STATE OF THE ENVIRONMENT REPORT 2015/2016

dube tradePORT

SOUTHERN AFRICA'S PREMIER AIR LOGISTICS PLATFORM

NEXT

CONTENTS

LIST OF FIGURES AND PLATES

LIST OF TABLES

ACTING CEO'S FOREWORD

THE STATE OF THE ENVIRONMENT REPORT IS JUST ONE MEASURE WE USE TO PROVIDE A BASELINE FOR TRACKING THE STATE OF OUR ENVIRONMENT AND DUBE TRADEPORT'S INFLUENCE ON IT. THE REPORT DISCUSSES SUCH IMPORTANT ENVIRONMENTAL METRICS AS AIR QUALITY, WATER MANAGEMENT, BIODIVERSITY AND HERITAGE, AMONG OTHERS.

Dube TradePort Corporation, a business entity of the KwaZulu-Natal Provincial Government, is charged with the responsibility to develop one of the province's biggest infrastructural projects, Dube TradePort. Dube TradePort is Southern Africa's premier air logistics platform, and (with King Shaka International Airport) forms the heart of the Durban Aerotropolis, which will seamlessly integrate road, rail and sea infrastructure, strengthening KwaZulu-Natal's status as the gateway to Southern Africa and enhancing the province's global connectivity.

Given the extent of this development, Dube TradePort has always been cognisant of its environmental footprint, and has consciously designed a sustainable approach to business.

The State of the Environment Report is just one measure we use to provide a baseline for tracking the state of our environment and Dube TradePort's influence on it. The report discusses such important environmental metrics as air quality, water management, biodiversity and heritage, among others. Some things to note from this year's report are the alien plant removal and rehabilitation initiatives, which form part of our offset programmes, and have become a highlight in our efforts towards improving the health of our ecosystems, as well as biodiversity.

Our water resource conservation management projects, which include rainwater harvesting and recycling, also continue to be vital to the operation and development of the Dube TradePort precinct, especially as we continue to face challenges posed by the drought. While waste management has already been effective in waste minimising, recycling and re-use as we continue our monitoring efforts, we are pleased that the current report indicates a sustained positive trend in this regard.

Thus far many policies, procedures and programmes have been put in place that will help Dube TradePort Corporation achieve our sustainability goals. Aspects related to reducing the carbon footprint, public transport, stakeholder engagement, renewable energy, responsible water management, rehabilitation of land and investment in staff and surrounding communities are being encouraged and practised, although there will always be room for improvement.

The compilation of our Carbon Footprint Report has become invaluable in giving us a dashboard view of our climate change impacts, and therefore assisting us to continuously assess our current and future carbon offset projects. To assist with better monitoring and reporting, the intention is to introduce an integrated electronic reporting system to ensure the most efficient and streamlined method of gathering information.

This is Dube TradePort's third State of the Environment Report; it demonstrates the progress our business has made and the challenges that lie ahead. Moreover, we trust that this report will exemplify the organisation's commitment to environmental sustainability.

This report will also help us, as management and staff, to understand the effectiveness of our management approach, so that we may tailor our programmes and responses to address immediate and long-term environmental challenges.

I have no doubt that Dube TradePort will continue to lead by example. I call upon all stakeholders to embrace the commitment to environmental sustainability that Dube TradePort Corporation has made, and thank you all for your ongoing efforts in this regard.

Hamish Erskine

Acting Chief Executive Officer

EXECUTIVE SUMMARY

OVERALL TREND: STABLE, WITH AREAS OF IMPROVEMENT REPORTED ACROSS THE VARIOUS THEMES

DUBE TRADEPORT WAS ESTABLISHED WITH THE AIM OF CREATING ECONOMIC OPPORTUNITIES THAT BENEFIT KWAZULU-NATAL. IT IS INTENDED TO BE THE GLOBAL TRADE GATEWAY INTO SOUTHERN AFRICA, AND THE REST OF THE WORLD.

In the 2013/14 State of the Environment Report (SoER) the future outlook of Dube TradePort was relatively positive, although admittedly much work and commitment was still required. It was anticipated that Dube TradePort would progress to an improving trend within the next reporting cycle, i.e. 2014/15. Although much work has been done in the way of planning and reporting, it is still felt that far more must be realised through implementation before an improving trend can be reported. For this reason, the trend for Dube TradePort SoER 2015/16, compared with the last reporting cycle, is perceived to be stable.

Dube TradePort Corporation was established with the aim of creating economic opportunities that benefit KwaZulu-Natal. It is intended to be the global trade gateway into Southern Africa, and the rest of the world. It is the first 'greenfield' South African international airport city, with dedicated zones for hotels, offices, warehouses, a cargo terminal, a retail sector and an agricultural zone. Located approximately 35km north of Durban, it is in close proximity to two of the major seaports in South Africa and is connected to the rest of Africa by road and rail.

In both its first State of the Environment Report in 2011/12, the second iteration in 2013/14, and in this report (2015/16), Dube TradePort Corporation has set out to provide an update of the baseline environmental information obtained since the operation began in 2010 and to determine the effectiveness of measures already in place. The willingness of Dube TradePort Corporation to undertake this process underscores the organisation's commitment to sustainability.

A SoER describes the condition of the environment against a set of key environmental indicators. It provides an evaluation of the status of the environment and establishes linkages to the socio-economic and political environment. The report is based on the international Drivers-Pressures-State-Impact-Responses (DPSIR) framework, which is used for most South African SoE reports. Indicators used in this framework are representative of various environmental aspects or features.

The SoER is an important tool that can be used by decision-makers to determine how best to utilise natural resources and ecological goods and services, and to determine the best management and monitoring to improve or maintain the current state. The findings of this SoER were mostly positive, although there were some indicators that identified areas where the management focus will need to be adjusted. Overall, the report should be used to celebrate Dube TradePort Corporation's successes and inform the process of continuous improvement.

Recommendations have been offered throughout this report to assist Dube TradePort Corporation with achieving its goals. However, it is also perceived that there are gaps in what has been presented in this report and that, through better monitoring and reporting, future SoERs could show a significant improvement in the status quo.

Lastly, it is recommended that future reports consider grading the status of the various aspects that are reported upon. This may assist with illustrating activities that are in an excellent state, but perhaps not improving: e.g. the trend may be reported to be stable, but the condition is good. This may better represent Dube TradePort and its various activities.

Table 1 contains a summary of the various chapters, issues and indicators reported on, as well as the findings and trends that have been identified.

KEY TO TREND INDICATORS	
Improving	
Stable	
Declining	

EXECUTIVE SUMMARY
(continued)

TABLE 1: SUMMARY OF THE 2015/16 REPORT FINDINGS

THEME	ISSUE	INDICATORS	DESCRIPTION	TREND
Governance and Integrated Environmental Management	Integrated Environmental Management	Percentage compliance with authorisations, licences and permits (%)	DTPC remains compliant and continues to maintain a high level of compliance at 96.6%.	
		Percentage budget allocated to environmental management (%)	A total budget of R10 000 000 was allocated (and spent) for the 2015/16 financial year.	
	Sustainable procurement	Percentage of locally sourced services and materials (%)	A clear trend could not be determined for this indicator, due to both a lack of data and a lack of historical data for comparison.	
	Sustainable development	Percentage of tenants on green leases (%)	There are currently no tenants on full green leases. However, DTPC has included voluntary disclosure clauses for energy, water and waste data in the lease agreements.	
		Percentage energy from renewable sources (%)	The energy sourced from renewable sources is on the increase.	
		Percentage emissions offset (%)	The percentage of offsets will increase as DTPC understands the need to reduce GHG emissions that contribute to climate change.	
		Percentage investment in skill development of staff (%)	The target of 2% has been exceeded, with 2.9% spent on investment in skills development. This is a total spend of R1 763 050. DTPC's Corporate Social Investment department's annual reporting indicates that it has been a productive and successful year, with much effort made to ensure that investment was linked to DTPC's key focus areas, specifically education and skills development.	
		Percentage staff employed from surrounding communities (%)	DTPC continues to generate jobs (locally), but due to the lack of data it is difficult to determine whether there has been an increase or decline.	

EXECUTIVE SUMMARY
(continued)

TABLE 1: SUMMARY OF THE 2015/16 REPORT FINDINGS (CONTINUED)

THEME	ISSUE	INDICATORS	DESCRIPTION	TREND
Land and transformation	Land use and rate of change	Rate of change of land cover (%)	The current trend associated with land and transformation is regarded as stable, with incremental increases in land transformation and loss of natural land cover. A continued emphasis on projects that promote sustainability is evident from Dube TradePort Corporation's annual reports and a number of initiatives, which seek to address efficient use of resources and rehabilitation of degraded natural areas.	
Biodiversity and ecology	Species and ecosystem diversity	Change in species diversity (number of species)	Dube TradePort has made significant efforts to remove alien plant species, plant locally-occurring indigenous species and improve management of natural areas.	
		Change in natural ecosystems (ha)	The Biodiversity Offset Management Plan and Conceptual Rehabilitation and Restoration Plan will see a total of 878ha set aside for various conservation activities, a 13.6% increase from the original 773ha indicated in the EIR.	
		Area of critical ecosystems rehabilitated (ha)	As of 2013, 10ha has been prepared and 58.2kg seed sown. In addition, about 30.04ha have been prepared for the sowing of 6484.75kg of grass seed.	
	Alien and invasive species	Change in alien and invasive species (ha)	Alien clearing work has been taking place since 2012/13 with 357ha reported to be cleared. In 2013/14 a further 420.38ha were cleared. In 2014/15 efforts expanded to include 150ha of plantation. It is anticipated that a further 85ha will be cleared in 2015/16, supported by ongoing maintenance of areas that have already been cleared.	

EXECUTIVE SUMMARY
(continued)

TABLE 1: SUMMARY OF THE 2015/16 REPORT FINDINGS (CONTINUED)

THEME	ISSUE	INDICATORS	DESCRIPTION	TREND
Water management	Water demand versus availability	Water demand per category (kl/day)	There has been a reduction in the amount of water used from municipal sources, with Dube AgriZone showing the greatest improvement. The use of municipal water by DTPC overall has reduced from 514.37kl/day (2012) to 229.02kl/day (2015), which represents approximately a 45% reduction.	
	Water quality of natural systems	Increase/decrease of treated water quality (various)	The Southern Waste Water Treatments Works is continuing to improve the quality of treated effluent produced, but the percentage of days that exceeded the GLVs is still an issue.	
		Increase/decrease of quality of stormwater run-off (various)	The water quality of the stormwater run-off is declining as most of the parameters exceeded the prescribed GLVs, but it is important to note that the level rate of the decline in water quality is an improvement on the values noted the previous year.	
		Surrounding wetland health status (various)	The wetland systems that have been assessed have been described as 'Largely Modified' to 'Critically Modified' which is the same condition as the previous iteration.	
		Surrounding river health status (various)	There have not been any comprehensive studies conducted on the rivers surrounding DTPC.	

EXECUTIVE SUMMARY
(continued)

TABLE 1: SUMMARY OF THE 2015/16 REPORT FINDINGS (CONTINUED)

THEME	ISSUE	INDICATORS	DESCRIPTION	TREND
Natural and cultural heritage	Existence of heritage resources on Dube TradePort land and how they are being impacted upon	Number and type of natural heritage sites	DTPC acknowledges the importance of heritage resources and has adhered to the recommendations made by specialists.	
		Number and type of cultural heritage sites		
		Current use of heritage sites		
		Access to heritage sites	The Memorial Garden is the only sensitive site in DTPC, and access to this site is still allowed.	
Air quality	Air pollution and climate change	Carbon dioxide emissions by source (CO2e/annum)	The highest contributor of carbon emissions within Scope 1 and Scope 2 analysis is Dube Cargo Terminal, where most of the emissions are due to energy consumption. The Support Zones account for the second highest contribution to carbon emissions, which is also due to high levels of energy consumption.	
		Percentage emissions offset (%)	It is anticipated that an improvement in emissions will be seen as a result of the initiatives DTPC has embarked upon to counter, and offset, the carbon footprint emanating from the aerotropolis.	

EXECUTIVE SUMMARY
(continued)

TABLE 1: SUMMARY OF THE 2015/16 REPORT FINDINGS (CONTINUED)

THEME	ISSUE	INDICATORS	DESCRIPTION	TREND
Waste management	Waste generation and characterisation	Waste generation by source and type (ton/annum)	Waste generation and characterisation has improved across all operational zones compared to the 2013/14 SoER. During the 2013/14 period, a total waste volume (recyclable and non-recyclable waste) of 280.10 tonnes was produced. By 2014/15, waste volumes had increased to 298.62 tonnes, while in 2015/16 waste volumes had decreased to 152.10 tonnes. In terms of waste separation, the current ratio of recyclable to non-recyclable waste across all the operational zones is 2:3. The amount excludes the March 2016 waste volumes for Dube AgriZone.	
	Waste minimisation and disposal strategies	Percentage waste diverted from landfill, e.g. reduced, reused, recycled (%)	Waste being diverted from landfill/recyclable waste has improved compared to the 2013/14 SoER. In 2013/14, 94.28 tonnes of recyclable waste was produced across all operational zones. This amounts to 34% of the total waste volume. By 2014/15, the amount of waste had increased to 144.19 tonnes. Although waste volumes increased, approximately 48% of total waste was recycled across all operational zones. This is an improvement compared to the previous year. During the 2015/16 period, waste volumes decreased to 71.58 tonnes. Recyclable waste decreased slightly to 47.06% across all operational zones.	
		Percentage waste disposed (%)	The percentage of waste being disposed at landfills has improved and is constantly decreasing. During the 2013/14 period, 185.82 tonnes of waste was produced. Approximately 66% of total waste was considered non-recyclable. Non-recyclable waste volumes decreased to 154.43 tonnes in 2014/15. This amounts to 52% of total waste across all operational zones. By 2015/16, waste volumes further decreased to 80.52 tonnes. This amounts to 52.94% of the total waste volumes.	

1. INTRODUCTION

THE QUANTITY AND QUALITY OF OUR NATURAL RESOURCES HAVE BECOME A PRIORITY CONCERN, REQUIRING A CONCERTED EFFORT BY ALL SPHERES TO ENSURE THAT ENVIRONMENTAL INTEGRITY AND RESILIENCE IS PRESERVED.

The various components of the environment provide the resources necessary for all forms of life to flourish. In addition, ecosystems and the goods and services they provide are fundamental to human health and well-being. However, the progression of human development is often to the detriment of the environment and the functioning of ecosystems. The quantity and quality of our natural resources have become a priority concern, requiring a concerted effort by all spheres to ensure that environmental integrity and resilience is preserved. In addition, the world is increasingly facing an unpredictable future, with unprecedented changes to economic, environmental and social systems and ways of life. This further resonates with, and is acknowledged in, the National Development Plan (NDP) as published by the Department of the Presidency for the Republic of South Africa. One of the ten 'critical actions' identified in the NDP is stated as 'interventions to ensure environmental sustainability and resilience to future shocks' (NPC, 2011).

In view of the above, the NDP identifies the building of environmental sustainability and resilience as a national imperative and articulates the following:

'From an environmental perspective, South Africa faces several related challenges, some of which are in conflict. The country needs to:

- Protect the natural environment in all respects, leaving subsequent generations with an endowment of at least equal value;
- Enhance the resilience of people and the economy to climate change;
- Extract mineral wealth to generate the resources to raise living standards, skills and infrastructure in a sustainable manner; and
- Reduce greenhouse gas emissions and improve energy efficiency.'

A State of Environment Report (SoER) therefore provides an account and gauge of the current state of processes, as well as a description of the trends that can be used to determine the progress towards sustainability. A SoER further provides an understanding of the variations in the environment, thereby allowing systems to become adaptable and resilient to change in social and economic areas, as well as assisting in informed decision making.

As such, a SoER provides a 'report card' on the quality and functioning of the environment. Following the general definition of a report card, the SoER for Dube TradePort Corporation aims to define:

- What is happening within Dube TradePort?
- Why is this happening?
- Are these changes significant?
- What is being done to address these changes?
- What are the sustainable development objectives for Dube TradePort Corporation, its organisational structures, staff, tenants and the surrounding communities?
- What can be done to achieve a more sustainable state of living for all people and ecosystems?

DUBE CITY (FRONT) WITH KING SHAKA INTERNATIONAL AIRPORT

DUBE AGRIZONE GREENHOUSE EXTERIOR

DUBE CARGO TERMINAL

1. INTRODUCTION
(continued)

As of December 2013, national and provincial 'environmental outlook' reporting is required in terms of an amendment to the National Environmental Management Act (Act 107 of 1998). According to the National Environmental Management Laws Second Amendment Act (Act 13 of 2013), both the National Minister and Provincial MECs have to prepare four-yearly Environment Outlook Reports.

The 2015/16 SoER will be the third iteration of reporting of this nature for Dube TradePort Corporation. In both the 2011/12 and 2013/14 reports, Dube TradePort Corporation set out to provide an update of the baseline environmental information since the operation of the Phase 1 development and to determine the effectiveness of measures already in place. A trend showing overall improvement has been noted throughout the reporting history, with recommendations identified for future improvement.

1.1 DUBE TRADEPORT CORPORATION

Dube TradePort is intended to act as the global trade gateway for Southern Africa, by providing a gateway between KwaZulu-Natal and the rest of the world. It is the first greenfield South African international airport city with dedicated zones for hotels, offices, warehouses, a cargo terminal, a retail sector and an agricultural zone. Located approximately 35km north of the City of Durban, it is in close proximity to two of the major seaports in South Africa and is connected to the rest of Africa by road and rail. Dube TradePort is composed of several development zones, namely:

- Dube City (Support Zone 1)
- Dube AgriZone
- Dube Cargo Terminal
- Dube TradeZone
- Dube iConnect

DUBE CITY

Dube City is described as South Africa's hub of international trade and business. Dube City aims to provide a secure, cosmopolitan environment that is within walking distance of the airport, reflecting the unique cultural diversity of KwaZulu-Natal and with architecture that makes full use of the superlative coastal climate and the surrounding natural environment. It is pedestrian orientated, with several walkways and parks.

Dube City (Support Zone 1) covers a total area of 12 hectares and offers fully serviced sites that have development rights. It is a developer driven, high-quality, managed public environment. Once complete, it will be one of Africa's first green precincts.

DUBE AGRIZONE

Dube AgriZone is a 20 hectare development with 16 hectares of greenhouses for flower and vegetable production, a tissue culture laboratory, a research centre and an indigenous plant nursery. The aim is to provide a centre for excellence and a model of new technology, production methods, training and research in high-value agriculture in KwaZulu-Natal for the entire SADC region.

Dube TradePort intends to develop Dube AgriZone 2. The facilities that have been envisioned for this area include: aquaponic facilities (within buildings), production, packaging and processing facilities (within buildings), packhouses (i.e. hydroponic packhouses), a distribution centre, a waste-to-energy renewable energy plant, a canteen and a mini substation, a rainwater harvesting area (collection area), rainwater harvesting ponds, water storage tanks, flush water ponds, a stormwater attenuation pond, roads and turning circles, and an entrance/access gate house.

DUBE CARGO TERMINAL

Dube Cargo Terminal is connected to the airside and Dube TradeZone. The terminal is SARS and CAA approved and recognised as a Part 108 Compliant facility. Dube Cargo Terminal consists of 13 000m^2 of warehouse floor space and 2 000m^2 office space, with an annual handling capacity of 100 000 tonnes and a projected capacity of 200 000 tonnes by 2060.

DUBE TRADEZONE

Dube TradeZone is for freight warehousing, logistics and distribution and is one of the most secure facilities in South Africa. In addition, Dube AgriZone 1 and Dube TradeZone 1 have certification in terms of Special Economic Zone (SEZ) status. Development within Dube TradeZone is aimed at ensuring a high-quality managed public environment with maximum security.

DUBE ICONNECT

Dube iConnect aims to provide world-class telecommunications, information technology and value added services to users in and around Dube TradePort. Dube iConnect is committed to providing services in line with the global advancement in technology, therefore ensuring that the quality gap is reduced between Southern Africa and the rest of the world.

DUBE TRADEZONE 1

DUBE ICONNECT DATA CENTRE

2. REPORTING FRAMEWORK

THE SOER PROCESS HELPS DUBE TRADEPORT CORPORATION TO MAKE INFORMED DECISIONS ABOUT ENVIRONMENTAL MANAGEMENT, AND PRESENTS INFORMATION ABOUT THE CONDITION AND QUALITY OF THE ENVIRONMENT, INFORMING DUBE TRADEPORT CORPORATION'S MANAGEMENT ABOUT WHAT IS BEING DONE TO IMPROVE AND ENHANCE IT, WITH THE AIM OF ACHIEVING SUSTAINABLE DEVELOPMENT.

A State of the Environment Report (SoER) describes the condition of the environment using a set of key environmental indicators. It evaluates the status of the environment, and establishes linkages to the socio-economic and political landscape. The report is designed to cover a full range of environmental issues, reporting on changes over time. Ultimately, a SoER should guide us towards sustainable resource management (DEAT, 2006a).

The SoER process helps Dube TradePort Corporation to make informed decisions about environmental management and presents information about the condition and quality of the environment, informing Dube TradePort Corporation's management about what is being done to improve and enhance it, with the aim of achieving sustainable development. Therefore, the SoER is a 'report card' on the condition or quality of the environment, giving information on how we affect the environment and how the environment affects us.

The reporting framework for this SoER is based on the definition of 'state of environment reporting' as www.environment.gov.za:

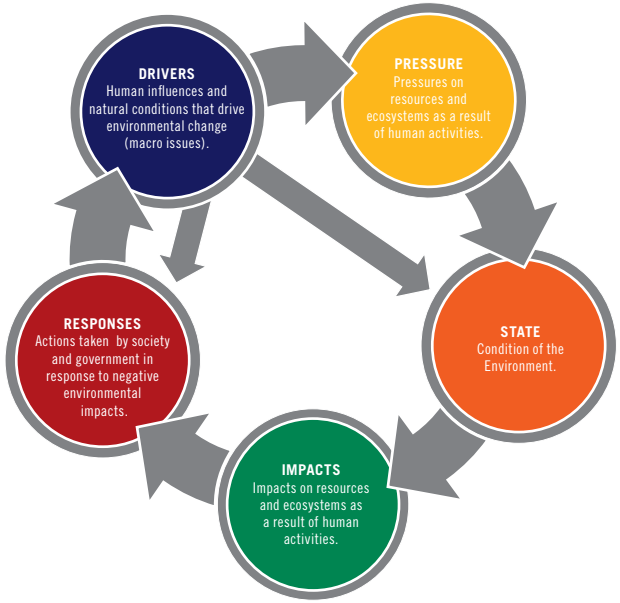
'The SoER describes the condition of the environment against a set of key environmental indicators. It provides an evaluation of the status of the environment and establishes linkages to the socio-economic and political environment. In this manner, the report is also intended to provide a broad audience with an overview of the state of seven environmental themes.

