

Environmental Management Framework for the Richards Bay Port Expansion Area and Industrial Development Zone



STATUS QUO REPORT

October 2009





A joint initiative between the City of uMhlathuze and the KwaZulu-Natal Department of Agriculture, Environmental Affairs and Rural Development (DAEARD), in association with the Department of Water and Environmental Affairs (DWEA) and the Danish International Development Agency (DANIDA) through the Urban Environmental Management Programme.

Environmental Management Framework for the Richards Bay Port Expansion Area and Industrial Development Zone

STATUS QUO REPORT

REPORT DETAILS:

<p>Prepared For: The Head Department of Agriculture and Environmental Affairs Private Bag X9059 Pietermaritzburg, South Africa 3200</p>	<p>Contact Person: Mrs Sphume Nowele Tel: 033 355 9432 Mobile: 082 461 8810 noweles@dae.kzntl.gov.za</p> <p>(REF: BID ZNB 3579/08A)</p>
<p>Prepared By: Thorn-Ex & MetroGIS JV PO Box 800 Hilton 3245</p> <div style="display: flex; align-items: center; justify-content: center;">   </div>	<p>Contact Person: Marita Thornhill Tel: 033 343 1814 Mobile: 084 5014665 E-Mail: thornhillm@thorn-ex.co.za</p> <p>(REF: TX2009/C007-14)</p>
Date: October 2009	Version: 1.5
<p>Scope of this report: The Status Quo Report provides the context and background for the preparation of an Environmental Management Framework for the Richards Bay Port-IDZ area, and serves to identify issues for further analysis. The report serves as a platform for engagement with project stakeholders and is therefore a "living document".</p>	
<p>Citation: Thornhill M and van Vuuren D (Eds) (2009) <i>Status Quo Report: Environmental Management Framework for the Richards Bay Port Expansion Area and Industrial Development Zone</i>. Report produced for the Department of Agriculture, Environmental Affairs and Rural Development. Report No. TX2009/C007-14, Pietermaritzburg, South Africa.</p>	

PROJECT TEAM MEMBERS:

TEAM MEMBER	PROJECT ROLE
Marita Thornhill	Lead Consultant (Strategic Environmental Management Specialist)
Dawie van Vuuren	Project co-management and GIS coordination (Professional GIS Scientist Practitioner)
Rod Bulman	Project support and public participation (Public Participation and Policy Specialist)
Claudia Mckenzie	Project support (Public Participation Office)
Sue George	Project support (Lead Consultant)
Lourens du Plessis	Data management and technical assistance (GIS Practitioner)
Prof Bruce Kelbe	Specialist Hydrologist
Steven Weerts	Specialist Ecologist (Marine and Estuarine)
Dr Tim O'Connor	Specialist Ecologist (Biodiversity)
Dr Mark Zunckel	Specialist Air Quality
Harold Thornhill	Environmental Assessment Practitioner: Impact Management
Cathy Ferguson	Professional Planner (Land use planning)
Skhumbuzo Mpungose	Project Intern (Impact Assessment)
Hloniphile Dlamini	Project Intern (Environmental Information Management)

ACRONYMS USED IN THIS REPORT

CARA	Conservation of Agricultural Resources Act
DAEA	Department of Agriculture and Environmental Affairs
DAEARD	Department of Agriculture, Environmental Affairs and Rural Development.
DANIDA	Danish International Development Agency
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
DED	Department of Economic Development
DSoE	Desired State of Environment
DTI	Department of Trade and Industry
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
EIA	Environmental Impact Assessment
EKZNW	Ezemvelo KwaZulu-Natal Wildlife
EMF	Environmental Management Framework
GGP	Gross Geographic Product
GIS	Geographical Information System
IDP	Integrated Development Plan
IDZ	Industrial Development Zone
LUMS	Land Use Management System
NEMA	National Environmental Management Act
NPA	National Ports Authority
PDF	Port Development Framework
PPES	Public Participation and Stakeholder Engagement Strategy
SACS	South African Committee for Stratigraphy
SANBI	South African Biodiversity Institute
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
SEA	Strategic Environmental Assessment
SEMP	Strategic Environmental Management Plan
SoE	State of the Environment

