

12. LAND USE AND HUMAN ACTIVITIES

This section reflects data concerning *the state of the land in terms of its cover and use*. This information is important for understanding how humans are modifying and using the land's surface as it *drives changes* in ecosystems and environmental processes. These changes *create environmental concern* such as biodiversity loss or water, soil, and air pollution. An interpretation of land use is therefore an important step in being prepared to deal with *issues* related to environmental management.

It is also important to understand the general direction in which the use of land is expected to move into the future (development trends) because it will indicate the kind of environmental changes that land managers should prepare for. An indication of the expected growth patterns in the study area is therefore also addressed.

The outcomes of past, current and future land use and human activities are "**pressures**" that are exerted on resources and ecosystems and cause environmental change. These pressures are recognised as environmental problems that should be managed. The EMF will therefore use this information in conjunction with the current status of environmental features to undertake a sensitivity analysis of the area. This will commence in the next phases of the project. The sensitivity analysis will enable the identification of the type of management parameters that should guide future development in the study area. The value of this information also lies in its use as a benchmark for monitoring the change in land use over time.

12.1 Current Use of Land

The use of land is based on the interpretation of current aerial photography and satellite images and significant ground verification. Detail and accuracy is very important to support the planned sensitivity analysis of the study area.

A land use map was created from the vegetation dataset by processing the data into categories as displayed in **Table 11** below. The following findings are evident from this data:

- **31.25%** of the study area is **natural open space**. This includes protected areas. Increasing pressure from development and expansion will be experienced in this area.
- **16.82%** is under commercial **agriculture** (sugar cane) and subsistence agriculture.
- **11.39%** of the study area is **open water**, consisting of lakes, rivers, wetlands, etc. which is under threat of pollution in varying degrees.
- **12.16%** of the study area is **undetermined** which includes road reserves.
- **4.78%** of the study area is **harbour**.

- **1.92%** is for **heavy industrial** and **2.04%** for **light industrial** (small footprint, big impact).

Table 1: Classification of the landscape in the study area

| USE OF LAND CATEGORY | EXTENT(Ha) | % |
|---------------------------------|-----------------|----------------|
| Agriculture | 4150.60 | 16.82% |
| Airport | 35.63 | 0.14% |
| Business & Commercial | 62.52 | 0.25% |
| Cemetery | 15.82 | 0.06% |
| Church | 11.22 | 0.05% |
| Caravan Park | 16.84 | 0.07% |
| Governmental Departments | 65.73 | 0.27% |
| Dwellings - Single | 1020.02 | 4.13% |
| Dwellings - Flats | 87.72 | 0.36% |
| Farm Estate | 15.66 | 0.06% |
| Harbour | 1178.16 | 4.78% |
| Industrial - Heavy | 474.01 | 1.92% |
| Industrial - Light | 504.00 | 2.04% |
| Infrastructure (Including Port) | 1110.61 | 4.50% |
| Mining | 463.12 | 1.88% |
| Natural Open Space | 7709.40 | 31.25% |
| Open Water | 2810.72 | 11.39% |
| Parking | 41.27 | 0.17% |
| Plantation | 15.74 | 0.06% |
| Public Open Space | 361.62 | 1.47% |
| Recreation & Sport | 83.39 | 0.34% |
| Rural Residential | 746.29 | 3.02% |
| School | 27.07 | 0.11% |
| Tailings Dam - Industrial | 137.26 | 0.56% |
| Technical College | 4.42 | 0.02% |
| Vacant Land (Formal) | 524.29 | 2.12% |
| Undetermined | 3000.17 | 12.16% |
| | | |
| Total | 24673.30 | 100.00% |

The current use of land is reflected in **Figure 33**. The focus is on human activities and open space. It gives an indication of the extent to which the state of the environment is influenced in the area.