The SoER is based on the international Drivers-Pressures-State-Impact-Responses (DPSIR) framework, which is used for most South African SoE reports. Indicators that are representative of various environmental aspects or features are used under this framework.'

Figure 1 provides further detail on the components of the DPSIR framework.

Experience has shown that the DPSIR framework can easily be misinterpreted, resulting either in under-reporting or overstating particular components of the framework, or in resources wasted on reporting irrelevant or less useful indicators. To avoid such inefficiencies, the framework is described carefully up front in a simpler format that can provide the necessary guidance to specialists (NB: the full framework is still used in the report).

FIGURE 1: THE DPSIR REPORTING FRAMEWORK (ADAPTED FROM UNEP/GRID-ARENDAL MAPS AND GRAPHICS LIBRARY, 2002)



This configuration implies that strong focus should be placed on the identification of indicators that describe the 'State' of the environment. If 'State' indicators are identified, then it will ensure that only relevant 'Drivers/Pressures' and 'Impacts/Responses' are reported. This will refine and streamline the reporting process, guaranteeing quality outcomes. The relevant indicators can be found in each of the following chapters.

2.1 REPORT STRUCTURE AND THEMES

As outlined above, reporting will follow the DPSIR Framework and this includes the use of indicators similar to those used in the previous SoER, to ensure consistency and continuity. Importantly, this will also allow for the identification of trends that are applicable to the environmental dynamics taking place within Dube TradePort, and the management of those dynamics by Dube TradePort Corporation.

2. REPORTING FRAMEWORK
(continued)

IT SHOULD ALSO BE NOTED THAT SOE REPORTS DO NOT ALWAYS SHOW 'GOOD NEWS'. IRRESPECTIVE OF THE FINDINGS, IT IS IMPORTANT TO ENSURE THAT THE REPORT IS TRANSPARENT AND ACCURATE SO THAT MANAGEMENT AND BEHAVIOUR IS INFLUENCED APPROPRIATELY.

The intention is to follow a report structure that compliments the DPSIR Framework, but that is also accessible to Dube TradePort and the general public. Each of the following themes are reported on, providing a full complement of environmental management aspects at Dube TradePort:

- Governance and Integrated Environmental Management;
- Land and Transformation;
- Biodiversity and Ecology;
- Water Management;
- Natural and Cultural Heritage;
- Air Quality; and
- Waste Management.

Drivers and pressures tend to be universal across the themes, although they may be found in different States and Impacts for different environmental aspects. For this reason, the main driving forces of change are presented as a separate chapter (Chapter 3). Each of the theme chapters focuses on issues relevant to that environmental aspect.

Emerging issues and trends are also elaborated upon in this report. This refers to any changes of varied spatial and temporal levels (i.e. international trends, norms and standards, new technology) that may influence Dube TradePort Corporation.

2.2 SUMMARY OF REPORTING INDICATORS

The selection of appropriate indicators is an important step in ensuring that the SoER reflects a complete overview of Dube TradePort Corporation. These indicators should, therefore, be continually reviewed and revised where appropriate. The indicators presented in this report are based on the 2013/14 report, to ensure that this SoER report can be compared to those of both 2013/14 and 2011/12, and in an effort to identify trends (refer to Executive Summary for full description of indicators).

Equally important is the availability of data on the selected indicators. Monitoring and reporting consistently will allow Dube TradePort Corporation to compare the findings of report iterations, and to track trends. Monitoring and reporting is taking place in most instances. However, the 2013/14 report indicated that there was need for some improvement in this regard. The current report will engage with new projects that have been undertaken, and any adjustments to monitoring and evaluation in response to the addition of these indicators.

It should be noted that only indicators of 'State' are set in this report and the other aspects of 'Drivers', 'Pressures', 'Impacts' and 'Responses' support the information provided by these 'State' indicators to present a full perspective of the trends taking place.

2.3 REPORTING GAPS AND LIMITATIONS

State of the Environment Reporting does not generate primary (new) information. It relies on existing data and information, such as studies, reports, audits and other information already produced. Royal HaskoningDHV has assumed that all information provided by Dube TradePort Corporation – both in writing and through verbal communication – is correct and accurate. Royal HaskoningDHV has further assumed that all relevant documentation and information has been provided and, therefore, a complete and accurate representation of the information available can be found in this report.

It should also be noted that SoE reports do not always show 'good news'. Irrespective of the findings, it is important to ensure that the report is transparent and accurate so that management and behaviour is influenced appropriately. The report is a useful tool to identify where changes need to be made or where greater management or action is required to ensure that Dube TradePort Corporation achieves its vision.

3. DRIVERS

THE PRESSURES FACED BY DUBE TRADEPORT CORPORATION ARE, SUBSEQUENTLY, THE PROVISION OF SERVICES WHICH MAKES DUBE TRADEPORT A LEADING ECONOMIC HUB, AS IDENTIFIED IN BOTH THE STATE OF THE ENVIRONMENT AND SITUATIONAL ANALYSIS REPORTS OF KWAZULU-NATAL.

South Africa displays an economic growth pattern typical of a developing country. This is characterised by urban sprawl and the development of edge cities, or cities formed away from the central city core of a municipality. Such growth inevitably leads to the development of economic hubs, which are characterised by a specific dominant land use and are often economically self-sufficient.

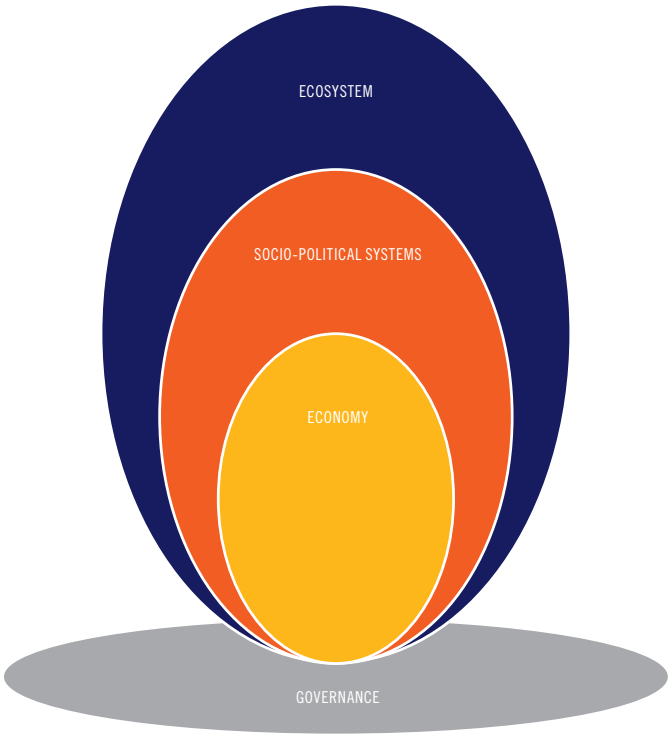
In the context of South Africa, it should be noted that the enhancement and expansion of the existing OR Tambo International Airport within the Ekurhuleni Metropolitan Municipality was the first aerotropolis, through modification of the existing development node (DTPC, 2013b). However, Dube TradePort enjoys the position of being the first purpose-built aerotropolis, with Dube TradePort itself being intended to form a dominant portion of the overall development from inception.

The pressures faced by Dube TradePort Corporation are, subsequently, the provision of services which makes Dube TradePort a leading economic hub, as identified in both the State of the Environment and Situational Analysis reports of KwaZulu-Natal. Furthermore, Dube TradePort Corporation faces the obligations of legal compliance and, therefore, developmental and operational compliance with the conditions set out in various environmental authorisations (previously referred to as Record of Decisions (RoDs)) and hereafter referred to as Environmental Authorisations (EAs), linked permits, and licences. Other drivers of change are elaborated upon below.

3.1 SUSTAINABLE DEVELOPMENT

In South Africa, the expression of sustainability as a 'nested' model is described in the National Strategy for Sustainable Development (NSSD) (DEA, 2011b) and Chapter Five of the National Development Plan (2030) which recognises and expresses the dependencies that exist between society, the economy and the natural environment (Figure 2). It implies that any deterioration of one aspect will result in a concurrent deterioration in the others. It therefore guides our interpretation of the indicators in this SoER (i.e. is the indicator showing an improvement or decline?) and consequently how Dube TradePort Corporation can plan for a more sustainable future.

FIGURE 2: CONCEPTUALISATION OF SUSTAINABLE DEVELOPMENT (DEA, 2011)



The NSSD and its conceptualisation of sustainable development are the local expression of the ongoing international negotiations, following the 1992 World Summit on Sustainable Development. The local response included a political declaration, the Johannesburg Plan of Implementation (JPOI) 2 and the National Framework for Sustainable Development (NFSD) in 2008 (DEAT, 2008), which gave rise to the NSSD1 in 2011 (DEA, 2011) and numerous subsequent documents.

3. DRIVERS
(continued)

The JPOI contains commitments and priorities for action on sustainable development in specific areas. It outlines 37 negotiated targets, including Paragraph 162 which reads as follows: 'States should take immediate steps to make progress in the formulation and elaboration of national strategies for sustainable development and begin their implementation by 2005' (www.un.org). The NFSD is the local response to the JPOI and contains South Africa's vision for a 'sustainable society'. It is aimed at '…all social partners and all organs of state within the national, provincial and municipal spheres to progressively refine and realign their policies and decision making systems…' (DEAT, 2008). As such, it acts as the framework driving appropriate policy and strategy shifts, and identifies strategic areas for intervention that respond to South African needs, priorities and targets, as well as to key international targets set out in the Millennium Declaration, the JPOI, and other regional and international commitments.

In order to facilitate the achievement of sustainable outcomes, the NSSD1 was developed for the period 2010-2014 as the 'action plan' of the NFSD. Five priorities identified in the NFSD as 'pathways to sustainable development' were reformulated as shown below in Table 2, showing a shift towards responsiveness to global climate change, following the adjustment of the original NFSD to take cognisance of recent developments, namely the global financial crisis, the international focus on climate change and the international emphasis on the 'green economy' (e.g. UNEP 'Global Green New Deal').

Three key foundations remain crucial to ensuring the shift to a more sustainable future (DEAT, 2008):

- Non-negotiable ecological thresholds must not be exceeded;
- Natural capital must be retained; and
- The precautionary principles will need to be exercised.

These principles of sustainable development are promoted in the National Development Plan (NDP) endorsed by Cabinet early in September 2012, which is the key planning document for government to implement until 2030 (NPC, 2011). As such, Dube TradePort Corporation needs to take these principles into account and internalise them in both strategic processes and operations.

TABLE 2: SUSTAINABLE DEVELOPMENT PRIORITIES, AS CONTAINED IN THE NFSD (2008) AND THE NSSD1 (2011)

NFSD, 2008	NSSD1, 2011
1. Enhancing systems for integrated planning and implementation	1. Enhancing systems for integrated planning and implementation
2. Sustaining our ecosystems and using natural resources efficiently	2. Sustaining our ecosystems and using natural resources efficiently
3. Economic development through investing in sustainable infrastructure	3. Towards a green economy
4. Creating sustainable human settlements	4. Building sustainable communities

3.2 GROWTH AND DEVELOPMENT

The National Development Plan (NDP) aims to eliminate poverty and reduce inequality by 2030. It states that South Africa can realise these goals by drawing on the energies of its people, growing an inclusive economy, building capabilities, enhancing the capacity of the state, and promoting leadership and partnerships throughout society.

The NDP aims to ensure that all South Africans attain a decent standard of living through the elimination of poverty and reduction of inequality. The core elements of a decent standard of living identified in the NDP are:

- Housing, water, electricity and sanitation;
- Safe and reliable public transport;
- Quality education and skills development;
- Safety and security;
- Quality health care;
- Social protection;
- Employment;
- Recreation and leisure;
- Clean environment; and
- Adequate nutrition.

The planning processes carried out by departments and other government entities (such as Dube TradePort Corporation) will have a vital role to play in bringing the vision and proposals contained in the NDP to life.

The implementation plan further indicates how the NDP proposals are being incorporated into the existing activities of departments, and broken down into the medium- and short-term plans of government at national, provincial and municipal level. The NDP provides the golden thread that brings coherence and consistency to these different plans. The NDP concludes that 'over the short term, policy needs to respond quickly and effectively to protect the natural environment and mitigate the effects of climate change'. The NDP also states that one of the objectives to facilitate environmental sustainability and resilience will be to 'put in place a regulatory framework for land use, to ensure the conservation and restoration of protected areas' and to establish 'an independent Climate Change Centre, in partnership with academic and other appropriate institutions … to support the actions of Government, business and civil society' (NPC, 2011).

3. DRIVERS
(continued)

A growing human population results in an increased demand for goods and services to meet their needs, which will exert more pressure on biodiversity, comprising ecosystems, species and genes. The eThekwini Municipal Area has already, by estimation, been transformed by 53% and is likely to continue with the current projected growth of the human population. Urban, industrial and agricultural development takes place to provide for the increasing needs of the growing population. In so doing, the natural environment becomes fragmented and the connectedness is lost, which makes it difficult for organisms and propagules to migrate between core areas (McNulty Consulting, 2014).

Dube TradePort's growth is being shaped by:

- Firms providing air transportation services;
- Firms which are frequent consumers of air transportation;
- Businesses which cater to the ancillary needs of air travelers and employees; and
- Companies that are searching for accommodating locations, with good regional highway access and better tax rebates due to Special Economic Zone (SEZ) status.

These various types of business activities result in accelerating airport area growth in a largely organic manner.

In addition, the rapid growth and development of Dube TradePort is placing an ever-increasing pressure on the environment (DTPC, 2013c). Loss of the natural resource base, and increased demand on energy, water and waste generation all have the potential to impact the environment if not managed correctly (DTPC, 2013c).

Against this background, it is therefore important to balance economic and infrastructural growth with the limits of the natural resource base, ensuring that all plans feature concepts of sustainability and corporate responsibility that recognise the 'triple bottom line'. The drivers identified include the development and execution (i.e. construction) of a Master Plan, which aims to realise the goal of a 'green', carbon-neutral aerotropolis (DTPC, 2012).

3.3 CONSUMER BEHAVIOUR

Consumerism is driven by a number of social and demographic factors. As the economy grows, the wealth filters down the various income levels and people have more disposable income to purchase items, such as food, clothing and electronics (Deloitte, 2013). Their spending is dictated and shaped through media and other influences. This creates a greater demand for consumer goods as the population increases.

This increased consumption rate places pressures on the environment and results in the increased use of natural resources, raw materials, an increased volume of waste generated, and increased levels of pollution and degradation. Increased consumption, in the absence of significant reuse or recycling of waste materials, implies that more waste will be sent to landfill sites, thus requiring more land to be cleared and destroying natural habitats to make way for these new landfill sites. In addition, increased consumption would require the extraction of new resources to generate new products.

3.4 GROWING MIDDLE CLASS

During the past 30 years, the middle class in Africa has tripled in size, with one in three people considered to be living above the poverty line. The current trajectory suggests that the African middle class will grow to 1.1 billion people (42%) in 2060 (Deloitte, 2013). While this is a positive indication of a growing economy with consequent improvements for human well-being (in a monetary sense), this has consequences for waste generation. As consumption increases, so does the volume of waste. Wealthier communities are the biggest generators of waste, because they are typically larger consumers of commercial products. In addition to an increasing population, more people are moving into the middle class financial bracket, associated with increased levels of consumption and, therefore, higher levels of waste generation.

3.5 LOSS OF BIODIVERSITY THROUGH URBANISATION

Biodiversity provides resources needed in social and economic development. Roberts, Mander and Boon (2001) commented on the rapid increase of the urban population and the associated needs of the people, and the economy specifically, where it relates to clean air and water. Components of the biodiversity collectively make up and determine the stability of ecosystems (Hoogervorst, 2004).

Stable ecosystems are able to withstand the impact of occasional disturbances. South Africa has experienced a decline in biodiversity due to urbanisation, agricultural expansion, industrialisation, and the infestation of alien invader plants, amongst other factors. With the decline in biodiversity, ecosystems are also lost and the ability of nature to purify water, produce clean air, prevent soil erosion, provide natural resources to humans and animals have also declined.

This negative impact on other ecosystems occurs further along the continuum. Erosion of upslope areas leads to sediment deposits in the wetlands below (Fuggle and Rabie, 2000). Wetlands covered in silt can no longer filter the water properly, leading to inferior water quality downstream. In the Dube TradePort area, the diverse natural vegetation was removed long ago and replaced with monoculture sugar cane fields. All the species of insects, invertebrates, mammals and birds dependent on the natural vegetation were displaced. Adding to this transformation, there is the onslaught of alien invasive plants on the remaining areas of natural vegetation competing for natural resources and putting the indigenous vegetation under pressure.

ALIEN VEGETATION CLEARING

3. DRIVERS
(continued)

Local communities use natural resources for fuel, handcrafts, traditional medicine or cultural practices. With the loss of the natural resources close to their homes, the socio-economic environment becomes compromised as the resources they rely upon become scarce, making it difficult to maintain livelihoods. This shortage then puts pressure on other neighbouring environments where such resources are still available (DTPC, 2014d).

The most significant cause of the loss and degradation of biodiversity systems is the use of natural resources by humans for economic and social development (Govender, 2013). On a local scale, the current and predicted future pressures that lower ecosystem health include:

- The loss of natural habitat due to urbanisation and informal settlements, agriculture, mining (quarrying and river sand-mining) and infrastructural development;
- Climate change;
- Invasion by alien species;
- Modification of rivers;
- Water abstraction;
- External inputs of nutrient loading because of inadequate management of sewage; and
- Over-exploitation and over-grazing.

3.6 CONSERVATION MANAGEMENT

Understanding of the interface of biodiversity with governance can be greatly enhanced by acknowledging and analysing biodiversity as part of a Social-Ecological System (SES) (Cox and Moore, 2000). Effective implementation of the Convention on Biological Diversity (CBD) at the city level can happen through good governance, but is dependent on Governmental and non-Governmental contributors, in collaboration with surrounding cities, other levels of Government and international organisations.

The management and conservation of biodiversity in South Africa has not had a substantial institutional change during the past five years. This is the case for national and provincial departments, public entities, agencies, municipalities and active Non-Government Organisations (NGOs). Increased cross-sector collaboration has been catalysed between these various institutions by the Presidential Delivery Agreement (DEA, 2014). The White Paper for the National Climate Change Response, published by the South African Government, has indicated that, in South Africa, risks to biodiversity will be monitored and researched to develop better projection models of impacts in order to prepare adaptation responses. This approach provides the direction in which conservation management is to develop. To achieve more effective conservation management throughout the country, Dube TradePort Corporation aims:

- To encourage and facilitate partnerships that ensure proper management of sensitive areas not under formal protection, and to invest in the expansion of key areas;
- To ensure that the expansion programme of protected area planning has an ecosystem approach to provide protection for threatened biomes, landscapes and species and to minimise the risk to species;
- To ensure a biodiversity monitoring system is put in place;
- To facilitate the expansion of existing programmes combating alien and invasive species infestations that destroy sensitive ecosystems;
- To promote the conservation and restoration of natural ecosystems, ensuring resilience to climate change impacts; and
- To maintain a gene bank of critically endangered species in the medium term.

eThekweni Metropolitan Municipality, Ezemvelo KZN Wildlife and the Isimangaliso Wetland Park have had successes in using partnerships to achieve biodiversity conservation objectives (Roberts *et al.*, 2001; and Hughes, 2001). Govender (2013) reports on interventions the eThekwini Municipality has implemented to achieve the objectives of adaptation to climate change. The eThekwini Environmental Planning and Climate Protection Department has done much to ensure that biodiversity is integrated with the plans of the eThekwini Municipality through mainstreaming (Roberts *et al*, 2001).

The Durban Metropolitan Open Space System, also known as D'MOSS, is a project aiming to protect open space linkages throughout the City of Durban. To achieve this, the Municipality has embarked upon a programme of Land Acquisition in which property is purchased or land is donated to the Municipality. Approximately 140.06ha was acquired in 2012/13 for environmental conservation. The next process is Nature Reserve Proclamation, through which 11 eThekwini Metropolitan Municipal nature reserves are being proclaimed as nature reserves in terms of the National Environmental Management: Protected Areas Act. Another project is Non-User Conservation Servitudes (NUCS) that have been registered over private property within the eThekwini Municipal area, where sensitive habitat is present and where the landowner continues to own the land, but development rights are restricted.

eThekweni Metropolitan Municipality has introduced a Municipal Adaptation Plan: Health and Water. In this adaptation plan, the City spells out what the City of Durban will be doing to prepare for projected climate change impacts. Plans are being made for water supply, infrastructure protection, coastal zone management and disaster management, as well as a shortlist of other impacts. The plan is refined through a multi-criteria assessment, with the aim of the Municipal Adaptation Plan project being to identify and select activities providing the greatest benefit at least cost. These activities need to be carried out in line with engineering solutions, biological responses and socio-institutional responses (Constable and Cartwright, 2009). Policy and Guidelines are used to direct activities in a particular direction, in order to achieve the aims set out in the

TREE PLANTING AS A RESULT OF COP'17 INITIATIVES

adaptation plan. Substantial progress has been made in South Africa with mainstreaming biodiversity. This embraces the ecosystem approach by applying it during planning, and is implemented in many programmes (Mbengashe, 2009).

3.7 MANAGING SCARCE RESOURCES

To combat the growing demand for resources and the consequences of climate change, Dube TradePort Corporation has implemented a number of environmentally efficient activities. These initiatives extend to all activities taking place on site, as well as in the surrounding community. In terms of water conservation, mitigation methods have been implemented, such as rainwater harvesting, balancing tanks for treated sewage water, stormwater structures that maintain the quality of the stormwater, and the Reverse Osmosis Plant in Dube AgriZone. Additional water conservation and water demand management options are also being investigated.

