

ESKOM HOLDINGS SOC LTD

**PROPOSED DEVELOPMENT OF THE RICHARDS BAY COMBINED
CYCLE POWER PLANT (CCPP) AND ASSOCIATED
INFRASTRUCTURE ON A SITE NEAR RICHARDS BAY, KWAZULU-
NATAL PROVINCE**

VISUAL IMPACT SCOPING REPORT

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1 INTRODUCTION

1.1 GENERAL

This Visual Impact Scoping Report (VISR) forms part of the Scoping and Environmental Impact Assessment process that is being undertaken for the proposed development of the 3000MW Combined Cycle Power Plant (CCPP) in Richards Bay by Savannah Environmental (Pty) Ltd on behalf of Eskom Holdings SOC Ltd (Eskom).

In terms of the amended National Environmental Management Act (NEMA) Act No. 107 of 1998, the proposed development requires environmental authorisation. A key impact to be assessed comprises the visual impact that the facility will have on surrounding areas.

This desktop Visual Impact Assessment Report has been prepared for inclusion in the Scoping Report prepared for the project.

1.2 PROJECT LOCATION

The proposed site is located adjacent and to the south west of the existing Mondi Plant within the Richards Bay Industrial Development Zone (Phase 1D), and approximately 3.5km west south west of the Richards Bay Town Centre. The affected properties are Portion 2 of erf 11376 and Portion 4 of erf 11376.

The project site comprises the following properties:

SG 21 Code	Property Area
N0GV04210001137600002	71ha
N0GV04210001137600004	

The site is indicated on the Site location Plan (Map 1).

1.3 BACKGROUND OF SPECIALIST

Jon Marshall qualified as a Landscape Architect in 1978. He is also a certified Environmental Assessment Practitioner (EAP) of South Africa. He has been involved in Visual Impact Assessment over a period of approximately 30 years. He has developed the necessary computer skills to prepare viewshed analysis and three dimensional modelling to illustrate impact assessments. He has undertaken visual impact assessments for major buildings, industrial developments, mining and infrastructure projects and has been involved in the preparation of visual guidelines for large scale developments.

Jon has also undertaken work in Richards Bay as part of a planning team that reviewed development options for the Richards Bay Water Front. He also undertook the drafting of the original Richards Bay IDZ Environmental Impact Assessment Report and has undertaken numerous other projects within the area. He is therefore familiar with the area.

A brief Curriculum Vitae outlining relevant visual impact assessment projects and the specialist's experience is included as **Appendix I**.

1.4 THE NATURE OF VISUAL IMPACT

Visual impacts may relate to a general change in the character of an area or in the change in a specific view for a person or group of people.

Visual impacts can be positive or negative and a degree of subjectivity is required in deciding this point. The approach of any visual assessment should, as objectively as possible, describe a landscape and as far as is possible reflect the likely majority view regarding the positive / negative aspect of an impact. This can be difficult particularly in South Africa due to different values and cultures associated with various sectors of the population. For example, poorer and particularly rural based sectors of the population are possibly more concerned with the productive nature of a landscape than its appearance, whereas the wealthier sectors might be more concerned with scenic value particularly as it is associated with property values. If possible the values and opinions of all impacted sectors of the community should be considered.

General change to a landscape might have greater or lesser significance subject to;

- a) The number of people that might use the landscape;
- b) The use of the landscape;
- c) The level of protection afforded the landscape; and
- d) The rarity of the landscape.

In terms of change to a specific view this might be defined as either visual intrusion or visual obstruction.

- a) Visual intrusion is a change in a view of a landscape that reduces the quality of the view. This can be a highly subjective judgement. Subjectivity has been removed as far as possible in this assessment by classifying the landscape character of each area and providing a description of the change in the landscape that will occur due to the proposed development.
- b) Visual obstruction is the blocking of views or foreshortening of views. This can generally be measured in terms of extent.

More often than not such an impact will be a combination of intrusion and obstruction. Obstruction can be measured in terms of the extent of an existing view that is screened by a development. However, judging intrusion requires a degree of subjectivity. It is however possible to relate this judgement to the manner in which proposed change would impact on the use or enjoyment of an area which again requires an understanding of local values.

1.5 RELEVANT GUIDELINES

Work is to be undertaken in accordance with the following guideline documents;

- a. The Government of the Western Cape Guideline for Involving Visual and Aesthetic Specialists in EIA Processes (Western Cape Guideline), which is the only local relevant guideline, setting various levels of assessment subject to the nature of the proposed development and surrounding landscape; and
- b. The Landscape Institute and Institute of Environmental Management and Assessment (UK) Guidelines for Landscape and Visual Impact Assessment which provides detail of international best practice (UK Guidelines).

Together these documents provide a basis for the level and approach of a VIA as well as the necessary tools for assessment and making an assessment legible to stakeholders.

1.6 SCOPING OBJECTIVES

This Environmental Scoping Study identifies and evaluates potential environmental impacts associated with all aspects of the proposed Project. In terms of the EIA Regulations, feasible and reasonable alternatives should be assessed within the Scoping Study. The scope of an environmental assessment is defined by the range of issues and feasible alternatives to be considered, and the approach towards the assessment that will follow.

The characteristics of a scoping exercise are as follows:

- a) Feasible and reasonable alternatives are identified and selected for further assessment;
- b) Important characteristics of the affected environment are identified;
- c) Significant issues that are to be examined in the assessment procedure are identified; and
- d) It provides the basis for determining terms of reference for the assessment procedure.

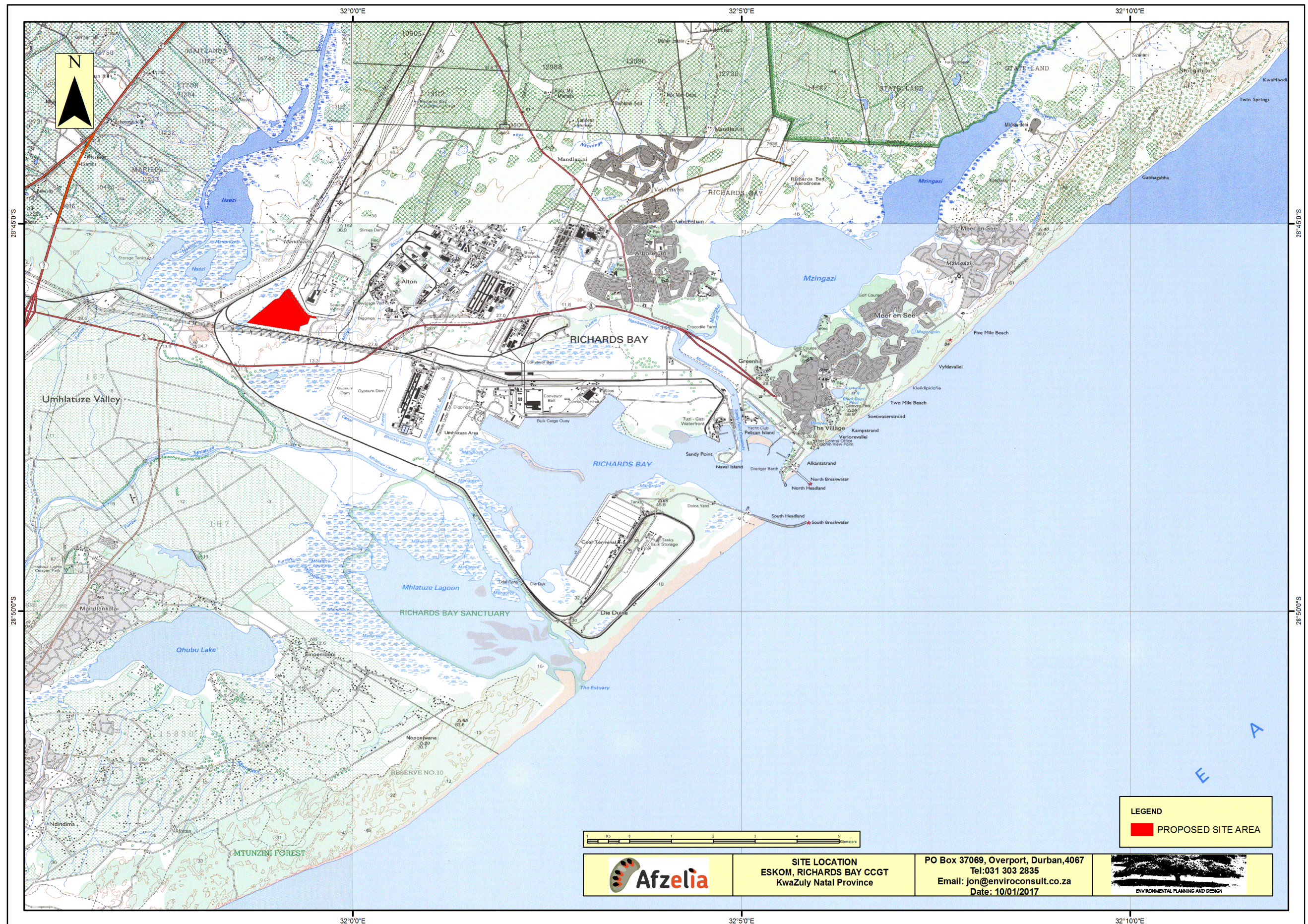
1.7 SCOPING OBJECTIVES

The proposed site was selected through an environmental screening assessment that considered the subject site and three alternatives. The findings of the environmental screening assessment are detailed in the Scoping Report.

1.8 LIMITATIONS AND ASSUMPTIONS

- a) This initial assessment is a desk top study that has made use of existing GIS data sets, on line mapping / photography, and the assessor's knowledge of the area.
- b) Layouts for each site were not available although a generic layout as indicated in Figures 1 and 2 was provided.

MAP 1 –SITE LOCATION



2. PROJECT DESCRIPTION

2.1 PROJECT MOTIVATION

The increase in demand for electricity in South Africa has mirrored an ever gradual increase in economic and population growth. Historically, coal has provided the backbone of electricity and liquid energy supply in South Africa. Consequentially, Eskom generates up to 92% of its electricity from coal sources. The large contribution of coal in the generation mix resulted in Eskom having a large carbon footprint.

The climate change problems afflicting the world, quest for sustainable development and health concerns, provided opportunities for Eskom to implement efficient usage of energy, energy generation and efficient usage of other scarce input resources such as water. Also the decline in performance of coal ageing infrastructure and intermittency of the current planned renewable energy calls for an alternative source of energy. Eskom had recognised sustainable development as a key pillar in its business and has as such taken the lead to support Governments National Development Plan and other development policies. For this purpose, Eskom has taken the initiative to investigate, develop and construct a 3000MW Combined Cycle Power Plant near Richards's Bay.

2.2 PROJECT DESCRIPTION

2.2.1 General

The envisaged footprint of the site is **40 - 60 ha**, preferably in close proximity to the National Port Authority. The project delivery date is planned for 2022, thus it is being developed, and will be implemented, on a fast-track mode. A concept design for this plant operating on natural gas was produced by the applicant. The outcome of the concept design was that a 2:2:1, Gas Turbine: HRSG: Steam turbine configuration with a total of 8 gas turbines and 4 steam turbines will produce 3000MW of electricity. The CCPP will comprise of the gas turbines, HRSGs, steam turbines, diesel storage, Balance of Plant, buildings and auxiliaries and gas and water pipelines to support power generation. Operations of this plant may be mid-merit or baseload. The plant can be operated on both gas and diesel, which will be transported in various alternatives, still under investigation.

The plant will use gas Liquefied Natural Gas (LNG) shipped to Richards Bay through the port or pipe natural gas from Mozambique. Diesel will be mainly used for backup and will be trucked from the source.

2.2.2 Overview of a CCPP

A CCPP uses a gas turbine generator to generate electricity and the waste heat is used to make steam to generate additional electricity via a steam turbine. The CCPP is one of the most efficient power generating facilities to convert either gas or diesel fuel to mechanical power or electricity. In other words gas or diesel is burnt

in a gas turbine producing both electrical power via a coupled generator and fairly hot exhaust gases. The hot exhaust gases pass through a water-cooled heat exchanger to produce steam, which can be turned into electric power with a coupled steam turbine and generator.

