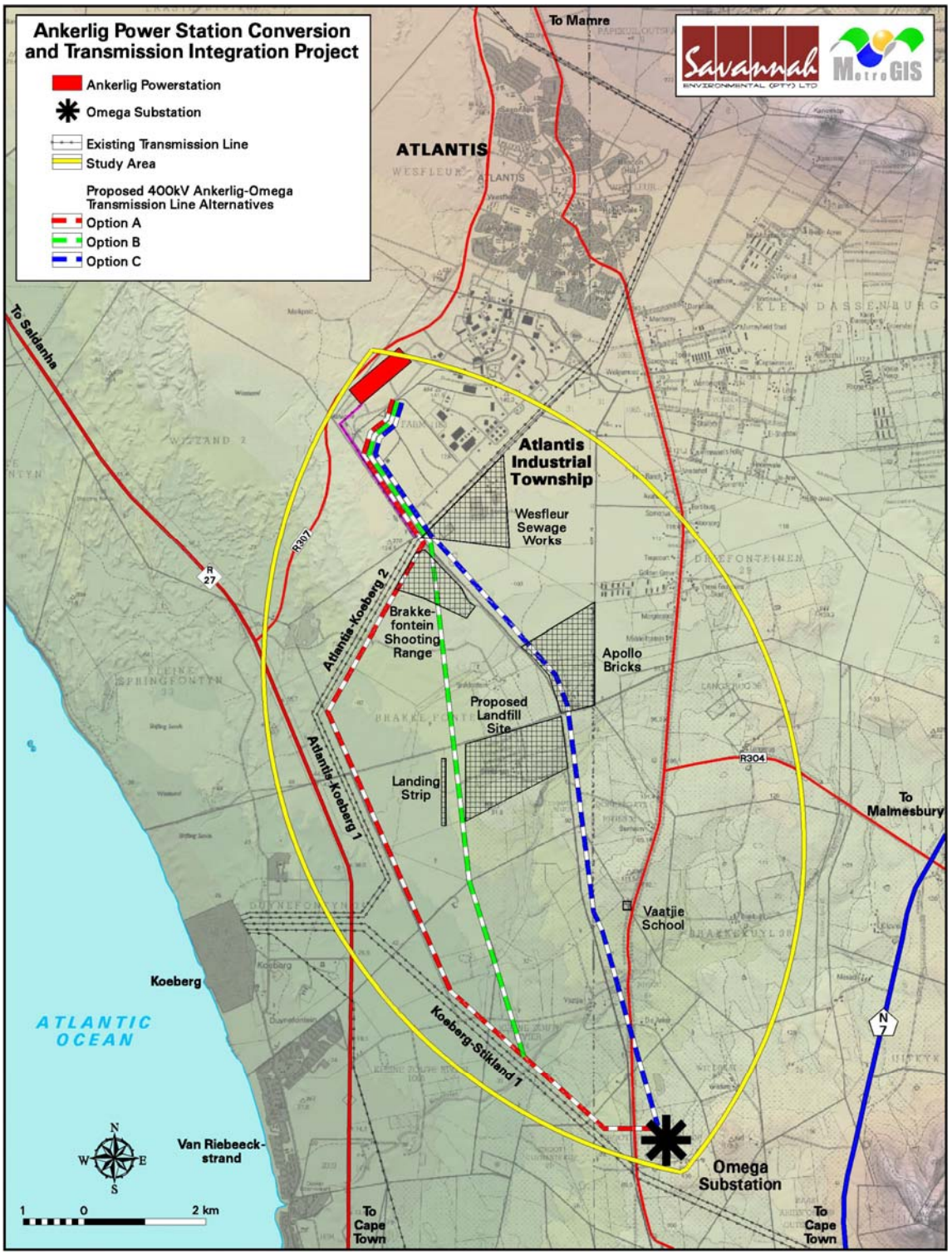

Figure 5.3: Map indicating land uses between Ankerlig Power Station and the Omega substation site which may be impacted by the proposed transmission power line alternatives

The population of Atlantis non-urban[12] is also predominantly Coloured (68%) according to the 2001 census, with a significantly greater percentage of Whites (22%) and slightly more Black African (10%). By contrast Melkbosstrand is predominantly White (89%).

Afrikaans is the most common language spoken in Atlantis (87%), Atlantis non-urban (78%) and to a somewhat lesser extent Melkbosstrand (58%). English is the first language of 38% of Melkbosstrand residents, 16% of those in Atlantis non-urban, and less than 10% of the Atlantis community.

5.2.3. Age and Gender Distribution

Gender distribution is reasonably equal across the study area, with slightly more females than males in all areas except Atlantis non-urban, where males predominate by a slight margin. This could indicate this area to have more male (possibly migrant) employees working on farms.

The age distribution in Atlantis is slightly younger than the average for the City of Cape Town, with a larger percentage (just under 40%) aged under 17. The corresponding percentage in Melkbosstrand is significantly lower at only 24%. By contrast the percentage of older people in the age categories above 35 is significantly higher in Melkbosstrand (~55%) than in the broader Cape Town (~35%) or Atlantis (28%) and surrounding non-urban areas (37%). Almost a third of the population in Atlantis is between the ages of 18 and 34, while a quarter is aged 35 to 54. These age groups may be considered as the potential labour force, together comprising about 55% of the Atlantis population, and 57% of Atlantis non-urban.

5.2.4. Educational Profile

Approximately 20% of Atlantis residents aged over 20 had completed matric in 2001, and of these less than 4% had attained any further levels of education (the majority (3%) being a certificate or diploma with less than 0.5% citing any types of degrees). The percentage with 'no schooling' was slightly higher in Atlantis non-urban at 9%, compared to 4% in Atlantis (similar to that for Cape Town as a whole). By contrast Melkbosstrand had less than 2% with no education, over three quarters had completed matric, and just under a third had attained some level of tertiary education, about half of which certificates, with the other half being various levels of degrees.

[12] Comprised of the rural area surrounding Atlantis to the north, south, east and west stretching South to include the Klein Zoute Rivier and Morning Star Agricultural Holdings, as well as the regions indicated as 'Malmesbury non-urban' and 'Koeberg' on the City of Cape Town Census suburb map (refer to Appendix L).

5.2.5. Employment and Income

The labour force, or economically active population[13] comprised of about 46% of City of Cape Town residents aged between 15 and 65 in 2001. Figures for the study area are similar, though slightly lower for Atlantis at 44%, and higher for Melkbosstrand (48%). Of those indicated as economically active, who can be considered the actual and potential labour force, 31% in Atlantis are unemployed, slightly higher than the average for the City of Cape Town as a whole. Corresponding percentages are much lower for Atlantis non-urban (13%), and Melkbosstrand (7%).

Of the economically active residents of Atlantis that are employed, approximately 12% commute to jobs outside Atlantis. Another 25% are employed by local industries, and 5% are employed by small- medium- and micro-enterprises (SMMEs). A significant number of jobs in Atlantis (2700) are held by outsiders who commute to the area. These jobs generally fall in the educational and other professional occupational categories (Afrosearch 2005).

Over half of those employed in Atlantis, and 62% in Atlantis non-urban earned less than R1 600 per month in 2001, with almost all the remainder (45% in Atlantis and 32% in Atlantis non-urban) earning between R1 600 and R6 400 per month. Income of Melkbosstrand residents was notably higher, with about half earning over R6 400 per month.