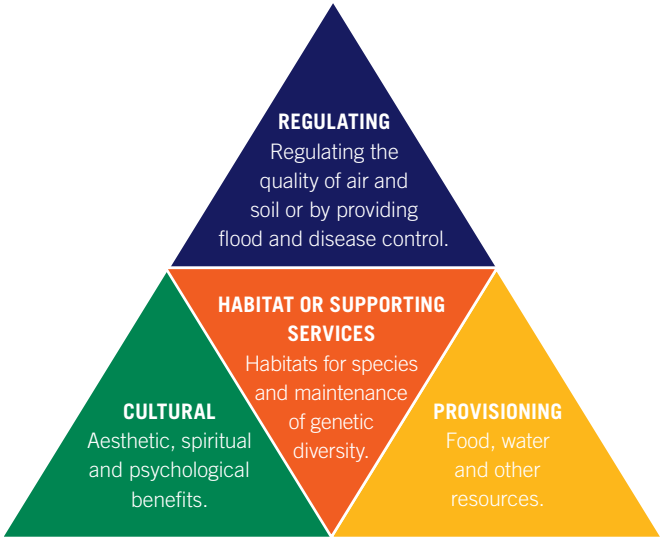
Wherever feasible and possible, Dube TradePort Corporation is implementing energy-saving measures within its precincts. Natural ventilation is included in all greenhouses to maintain a stable climate, without the use of non-renewable energy sources. Photovoltaic systems are being installed on the two packhouses that consume the greatest amount of energy within Dube AgriZone.

Waste management options are being used to reduce the amount of waste going to landfill sites from Dube TradePort. Additional methods being applied include recycling and reuse options. Members of the public are also encouraged to make use of Dube TradePort recycling bins. Dube TradePort also operates a programme for schoolchildren, enabling the exchange of recyclables for fresh fruit and vegetables (refer to Chapter 4, section 4.2.5 on Corporate Social Initiatives).

3.8. ECOLOGICAL GOODS AND SERVICES

Natural habitats are recognised by most people for their importance in providing habitat for wildlife and by some for their scenic and recreational values. While these are important attributes, natural ecosystems generate a wide range of additional goods and services that are often overlooked and undervalued by society. These include global benefits such as carbon sequestration and regional benefits such as water purification and flood mitigation. Internationally, ecosystem goods and services are typically grouped and valued under a few common themes. These include regulating, cultural, provisioning and habitat or supporting services as outlined in Figure 3.

FIGURE 3: OVERVIEW OF THE RANGE OF ECOSYSTEM GOODS AND SERVICES PROVIDED BY NATURAL ECOSYSTEMS



With a growing understanding of the value of natural capital, scientists have started assigning economic values to natural ecosystems. In a recent global review, the value of global ecosystem services was estimated at $125 trillion/year (Costanza *et al.*, 2014) compared with a global gross domestic product of $72 trillion/year (www.statista.com).

Such an assessment was also undertaken in eThekwini Municipality in 2003 (www.durban.gov.za). The study estimated the value of the city's natural assets as R6.6 billion per annum in today's terms (based on an initial estimate of R3.1 billion with an inflation rate of 6% applied), excluding the value that open space contributes to tourism. This emphasises the need for sustainable development that supports inclusive wealth building whilst not undermining the natural ecosystems upon which society ultimately depends.

The values provided by landscapes are strongly linked to specific habitats, with habitats such as forests performing particularly important climate regulating services whilst wetlands and rivers are critical for freshwater provision. The value of the ecological systems is further elaborated on in Chapter 7 on Biodiversity and Ecology.

A better understanding of the role of ecosystem services emphasizes our natural assets as critical components of inclusive wealth, well-being, and sustainability. Sustaining and enhancing human well-being requires a balance of all of our assets: individual people, society, the built economy, and ecosystems.

In moving forward, Dube TradePort Corporation has an opportunity to develop its landholdings in a manner that is compatible with nature, and to enhance the delivery of critical ecosystem services and ecological infrastructure on those landholdings and in the broader region. This reframing of the way we look at 'nature' is essential to solving the problem of how to build a sustainable and resilient future for humanity (Costanza *et al.*, 2014).

4. GOVERNANCE AND INTEGRATED ENVIRONMENTAL MANAGEMENT

IN TERMS OF THE PFMA, THE KWAZULU-NATAL PROVINCIAL GOVERNMENT IS ALLOWED TO BE THE SOLE SHAREHOLDER OF THE STRATEGIC ASSETS BEING DEVELOPED THROUGH THE DUBE TRADEPORT CORPORATION, WHOLLY FUNDED BY THE PROVINCE'S DEPARTMENT OF ECONOMIC DEVELOPMENT, TOURISM AND ENVIRONMENTAL AFFAIRS (EDTEA) (PREVIOUSLY KNOWN AS DEPARTMENT OF AGRICULTURE AND ENVIRONMENTAL AFFAIRS (DAEA)).

Dube TradePort Corporation is custodian of the Dube TradePort development node, which is home to King Shaka International Airport. In this scenario, Dube TradePort Corporation is a fully-fledged public entity. Core to its role is the development of a system of governance, strengthened by the Dube TradePort Corporation Act (Act No. 2 of 2010) (DTPCA), and the Corporation's environmental policy and environmental strategy.

Allied to this is legislative compliance with the principles of integrated environmental management (IEM). In achieving the overarching vision of being an environmentally responsible organisation, Dube TradePort Corporation thus reports on governance as part of its annual reports, and specifically (in the case of the document at hand) the 2015/2016 State of Environment Report (SoER).

Initially, IEM in South Africa was associated with authorisations of controlled activities alone. A broader perspective on environmental management has emerged as the result of an evolution in IEM that views IEM as an underlying philosophy and suite of tools that can be infused into decision-making by all sectors of society (e.g. government/public sector, private sector and civil society) (DEAT, 2004).

In terms of governance, Dube TradePort Corporation was established as a result of the enactment of the KwaZulu-Natal Dube TradePort Corporation Act (Act No. 2 of 2010). This Act established Dube TradePort Corporation as the entity responsible for the strategic planning, establishment, design, construction, operation, management and control of Dube TradePort, with a particular mandate to act as a catalyst for direct foreign investment (DFI) in the region.

In 2011, legislation was enacted to see the establishment of Dube TradePort Corporation as a Schedule 3C Provincial Public Entity under the Public Finance Management Act (Act No. 1 of 1999, as amended) (PFMA).

In terms of the PFMA, the KwaZulu-Natal Provincial Government is allowed to be the sole shareholder of the strategic assets being developed through the Dube TradePort Corporation, wholly funded by the Province's Department of Economic Development, Tourism and Environmental Affairs (EDTEA) (previously known as Department of Agriculture and Environmental Affairs (DAEA)).

This chapter aims to present the progress that Dube TradePort Corporation has made in the areas of Governance and IEM. The progress for 2015/16 is an update to the 2013/14 reporting period (second iteration) which was the first update done on the baseline SoER (2011/12) (first iteration) and the Phase 1 EIA process to determine if continuous improvement is taking place. This chapter also attempts to discern where improvements can and should be made, as well as emerging issues that Dube TradePort Corporation will need to consider in the near and far future.

Overall, it should be noted that Dube TradePort Corporation's governance and IEM strategies have added value both on site and to surrounding communities.

4.1 PRESSURES

Dube TradePort aims to become Africa's first carbon neutral airport, and is also striving to be the first purpose-built aerotropolis in Africa as well as the first green city on the African Continent. It is therefore imperative that the services of Dube TradePort Corporation are aligned with this goal and that of sustainable development (DTPC, 2012).

The pressures faced by Dube TradePort Corporation are subsequently the provision of services that make Dube TradePort a leading economic hub as identified in the State of the Environment Report of KwaZulu-Natal.

Furthermore, Dube TradePort Corporation faces the pressures of legal compliance, as well as compliance with the conditions set out in various environmental authorisations (previously referred to as Records of Decision (RoDs), hereafter referred to as Environmental Authorisations (EAs)), linked permits, statutory legislation, and/or licences.

The change in the environmental legislation also places pressures on all developing nodes, such as Dube TradePort. This is due to situations where the exact infrastructure developed may need to be amended due to changes linked to tenant needs, economic trends, etc. The issue is that, as of December 2014, a new iteration of the Environmental Impact Assessment (EIA) Regulations was published in the form of Government Notice Regulation (GNR) No. 982, with related listed activities (GNR No. 983 – 985). The changes may also lead to a situation where a small, seemingly insignificant change triggers a new activity not

4. GOVERNANCE AND INTEGRATED ENVIRONMENTAL MANAGEMENT
(continued)

previously covered by existing EIAs. The onus lies on Dube TradePort Corporation to ensure that the EIA (general, air quality and waste specific) is still appropriate to the scope of the construction to take place prior to commencement of any new construction activity.

Changes in the wider planning frameworks, although linked to and taking cognisance of the approved framework plans for Dube TradePort, may conflict with the planned future roll-out of future phases and individual erven. Therefore, iterations of such documents should be checked with care when they are made available for comment, to ensure that potential conflicts are avoided. For instance, the final adopted version of the 2015/16 Integrated Development Plan (IDP) generated to comply with the Municipal Systems Act (Act No. 32 of 2000) (MSA) was released on 27 May 2015 and specifically considers Dube TradePort (eThekwini District Municipality, 2015). The considerations included therein are discussed further under the following sections. It is however worth noting that the Municipality is currently working on the 2016/17 iteration which will be the first of the next five-year planning cycle, as linked to the next term of office. As such, the 2016/17 IDP will set the scenario for the next five years, not merely the year at hand.

Further pressures include:

- Increased capital required for development;
- Transformation of land and changes in land use;
- Increases in resources required; and
- Increases in imports (both locally to the node, and on a wider scale).

4.2 STATE

Currently, environmental issues across Dube TradePort Corporation as an entity are managed through the Environmental Sub-programme. This sub-programme is housed within the broader Development Planning and Infrastructure Programme (PDIP). The PDIP Executive reports via the Executive Committee to the Dube TradePort Corporation Board on all environmental and sustainability issues within Dube TradePort. It should be noted that, at present, there is no Board-level sustainability-specific committee or representative.

The Environmental Sub-programme's annual objectives and targets, as well as reconciled performance against previous year's targets, are outlined in the Annual Performance Plan (APP). The mandate of the Environmental Sub-programme, according to the APP, is to:

'Ensure that all development planning and practices are sustainable in nature through minimising and preventing environmental impacts, by setting policy related objectives and targets. It also recognizes the benefits and importance of developing innovative measures to ensure the long term protection of the environment.'

The APP also sets about creating annual performance targets and annual key performance indicators (KPIs) for the Environment Sub-programme (DTPC, 2015f). At present (i.e. 2015/16), these targets and KPIs are largely focused on:

- Auditing and ongoing development of state of environment reporting;
- Reducing annual baseline carbon footprint by 7%;
- Compliance with EAs based on independent audits; and
- Rehabilitation of land as per site-wide rehabilitation plans, in terms of hectares of land offset.

It is noted that the last KPI presented in the 2013/14 documentation related to the promotion and development of sustainable green projects within all Dube TradePort precincts. This is however considered to be part of the overall development pattern already established, and is further considered to be integrated into the three KPIs as specified above.
Striving towards ISO 14001 compliance, an Environmental Management System (EMS) is being developed on an ongoing basis as part of meeting the requirements for registration. This represents the core standard used by Dube TradePort Corporation for designing and implementing an effective standard. As part of the EMS, an environmental policy and short statement has been developed, which will continue to drive the remainder of the EMS. The EMS as developed has been endorsed by top-level management (WSP, 2013a and 2013c). The policy sets out Dube TradePort Corporation's commitment, purpose and objectives, legal requirements and responsibilities.

Having the intention and purpose to be a sustainably-developed precinct, Dube TradePort Corporation has ensured that development takes place in a sustainable manner. Key to sustainable development is procurement and legal compliance.

Three themes have been employed to best depict Dube TradePort Corporation's performance in maintaining a state of environment that is in line with their strategy and policy. These are: (a) integrated environmental management, (b) sustainable procurement, and (c) sustainable development, each with their respective indicators of state. These are discussed below.

4.2.1 INTEGRATED DEVELOPMENT PLANNING

The Dube TradePort project is a key project within the eThekwini Municipality's regional planning controls. The adopted 2015/16 iteration of the eThekwini Integrated Development Plan (IDP) 2015/16 – 2019/20 (eThekwini District Municipality, 2015a), specifically considers Dube TradePort and its surrounds as a key or priority area for development within the northern region of eThekwini. The IDP makes reference to the Strategic Development Frameworks (SDF) and Strategic Development Plans (SDP) which:

'… allow for a continual strategic refinement of the plants. Of critical importance is obtained city wide agreement on the Priority areas for social, economic and infrastructure development in the next 5 years' (eThekwini District Municipality, 2015).

The IDP further elaborates on the eThekwini SDP, noting that it consists of local areas with linked Local Area Plans (LAPs) which consider areas experiencing or expected to experience change, and thus provide more detailed planning along with extensive management controls. Dube TradePort falls within the Northern Urban Development Corridor LAP and is focused on King Shaka International Airport (KSIA) and Dube TradePort as associated with the R102 road upgrades.

A crucial support to Dube TradePort (included in the IDP), in terms of empowering and enhancing development, is provided specifically through the so-called Plan 2: developing a prosperous, diverse economy and employment creation with the aim being to position the municipal

4. GOVERNANCE AND INTEGRATED ENVIRONMENTAL MANAGEMENT
(continued)

economy as 'Africa's Southern Gateway to Trade and Travel', with KSIA and Dube TradePort forming two parts of nodes to be enhanced through this plan. Dube TradePort is seen to hold a catalytic function to encourage investment in the region.

It should be noted that, from a reporting point of view, the 2015/16 IDP report includes under its Sector Department Projects (Annexure 13 of eThekwini District Municipality, 2015) the projects active in 2014/15 and 2015/16 by name, location, budget and implementation timeframes.

The Dube TradePort Industrial Development Zone (DTP IDZ), specifically Dube AgriZone and Dube TradeZone, was proclaimed on 1 July 2014, where the IDZ operator permit to Dube TradePort Corporation was announced. This has since been upgraded to a Special Economic Zone (SEZ) with the implementation of the SEZ programme. This strengthens the vision of KwaZulu-Natal becoming a gateway to Africa and the world, and attracting direct foreign investment as well as national and local investment to the province. An SEZ is deemed an effective tool to stimulate effective industrial land-usage and thus enhance the status of Dube TradePort. The SEZ status allows for tenants and/or landowners within the zone to be afforded a range of business-related benefits, including tax incentives.

DUBE TRADEHOUSE, LOCATED WITHIN DUBE TRADEZONE

At the KwaZulu-Natal provincial cabinet level a milestone was reached, in that the Aerotropolis Master Plan was tabled with Dube TradePort Corporation a key reviewer of the document (DTPC, 2015c). The Master Plan is not finalised yet, but will need to be monitored and regular input therein made, combined with compliance therewith after the document is approved and finalised.

4.2.2 INTEGRATED ENVIRONMENTAL MANAGEMENT

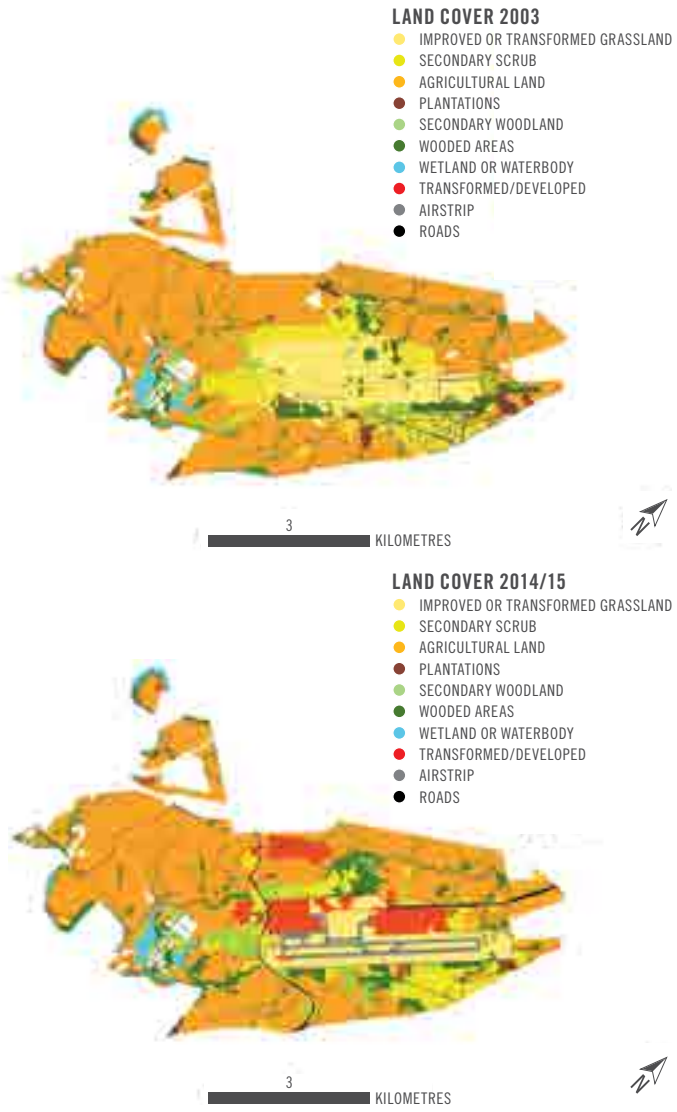
Approximately 25% of the overall Dube TradePort Master Plan (i.e. building footprint and related infrastructure) has been developed to date. Of the land already developed, the 20ha comprising Dube TradeZone 1 has been developed, with an occupancy approaching 100%. The 135ha of TradeZone 2 and 3 are thus being brought online within the existing site's boundaries (DTPC, 2015a).

As a visual consideration of the level of development, land cover may be used as a clear indicator of the development level to date. Figure 4 and Table 3 show the level of development in 2003 (i.e. pre-Dube TradePort Corporation development), whilst the 2014/15 land cover shows the current scenario.

As can be expected, the land-use has shifted from agricultural ('previous land-use') at over two-thirds of the total site, to uses associated with Dube TradePort infrastructure ('DTP') covering approximately 300ha of the total site. An important facet is that enhancements to the 'green' infrastructure of the site account for 45ha increase over the 2003 levels. The amount of land directly linked to 'green services' is set to increase sharply, with a concurrent drop-off in development potential. This is discussed in detail in the biodiversity chapter.

Authorisation in terms of the National Environmental Management Act (Act No. 107 of 1998, as amended) (NEMA) was granted to develop the Dube TradePort complex, on the basis of three separate Environmental Impact Assessment (EIA) applications for (i) Dube TradeZone and Support Zone combined, (ii) Dube AgriZone and (c)Dube TradeZone Watson Highway Link Road. Thus, the development and operation of the Dube TradePort complex is formally authorised through these separate Environmental Authorisations (EAs).

FIGURE 4: LAND COVER PATTERN CHANGES: 2003 TO 2014/15



4. GOVERNANCE AND INTEGRATED ENVIRONMENTAL MANAGEMENT
(continued)

TABLE 3: CHANGES IN LAND COVER (2003 TO 2014/15) SHOWING DEVELOPED LAND AND ENHANCEMENTS (I.T.O. DTP)

LAND COVER CLASS	2003 (HA)	2014 (HA)	CHANGE (HA)
Agricultural Land	1776.14	1650.52	-125.63
Wooded Areas	299.47	309.33	9.86
Secondary Scrub	348.23	269.40	-78.82
Improved or Transformed Grassland	364.71	248.89	-115.81
Transformed/Developed	6.82	225.63	218.81
Secondary Woodland	97.11	138.17	41.06
Airstrip	2.00	80.58	78.58
Wetland or Waterbody	65.02	66.16	1.14
Roads	43.47	58.26	14.78
Residential Areas	57.92	44.90	-13.01
Plantations	48.84	19.08	-29.76
Total	**3109.72**	**3110.92**	

The original EA granted for Dube TradeZone, Support Zone and King Shaka International Airport (KSIA) (TradeZone/Support Zone) was initially appealed by the stakeholders. The documentation was amended and updated, with the outcome being that the authorisation was thereafter granted as an Appeal Decision on the basis of additional conditions for authorisation specific to the issues of concern.

The authorisation conditions were specified in each EA, and are managed and applied through the development of, and now compliance with, the linked Environmental Management Programmes (EMPr) and Operational Environmental Management Plans (OEMP) for construction and operational phases respectively on an ongoing basis. It should be noted that, unlike an EA, an environmental management programme/plan is open to revision, and should in fact be revised based on information that becomes available during the development's lifespan. This may include new information, changes in policy, moves to meet emerging best practice options, or arising due to potential conflicts between different pieces of legislation.

Proof of compliance with these conditions and the EMP(r)s, as relevant according to the stage of development, is mandatory and is required to be submitted to the national DEA (as the Competent Authority), and the activities on site regularly audited (DTPC, 2013b). This process of auditing and monitoring the conditions imposed forms an important part of an ISO 14001-type EMS framework, thus feeding into both the legislative and administrative compliance processes. It is noted that although not currently ISO 14001 accredited, Dube TradePort Corporation is moving towards this goal, and thus development of documents such as the EMS along ISO standards is deemed good practice.

With each of the existing and new (future) EAs granted, the conditions for specific portions of land are to be controlled by the relevant conditions combined. It is recommended that, given the growing complexity of the EAs and their related documentation, the various permits and licences be cross-referenced to determine any possible conflicts, and they must be specifically linked to each portion of land such that auditing is more effective and can be linked back to each permit/licence more easily. This confirmation audit should link all applicable conditions to each portion of land so as to be certain of all requirements for a specific land portion.

4. GOVERNANCE AND INTEGRATED ENVIRONMENTAL MANAGEMENT
(continued)

This will also allow for streamlining of auditing with one checklist per land portion, or group of such, rather than the potential for a number of EAs being separately audited per land portion. Such a system is easier to update or amend via an amendment application if deemed necessary, and is easier to capture in reporting on compliance.

Table 4 details the Environmental Authorisations granted to date. It is noted that an additional EA is awaited which relates to a new bulk sewer line. The final documentation in terms of this EIA has been submitted for consideration and authorisation, at the Department's discretion, and is expected to be received before the end of May 2016. This has been included for completeness, but is clearly marked as outstanding as it is not in hand as yet.