The primary components of the project include the following:

- A gas turbine uses gas (diesel or natural gas) to generate electricity.
- A heat recovery steam generator (HRSG) will capture heat from the high temperature exhaust gases to produce high temperature and high pressure dry steam, which is then supplied to a steam turbine.
- A steam turbine will use the dry steam to drive its turbine to generate additional electrical power.
- A condenser which converts exhaust steam from the steam turbine back into water through a cooling process.
- A bypass stack for the CCPP, anticipated to be approximately 40 to 60 meters in height, will be associated with each HRSG. It is anticipated that there will be bypass stacks for each gas turbine.
- Water treatment plant for the treatment of potable water and production of demineralised water (for steam generation).
- Dry-cooled technology consisting of a system of air-cooled condenser fans situated in fan banks approximately between 25 m - 30 m above ground.
- A water pipeline – supply of potable from a potential water source to the power station.
- A water tank – the exact size, still need to be determined depending on the sizing of the steam turbine.
- A gas pipeline – the supply of natural gas from the gas supply take-off point at the harbour and the power station.
- A water pond/dam - temporary retention, flushing and treatment of waste water produced on the site.
- A gas supply conditioning – a process facility to condition and meter the gas prior to being supplied to the gas turbine.
- Diesel off-loading and storage – diesel will be used as a back-up fuel supply if and when natural gas is not available for power generation. A diesel truck off-loading facility is to be built and stored in tanks which will hold a capacity for an 8 hour operation. The size of the tanks is still to be determined.
- Closed Fin-fan coolers – these are heat exchangers used to cool the lube oil for the gas turbine and steam turbines.
- Exhaust stack – after the HRSG, the combustion gases are discharged into the atmosphere via the exhaust stack. The stack is estimated to be between 40 and 60 meters in height.
- Once-through-cooling – Once-through-cooling is another option for the cooling technology but it is dependent on the final site screen and the technical feasibility of its application.
- High voltage (HV) yard.
- Power lines for the evacuation of power to the grid/network.

Water will be required for the CCPP power generation process. High quality water is required for use within the CCPP power generation process. Membranes/ion

exchange systems would be required for water treatment on site. A waste treatment plant for the effluent from this water treatment system will be required. All solid waste generated from this process would be disposed of off-site at a suitably licensed waste disposal facility.

The power station is to be operated as a zero liquid effluent discharge (ZLED) system, i.e. water within the power station will be recycled for re-use in the power station process. No liquid waste from the power station will therefore be discharged to the environment.

In addition, the Project will include the following facilities/components:

- Access road to site;
- 132kV and 400kV switchyard;
- Control and electrical building;
- Central control room, warehouse and administrative buildings;
- Firefighting systems;
- Fuel/gas/diesel storage facilities;
- Emergency backup generators (diesel or LPG); and
- Chemical storage facilities (Water treatment chemicals, and demineralizing resins, lubricants, grease and turbine cleaning detergents, fire extinguishing foams).

The preliminary plant layout is indicated in **Figure 1** and a 3D illustration of the proposed installation is indicated in **Figure 2**. Both of these images were provided by the applicant and indicate initial concepts only.

2.3 LIKELY SCALE OF DEVELOPMENT AND NATURE OF VISUAL IMPACTS

Other than the stacks, no detail has been provided regarding the heights of the various elements. As this is fundamental to visual impact, broad assumptions based on layout and illustrative information provided by the applicant have to be made in order to progress the Scoping Assessment.

The main elements that are likely to have visual influence on surrounding areas can be divided into the following:

High elements in excess of 40m that will include the three HSRG bypass stacks and the HSRG exhaust stack. These may be up to 60m high. Whilst these will be the highest elements within the development, they will be comprised of three relatively slim structures that may be easily missed by the casual viewer particularly if only the upper sections are visible. It is possible however that attention could be drawn to the stacks by visible emissions.

Medium high elements that will include the condenser fan banks, the workshop building, the three HSRG enclosures, the diesel tank, the taller elements in the transmission yard including bus bars, and power lines. These elements are likely to be in the order of 20 to 30m high. Whilst not the tallest elements, they will appear as relatively solid structures that will be combined to provide visual mass that is likely to present a simple geometric form that contrasts strongly in terms of scale outline, texture and colour with a surrounding landscape. The exception is likely to

be the higher structures associated with the transmission yard which include the bus bars and possibly lightning conductors and power lines. These elements are likely to be comprised of relatively narrow steel sections and possibly lattice structures. Whilst they may be relatively high, their nature is likely to mean that they will be visible over a limited distance only.

Low elements will include; the water treatment plant, ancillary buildings, pipelines (gas and water), security fencing, loading / unloading areas, and external storage areas. These elements are all likely to be lower than 20m with the majority being below 10m high. From a visual perspective they will add to the visual mass of the plant particularly from close quarters. Where visible they will also add visual complexity and detail that some may find interesting but has the potential to provide a high level of contrast with immediate surroundings particularly when set against a cohesive naturalistic landscape. However, because these elements are relatively low there is a good possibility that screening may be effective.

These orders of height will be used in the initial scoping assessment to help indicate the nature of likely views of the proposed development that may be visible and identify the nature of impacts that are likely to affect sensitive receptors.

2.4 LIKELY LIMITS OF VISIBILITY

A GIS based visibility assessment does not take the curvature of the earth or reduction in scale due to distance into account. In order to provide an indication of the likely limit of visibility due to this effect a universally accepted navigational calculation (refer to **Appendix II**) has been used to calculate the likely distance that the proposed structures might be visible over. Using this formula, table 2 indicates the distances within which the various structures highlighted in 2.2 might be visible within a flat landscape.

Table 2 – Likely Limits of Visibility

Structure	Likely limit of visibility
Tall structures up to 60m high	27.7km
Medium tall structures up to 40m high	22.6km
Low structures up to 20m high	16km

It is acknowledged that the landscape within which the development is proposed is far from flat. This approximate visual horizon is therefore only used as a rough guide of visibility from areas of a similar or lower elevation than the proposed site.

The landscape inland and to the north and west within the likely limits of visibility is relatively flat / gently sloping. Adjacent to the coast, to the south and east of the study area, the terrain is comprised of tall steep dunes. These higher areas are however generally within the limits highlighted above. The limits indicated are therefore considered to be a reasonable estimate of limits of visibility.

In reality visibility could be reduced by:

- Weather conditions that limit visibility. This would include hazy conditions during fine weather as well as mist and rain; and

- Scale and colour of individual elements making it difficult to differentiate structures from background.

Figure 1 – 3D Illustration of Proposed Installation

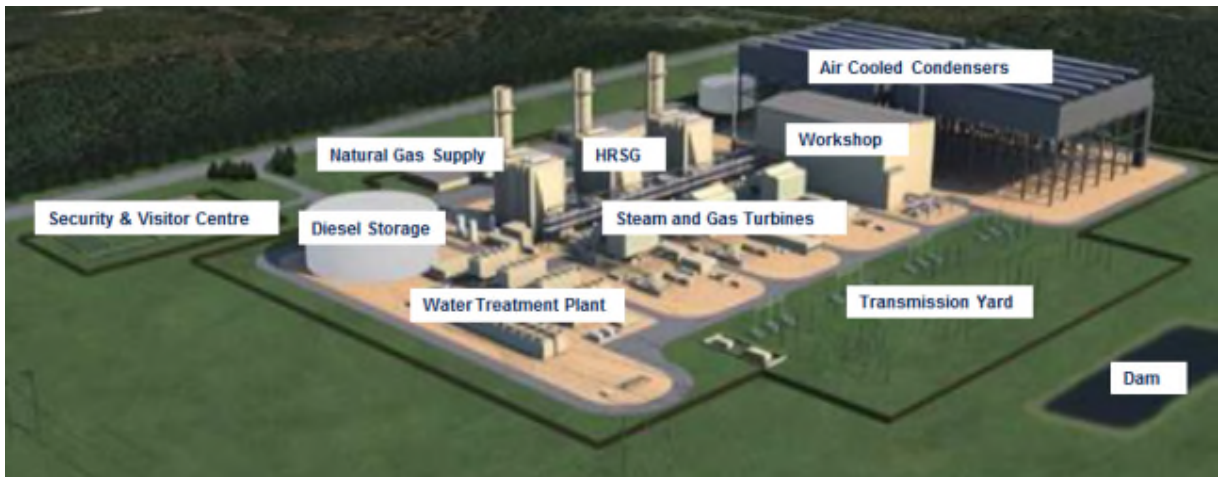


Figure 2 – Initial Indicative Layout

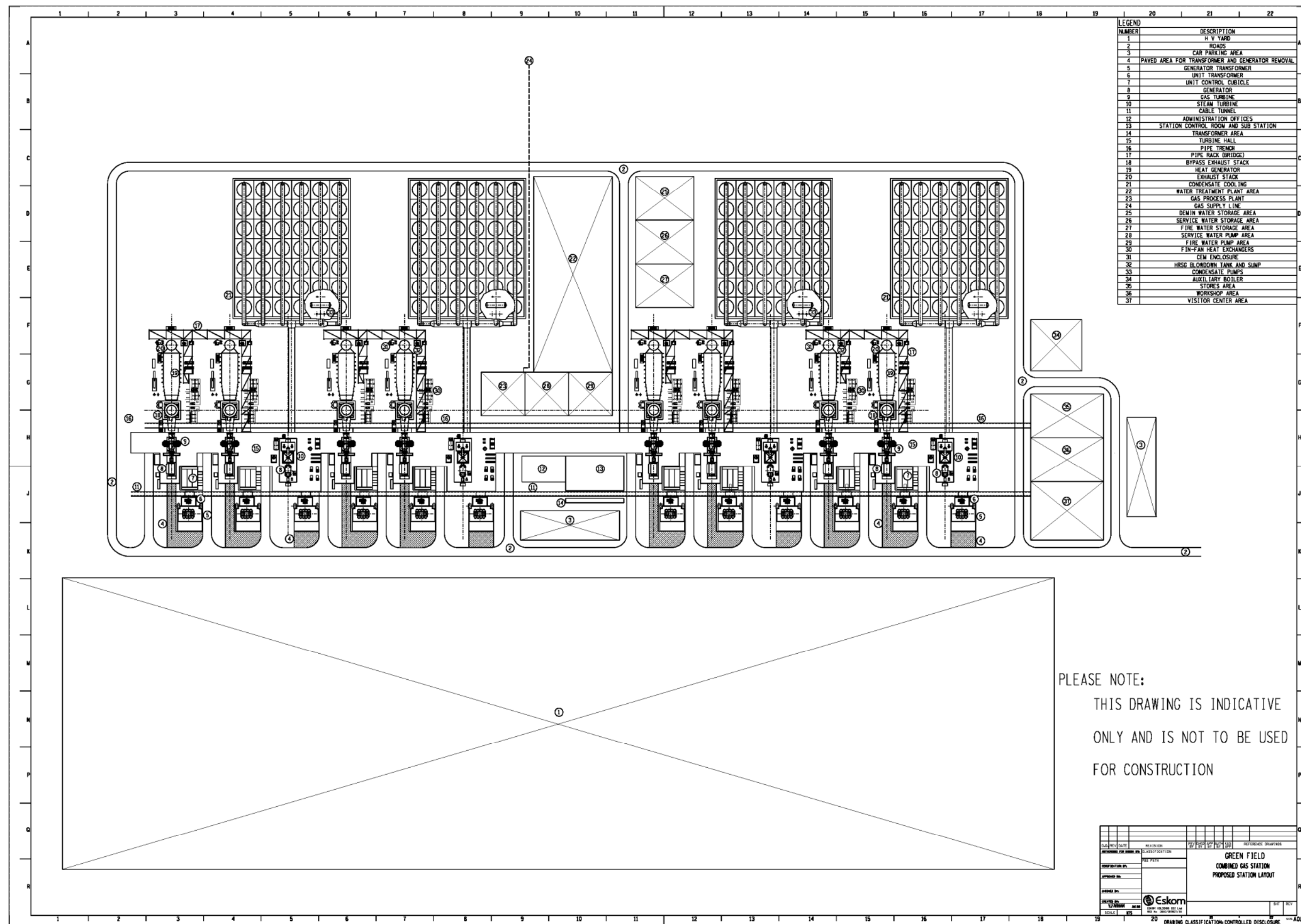




Plate 1: A Power Station (Hendrina) stack from approximately 5km. It should be noted that this stack is considerably taller than those associated with the proposed plant. It does however illustrate the fact that they are likely to be visible even when the lower sections of the plant are hidden and it will be possible, particularly in areas from which only the very tops of the stacks are visible, that they may be missed by the casual observer.