5.2.6. Housing

Atlantis has experienced land invasions and the growth of informal settlements, especially in the area that has become known as Witzand. These informal settlements are home to locals who have lost their homes as a result of rising unemployment, farm labourers who are no longer able to secure work and accommodation on the surrounding farms and smallholdings, and job seekers attracted to the area by the prospect of finding work (Afrosearch 2005).

The percentage of households residing in a ‘house or brick structure on a separate stand or yard’ is higher across the study area than in the City of Cape Town as a whole, but most so in Melkbosstrand (80%), followed by Atlantis at 75%, and least in Atlantis non-urban (68%). Atlantis non-urban has the greatest percentage residing in traditional dwellings (12%), while Atlantis and Melkbosstrand both have around 9% residing in flats. The percentage in informal dwellings is lower than that for the broader Cape Town in all parts of the study area, but notably higher in Atlantis non urban (mostly shacks in back yards) and

[13] A person of working age (15–65 years) who is available for work, and is either employed or unemployed.

Atlantis (predominantly not in back yards, which would include residents of the Witzand settlement).

The City of Cape Town's Blaauwberg Sub-council has earmarked R1.9 million for a Melkbos Housing Project, while the Koeberg sub-council has earmarked R3 million for Phase 2 of the Witzand Housing Project and R2 million for the Atlantis Housing Project respectively between 2007 and 2010.

5.2.7. Access to Electricity

According to the 2001 Census, 70% of South Africa's population used electricity as primary source of energy for lighting. The corresponding figure in the Western Cape was significantly higher at 88%, with that in the City of Cape Town being 89%.

Within the study area electricity use for lighting is almost universal in Melkbosstrand (98% of households) and only slightly less common in Atlantis (92%) where paraffin is the other form most cited (7%). Atlantis non-urban noted this to be slightly less common at only 64% of households using electricity for lighting, with a 32% relying on candles, and smaller percentages on gas, paraffin and other sources of energy.

5.2.8. Water and Sanitation

Atlantis receives the bulk of its water supply from the Witzand Water Treatment Works which abstract water from the Atlantis aquifer. Access to piped water inside dwellings is higher in Atlantis (83%) and Melkbosstrand (93%) than in the broader Cape Town (69%). This percentage is significantly lower in Atlantis non-urban at only 36%, with 23% citing piped water in the yard, and over 30% piped water on a community stand, mostly over 200 m from the dwelling.

The comparatively lower levels of living prevalent in the Atlantis non-urban area is highlighted in terms of access to sanitation facilities, with only half of all households having access to flush toilets (including both sewerage and septic tanks), compared to over 90% in Atlantis and Melkbosstrand. About 1/5th of Atlantis non-urban households have no sanitation facilities, while 17% rely on bucket latrines. The remainder use chemical toilets and pit latrines.

5.2.9. Heritage Profile

Numerous fossil and archaeological sites have been recorded in the broader study area. Fossils are regularly encountered between Woodstock beach, near Cape Town, and Saldanha Bay to the north of Yzerfontein. These include the material excavated from sites such as Elandsfontein, Duinefontein 2 and Langebaanweg.

Fossil bones were also seen at Bakoond and Tygerfontein, both to the south of Yzerfontein, and a large collection has been made from an occurrence at Melkbosstrand. Material from the Milnerton beach area has also been recorded.

The fossil site of Duinefontein 2 in the Koeberg Private Nature Reserve contains Early Stone Age (ESA, >200 thousand years ago (kya)) artefacts and similar isolated items are routinely found in ploughed fields across the south-western Cape. Kaplan (1996, 2000b) reports ESA artefacts from farmlands near the study area.

Middle Stone Age (MSA, 200kya – 20kya) artefacts were found in association with the Melkbosstrand fossils indicating at least some MSA presence in the area. MSA artefacts of the Stillbay type have also been collected in the region of Maitland just south of the study area and at a site described as being between Milnerton and Maitland. Artefacts thought to date to the MSA were observed at Groot Oliphantskop to the east of the Melkbosstrand Wastewater Treatment Works (WWTW) and in the region of Vissershok.

In general, Later Stone Age (LSA, <20kya) sites are far more commonly encountered than earlier material. This may be largely due to burial of older sites beneath recent sand. The only formal excavations to have taken place at an LSA site are those in the near coastal dunes of the Atlantic Beach Golf Estate, just northwest of Blaauberg Hill and at Melkbosstrand. LSA artefacts have also been noted from the vicinity of Maitland, the farm Groot Oliphantskop – site of the Omega substation - as well as other farms in the area. Halkett (*pers comm*) reports the presence of Early Stone Age scatters on the farm Vaatjie as well as substantial Late Stone Age open sites on an adjoining property. Early Stone Age material has also been located on the farm Brakkefontein just south of Atlantis.

Two burials were reportedly excavated from the Groot Oliphantskop farm in the mid-20th century. Morris (1992) has catalogued human burials from South Africa and records numerous burials from the Milnerton (13 listed), Blaauwberg (20 listed) and Melkbosstrand (22 listed) areas. Others have also been recorded in recent years and continue to be found at new development sites.

5.3. Biophysical Characteristics of the Study Area

The topography of the Atlantis study area is gently rolling, but generally sloping towards the south. The vegetation of the area is **Cape Flats Dune Strandveld** in the north-western section, **Atlantis Sand Fynbos** on the sandy sections and **Swartland Shale Renosterveld** on the clayey sections (Mucina & Rutherford 2006). Alien plant infestation is considerable and large sections have been transformed.

The climate of Atlantis and the Cape West Coast is similar to Mediterranean countries and is influenced by the effects of the nearby Atlantic Ocean, resulting in warm to hot summers and cool winters. The average daily maximum and minimum temperatures in summer are 27°C and 13°C respectively. In winter, the daily temperatures range between an average maximum of 18°C and an average minimum of 6°C.

Rain occurs predominantly in the winter, and the summer months are generally dry. The average annual rainfall is 466 mm. The month with the highest rainfall is July (with a high of 77 mm), and the driest month is February (with a monthly total of 10 mm).

The predominant wind directions in the area are south-westerly to south-easterly during the spring and summer months, and north-westerly to north-north-westerly during the winter months. The strength of the wind is generally greater during the summer months.

The study area is situated on a coastal plain that comprises unconsolidated Cenozoic sediments (mainly quartz sand) associated with the Sandveld Group. These have been deposited on shale bedrock of the Malmesbury Group. The sand deposits average 25 m in thickness, although a maximum of some 80 m is attained in the southwest. Bedrock outcrops of shale occur sporadically along the coast and inland to the north and south of Atlantis. Granite intrusions associated with the Cape Granite Suite are exposed in the vicinity of Mamre. These reach a maximum elevation of some 418 m above sea level in the form of Kanonkop located about 9 km to the northeast.

The western portion of Atlantis Industria occupies a surface elevation of around 125 m above sea level. The land surface slopes gently from northeast to southwest. A variety of other sandy soil types are also found across the area. The landscape can be loosely divided into residential, agricultural, industrial and Fynbos shrub land.