Ongoing monitoring and external auditing of the developments is done as per specific Construction EMPs (CEMPs) for the majority of the entire Dube TradePort precinct.

For the Dube AgriZone and KSIA/Dube TradePort specific Operational Environmental Management Plans (OEMPs), in compliance with the EIA recommendations and the EA conditions, two separate OEMPs were prepared and approved by the competent authority. At present, the OEMPs are the main mechanisms through which legal compliance with the environmental authorisations are monitored for these specific zones. The monitoring is completed via both internal and external (i.e. independent) audits.

Findings from the OEMP Audit of Dube TradeZone or Support Zone (2011) were reported in the 2011/12 State of the Environment Report (WSP, 2013a). Dube TradePort Corporation is noted as having a very high compliance rate with respect to the required (and obtained) authorisations, licences, and permits. Compliance with construction and operational environmental management plans is assured through the commissioning of a panel of suitably qualified and certified Environmental Control Officers (ECOs), who are rotated and used to monitor and report on compliance. This panel of ECOs provides a competent list of consultants who may be called upon to tender for various appointments. The panel of ECOs has been active since April 2014 with this ongoing; prior to this date, independent ECOs were appointed as and when an EA was obtained.

TABLE 4: ENVIRONMENTAL AUTHORISATIONS (RECORDS OF DECISION) HELD BY DUBE TRADEPORT CORPORATION

DEVELOPMENT	REFERENCE NUMBER OF ROD/EA
KSIA and Dube TradePort	12/12/20/686 (230/8/2007)
KSIA and Dube TradePort (appealed)	12/12/20/686 (29/10/2008)
Dube AgriZone	12/12/20/1761 (12/03/2010)
Electronic Billboards	12/12/20/1709 (29/04/2010)
Watson Highway Link Road Environmental Authorisation	12/12/20/1887 (08/12/2011)
MRO Environmental Authorisation	12/12/20/2340 (01/08/2012)
Bulk Sewerline Authorisation	12/12/20/1894 (authorisation received July 2016)

With regard to compliance with conditions of their EAs, Dube TradePort Corporation is 96.6% compliant with environmental audits based on the various forms of EMPs (both Construction EMPs (CEMPs) and Operational EMPs (OEMPs)) (DTPC, 2015a). It is noted that these environmental audits are conducted on a monthly basis and are a sum of all environmental authorisations currently active on the site, as detailed in Table 4.

Given the complexity of a number of EAs now being in place, with the potential for different EAs to give conflicting requirements for a specific portion of land, it is recommended that an audit is carried out that links every condition from each EA to the affected piece of land or sets of land portions, and a once-off comprehensive audit be undertaken to confirm compliance across all EAs, WULAs and related environmental legislation. The audit checklists continuing thereafter on a monthly basis may then be updated to note any exclusions, or to clarify any potential conflicts.

The Dube TradePort Corporation Annual Performance Plan reported a R6 979 207 expenditure on environmental controls for the 2011/12 time period (i.e. 28% of total expenditure of the total development planning and infrastructure allocations), and R3 897 260 expenditure for 2012/13 (2.27% of total expenditure for development planning and infrastructure allocations). During the 2015/16 financial year, the budget spent on environmental management was R10 000 000. This amount included all rehabilitation work done on Dube TradePort Corporation landholdings.

4.2.3 SUSTAINABLE PROCUREMENT

Data on the percentage of locally sourced services and materials is not currently available from Dube TradePort Corporation, even though this has been identified as a key indicator to be reported on for the SoER. Currently, the information is more qualitative than quantitative, and is mostly in the form of guiding principles. Dube TradePort Corporation has recognised the lack of quantitative data as an area of improvement to take forward for consideration in the tendering and procurement procedures.

4.2.4 SUSTAINABLE DEVELOPMENT

The concept of sustainability has been an integral part of development principles and controls since the late 1980s. Understanding of the concept of sustainability has evolved in the 25 years since the Brundtland Commission (Sustainable Cities International, 2012).

A key aim of the initiatives of Dube TradePort Corporation is to achieve sustainability. Dube TradePort Corporation acknowledges that it utilises various natural and finite resources in its operations, including a number of fossil fuel-derived energy sources. Dube TradePort Corporation recognises the need to conserve finite resources and the importance of minimising fossil fuel usage so as to mitigate the release of greenhouse gas (GHG) emissions, which contribute to climate change.

4. GOVERNANCE AND INTEGRATED ENVIRONMENTAL MANAGEMENT
(continued)

To this end, a number of non-fossil fuel energy systems form part of Dube TradePort. A solar energy system powers the two packhouses and tissue culture building, which form part of Dube AgriZone. To limit impacts on natural resources, rainwater harvesting and recycled irrigation water systems are integrated into Dube TradePort. In January 2014 alone, one of the operators saved R140 000 on electricity by using solar energy, and the green initiatives being considered for Dube AgriZone Phase Two will further assist farmers in resource usage minimisation (DTPC, 2014b).

The PV systems constructed at Dube AgriZone are a 250kWp system supplied to the smaller packhouse and 430kWp systems to the larger packhouse. These supply energy for the systems in the greenhouses, and further allow for energy to be exported from the facilities during periods of low activity, thus supplementing other systems' needs (DTPC, 2014c).

It is clear (Figure 5) that the dominant energy usage is from the core Dube TradePort functional areas, namely Dube Cargo Terminal and Dube TradeZone Communications Building, the 29° South buildings, and Dube TradeHouse. This has been the scenario since 2012 (Figure 6 (a) and (b)) and is not expected to change. What is interesting is that for all these infrastructure entities, the usage of electricity has tapered off slightly year-on-year since 2013. Of the larger energy consumers only Dube AgriLab shows an inverse trend, with an increase in energy usage year-on-year.

Dube TradePort Corporation acknowledges the need to minimise fossil fuel consumption and to mitigate GHG emissions through pursuing a strategy which includes the following elements:

- Review and, where feasible, develop renewable energy and energy efficiency projects; and
- Monitor and manage GHG emissions with the ultimate aim of becoming 'carbon neutral' through implementation of the Carbon Management Strategy (WSP, 2013c).

FIGURE 5: GRAPHICAL REPRESENTATION OF THE SITE WITH REGARDS TO ELECTRICITY CONSUMPTION

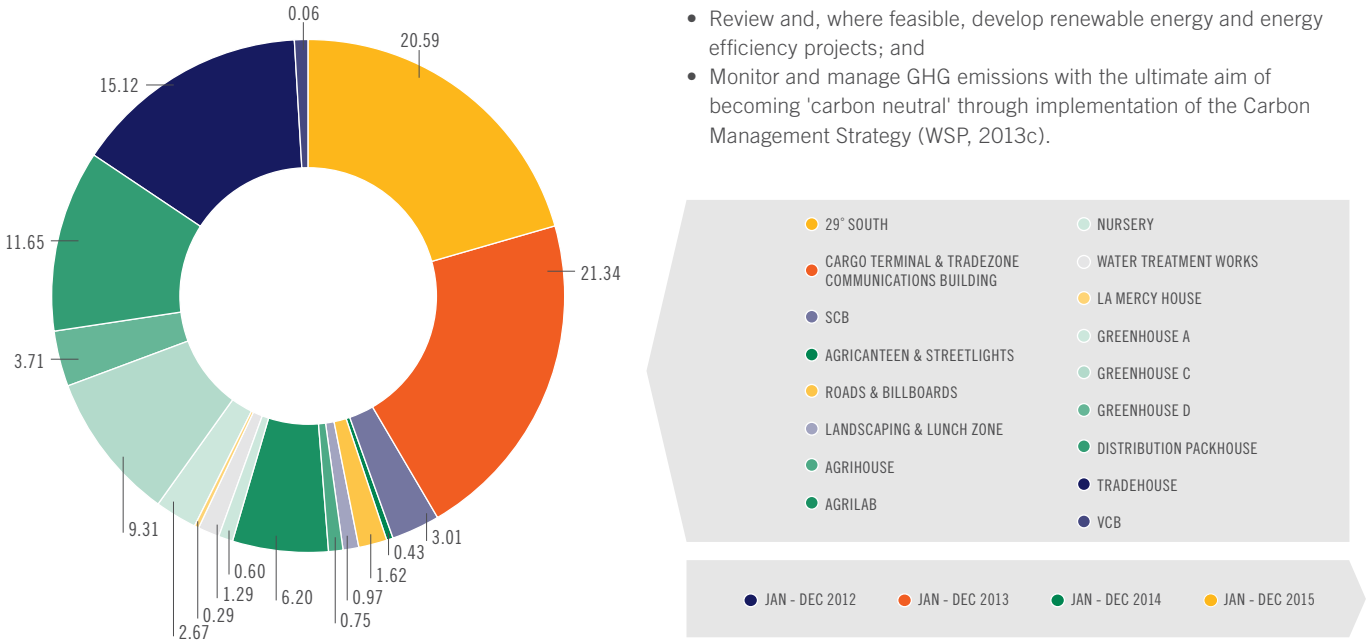


FIGURE 6(a) AND (b): GRAPHICAL REPRESENTATIONS OF THE ELECTRICITY CONSUMERS ON THE SITE (SPLIT TO ALLOW BETTER DISCRIMINATION), SHOWING TRENDS PER YEAR SINCE 2012 TO END OF 2015

FIGURE 6(a): ELECTRICITY CONSUMPTION PER SITE (SUM ABOVE R250 000)

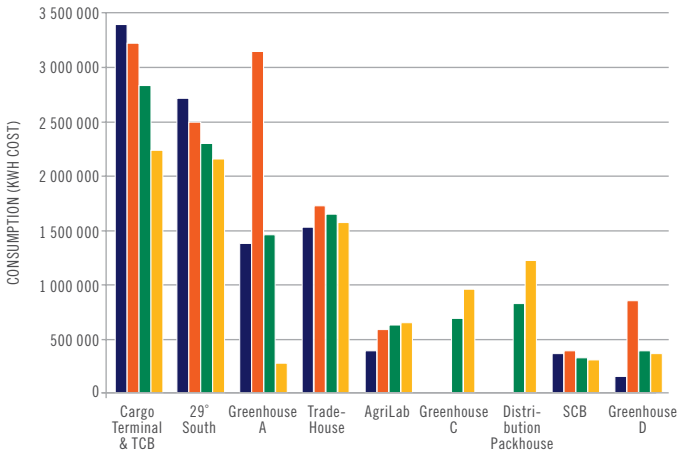
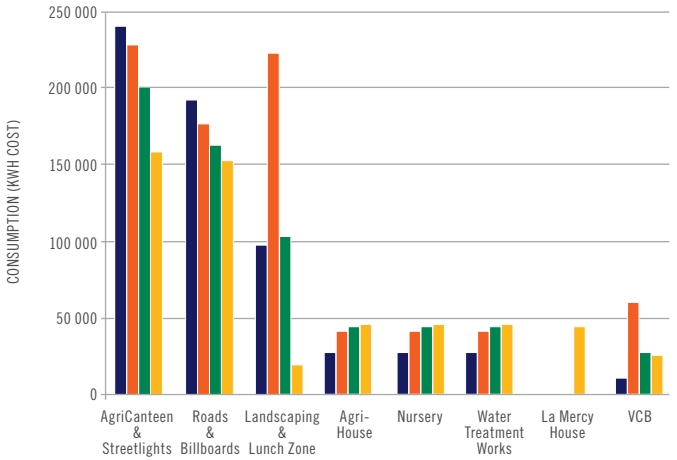


FIGURE 6(b): ELECTRICITY CONSUMPTION PER SITE (SUM BELOW R250 000)



4. GOVERNANCE AND INTEGRATED ENVIRONMENTAL MANAGEMENT
(continued)

FIGURE 7: TOTAL ENERGY USAGE FOR PACKHOUSE FACILITIES

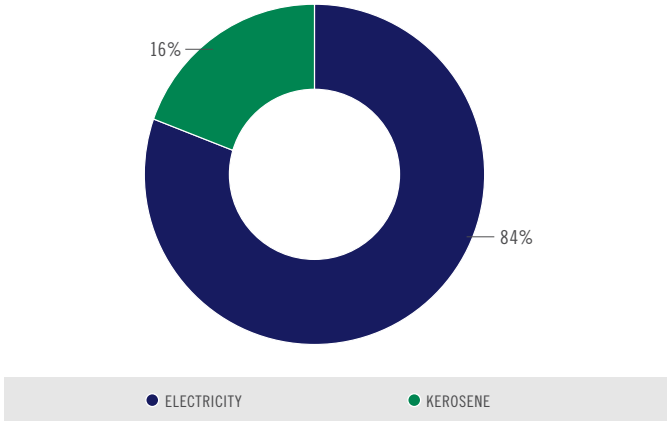
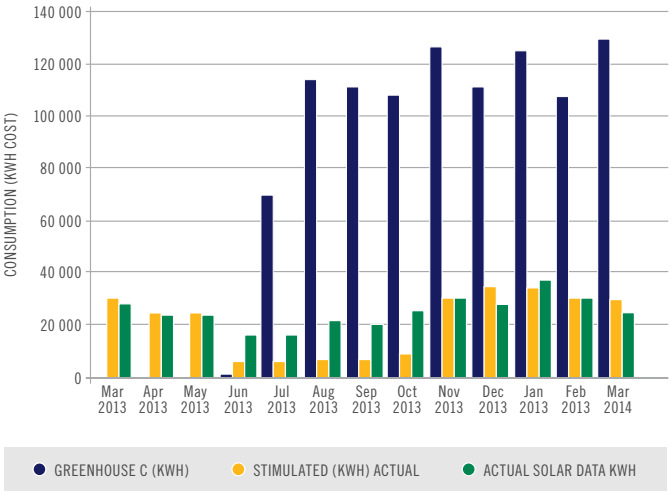


FIGURE 8: TREND IN SOLAR ENERGY EXPECTED VS GENERATED ON-SITE VS THE ENERGY REQUIREMENTS OF GREENHOUSE C (MARCH 2013 – MARCH 2014) (IN KWH)



As part of the pursuit of these targets, a Carbon Footprint Analysis (DTPC, 2016a) has been undertaken. This study aimed to: (a) identify sources and sinks of Dube TradePort Corporation's emissions; (b) quantify these emissions for the 2014/15 year (direct and indirect); (c) develop a customised tool allowing the capture of accurate, verifiable and automatic calculations for the greater site; (d) provide recommendations helping Dube TradePort Corporation to achieve its aim of being carbon neutral combined with knowledge of the carbon inventory, including input in terms of governance and management structures; (e) provide input into sustainability and green project initiatives; and (f) evaluate data in preparation for an external audit. Preliminary trend analyses were also undertaken to determine changes from baseline emission data measurements. More detail on the Carbon Footprint Analysis is provided in the Air Quality chapter (Chapter 9).

An overarching requirement is that, through knowledge of the real status of the greater site, more effective and enhanced stakeholder engagement can be undertaken to consider these issues directly, as well as considering indirect knock-on considerations.

As noted, this report is currently in final draft format, with the results being verified at this time and the interventions or recommendations related thereto finalised. The intent is that the status of key GHGs, as well as their trends over time, will be reported in future iterations of the SoER.

Dube TradePort Corporation is dedicated to reducing the use of non-renewable sources of energy and is implementing a number of systems to reduce energy use in Dube AgriZone. Methods to reduce energy use include, for example, using natural ventilation in all the greenhouses to reduce the energy required to maintain a stable climate.

Figure 7 depicts total energy use as reported in 2013 for the packhouses. The energy quick scan investigation identified a total of 513.2MWh/yr potential savings, which translates to a total of R1 489 350 per year. Therefore energy savings potential at the site are significant, at 7.4% of the total energy usage across all energy carriers.

The percentage of energy that is obtained from renewable sources is presented in Figure 8. It is noted that Greenhouse C came online in July 2013. The simulated (or expected) solar energy generated is noted as being similar to that actually generated.

PERCENTAGE INVESTMENT IN SKILLS DEVELOPMENT OF STAFF

The creation of employment opportunities is one of Dube TradePort Corporation's key delivery areas. Employment creation is monitored on a quarterly basis and by the conclusion of the 2012/13 financial period saw about 1 300 jobs directly sustained throughout the Dube TradePort precinct, of which 409 were created in the 2012/13 period itself. This excludes jobs at the airport's passenger terminal, which is operated by Airports Company South Africa (ACSA). It should be noted that these figures do not include the cascade implications in terms of indirect job creation, that is the numerous indirect and induced employment opportunities created by Dube TradePort as a result of linkages to other sectors of the economy (DTPC, 2014a).

The 2011/12 SoER reported that, by the end of July 2009, R9 million had been spent on skills development during the construction of Dube TradePort, beating the target of R4 million by more than 100%. A total of 27 131 individuals were trained in core skills which were identified at the start of the project. Of these, 21 113 were African males and 1 684 were African females (DTPC, 2012).

As at 10 April 2014, the number of direct employees of Dube TradePort Corporation was 178 permanent staff and 17 interns. All of these staff reside in the eThekwini municipal area. Of these, 64 are semi-skilled and 21 are deemed to be unskilled. Dube TradePort Corporation does not currently have any employees with disabilities. Current construction of the road linking Dube TradeZone to the uShukela Highway is creating a further 879 indirect and induced employment opportunities in KwaZulu-Natal (DTPC, 2014a). However, the Annual Performance Plan 2013/14 showed a planned employment target of 700, showing a significant shortfall.

Dube TradePort Corporation launched the Internship programme in 2012. The programme trains graduates in a suite of disciplines. Recruitment of interns is limited to those who have graduated but are not yet employed. The programme is currently focusing on students from KwaZulu-Natal. This recruitment programme started in October 2013, and by the end of 2013 over 10 intern candidates were placed within different divisions at

4. GOVERNANCE AND INTEGRATED ENVIRONMENTAL MANAGEMENT
(continued)

Dube TradePort Corporation. A total of 30 plus candidates were expected to be on the programme by the end of 2014. This programme has received a tremendous response from the public to date. This is reflected in close to one thousand applications having been received. The Corporate Social Investment programme of Dube TradePort Corporation continues to touch the lives of ordinary people in different communities of KwaZulu-Natal. This is done through different projects and sub-programmes falling under 3 key focus areas: education and skills development, environmental sustainability, and socio-economic development. The following projects and programmes were implemented in 2015/16.

For the 2015/16 financial year, the target of 2% has been exceeded, with a 2.9% spend on investment in skills development. This translates into a total spend of R1 763 060. The CSI Annual Report states that it has been a productive and successful year, with much effort made to ensure that investment was linked to Dube TradePort Corporation's key focus areas, specifically education and skills development which is further elaborated on in section 4.2.6.

4.2.5 CORPORATE SOCIAL INVESTMENT

Dube TradePort Corporate Social Investment (CSI) aims to uplift and empower the community, through strategic projects that are aimed at providing support to the disadvantaged communities.

The 2014/15 results were deemed a success according to Dube TradePort (DTPC, 2015b); although there were some challenges faced, the budget was better utilised. The key focus areas were: (a) education and skills development; (b) environmental sustainability; and (c) socio-economic development. During 2015, all of these key focus areas were being actively implemented.

It is noted that the goal for Dube TradePort Corporation, in terms of CSI, projects is for two projects to be run in any one year; at this time, 3 projects are operating and have been expanded in their impact since 2014/15, and three additional projects have been added.

One of the critical areas for Dube TradePort Corporation has been empowering women. This year has seen a concerted effort towards this initiative, specifically with regards to providing assistance to small-scale female farmers. There will be proper execution of these projects within the next financial year.

4.2.6 EDUCATION AND SKILLS DEVELOPMENT

The education and skills development focus areas of the CSI programme are implemented through the following four sub-programmes:

- **Internship Programme** – The total number of new interns that were placed during the 2015/16 financial year is 28. The programme continues to provide unemployed graduates with much needed experience, so that they can be employable.
  A number of these interns do not complete their internship because they get permanent employment while they are still in the programme.
- **School Uniform Programme** – The total number of learners who benefited from this programme in 2015/16 was 1 100. They received full school uniforms. These learners were from 10 different primary schools. The programme continues to enhance the self-esteem of learners from impoverished families.
- **Engineering Bursary Scheme** – Since the start of this project in 2013, there have been more than 30 bursaries awarded to students, and the 2014/15 financial year saw a further 21 students included in this project. Three of the bursars have obtained/completed their degrees in this time, with two of these bursars having secured employment in the professional engineering field within their specific fields.
- **Science Laboratory Kits Programme** – Dube TradePort Corporation has noted the high failure rate in subjects such as life and physical science, as well as a correlation with under-resourced schools. Dube TradePort Corporation has thus partnered with the Department of Basic Education to provide science equipment to the most underprivileged. Dube TradePort has supplied eight (8) schools in the Ndwedwe, Verulam and Tongaat areas with science laboratory kits. In addition, direct contributions are made for improvement in maths and science teaching.
- **Ohlange High School Library Renovation** – Ohlange High School, Inanda, has a rich history linked to Dube TradePort Corporation as it is the site where the Ohlange Institute was established by the late Dr John Langalibalele Dube, as well as where former President Nelson Mandela cast his vote in the first democratic elections in 1994. This project is being completed in this 2015/16 financial year and includes: (a) provision of books, furniture, and, audio and visual equipment; and (b) renovation of the building itself.

4.2.7 ENVIRONMENTAL SUSTAINABILITY

Environmental sustainability is being enhanced within the wider area through two specific sub-programmes. The one serves to cross-link with local schools in the provision of 'green' energy, while the second provides trees, thus enhancing the aesthetics, enhancing carbon sequestration, and providing ecological niches:

- **Solar Power Units Installation** – This specific sub-programme cross-links to the Education and Skills Development sub-programme, as it serves to provide sustainable energy and supports schools through this renewable energy provision. Two additional schools had Solar Power Units installed during 2014/15, with the programme thus benefiting over 5 000 learners, as there has been a decrease in the schools' electricity bills, allowing funds to be used in other important areas. There are a total of 8 installations to date.
- **Hammond's Farm Tree Planting** – The planting of trees is another way in which Dube TradePort Corporation shows their commitment to environmental initiatives. Tree planting has occurred in Mount Moreland and Cottonlands as well as various schools and crèches in Waterloo and Tongaat.