Plate 2: An existing Gas Turbine Power Station (Gourikwa) as seen from within 1km. The image highlights that the main visual mass is provided by the medium high structures that combine to provide the main visual bulk.



Plate 3: An existing 400kV Substation (Hammersdale) viewed from a distance of 1.5 -2.0km. Note the 400kV pylons entering the site are the most obvious elements. The relative slenderness and transparency of lattice structures, particularly when viewed against the power plant as a backdrop, is likely to mean that the electrical infrastructure has an impact over a relatively short distance.

3. DESCRIPTION OF THE RECEIVING ENVIRONMENT AND POSSIBLE RECEPTORS

It is possible that landscape change due to the proposed development could impact the character of an important landscape. Landscape character can be derived from specific features relating to the urban or rural setting and may include key natural, historic or culturally significant elements. Importance might also relate to landscapes that are uncommon or under threat from development.

This section will:

- Describe the types of landscape that may be impacted;
- Indicate likely degree of sensitivity; and
- Describe how the landscape areas are likely to be impacted.

The study area is defined by the limit of visibility of the proposed project. As an initial guide the limit has been set at 27.7km from the proposed stacks being the approximate visual limit of the tallest items associated with the development. Refer to Section 2 for the justification for this distance.

3.1 LANDSCAPE CHARACTER

Landscape character is defined as “a distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another”.

Landscape Character is a composite of a number of influencing factors including:

- Landform and drainage;
- Nature and density of the development; and
- Vegetation patterns.

3.1.1 Landform and Drainage

Refer to Map 2 for analysis of the landform and drainage.

The proposed project will be located on a wide coastal plain close to Richards Bay. Landform close to the coast to the east and south east of the study area is a high dune cordon that largely blocks views of the sea from inland areas. The coastal plain is generally set at a level of between 5 and 30m amsl and at its highest the dune cordon rises to between 50 and 60m amsl.

Due to a generally high water table and highly permeable soils within the coastal plain, there are numerous drainage pans even within higher areas of the coastal plain.

In the vicinity of Richards Bay the coastal plain is approximately 13 to 14 km wide. Inland of this, a small range of hills run approximately parallel to the coast rising to between 80 to 120m amsl effectively blocking views between the coastal plain and areas further inland.

A large proportion of the coastal plain is comprised of flood plain areas for watercourses that flow through the area. Due to the landform many water courses in the area terminate in closed lagoons. The development of the port of Richards Bay has altered this system to allow the main river within the region, the Mhlatuze,

to flow directly into the Indian Ocean. The natural lagoon has been protected however in that the river flows through the lagoon and then through a tidal gate into the port. The Mhlatuze Lagoon forms the basis of the Richards Bay Game Reserve which is an important nature reserve.

The relative flatness of areas around Richards Bay and the visual barriers comprised of the coastal dune cordon and inland hills are significant in assessing visual impacts.

3.1.2 Landcover

Refer to Map 3 for analysis of landcover.

Landcover mapping has been extracted from the South African National Biodiversity Institute 2009 mapping. Major landcover types in the vicinity of the proposed site include;

- a) Urban development;
- b) Plantation;
- c) Cultivation; and
- d) Natural areas.

a) Urban Areas

Major urban centres have developed within the coastal plain including Richards Bay, Empangeni and Esikhwini, all of which are in relative close proximity to the proposed site.

Inland of the coastal plain built development has largely developed as smaller more scattered centres.

There is also little or no urban development within the main coastal dune cordon. The exception to this is Richards Bay where port, residential and recreational areas have developed in close proximity to the coast.

b) Plantation

Forestry plantations extend to the east, the north east and the south west of Richards Bay within the coastal plain. There are also smaller sections of forestry plantation on the coastal dune cordon close to and within areas of natural dune vegetation. Forestry plantation is important from a visual perspective because as the trees develop they provide a significant amount of screening. Once mature however, trees within large areas of plantation are felled immediately opening up views to surrounding areas. Within larger plantation areas felling of mature blocks does not generally tend to expose views of areas outside forestry areas. This is due to the fact that the areas are comprised of a large number of blocks with trees at various stages of development.

c) Cultivation

There are two types of cultivation evident within the areas identified;

- i. A part of this landcover type is comprised of traditional areas. Typically cultivation in these areas is made up of small-scale agricultural units cultivating vegetables and small areas of sugar cane with groups of houses and kraals located relatively evenly throughout the area. In visual terms

this is a small-scale rural landscape with numerous structures and boundary trees and other woody vegetation that provide a degree of screening.

- ii. Large scale intensive sugar cane production generally covers cultivated areas outside traditional areas. Settlement within this area is made up of occasional farmsteads comprised of a main farm house, workers cottages and agricultural buildings. In visual terms, sugar cane does provide a degree of screening particularly as cane matures before harvesting. Screening potential however is relatively limited particularly as the majority of roads and urban development have occurred on slightly higher land resulting in a clear overview of cultivated areas at all times.

d) Natural Areas

Natural areas are generally located inland of the coastal plain as well as within a narrow band adjacent to the coast that is generally comprised of the dune cordon and areas surrounding lagoons.

In addition to the general pattern noted above, there is also a significant area of natural vegetation cover to the east, south and west of Richards Bay.

The nature of natural areas is described in 3.1.3 below.

From a visual perspective, the significance of natural areas is that, subject to their nature, they can provide a high degree of screening for development on a relatively permanent basis.

e) Industrial Development

Richards Bay is known as an industrial centre. The main industrial areas in the vicinity of the site include:

- Extensive industrial development has occurred to the south of Richards Bay and to the north of the Port. This area is home to numerous large-scale, heavy industrial installations that have largely developed in the area due to their location close to a major port. Whilst there is an extensive area of existing heavy industry, this is likely to expand in the future as currently undeveloped areas have been designated as an Industrial Development Zone.
- The north east area of the port which is largely set up for loading and unloading bulk cargo. This has included the establishment of extensive silos and conveyor systems some of which extend through the adjacent landscape to external industrial operations.
- The south eastern section of the port within which a major coal terminal has been established for export. This area includes extensive coal stockpiles in addition to railway and loading infrastructure.
- A major dune mining operation that is being undertaken to the north of Esikhwini. This operation includes the stripping and processing of dune soils. In addition to disturbance of mined areas, it has resulted in the development of a major slimes dam immediately adjacent and to the south of the N2 on the inland edge of the coastal plain.

From a visual perspective these elements all add to the perception that the area around and particularly to the south of Richards Bay is an industrialised landscape.

3.1.3 Vegetation Patterns

Refer to Map 4 for analysis of vegetation patterns.

Vegetation includes areas of natural vegetation indicated on Map 3 as well as crops, alien invasive and ornamental vegetation within the study area.

Map 4 overlays key activities that have modified natural vegetation patterns that occurs in the area as identified by the SA National Biodiversity Institute. Key influencing activities are indicated in the bolder colours on Map 4, they include:

- Cultivation that generally includes sugar cane plantations. This arable monoculture has generally resulted in the removal of the majority of natural vegetation although forest patches tend to remain on uncultivable overstep slopes. In general however, natural vegetation other than the sugar cane crop plays a minimal role in visual considerations within this area.
- Urban development which has largely removed natural vegetation from within its footprint area although patches and corridors do still remain. The predominant vegetation type within this area is either ornamental vegetation in the form of street trees and garden shrubs and trees or alien invasive vegetation that generally colonises undeveloped plots and property boundaries.
- Forestry plantation that has also generally resulted in the removal of the majority of natural vegetation. There are however corridors of natural forest remaining within these plantations that generally occur along water courses and main roads. Whilst these corridors may provide visual interest for viewers within the plantation areas they are likely to have no effect in terms of helping to mitigate impacts of the proposed development.
- Mining areas are also evident within the area. In general these operations involve the stripping of existing vegetation to allow the open cast processing of the sands and soils below. Rehabilitation generally entails the return of the affected area to cultivation or plantation.

Areas of natural vegetation as described by Mucina and Rutherford¹ are indicated in the pastel colours on Map 4. The vegetation types closer to the proposed site that are likely to have an influence on the landscape character of the area in which they are set and possible screening of the site include;

- **Maputaland Coastal Belt** is the dominant natural vegetation type associated with the coastal plain in the Richards Bay area. Muncia and Rutherford report that this vegetation type is a feature of the flat coastal plain. It was originally densely forested in places with a wide range of interspersed non-forest plant communities including dry grasslands (which include palm veld where special conditions prevail), hygrophilous grasslands and thicket groups. This vegetation type therefore generally enables open views across the coastal plain although the occasional thicket groups are

¹ Vegetation types of South Africa (including Prince Edward and Marion Islands), Lesotho and Swaziland, 2006

likely to provide a degree of enclosure and may soften views of visible development.

- **Northern Coastal Forest** generally occurs in small patches within the coastal plain and is the dominant vegetation type close to the coast and on the coastal dune cordon. Muncia and Rutherford report that this vegetation type is comprised of species-rich, tall/medium height subtropical coastal forests with well-developed tree, shrub and herb layers. This vegetation type is therefore likely to contribute to an enclosed landscape from within which views over surrounding areas will be limited.
- **Subtropical Coastal Lagoon** is a large area which is located to the south of Richards Bay. Muncia and Rutherford report that this vegetation type occurs within flat topography supporting low beds dominated by reeds, sedges and rushes and waterlogged meadows dominated by grasses. This vegetation type therefore generally enables open views across the coastal plain.
- **Mangrove Forest**, a portion of which is located within the Richards Bay Game Reserve. Muncia and Rutherford report that this vegetation type is comprised of species-poor and often monospecific, low and dense forests of mangroves (and fringing thickets of *Hibiscus tiliaceus* and *Acrostichum aureum*) in tidal zones of coastal lagoons and estuaries. This vegetation type is likely to influence landscape character within its immediate vicinity only and is unlikely to provide significant screening of development.

3.2 LANDSCAPE CHARACTER AREAS SIGNIFICANCE & VISUAL ABSORPTION CAPACITY

Landscape Character Areas (LCAs) are defined as "single unique areas which are the discrete geographical areas of a particular landscape type".

Visual Absorption Capacity (VAC) is defined as the landscape's ability to absorb physical changes without transformation in its visual character and quality. Where elements that contrast with existing landscape character are proposed, VAC is dependent on elements such as landform, vegetation and other development to provide screening of a new element. The scale and texture of a landscape is also critical in providing VAC, for example; a new large scale industrial development located within a rural small scale field pattern is likely to be all the more obvious due to its scale.

Topography provides the main character division, dividing the affected area up into three separate zones. The coastal dunes effectively cut off visibility between the coastal plain and the coast and views inland of the coastal plain are generally screened by the low hills on its inland edge.

Within these three areas landcover and vegetation provide varying degrees of enclosure:

- Forestry Plantations, particularly the larger blocks where clear felling of the entire area does not occur, provide significant enclosure;
- Arable areas that include sugar cane plantations provide relatively open landscape areas within which visibility is often only limited by landform;

- Natural vegetation which also generally provides enclosure. Even where long range views might be expected from the summit of tall dune slopes the screening effect of natural dune vegetation often blocks views.
- Urban areas are generally hard landscapes where structures, ornamental vegetation and alien vegetation provide enclosure limiting external views and focusing attention on internal areas.
- Open water in the form of the Port and larger lagoons that provide openness and long vistas in addition to a major scenic element.

Once these elements are overlaid onto the landform, the following key Landscape Character Areas are identified;

Coastal Plain and Intensive Agriculture LCA – this area is comprised of cultivated areas indicated as being outside of traditional settlement areas. It is a relatively open landscape however a degree of VAC is provided by small clumps of woody vegetation in the form of occasional natural forest patches and alien species that largely occur along roadsides and property boundaries. The primary importance of this LCA is as a productive landscape. It does have some visual significance however, due to the length of view that is generally possible.

Coastal Plain and Traditional Agriculture LCA - this area is comprised of cultivated areas indicated as being inside of traditional settlement areas. It is a relatively enclosed landscape with a high degree of VAC which is provided by patches of woody vegetation which is mainly made up of alien species that largely occur along roadsides and on the boundaries of small scale cultivated areas. This area is important as both a productive landscape and a settlement area.