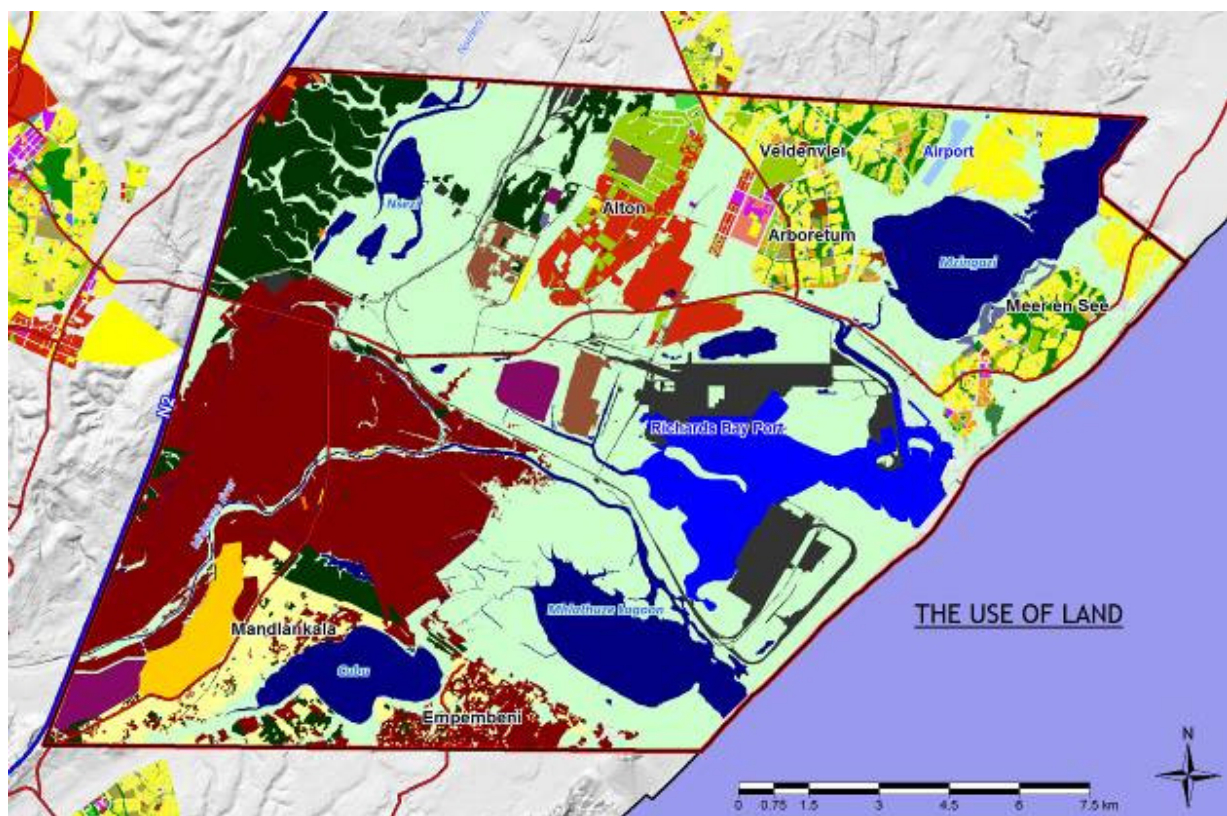


Figure 1: The use of land in the study area

| LEGEND | | |
|---|--|--|
| ■ Agriculture | ■ Harbour | ■ Public Open Spaces |
| ■ Business/Commercial | ■ Hotel | ■ Sport & Recreation |
| ■ Cemetery | ■ Industrial - Heavy | ■ Rural Residential |
| ■ Caravan Park | ■ Industrial - Light | ■ School |
| ■ Creche | ■ Infrastructure | ■ Swimming Pool |
| ■ Government | ■ Mining | ■ Technical College |
| ■ Depot | ■ Offices | ■ Vacant Land |
| ■ Dwelling - Single | ■ Natural Open Space | — National Route |
| ■ Dwelling - Flats | ■ Open Water | — Main Routes |
| ■ Farm Estate | ■ Parking | - - - Railways |
| ■ Church | ■ Plantation | □ EMF Study Area |

The land use map shows a distinct pattern of land use activities concentrated in specific areas:

- Residential in the north and south;
- Commercial and industrial in the central area;
- Mining in the south-east;
- Commercial agriculture and forestry in the east;

- Subsistence farming and woodlots in the south;
- Large water bodies around the industrial / commercial zone
- Natural open space dispersed in between the above land use zones and strongly associated with the hydrological system

From the above it is evident that the natural environment within the study area has been modified and fragmented. The EMF will seek to consolidate this as far as possible by means of conservation and rehabilitation in order to sustain the production of essential resources.

12.2 Development Trends and Pressures

Development pressure is formed when economic development within a city creates a demand for land for expansion. In the case of uMhlathuze, the existence of a port and an industrial development zone is creating unique opportunities for development, which in turn creates pressure on the availability of land which would eventually be transformed from a natural state (open space) to a built environment associated with infrastructure and human activity.

For the purpose of the EMF information on development pressure is derived from the following categories:

- Established Developments
- Long Term Port Expansion Initiatives
- Industrial Development Zone
- Development Proposals (various other)
- Mineral Lease Areas
- Servitudes

The City of uMhlathuze has experienced vast growth over the last 30 years, especially since the 1970's with the establishment of the port. The development of the port has resulted in extensive transformation of the landscape, especially the estuary. The associated industrial development activities have also changed the character of the area. Residential, business and other land uses have expanded in close correlation with industrial development. These established developments and the demand for land for future expansion are placing pressures on the environment. The following sections discuss aspects of land modification and use over time in order to get an idea of the development pressures and trends that are relevant to the study area.

12.2.2 Harbour Development and Infrastructure

The growth of Richards Bay over the last 30 years was and remains strongly associated with the establishment and expansion of the port. **Figures 34 and 35** on the following pages show photographs of the state of development the years before and after development of the port and Richards Bay as an industrial town. The development of the port has resulted in extensive transformation of the landscape, especially the estuary, and impacted the natural functioning of the Mhlathuze Estuary.