TABLE OF CONTENTS

EXECUTIVE SUMMARY	8
1. INTRODUCTION TO PROJECT AND STUDY AREA CONTEXT	11
2. PURPOSE OF THE EMF	12
3. PURPOSE OF THIS REPORT	14
4. PROCESS OF DEVELOPING THE EMF	14
5. KEY ISSUES	15
6. LEGAL AND POLICY CONTEXT AND GOVERNMENT MANDATE	17
6.1 Sustainable Development Decisions.....	17
6.2 EMF Decisions	23
6.3 EIA Decisions	23
7. PRINCIPLES FOR THE EMF	25
8. HISTORICAL BACKGROUND	26
9. THE PHYSICAL ENVIRONMENT.....	28
9.1 Climate and Weather	28
9.1.1 Climate of Richards Bay.....	28
9.1.2 Climate Change	33
9.1.3 Extreme flooding.....	37
9.1.4 Sea-level rise	38
9.2 Geology.....	39
9.2.1 General description.....	39
9.2.2 Hard Rock Geology of the Empangeni Region	40
9.2.3 Basement Rocks Underlying the Maputaland Group	42
9.2.4 Maputaland Group	42
9.2.5 The Occurrence of Mineral Resources.....	46
9.3 Geomorphology	46
9.4 Soils	52
9.5 Geotechnical conditions.....	53
9.6 Hydrology.....	55
9.6.1 Regional Context.....	55
9.6.2 Surface Water Description	57
9.6.2.1 Mhlathuze Estuary	57
9.6.2.2 Harbour.....	59
9.6.2.3 River Systems	60
9.6.2.4 The Lake System	61
9.6.3 Ground Water Aquifers.....	64
9.6.4 Groundwater-Surface Water Interactions.....	65
9.6.5 Water Quality	66
9.7 Geohydrological constraints	67
10. THE BIOLOGICAL ENVIRONMENT	69
10.1 Vegetation	69
10.1.1 Vegetation Types	69
10.1.2 Quality of the vegetation (extent of degradation).....	76
10.2 Terrestrial Ecosystem Types.....	79
10.2.1 Dune cordon.....	79
10.2.2 Grasslands	80
10.3 Aquatic and Estuarine Ecosystem Types	81
10.3.1 Wetland Systems	81
10.3.2 River Systems	82
10.3.3 Richards Bay Port Estuary.....	82
10.3.4 The Mhlathuze Estuary (Sanctuary).....	83
10.4 Terrestrial Fauna.....	84
10.4.1 Birds.....	84
10.4.2 Amphibians, Reptiles and Mammals.....	85
10.5 Visual Quality and Sensitivity	85

11. CULTURAL AND HISTORICAL FEATURES.....	89
12. LAND USE AND HUMAN ACTIVITIES	90
12.1 Current Use of Land.....	90
12.2 Development Trends and Pressures	93
12.2.1 Harbour Development and Infrastructure	94
12.2.2 Industrial Development	98
12.2.3 Mining and Mineral Lease Areas	101
12.2.4 Public Open Space	104
12.2.5 Agriculture and Forestry	104
12.2.6 Servitudes	105
13. POLLUTION	106
13.1 Landscape Modification	106
13.1 Air pollution	107
13.1.1 Buffer zones.....	109
13.1.2 The impacts of air pollution	113
13.2 Potential Pollution Sources	114
14. SERVICES AND INFRASTRUCTURE	116
14.1 Water provision	116
14.2 Sewage treatment and discharge.....	118
14.3 Storm water management	120
15. POPULATION CHARACTERISTICS	121
15.1 General overview	121
15.1.1 Population.....	121
15.1.2 Distribution	122
15.1.3 Age Structure	122
15.1.4 Education	122
15.1.5 Employment.....	122
15.1.6 Access to Housing	122
15.1.7 Access to Services	123
15.2 Poverty in the study area	124
15.3 Discussion of trends	124
16. ECONOMIC CHARACTERISTICS.....	125
16.1 Economic drivers and sectors	125
16.2 Local economic sectors and contributions	125
16.3 Economic development priorities.....	127
16.4 An enabling environment for economic development	128
16.5 Discussion of trends.....	128
17. CONSERVATION PLANNING	130
17.1 Provincial Conservation Planning.....	130
17.2 Local Conservation Planning.....	130
18. LAND USE PLANNING.....	133
18.1 The harbour extension plans	133
18.2 Industrial development	133
18.3 Business development with a focus on tourism.....	134
18.4 Residential and related development	135
19. PUBLIC AND STAKEHOLDER PARTICIPATION PROCESS.....	136
19.1 Background Information Document	136
19.2 Meetings with Transnet National Ports Authority	136
19.3 Meetings with uMhlatuze City Officials.....	136
19.4 Public meetings	136
20. OPPORTUNITIES IDENTIFIED TO DATE	138
20.1 Conservation	138
20.2 Agriculture.....	138
20.3 Tourism.....	138
20.4 Mining.....	138
20.5 Industry and Commerce.....	138
20.6 Port Expansion	139
20.7 Sustainable Livelihoods	139
21. CONSTRAINTS IDENTIFIED TO DATE.....	139