Coastal Plain and Forestry LCA – this LCA is largely enclosed with very limited views over surrounding LCAs that are generally limited to its outer edge. VAC is therefore high. This area is also important as a productive landscape.

Coastal Plain and Open Water LCA – this LCA is relatively open with long views possible over large water bodies. VAC is therefore generally low although vegetation that fringes the waterbodies is generally dense and relatively natural and it does provide a degree of screening of larger industrial elements. Landscape importance relates to that of a working landscape in terms of the Port, however, all the areas of open water highlighted are also important for tourism and local recreation.

Coastal Plain and Urban LCA – this is generally an inward looking LCA from which views of surrounding areas are only possible from its outer edges. Its primary importance is as a living and working environment. Outlook is therefore important particularly from residential and commercial use areas. Some urban areas particularly those areas in close proximity to the coast also have tourism importance.

Coastal Strip and Forestry LCA – small patches of forestry occur within the coastal strip. This often occurs within areas that have been mined. The coastal strip is particularly important for recreation and tourism. Areas of forest plantation do detract slightly from the natural character that is reinforced by the majority of vegetation within this landform type. However, the fact that it is green and

generally undeveloped does help to provide visual continuity along the coastline which is important for coastal recreation and tourism.

Coastal Strip and Natural LCA – this LCA is important for its natural resources as well as providing an attraction and backdrop for coastal recreation and tourism. VAC within the area is relatively high.

Upland and Urban LCA – this LCA consists of the urban area of Empangeni and adjacent settlements. It is located within the low hills inland of the coastal plain and it is generally not visible from lower areas to the south and east. As with other urban areas, external views are generally limited. Its prime importance is as a living and working environment and so outlook is generally important. Due to surrounding rolling hills that are likely to screen the LCA from the proposed site and its inward looking nature, this LCA is unlikely to be significant in the assessment.

Upland, Agriculture and Settlement LCA – this LCA is relevant due to the fact that it consists of the area of rolling hills inland of the coastal plain that generally block views of coastal plain areas from further inland. Where views are possible they are generally limited to higher hilltops. VAC is therefore generally high. A number of landcover types exist within the LCA including scattered rural settlement, natural areas and intensive sugar cane production.

3.3 RELEVANT ACTIVITIES

There are a number of activities in the general area surrounding the proposed site that elevate the importance of various areas. These include;

Existing Protected Areas and in particular the Richards Bay Game Reserve that is an important local conservation resource as well as being a local recreation and tourism attraction.

Offshore recreation is important to Richards Bay, particularly deep sea fishing and whale watching. The two local ski boat clubs undertake numerous competitions during the year and they are an important draw card for international and national participants. Whilst the focus of the activity is game fishing, this experience is no doubt enhanced for many by the perception that it is being undertaken off a reasonably natural coastline.

The north eastern edge of the Port is particularly important for local recreation and tourism. In addition to the area being the home of a number of water based sports clubs, the back of the port area has generally been laid out as an informal recreation area that attracts large numbers of people particularly during holidays and weekends. The area is also used for formal sporting events such as the Richards Bay / Esikhawini Marathon.

3.4 VISUAL RECEPTORS

3.4.1 Definition

Visual Receptors are defined as “individuals and / or defined groups of people who have the potential to be affected by the proposal”.

It is also possible that an area might be sensitive due to an existing use. The nature of an outlook is generally more critical to areas that are associated with recreation, tourism and in areas where outlook is critical to land values.

3.4.2 Possible visual receptors

This section is intended to highlight possible Receptors within the landscape which due to use could be sensitive to landscape change. They include;

Area Receptors:

- Urban areas of Esikhawini which is located approximately 6.5km to the south west of the proposed site. Residential areas particularly may be sensitive to change in view;
- The Richards Bay Game Reserve is located approximately 4.5km to the south east of the proposed site; and
- The popular public recreational area on the northern edge of the Port which is located approximately 9km to the east of the proposed site.

- **Linear Receptors** which include the roads that are aligned through the area. The main linear receptors include;

- The N2 Freeway which runs approximately 3.9km inland and to the west of the proposed site. This road is a key regional route and is important for both tourism and business. In the vicinity of Richards Bay, it runs on elevated ground just inland of the coastal plain and therefore an overview of the coastal plain looking towards the proposed development site is possible.
- The R34 is the main route into Richards Bay from the south. It links the N2, Empangeni and inland areas to the urban area and the port. This road is duelled over a proportion of its length. It is the main access route that carries a high proportion of business and tourism related traffic. As it crosses flood plain areas it is slightly elevated which does enable views over lower sections of the coastal plain. As it approaches Richards Bay it is located on slightly elevated land that is surrounded by natural vegetation. This vegetation and the landform results in only partial views over the coastal plain being possible. This road traverses close to the proposed site which is located within an area that is planned for industrial development and close to existing major industrial uses.
- The P106 is the main route between the R34 / Richards Bay and Esikhwini. This road crosses the flood plain of the Mhlatuze River that is largely planted with sugar cane. Whilst it is set at a relatively low level, panoramic views over the flood plain are possible. This road joins the R34 in close proximity to the proposed site. This road is largely a local distributor providing access for local residents and businesses. It is unlikely to carry a large number of tourists although it does provide access to the southern side of the Richards Bay Game Reserve.

- **Point Receptors** which include:

- Isolated homesteads and small rural settlements most of which are likely to be associated with agricultural uses. There are no isolated

homesteads in the vicinity of the proposed site. There are however a number of homesteads located in higher areas inland of the coastal plain.

- A service station on the N2 overlooking the coastal plain. This facility is used by many local and regional travellers as a rest and refuelling stop. A large proportion of these travellers are likely be travelling for tourism related reasons.

Visual receptors will be subject to verification during the EIA phase.

LANDSCAPE CHARACTER AREAS



Plate 4
Coastal Plain &
Agriculture LCA



Plate 5
Coastal Plain &
Urban LCA

LANDSCAPE CHARACTER AREAS



Plate 6
Coastal Plain &
Industry LCA.



