6 BIOPHYSICAL BASELINE

This Chapter presents the biophysical baseline conditions in the Project's Areas of Influence (AoI) (described in Chapter 3: Project Description). The baseline was determined through review of existing information and observations and interviews conducted during site visits.

The objective of the biophysical baseline is to establish the characteristics of the existing biophysical conditions in the Project's AoI. The baseline serves as the reference point against which changes (impacts) can be predicted and monitored.

6.1 TERRESTRIAL ENVIRONMENT

6.1.1 Climatic Conditions

Saldanha falls within the Mediterranean climate zone which is characterised by warm, dry summers and cold, wet winters. The rainfall in the project area occurs most primarily between the months of April and September, with precipitation intensity highest in the months of June and July. The periods of lowest rainfall occur in the months of January and February, where average monthly precipitation is approximately 3 mm. Mean annual precipitation has been recorded at 320 mm. The maximum and minimum temperatures in Saldanha Bay do not exhibit stark variations due to its proximity to the ocean and the cold Benguela current and the incursion of summer fog which acts to temper summer temperatures. Thus average temperatures over the summer season seldom exceed 25 °C. Winter temperatures seldom drop below 10 °C. *Table 6.1* shows monthly temperatures for towns within the Saldanha Bay Municipality.

Table 6.1 Monthly Temperatures (°C) in the Saldanha Bay Municipality

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cape Columbine	17.2	17.9	17.1	16.1	15.4	14.6	13.9	13.6	14	15.7	16.1	17.2
Geelbek	19.3	19.4	18.1	16.3	14.7	12.8	11.8	12	12.9	15.8	16.7	18.5
Langebaan	21.8	21.9	21	18.0	15.3	13.2	12.3	12.4	13.6	17	18.2	20.4
Vredenburg	18.5	20.4	19.9	17.1	14.8	13.7	14.1	12.9	13.5	15.9	17	18.4

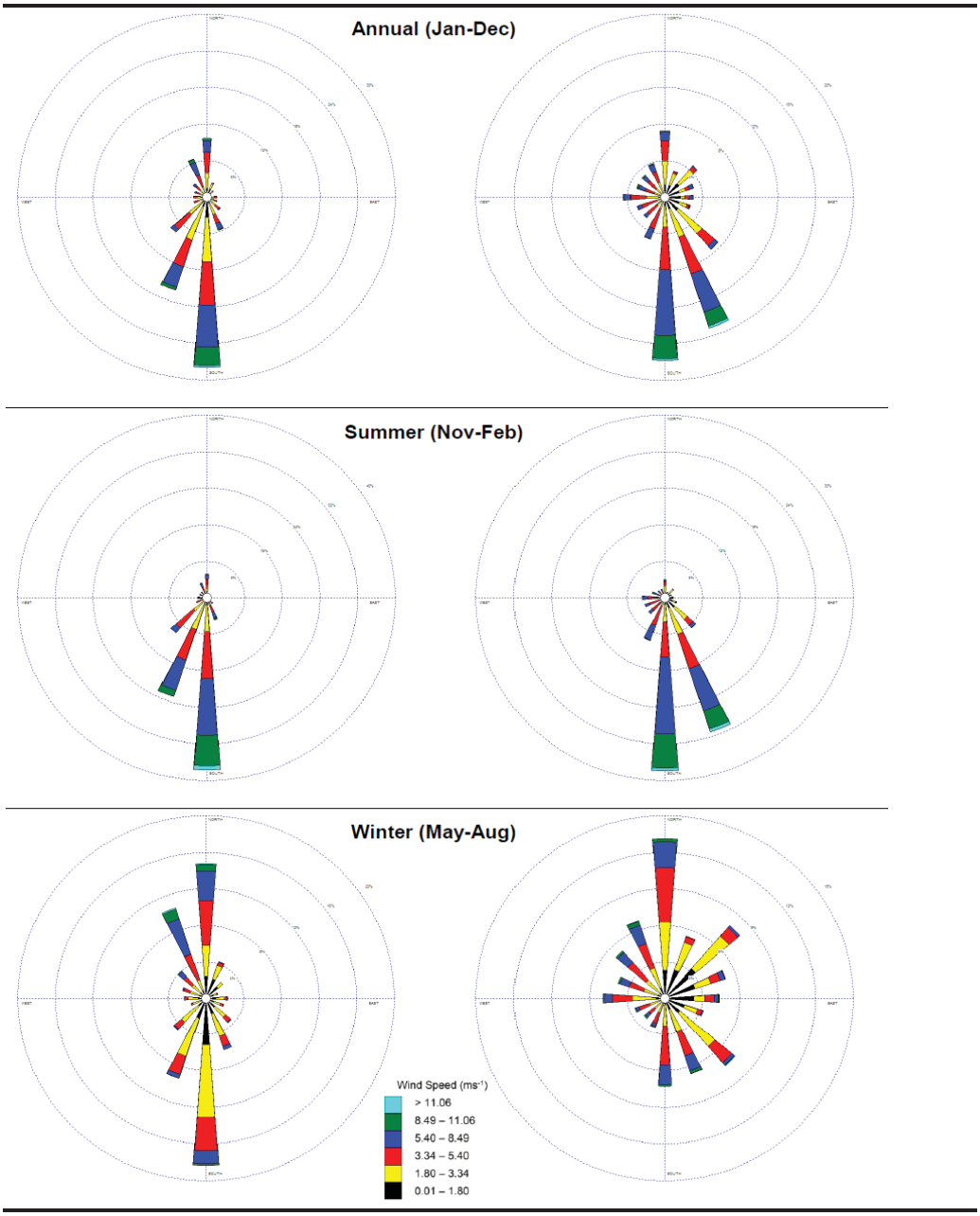
Source: Aurecon (2014)

The release of atmospheric pollutants results in the dilution of pollutants during unstable atmospheric conditions (conditions of free convection and atmospheric mixing). These conditions occur most frequently in summer during the daytime. This dilution effect can however be inhibited under stable atmospheric conditions in the boundary layer where surface pollution is

trapped under a surface inversion (Tyson & Preston-Whyte, 2000). This occurs in Saldanha during the winter months when temperature inversion layers 'trap' air pollution. Under these conditions an inversion can occur when a layer of warm air lies directly above a layer of cool air. This layer prevents a pollutant from mixing. Inversion layers tend to occur in calm and dry conditions during winter.