22.1	Sensitive environments	139
22.2	Air Quality	140
22.3	Industrial Development	140
22.4	Port Development and Expansion	140
22.5	Tourism	141
22.6	Human Vulnerability	141
23.	DESIRED STATE OF ENVIRONMENT	141
23.1	Expectations, opportunities, constraints and potential conflicts.....	141
24.	STRATEGIC ENVIRONMENTAL PLANNING	141
25.	REFERENCES	141

TABLES

Table 1:	National laws and organs of state that promote environmental protection objectives	19
Table 2:	Provincial legislation that promote environmental protection objectives	20
Table 3:	Municipal Bylaws that promote environmental protection objectives.....	20
Table 4:	Organs of state that also make environmental-related decisions	23
Table 5:	Local Development and Structure Plans prior to 2000.....	27
Table 6:	Climate data for Richards Bay based on monthly averages for the 30-year period 1961- 1990 (SAW, 2005)	29
Table 7:	Summary of environmentally sensitive geotechnical constraint zones.....	54
Table 8:	Groundwater vulnerability classes (after Golder, 2004).....	68
Table 9:	Vegetation statistics in the study area	74
Table 10:	Red Listed Bird Species	84
Table 11:	Classification of the landscape in the study area	91
Table 12:	Large Industries in the area and their relationship with the port.	99
Table 13:	Open Space Analysis.....	104
Table 14:	A summary of the main sources of air pollution in the study area	107
Table 15:	Total emissions of key pollutants in t/a from the main source in the City of uMhlathuze (adapted from Liebenberg and Petzer, 2006 and CSIR Environmentek, 2005)	108
Table 16:	Local-Provincial Population Dynamics, 1996 to 2007 based on Stats SA and Global Insight Data (after Coetzee, 2009)	121
Table 17:	Formal Employment by Economic Activity (STATS SA, 2001)	126
Table 18:	IDZ Land Use Plan and Priority Sectors	134
Table 19:	Constraints and Current Land Use Status in the IDZ	140