Plate 7
Coastal Plain &
Open Water LCA



PLATE 8
Coastal Plain &
Forestry LCA

SENSITIVE RECEPTORS



**Plate 9
Recreational and
tourism activity
areas to the north
of Richard Bay Port**



**Plate 10
The N2 Highway**



**Plate 11
The R34
approaching
Richards Bay**

SENSITIVE RECEPTORS



Plate 12
The Service Station
on the N2

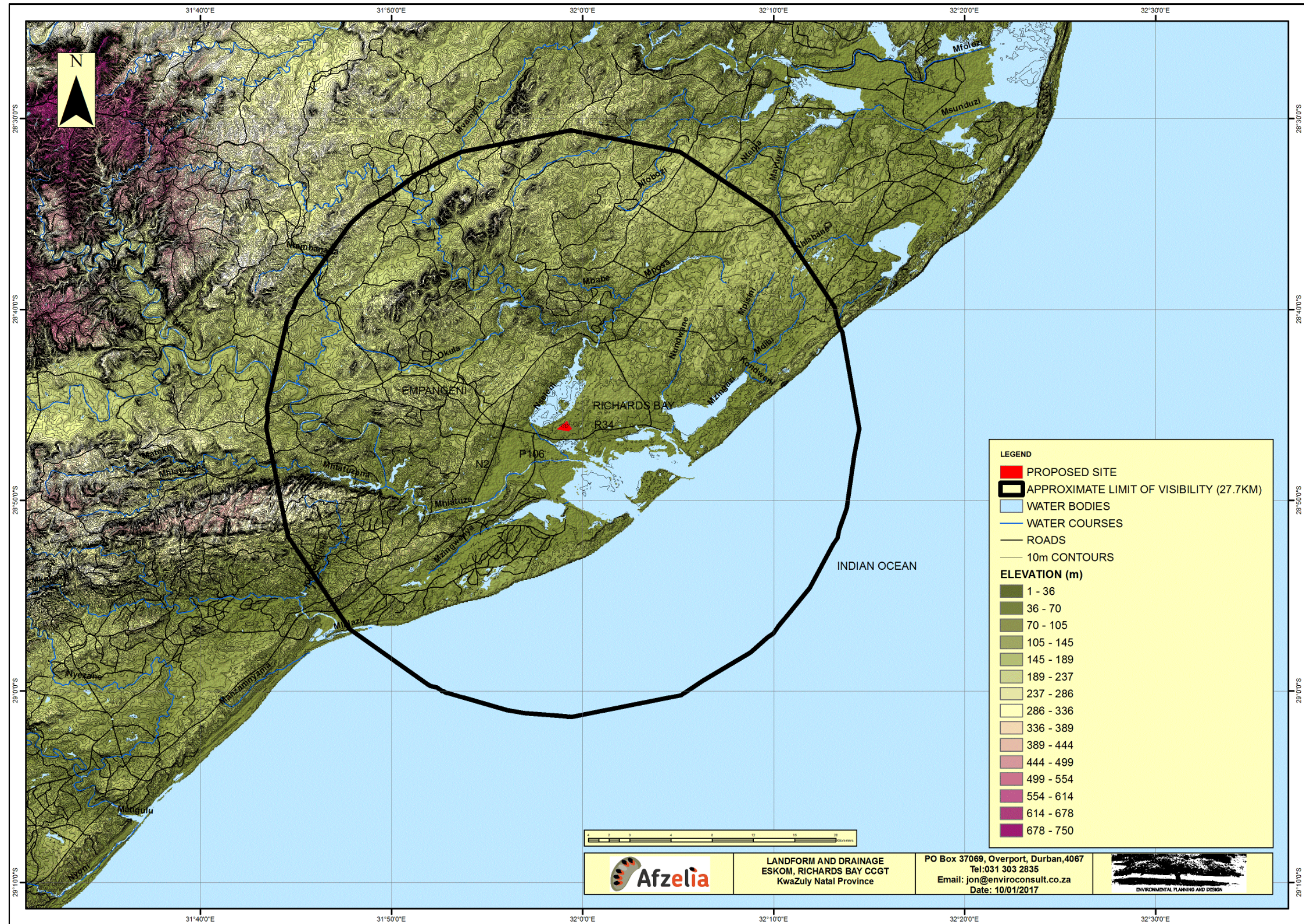


PLATE 13
Residential areas

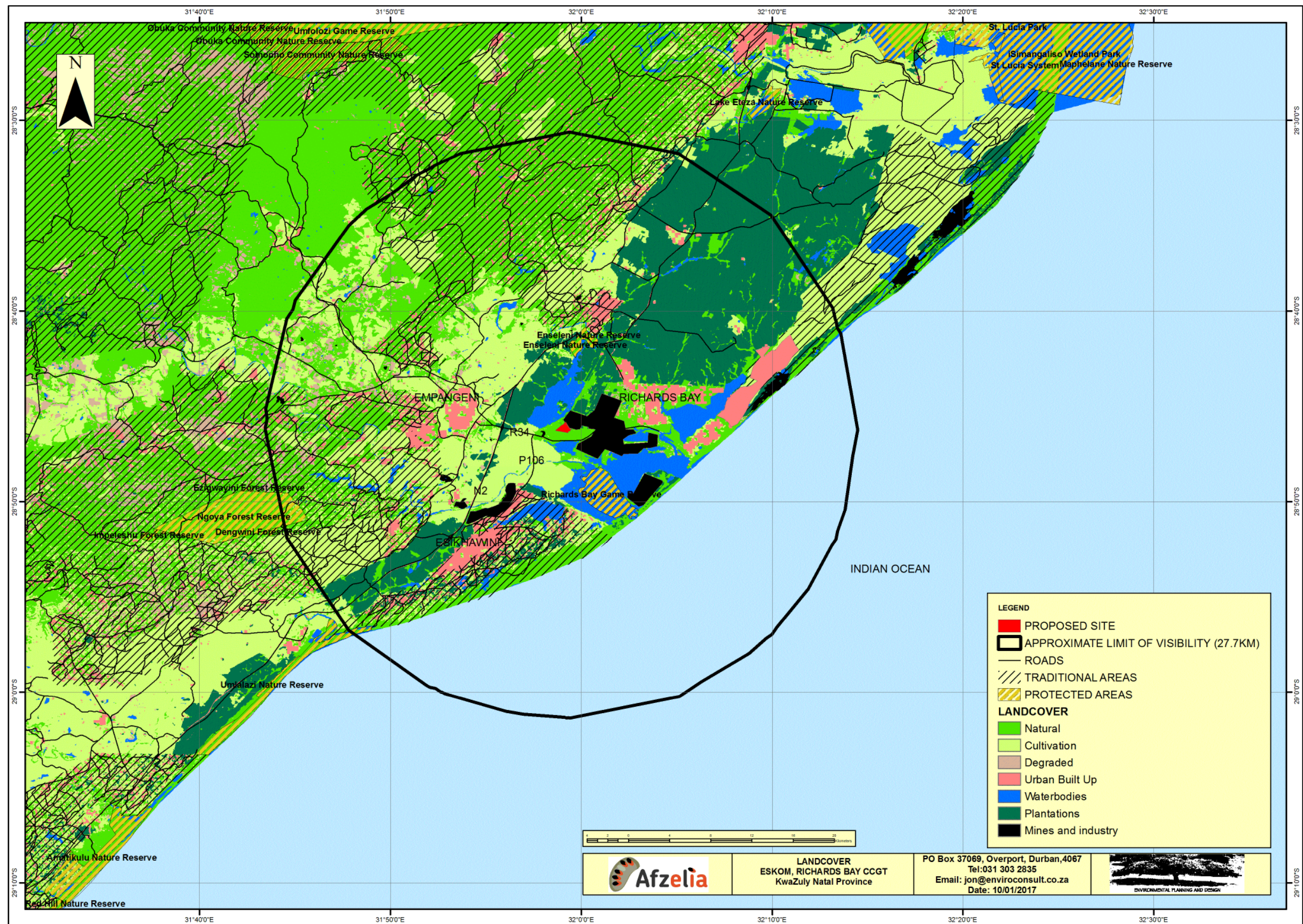


PLATE 14
Protected areas

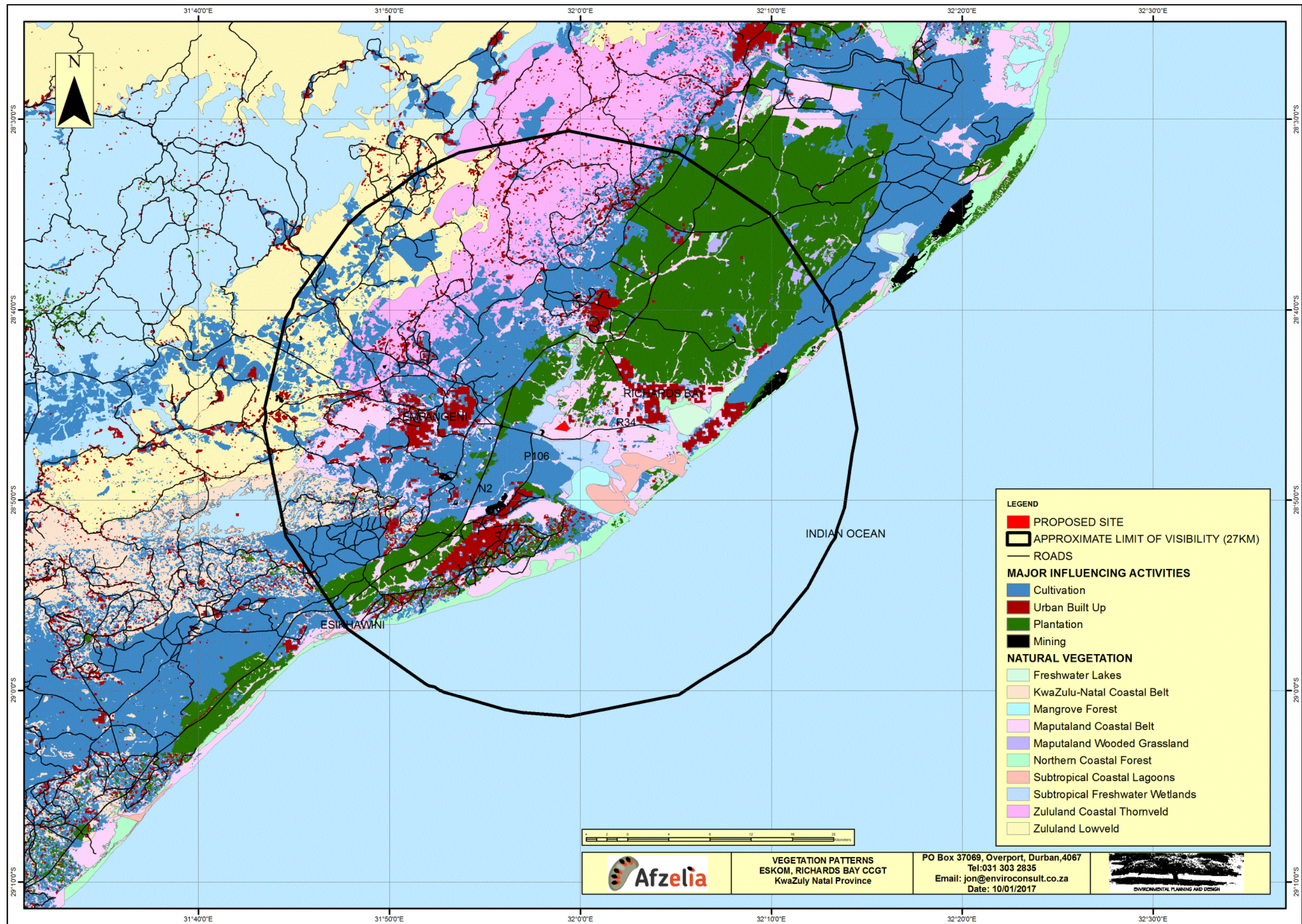
MAP 2 – LANDFORM AND DRAINAGE



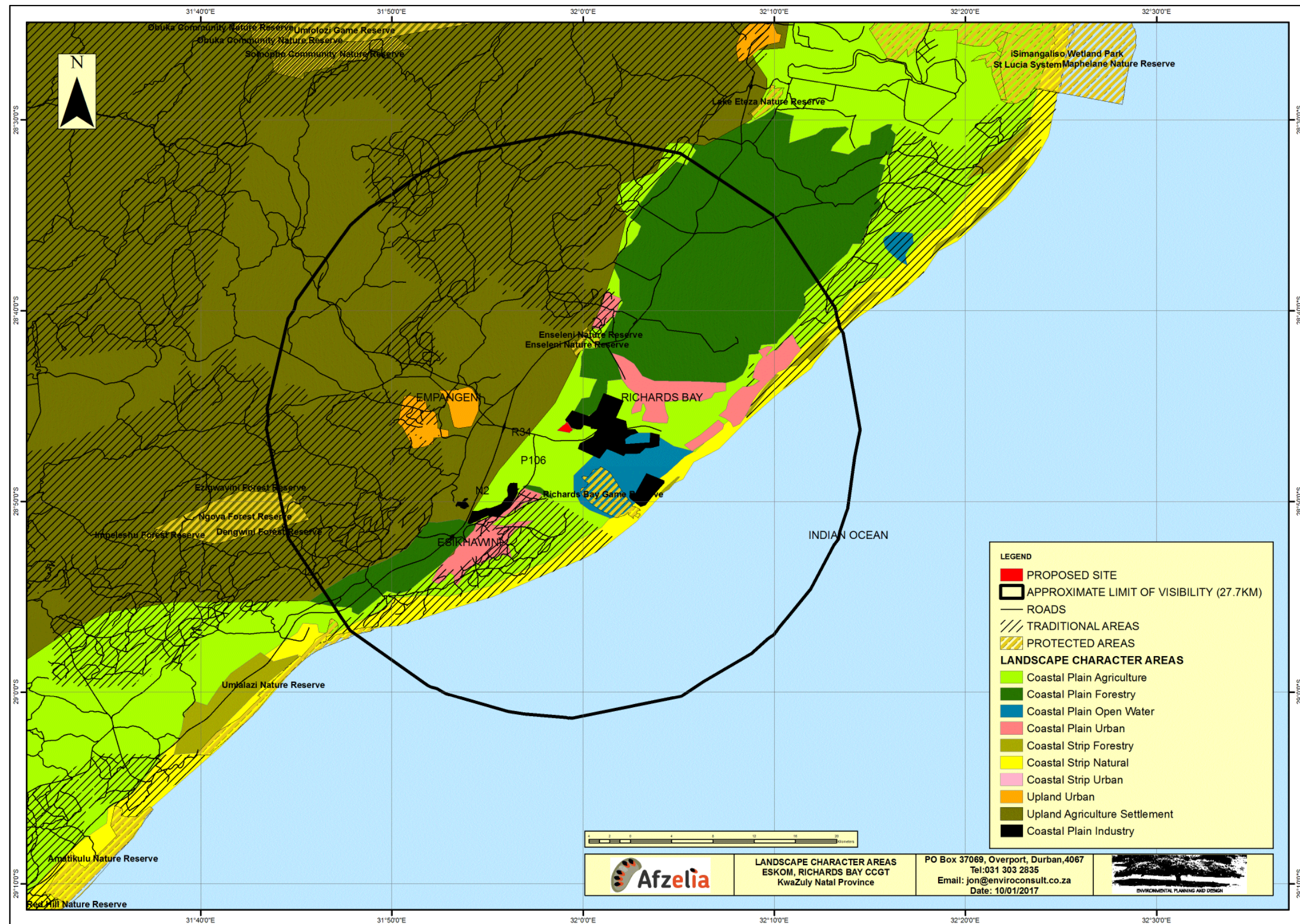
MAP 3 – LANDCOVER



MAP 4 – VEGETATION



MAP 5 – LANDSCAPE CHARACTER AREAS



4 THE NATURE OF POTENTIAL VISUAL IMPACTS

4.1 GENERAL

Impacts could include general landscape change, or due to the development as it could detract from the existing character as well as change of view for affected people and / or activities;

- a. General landscape change or degradation. This is particularly important for protected areas where the landscape character might be deemed to be exceptional or rare. However, it can also be important in non-protected areas particularly where landscape character is critical to a specific broad scale use such as tourism or just for general enjoyment of an area. This is generally assessed by the breaking down of a landscape into components that make up the overall character and understanding of how proposed elements may change the balance of the various elements. The height, mass, form and colour of new elements all help to make new elements more or less obvious as does the structure of an existing landscape which can provide screening ability or texture that helps to assimilate new elements. This effect is known as visual absorption capacity.
- b. Change in specific views within the affected area from which the character of a view may be important for a specific use or enjoyment of the area.
 - Visual intrusion is a change in a view of a landscape that reduces the quality of the view. This can be a highly subjective judgement. Subjectivity has however been removed as far as is possible by classifying the landscape character of each area and providing a description of the change in the landscape that will occur due to the proposed development. The subjective part of the assessment is to define whether the impact is negative or positive. Again to make the assessment as objective as possible, the judgement is based on the level of dependency of the use in question on existing landscape characteristics.
 - Visual obstruction is the blocking of views or foreshortening of views. This can generally be measured in terms of extent.

Due to the nature of the proposed development, visual impacts are expected to relate largely to intrusion.

4.2 ZONES OF THEORETICAL VISIBILITY

Zones of Theoretical Visibility (ZTV) are defined by the UK Guidelines as "a map usually digitally produced showing areas of land within which a development is theoretically visible".

Initial ZTV maps have been prepared for the various elements of the proposed development that are identified in section 2.2 including; extremely tall elements such as stacks that will be up to 60m high, Medium High Elements that include the condenser fans, workshop, HSRG enclosures, diesel tank and Bus Bars all of which will be up to 40m high and Low elements that include the water treatment plant,

ancillary buildings, pipelines (gas and water), security fencing, loading / unloading areas, and external storage areas) up to 20m high.

The ZTV analysis has been undertaken using Arc Spatial Analyst Geographic Information System (GIS). The assessment is based on terrain data that has been derived from satellite imagery. This data was originally prepared by the National Aeronautics and Space Administration (NASA) and is freely available on the International Centre for Tropical Agriculture's - Climate Change, Agriculture and Food Security (CIAT-CCAFS) website (<http://www.cgiar-csi.org>).

The approximate limits of visibility as indicated in 2.4 are indicated on the ZTV Mapping for information.

ZTV mapping has been prepared for all three heights assessed, however because there is only a small difference in the ZTV areas only the 60m ZTV is presented. This development height could be visible over a distance of approximately 27.7km.