Winds in the Saldanha Bay area are dominated by the seasonal migration of the South Atlantic Anticyclone (high pressure cell). In the austral summer the high pressure cell moves into its southernmost position and strong southerly and south westerly winds prevail. During the winter months the South Atlantic Anticyclone is situated further north and the Western Cape coastline is exposed to frequent mid latitude cyclones (commonly referred to as cold fronts), which are associated with north and north westerly winds (*Figure 6.1*). The wind roses in *Figure 6.1* below depict the seasonal variances of the measured wind speeds. In the summer months, the wind blows predominantly from the south-west with wind speeds of greater than 5.6 m/s occurring frequently. During the winter months, the percentage of calm periods increase to 11.5 percent and wind blows at low speeds (frequently less than 3.5 m/s) from the south and higher wind speeds from the north and north westerly direction.

Figure 6.1 *Wind roses for Langebaanweg (left panels) and Geelbek (right panels), with annual (top), summer (centre) and winter (bottom)*



Source: SAWS, 2012

6.1.2 *Air Quality*

Particulate emissions within Saldanha Bay arise mostly from industry, although dust emissions from agricultural areas are also high. The main industrial sources of air pollution in Saldanha include (Burger and Krause, 2011):

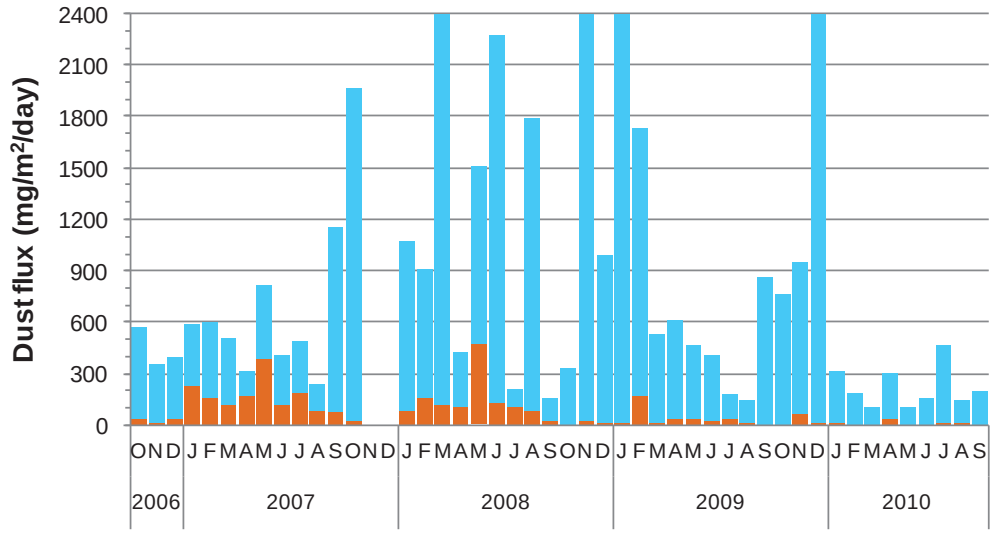
- ArcelorMittal Saldanha Works;
- Tronox (previously Exxaro) Namakwa Sands;
- Duferco Steel Processing;
- Saldanha Iron Ore Terminal;

- SFF Saldanha Bay Oil Storage;
- St Helena Bay Fishmeal Industries (Oceana, Oranjevis, Hannasbaai, West Point); and
- Limestone and Aggregate Quarries.

Emissions originating from these sources may include combustion products, such as SO_2, NOx, CO, Particulate Matter [1](PM_{10} and $PM_{2.5}$, fugitive dust (TSP, PM_{10} and $PM_{2.5}$), trace amounts of organic compounds and heavy metals, and odorous compounds (Burger and Bird, 2014).

Particular hot spots in terms of particulate levels (PM_{10}) are found in the vicinity of the iron ore handling facility (at the Port of Saldanha) and in the vicinity of the large industry complex (mainly comprising ArcelorMittal and Exarro facilities) (EMF, 2015). Iron ore dust levels are also significant (See *Figure 6.2* below for dust levels in Bluewater Saldanha Bay). Other emission source activities at the port include the handling of break bulk cargo and petroleum products, which emit particulates and volatile organic compounds. Emissions from shipping and port side vehicles and equipment are also sources of particulates and volatile organic compounds (VOCs).

Figure 6.2 Dust Monitoring Data in Bluewater Bay (Saldanha Bay)



Source: uMoya-Nilu (2011)

***Blue bars equal other dust and the Orange bars equal Fe oxide*

(1) Particulate matter is the term for solid or liquid particles found in the air. Some particles are large or dark enough to be seen as soot or smoke. Others are so small they can be detected only with an electron microscope. Particles originate from a variety of sources and as a result their chemical and physical compositions vary widely (EPA, 2015). PM10 particles are <10 µm in size and PM2.5 particles are less than <2.5 µm in size.