Since construction of the harbour in 1976 it has expanded rapidly with the establishment of one new berth every second year on average. Today there are 22 cargo berths and the Port of Richards Bay is one of the worlds' leading bulk ports. The total port area is approximately 3780 hectares in extent of which 70% of the lettable land has been leased and developed.

Port Land & Water Statistics

| | |
|--------------------------------|----------|
| <i>Total land surface:</i> | 2174 ha |
| <i>Total land leased:</i> | 669.6 ha |
| <i>Total water surface:</i> | 1443 ha |
| <i>Total navigable water:</i> | 695 ha |
| <i>Entrance channel width:</i> | 300m |

There are six cargo-handling terminals in the port:

- The Dry Bulk Terminal for the imports and exports of a variety of ores, minerals and woodchips.
- The Multi Purpose Terminal that handles a variety of breakbulk cargoes as well as heavy lifts and abnormal loads.
- The Richards Bay Coal Terminal which is the largest single export coal terminal in the world with the capacity to export 84 million tonnes per annum.
- A bulk liquid terminal that handles a wide range of bulk liquids
- The Bunker Terminal that imports bunker fuel from Durban and Cape Town.
- Facilities that include a phosphoric acid export loading facility and a liquid pitch import facility.

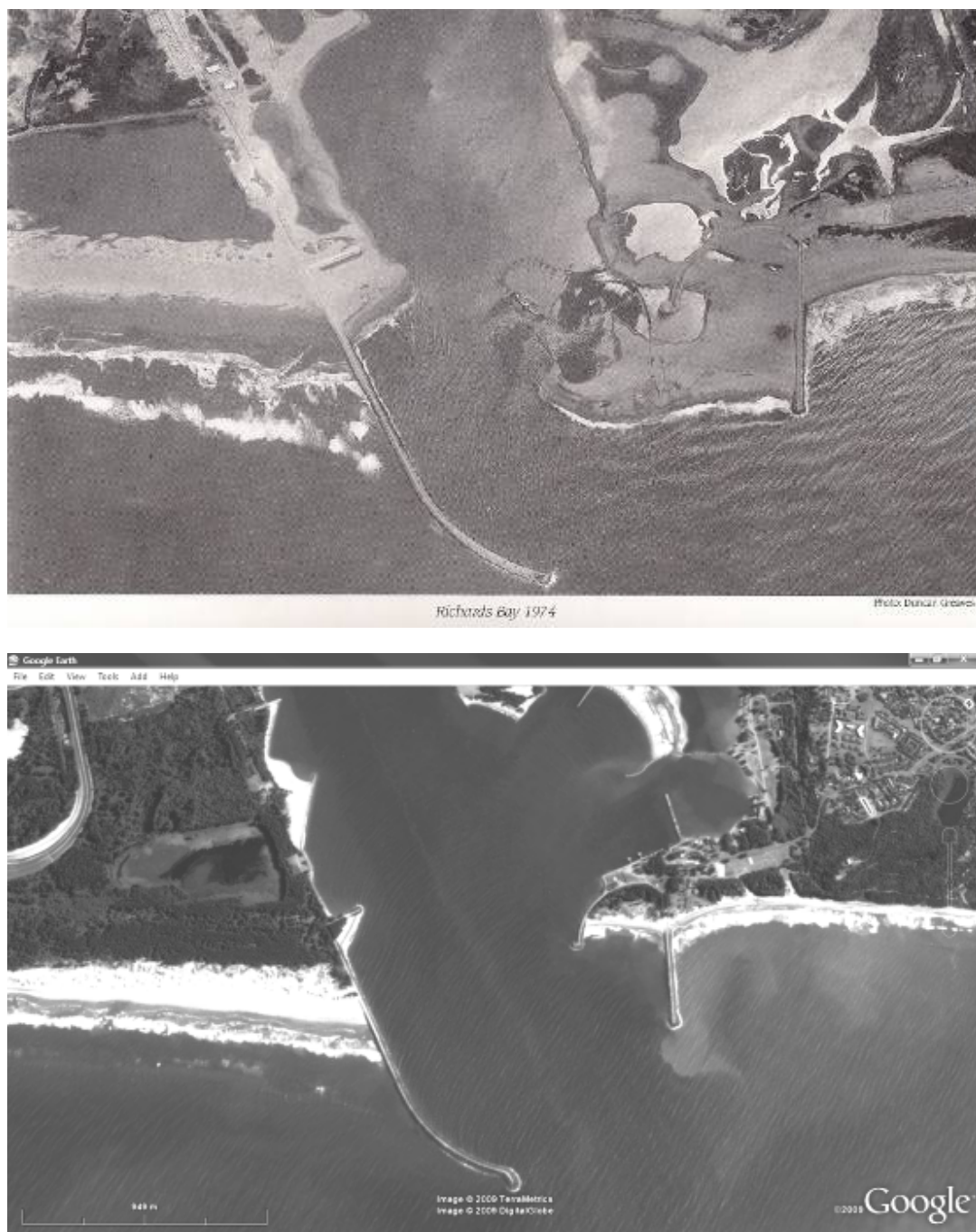


Figure 2: Port area in 1974 (above¹) and circa 2006 (below²)

¹ Photograph sourced from Van der Walt, J.C (2007). Zululand True Stories. Richards Bay Printers. Richards Bay

² Image sourced from Google Earth. www.googleearth.com. Accessed 24 September 2009.