The site occurs within quaternary catchment G21B (304 km^2 in extent) of the Berg Water Management Area. The area is largely devoid of rivers and streams. The most significant surface water drainage feature is the southwesterly draining Donkergat River located some 6 km to the southeast of the site (Figure 5.1). The Donkergat River itself is a major tributary of the Sout River, which enters the Atlantic Ocean at Melkbosstrand. A much smaller drainage, the Buffels River, occurs in the Silwerstroom area to the northwest (Figure 5.1). All streams in the study area have an ephemeral character.

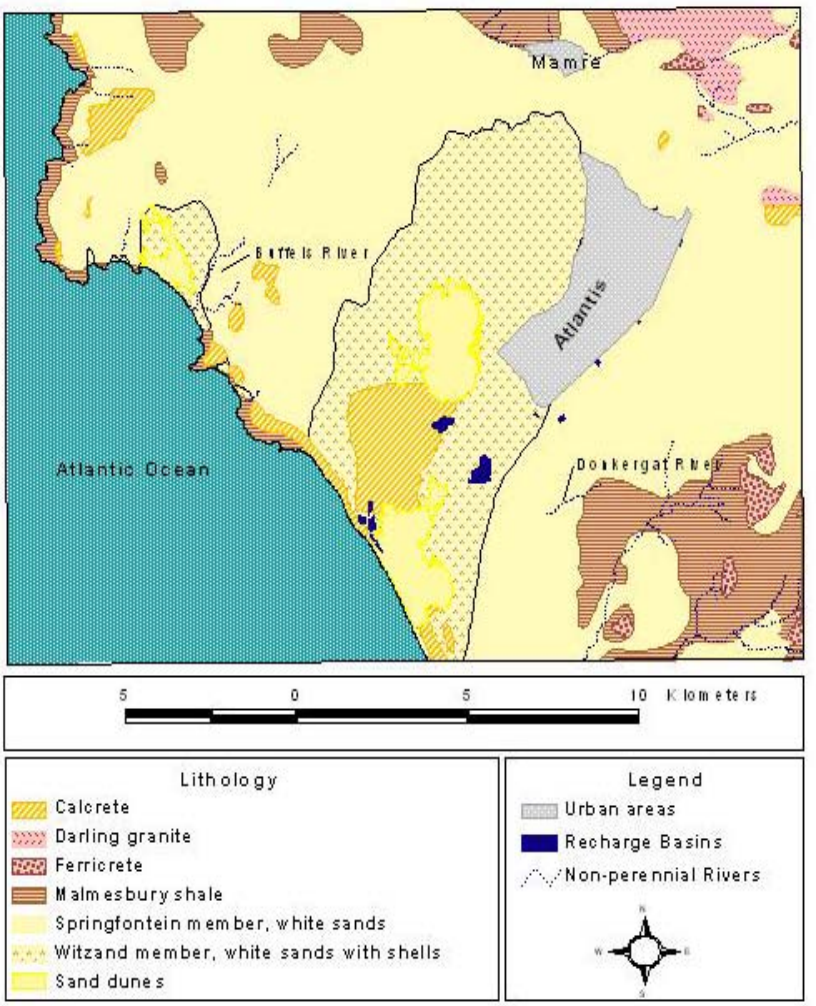

Figure 5.1: Geographical map for Atlantis and its surrounds

A high-yielding spring (approximately 30 L/s) is located at Silwerstroom on the coast, and another at Mamre. Both of these features serve as sources of potable water. Silwerstroom is utilised by the City of Cape Town, and the spring at Mamre represents the original source of water for the Mission Station established there in 1808.

The study area is part of the Cape Floristic Region, a renowned botanical hotspot with a very high percentage of endemic plant species (species restricted to that area) and threatened plant species. Almost 85% of the threatened plants found in South Africa are restricted to the Cape Floristic Region. The vegetation of the area is Cape Flats Dune Strandveld in the north-western section, Atlantis Sand Fynbos on the sandy sections and Swartland Shale Renosterveld on the clayey sections (Mucina & Rutherford 2006). Alien plant infestation is considerable and large sections have been transformed.

The ecology of the power station site has been largely transformed through the construction of the existing Ankerlig Power Station. Small portions of vegetation do, however, still exist in areas not directly impacted by construction. Previous investigations of the vegetation of the power station site (Bohlweki Environmental 2005; 2007) have indicated that the vegetation for a large portion of the site has been substantially modified or disturbed by a variety of factors or combinations thereof. In terms of vegetation integrity, the site was described as fragmented with severely disturbed natural drainage patterns. The vegetation on the site was severely degraded and transformed due to human disturbance, e.g. road building, original site clearance and installation of stormwater drainage systems, change of drainage patterns, illegal quarrying of sand, illegal dumping of waste, frequent fires at the wrong time etc. As a result, large areas were totally dominated by alien invader species such as Port Jackson (Acacia saligna) and Rooikrans (A. cyclops). The site is separated from the natural vegetation of the Melk Post and Witsand areas to the north and west by the Dassenberg road (R307).

The proposed transmission power line routes traverse an area that has been fairly extensively transformed by agriculture, originally by ploughing, and subsequently by heavy grazing and trampling by cattle, as well as too frequent fires. Alien invasive vegetation is therefore not surprisingly a prominent feature of the area. Soils are typically acid to neutral sands overlying shale – derived clays, and the latter are exposed in river valleys and along the railway cuttings.

Five potential faunal habitats are present within the study area, i.e.

» **Rocky habitat**, which supports many animals, including many invertebrates, amphibians, reptiles, birds and mammals. Rock habitat islets may therefore house unique forms and for this reason, this habitat has high conservation importance, especially along the western coastal lowlands.
» **Coastal fynbos/coastal sand**, a unique animal habitat that supports many endemic species, especially psammophylic or sand-loving species such as burrowing lizards, golden moles and mole rats.
» **Renosterveld**, found on the lowlands along the coast on shale and granite, from sea level to 400 m above. As a veld type, it is rich in a wide variety of species and dominated by renosterbos and the characteristic wealth of spring flowers. Although poor in fauna, a number of threatened species are associated with this habitat, e.g., several butterfly species, the Geometric Tortoise and the Cape Rain Frog.
» **Water bodies**, such as rivers, streams, pools, lagoons and estuaries and other wetland areas support a wide range of animal species, including many endemic species and/or species of conservation importance. The majority of frog species occurring in the greater study area are associated with water bodies. A wide range of bird species and several mammal species are also dependant on permanent or seasonal water bodies.

» **Mountain fynbos**, characterised by ericoids, restioids and proteoid shrubs like proteas and conebushes. Trees are scarce in this veld type. Several endemic bird species are associated with this habitat type.

The presence of any Red Data invertebrate taxa within the Atlantis study area is doubtful. Of the nine Red Data frog species occuring in the Western Cape, only the Cape Rain Frog (*Breviceps gibbosus* – listed as vulnerable), and the Cape caco (*Cacosternum capense* – listed as vulnerable) may occur within the study area.

Eighty-five reptile species occur in the greater study area, including 3 tortoise, one terrapin, 51 lizard and 30 snake species (Branch 1998). Of these, only 5 could occur within the study area, i.e. the Cape Sand Snake (*Psammophis l. leightoni* – listed as Lower Risk)[14], the Large-scaled Girdled Lizard (*Cordylus macropholis* – listed as Lower Risk)[15], the Silvery Dwarf Burrowing Skink (*Scelotes bipes* – listed as Data Deficient), Cuvier's Blind Legless Skink (*Typhlosaurus caecus* – listed as Data Deficient), and Austen's Thick-toed Gecko (*Pachydactylus austeni* - listed as Data Deficient).