6.1.3 *Surface and Groundwater*

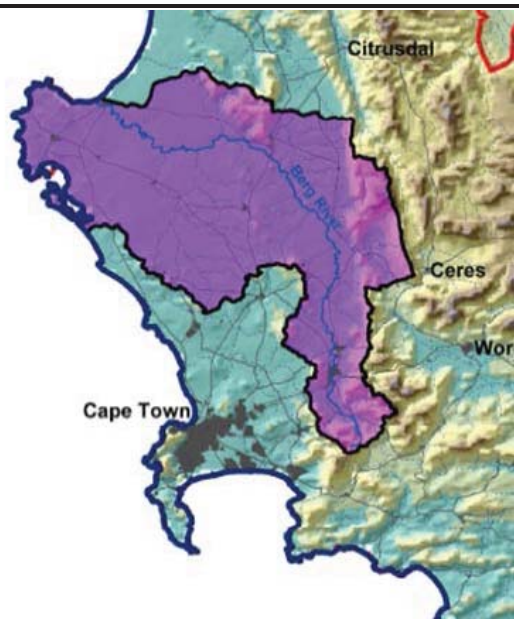
Surface water

The West Coast is a water scarce area with the region receiving on average 300 mm of rain annually (EMF, 2015). The primary water resource is the Berg River; however groundwater still plays a significant role as a water supply source. The area falls within the winter rainfall region of South Africa and therefore receives most of its rainfall April and September. Mean annual evaporation (MAE) is relatively high with a total potential rate of some 1 300 mm (EMF, 2015).

The site is situated within the Berg River catchment area (*Figure 6.3*), which is over 9,000 km^2 in area, and is the most important and largest catchment in the Western Cape Province. The catchment area is divided into 12 zones. The proposed site is located in quaternary catchment G10M [(1)], within the Berg Water Management Area (WMA). G10M is the catchment area's biggest zone, covering an area of 1,999 km^2.

There are no surface water resources (including rivers, dams or wetlands) located at the proposed site or along the pipeline route.

Figure 6.3 Berg River Catchment



Groundwater

<u>Geology and aquifers and recharge</u>

(1) Department of Water Affairs water management area boundary description number

According to the available published geological information, the proposed site is underlain by limestone and calcrete of the Langebaan Formation (GMS, 1973). The formation is of Quaternary age and the thickness ranges from 30m to 80m. The older limestone dunes of the formation in the area are heavily calcretised and are capped by a 1-2m thick layer of cohesionless, quartzitic sand overlying hardpan calcrete. The younger limestone dunes occur on the western shore of the Langebaan Lagoon are exposed as a calcrete-capped, consolidated barrier dune (Theron *et al*. 1992).

The proposed site is located on the Langebaan Road Aquifer System (LRAS) which extend towards Vredenburg in the North-west, Velddrif in the north and Hopefield in the east. The aquifer is an intergranular type aquifer with typical borehole yields between 0.1 and 0.5 litres/second. Using the Aquifer Classification according to the Aquifer Classification Map of South Africa (DWAF, 1999) the aquifer at the site is classified as a poor aquifer system with low vulnerability ( ) and low susceptibility ( ) to contamination.

The mean annual precipitation for the area ranges from 300 to 400mm and groundwater recharge is 10 to 15mm per annum (DWAF, 1995).

Groundwater levels and flow direction

The depth to groundwater is important primarily because it determines the depth of material through which any contaminants from surface must migrate before reaching an aquifer. There is a greater chance for attenuation of contaminants to occur as the depth to groundwater increases. The groundwater levels in the area are typically 10 to 20 meters below ground level (DWAF, 1995) and groundwater level data obtained from NGA boreholes suggest groundwater ranges between 2 and 7 meters below ground level. The difference in depth to groundwater levels suggest that the boreholes are accessing a perched water aquifer, perhaps above the calcrete geology typically found in the area.

Groundwater flows in a south-westerly direction across the site towards the coast and Saldanha Bay.

Quality and groundwater users

The electrical conductivity (EC) of water is a physical property which is widely used as an alternative to the chemical measuring of total dissolved solids (TDS), to determine water quality. Pure water has a low conductivity and an increase in conductivity generally reflects a decrease in water quality. The EC of groundwater in area of Sites A and B is generally between 150 and 300 mS/cm (DWAF, 2002). According to DWAF (1998) this represents saline conditions and is unacceptable for long-term drinking purposes.

According to the National Groundwater Archive (NGA) there are a number of registered boreholes within 1 km of Site A and Site B. The location, usage and owner of the boreholes are detailed in *Table 6.2.*

Table 6.2 Identified NGA boreholes

Approx. distance and direction	Land owner / operator	Usage	Other information
3.0km, west	Arcelor Mittal	Unknown	None
4.0km, south west	Arcelor Mittal	Groundwater monitoring	Depth to groundwater is 4-7mbgl (Aurecon, 2013)
7.5km, west	Water works plant	Unknown	Depth of groundwater is 2-3mbgl (NGA, 2015)

The closest municipal abstraction of groundwater occurs approximately 20 kilometres to the north east of the sites close to Langebaanweg where the range of extraction is between 1 and 2 million cubic metres per annum.

6.1.4 Geology, Soils and Fossils

The geology of the region and its paleontological history are closely linked as fossil types, their abundance, and mode of occurrence is directly related to the nature of the sediments in which they occur (EMF, 2015). Thus a description of the fossil potential or sensitivity is closely related to the geology of the area. The Saldanha Bay area has the following key formations:

- The *Varswater* Formation: This consists of two key sub members. The Langeberg Quartz Sand Member (LQSM) is richly fossiliferous, with a diversity of bones, shells and microfossils reflecting river floodplain, salt marsh and tidal-flat environments; and the Muishond Fontein Pelletal Phosphorite Member (MPPM) reflects further deepening, with deposition in an expanded estuarine system.

- The *Uyekraal* Formation: Shelly Sands were deposited on the shoreline to form the lower, outer part of the coastal plain after a seal level lowering occurring in the middle of the Pliocene period.

- The *Velddrif* Formation: includes all Quaternary marine deposits below about 15 meters above sea level (masl) that fringe the coast.

- The *Prospect Hill* Formation; consists of the inner aeolianite ridge between Saldanha Bay and Paternoster, includes fossil eggshell of the extinct ostrich *Diamantornis wardi.*

- The *Langebaan* Formation: These calcareous aeolianites are evident in the coastal landscape as the ridges, low hills and mounds beneath a capping calcrete crust, or surface limestone.