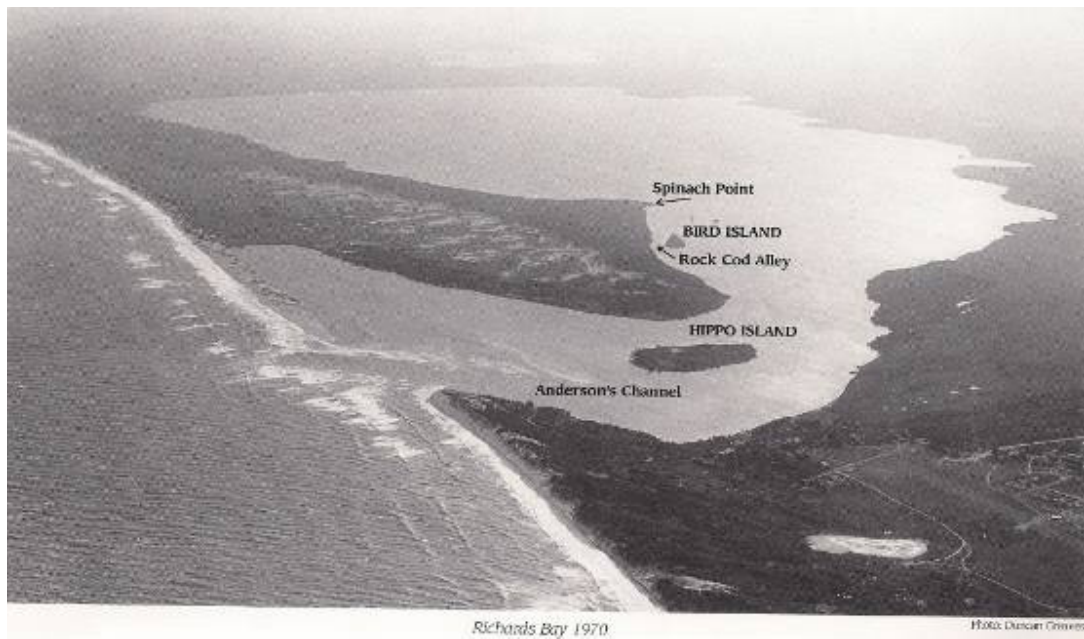


Figure 3: Photographs showing development status before and after industrial development; (Estuary in 1970, view south west from the coast)³ and (Grassland in 2009, view south from inland)⁴.

³ Photograph sourced from Van der Walt J C (2007) *Zululand True Stories*. Richards Bay Printers. Richards Bay.

⁴ Photograph by MetroGIS. 2009.

The use of land and water has changed the character of the landscape and places pressures on the environment. These pressures are managed by Transnet Port Authority to the extent possible through their Environmental Policy and ISO 14001 Environmental Management System. They have various strategies in place to minimise impacts and has also developed a Waste Management Plan to control and manage waste (including waste from vessels) in the port.

The EMF identifies the significant polluting facilities and activities (pressures) in association with the land use layer in order to use the information in the land use sensitivity analysis. For example the coal loading facility is associated with dust emissions which have a high nuisance value and can impact human health and the biotic environment. The most significant pressures are described in various sources, most notably the Strategic Environmental Assessment that was conducted for the Port of Richards Bay. The sensitivity analysis will make use of these sources.

Long-Term Port Expansion and the IDZ

Richards Bay has been established as a port and industrial town, therefore the expansion of these land uses should be expected as part of planning initiatives. The Ports Authority recently produced a development framework which spans a long term planning of more than 70 years. This framework forms part of a national strategy for ports development in South Africa. Transnet has commissioned Due Diligence Investigations in order to consider the acquisition of land for the proposed expansion and the development of offset areas. The final outcomes of this study will be released at the end of November 2009. This information will be considered for integration into the EMF.

The IDZ, which is discussed below, is closely linked to the port, as well as the industrial area of the town. These areas, as shown on the map in **Figure 36**, form the key focus of this EMF.