Sixty-seven mammal species potentially occur in the greater study area, including seven insectivores, 11 bats, one primate, 3 hare/rabbit species, 23 rodents, 3 felids, 3 canids, 3 mustelids, 6 viverrids, the aardvark, the dassie, and 5 antelope species (Skinner & Smithers 1990). Of these, 8 are endemic to the greater study area. During previous investigations of the power station site (Bohlweki Environmental, 2005; 2007), there was no evidence of medium- to large-sized mammals, given the general nature of the area that is semi industrialised with an adjacent residential area. The presence of small mammals, in particular terrestrial rodents and subterranean rodents was considered more likely to occur in the proposed study area. Three Red Data species have the potential to occur in the study area as a result of the habitats present, i.e. the Forest Shrew (*Myosorex varius* – listed as Data Deficient), the Greater Musk Shrew (*Crocidura flavescens* – listed as Data Deficient), and the Cape Golden Mole (*Chrysochloris asiatica* – listed as Data Deficient).

The area supports 201 bird species, of which 15 species are Red-listed, 44 species are regional endemics or near-endemics, and three species are Red-listed endemics. Of the 5 avian microhabitats identified, natural (if generally degraded) Strandveld/Fynbos areas and wetlands support or partially support the bulk of the local avian diversity and most of the Red-listed and endemic species.

[14] Presence unconfirmed but possible due to habitats present.

[15] Presence unconfirmed but possible due to habitats present.

The Cape West Coast Biosphere Reserve is situated in the coastal zone north of Cape Town. Core areas consist of the West Coast National Park, and Dassen and Vondeling Islands. There is also a buffer zone and transition zones. The Atlantis study area is located within the transition zone of the Cape West Coast Biosphere Reserve[16] (refer to www.capebiosphere.co.za/CONSERVATION.55.0.html).

Other conservation areas in the region surrounding the power station site include the Koeberg Private Nature Reserve, the Blouberg Nature Reserve and the Blaauw Mountain Private Nature Reserve.

[16] Transition zones are areas of co-operation that contain a variety of land uses, including settlements, where the area's natural resources are sustainably developed for the benefit of those who live there.

SCOPING OF ISSUES ASSOCIATED WITH THE PROPOSED POWER STATION CONVERSION CHAPTER 6

This section of the Scoping Report serves to evaluate the identified potential environmental (socio-economic and biophysical) impacts associated with the proposed conversion of the OCGT units at the Ankerlig Power Station to CCGT units. Potential direct and indirect impacts of the proposed conversion project are evaluated, and recommendations are made regarding further studies required within the EIA phase of the process.

The cumulative impacts associated with the proposed power station conversion project are expected to be associated with the addition of infrastructure onto the existing power station footprint and are largely associated with visual impacts of the facility on the surrounding environment. Cumulative effects can only be assessed once the detailed design information becomes available, and will be considered in the detailed specialist studies to be undertaken in the EIA phase.

6.1. Potential Impacts on Air Quality

The Ankerlig Power Station is situated on the western side of the Atlantis Industrial Zone. This area is located approximately 7 km inland from the Cape West Coast, approximately 40 km north of Cape Town. The existing Ankerlig Power Station is approximately 10 km northeast of Eskom's Koeberg Nuclear Power Station.

The existing air quality in the area is relatively good. There are several air pollution sources in the Atlantis Industrial area that could potentially have a negative impact on the ambient air quality. Apart from industrial activities in the area, other potential air pollution sources include vehicular traffic, domestic fires, ploughed fields and non-vegetated land.

Potentially sensitive receptors surrounding the power station site include (refer to Figure 6.1):

» The residential township of Atlantis
» The informal settlement of Witzand
» Open farmlands in the vicinity of the power station site

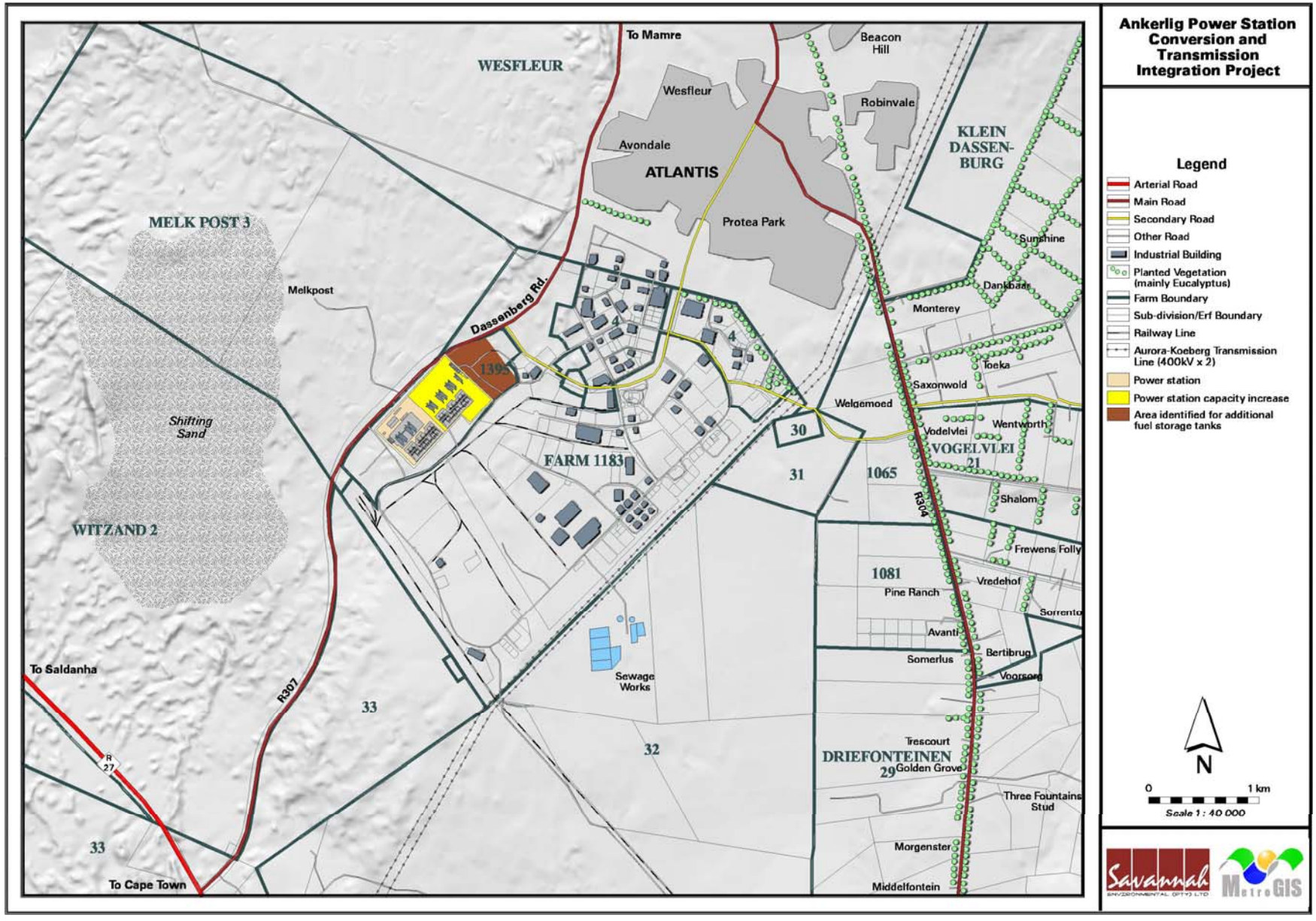

Figure 6.1: Locality map showing the power station site in relation to surrounding areas

6.1.1. Nature and Extent of Impacts

Potential impacts are associated with both the construction and operational phases of the proposed power station conversion project. The main air pollution sources identified to be associated with the proposed power station conversion include:

» The various construction activities during the construction phase.
» The turbine combustion emissions during the normal operation phase.
» The turbine combustion emissions during start-up and upset conditions.