- The *Springfontyn Formation*: This formation comprises the mainly non-calcareous, windblown sand sheets and dunes that have covered parts of the landscape during the Quaternary.

There have been numerous fossil discoveries in the area many of which are now preserved in the West Coast Fossil Park, near Langebaan. Stone Age artifacts and remains of the indigenous Khoikoi are also widespread.

The soils in the area range from calcareous sands at the coast to acidic sands further inland. Shale and granite soils are relatively fertile and form the backbone of agriculture in the region (CWCBR, 2010). The area is primarily underlain by the *Langebaan Formation*, characterised by old calcareous aeolianites (dune sandstones), beneath a capping calcrete crust. The old dune accumulation dominates the local topography, forming the low mounded hills that are evident in the coastal landscape and are covered with vegetation of darker-green hue. The old dunes were formed during a lower sea level, when Saldanha Bay was exposed. At the coast these old dunes are now erosionally truncated by previous high shorelines and the present shoreline, forming a cliff that is partly covered by more recent sands.

Between the low hills of outcropping "Langebaan Limestones" is a cover of pale sands with less dense vegetation. Due to the erosional truncation of the Langebaan Formation at the present coast, it is exposed in the intertidal zone of the beach fringing the farm Spreeuwal. These beds are fossiliferous, with large mammal bones and some MSA artefacts (Avery & Klein, 2009). These "Spreeuwal Beds" illustrate the palaeo-environments that are a typically interbedded in the lower parts of the Langebaan Formation.

6.1.5 Flora and Fauna

Flora

Saldanha Bay falls within the Fynbos Biome and the Cape Floristic Region (CFR). The CFR is one of only six floristic regions in the world, is the richest temperate flora in the world, and is the only one confined to a single country. It is also the smallest floristic region and supports about 9000 plant species - almost half of all the plant species in South Africa. At least 70% of all the species in the Cape region do not occur elsewhere, and many have very small home ranges (these are known as narrow endemics, and may be confined to a single farm).

Many of the vegetation types that are present in the Saldanha Bay area occur only along the West Coast and are thus endemic to this area. The area is characterised by lowland habitats which are under pressure from agriculture, urbanisation, and alien plants, and thus many of the range restricted species

are also under threat of extinction, as habitat is reduced to extremely small fragments. Data from the Red Data Book listing process recently undertaken for South Africa is that 67% of the threatened plant species in the country occur only in the Fynbos biome, and these total over 1800 species (Raimondo *et al* 2009). The south-western Cape is a national and global conservation priority (Helme, 2015). In addition, there are Critical Biodiversity Areas (CBA's) across Saldanha Bay and the West Coast. CBAs are regarded as essential areas for the achievement of regional conservation targets, and are designed to ensure minimum land take for maximum result (Maree and Vromans 2010). These areas are categorised across the country.

Power Plant Site

A survey of the proposed site (1) was undertaken by Nick Helme during August 2015 (flowering season). The site is largely disturbed (likely by ripping) and has been heavily grazed and trampled which has reduced the rehabilitation success. The heavy grazing has meant that there were virtually no flowering annuals on the site at the time of the survey. Prior to disturbance the site would have supported Saldanha Flats Strandveld. The site is largely flat, but with deep neutral sands overlying calcrete, which are seldom exposed at the surface. There are no wetlands.

Figure 6.4 View of the proposed site looking northeast looking toward Blouwater substation

Source: Nick Helme, 2015
* Note the relative lack of flowering spring annuals, due to heavy grazing by livestock.

The northern 5-10% of the study area (adjacent to the road to Blouwaterbaai substation) supports intact Saldanha Limestone Strandveld, which has not

(1) Note that at the time of survey the site area had not been refined and was larger than the site area now indicated. The area of high conservation concern has been removed from the proposed site.

been ripped or heavily disturbed, and is thus more structurally diverse and of higher conservation value than the rest of the site.

Saldanha Limestone Strandveld was previously listed as an Endangered vegetation type (Rouget *et al* 2004), and then was unfortunately downgraded to Least Threatened (DEA 2011), due to an oversight by SANBI, and this error will apparently only be remedied only in about 2016. The unit has the highest number of threatened and localised plant species of all vegetation types in the Saldanha region (Helme & Koopman 2007). The unit is also poorly conserved (represented) in the West Coast National Park.

Typical species in this intact limestone area include *Thamnochortus spicigerus*, *Zygophyllum morgsana*, *Limonium capense*, *Senecio alooides*, *Pteronia divaricata*, *Euphorbia burmanii*, *Othonna cylindrica* and *Searsia glauca*.

Two plant Species of Conservation Concern (SCC) were recorded in this limestone area, and the likelihood that any others occur here in viable numbers is low. The recorded SSC include *Limonium capense* (Near Threatened), *Aloe distans* (a large population of this regional endemic, but now regarded as a subspecies of *A. perfoliata*), and *Nenax hirta ssp calciphila* (Near Threatened).

Indigenous plant species diversity includes *Galenia fruticosa*, *Exomis microphylla* (brakbos), *Oncosiphon suffruticosum* (stinkkruid), *Arctotheca calendula* (Cape weed), *Osteospermum incanum* (dune bietou), *O. chrysanthemoides* (bietou), *Muraltia spinosa* (tortoise berry), *Helichrysum niveum*, *Phyllobolus canaliculatus*, *Tetragonia fruticosa* (kinkelbos), *Stachys ballota*, *Mesembryanthemum crystallinum* (slaai), *Lycium ferocissimum*, *Oxalis pes-caprae* (geel suuring), *O. obtusa*, *Limeum aethiopicum* (koggelmandervoet), *Trachyandra divaricata* (duinekool), *Carpobrotus edulis* (suurvy), *Torilis arvensis*, *Senecio burchellii* (hongerblom), *Gladiolus cunonius*, *Calobota sericea* (fluitjiesbos), *Felicia hyssopifolia*, *Ehrharta calycina* (polgras), *Cynodon dactylon* (fynkweek), *Conicosia pugioniformis*, *Hermannia prismatocarpa*, *Ehrharta villosa* (pypgras), *Pelargonium myrrhifolium*, *Thamnochortus spicigerus* (duinriet), *Aspalathus acuminata*, *Searsia glauca* (kunibush), *Searsia laevigata* (dune taaibos), *Melolobium adenodes*, *Cissampelos capensis*, *Asparagus africanus*, *A. capensis*, *Amellus sp.*, Gymnosporia buxifolia (pendoring), *Oxalis luteola*, *Crassula expansa*, *C. vaillantii*, *Ornithogalum sp.*, *Zygophyllum morgsana*, *Viscum capense* (voelent), *Haemanthus pubescens* (poierkwas), *Trachyandra falcata* (veldkool) and *T. ciliata*.