In reality this distance could be reduced by;

- Weather conditions that limit visibility. This would include hazy conditions during fine weather as well as mist and rain.
- Scale and colour of individual elements making it difficult to differentiate structures from the background.

As no site layout has been provided, it has been assumed that the development would be located approximately central on the site.

Map 6 indicates the likely ZTV of development on the proposed site.

The following conclusions can be drawn from this map:

4.2.1 Visibility to Coastal Recreation Areas

Development of the proposed site is likely to be visible to limited areas of the coastal strip. It will be seen in the context and is not likely to be distinguishable from existing adjacent industrial development.

4.2.2 Visibility to Urban Areas

Development is indicated as being visible to all indicated urban areas. It is however located immediately adjacent to existing heavy industrial areas and will be viewed against an industrial backdrop.

In reality, the high VAC associated with urban areas is likely to limit visibility of proposed developments to negligible levels.

4.2.3 Visibility to Protected Areas

The Richards Bay Game Reserve is the only formal protected area that is likely to be affected. This area is comprised of a large open lagoon fringed by mangroves and coastal vegetation.

Development of the proposed site may be visible from the reserve, however this will be seen in the context of other major industrial development in the area.

4.2.4 Visibility to Roads

Development of the proposed site will be visible to approximately 11km of the N2, 13km of the R34 and 8km of the P106. However, the development will be seen against a backdrop of other heavy industrial developments that are located immediately to the north and east. It is therefore unlikely to create a new area of impact but may intensify the existing industrial character of the area.

4.2.5 Visibility to Rural Homesteads

The development is likely to be visible to a small number of rural homesteads within the Upland Agriculture LCA inland of the coastal plain. However, only views in excess of 5.5km will be possible. Developments will also be seen in the context of other industrial development. Whilst it is possible that the development could increase the degree of industry visible it is unlikely to be a significant impact.

4.2.6 Visibility to the N2 Service Station

The change in view experienced from the N2 Service Station is likely to be similar in nature as that described for the N2 Road.

4.3 POSSIBLE IMPLICATIONS FOR LANDSCAPE CHARACTER

In general terms, the development of the proposed project is in keeping with the heavy industrial base in the Richards Bay area.

The proposed site is located immediately adjacent to large scale industrial development and within an area in which industrial expansion is planned and is therefore likely to have minimal impact on the character of surrounding areas.

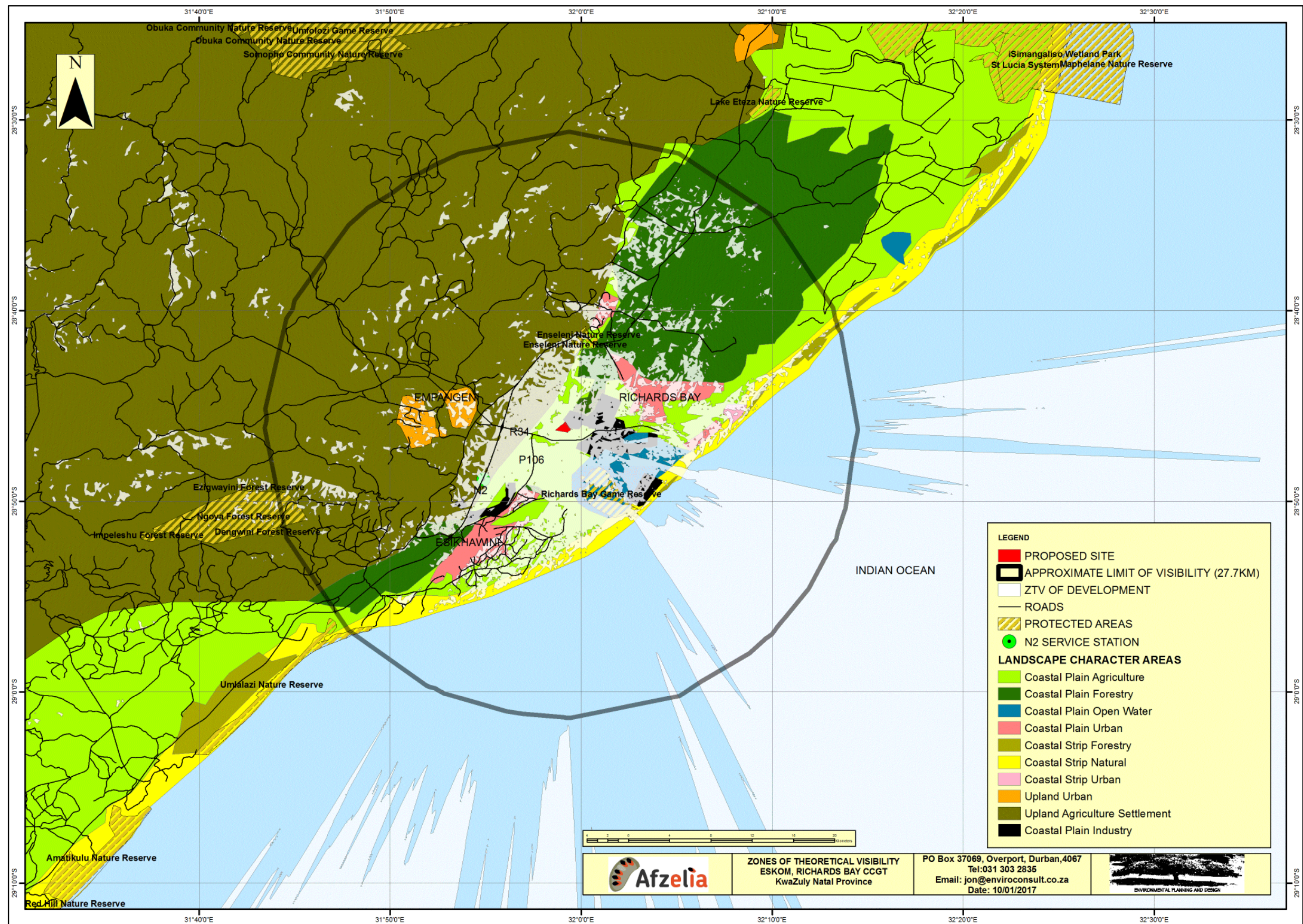
4.4 POSSIBLE IMPLICATIONS FOR VISUAL RECEPTORS

The proposed site is located immediately adjacent to existing heavy industry and within an area in which additional heavy industrial development is planned (Richards Bay IDZ Phase 1D).

Whilst development on the site will be visible over a relatively wide area it is unlikely to be discernible over much of the ZTV from other existing heavy industry.

It will be most obvious from the R34 which runs approximately 800m to the south of the site. Travellers on this road will experience closer views than any other sensitive receptor. Even here however, the development will be viewed in the context and largely with a backdrop of other heavy industrial installations. Impacts in terms of further industrialisation of surrounding landscapes as experienced by possible sensitive receptors are therefore likely to be negligible.

MAP 6 – ZONES OF THEORETICAL VISIBILITY (ZTV)



5 IDENTIFIED AREAS OF IMPACT

5.1 IMPACTS TO BE CONSIDERED

From the review of the proposed project, the following issues should be considered and if relevant addressed during the EIA process;

- a) The proposed development could negatively impact on the landscape character of the area. From the desktop analysis, the landscape character is likely to vary including developed and industrialised landscapes as well as rural and natural landscapes. However, the proposed site is located within an existing heavy industrial area. The EIA phase will focus on the extent to which this development will further industrialise rural and natural landscapes.
- b) The proposed development could have a negative impact on urban areas. The desktop analysis indicates that distance and the VAC of the landscape is likely to help mitigate this possible impact.
- c) Whilst the area around Richards Bay is developed, this is not highly obvious from the coast or out to sea as a result of an extensive coastal dune system that appears relatively natural despite including areas of forestry plantation is present. Development of the proposed site is unlikely to alter this situation.
- d) As indicated on Map 5, Landscape Character Areas, there are eight protected areas within the approximate limit of visibility of the development. The desktop analysis indicates that the majority of these areas are likely to be unaffected although, the development may be visible from within the Richards Bay Game Reserve.
- e) The proposed development could be visible from routes throughout the area. From the desktop analysis it is anticipated that some of these routes will have tourism significance although they are all currently impacted by industrial development to a degree.
- f) The proposed development could impact negatively on local homesteads. There are a small number of homesteads from which the development could be visible.
- g) The recreational uses on the northern side of the port could be negatively impacted by further industrialisation of the landscape.
- h) A service station on the N2 that overlooks the coastal plain to the south of Richards Bay. This facility is used by many tourists as a rest and refuelling stop. Heavy industry is currently visible from this location but the project has the potential to extend the industrial character over larger sections of the landscape as seen from this location.
- i) Lighting associated with the development could extend existing light pollution. There is already significant lighting associated with industry and urban development. The introduction of a new light source is not anticipated to be a significant issue particularly as it will be seen in the context of lighting associated with other industrial uses. However, good practice in ensuring that it causes minimum impact and nuisance for receptors should be ensured.

These issues will be considered in the context of the Landscape Character Areas, visual effects identified and possible cumulative influence of other possible infrastructure projects that are planned in the vicinity.

Possible mitigation measures will also be identified.

5.2 INITIAL REVIEW OF LIKELY IMPACTS

All identified impacts are likely to be experienced during the construction phase, the operation phase and the decommissioning phase. Impact levels are likely to gradually increase during construction, be at their highest level towards the end of construction, through the operation phase to the beginning of decommissioning when they will start to decrease.

The initial assessment is intended to provide an indication of the likely areas and severity of impacts as well as possible strategic mitigation measures that may be employed.

Terminology used in the initial assessment includes;

- Negligible impact - small but no obvious change in landscape character;
- Low impact – small and noticeable impact that will change views but will not modify the predominant landscape character;
- High impact – significant impact that will change the predominant landscape character;
- Negative Impact – a change in landscape character that is likely to negatively affect receptors;
- Positive Impact – a change in landscape character that is likely to positively affect receptors; and
- Neutral Impact – a change in landscape character that is likely to have negligible effect on receptors.

Impact a) The proposed development could negatively impact on the landscape character of the affected area. The issue relates to the degradation of a sensitive landscape. Desktop Sensitivity Analysis: The development area is located adjacent to existing heavy industrial development and within an area where further heavy industry is planned (IDZ Phase 1D). It is therefore possible that the development could intensify existing industrial impacts. It is however highly unlikely to significantly add to the current area of industrial influence within the surrounding landscape. It is also likely to be possible to partly mitigate any additional influence by ensuring that the development occurs in as close a proximity to existing heavy industry as possible. Analysis has also indicated that affected surrounding landscapes are not likely to be highly sensitive to possible change associated with the proposed development. Desktop Sensitivity Analysis:			
Issue	Nature of Impact	Extent of Impact	No-Go Areas
Industrialisation of the landscape	The proposed development is likely to have limited impact due to the fact that the development will be set against and within an industrial area.	This is likely to affect the Immediately surrounding area	No no-go areas have been identified from a visual perspective.

Discussion of expected significance:

There is likely to be minimal additional industrial influence on surrounding LCAs due to this development.

Possible mitigation:

Plan the development to ensure that it is on the northern section of the site as far as possible in order that it is seen in the closest proximity to existing industry as possible and a buffer area is maintained between the development and the R34.

Cumulative Impacts:

Development of this site is likely to result in minimal cumulative impact. Development as close to other heavy industry as possible and as far from the R34 as possible will help to minimise the intensification of industrialisation of the landscape as experienced from surrounding areas.

Gaps in knowledge & recommendations for further study

- Confirmation of sensitivity of the LCAs from a site visit and consultation during the EIA process.
- A development layout and details of structure height is needed to assess the impacts as well as the identification of possible mitigation measures in any detail.

Impact**b) Visual impact on Urban Areas**

The issue relates to a possible increase in visibility of industry from urban areas.

Desktop Sensitivity Analysis of the Site:

The main urban area of Richards Bay is located on the opposite side of an existing heavy industrial area to the proposed development. It is therefore highly unlikely to be visible from this area.

Views of the development will be possible from Esikhawini which is a residential settlement approximately 6.7km to the south of the proposed development site. This is a relatively dense settlement and views are only likely to be possible from the northern edge. It is also highly likely that vegetation located on the fringe of the settlement will largely screen views of the development.