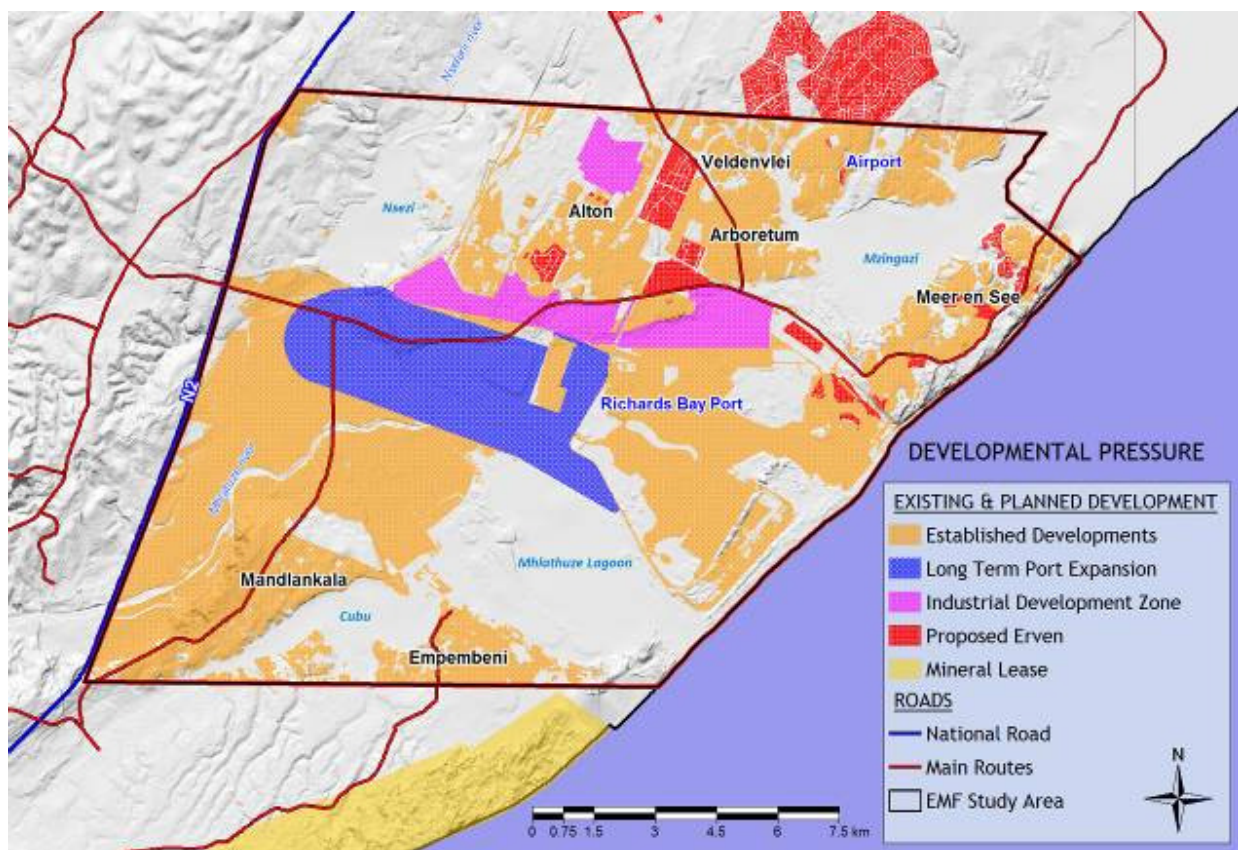


Figure 4: Location and extent of the Port Expansion Area and the IDZ in relation to other development pressures in the study area.

Whereas the IDZ has been promulgated and spatially defined, the port expansion, which is planned in subsequent phases, is still in its planning phase. The spatial representation in **Figure 36** is rather illustrative and might change in future. Nevertheless it does give an indication of the extent of the expansion and the pressure on the environment can be quantified to a large degree. For example the potential impact on agricultural, the floodplain and hydrological regime is clearly evident. The proposed erven indicated on the map reflects information on development proposals as lodged with the Town Planning Department of the uMhlathuze Municipality.

12.2.3 Industrial Development

Industrial development in Richards Bay was established with an anchor project in 1971, the Alusaf Aluminium Smelter, known as Bayside Aluminium. Since then a number of large industries have been

successfully established in the study area. Most of these are intimately connected to the port⁵. These are identified in **Table 12** below.

The development of heavy industries not only impacted on land based biodiversity, but also changed the character of the area's air and water quality. The industrial sector is further dominated by the manufacturing industry which is also the most energy intensive sector in uMhlatuze. Industrial processes also place additional demand on water resources. Most of these industries have Environmental Management Systems in place to manage or minimise their impacts.

The EMF identifies the most significant industrial facilities and activities that represent the main pollution sources in the study area. This information will be used in the land use sensitivity analysis. For example the main industry sources of air pollution has been captured and described in the air quality section.

Table 2: Large Industries in the area and their relationship with the port.