SOCIO-ECONOMIC DEVELOPMENT

A number of the programmes above can be seen to be socio-economic due to the fact that they aim to bring benefit to local communities. The specific sub-programmes which can be directly deemed to be of socio-economic benefit include the following:

- **Internship Programme** – Again, this is a cross-over programme which serves both to provide education and to enhance socio-economic development within the province. This programme was initiated in 2013 and has grown over time so as to benefit over 50 graduates in a diverse range of studies. This programme aims to provide graduates with an opportunity to gain experience in their

4. GOVERNANCE AND INTEGRATED ENVIRONMENTAL MANAGEMENT
(continued)

respective fields, and typically ranges from 12 to 18 months. It is key to note that 64% of the interns are female tertiary institution graduates, thus helping with the empowerment of women, both a provincial and national priority focus area. Six of the interns to date have been gainfully employed on leaving the internship programme.

- **Dube TradePort's Emerging Farmers Market or Small Farmers' Development** – The communities surrounding Dube TradePort are some of the poorest in the municipality, and the majority of the women in these settlements are not satisfied with relying on social grants and have taken the initiative in forming cooperatives. In this case, most of the women are involved in farming/agriculture. The initiative was started when it was realised that, once enough food had been harvested for their respective families, the family could sell the food to the community. This is not only an opportunity for female empowerment but also a way to strengthen food security within the local area. Dube TradePort Corporation, through its Corporate Social Investment programme, continues to support emerging farmers from the nearby communities. During this financial year the programme provided tools, seeds and protective wear to farmers. These farmers will also be helped with access to markets so that they can sell their produce. (Dube TradePort has also provided a platform for these emerging farmers to sell their produce to Dube TradePort Corporation staff members.) In 2015, farmers were also provided with a platform to sell their produce at the popular Royal Show in Pietermaritzburg.

BROAD-BASED BLACK ECONOMIC EMPOWERMENT

Linked to the CSI and sustainable procurement practices is the consideration of Broad-Based Black Economic Empowerment (B-BBEE). A strategic plan in this regard is linked to the Annual Performance Plan of Dube TradePort Corporation, and includes Enterprise, Supplier and Socio-Economic Development Strategy. The CSI programme and sub-programme are linked into this wider initiative.

PERCENTAGE STAFF USING PUBLIC TRANSPORT

Dube TradePort and ACSA undertook a study to determine the current public transport demand on site, in order to inform a strategy as to how to deal with public transport dynamics as well as to ascertain if an internal shuttle service is required. This was done to gain an understanding of the number of users of public transport, both site-wide and within each individual precinct. In order to achieve the objective of the study, questionnaires were completed; there was a 100% participation rate within the Dube TradePort precincts, facilitating a robust research process.

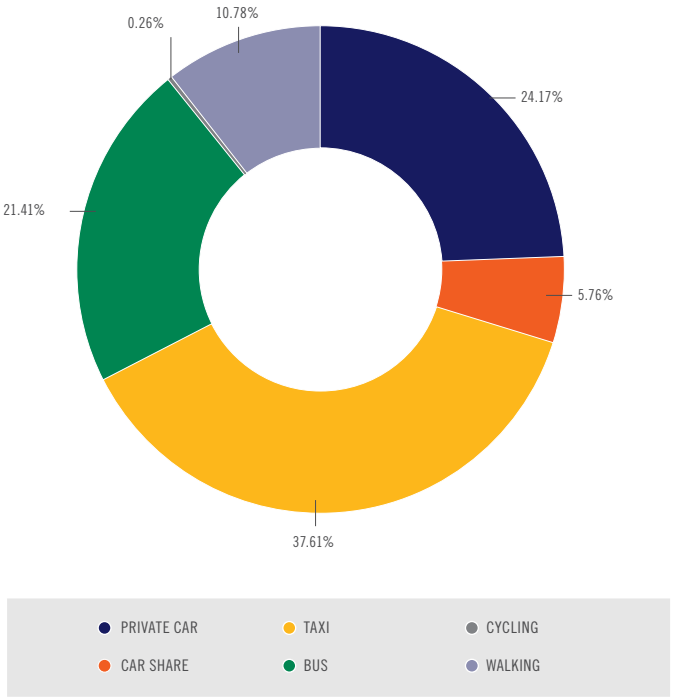
The study revealed that site-wide there are roughly 1 920 people working in various precincts on the Dube TradePort site. Of those 1 920 people, it was found that 1 329 people rely on public transport to get to work. This equates to roughly 70% of those working on site (Figure 9). The figure shows that the main mode used to get to Dube TradePort is taxi, with 38% of respondents indicating that this was their primary mode of travel to work. Also notable was use of the private car as the main mode of travel (24%), and the bus (21%). A total of 619 people were found to be working at Dube TradeZone. Of these, 370 people rely on public transport to get to work. This equates to approximately 59% of all workers within this area.

The analysis revealed that approximately 238 people work at Dube AgriZone, with 211 people relying on public transport. In total, this equates to approximately 88% of all workers within Dube AgriZone. The majority of workers at Dube AgriZone travel to work via train (over 40% of all workers), and then walk from the Inyaninga station. A few workers travel from the train station to the site via taxi. The study considered those walking from the train station to Dube AgriZone to be public transport users and thus a potential source of demand. For Dube City, the analysis revealed that a total of 126 people work in and around Dube City, and of those a total of 61 people (roughly half of the total number of workers) are reliant on public transport. The dominant mode in Dube City is undoubtedly the private car, with 56 people travelling via this mode every day. This was followed by the taxi (50 respondents). In addition, four (4) people stated that they take the train to work and then walk to Dube City[1].

The study was conducted in depth, analysing times of peak flow in order to gauge statistics which can be used to develop a strategy for public transportation for staff site-wide. It is therefore a commendable initiative undertaken on the part of Dube TradePort Corporation and ACSA. The study states that some sort of internal public transportation system is required considering the number of workers dependent on a service. Any internal shuttle system would need to look at servicing each node within Dube TradePort. The study makes recommendations for routes, operations, frequency and vehicle type.

[1] These figures represent Dube TradePort only and are not a representation of the ACSA figures. However it is imperative to note that the public transport strategy takes cognisance of Dube TradePort and ACSA figures.

FIGURE 9: MODAL SPLIT – SITE-WIDE



4.3 IMPACTS

Development of an 'edge city' or a self-sustaining aerotropolis creates downstream impacts, such as increased urban sprawl, extended transport networks and bulk infrastructure provision, and isolation of elite communities. Further, cumulative impacts stretch beyond the boundary of the study area and beyond the control of Dube TradePort Corporation, but obviously are of concern both from a negative and positive point of view. It should be noted that the impacts are not all negative.

4. GOVERNANCE AND INTEGRATED ENVIRONMENTAL MANAGEMENT
(continued)

The Dube TradePort region is on track to becoming the purpose-built green aerotropolis it seeks to be. A growing tenant base with a diverse range of operational activities is known, however, to increase risks for non-compliance in terms of environmental legislation and/or sustainability compliance. The need for ongoing monitoring and auditing and continual improvement of such systems (as per the Deming Cycle of continual improvement through revisiting the goals) is thus crucial. Should the Dube TradePort Corporation Strategy and Policy not be implemented, increased growth could easily result in decreased levels of legal compliance and governance over time.

A point of concern raised is that sustainability is not included at the Board/Committee level, and thus is not granted the level of priority that it should to ensure that the path to sustainable development is focused on. It is also noted that the risk assessment methodology employed by Dube TradePort Corporation is based on the traditional financial risk methodology, which may not be best suited for environmental risk ratings (WSP, 2013c). It is recommended that this be revisited and, if needed, the risk assessment process be enhanced to have meaningful input from an environmental point of view.

One of the positive impacts that were identified during the EIA phase was job creation. Thus far jobs have been created for locals. It is important that Dube TradePort Corporation continues to source staff locally. Concerted effort will need to be made to ensure local resources are sourced and that this is better recorded (for future reporting).

4.4 RESPONSES

Dube TradePort Corporation is committed to being a responsible organisation from a sustainability point of view, through minimising and reducing its environmental impact both now and in the future. This relates to the existing projects being rolled-out, the approved but not currently developed projects, and the proposed new or future projects being contemplated.

Dube TradePort Corporation recognises the requirement for sustainable development and thus strives to manage environmental issues on an ongoing basis, seeking to improve its response to such issues. In order to ensure this, Dube TradePort Corporation has commissioned an environmental policy and strategy, along with a myriad of initiatives to achieve sustainability as listed. The Dube TradePort Corporation Policy and Strategy is pertinent to Dube AgriZone, Dube TradeZone (incorporating Dube TradeHouse and Dube Cargo Terminal), and Dube Support Zone (Dube City) only.

The Dube TradePort Corporation Annual Report produced in terms of the PFMA sets out the vision, mission, principles and objectives of Dube TradePort Corporation, as well as financial disclosure and annual performance across the range of operational programmes and objectives identified in the previous year's Annual Performance Plan.

The annual report also includes sections relating to Corporate Social Investment (CSI), Corporate Governance, Human Resources, and Environmental Issues, as well as disclosure of environmental performance against annual objectives set out for the Planning and Infrastructure Development Programme.

A quick list of the various documents compiled by Dube TradePort Corporation includes:

- Quick Scan Assessment – Energy Risk and Opportunity Assessment – WSP;
- The Safety Health Environmental Quality – Implementation Management System (SHEQ-IMS);
- 'Green' projects;
- Corporate Social Investment Strategy, 2013 – 2016;
- Dube TradePort Corporation Development Framework Plan, 2008;
- Dube TradePort Corporation Annual Performance Plan, 2012/13;
- Annual Report, 2012/13;
- Dube TradePort Corporation State of the Environment Report, 2012;
- Operational Environmental Management Plans and Audit reports;
- Frameworks and management plans;
- Environmental Impact Assessments and associated Specialist Studies;
- Planning and Infrastructure Programme;
- Risk and audit committees;
- Advisory Forum (to stakeholder engagement);
- Environmental Joint Working Group;
- Climate Resilient Committee – comprising Dube TradePort Corporation, Tongaat Hulett, and the eThekwini Environmental Management and Climate Protection Department;
- Master Plan Review Panel – comprising Dube TradePort Corporation, ACSA, and eThekwini Planning Unit;
- Best Environmental Management Practice (BEMP) audit and development of an Aspects and Impacts Register to inform the development of a new OEMP;
- Commitment to sustainability by 2018;
- Development of Carbon Management Strategy Framework – Strategy to achieve proposed carbon targets;
- Pilot lighting investigation – Dube Cargo Terminal investigating the feasibility of installing energy-efficient lighting rated at 80W to replace the 400W CFLs;
- Unit Load Device (ULD) Design Challenge – Dube TradePort Corporation is engaging with design professionals to develop a lighter ULD for cargo transfer, to ultimately reduce the fuel requirement and therefore carbon emissions of transport;
- Dube TradePort Corporation Environmental Strategy 2013 – 2018 Action Plan;
- Carbon Calculation Audit for 2014/2015; and
- Carbon Offset Certificate for the Fuel Switch at Corobrik's Driefontein Brick Factory in South Africa Project.

At present, the requirement for Integrated Reporting under the King III Code of Governance is only applicable to listed South African companies. Non-listed private firms are subject to the Companies Act (Act No. 71 of 2008), which adopts many of the recommendations and policies contained in King III and draft King V report. Further, there is currently no legal requirement under the PFMA for public entities to report on environmental and/or social governance issues. The inclusion of Sustainability Performance Indicators (PI) in the PI Framework, as set out by the South African National Treasury (www.treasury.gov.za) is however encouraged (DTPC, 2013b). In short, such sustainability reporting is considered to be best practice and, although not currently required, is preferred.

4. GOVERNANCE AND INTEGRATED ENVIRONMENTAL MANAGEMENT
(continued)

It is noted that the draft Carbon Tax Bill was released in November 2015 (Department: National Treasury, 2015). This was out for comment, but has not been enacted to date. The intent of the Bill is to ensure that carbon tax forms an integral part of the system for implementing government policy on climate change, as outlined in the 2011 National Climate Change Response Policy and National Development Plan.

Dube TradePort Corporation presents a unique opportunity to meaningfully stimulate the economy of the eThekwini Metropolitan Municipality (i.e. the City) and the KwaZulu-Natal Province. Specific opportunities relate to the creation of sustainable employment opportunities through the promotion of small, medium and micro enterprises (SMMEs), with an explicit focus on Broad-Based Black Economic Empowerment (B-BBEE). These interventions were identified by Dube TradePort Corporation in the development and subsequent assessment of the Socio-Economic Impact Approach (2009), which aimed to ensure maximum benefit to local communities and businesses. In line with this, the facilitation of participation by relevant stakeholders in the implementation of strategies was identified as, and remains, one of the core business principles of Dube TradePort Corporation (DTPC, 2013b).

It should be noted that stakeholder engagement has been included as a new strategic objective indicator for Dube TradePort Corporation, from the 2012/13 APP onwards.

4.4.1 DUBE TRADEPORT CORPORATION STRATEGIC PLAN

The Dube TradePort Corporation Strategic Plan for the fiscal years 2015/16 – 2019/20 (DTPC, 2015c) outlines the key outcomes that Dube TradePort Corporation aims to achieve in alignment with the relevant national and provincial priorities. In line with the Constitutional imperative of the need 'to secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development', Dube TradePort Corporation aims to meet all its key outcomes in an environmentally sustainable manner.

As such, the following key outcomes have been set regarding environmental sustainability. The Environmental sub-programme echoes the imperative of environmentally sustainable practices with particular reference to all development planning activities. This is to be achieved by minimising and preventing environmental impacts through appropriate objectives and targets, as well as innovative measures for environmental protection. The strategic objective for the Environmental sub-programme is to ensure that the aerotropolis is environmentally sustainable.

In terms of Environmental Sustainability, the percentage of enterprise-wide contribution to carbon offset is a 7% reduction from baseline in the 2015/16 financial year. This will result in a 30% drop from the current baseline by 2019/20 (DTPC, 2015c).

With regard to the number of hectares of land rehabilitated, the 5-year strategic plan target is 100ha. The annual targets are as follows: 15ha in 2015/16 financial year, and then 20ha and 25ha respectively in the 2016–2018 financial years, concluding with 30ha in the 2019/20 financial year (DTPC, 2015c).

The intention is to regularly test Dube TradePort Corporation's impact on the environment and thereby ensure that the development of the aerotropolis takes place in an environmentally sustainable manner. As such, an Environmental Strategy and Policy encompassing all aspects of Dube TradePort Corporation, and a carbon calculator tool, have been developed.

Through the application of the carbon calculator tool, Dube TradePort Corporation expects to reduce its carbon emissions by 7% per annum, resulting in a 30% drop from the current baseline by 2019/20 (Figure 10).

In addition, it is intended to rehabilitate land on an annual basis to compensate for the loss of areas affected by development. This will be done by creating offsets elsewhere to enhance the environment, in order to comply with RoD obligations and give effect to the goal of being a responsible developer. To this end, targets have been set per annum for the rehabilitation of land. As indicated in Figure 11, 16ha were expected to be rehabilitated in 2014/15 and a further 100ha over the following 5 years.

4.4.2 ENVIRONMENTAL POLICY

Dube TradePort is Africa's first global trade portal providing a world-class logistics platform incorporating cargo, commercial and agricultural services. With a view to becoming a world-class aerotropolis, and a catalyst for economic growth, Dube TradePort is committed to promoting sustainable development by minimising its environmental impacts, whilst continually striving for improved performance. To this end, Dube TradePort Corporation has developed an Environmental Policy, which demonstrates its commitment to promoting sustainable development by minimising its environmental impacts, whilst continually striving for improved performance (DTPC, 2015d).

FIGURE 10: BASELINE VS TARGETED ENTERPRISE-WIDE CARBON OFFSET

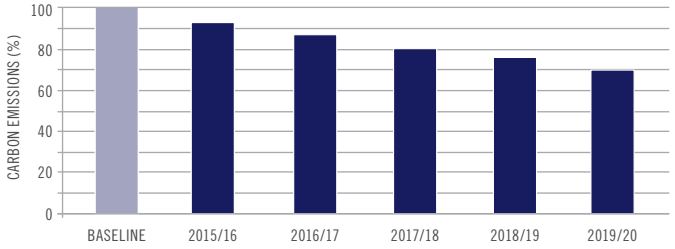
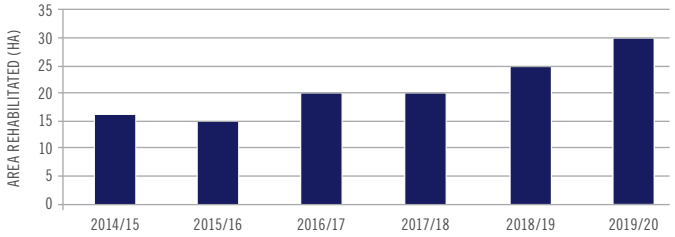


FIGURE 11: TARGETED NUMBER OF HECTARES REHABILITATED



To achieve this Dube TradePort commits to:

- Meeting all legal requirements, and agreed upon environmental and public commitments;
- Continually assessing the impact of our activities on the natural environment and annually reviewing objectives, targets and plans relating to significant environmental impacts associated with our operations, specifically:

4. GOVERNANCE AND INTEGRATED ENVIRONMENTAL MANAGEMENT
(continued)

- To promote development in a way that is sensitive to our natural ecosystems and the services they provide;
- To create a working environment that allows for the efficient use of natural resources such as water and fossil fuel energy;
- To monitor and manage our carbon emissions with a view to becoming carbon neutral;
- To minimise our emissions to air, water and land;
- To balance the needs of the environment against other Dube TradePort sustainability mandates; and
- To foster an environmentally responsible culture amongst our employees, tenants, developers and third party suppliers, to assist Dube TradePort in becoming Africa's first green aerotropolis.

The following strategic environmental objectives should be applied to all planning, decision-making as well as day-to-day operations at Dube TradePort:

4.4.3 LAND USE AND ECOLOGY

Dube TradePort is a greenfield development and operations occur near to a number of areas of high conservation importance or potential. In acknowledgement of the importance of the ecological importance of such areas, Dube TradePort commits to:

- Enhancing natural ecosystems and the ecological goods and services they provide, through restoring and rehabilitating natural areas for conservation as set out in the Dube TradePort Restoration and Rehabilitation Plan; and
- Adopting a strategy aimed at stabilising biodiversity impacts such that 'zero net-loss' can be achieved in the medium term.

4.4.4 WATER

Dube TradePort Corporation recognises that South Africa is a water scarce country. In order to conserve water, Dube TradePort Corporation will:

- Apply the concept of the water hierarchy in project and infrastructure design, which first seeks to avoid water usage, followed by incorporation of reuse and then recycling initiatives where feasible; and
- Minimise the use of potable water in circumstances where its usage is not absolutely required.

4.4.5 ENERGY AND GREEN HOUSE GAS EMISSIONS

Dube TradePort Corporation utilises various natural and finite resources in its operations, including fossil fuel energy carriers. Dube TradePort Corporation recognises the need to conserve finite resources and the importance of minimising fossil fuel use to mitigate the release of greenhouse gas (GHG) emissions, which contribute to climate change. Dube TradePort is therefore pursuing a strategy that includes the following elements:

- Review and, where feasible, develop renewable energy and energy efficiency projects; and
- Monitor and manage GHG emissions with the ultimate aim of becoming carbon neutral through implementation of the Carbon Management Strategy.

4.4.6 BUILT ENVIRONMENT

Dube TradePort Corporation recognises that development which is efficient, safe, clean and environmentally friendly is a key component of the long term sustainability of operations and key in creating an environmentally responsible culture amongst our employees and tenants. In line with this, Dube TradePort Corporation will:

- Pursue, as a minimum, a 4-star rating according to the Green Building Council of South Africa for all new and qualifying buildings;
- Enforce the use of Environmental Design Guidelines applicable to all Dube TradePort infrastructure, buildings and tenants; and
- Work with tenants and partners to monitor and reduce resource (water, waste and energy) consumption and adequately address cross-cutting issues.

4.4.7 DISCHARGES TO THE ENVIRONMENT

Dube TradePort Corporation produces various discharges to the environment through its operations, including emissions to air (pollutants), water (effluents) and land (waste). In line with this, Dube TradePort Corporation commits to reducing such emissions through avoidance and minimisation techniques, specifically:

- Minimising discharges to the environment, including air, water and land and meeting the minimum standards as set out in national environmental legislation; and
- Application of the waste hierarchy to all waste streams, which includes first avoiding, then reducing, reusing, and recycling the waste stream where possible, with disposal as the last option.

4.4.8 PROCUREMENT

Dube TradePort Corporation has the potential to strategically transform its existing supply chain to reduce resource consumption and impacts associated with its activities. In order to have a positive influence on its supply chain, Dube TradePort Corporation will:

- Implement a system to improve sustainability of procurement decision-making processing, including analysis of the life-cycle impact of goods and services procured by Dube TradePort Corporation;
- Invest in feasibility for incorporating ecological infrastructure in project design and implementation;
- Encourage purchase of goods, materials and services that use recycled products; and
- Reuse, recycle and recover goods and materials, wherever possible.

4.4.9 STAKEHOLDER ENGAGEMENT

Dube TradePort Corporation understands the importance of maintaining good relationships with stakeholders. Dube TradePort Corporation therefore commits to:

- Engaging with tenants and joint venture partners to encourage the application of the principles set out in this Policy;
- Undertake to understand the needs and concerns of Dube TradePort Corporation's stakeholders and communicate with them in a transparent and meaningful way, through the development and implementation of a stakeholder engagement strategy;
- Disclose environmental performance against the objectives set out in this Policy to Dube TradePort Corporation's stakeholders; and
- Maintain close consultation with joint venture partners to ensure sound management and proactive responses to potential environmental incidents and continual improvement across the aerotropolis complex.

4. GOVERNANCE AND INTEGRATED ENVIRONMENTAL MANAGEMENT
(continued)

THE NUMEROUS PLANS, STRATEGY REPORTS, QUICK SCANS, RISK AND OPPORTUNITY ASSESSMENTS AND ACTION PLANS HAVE LAID DOWN AN EXCELLENT PATH TO FOLLOW.

4.5 CONCLUSION

TREND: STABLE

Dube TradePort Corporation is making progress towards entrenching environmental management and sustainability into its overall strategic direction as well as day-to-day operations. It is noted that Dube TradePort Corporation's governance and IEM strategies have added value both on site and to surrounding communities. However, the lack of information for some indicators means that it is difficult to determine an overall trend that is improving. Systems should be put in place to monitor these indicators over time.