FIGURES

Figure 1: The EMF Study Area	12
Figure 2: Rainfall patterns in Richards Bay (Source: SA Weather Services, 2009).....	30
Figure 3: Average temperatures in Richards Bay (Source: SA Weather Services, 2009).....	31
Figure 4: Period, day-time and night-time wind roses depicting the wind profile at the Richards Bay Airport for the period January 2002 to the 11 th of May 2004 (Liebenberg-Enslin and Petzet, 2006)....	32
Figure 5: Distribution of bio-climatic zones of KwaZulu-Natal under temperature increases (0.5°C – 1.5°C), (Whitwell, 2009)	35
Figure 6: Distribution of bio-climatic zones of KwaZulu-Natal under temperature increases (2°C – 3°C), (Whitwell, 2009)	36
Figure 7: Flood Areas (1: 100 yr)	37
Figure 8: Geology of the Study Area.....	39
Figure 9: (A) A generalised vertical cross-section from West to East through the study area. Adapted from Worthington, 1978. (B) A map of the main geological features (from DWAF, 2005). Superimposed on the map are the geological fault lines and the shaded areas of urban settlements.	41
Figure 10: Schematic composite section through the proposed Maputaland Group as proposed by Dr G.A.Botha. The subdivision has been proposed by the SACS Cenozoic Task Group but has not yet been formally recognized by SACS (Miller, 2001)	43
Figure 11: Three dimensional representation of the top and base of the primary aquifer. The vertical lines represent boreholes. The green-blue contour area represents the Uloa Formation lying between the incised paleochannels in the Cretaceous bedrock.....	43
Figure 12: Coastal Plains of Zululand contrasting with mountainous hinterland	47
Figure 13: Classification of topographical features in the study area	48
Figure 14: The historical floodplain within the coastal plain	48
Figure 15: Photograph of the berm that was constructed to separate the harbour (on the right) and the estuary (on the left)	49
Figure 16: Drainage channels indicated on shaded relief map	50
Figure 17: Coastal dunes prominent along the coastline. Erosion of the sand plain evident around Lake Mzingazi	51
Figure 18: Land Types	53
Figure 19: Geotechnical Constraints	54
Figure 20: Surface Hydrology within the study area.	56
Figure 21: Catchment Units for uMhlathuze Municipality, as defined in the ESMP.....	57
Figure 22: 1969 aerial photo of the Mhlathuze Estuary before development	58
Figure 23: Dyke with railway and road separating the harbour (left) from the estuary (right).....	58
Figure 24: Groundwater flow following the incline of the topography.....	59
Figure 25: Aerial view of Thulazihleka Pan	63
Figure 26: The extent of the riparian zone around Lake Nsezi and the port area.....	64
Figure 27: Evidence of mining operations impacting on the Mhlathuze River (September 2009).....	66
Figure 28: Sensitivity classes of ground water (Refer to Table 4 above).....	68
Figure 29: Vegetation in the study area.	73
Figure 30: Open space in Meerensee	86
Figure 31: View of Foskor (left) and Tata Steel (far right) with a foreground of degraded vegetation.	87
Figure 32: Visual quality.....	87
Figure 33: The use of land in the study area	92
Figure 34: Port area in 1974 (above) and circa 2006 (below).....	95
Figure 35: Photographs showing development status before and after industrial development; (Estuary in 1970, view south west from the coast) and (Grassland in 2009, view south from inland).	96
Figure 36: Location and extent of the Port Expansion Area and the IDZ in relation to other development pressures in the study area.	98
Figure 37: Richards Bay Main Industries in relation to the IDZ Area.....	100
Figure 38: Location of possible mining areas south of the study area	102
Figure 39: 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.....	103
Figure 40: Construction of a pipeline in a servitude. Note the extensive clearing of vegetation	105
Figure 41: Extract from the shaded relief map of the study area. Note the linear structures depicting road and railway networks, as well as the tailings dam protruding from low land.	107
Figure 42: Annual average SO ₂ concentrations at the RBCAA monitoring stations (Ecoserv, 2008) ..	109

Figure 43: Potential Health Impact Zone (99 th Percentile)	110
Figure 44: Nuisance Zone (Lowest Odour Detection Threshold)	110
Figure 45: Management Zone (Single Health Limit Exceedence)	111
Figure 46: Alert Zone (LOAEL* and Alert Threshold)	111
Figure 47: Environmental Impact Zone (Vegetation Sensitive)	112
Figure 48: Buffer Zones Based on Air Pollution Criteria	112
Figure 49: Potential Pollution Sources	115
Figure 50: Engineering Services: Water	117
Figure 51: Sanitation Infrastructure	119
Figure 52: Engineering Services: Stormwater	120
Figure 53: Sectoral contribution to GGP in the uMhlathuze Municipality (2008)	126
Figure 54: Existing and proposed nature reserves	131
Figure 55: Participatory map-making at a public meeting	137
Figure 56: Development constraints (Hydrological & Geotechnical Constraints)	139

EXECUTIVE SUMMARY

The baseline assessment in this report translates environmental information of the Richards Bay Port Expansion Area and Industrial Development Zone into data categories and features to create context and background for the preparation of an Environmental Management Framework (EMF). The purpose of this information is twofold. It uncovers the inherent sensitivity and environmental potential of the resource base in the study area and it defines the problems that should be managed in the area in order to promote sustainability.

The human-nature interface in the study area over the last 30+ years illustrates an area of tremendous progress and rapid economic growth. Large-scale landscape transformation took place since the development of the Port of Richards Bay in the late 1970s. To date ecosystems in the area coped well with this change but there are problems. The environment has deteriorated and resources are depleted. The boundaries and potential of the resource base have subsequently changed and will influence the extent to which future development can be accommodated.

Government's macro economic development policies recognise the study area as an international investment destination and expect progress and economic growth in Richards Bay to continue. The population of the area, which has increased in association with past growth, will also continue in conjunction with rural-urban migration trends. These trends are placing huge demands on the local municipality for creating jobs and delivering appropriate infrastructure and adequate services. The implications of these demands are becoming apparent. For example there is already insufficient land within the existing urban footprint to accommodate the housing demand. A shift is also needed to promote labour intensive business sectors as oppose to the capital intensive industries that provide few employment opportunities.