| INDUSTRY | PORT-INDUSTRY RELATIONSHIP |
|---|---|
| Billiton (formerly Alusaf) Bayside Aluminium Smelter | Import bauxite to produce aluminium ingots for the domestic and export markets. The bauxite is transported on a dedicated rail link. |
| Hillside Aluminium Smelter (build in the 1990's) | Import bauxite to produce aluminium ingots for the domestic and export markets. Bauxite is transported by conveyer belt. |
| FOSKOR, previously known as Indian Ocean Fertilizers (build in the 1970's) | Makes use of the privately-operated Richards Bay Bunker Terminal and Bulk Storage for liquid chemicals, and the Transnet operated Dry Bulk and Multi Purpose Terminals to ship rock phosphates and fertilizers. |
| Richards Bay Minerals (RBM). | Mines sand dunes around Richards Bay to produce a range of metals including rutile, zircon, monazite, titanium and magnetite. These minerals are used in the local market or are exported through the Richards Bay Dry Bulk and Multi Purpose terminals. |
| Mondi Paper | Produces paper and pulp. Much of the pulp is exported with pulp produced elsewhere in the province through the Durban harbour. Paper products are exported through the Multi Purpose Terminals |
| The Central Timber Co-operative chipping mill (established in 1981) was joined by the SilvaCell plant. | Produces woodchips for export to the far east through the Dry Bulk Terminal. |
| Bell Equipment relocated to Richards Bay from Empangeni in 1984 to gain industrial incentives on offer at the time. | Produces heavy articulated equipment for sugar cane, mining, forestry and construction industries. |
| Tata Steel | A high carbon ferrochrome production facility at Alton North. Construction of Phase 1 started in late 2006 and will produce 135 000 tonnes of high carbon ferrochrome per annum; full production of 270 000 tonnes per annum is planned for Phase 2. Makes use of the Dry Bulk and Multi Purpose Terminals. |
| LaFarge | Produces cement for local use and sporadically make use of the break bulk terminal. |

⁵ Hall P V (1999) *Regional Institutional Structure and Industrial Strategy: Richards Bay and the Spatial Development Initiatives*. Working Paper No 99/28 of the Development Policy Research Unit, University of Cape Town.

The Richards Bay Industrial Development Zone (IDZ) was designated in April 2002 consisting of precincts marked IDZ 1A, 1B, 1C and 1D on **Figure 37** below. The Alton North Industrial Area (1F) was incorporated into the IDZ as Phase 2 in 2006.

The IDZ Programme is aimed at promoting the competitiveness of South African enterprises through leveraging investment in export-oriented manufacturing industries and promoting the competitiveness of South African firms through the export of value-added manufactured products. The National Department of Trade and Industry (DTI) is the custodian of the Programme and an IDZ is designated by the Minister of Trade and Industry in terms of the Manufacturing Development Act⁶.

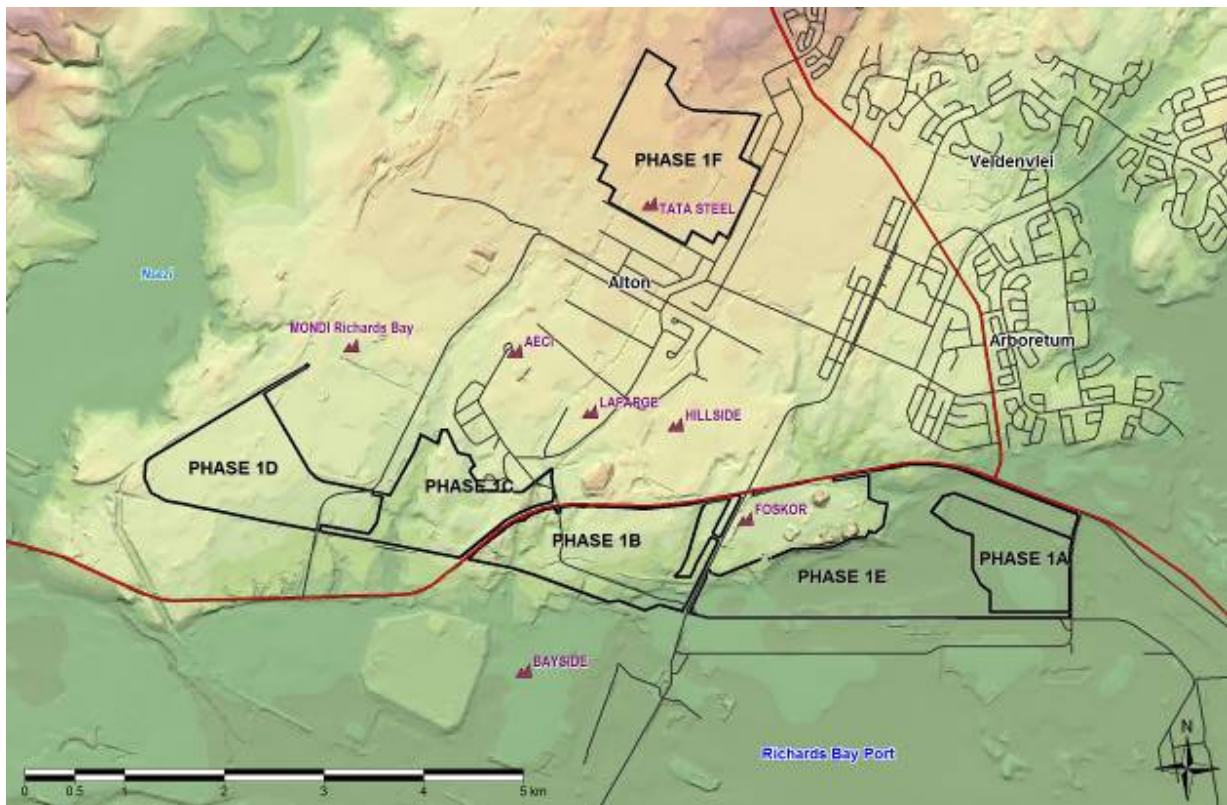


Figure 5: Richards Bay Main Industries in relation to the IDZ Area

While proposed developments within the current IDZ will be placing additional pressures on the environment **Figure 37** also emphasizes that the layout of Phase 1A and 1E is situated on the floodplain and just below the 1:100 year floodline. Phase 1B and 1C falls within a transition zone. This zone has a hydrological function particularly with respect to stormwater control.