Various annual alien grasses are also present, including *Bromus pectinatus*, *Bromus diandrus* (ripgut brome), *Lolium sp.* (ryegrass), *Avena sp.* (wild oats) and *Vulpia myuros* (ratstail fescue), plus the alien herbs *Erodium moschatum* (cranesbill), *Echium plantagineum* (Pattersons's curse), *Raphanus rapistrum* (wildemostert) and *Brassica tournefortii*. No woody alien species are present, and none of the alien herbs or grasses is dominant.

No plant Species of Conservation Concern were recorded in the disturbed part of the study area, and the likelihood that any occur here in viable numbers is low.

Importantly it should be noted that the small northern portion of the study area with high conservation concern has been removed from the proposed site subsequent to the survey.

Botanical Conservation Value

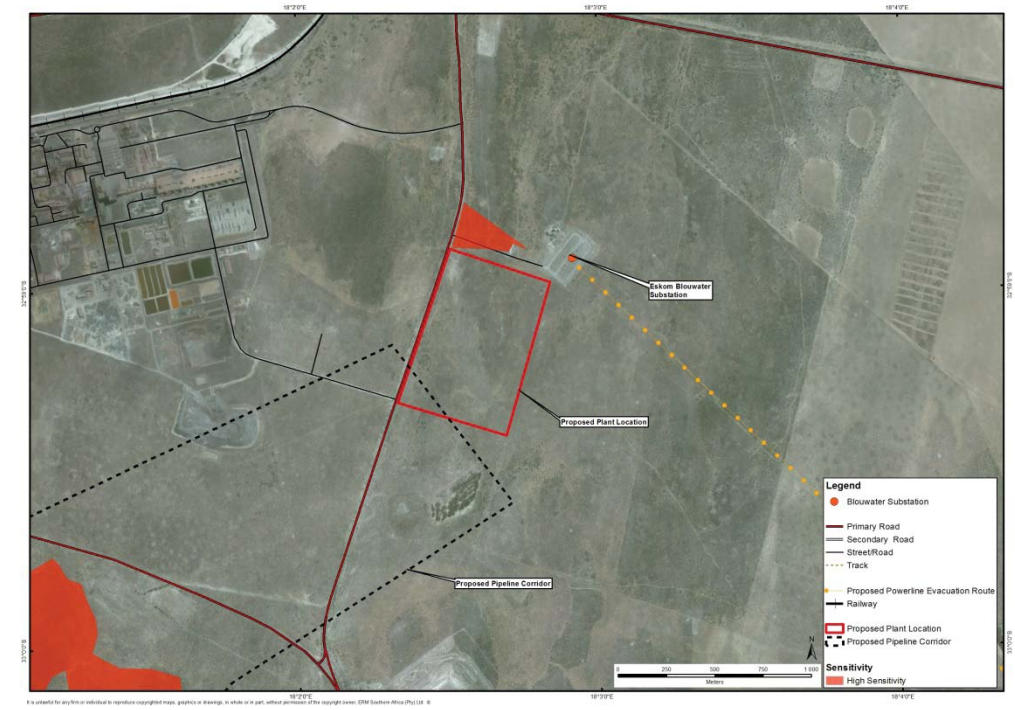
The terms conservation value and sensitivity are often used interchangeably, but this is not strictly correct. The term "conservation value" refers to the value of the habitat in local and regional conservation terms (*i.e.* answering the question how important is it?), whilst "sensitivity" strictly means how resilient is the habitat to disturbance. In the case of urban or industrial development any natural or partly natural habitat would effectively be permanently lost in the development footprint, and thus technically sensitivity would be high, irrespective of the conservation value of the underlying habitat.

The conservation value of a habitat is a product of species diversity, rarity of habitat, rarity of species, ecological viability and connectivity, vulnerability to impacts, and reversibility of threats (ease of rehabilitation).

Areas that have been cultivated or ripped and have relatively low botanical diversity and no significant populations of plant Species of Conservation Concern (SCC) are considered to be of Low botanical conservation value at a regional scale.

High conservation value areas support relatively intact examples of the locally restricted vegetation type Saldanha Limestone Strandveld, with regionally significant populations of various plant Species of Conservation Concern. These areas may or may not be designated CBAs. These areas are considered ecologically irreplaceable, on account of the presence of relatively intact examples (with both high species diversity and high structural heterogeneity) of a regionally restricted vegetation type (in this case Saldanha Limestone Strandveld), and due to the presence of regionally endemic plant Species of Conservation Concern. Conservation of such areas would contribute significantly to species and/or ecological process targets for the region, and should be considered No Go areas for development.

Figure 6.5 ***Orthophoto showing the proposed site and the area of high conservation concern to the north***



Source: ERM, 2016

Fauna

In general, fynbos vegetation cannot support high numbers animals due to the poor nutrients in the soils. However, there is a range of faunal life within the Saldanha Bay area (EMF, 2015).