The first impression of the baseline situation is the inherent environmental sensitivity of the study area due to its position in the landscape. The area falls predominantly within a floodplain consisting of interconnected coastal lakes. This system has been exposed to large-scale transformation. It has significantly altered ecosystems, landscapes and their associated processes, and compromised species diversity patterns. Land-based activities in the study area are also compromising marine and coastal systems. Existing development pressures and trends are worsening the situation. In the face of continued transformation and human use of the area's resources, as well as global change, there is little doubt that Richards Bay will in the very near future be recognised as an area that has pushed integrated systems over 'thresholds of sustainability'. This potential scenario will have to be avoided at all cost. The risks are however very high. For example, the report shows that:

- The biodiversity richness in the study area is of global significance and vulnerable to change. Terrestrial, aquatic and estuarine ecosystem types are closely connected and spatially related to each other and to processes that happen at the landscape level. Together they constitute an ecosystem that plays a significant role in the maintenance of ecosystem goods and services, including maintenance of the adjacent marine environment. These systems are under pressure due to existing and planned developments and will require careful management of the open spaces to enable the system to sustain itself and the social and economic systems of the area.
- Industrial and related activities in Richards Bay have fully developed its air quality capacity and predictions were made to indicate that, in order to stay within “air quality limits”, no more air pollution activities should be allowed in the area. If these limits are exceeded it will increase pressures on the social, ecological and economic subsystems of the area and there is no reason to believe that these systems will be able to moderate potential damages or cope with the consequences. As regards this situation there is a real risk that Richards Bay may push integrated systems over thresholds of sustainability.
- The urban, industrial and mining sectors in Richards Bay have fully developed the local water supply capacity. Water is however being augmented from sources outside the catchment, while changes within the hydrological regime of the study area are compromising social and ecological subsystems. Predictions are that the demand for water will grow and there are questions around the adequacy of water to sustain the ecological reserve. These water limits cannot be exceeded without increasing pressures on the social, ecological and economic subsystems of the area. If this happens it will in effect mean that Richards Bay would have pushed integrated systems over “thresholds of sustainability”.

Past and current development pressures have changed the boundaries and potentials of the inherently sensitive resource base in the area. There are a number of development constraints. For example:

- Geotechnically most of the study area is unsuitable for development.
- Shallow groundwater levels and contamination risks make most of the area highly sensitive to development.
- Critical endangered grasslands are irreplaceable and should therefore not be made available for further development.
- Ecologically significant features such as intertidal mudflats and sandflats, and canal habitats, in the Richards Bay Port Estuary are critical for system maintenance, including sustenance of the prawn trawling industry off the KwaZulu-Natal east coast.

The second impression of the baseline situation is that Richards Bay and its inhabitants are very aware that they are progressing sustainable development in a very risky environment. This is particularly evident in the number and types of studies that have been undertaken over the last 5 years and the prevailing approaches to development planning. There is also an awareness of the need for eco-

efficient growth as is evident in the types of industrial responses in the area. Public contributions to date reiterate the need to give more attention to vulnerable groups in the area when developments are planned. Stakeholders have also raised concern about the small and rather artificial boundaries of the study area highlighting the need to respond to ecosystems and development pressures on a broader landscape level rather than a part of a system that is only focused on certain types of development.

The key message that is coming out of the status quo report is that future plans that are on the table may be in conflict with the environmental potential of the area as well as with each other. These plans need very careful consideration because the demand for land and resources may before long exceed supply. A risk-averse approach is especially required in future development planning considering that scientist can't say with certainty where the limits or thresholds of ecosystems are, an uncertainty that is exacerbated by the increasing threats posed by climate change. Reducing risks require urgent attention to the current uncoordinated and conflicting land use planning by the various developmental agencies with an interest in the area. These plans present divergent expectations and a deviation between the "what is" vs the "what should be". The undesirable development pressures in the study area must be kept within limits to avoid drastically reducing the flow of ecosystem services as this may increase pressures on the social and economic subsystems. The purpose of the EMF is to become the key informant for development planning. Its task is to close the gap between the current state and the desired state and to provide strategic guidelines to transform the current state into a desired one that represents a sustainable state. The next phase of the project will be focused on overcoming the obstacles that are presented.