» *Potential Impacts during the Construction Phase:*
Dust would be generated through the various construction activities of the proposed CCGT power station. The greatest impact of the dust would be limited to the immediate vicinity of the proposed site. This impact is expected to be of low significance.

» *Potential Impacts during the Operational Phase*
The exhaust emissions during normal operation, start-up and upset conditions could have a negative impact on the air quality of residential townships in close proximity to the power station. The type of emissions are not expected to change from those currently generated by the 9 OCGT units, since instead of being released into the atmosphere after the turbines, as the gases from the OCGT plant will pass through a heat recovery system and then be released. The only variations to the OCGT emissions will be the different release heights of the new stacks and the temperature of the emitted gases. These changes could have a small additional negative impact on potentially sensitive receptors in the vicinity of the power station. If vapour recovery systems are installed on fuel storage tanks, air pollution impacts associated with emissions from fuel storage tanks are anticipated to be small. The extent of potential impacts associated with all emissions from the power station will need to be quantified and assessed in the EIA.

Potential impacts on human health could potentially occur where people live in close proximity to the power station site. The duration of these impacts will be long-term, i.e. for the lifespan of the project. The extent of potential impacts will need to be assessed in the EIA.

It should be noted that the utilisation of natural gas as a replacement for diesel as a fuel source is currently under investigation. Should this fuel source change occur, it is expected that the operational impacts could be reduced, since natural gas is expected to have lower SO_2, CO and particulate emissions than diesel. However, it is envisaged that the CCGT units would initially be diesel-fired, until such time that natural gas becomes available.

The emission reductions due to the fuel conversion will be estimated and the impact reductions assessed in the detailed EIA. Air quality modelling will be undertaken for both the use of diesel and natural gas as fuel sources.

6.1.2. Conclusions and Recommendations

In order to determine existing air quality and assess potential air pollution impacts as a result of the proposed power station conversion project and to make recommendations with regards to mitigation measures, as well as air quality monitoring (if deemed necessary), a specialist air quality impact assessment must be undertaken in the EIA Phase. This study will consider the following conditions:

» Normal operations
» Start-up and upset conditions

6.2. Potential Noise Impacts

The existing noise environment in the residential areas surrounding the Ankerlig Power station is typical of a suburban residential area next to an industrial zone. The noise environment is affected by localised vehicular traffic from the R27 and R307, human activities and the industrial activities in the Atlantis Industrial area.

The acceptable daytime and night time rating levels in a residential district with little road traffic are, respectively, 50 dBA and 40 dBA. For a rural residential district the acceptable levels are, respectively, 45 dBA and 35 dBA. Noise levels measured in the Avondale area (within the Atlantis residential area) as part of the previous EIA processes (Jongens, 2005) were found to be between 35 dBA and 39 dBA, with an average of 38 dBA. The measured ambient noise levels within Atlantis Industria were significantly less than the acceptable daytime rating levels of noise for both a suburban residential district and a rural residential district.

Noise impacts associated with the existing OCGT units at the Ankerlig Power Station on the Atlantis residential area and surrounding farm areas is considered to be limited, and would decrease with increased distance from the power station (DDA, 2007). Preliminary ambient noise level measurements undertaken within the scoping study phase indicate that the noise levels due to the operation of the four transformers at the Ankerlig power station it was concluded that the noise contribution of the transformers during the daytime would be negligible for locations further than 1.5 km away from the power station (i.e. it would increase the existing noise levels below 1 dBA). For the night-time conditions, the noise contribution of the transformers would be negligible for locations further than 4.1 km away from the power station.

6.2.1. Nature and Extent of Impacts

The conversion of the Ankerlig Power Station units from open cycle to combined cycle will introduce additional noise sources, including:

» The construction equipment and activities during the construction phase.
» The equipment during the operational phase such as:
  * the air filters
  * the gas compressor
  * the gas turbine
  * the generator
  * the electricity transformers
  * the fans associated with the stacks
  * the heat recovery equipment
  * the steam generator
  * the steam turbine
  * the air-cooled condenser system associated with the dry-cooling system

» *Potential Impacts during the Construction Phase:*
  Noise associated with construction activities is generally of local extent and short duration. The construction operations are not expected to have any significant impact on the nearest communities in Atlantis. The noise impact therefore is expected to be of low significance.

» *Potential Impacts during the Operational Phase:*
  The introduction of additional noise sources could have additional impacts (direct and cumulative impacts) as a result of the increase of the noise levels within and around the power station site. The duration of the noise impact is expected to be long-term, i.e. for the duration of the operational life of the project. The extent is expected to be of low to medium significance, depending on the final design and any mitigation implemented.

6.2.2. Conclusions and Recommendations

In order to assess the nature and extent of the noise emissions from the CCGT units (and verify the expected significance thereof), information regarding the reduction efficiency and the noise emissions will need to be obtained from the design engineers and included in the assessment within the detailed EIA phase. The noise sources will then be used in a noise model in order to calculate the resulting noise levels around the power station and assess the impacts. This detailed assessment will be performed in the EIA phase.

6.3. Potential Visual Impacts

The Ankerlig Power Station site is removed from major centres, tourist attractions and major roads. It is located next to the R307 (Dassenberg Road) that functions as the primary access route to Atlantis and Mamre (north of Atlantis) from Cape Town. The closest major road is the R27 (about 5 km from the site). The R27 functions as the primary connector between Cape Town, Saldanha and the West Coast National Park. Significant landmarks in the wider area are the existing Ankerlig Power Station, Koeberg nuclear power station located some 9 km to the south-west, and the town of Mamre located some 3 km to the north.

6.3.1. Nature and Extent of Impacts

The conversion of the power station from OCGT to CCGT technology, as a visual concern, primarily entails the increase of the dimensions of the gas turbine units. The tallest of the new components (such as the smokestacks) will be 60 m tall whereas the existing tallest structures (exhaust stacks) are 30 m tall. Additional infrastructure associated with the conversion project includes the construction of a small water reservoir (2 Ml), a water treatment plant, and eight additional fuel tanks (with a total capacity of approximately 43 million litres) east of the OCGT capacity increase area.

An initial viewshed analysis of the proposed Ankerlig Power Station conversion project, based on a 5 m contour interval digital terrain model of the study area, indicates the visibility of the OCGT plant at full capacity (i.e. nine turbine units) and the potential future visual exposure after the conversion (refer to Figure 6.2). The object offset for the current power station was taken at a maximum 30 m above ground level (i.e. the height of the OCGT smoke stacks) and the proposed converted power station was taken at 60m offset above ground level[24].