In a peer benchmarking exercise undertaken by Dube TradePort Corporation against various performance criteria, and in comparison with similar corporations, Dube TradePort Corporation came out strong in risk management, auditing and compliance, but poorly in sustainability. It is recommended that Board-level oversight be prioritised, as this has been identified as a weakness in the current corporate structure of Dube TradePort Corporation (WSP, 2013a & 2013c).

The peer benchmarking exercise identified that, if Dube TradePort Corporation is to effectively incorporate environmental and sustainability issues into the day-to-day running of the company, it needs to be sure that its corporate governance structures, policies and strategies are suitably designed to encompass effective environment and sustainability management (WSP, 2013b). The numerous plans, strategy reports, quick scans, risk and opportunity assessments and action plans have laid down an excellent path to follow. However, the number of periods completed is still relatively low, thereby making progress difficult to report on as the trends are not easily noted.

PLANTING OF INDIGENOUS TREE AND PLANT SPECIES

The lack of information on locally sourced material remains a challenge for Dube TradePort Corporation. It is recommended that initiatives such as the inclusion of preference points for the use of local materials (NB: some items must be locally sourced e.g. t-shirts, some IT items), as linked to a more qualitative assessment of procurement controls, be added to tender documents and that surrounding communities are encouraged to produce products that can be used by Dube TradePort Corporation.

There is a growing pressure on public and state-owned entities to utilise the integrated reporting approach and principles championed by the King III, to more fully embrace stakeholder inclusivity, and to fulfil the critical need to maintain social, economic and environmental sustainability. KPMG (2012) and others have highlighted the alignment of the PI initiative, with a special focus on the sustainability PI, as an indication that Integrated Reporting is likely to be the future for public sector reporting in South Africa. Although not listed on the stock exchange, reporting at the level required for the King III requirements would be worth working towards. Consideration for the need of integrated reporting is reflected in the 2011/12 Dube TradePort Corporation Annual Report (and later reports) which includes sections relating to CSI, Corporate Governance, Human Resources and Environmental issues (DTPC, 2013b).

Poverty in the surrounding area is a key social concern (although not due to the presence of Dube TradePort). From a social responsibility point of view, Dube TradePort Corporation can help to reduce poverty through programmes aimed at the local, surrounding communities. To effect such, Dube TradePort Corporation is committed to:

- Further develop a commonly shared long term vision for a sustainable airport city or aerotropolis;

- Build participation and sustainable development capacity in the local community;
- Invite all sectors of local society to participate effectively in decision making;
- Make our decisions open, accountable and transparent; and
- Cooperate effectively and in partnership with adjoining businesses, other cities and towns, and other spheres of government (Sustainable Cities International, 2012).

4.5.1 CONSIDERATION FOR ENVIRONMENTAL ETHICS

As further recommendations, Dube TradePort Corporation should consider the following with ISO 14001 accreditation in mind (North West University, 2014):

- Human impact on the surrounding environment – in this case, consideration for the development of what is equivalent to a city in terms of potential impact should be considered;
- Differentiation between right and wrong with the use of scenarios; and
- Consider the ethics of the applicable law and its associated challenges – where can Dube TradePort Corporation stand out and lead? This refers to making choices and influencing behaviour.

4.5.2 INTEGRATED AUDITING CONTROLS

There is no formal authority-approved process in place to identify operational impacts and aspects associated with activities at Dube TradePort for the entire site; therefore, it is highly recommended that this be set up.

It is recommended that a Legal Register should be maintained for the entire site, instead of being limited to Dube AgriZone alone, and a monthly compliance audit and audit protocol of not only an EMP(r) that audits EAs and also day-to-day operations be set up and linked to advancement of best practice as well. It is noted that quarterly operational audits are done, and currently an external operation audit is being undertaken by an independent ECO. Impacts and aspects registers are in place and used for Dube AgriZone, but ideally this should be extended out to other sections of the greater site. The site as a whole is monitored via an internal protocol, as well as compliance registers, but this needs to be integrated with the permitting and authorisation compliance audit processes.

A recommendation is that, with each of the existing and new (future) EAs granted, the conditions for specific portions of land are to be controlled by the relevant conditions combined. Given the growing complexity of the EAs and their related documentation, it is recommended that (a) possible conflicts be identified, and (b) they are specifically linked to each portion of land and clearly linked to the relevant permit such that auditing is more effective.

This confirmation audit should link all applicable conditions to each portion of land. This will, over time, allow for streamlining of auditing with one checklist per land portion, or group of such. Such a system is easier to update or amend via an amendment application if deemed necessary, and is easier to capture in reporting on compliance.

4.5.3 REGIONAL PLANNING INITIATIVES

Compliance and ongoing interaction in the development of Regional Planning Initiatives must continue given the regional, provincial, and national importance of the Dube TradePort and KSIA node in South Africa. As such, Dube TradePort Corporation should ensure that all such planning processes are actively monitored, taken part in when possible, and ensure that new planning initiatives within Dube TradePort Corporation's control are in alignment with such regional plans.

4.5.4 SPECIAL ECONOMIC ZONE

Capitalising on the status and benefits inherent in an SEZ should be at the forefront of all planning initiatives. Equally, the area of control and the powers linked to an SEZ to enforce compliance with overarching initiatives must be pushed. An SEZ will always be very visible. This, coupled with the regional importance of the node, allows Dube TradePort Corporation to set the way for other developing industrial nodes, and will set the bar for what is acceptable in an SEZ. This 'power' must not be overlooked or misused.

4.5.5 ISO 14001 CERTIFICATION

There are several requirements for ISO 14001 Certification (North West University, 2014), including structures, documents, plans, etc. These include stormwater and drainage plans, a list of all known impacts, and a list of environmental management programmes or means of continual improvement. All licences and authorisations are to be documented and complied with, or evidence of compliance monitoring provided (records on which Dube TradePort Corporation bases its assessment of compliance with regulatory requirements). These also include records of management reviews, training and monitoring, as well as records of EMS communication received and actions taken (North West University, 2014). It is highly recommended that Dube TradePort Corporation obtain ISO 14001 certification, whereby an external accredited body will confirm that Dube TradePort's EMS meets all the requirements of ISO 14001. Certification will result in the following benefits:

- Confidence that the EMS meets recognised requirements and standards;
- A means of momentum and aid in keeping the EMS dynamic and driving forward, in keeping with continual improvement;
- Independent and 'fresh' review of Dube TradePort Corporation's EMS and its functioning; and
- Potential recognition of achievements from third parties such as environmental regulators.

4. GOVERNANCE AND INTEGRATED ENVIRONMENTAL MANAGEMENT
(continued)

TABLE 5: SUMMARY OF GOVERNANCE AND INTEGRATED ENVIRONMENTAL MANAGEMENT INDICATORS

INDICATORS	TRENDS	DESCRIPTION	RECOMMENDATIONS
Percentage compliance with authorisations, licenses and permits (%)		Dube TradePort Corporation remains compliant and continues to maintain a high level of compliance of 96.6%.	Environmental audits should continue to be conducted on a monthly basis. Given the complexity of a number of EAs now in place, with the potential for different EAs to give conflicting requirements for a specific portion of land, it is recommended that an audit is carried out that links every condition from each EA to the affected piece of land or sets of land portions, and a once-off comprehensive audit be undertaken to confirm compliance across all EAs, WULAs and related environmental legislation. The audit checklists continuing thereafter on a monthly basis may then be updated to include any exclusions, or to clarify any potential conflicts. It is also highly recommended that Dube TradePort Corporation obtains ISO 14001 certification.
Percentage budget allocated to environmental management (%)		A total budget of R10 000 000 was allocated (and spent) for the 2015/16 financial year. This includes the development and application of relevant strategies, policies, licences and plans, and all rehabilitation work done on site.	Secure the necessary funding for environmental and sustainability assessment and policy related work, as well as ongoing rehabilitation work.
Percentage of locally sourced services and materials (%)		A trend could not be determined for this indicator, due to both a lack of data and a lack of historical data with which to compare. This is a performance indicator identified for improvement on Dube TradePort Corporation's part.	The lack of information on locally sourced material remains a challenge for Dube TradePort Corporation. It is recommended that initiatives such as the inclusion of preference points for the use of local materials, as linked to a more qualitative assessment of procurement controls, be added to tender documents, and that surrounding communities are encouraged to produce products that can be used by Dube TradePort Corporation.
Percentage of tenants on Green Leases (%)		There are currently no tenants on full green leases. However, Dube TradePort Corporation has included voluntary disclosure clauses for energy, water and waste data in the lease agreements.	Progression to full green leases for tenants based on the voluntary disclosure practices.

4. GOVERNANCE AND INTEGRATED ENVIRONMENTAL MANAGEMENT
(continued)

INDICATORS	TRENDS	DESCRIPTION	RECOMMENDATIONS
Percentage energy from renewable sources (%)		The energy sourced from renewable sources is on the increase.	It is anticipated that the energy sourced from renewable sources will increase due to the implementation of energy-saving measures (non-fossil fuel energy systems) within DTPC's precincts. Natural ventilation is included in all greenhouses to maintain a stable climate, without the use of non-renewable energy sources. Photovoltaic systems are being installed on two of the packhouses, which together consume the greatest amount of energy within Dube AgriZone.
Percentage emissions offset (%)		It is anticipated that the percentage emissions offset will improve as Dube TradePort Corporation recognises the need to conserve finite resources and the importance of minimising fossil fuel usage, so as to mitigate the release of greenhouse gas (GHG) emissions which contribute to climate change.	DTPC must monitor and manage GHG emissions with the ultimate aim of becoming carbon neutral, through implementation of the Carbon Management Strategy and the recommendations of the Carbon Footprint Analysis. Through the application of the carbon calculator tool, Dube TradePort Corporation expects to reduce its carbon emissions by 7% per annum, resulting in a 30% drop from the current baseline by 2019/20.
Percentage investment in skill development of staff (%)		The target of 2% has been exceeded, with 2.9% spent on investment in skills development. This is a total spend of R1 763 060 (2015/16 financial year). The CSI Annual Report 2014/15 states that it has been a productive and successful year, with much effort made to ensure that investment was linked to Dube TradePort Corporation's key focus areas, specifically education and skills development	Continue to secure budget for investing in skills development of staff.
Percentage staff employed from surrounding communities (%)		Dube TradePort Corporation continues to generate jobs (locally), but due to the lack of data it is difficult to determine whether there has been an increase or decline.	Survey to determine the number of staff that are employed from surrounding communities.

5. LAND AND TRANSFORMATION

THE TERM 'LAND' IS A BROAD CATEGORY USED TO DESCRIBE THE BASIC BUILDING BLOCKS THAT SUPPORT THE MAJORITY OF HUMAN ACTIVITY ON THE EARTH'S SURFACE.

Our interaction with land resources is complex, as human activity both influences and is influenced by the condition and state of land resources (Pauw, 2011). Maintaining land in a good and/or productive condition is therefore particularly important for the protection of the natural resource base, where soil quality and habitat transformation are properly managed and controlled (GDARD, 2011).

5.1 PRESSURES

The area under consideration for this assessment is approximately 3 110 hectares (ha) in extent, and includes Special Economic Zone areas, JV land, Dube TradePort land as well as ACSA land. This area faces a number of acute development pressures from a number of sources, not least due to its location on the periphery of a major metropolitan urban area and its status as the first purpose-built aerotropolis on the continent. The pressure to transform natural and/or undeveloped areas in such environments becomes particularly challenging, but nonetheless crucially important to maintain productivity and protection of important agricultural and natural resources, environmental quality, and ecosystem goods and services.

KING SHAKA INTERNATIONAL AIRPORT AERIAL VIEW

Understanding the pressures that influence this area allows us in turn to understand why change is occurring. Regionally, Dube TradePort is located within the eThekwini-Umhlatuze provincial corridor, as defined in the Provincial Spatial Economic Development Strategy (PSEDS). The National Route (N2) acts as the development spine of the corridor, which is anchored by Durban Harbour to the south and Richards Bay Harbour to the north, which together function as the primary logistics gateway into Southern Africa (SSI, 2009). This corridor is focused predominantly on linking the opportunities associated with Dube TradePort and King Shaka International Airport (KSIA) with Durban, Richards Bay and areas in between. As such, and due to their strategic location, land resources within this corridor (including Dube TradePort) face unique pressures given their regional and national importance. In light of the above, specific pressures promoting land transformation include but are not limited to:

- Demand to transform land for bulk transport, housing, agriculture and logistics infrastructure;
- Population growth and concomitant demands for mixed use developments;
- Demand for land for the purposes of industry; and
- Continuing demand for land to be utilised for the transport infrastructure, warehousing and logistics required for the aerotropolis.

In many ways, the pressures that affect land resources reflect the pressures that impact many of the other environmental considerations in this document, such as biodiversity, wetland resources and ecosystem goods and services.

5.2 STATE

It is necessary to assess the state of land resources within Dube TradePort and its associated landholdings over time in order to identify trends that can inform decision-making. To this end, land cover has been analysed for the study area between 2003 and 2015, resulting in the classification of different land cover elements based on remotely sensed land cover data in raster format, as well as high resolution aerial imagery (dated 2014 and 2015). Data captured in 2003 was used as the baseline condition, given that construction of the airport and its associated infrastructure had not yet commenced. The same classes identified as part of the baseline

5. LAND AND TRANSFORMATION
(continued)

TABLE 6: DETAILED LAND COVER FOR 2003 AND 2015

LAND COVER CATEGORY	2003 COVERAGE (HA)	2014/15 COVERAGE (HA)	2003 COVERAGE (%)	2014/15 COVERAGE (%)	PERCENTAGE CHANGE 2003-2015 (%)
Agricultural Land	1 776.14	1 650.52	57.1%	53.1%	-4.1%
Grassland	364.71	248.89	11.7%	8.0%	-3.7%
Secondary Scrub	348.23	269.40	11.2%	8.7%	-2.5%
Plantations	48.84	19.08	1.6%	0.6%	-1.0%
Residential Areas	57.92	44.90	1.9%	1.4%	-0.4%
Wetland or Water Body	65.02	66.16	2.1%	2.1%	0.0%
Wooded Areas	299.47	309.33	9.6%	9.9%	0.3%
Roads	43.47	58.26	1.4%	1.9%	0.5%
Secondary Woodland	97.11	138.17	3.1%	4.4%	1.3%
Airstrip	2.00	80.58	0.1%	2.6%	2.5%
Transformed/Developed	6.82	225.63	0.2%	7.3%	7.0%

assessment in 2003 were applied to the 2015 data, and thereafter compared to the baseline data. The results of this analysis are presented below as detailed, summarised, and binary land cover respectively.

5.2.1 DETAILED LAND COVER

During the environmental impact assessment for KSIA, land cover categories were assigned to the landholdings planned for the airport and its associated infrastructure. For the purposes of this report, the same categories were applied to the extended study area (see Section 5.1). Table 6 compares the extent of the respective land cover categories in 2003 (i.e. the baseline data set) and in 2014/15 (the comparative data set). The percentage of the total area for each land cover category is also shown for 2003 and 2014/15, as well as the ratio of change between 2003 and 2015. Land cover classes are as detailed as possible in order to detect possible changes at the smallest possible scale.

Table 6 shows stability in the land cover categories of wetlands/water bodies, wooded areas, residential areas, plantations and roads. That is to say, there was 1% or less change in their extent between 2003 and 2015. By contrast, the land cover categories of transformed/developed, airstrip and secondary woodland showed significant growth in their extent, while agricultural land, grassland and secondary scrub exhibited shrinkage in their extent between 2003 and 2015. Given the development of the airport and its associated infrastructure, the growth in airstrip and transformed/developed areas is understandable, while concomitant losses in agricultural land and grassland also make sense in this context.

5. LAND AND TRANSFORMATION
(continued)

Figure 12 reinforces these findings, and also highlights how agricultural land is still the dominant land cover for the study area, despite significant growth in certain other land cover categories between 2003 and 2015.

The spatial extent and location of the aforementioned detailed land cover categories in 2003 is shown in Figure 13, while Figure 14 shows the extent and location of the same categories approximately 12 years later.

Much of Dube TradePort and its associated infrastructure has been developed on grassland areas (these include 'natural' grasslands as well as improved or transformed grasslands). Interestingly, the extent of wooded areas remained relatively stable between 2003 and 2015, despite large tracts of these natural areas being cleared to make way for Dube TradePort and KSIA associated infrastructure. Figure 14 shows that the wooded areas that weren't cleared expanded in size since 2003, particularly west and south of Dube TradePort. In some cases, this may be attributable to changes from secondary woodland to more established wooded areas, necessitating a change in land cover category.

FIGURE 12: COMPARISON OF DETAILED LAND COVER CATEGORY EXTENT BETWEEN 2003 AND 2015

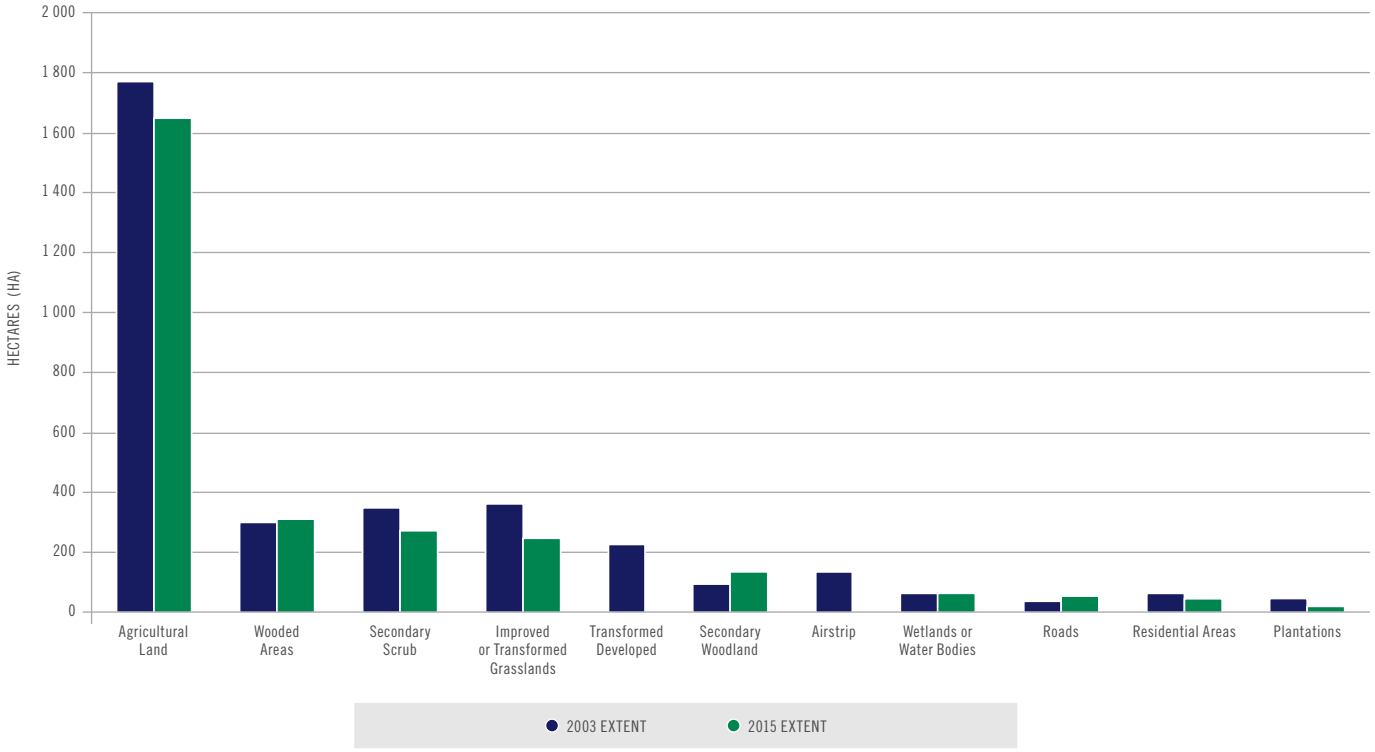
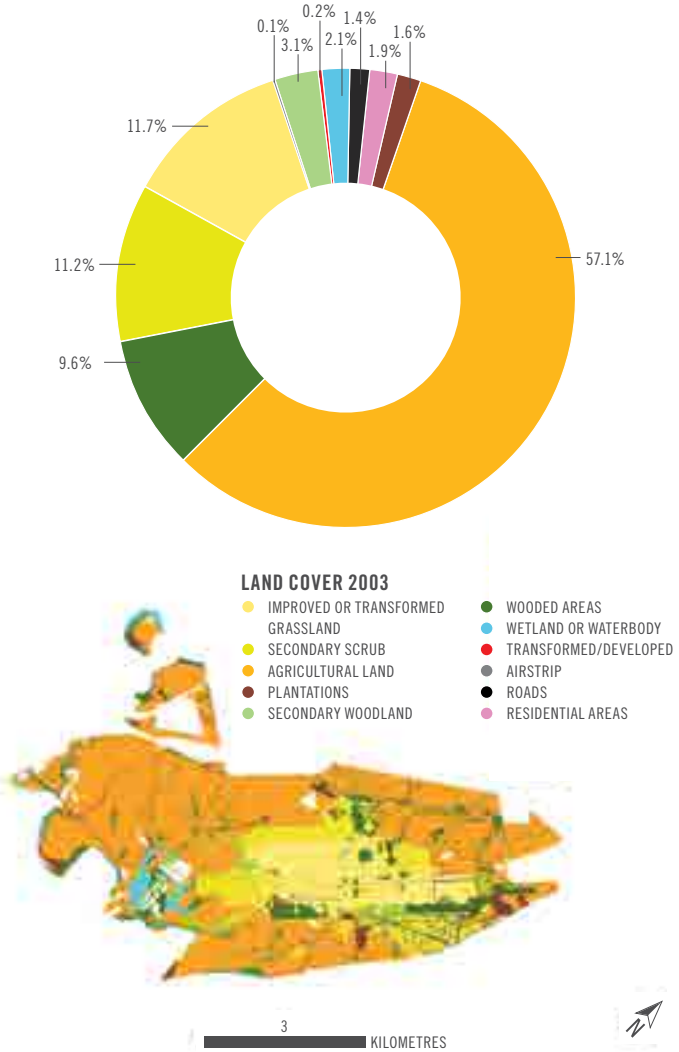