- *Mammals*. A number of mammal species are threatened, endemic or near endemic to the area. Key species include: The Van Zyl's Golden Mole (*Cryptochloris zyli)*, Cape Dune Molerat (*Batyergus suillus)*, Cape Gerbil *Tatera afra* and Grant's Golden Mole (*Eremitalpa granti)* (Vulnerable) are endemic or near endemic. The Honey Badger (*Mellivora capensis)* is listed as Near Threatened, as is the Cape Horseshoe Bat (*Rhinolophus capensis)*, and the White-tailed Mouse (*Mystromys albicaudatus)* is endangered.

- *Reptiles*. The diversity of reptile species is relatively high in the drier areas along the West Coast including snakes, lizards and tortoises. For example. Seven species of girdled lizards of the genus Cordylus, including the armadillo girdled lizard (*Cordylus cataphractus*, Vulnerable) and the Cape Girdled Lizard *(Cordylus niger)* (endemic to Cape Peninsula and Saldanha Peninsula) are endemic to the area. The Geometric Tortoise (*Psammobatus geometricus)* is Critically Endangered and has lost more than 90% of its habitat.

Avifauna

Up to 267 bird species have been recorded within the relevant and respective South African Bird Atlas Project (SABAP 1) and within the study area as well as the broader impact zone of the development, including 26 red-listed or threatened species, 40 endemic species and 26 near – endemic species. A large portion of these species were however not considered relevant for this study due to the fact that the grid size used for the SABAP 1 data collection was 27 km X 27 km, extending out to sea.

The birds of greatest potential relevance and importance in terms of the possible impacts of the proposed CCGT power plant are likely to be local populations of endemic passerines (Cape Long-billed Lark Certhilauda curvirostris and Cape Clapper Lark Mirafra apiata), resident or visiting large terrestrial birds (Blue Crane, Southern Black Korhaan and Secretarybird Sagittarius serpentarius), resident or passing raptors (Martial Eagle, Lanner Falcon, Black Harrier) and transient waterbirds (Greater Flamingo, Lesser Flamingo, Great White Pelican and Maccoa Duck).

Table 6.3 includes a list of priority species list considered central to the avifaunal impact study for the proposed Project, selected on the basis of conservation status (Taylor *et al.*, 2015).

Critical Biodiversity Areas (CBA)

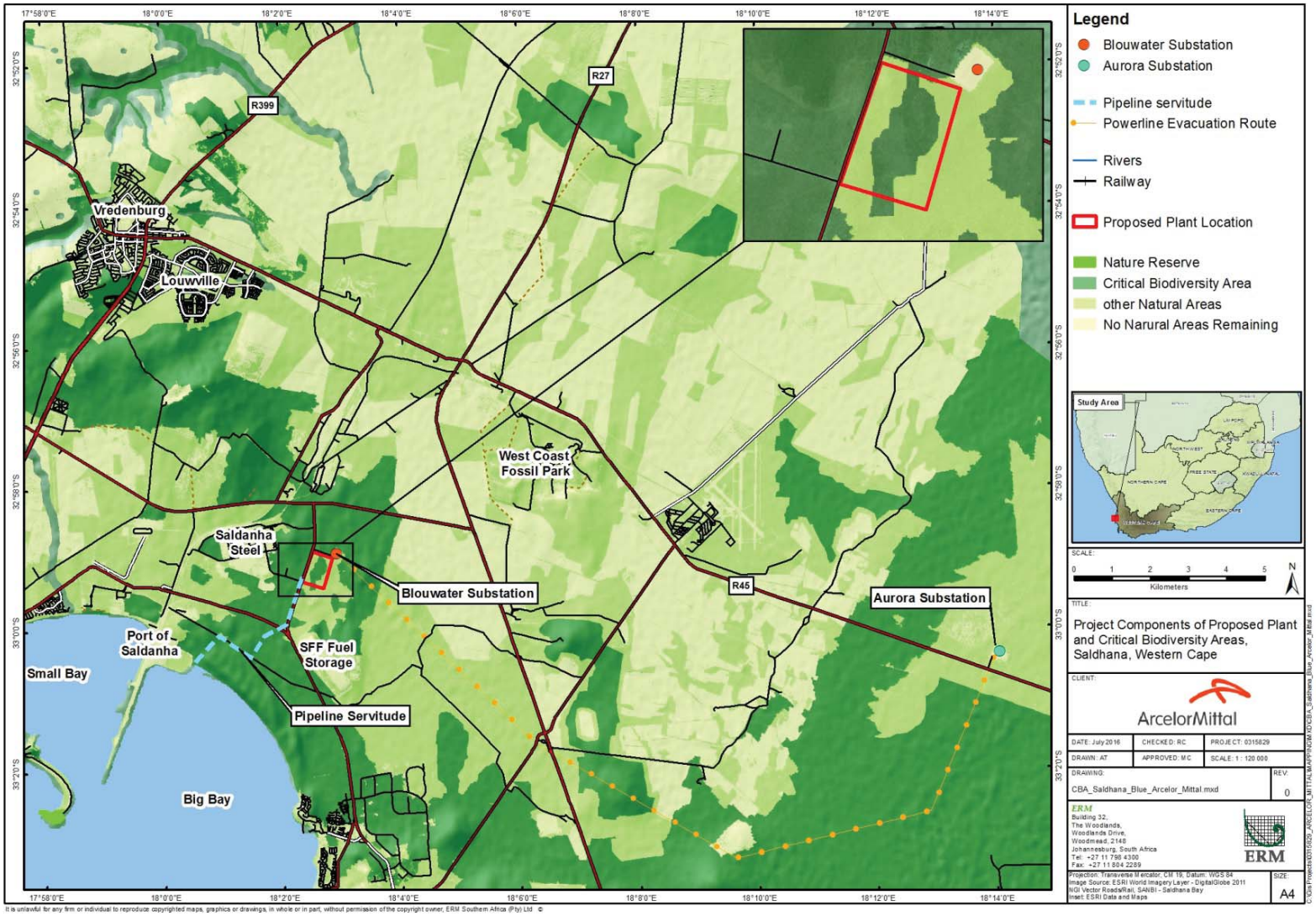
CBA information has been drawn from the Biodiversity Sector Plan that has been prepared for the Saldanha Bay, Berg River, Cederberg and Matzikama municipalities. The sector plan is based on the work conducted under the auspices of Cape Nature's Fine-Scale Biodiversity Planning project. The study area is within the planning domain of the Saldanha Fine Scale Conservation Plan (Pence, 2008). The maps have been produced to satisfy legislation in Chapter 3 of NEMBA. CBA's defined as biodiversity areas that are of high priority and that is required to maintain biodiversity pattern and process (i.e. functioning ecosystems) and to meet conservation targets (EMF, 2015). *Figure 6.6* illustrates the CBA and potential Project component, showing that potentially up to 43percent of the land within the ArcelorMittal project site is within a declared CBA.