It becomes apparent that the facility would be relatively exposed due to the predominantly flat topography of the region. The general trend of the visual exposure (for the OCGT power station) shows a larger area with a short to medium distance exposure, and a smaller, scattered area with medium to long distance exposure. The areas shown in red in Figure 6.2 indicate the potential additionally exposed land after the conversion to a CCGT power station. The increase in dimensions of the power station following the conversion process will potentially increase the medium to long distance exposure of the power station, especially to the south-east of the industrial area.

[24] This viewshed analysis is based on the OCGT/CCGT plant alone and does not include the proposed Ankerlig - Omega transmission power line integration. Separate viewshed analyses were done for the three transmission power line alternatives (refer to Chapter 7).

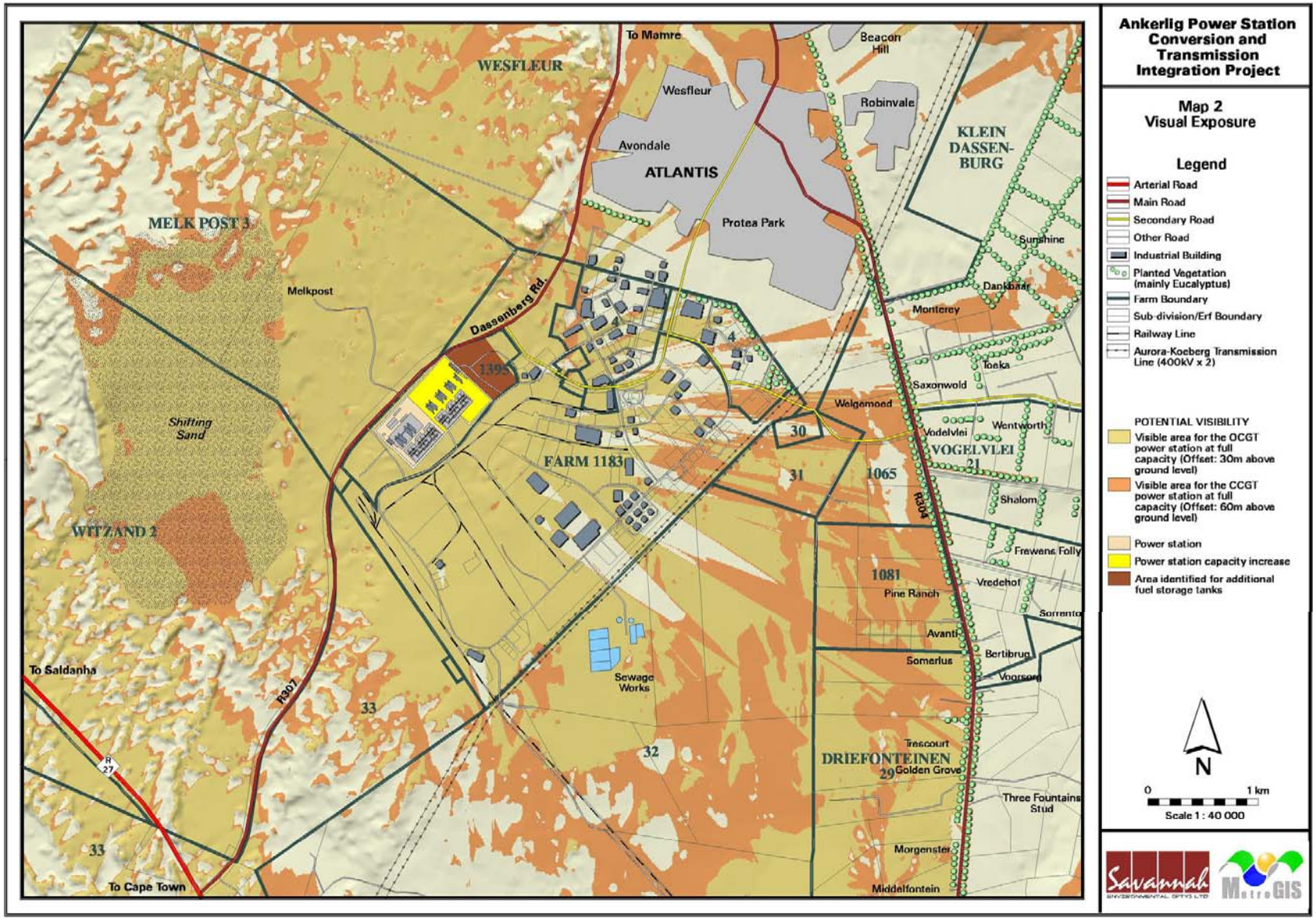

Figure 6.2: Potential visual exposure of the Ankerlig power station

6.3.2. Conclusions and Recommendations

The fact that these additional areas are exposed does not imply that it constitutes a significant visual impact, at least not for all of the exposed areas. Further investigation is necessary in order to determine the specific visual impact within these exposed areas (i.e. the potential occurrence of sensitive visual receptors).

The visual impact assessment within the EIA will address issues related to the visibility of the proposed OCGT to CCGT conversion project, as well as potential cumulative visual impact of the power station conversion project. These issues or criteria will aim to quantify the actual visual impact and to identify areas of perceived visual impact.

6.4. Potential Impacts on Vegetation

The study area is part of the Cape Floristic Region, a renowned botanical hotspot with a very high percentage of endemic plant species (species restricted to that area) and threatened plant species. Almost 85% of the threatened plants found in South Africa are restricted to the Cape Floristic Region. Cape Flats Dune Strandveld is the main vegetation type within the area surrounding the power station site. This vegetation type is regarded as an Endangered vegetation type in terms of the NSBA (Rouget et al., 2004), and is restricted to the Atlantis area, the Cape Flats, and the south Peninsula.

The ecology of the power station site has been largely transformed through the construction of the existing Ankerlig Power Station. Small portions of vegetation do, however, still exist in areas not directly impacted by construction, such as the area proposed for the establishment of additional fuel storage tanks.

6.4.1. Nature and Extent of Impacts

It is expected that the vegetation structure and species composition is likely to be very (>80%) similar to that on the adjacent portion to the west that was part of the recent application for the power station expansion. It is possible that up to three threatened plant species still occur in limited numbers on the site. However, it is considered fairly unlikely that these constitute regionally significant populations, partly because the site is fairly small, and partly because the site is already partly degraded (as evidenced by the patches of dense invasive *Acacia cyclops* and open sand, in total covering up to 30% of the site). The local conservation value of the site is likely to be Medium, and the regional conservation value is likely to be Low to Medium. The loss of the site is unlikely to have major regional consequences from an ecological process perspective, as the main part of the Atlantis Industrial area is to the east of the site, with no natural vegetation of significance.

6.4.3. Conclusions and Recommendations

It is recommended that a botanical survey of the site be undertaken as part of the EIA Phase. As far as possible, this survey should be undertaken during the period June – August. The aim of this survey will be to assess the condition and connectivity of the proposed fuel storage site from an ecological perspective, assess the likelihood of occurrence of threatened or localised plant species, assess the size and viability of populations of any such species, and make recommendations for mitigation, including recommendations in terms of a possible biodiversity offsets (if required).