Empangeni is located approximately 6.2km to the west of the proposed development site. While the ZTV mapping indicates that views may be possible from parts of the urban area, views of the development are likely to be broken by landform and additional screening is likely to be provided by vegetation. The development will also be seen at a distance and with heavy industry as a backdrop. It is therefore highly unlikely that the development will impact on Empangeni.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Industrialisation of views from urban areas	The development is likely to have limited impact on urban areas due to the fact that the development will be set against and within an existing industrial area.	This is likely to affect the Immediately surrounding area	No no-go areas have been identified from a visual perspective.

Discussion of expected significance:

There is likely to be minimal additional industrial influence on urban areas due to this development.

Possible mitigation:

Plan the development to ensure that it is on the northern section of the site in order that it is seen in the closest proximity to existing industry as possible.

Cumulative Impacts:

There is likely to be very limited cumulative impact due to development of this site.

Gaps in knowledge & recommendations for further study

- Confirmation of sensitivity of the LCAs from a site visit and consultation during the EIA process.
- A development layout and details of structure height is needed to assess the impacts as well as the identification of possible mitigation measures in any detail.
- Confirmation of sensitivity and location of the receptors from a site visit.

Impact**c) The proposed development could negatively impact on coastal recreation areas.**

The issue relates to an increase in visibility of industry from coastal recreation areas.

Desktop Sensitivity Analysis:

These areas are generally located in the order of 10km to the east of the proposed site.

Existing industry, numerous areas of vegetation and the coastal dune system are all likely to screen views of the development from these areas.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Industrialisation of the landscape	There is likely to be no impact on coastal recreation areas associated with development of this site due to both distance and landform.	No Impact	No no-go areas have been identified from a visual perspective.

Discussion of expected significance:

Negligible significance, even if glimpses of the development are possible it is unlikely to be obvious or discernible from other heavy industry from coastal areas.

Possible mitigation:

No mitigation is likely to be necessary.

Cumulative Impacts:

Development is unlikely to have a cumulative effect.

Gaps in knowledge & recommendations for further study

- Confirmation of sensitivity of the LCAs from a site visit and consultation during the EIA process.
- A development layout and details of structure height is needed to assess the impacts as well as the identification of possible mitigation measures in any detail.
- Confirmation of sensitivity of the receptors from a site visit.

Impact**d) The proposed development could negatively impact on protected areas and in particular the Richards Bay Game Reserve.**

The impact relates to a possible increase in industrial development being visible to protected areas. It is possible that this could reduce enjoyment of these areas by visitors.

Desktop Sensitivity Analysis:

The Richards Bay Game Reserve is the only protected area that is likely to be

affected.

The proposed site is approximately 4.5km from the Richards Bay Game Reserve. The land between the reserve and the site is generally low lying although it rises close to the proposed site.

The proposed development could slightly extend the amount of industrial development that may be visible from within the Reserve.

Areas of vegetation on higher land close to the proposed site are likely to soften / screen the lower sections of the proposed development.

Vegetation within the Reserve is also likely to screen / soften views of the development.

If the development is visible it is likely that only the higher elements will be obvious.

It is likely to be possible to partly mitigate any additional influence by ensuring that the development occurs in as close a proximity to existing heavy industry as possible and towards the east of the site.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Industrialisation of the landscape	The development could result in a small impact on the reserve. If visible, only the upper elements are likely to be visible (stacks) and it will be seen in the context of existing industry.	This is likely to affect the Immediately surrounding area	No no-go areas have been identified from a visual perspective.

Discussion of expected significance:

The development of this site is unlikely to be highly obvious from the reserve.

Possible mitigation:

- Locate the development to the east of the proposed site to ensure that as much of the development as possible is seen against the backdrop of existing heavy industry.
- Ensure that colours selected for stacks and other structures help the taller elements blend into the background.

Cumulative Impacts:

Development of this site could result in a small cumulative impact as it could marginally increase the extent of industry that is visible from within the reserve.

Gaps in knowledge & recommendations for further study

- Confirmation of sensitivity of the LCAs from a site visit and consultation during the EIA process.
- A development layout and details of structure height is needed to assess the impacts as well as the identification of possible mitigation measures in any detail.
- Confirmation of sensitivity of the receptors from a site visit.

Impact

e) The proposed development could negatively impact on views from local roads. Those likely to be affected include the N2, the R34 and the P106

The development could result in an increase in the extent of industry that is visible from local roads.

Desktop Sensitivity Analysis:

The R34 is the closest road to the site running approximately 1km to the south of the southern site boundary. From sections of this road panoramic views across the site

will be possible. For the most part however, the site will be seen against the backdrop of other heavy industry. The site does however extend further west than existing industrial development meaning that development of western portions will extend the visual influence of industry further to the west along the road.

From the N2, which at its closest is approximately 4km from the proposed site, where ever the development is positioned within the site it will be seen against the backdrop of existing heavy industry. Development is therefore unlikely to extend the visual influence of industrial development along the road.

The P106 runs in approximately a north / south alignment joining the R34 approximately 1.3km to the south west of the proposed site. People travelling from Esikhawini along the road towards the R34 are likely to have a clear view of development within the site. If development should occur on the eastern portion of the site it is likely to be seen against the backdrop of other heavy industry. If it should occur on the western portion of the site however, it is likely to slightly extend the influence of industry within the view.

Whilst the R34 and the N2 are likely to carry a proportion of recreational and tourism related traffic, the sections of road that are likely to be affected are not likely to be sensitive to the change in view although from a municipal perspective it is possibly beneficial to minimise the visual impact of industry on residents and visitors.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Industrialisation of the landscape	The development of this site is likely to have limited impact due to the fact that the development will be set within an industrial area.	This is likely to affect the Immediately surrounding area	No no-go areas have been identified from a visual perspective.

Discussion of expected significance:

The significance of impacts on roads due to development of this site is likely to be low due to the fact that it is located within an industrial area and will be seen in the context of other heavy industries.

Possible mitigation:

- Plan the development to ensure that it is on the north eastern section of the site as far as possible in order that it is seen in the closest proximity to existing industry as possible and a buffer area is maintained between the development and the R34.
- Ensure colours of stacks help the development blend into the background.
- Avoid the use of reflective surfaces.

Cumulative Impacts:

Development of this site is likely to result in minimal cumulative impact.

Gaps in knowledge & recommendations for further study

- Confirmation of sensitivity of the LCAs from a site visit and consultation during the EIA process.
- A development layout and details of structure height is needed to assess the impacts as well as the identification of possible mitigation measures in any detail.
- Confirmation of sensitivity of the receptors from a site visit.

Impact

f) Visual impact on Homesteads.

- There are two types of homestead that are potentially affected including;
- Rural homesteads that are associated with agricultural activities that are largely

- located inland of the coastal plain, these homesteads are generally isolated; and
- Traditional homesteads within rural settlement areas that are located immediately inland of the coastal belt to the north and south of Richards Bay, these homesteads are generally distributed relatively evenly throughout traditional areas.

Desktop Sensitivity Analysis of the Site:

Due to distance, it is highly unlikely that traditional homesteads will be affected.

It is possible that a small number of rural homesteads (4 – 5) that are located to the west of the N2, and at closest 3.5km from the proposed site, may be affected. However the proposed development will be seen at a distance and is likely to be viewed against the backdrop of existing industry.

The affected homesteads also appear to be generally surrounded by mature vegetation which is likely to soften or screen external views.

The affected homesteads are therefore not expected to be sensitive to the possible change in view.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Industrialisation of the views	The development of this site is likely to have limited impact on homesteads due to the fact that the development will be seen largely against existing industry.	This is likely to be a regional impact due to the distance from which the development is likely to be visible.	No no-go areas have been identified from a visual perspective.

Discussion of expected significance:

There will be limited additional industrial influence on views from homesteads due to this development and the current industrial characteristics of the area in which it is set.

Possible mitigation:

- Plan the development to ensure that it is on the northern section of the site in order that it is seen in the closest proximity to existing industry as possible.
- Ensure that colours selected for stacks and other structures help the taller elements blend into the background.

Cumulative Impacts:

There will be very limited cumulative impact due to development of this site.

Gaps in knowledge & recommendations for further study

- Confirmation of sensitivity of the LCAs from a site visit and consultation during the EIA process.
- A development layout and details of structure height is needed to assess the impacts as well as the identification of possible mitigation measures in any detail.
- Confirmation of sensitivity of the receptors from a site visit.

Impact

g) Visual impact on recreational uses on the northern side of the port of Richards Bay.

Currently when in this area, views of heavy industry are not obvious as they are largely mitigated by existing vegetation and distance. The issue relates to an increase in industry within the view from this area.

Desktop Sensitivity Analysis of the Site:

The proposed site is approximately 4.9km from recreational areas.

It is possible that the proposed development could increase the visual influence of industry from within the recreational area. However, there is a substantial amount of natural vegetation both around the recreational area and between the site and the recreational area that is likely to provide substantial screening. This will mean that only higher sections of the development may be visible

If it is visible, the development is likely to be seen through existing major industrial operations that are located to the north west of the port.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Industrialisation of the views	The development is unlikely to be obvious. If it is visible, it will be seen in the context of other heavy industry	This could have regional significance due to the distance from which the development could be visible as well as the regional importance of the recreational area	No no-go areas have been identified from a visual perspective.

Discussion of expected significance:

Due to the fact that the development is unlikely to be obvious from this area, the significance of the impact is likely to be low.

Possible mitigation:

- Ensure colours of stacks help the development blend into the background.
- Avoid the use of reflective surfaces.

Cumulative Impacts:

Cumulative impacts are unlikely.

Gaps in knowledge & recommendations for further study

- Confirmation of sensitivity of the LCAs from a site visit and consultation during the EIA process.
- A development layout and details of structure height is needed to assess the impacts as well as the identification of possible mitigation measures in any detail.
- Confirmation of sensitivity of the receptors from a site visit.

Impact

h) Visual impact on the N2 Service Station

This issue relates to an increase in industrialisation of the view from the service station which is currently predominantly rural.

Desktop Sensitivity Analysis of the Site:

Currently when at this facility, views of heavy industry to the south of Richards Bay are obvious. Due to distance only the larger / higher industrial structures are obvious. It is likely that the development could add industrial element to other sectors of the view.

The proposed site is located approximately 4km from the service station. Where ever the development is positioned within the site it will be seen against the backdrop of existing heavy industry. The development is therefore unlikely to extend the visual influence of industrial development from this view point.

Desktop Sensitivity Analysis of the Site:			
Issue	Nature of Impact	Extent of Impact	No-Go Areas
Industrialisation of the views	The development of this site is likely to have limited impact due to the fact that the development will be set against and within an industrial area.	This is likely to affect the Immediately surrounding area	No no-go areas have been identified from a visual perspective.
Discussion of expected significance: Negligible significance due to distance and the fact that the development will be viewed in the context of other major industry.			
Possible mitigation: <ul style="list-style-type: none"> • Ensure colours of stacks and higher structures help the development blend into the background. • Avoid the use of reflective surfaces. 			
Cumulative Impacts: Negligible cumulative impact.			
Gaps in knowledge & recommendations for further study <ul style="list-style-type: none"> • Confirmation of sensitivity of the LCAs from a site visit and consultation during the EIA process. • A development layout and details of structure height is needed to assess the impacts as well as the identification of possible mitigation measures in any detail. • Confirmation of sensitivity of the receptors from a site visit. 			

Impact i) Light pollution changing the nature of the night time possibly causing nuisance for neighbouring uses and further industrialising the night time landscape. This issue relates to the lighting of a sensitive area. It could include the general lighting of a natural landscape that would otherwise be dark or light spill and glare that could affect adjacent properties and road users. Desktop Sensitivity Analysis of the Site: The only receptor that could potentially be sensitive is the R34. This road is approximately 1km from the site. Because of this distance, it is unlikely that lighting will be problematic for road users.			
Issue	Nature of Impact	Extent of Impact	No-Go Areas
Further industrialisation of the landscape.	The development will be seen against the backdrop of other heavy industrial sites that are lit at night.	This is likely to affect the Immediately surrounding area	No no-go areas have been identified from a visual perspective.
Discussion of expected significance: Impacts associated with the development of this site are likely to have a negligible to low significance.			
Possible mitigation: <ul style="list-style-type: none"> • Plan lighting to minimise light spill onto neighbouring properties and roads. • Plan to use infra-red and motion triggers for security systems. • Split operational lighting into sectors so that only the sector that is being worked on is lit at any one time. 			
Cumulative Impacts. It is likely that the proposed project will add to lighting associated with industry in the			

area. The cumulative effect will be subject to the extent of current impacts, the location of the development within the site and the lighting strategy adopted by the developer.