FIGURE 13: SPATIAL EXTENT OF DETAILED LAND COVER FOR THE STUDY AREA IN 2003



5. LAND AND TRANSFORMATION
(continued)

FIGURE 14: SPATIAL EXTENT OF DETAILED LAND COVER FOR THE STUDY AREA IN 2014/15

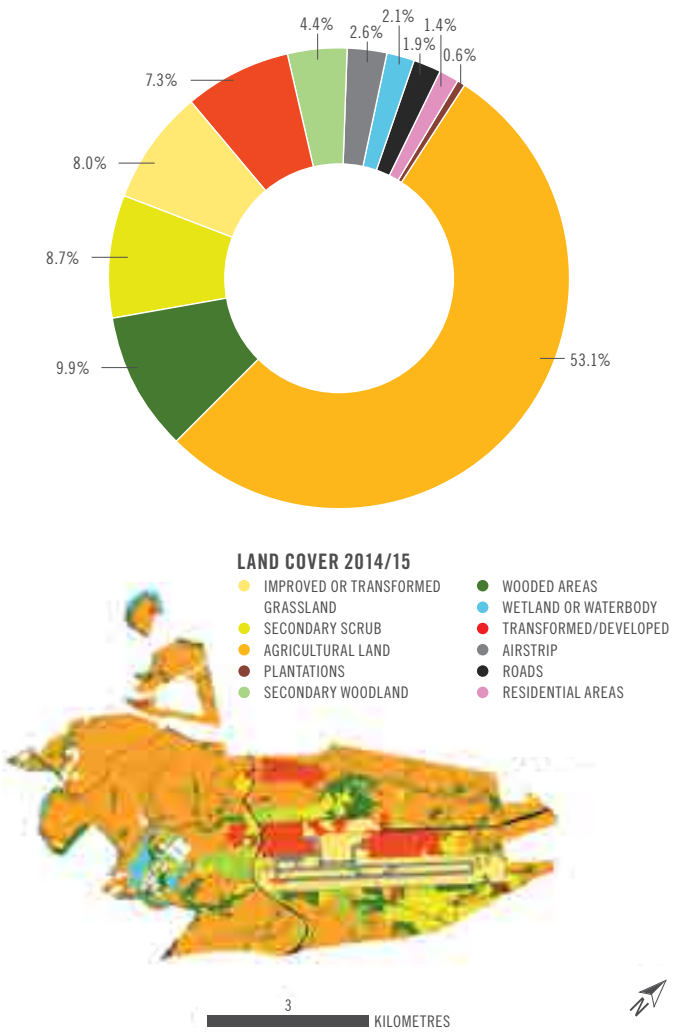


TABLE 7: SUMMARISED LAND COVER FOR 2003 AND 2015

LAND COVER CATEGORY	2003 COVERAGE (HA)	2014/15 COVERAGE (HA)	2003 COVERAGE (%)	2014/15 COVERAGE (%)	PERCENTAGE CHANGE 2003-2015 (%)
Natural	1 174.52	1 031.96	37.8%	33.2%	-4.6%
Cultivation	1 776.14	1 650.52	57.1%	53.1%	-4.1%
Plantations	48.84	19.08	1.6%	0.6%	-1.0%
Urban Built-Up	110.21	409.37	3.5%	13.2%	9.6%

5.2.2 SUMMARISED LAND COVER

The South African National Biodiversity Institute (SANBI) produced a national land cover data set in 2009, using more generic or 'summarised' land cover classes to assess land cover at the country scale. It is useful to contextualise the land cover for Dube TradePort within these same categories, to allow for easy comparison to the national data set captured in 2009. To this end, the categories described in Section 5.2.1 were reclassified into more generic categories, shown in Table 7. Coverages (or extent) of the various categories for 2003 and 2014/15 are shown, as well as percentage coverage and the ratio of change.

Table 7 shows similar trends to Table 6, showing the greatest growth in the urban built-up category, with the greatest loss of coverage in the natural category, followed closely by cultivation. Figure 15 and Figure 16 show the coverage of summarised land cover categories in 2003 and 2015 respectively. In spatial terms, the most striking feature when comparing the 2003 and 2015 coverages is the growth in urban built-up areas, particularly around KSIA. Beyond this area, the mosaic of natural and cultivated land cover categories remains relatively unchanged over the 12 year period of assessment.

5. LAND AND TRANSFORMATION
(continued)

FIGURE 15: SPATIAL EXTENT OF SUMMARISED LAND COVER FOR 2003

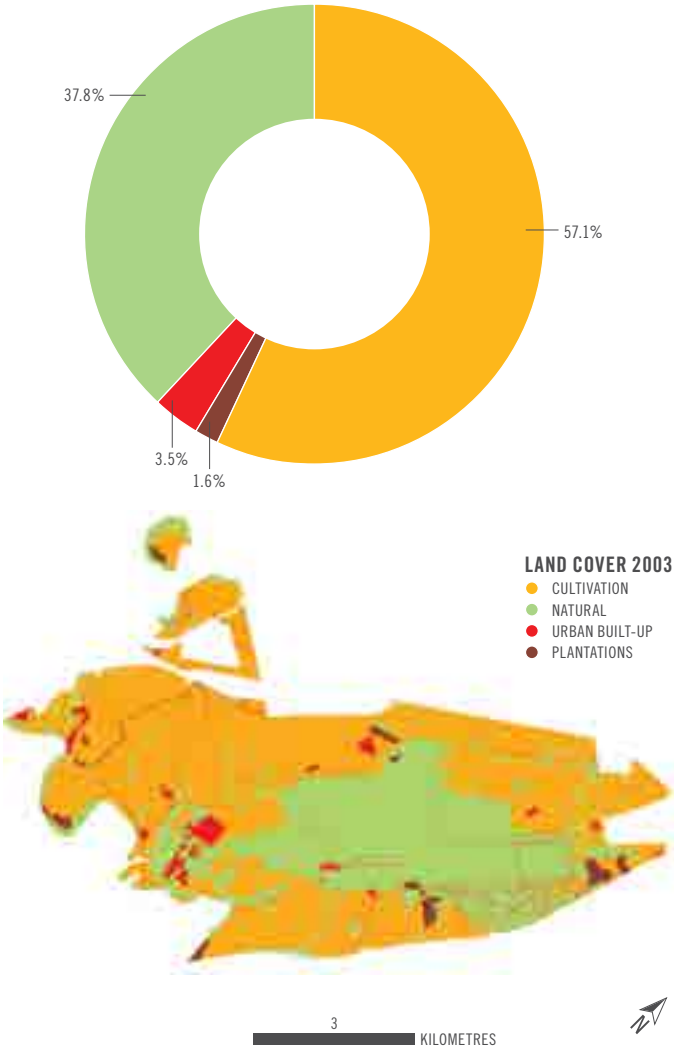


FIGURE 16: SPATIAL EXTENT OF SUMMARISED LAND COVER FOR 2014/15

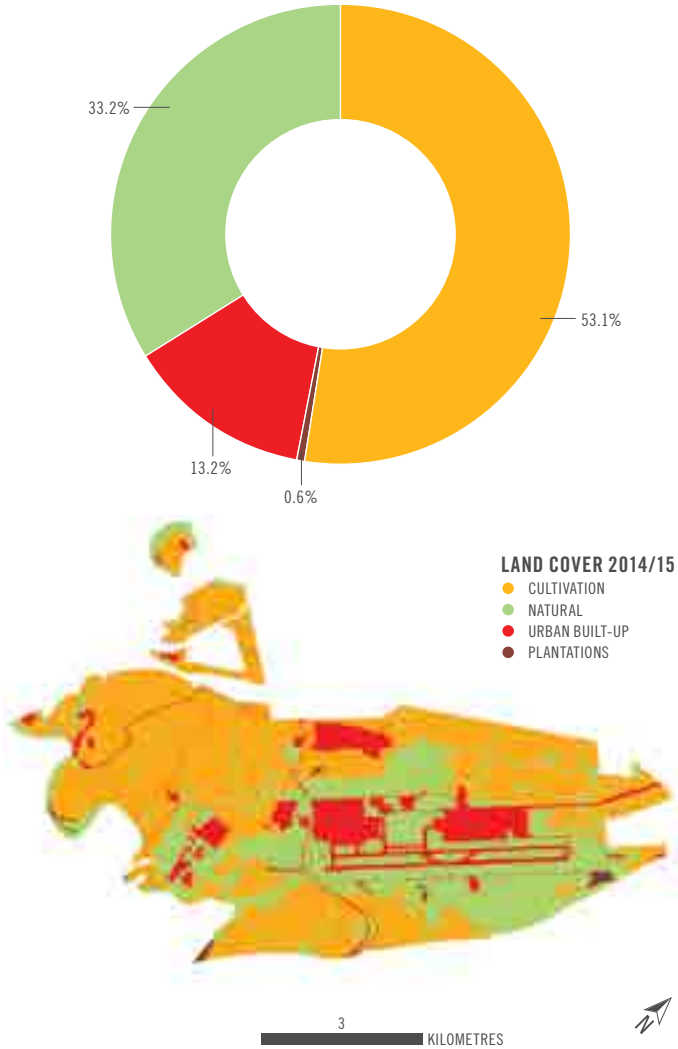
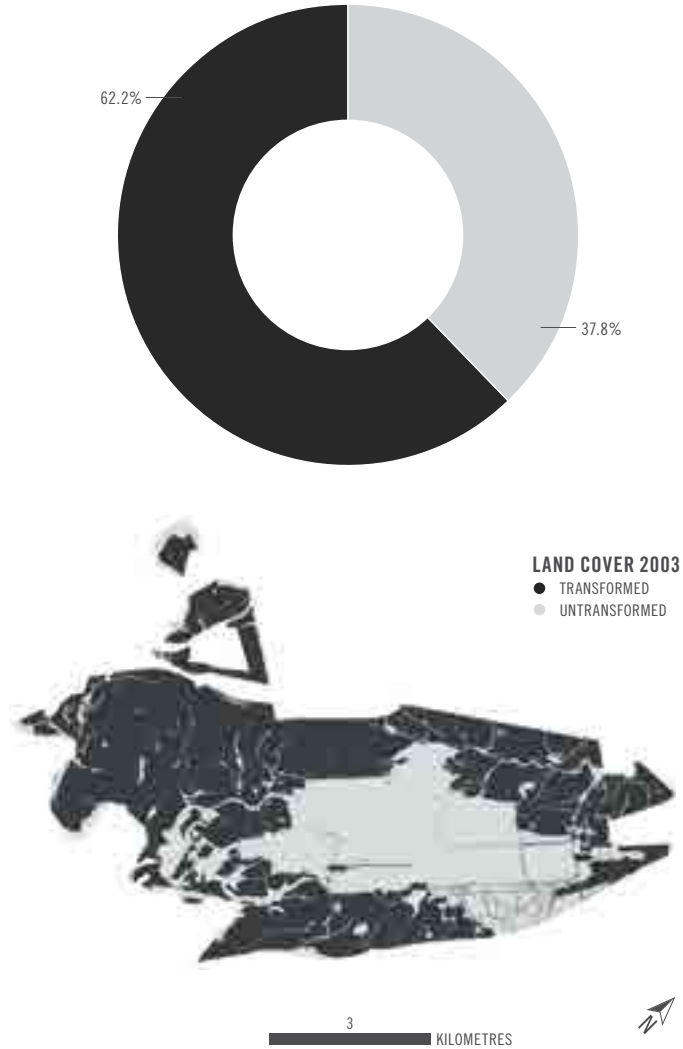


FIGURE 17: SPATIAL EXTENT OF BINARY LAND COVER FOR 2003



5. LAND AND TRANSFORMATION
(continued)

FIGURE 18: SPATIAL EXTENT OF BINARY LAND COVER FOR 2014/15

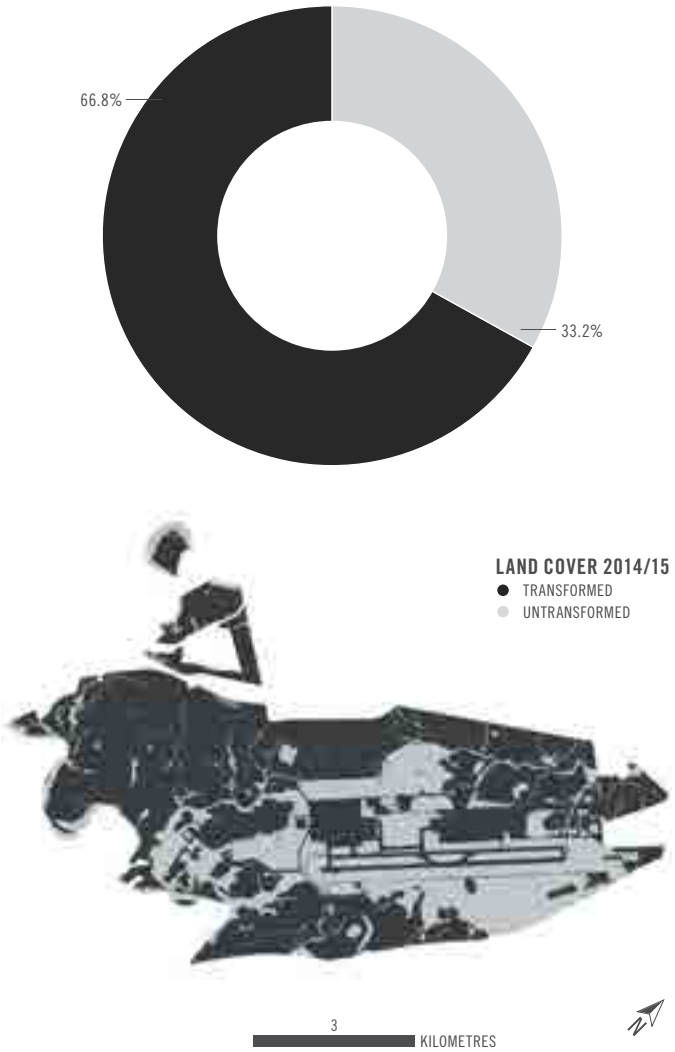


TABLE 8: BINARY LAND COVER FOR 2003 AND 2015

LAND COVER CATEGORY	2003 COVERAGE (HA)	2014/15 COVERAGE (HA)	2003 COVERAGE (%)	2014/15 COVERAGE (%)	PERCENTAGE CHANGE (%)
Transformed	1 935.19	2 078.97	62.2%	66.8%	4.6%
Untransformed	1 174.52	1 031.96	37.8%	33.2%	- 4.6%

5.2.3 BINARY LAND COVER

Perhaps the simplest method of assessing land cover change over time is to summarise detailed land cover classes to a binary categorisation, i.e. to one of two categories. In this case, classifying land as 'transformed' or 'untransformed' allows for potential identification of landscape corridors or areas suitable for rehabilitation to more functional states, and aids general decision-making. In conservation planning, assessing transformation allows for more informed decisions because areas that are completely transformed may be removed from planning targets, as these areas are generally considered to have lost significant levels of biodiversity. Table 8 shows binary land cover for the study area in 2003 and 2015, including coverage in hectares and in percentage terms, as well as change ratio. Binary land cover in terms of coverage, percentage coverage, ratio of change and spatial extent are shown in Table 8, Figure 17 and Figure 18

Importantly, even though Table 8 shows a relatively minor loss of untransformed land cover (just less than 5%), Figure 17 and Figure 18 show that the development of Dube TradePort and KSIA-associated infrastructure fragments a large, previously untransformed area which is likely having the effect of limiting connectivity and ecosystem function within that area.

5.3 IMPACTS

Having assessed the pressures that influence the study area in Section 5.1, as well as the state of the land resources within the study area in Section 5.2, it is necessary to determine the impacts typically associated with changes in land cover and transformation of land resources. This is shown in Table 9. It should be noted that these are descriptions of impacts without mitigation or corrective intervention/ responses, and include potential negative and positive impacts.

The introductory component of this chapter alluded to the interconnectivity of environmental systems, i.e. changes in seemingly independent components can have unforeseen or unanticipated impacts on other dependent or related natural systems. The state of the land has implications for the state of rivers, as the land and rivers are inseparable. Similarly, the conservation of rivers depends entirely on sound management of the entire catchment that they drain (Nel *et al*., 2007). Dube TradePort is abutted by two critical river systems (i.e. uMdloti and Tongaat) and therefore any changes and impacts on ground cover, soil loss and the maintenance and decline of plant species has the potential to affect these critical systems.

5.4 RESPONSES

At the local level, Dube TradePort Corporation has formulated and implemented a number of policy responses to mitigate the negative impact of the above impacts and pressures, as seen in Table 10.

5. LAND AND TRANSFORMATION
(continued)

TABLE 9: ANTICIPATED IMPACTS ON LAND RESOURCES

IMPACT	DESCRIPTION
Fragmentation and Loss of Natural Areas	• Loss of habitat and species; • Fragmentation of habitat; • Loss of ecosystem goods and services such as flood attenuation; and • Potential negative impacts on provincial conservation targets.
Spread of Invasive Alien Plant Species (IAPs)	• IAPs often follow soon after land has been disturbed; • Reduced extent of natural areas; • Altered fire regimes (IAPs often have higher biomass than indigenous species); and • Reduced integrity/resilience of natural areas which are out-competed by IAPs.
Reduced Climate Change Resilience	• Replacement of natural areas with hardened surfaces decreases climate change resilience.
Loss of Agricultural Resources	• Replacement of areas with high agricultural potential will lead to a loss of these resources for agricultural purposes.
Employment Opportunities and/=82 Economic Growth	• Increased employment opportunities through Dube TradePort projects and economic growth initiatives.
Coordination/Formalisation of Rehabilitation Initiatives	• Increase effectiveness of biodiversity rehabilitation and restoration efforts.
Spatial Restructuring	• Use of marginal and/or undeveloped land for more productive purposes.
Food Security	• Food produced within the study area can make a positive impact on local and regional food security.

TABLE 10: SUGGESTED RESPONSES

RESPONSE	DESCRIPTION
Development Impact Management & Mitigation	Detailed and activity-specific environmental management programmes for all construction activities, including operational phase guidelines.
Biodiversity Management	Development and implementation of rehabilitation strategies for biodiversity assets (such as wetlands and grasslands) as part of the site-wide KSIA/DTP Rehabilitation and Restoration Plan.
Water Demand Management	Numerous strategies aimed at reuse and more efficient utilisation of water resources including rainwater and stormwater harvesting, use of treated effluent, and water treated by reverse osmosis for irrigation, and the use of borehole water resources where appropriate, including but not limited to Water Demand Management and Conservation Plan.
Water Quality Management	Establishment of a water quality monitoring programme to ensure Water Demand Management does not have negative environmental impacts.
Waste Management	Recycling and waste management initiatives implemented across all sectors, including centralised collection of recyclable materials.

5. LAND AND TRANSFORMATION
(continued)

IT IS IMPORTANT TO NOTE THAT, IN THE CONTEXT OF THIS REPORT, LAND COVER IS USED AS AN INDICATOR, AND INDICATORS ARE INTENDED TO PROVIDE A 'SNAPSHOT' OF RESOURCE CONDITION AS OPPOSED TO A DETAILED ASSESSMENT AT A FINE SCALE OR LEVEL OF DETAIL.

5.5 CONCLUSION

TREND: STABLE

The current trend associated with land and transformation is regarded as stable, with incremental increases in land transformation and loss of natural land cover.

The three types of land cover change assessed in Section 5.2 show that, while rates of transformation do not appear to be alarmingly fast, there are undoubtedly negative impacts associated with the changes identified between 2003 and 2015.

It is important to note that, in the context of this report, land cover is used as an indicator, and indicators are intended to provide a 'snapshot' of resource condition as opposed to a detailed assessment at a fine scale or level of detail. It is of critical importance to continue monitoring activities in order to accurately track change and respond accordingly to negative impacts. An important issue from a land resource perspective is, therefore, the need to ensure that the latest data and information is used when assessing change and impacts on land and landscape. This includes spatial data and data captured during fieldwork and ground-truthing exercises from other studies.

Land and landscape are useful concepts to track overall change and environmental impact; thus the development and maintenance of a comprehensive land resources database is an important addition to Dube TradePort Corporation's existing datasets.

A continued emphasis on projects that promote sustainability is evident from Dube TradePort Corporation's annual reports, and the number of initiatives which seek to address efficient use of resources and the rehabilitation of degraded natural areas. It is suggested that an overall environmental database based on indicators assessed in this and previous SoER reports be developed and maintained, to allow for more efficient environmental reporting and decision-making.

NURSERY TEAM REHABILITATING DEGRADED NATURAL AREAS WITHIN THE DUBE TRADEPORT CORPORATION PRECINCT

6. HERITAGE

OVERALL, DUBE TRADEPORT CORPORATION HAS MADE CONCERTED EFFORTS TO DETERMINE THE PRESENCE OF HERITAGE RESOURCES ON SITE.

Dube TradePort Corporation (2014a) stated that the overall trend during this reporting period was stable. Dube TradePort Corporation has made numerous efforts to identify heritage resources and develop management strategies for sensitive sites. The memorial garden is also a very positive contribution to the preservation of history and acknowledgement of the people of the area.

Overall, Dube TradePort Corporation has made concerted efforts to determine the presence of heritage resources on site. Positive progress has been made in the preservation of sensitive heritage sites, such as Inyaninga Ex-Residents' Grave Site or Memorial Garden and the De Ricquebourg Family Garden Memorial Site. Most importantly, in working with the public, Dube TradePort Corporation has forged a strong relationship with the local community, which will see continued progress of this nature.

TABLE 11: HERITAGE IMPACT ASSESSMENTS COMPLETED FOR DUBE TRADEPORT CORPORATION

	HERITAGE IMPACT ASSESSMENTS COMPLETED FOR DUBE TRADEPORT CORPORATION	YEAR COMPLETED
1	Heritage Impact Assessment of Dube TradePort	2007
2	Heritage Impact Assessment of Dube AgriZone	2009
3	Heritage Impact Assessment of Dube TradeZone-Watson Highway Link Road	2010
4	Heritage Impact Assessment for the Dube TradeZone Project	2012
5	Heritage Survey of Dube AgriZone 2 and Support Zone 2	2013

Heritage resource management in Dube TradePort has proceeded timeously, systematically and in accordance with relevant legislation, including the NHRA and the KwaZulu-Natal Heritage Act 4 of 2008 (see Table 11). It is recommended that financial provision be made for ongoing heritage requirements, including Heritage Impact Assessments (HIAs) of unsurveyed landholdings and the maintenance of the Inyaninga Ex-Residents' Memorial Garden. In addition, in order to preserve it as a heritage asset, Dube TradePort Corporation must lodge an application for permanent protection of the Inyaninga Memorial Site from the provincial heritage authority, Amafa KwaZulu-Natal.