6.5. Potential Impacts on the Social Environment

The Ankerlig Power Station site is located within the Koeberg and Blaauwberg sub-councils of the City of Cape Town Metropolitan Municipality in the Western Cape Province. The population potentially affected by the development include residents of Atlantis, particularly the suburbs of Avondale, Wesfleur, Protea Park, Beacon Hill and Robinvale, and the nearby informal settlement of Witsand, situated in close proximity to the Industrial area.

6.5.1. Nature and Extent of Impacts

Potential impacts on the social environment as a result of the proposed power station conversion project are expected to occur as a result of both the construction and operational phases. Potential impacts are expected to be similar to those that were identified for the initial OCGT development, which was assessed in 2005 (Afrosearch, 2005) as well as the expansion of the OCGT plant, which was assessed at the beginning of 2007 (MasterQ, 2007).

» *Potential Impacts during the Construction Phase:*

Temporary local employment opportunities

Construction activities will create a number of temporary employment opportunities, resulting in a positive economic impact, albeit limited. In addition to creating job opportunities for construction workers, the project may also offer other sources of temporary employment. These include possible indirect employment creation in the informal sector, for instance catering for construction workers (Afrosearch, 2005).

The issue of local employment has been raised as part of this EIA process (refer to Appendices H and I). It has been recommended in previous assessments that local labour be used as far as possible. The MasterQ (2007) assessment noted however that it seemed as if some community members were dissatisfied with the process followed to employ local labour through a third party labour broker during the initial OCGT construction process. It was

recommended that the procurement process followed for the expansion should be closely monitored by Eskom to ensure that the process is transparent and equal opportunities are afforded.

Potential impacts are expected to be of low to medium significance at the local level. The magnitude of this impact will depend on the number of construction workers to be employed, either by Eskom itself or by contractors.

Although the impact on employment will be temporary, due to high levels of poverty and unemployment, any impact on job creation in the area will have some positive impact and thus be of some positive significance. This impact can be optimised by focusing on local employment creation where possible, and addressing current community concerns. This will be discussed in more detail in the detailed SIA to be undertaken in the EIA phase of the process.

Influx of job seekers and housing of temporary workers

As news regarding the proposed project spreads, expectations regarding possible employment opportunities may take root. Consequently, the area surrounding the site could experience an influx of job seekers. This can result in an increase in social problems such as alcohol abuse, and prostitution (Afrosearch 2005). If the area experiences an influx of job seekers, competition over scarce employment opportunities may give rise to conflict between local residents and newcomers. An influx of newcomers might also be accompanied by an increase in crime. Even if particular instances of crime are not as a result of the newcomers, they may still be attributed to them by local communities (Afrosearch 2005).

If construction workers are not sourced locally, but are housed close to the site, this may also lead to conflict with locals (Afrosearch 2005). Conversely the presence of temporary workers could provide a small stimulus to the local economy if accommodation for such workers could be procured locally. Possible population influx that may be caused by additional developments at and around the power station site can be considered a cumulative impact related to general development in the area. Concerns regarding housing of temporary workers brought from other areas during the construction phases have been raised within the public participation process undertaken as part of this EIA process (refer to Appendices H and I).

The extent to which Eskom's operations associated with the power station conversion will specifically add to this impact cannot easily be quantified, but measures can be put in place to minimise possible social disruption caused by such influx. Potential measures which could be implemented will require further investigation in the EIA Phase.

Increase in traffic as a result of construction traffic

Increase in traffic during the construction phase can potentially result in the disruption of daily movement patterns. Depending on access routes that are used, construction vehicles could impact on safety and daily movement patterns of residents in surrounding communities. The magnitude of this impact will depend on current traffic volumes, traffic volumes that will be associated with construction activities, as well as construction schedules (Afrosearch 2005), but is expected to be similar to that experienced during the construction phases associated with the OCGT power station (initial 4 units) and the current expansion activities (additional 5 units). According to the traffic study undertaken by SSI for the power station expansion project (SSI, 2007), the traffic impact of construction traffic on traffic movements was expected to be negligible. No complaints regarding construction traffic movements were received during the construction phase of the initial OCGT units or as a result of current construction traffic associated with the power station expansion. The traffic impact of construction traffic on pavement loading was, however, expected to be significant, with the impact expected to accelerate road rehabilitation programmes by 10 – 14%. Quantification of the impact which the traffic associated with the power station has on the road pavement and the associated impact on road rehabilitation programmes is currently being undertaken. The results of this study will inform the assessment of impacts within the EIA Phase.

The potential impact on daily movement patterns as a result of construction traffic is expected to be of low to medium significance at a regional scale[25]. The assessment of this impact will be informed by the Transport Study undertaken for the initial OCGT process.

Impacts on Sense of Place[26]

As the proposed Ankerlig Power Station Conversion would take place in the Atlantis Industrial Area, on a site currently occupied by the Ankerlig Power Station, impact on sense-of place can be expected to be limited. It is however worth noting that the tallest of the new components (such as the smokestacks) will be 60 m tall whereas the existing tallest structures (exhaust stacks) are 30 m tall. Eskom are also proposing additional fuel storage on the site.

[25] Because this impact may be felt along access routes between the supply point of the power station components (possibly Cape Town harbour) and the Ankerlig Power Station site, and not only within communities adjoining the site, the extent of the impact may be widespread rather than concentrated in the study area (Afrosearch 2005).

[26] The term sense of place has been defined and utilised in different ways by different people. To some, it is a characteristic some geographic places have and some do not, while to others it is a feeling or perception held by people (not by the place itself). It is often used in relation to those characteristics that make a place special or unique, as well as to those that foster a sense of authentic human attachment and belonging.

To the extent that such impacts may occur, their significance would relate largely to other impacts, notably visual and noise impacts, as well as impacts on air quality and traffic volumes, which need to be taken into consideration in assessing this impact. Potential visual, air quality and noise impacts that may be associated with the construction phase of the conversion project have been addressed in separate specialist assessments (refer to Sections 6.1, 6.2 and 6.3).

» *Potential Impacts during the Operational Phase:*

Provision of electricity: Local/regional/national linkages and macro-economy

The purpose of the Ankerlig Conversion project is to improve Eskom's capacity to provide for South Africa's increasing demands for electricity in the medium-term (i.e. until 2014). The most significant and far reaching social impact during the operational phase of the project will hence be the provision of electricity for the South African population.

Electricity supply makes an important contribution towards economic growth, and hence to employment creation and poverty alleviation on a national level. If peak demand exceeds supply, the reliability and quality of electricity services will be negatively impacted (Afrosearch 2005). Unreliable electricity supply is likely to have significant negative economic (and hence social) consequences, as has been evidenced particularly in the Western Cape in 2006. These impacts derive from the fact that several economic sectors - manufacturing industries, in particular - are dependent on the electricity sector for their operation and survival. Electricity generation and provision therefore constitute an enabling industry without which few other industries would be able to flourish (Afrosearch 2005).

Therefore, the impact associated with the proposed project is expected to be one of high positive significance at a national level.

Ongoing employment opportunities for locals

Given the technical nature of the operation, it is unlikely that employment opportunities will benefit members of local communities. However, local communities might reap benefits from employment opportunities created by the need for support services such as additional provision of stationary, cleaning services, gardening services, catering services, etc which may be associated with the proposed conversion project. Although some local people have also trained as operators and maintainers, it is unlikely that the operation of the CCGT power station units will employ more people than is currently the case at the existing power station. Therefore, an impact of low to no positive significance is expected at a local scale.