Table 6.3 Important avifauna species found within study area

Common name	Scientific name	Conservation status	Regional endemism	Estimated importance of local population	Preferred habitat	Likelihood of occurring in the study area
Bustard, Ludwig's	*Neotis ludwigii*	Endangered	Endemic	Moderate	Semi-arid dwarf shrubland, also in arid savanna and fynbos	Low
Crane, Blue	*Anthropoides paradieus*	Near-threatened	Endemic	High	Grasslands, but also in wetlands, cultivated pastures and croplands	High
Courser, Burchell's	*Cursorius rufus*	Vulnerable	Near-endemic	Low	Sparsely vegetated arid regions	Low
Duck, Maccoa	*Oxyura maccoa*	Near-threatened	-	Moderate	Inland water bodies with emergent vegetation; flyover	Moderate
Eagle, Martial	*Polemaetus bellicosus*	Endangered	-	Low	Open savanna and woodland on plains, also semi-arid shrublands	Recorded in the study area
Eagle, Verreaux's	*Aquila verreauxii*	Vulnerable	-	Moderate	Mountainous regions and rocky areas with cliffs	High
Falcon, Lanner	*Falco biarmicus*	Vulnerable	-	High	Open grassland or woodland near cliff or electircity pylons	Recorded in the study area
Flamingo, Greater	*Phoenicopterus ruber*	Near-threatened	-	High	Saline or brackish water bodies; flyover	High
Flamingo, Lesser	*Phoenicopterus minor*	Near-threatened	-	High	Eutrophic shallow wetlands, saltpans; flyover	High
Harrier, African Marsh	*Circus ranivorus*	Endangered	-	High	Inland and coastal wetlands, and ajacent moist grasslands	High
Harrier, Black	*Circus maurus*	Endangered	Near-endemic	High	Fynbos, shrubland, dry grassland and croplands	Recorded in the study area
Korhaan, Southern Black	*Afrotis afra*	Vulnerable	Endemic	High	Renosterveld, fynbos and succulent Karoo	Recorded in the study area
Pelican, Great White	*Pelecanus onocrotalus*	Vulnerable	-	High	Shallow lakes, estuaries, large pans and dams	High
Secretarybird	*Sagittarius serpentarius*	Vulnerable	-	Moderate	Open grassland with scattered trees and shrubs	Moderate

Common name	Scientific name	Conservation status	Regional endemism	Estimated importance of local population	Preferred habitat	Likelihood of occurring in the study area
Stork, Black	*Ciconia nigra*	Vulnerable	-	Moderate	Mountainous regions	High
Vulture, Cape	*Gyps coprotheres*	Endangered	Near-endemic	Low	Mountainous regions, but range widely in surrounding areas	Low

Figure 6.6 *Critical Biodiversity Areas close to the Project*



6.1.6 Noise

The area is sparsely populated in the vicinity of the industrial zone. The closest noise-sensitive receptors are further than 2000 m from the proposed Project. An assessment of the area was done using available topographical maps to identify potential Noise Sensitive Developments (NSD) in the area. Noise-sensitive developments and other potential Interested and Affected Parties identified are highlighted in *Figure 6.7*.

Ambient sound levels were measured at one location for a two night-time period during May 2016 using a class-1 Sound Level Meter. The sound level meters would measure "average" sound levels over a 10 minutes period, save the data and start with a new 10 minute measurement till the instrument was stopped. This data was also augmented with additional measurements at three locations during the day and night.

The data collected and information about the measurement locations are presented in *Table 6.4*.

Short term measurements indicated ambient sound levels typical of an urban noise district (with main roads, business and workshops) closer to the project site. Daytime ambient sound levels are higher, mainly due to road traffic, although wind-induced noises also contributed to the ambient sound levels. Short term measurements away from roads, business and residential dwellings indicate an area with the potential to be very quiet.

Figure 6.7 *Aerial image indicating potential noise sensitive receptors in the vicinity of the proposed development*

Table 6.4 Summary of singular noise measurements

Measurement location	$L_{Aeq,i}$ level (dBA)	$L_{Aeq,f}$ level (dBA)	L_{A90} Level (dBA90)
AMSGSTASL01 Daytime	76	73	52
	76	73	50
AMSGSTASL01 Night-time	51	47	45
	52	48	45
AMSGSTASL02 Daytime	75	72	51
	75	72	51
AMSGSTASL02 Night-time	49	46	45
	51	47	46
AMSGSTASL03 Daytime	49	47	39
	47	45	37
AMSGSTASL03 Night-time	37	29	24
	32	24	20

Legend:
$L_{Aeq,i}$ - Equivalent (average) A-weighted impulse-time-weighted noise level
$L_{Aeq,f}$ - Equivalent (average) A-weighted fast-time-weighted noise level
L_{A90} - Noise level that is exceeded 90% or more of the time, A-weighted fast-time-weighted noise level