Gaps in knowledge & recommendations for further study

- The extent of current lighting associated with industry needs to be confirmed from a site visit.
- The developer needs to confirm the lighting strategy for the proposed development.

6 CONCLUSIONS

The proposed site is located to the west of Richards Bay within an area that is planned for heavy industry (Richards Bay IDZ Phase 1D) and immediately adjacent to existing heavy industrial installations like the Mondi Paper Mill.

Due to the nature of the landscape in the vicinity of the proposed project which includes an area of wide coastal plain, the development could be visible from an extensive area.

It should be noted however, that due largely to local topography including an extensive coastal dune system and elevated rolling hills directly inland of the coastal plain and the location of the site within an existing heavy industrial area, it is likely that visibility of the project will largely be limited to areas that are already impacted visually by heavy industry.

The closest sensitive receptors to the development are likely to be travellers on the R34 that runs within approximately 1km of the southern end of the site. This road is the main access route into Richards Bay. From the affected section of the road, views over other heavy industrial installations are obvious.

Whilst this site is highly visible, the proposed development is likely to be seen in the context of other heavy industrial structures from all but the closest viewpoints.

The analysis also indicates that the affected landscape is not likely to be sensitive to possible changes in view due to the proposed development.

Because development of this site is unlikely to significantly extend the influence of industry over the landscape surrounding Richards Bay and because the proposed development seems unlikely to have a major influence in terms of changing the nature of views, it seems unlikely that there will be any visual impacts that cannot be readily mitigated.

While there may not appear to be major visual concerns, in the interest of ensuring that impacts on local roads, including the R34, which is the main access route into Richards Bay and local recreation areas are minimised, a number of mitigation measures have been identified, including:

- Ensuring that colours of stacks and higher structures help the development blend into the background;
- Avoiding the use of reflective surfaces;
- Planning the development to ensure that the higher elements particularly are seen in the closest proximity to existing industry as possible. It is noted that subject to the viewpoint / receptor in question the best location is

assessed as either the eastern or northern sector of the proposed site. Locating the higher impact elements to the north east of the site is therefore likely to have the best all round effect; and

- Ensuring that as large a buffer area as possible is maintained between the development and the R34 in order to minimise the visual impact of industry on this important entrance to Richards Bay. It is noted that there is approximately 1km between the R34 and the southern boundary of the site and given the nature of views from the road, the landscape is not highly sensitive, however in the interest of minimising further impacts, and if other environmental constraints allow it, site planning should take into account locating the development and particularly the larger elements as far from the road as is practical.

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APPENDIX I
ASSESSOR'S BRIEF CURRICULUM VITAE



Name JONATHAN MARSHALL
Nationality British
Year of Birth 1956
Specialisation Landscape Architecture / Landscape & Visual Impact Assessment / Environmental Planning / Environmental Impact Assessment.

Qualifications

Education Diploma in Landscape Architecture, Gloucestershire College of Art and Design, UK (1979)

Professional Environmental Law, University of KZN (1997)
Registered Professional Landscape Architect (South Africa)
Chartered Member of the Landscape Institute (UK)
Certified Environmental Assessment Practitioner of South Africa.
Member of the International Association of Impact Assessment, South Africa

Languages

<u>English</u>	-	Speaking	-	Excellent
	-	Reading	-	Excellent
	-	Writing	-	Excellent

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Key Experience

Jon qualified as a Landscape Architect (Dip LA) at Cheltenham (UK) in 1979. He has also been a Certified Environmental Assessment Practitioner of South Africa since 2009.

During the early part of his career (1981 - 1990) He worked with Clouston (now RPS) in Hong Kong and Australia. During this period he was called on to undertake visual impact assessment (VIA) input to numerous environmental assessment processes for major infrastructure projects. This work was generally based on photography with line drawing superimposed to illustrate the extent of development visible.

He has worked in the United Kingdom (1990 - 1995) for a major supermarket chain and prepared CAD based visual impact assessments for public enquiries for new green field store development. He also prepared the VIA input to the environmental statement for the Cardiff Bay Barrage for consideration by the UK Parliament in the passing of the Barrage Act (1993).

His more recent VIA work (1995 to present) includes a combination of CAD and GIS based work for a new international airport to the north of Durban, new heavy industrial operations, overhead electrical transmission lines, mining operations in West Africa and numerous commercial and residential developments.

VIA work undertaken during the last eighteen months includes assessments for proposed new mine developments in Ghana and Guinea, numerous solar plant projects for Eskom and private clients, proposed wind farm development and a proposed tourism development within the Isimangaliso Wetland Park World Heritage Site .

Jon has also had direct experience of working with UNESCO representatives on a candidate World Heritage Site and has undertaken VIAs within and adjacent to other World Heritage Sites.

Relevant Visual Impact Assessment Projects

1. **Isundu Sub- Station Development** - Visual impact assessment for a new major sub – station in KwaZulu Natal for Eskom.
2. **Bhangazi Lake Tourism Development** – Visual impact assessment for a proposed lodge development within the Isimangaliso Wetland Park World Heritage Site. This work is ongoing.
3. **Quarry Development for the Upgrade of Sani Pass** – Visual Impact Assessments for two proposed quarry developments on the edge of the uKhahlamba-Drakensburg World Heritage Site.
4. **Mtubatuba to St Lucia Overhead Power Line** – Visual Impact Assessment for a proposed power line bordering on the Isimangaliso Wetland Park World Heritage Site for Eskom.
5. **St Faiths 400/132 kV Sub-Station and Associated Power Lines** - Visual Impact Assessment for a proposed new major sub-station and approximately 15km of overhead power line for Eskom.
6. **Clocolan to Ficksburg Overhead Power Line** – Visual Impact Assessment for a proposed power line for Eskom.
7. **Solar Plant Projects including Photovoltaic and Concentrating Solar Power Plants** – Numerous projects for Eskom and private clients in the Northern Cape, Limpopo, Mpumalanga and the Free State.
8. **Moorreesburg Wind Farm**. Visual impact assessment for a proposed new wind farm in the Western Cape.
9. **AngloGold Ashanti, Dokyiwa (Ghana)** – Visual Impact Assessment for proposed new Tailings Storage Facility at a mine site working with SGS as part of their EIA team.
10. **Camperdown Industrial Development** - Visual Impact Assessment for proposed new light industrial area to the north of Camperdown for a private client.
11. **Wild Coast N2 Toll Highway** – Peer review of VIA undertaken by another consultant.
12. **Gamma to Grass Ridge 765kv transmission line** – Peer review of VIA undertaken by another consultant.
13. **Gateway Shopping Centre Extension (Durban)** – Visual Impact Assessment for a proposed shopping centre extension in Umhlanga, Durban.
14. **Kouroussa Gold Mine (Guinea)** – Visual impact assessment for a proposed new mine in Guinea working with SGS as part of their EIA team.
15. **Mampon Gold Mine (Ghana)** - Visual impact assessment for a proposed new mine in Ghana working with SGS as part of their EIA team.
16. **Telkom Towers** – Visual impact assessments for numerous Telkom masts in KwaZulu Natal
17. **Dube Trade Port, Durban International Airport** – Visual Impact Assessment for a new international airport.
18. **Sibaya Precinct Plan** – Visual Impact Assessment as part of Environmental Impact Assessment for a major new development area to the north of Durban.
19. **Umdloti Housing** – Visual Impact Assessment as part of Environmental Impact Assessment for a residential development beside the Umdloti Lagoon to the north of Durban.
20. **Tata Steel Ferrochrome Smelter** - Visual impact assessment of proposed new Ferrochrome Smelter in Richards Bay as part of EIA undertaken by the CSIR.
21. **Diamond Mine at Rooipoort Nature Reserve near Kimberley** – Visual impact assessment for a proposed diamond mine within an existing nature reserve for De Beers.
22. **Durban Solid Waste Large Landfill Sites** – Visual Impact Assessment of proposed development sites to the North and South of the Durban Metropolitan Area. The project utilised 3d computer visualisation techniques.
23. **Hillside Aluminium Smelter, Richards Bay** - Visual Impact Assessment of proposed

extension of the existing smelter. The project utilised 3d computer visualisation techniques.

24. **Estuaries of KwaZulu Natal Phase 1 and Phase 2** – Visual character assessment and GIS mapping as part of a review of the condition and development capacity of eight estuary landscapes for the Town and Regional Planning Commission. The project was extended to include all estuaries in KwaZulu Natal.
25. **Signage Assessments** – Numerous impact assessments for proposed signage developments for Blast Media.
26. **Signage Strategy** – Preparation of an environmental strategy report for a national advertising campaign on National Roads for Visual Image Placements.
27. **Zeekoegatt, Durban** - Computer aided visual impact assessment. Acted as advisor to the Province of KwaZulu Natal in an appeal brought about by a developer to extend a light industrial development within a 60 metre building line from the National N3 Highway.
28. **La Lucia Mall Extension** - Visual impact assessment using three dimensional computer modelling / photo realistic rendering and montage techniques for proposed extension to shopping mall for public consultation exercise.
29. **Redhill Industrial Development** - Visual impact assessment using three dimensional computer modelling / photo realistic rendering and montage techniques for proposed new industrial area for public consultation exercise.
30. **Avondale Reservoir** - Visual impact assessment using three dimensional computer modelling / photo realistic rendering and montage techniques for proposed hilltop reservoir as part of Environmental Impact Assessment for Umgeni Water.
31. **Hammersdale Reservoir** - Visual impact assessment using three dimensional computer modelling / photo realistic rendering and montage techniques for proposed hilltop reservoir as part of Environmental Impact Assessment for Umgeni Water.
32. **Southgate Industrial Park, Durban** - Computer Aided Visual Impact Assessment and Landscape Design for AECI.
33. **Sainsbury's Bryn Rhos (UK)** - Computer Aided Visual Impact Assessment/ Planning Application for the development of a new store within the Green Wedge North of Swansea.
34. **Ynyston Farm Access (UK)** - Computer Aided Impact Assessment of visual intrusion of access road to proposed development in Cardiff for the Land Authority for Wales.
35. **Cardiff Bay Barrage (UK)** - Concept Design, Detail Design, Documentation, and Visual Input to Environmental Statement for consideration by Parliament in the debate prior to the passing of the Cardiff Bay Barrage Bill. The work was undertaken for Cardiff Bay Development Corporation.
36. **A470, Cefn Coed to Pentrebach (UK)** - Preparation of frameworks for the assessment of the impact of the proposed alignment on the landscape for The Welsh Office.
37. **Sparkford to Ilchester Bye Pass (UK)** - The preparation of the landscape framework and the draft landscape plan for the Department of Transport.
38. **Green Island Reclamation Study (Hong Kong)** - Visual Impact Assessment of building massing, Urban Design Guidelines and Masterplanning for a New Town extension to Hong Kong Island.
39. **Route 3 (Hong Kong)** - Visual Impact Assessment for alternative road alignments between Hong Kong Island and the Chinese Border.
40. **China Border Link (Hong Kong)** - Visual Impact Assessment and initial Landscape Design for a new border crossing at Lok Ma Chau.
41. **Route 81, Aberdeen Tunnel to Stanley (Hong Kong)** - Visual Impact Assessment for alternative highway alignments on the South side of Hong Kong Island.

APPENDIX II

FORMULA FOR DERIVING THE APPROXIMATE VISUAL HORIZON

The Mathematics behind this Calculation

This calculation should be taken as a guide only as it assumes the earth is a perfect ball 6378137 metres radius. It also assumes the horizon you are looking at is at sea level. A triangle is formed with the centre of the earth (C) as one point, the horizon point (H) is a right angle and the observer (O) the third corner. Using Pythagoras's theorem we can calculate the distance from the observer to the horizon (OH) knowing CH is the earth's radius (r) and CO is the earth's radius (r) plus observer's height (v) above sea level.

Sitting in a hotel room 10m above sea level a boat on the horizon will be 11.3km away. The reverse is also true, whilst rowing across the Atlantic, the very top of a mountain range 400m high could be seen on your horizon at a distance of 71.4 km assuming the air was clear enough.