One of the suitability criteria for designating an IDZ is that the Minister must be satisfied that the IDZ will be consistent with any applicable national policies and law “as determined by appropriate

⁶ Manufacturing Development Act (Act 187 of 1993).

environmental, economic and technical analyses”. The IDZ Programme Guidelines⁷ then mention some of the environmental factors that should be considered in this regard:

- Compliance with all environmental requirements (including strategic environmental assessments and environmental approvals required), and
- Current environmental conditions that might hamper development, as well as proposed steps to overcome such conditions.

An EIA for the initial IDZ area was carried out during 2002 (EIA/2851, RoD dated 17 October 2002), assumingly in support of the IDZ Designation. The Alton North Site (1F) was also zoned for industrial use in accordance with the applicable environmental and planning legislation (the EIA number for this application must still be traced). These EIAs contain useful information that adds value to the EMF and the decision-support system that must ultimately supplement future EIAs in the IDZ. For example it highlighted the irreplaceability of critical endangered grasslands and important hydrological and ecological linkages. It also identified the strategic environmental issues and on-site environmental sensitivities that should be managed in the future. It is noted that various concerns were raised during the EIA process on the proposed use of land, including an appeal that held that the original environmental authorization did not safeguard or sufficiently protect grassland habitat and important ecological linkages.

Not much development has taken place since the above-mentioned process. EIA delays have been identified as one of the administrative challenges that cause bottlenecks in development. However, the success of the IDZ depends largely on the efficiency of the regional infrastructure:

- John Ross Highway
- The airport
- The rail link to the interior
- The harbour and its facilities

12.2.4 Mining and Mineral Lease Areas

Mining activities in and around uMhlatuze have been ongoing for years, and have been met with controversy in respect of the destructive nature of operations. Although rehabilitation plans are in place, and have been implemented successfully, the impact of current operations on the environment is evident, as can be seen on the photographs in **Figure 39**. It depicts the mining of heavy mineral sands ore at the Hillendale Mine (Exxaro) within the study area. The footprint of the area is approximately 256ha, comprising 1.05% of the study area. The area was previously under sugarcane farming. A closure process for this mine operation has been initiated⁸ and will include rehabilitation of

⁷Department of Trade and Industry(2008) IDZ Programme Guidelines.

⁸ Exxaro KZN Sands and ACER (Africa) Environmental Management Consultants (2008) *Hillendale Mine Closure Mine Draft Risk Assessment and Mine Closure Plan*. Report produced in February 2008

the area to its original land use. The Environmental Management Programme Report (EMPR) for the mine specifies mine closure objectives that make provision for the desired future environmental quality for the area. In terms of rehabilitation and mine closure the mine is grouped into three distinct areas:

- Mining area, including all pipes, roads etc
- Primary wet plant, including offices, ablutions and workshops
- Residue dam, including all associated infrastructure

Future mining of the coastal dunes south of the study area can also be seen as a threat in terms of potential pollution of river streams that feed into Lake Cubhu and the estuary, as indicated on the map in **Figure 38** below.