Figure 6.8 Day and night spectral frequencies recorded at AMSGSTASL01

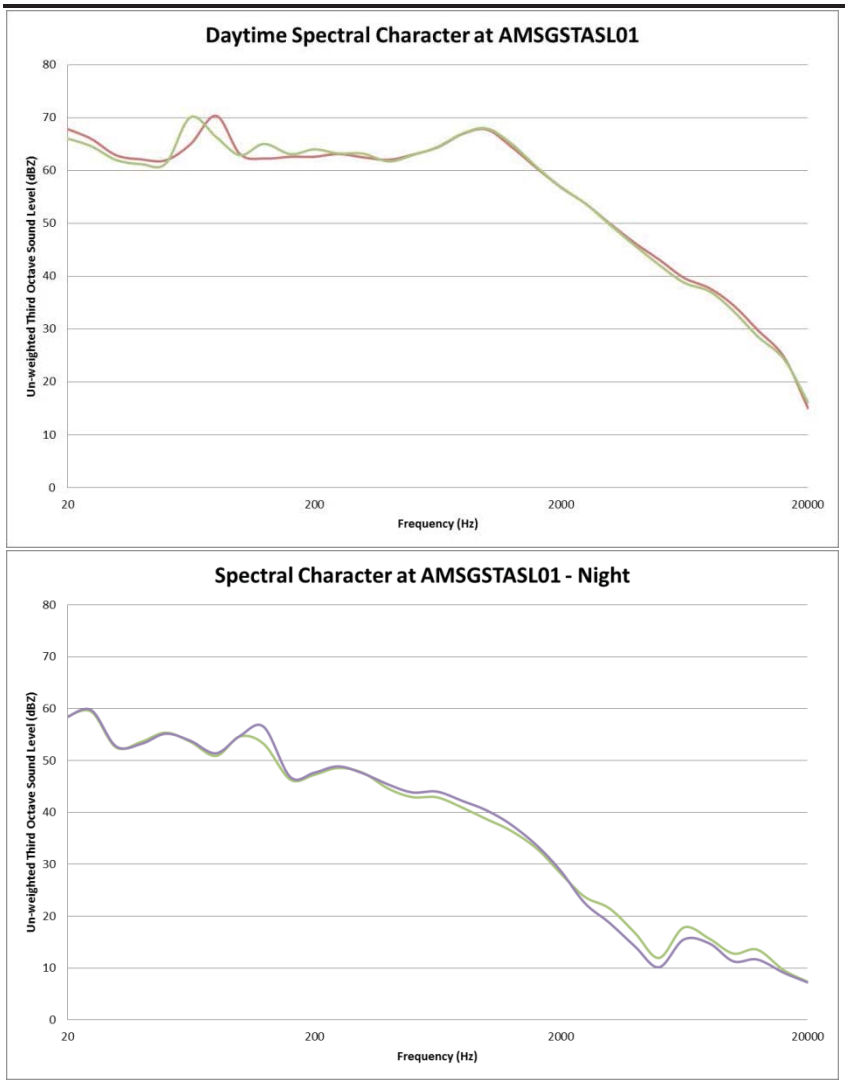


Figure 6.9 Day and night spectral frequencies recorded at AMSGSTASL02

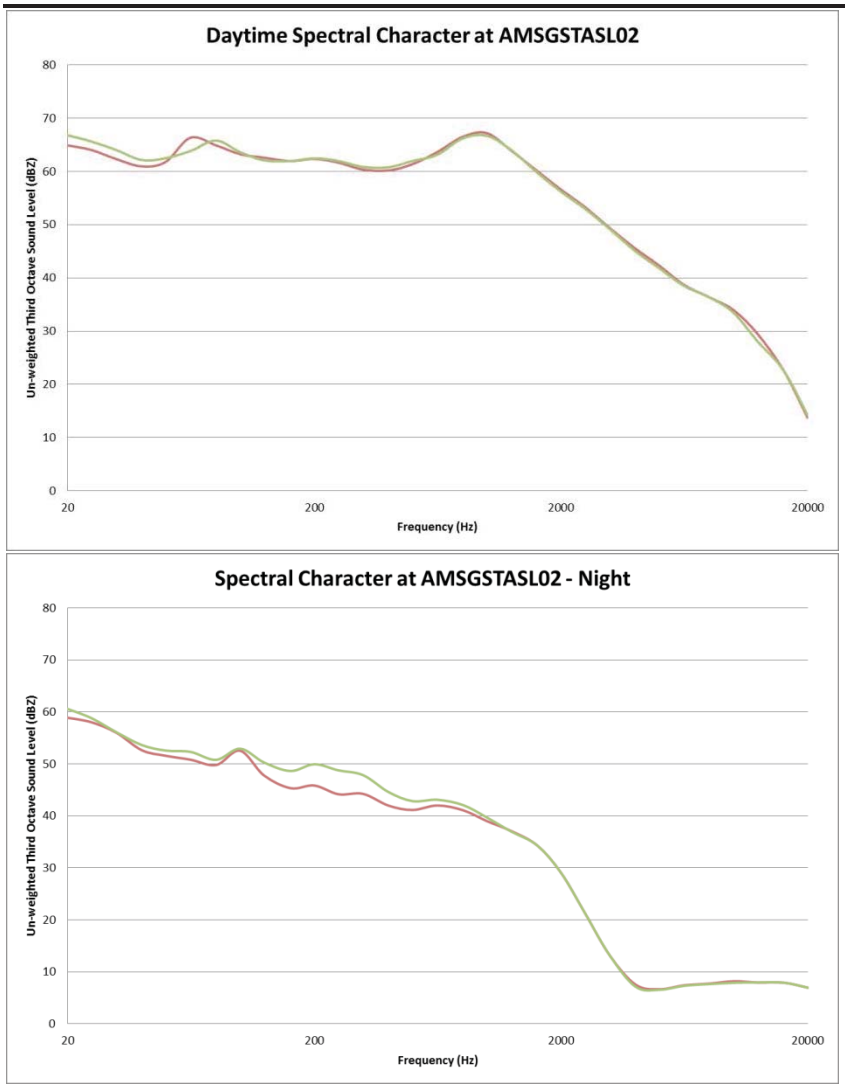


Figure 6.10 Day and night spectral frequencies recorded at AMSGSTASL03