Social Investment

As the number of employment opportunities that will be created during the operational phase of the project will be limited, it will be necessary to augment the benefits for surrounding communities by implementing appropriate social investment activities. The Afrosearch assessment (2005) recommended that Eskom undertake a community needs analysis and consult with local community leaders to identify the most appropriate social investment activities.

Social development initiatives that have since been implemented by Eskom as well as the contractors involved during construction of the OCGT station include development assistance given to upgrade a Multi Purpose Community Centre (MPCC), as well as to various schools, the Wesfleur Hospital, and sporting facilities (MasterQ, 2007). Queries concerning Eskom's Social Responsibility and plans for Social Investment in the area were again raised within the public participation process being undertaken for this EIA process.

An impact of low to high positive significance can be expected, depending on the type and extent of Social Investment implemented by Eskom.

Increase in traffic as a result of increased fuel transport

Concerns regarding the potential impact that road transport of fuels to the Ankerlig site will have on traffic were raised in the public participation process being undertaken as part of the EIA for this project. Fuel is currently transported to the Ankerlig Power Station site from the fuel supply point in Milnerton by road.

The independent detailed investigation of Fuel Supply to the Atlantis Site undertaken in 2005 indicated that road based alternatives from the Caltex Refinery in Milnerton to Table Bay are the most cost effective and safest options. According to the traffic study undertaken by SSI for the power station expansion project (SSI, 2007), the traffic impact of fuel tanker traffic on traffic movements was expected to be small to insignificant. The cumulative pavement loading of the fuel tankers over 25 years is expected to vary with a maximum of 12,4% predicted to occur on Neil Hare Road. Quantification of the impact which the traffic associated with the power station has on the road pavement and the associated impact on road rehabilitation programmes is currently being undertaken. The results of this study will inform the assessment of impacts within the EIA Phase.

As a result of the higher load factor associated with the CCGT power station to meet the need for mid-merit capacity[27], additional fuel consumption would be

[27] Mid-merit capacity is during the daytime from about 6 am to about 10 pm on weekdays.

required. Eskom would therefore require additional fuel to be transported to the power station site. The findings of the traffic impact studies undertaken as part of the previous EIAs conducted, as well as the traffic study to be undertaken as part of this EIA process (refer to Chapter 9) will be used as the basis for the assessment of potential impacts on the social environment in this regard during the EIA process.

In addition, in order to limit impacts associated with fuel transport to the power station site, the installation of a liquid fuel pipeline to the Ankerlig Power Station, as well as transport of fuel by rail is currently being investigated as part of a separate EIA application being undertaken by Bohlweki Environmental (DEAT reference number 12/12/20/955).

Impacts on Health and Safety

Concern has been expressed throughout previous Public Participation processes, and again reiterated during the public participation process undertaken as part of this assessment, regarding potential health and safety implications that may result from:

* Transportation of fuel
* Storage of fuel
* Impacts on air quality during operation
* Potential impacts on water availability and quality of water

These potential impacts were assessed within the initial OCGT power station (Bohlweki Environmental, 2005) and the power station expansion (Bohlweki Environmental, 2007). The findings of these studies will be used as the basis for the assessment of these potential impacts on the social environment during the EIA process. Impacts are expected to be localised and of low to medium significance.

Impact on sense of place

As the proposed Ankerlig Conversion would take place in the Atlantis Industrial Area, on a site currently occupied by the Ankerlig OCGT power station, impact on sense-of place can be expected to be limited. It is however important to note that the community already perceives itself as vulnerable to a variety of developments which many feel are being 'dumped' on them. The impact on sense of place can thus be regarded as a cumulative impact, whereby Atlantis residents increasingly feel victim to broader developments in the area which potentially impact on them.

To the extent that such impacts may occur, their significance would relate largely to other impacts, notably visual and noise impacts, as well as impacts on air quality and traffic volumes, which need to be taken into consideration

in assessing this impact. These will be assessed based on a review of separate studies undertaken for this and previous processes.

» *Possible interest group activity*
The effects of exposure to risk (whether real or perceived) are among the most significant potential social impacts of the project. Apart from psychological effects such as increased stress and psychosomatic symptoms, it may lead to interest group activity and social mobilisation against the project. Some interest group activity was already evident at the time of the Afroseach (2005) assessment undertaken for the initial OCGT development (i.e. initial 4 units).

The MasterQ (2007) Assessment undertaken for the expansion project (i.e. additional 5 units) noted that some interest group activity was still evident. Potential interest group activity is linked to potential health and safety impacts (see above). Objections by members of the Atlantis community against industrial developments in the area were made during public/focus group meetings: "Atlantis has become a convenient dumping ground for these kinds of projects." (MasterQ 2007).

Following the previous EIA processes undertaken, a Community Monitoring Committee (CMC) was established to liaise between the project and the local community, but it was noted during the public participation process being undertaken as part of this assessment that this committee is no longer functional. Concerns were raised concerning the way the committee, which was not considered representative of the broader Atlantis community, was elected.

6.5.3. Conclusions and Recommendations

In order to assess the potential impacts on the social environment associated with the construction and operation of the proposed power station conversion project (and verify the expected significance thereof), a detailed Social Impact Assessment (SIA) must be undertaken within the EIA phase of the project.

6.6. Impacts associated with the 'Do-nothing' Alternative

The 'do-nothing' alternative is the option of not converting the existing Open Cycle Gas Turbine units at Ankerlig Power Station to Combined Cycle Gas Turbine units.

The electricity demand in South Africa is placing increasing pressure on Eskom's existing power generation capacity. Using the strategic electricity planning in place (refer to Chapter 2) and taking into account the continued growth in

electricity demand, Eskom has determined that there is a need for additional power generation capacity in the medium-term. In considering the most suitable options to meet the increased electricity demand in the mid-term (i.e. by 2011), Eskom has concluded that the most feasible option is the conversion of the existing Ankerlig OCGT units to CCGT units, thereby generating additional capacity for the same amount of fuel (under a similar operating regime). The CCGT units can be operated for longer periods than the OCGT units, and can therefore be successfully utilised as mid-merit capacity, with the OCGT units still being available for use during peaking periods.

The do-nothing option will result in electricity demands in the medium-term not being met. This has serious short- to medium-term implications for economic growth, and hence to employment creation and poverty alleviation on a national level.

An economic analysis conducted by Global Insight (2005) for the first phase of the OCGT Development offers an estimate of the cost of un-served energy that would result if the OCGT power station at Atlantis were not constructed. If it is assumed that the power station will operate at a 5% load factor and that failure to construct the power station will result in an inability to meet peak electricity demand for 438 hours per year over a five-year period, the analysis indicates that the resultant cost of un-served energy will amount to a total of nearly R20 billion (Afrosearch 2005).

It should be noted that this estimate is a conservative one, as it ignores the possibility of additional indirect economic cost effects associated with un-served energy. In the context of a global economy, for example, industries faced with a situation where they are unable to depend on a reliable and uninterrupted electricity supply may well decide to invest in other locations where this need is adequately satisfied. The cost incurred through such indirect impacts could be many times higher than the estimated provided above (Afrosearch 2005).

Therefore, this option is rejected as a feasible alternative and is not considered further in the EIA.