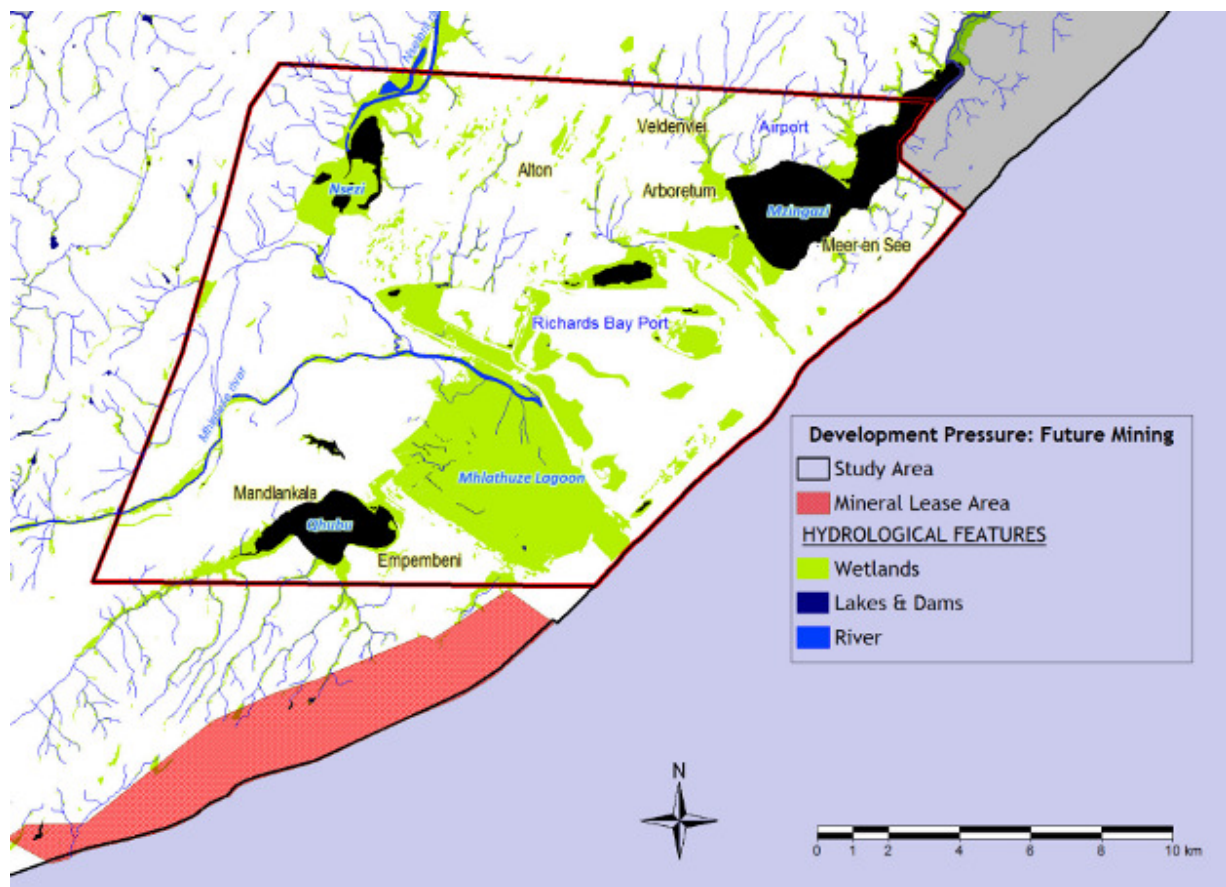


Figure 6: Location of possible mining areas south of the study area



Figure 7: Mining operations at Hillendale. Note the formation of an "alluvial fan" in the uMhlathuze river (bottom photograph), which is the result of sand being washed into the river.

12.2.5 Public Open Space

The town planning scheme provides for a public open space in formal townships. The following information (**Table 13**) was forthcoming from the zoning data:

- An average of 3.36% of all erven is zoned as 'public open space'
- In terms of area it accounts for 16.57% of formal land.
- It is noted that the Alton area only provides 1% of its total area to open space and Mzingazi has no open space zoned.
- Tribal land is typically rural residential and associated with subsistence farming.

Table 3: Open Space Analysis

| SUBURB | ZONING_DESCRIPTION | Area (Ha) | % |
|-------------|------------------------|-----------|--------|
| Alton | Public Open Space (RB) | 5.81 | 0.69% |
| Arboretum | Public Open Space (RB) | 84.02 | 22.53% |
| Birdswood | Public Open Space (RB) | 57.82 | 29.48% |
| Meerensee | Public Open Space (RB) | 81.6 | 19.27% |
| Mzingazi | Public Open Space (RB) | 0 | 0.00% |
| Veldenvlei | Public Open Space (RB) | 76.48 | 18.06% |
| Wildenweide | Public Open Space (RB) | 17.45 | 25.94% |

| SUBURB | ZONING_DESCRIPTION | Nr Erven as Open Space | Total Nr Erven | % |
|-------------|------------------------|------------------------|----------------|-------|
| Alton | Public Open Space (RB) | 19 | 511 | 3.72% |
| Arboretum | Public Open Space (RB) | 72 | 1673 | 4.30% |
| Birdswood | Public Open Space (RB) | 35 | 1138 | 3.08% |
| Meerensee | Public Open Space (RB) | 63 | 1760 | 3.58% |
| Mzingazi | Public Open Space (RB) | 0 | 575 | 0.00% |
| Veldenvlei | Public Open Space (RB) | 39 | 923 | 4.23% |
| Wildenweide | Public Open Space (RB) | 15 | 325 | 4.62% |

12.2.6 Agriculture and Forestry

16.82% of the study area is currently used for agricultural purposes. The majority of this land is on the floodplain and is used for commercial sugar-cane production. Subsistence farming on tribal land comprises food security crops and dryland cropping.

Small areas of commercial forestry plantations occur in the area. No further expansion is expected due to water constraints in the catchment. A number of small woodlots occur in the Esikhawini area. There is potential for expansion because of the water allocation policies to redress previous injustices.

12.2.7 Servitudes

Servitudes are linear features that could potentially interfere with linkages. Impacts are associated with construction operations (**Figure 40**) and physical design resulting in “barrier impacts” in some instances.



Figure 8: Construction of a pipeline in a servitude. Note the extensive clearing of vegetation