6.1 PRESSURES

The integrity and significance of heritage resources can be jeopardised by natural processes (i.e. erosion) and human activities (i.e. development). In the case of human activities, a range of legislation and policy frameworks exist to ensure the timeous identification and effective management of heritage resources for present and future generations.

Heritage resources in the study area will continue to be threatened by new infrastructural developments and agricultural activities. However, the significance of these negative impacts is likely to remain low in the case of archaeological sites, given the low to moderate heritage value. If identified timeously, impacts on traditional burial places are likely to remain positive, with management interventions favouring in situ preservation.

6. HERITAGE
(continued)

TABLE 12: STRUCTURES AND ARCHAEOLOGICAL SITES WITHIN DUBE TRADEPORT

ID	DESCRIPTION	HERITAGE SIGNIFICANCE	CURRENT STATUS AND RECOMMENDATION
1	Inyaninga Ex-Residents' Memorial Garden.	Medium	Fenced and landscaped, with public access.
2	Farmstead, cement block and brick ruins.	Low	Demolish with permit from Amafa.
3	Compound, structures have been demolished.	Low	Remove with permit from Amafa.
4	Nid residence, dating to 1968.	Low (possibly low to medium)	May not alter or demolish without permit from Amafa.
5	LIA hilltop settlement, with slag; flattened for construction of modern structures (compound), also now in ruins.	Low	Demolish with permit from Amafa.
6	LIA hilltop settlement, very few ceramic sherds and hammer stones.	Low	Demolish with permit from Amafa.
7	LIA hilltop settlement, ceramic sherds <5/10m² and very fragmented; one whetstone.	Low	Demolish with permit from Amafa.
8	LIA hilltop settlement, ceramic sherds <5/10m² and very fragmented; smithing slag.	Low	Demolish with permit from Amafa.
9	Deflated LIA iron working midden with bloomery/smithing slag; ceramic sherds >10/m² on surface, no artefacts in profile. Located in saddle on high point.	Low	Demolish with permit from Amafa.
10	LIA hilltop settlement, ceramic sherds only, <2/10m².	Low	Demolish with permit from Amafa.
11	LIA hilltop settlement, ceramic sherds only, <2/10m².	Low	Demolish with permit from Amafa.

6. HERITAGE
(continued)

6.2 STATE

As stated in the previous iteration of the State of Environment Report (SoER), there were a number of heritage impact assessments conducted to determine if there were any sensitive areas with respect to these resources, in order to guide development (DTPC, 2014a).

Table 12 indicates the heritage resources found within Dube TradePort, as well as the level of sensitivity and recommendations. Most of the heritage resources have been deemed to be of low significance, with the exception of the Inyaninga Ex-Residents' Memorial Gardens which is of medium significance.

Figure 19 shows that the Dube TradePort area is found on an area that has been determined to have a high paleontological significance. As such, there is a strong possibility of fossils buried below the surface which need to be managed appropriately, should any excavation work take place.

6.3 IMPACTS

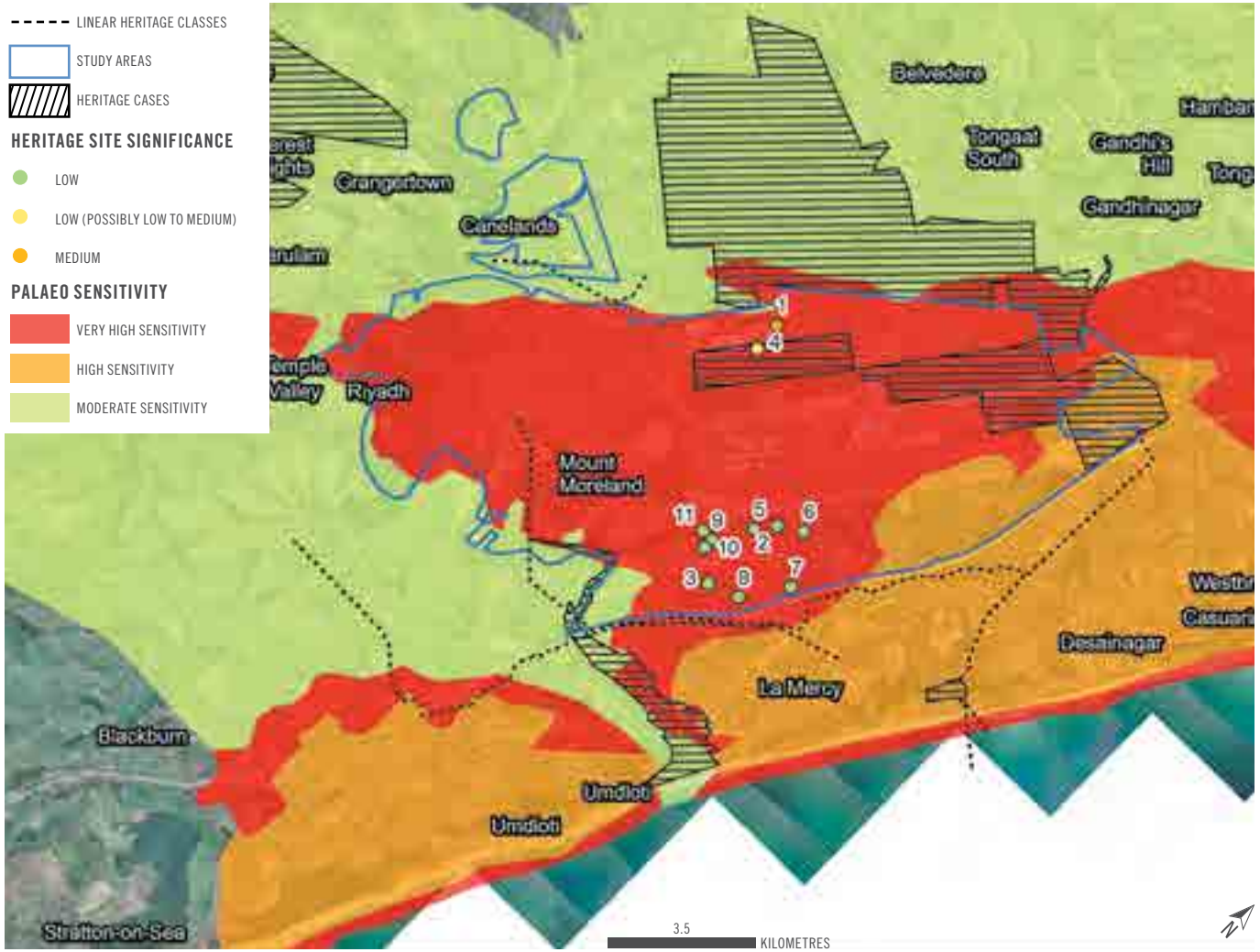
A heritage resource impact may be defined broadly as the net change, either beneficial or adverse, between the integrity of a heritage site with and without the proposed development. Beneficial impacts occur wherever a proposed development actively protects, preserves or enhances a heritage resource, for example by minimising natural site erosion or facilitating non-destructive public use. More commonly, development impacts are of an adverse nature and can include:

- Destruction or alteration of all or part of a heritage site;
- Isolation of a site from its natural setting; and/or
- Introduction of physical, chemical or visual elements that are out of character with the heritage resource and its setting.

Beneficial and adverse impacts can be direct or indirect, as well as cumulative, as implied by the aforementioned examples. Although indirect impacts may be more difficult to foresee, assess and quantify, they must form part of the assessment process.

In the study area, development impacts on archaeological sites generally entail their destruction (with a permit from Amafa/Heritage KwaZulu-Natal)

FIGURE 19: HERITAGE RESOURCES WITHIN DUBE TRADEPORT CORPORATION AND THE PALEONTOLOGICAL SIGNIFICANCE OF THE STUDY AREA (WWW.SAHRIS.ORG.ZA, 2015)



6. HERITAGE
(continued)

once basic recording is complete, since their nature and significance does not warrant detailed site sampling/excavation or incorporation into the development. However, it is advisable to manage traditional burial places in situ wherever possible (as in the case of the Inyaninga Ex-Residents' Memorial Garden), since relocation of human remains is time-consuming and carries a high emotional and financial cost.

6.4 RESPONSES

6.4.1 LEGISLATION

The South African Heritage Resources Agency (SAHRA) is the national administrative body responsible for the protection and management of South Africa's cultural heritage. SAHRA was established through the National Heritage Resources Act (NHRA) (Act 25 of 1999) and, together with provincial heritage resources authorities, is one of the bodies that replaced the National Monuments Council.

Section 27 of the NHRA of South Africa provides for places of historic or cultural importance to be designated as national heritage sites. Both national and provincial heritage sites are protected under the terms of Section 27 of the NHRA, and a permit is required to work on them. National heritage sites are declared and administered by the national heritage resources authority, SAHRA. Provincial heritage sites fall within the domain of the various provincial heritage resources authorities; in this instance, Amafa is the KwaZulu-Natal Heritage Resources authority.

Dube TradePort Corporation can refer to the set of assessment criteria that are commonly used to assess the impacts of a proposed development on identified heritage resources, particularly in unsurveyed landholdings and further development phases.

6.4.2 MEMORIAL GARDEN

During the second half of the nineteenth century, two broad categories of Indian immigrants arrived in Natal. The first group of indentured labourers began to arrive in November 1860, and were known as 'girmityas' or 'grimitkaran'. This was as a result of the decision taken the previous year by the government of India to include Natal in the indenture system, which had been in operation in other parts of the British Empire since 1842 (SEF, 2015). The second group consisted of free immigrants who arrived as traders and were usually called 'passenger' Indians. The Indian community became established in Natal over the following years, as only about 24% of the first phase of over 150 000 men, women and children of the indentured group had returned to India by 1911. The second phase lasted from 1874 to 1911 (SEF, 2015). The majority of the Indians who did not return to India worked in sugar plantations as labourers.

As testament to this history of agriculture and indentured labour, a gravesite of residents of Inyaninga was uncovered within Dube TradePort in 2010 during vegetation clearing (SEF, 2015). These residents were indentured labourers, who once worked in sugarcane plantations in the area. Once the area was cleared, three headstones were discovered, suggesting that the first burials occurred around the 1940s.

The Indian tradition of cremation was not acceptable to the Government of the time. Few people could afford tombstones, so iron rods were used as markers. The entrance to the burial ground had two iron rods on either side. This was 'The Gateway to Heaven' (Tamil – 'Harichandra Kovil'). An offering would be made here before entering the site. To offset the smell of decomposing bodies, salt, talcum powder and perfume was placed in the coffins. Trees were also planted on the graves.

African labourers were also buried here. The presence of the plant *Sanseveria Trifasciata* ('mother-in-law's tongue') is significant in Africa, as this plant is believed to be a protective charm against evil.

Dube TradePort Corporation has worked closely with the public to restore the area and create a memorial garden to honour the ex-residents of Inyaninga. This memorial garden includes a beautiful contemplative space for the public to reflect and pay homage to those who paved the way before us. It is also used for educational purposes for the general public, and in particular schoolchildren.

6.4.3 THE DE RICQUEBOURG FAMILY GARDEN

The De Ricquebourg Family settled in South Africa in the 1800s. The family farmed and had a house on land now owned by Dube TradePort Corporation. In 1965 the farm was expropriated and the farmhouse was demolished; however, it is important to note that remnants of the garden are still there today. There is a memorial within the old farmstead, with a fig tree being the most significant site, where the family has scattered the ashes of various family members. The current generation of the De Ricquebourg family still visits this site to pay respect to their ancestors. Currently, there is no conflict with development as there are no plans to develop this area. It is important to ensure that access to this site is maintained (eThembeni Cultural Heritage, 2015).

HERITAGE RESOURCES PLAY A VITAL ROLE IN FOSTERING A SENSE OF BELONGING AND A LINK TO THE ANCESTORS THAT LIVED ON THE LAND...

6.5 CONCLUSIONS

TREND: STABLE

Dube TradePort Corporation has made numerous efforts to identify heritage resources, and develop management strategies for sensitive and critical heritage sites. The memorial garden is also a very positive contribution to the preservation of history and acknowledgement of the people of the area.

There has been no new information with regards to heritage resources since the last SoER iteration, but the heritage resources that have been identified through the previous assessments have been preserved according to the recommendations proposed by the specialists. At this stage, the Inyaninga Memorial Gardens is still being maintained and protected to ensure that the heritage and memory of these residents is still preserved. The site is fenced and landscaped, and has full public access.

Heritage resources play a vital role in fostering a sense of belonging and a link to the ancestors that lived on the land now used by Dube TradePort Corporation, such as the indentured labourers who worked to ensure a thriving cane plantation. The continued protection of this site ensures that the history of the land is still remembered.

6. HERITAGE
(continued)

TABLE 13: DUBE TRADEPORT HERITAGE INDICATORS

INDICATORS	TRENDS	DESCRIPTION	RECOMMENDATIONS
Number and type of natural heritage sites		DTPC acknowledges the importance of heritage resources and has adhered to the recommendations made by specialists.	As plans for the undeveloped sites of DTP are finalised, it is imperative the Heritage and Paleontological studies are carried out to ensure that these resources are protected.
Number and type of cultural heritage sites			
Current use of heritage sites		Heritage is not static, hence new heritage sites are continuously being created due to events that take place, or because existing features and structures age, and all should be considered for their contribution to retelling the story of the past. This is part of the heritage resource utilisation and management applicable to the Dube TradePort site.	The process of identifying and documenting heritage sites should never stop and those that are not directly affected by new developments should be preserved.
Access to heritage sites		The Memorial Garden is the only sensitive site in DTP and access to this site is still allowed.	DTPC should continue to handle this sensitive site with great care and due consideration for the public. The public has full access to the site, including for educational purposes.

7. BIODIVERSITY AND ECOLOGY

IN ORDER TO ADEQUATELY NURTURE BIODIVERSITY AND IMPROVE ECOSYSTEM HEALTH, IT IS IMPORTANT TO UNDERSTAND THE THREATS TO BIODIVERSITY AND HOW ACTIVITIES AND DEVELOPMENT ASSOCIATED WITH DUBE TRADEPORT IS RELATED TO THESE THREATS.

In the 2013/14 SoER, it is reported that the state of biodiversity and ecology is improving. Although reported to be slight at that point, this improvement was attributed to the initiation of rehabilitation work on Dube TradePort Corporation landholdings. This chapter builds on what was presented in the 2013/14 SoER by describing the progress made in terms of rehabilitating natural ecosystems, enhancing biodiversity values and the delivery of ecosystem goods and services. It also defines some common pressures or threats to biodiversity, which are currently driving change in these natural systems. The chapter ends by summarising the state of biodiversity and ecosystem health, and recommending how this may continue to advance in the future.

7.1 PRESSURES

In order to adequately nurture biodiversity and improve ecosystem health, it is important to understand the threats to biodiversity and how activities and development associated with Dube TradePort is related to these threats. These threats or 'pressures' are described in this section, so that the conservation and rehabilitation efforts undertaken by Dube TradePort Corporation can be better understood. This further allows for recommendations that may assist Dube TradePort Corporation with its biodiversity targets.

7.1.1 LAND TRANSFORMATION

The Dube TradePort site has had a long history of transformation, which has impacted on the biodiversity and ecological functioning of the site. Prior to human settlement, the Dube TradePort site must have been similar to remnant coastal grassland vegetation types with woody habitat types confined largely to wetter, steeper areas where they received some protection from fire. Whilst it is difficult to reconstruct what natural habitats must have looked like, it is estimated that as much as 60% of the site would have comprised grassland habitats. Wetlands have been well mapped and account for just over 20% of Dube TradePort Corporation landholdings. Wooded areas are likely to have been quite limited in extent and are unlikely to have occupied much more than 10% of the Dube TradePort Corporation site. Some areas of scrub and woodland are also likely to have been present as transitional zones between grassland and woody habitats.

At the time of expropriation for the planned airport, the area was already mostly under sugarcane cultivation and only small remnant patches of indigenous vegetation remained in drainages and on the steeper, drier slopes. These fields were tended by indentured labourers, and included areas for housing and vegetable gardens (this is elaborated on further in Chapter 6).

In late 1976 major earthworks were undertaken at the site, and a cut and fill platform was constructed which varies from shallow surface bedrock to deep fills ranging in depth from 10m to 23m. The platform was completed in 1977 and overlies a Y-shaped valley (INR 2007). Relatively open secondary grassland became established on platform areas over time which, although being of low plant diversity, was one of the larger tracts of grassland in the coastal zone of the greater Durban area.

The disturbances to the natural ecosystem and limited management of the site following initial platform development lead to the encroachment of alien invader plants. This is particularly evident in old sugarcane fields and disturbed sites, which developed into secondary scrub and woodland habitats. Most wetlands were drained to increase opportunities for cultivation, and then planted with sugarcane.

Between roughly 2008 and 2010, construction of King Shaka International Airport (KSIA) and phase 1 of Dube TradePort resulted in transformation of the site yet again. This resulted in widespread transformation of secondary grasslands and wooded areas. Two noteworthy sensitive habitats that were compromised include wetlands and the only known breeding site in Durban of the Black Coucal (*Centropus grillii*). This bird has not been seen since, and this was also the southernmost known breeding locality of the species in Africa (Croucamp, 2009).

Since its establishment, Dube TradePort Corporation and Airports Company South Africa (ACSA) have put in place a number of initiatives to rehabilitate large portions of their landholdings in order to offset impacts from development activities. The status quo of biodiversity and ecosystem health, and the strategies to improve this, is unpacked further in the rest of this chapter.

7. BIODIVERSITY AND ECOLOGY
(continued)

7.1.2 CLIMATE CHANGE

It is predicted that climate change is the greatest long-term threat to biodiversity as a consequence of changes in air temperature, rainfall patterns, and extreme weather events such as droughts and flood. The complexities and multiple components of climate change affect all levels of biodiversity, from organisms through to biomes and landscape processes.

Climate change is likely to cause a shift in species distribution, in response to habitat changes and shifts in food resources. Some animal and plant species are already undergoing related change in terms of timing of life stages and growth (phenology). This often leads to a breakdown in species interactions, with consequences for ecosystem functioning resulting in large-scale biodiversity losses (WCG, 2013).

Human-induced disturbances, such as habitat fragmentation, pollution, over-exploitation and biological invasion, will exacerbate the effects of climate change on biodiversity and may increase the likelihood of extinctions if adequate natural habitat is not preserved. General global estimations of species loss stand at 30% loss in diversity (WCG, 2013).

However, climate change impacts will not be felt evenly across the globe. Resilience to these impacts varies greatly based on geographical considerations and the magnitude of the actual level of biophysical disturbance (CEPF, 2016). As such, environments that have great diversity of species and have more stable ecosystems have better chances to spring back during environmental disruptions, and can endure an onslaught of pressure for longer than weak environments (Croucamp, 2009). It is for this reason that the efforts to rehabilitate and restore biodiversity and ecosystem health are so valuable.

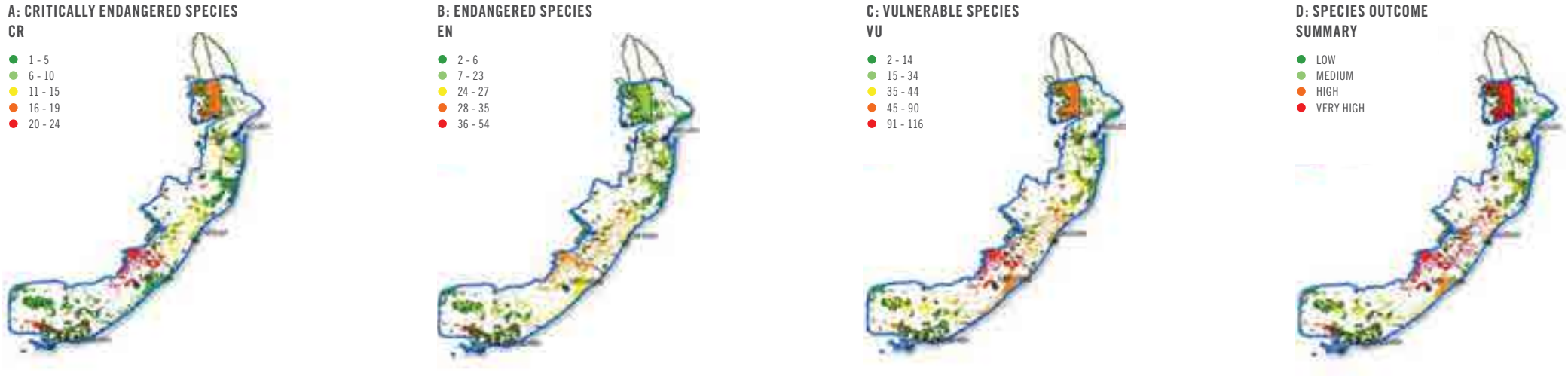
7.2 STATE

South Africa is one of the top three countries in the world in terms of biological diversity. The biological diversity is due to the diversity of species, the level of endemism and the diversity of ecosystems (DEA, 2014). Dube TradePort is located within one of only 3 hotspots in South Africa (and one of 34 in the world): the Maputaland-Pondoland-Albany Hotspot (Roberts, 2007, Yawitch, 2010; DEA, 2014; CEPF, 2016).

The Maputaland-Pondoland-Albany Hotspot is the second richest floristic region in Southern Africa (after the Cape Floristic Region, located in the Western Cape) and also the second richest floristic region in Africa on account of its size. It unites three enchanting and diverse centres of endemism (i.e. Maputaland, Pondoland and Albany) encompassing six of South Africa's eight biomes in an area of nearly 275 000km² along the east coast of Southern Africa, below the Great Escarpment (CEPF, 2016) (see Figure 20).

At a habitat level, there are also a number of species that are endemic to this hotspot, namely: one (1) type of forest where at least 598 tree species occur, three (3) types of endemic subtropical thicket, six (6) types of bushveld, and six (6) types of grasslands. The coastal waters of this hotspot, which encompass three of South Africa's six marine bioregions, are also significant at the global level for the diversity of marine species (CEPF, 2016).

FIGURE 20: DISTRIBUTION OF GLOBALLY THREATENED TERRESTRIAL SPECIES IN THE MAPUTALAND-PONDOLAND-ALBANY HOTSPOT (CEPF, 2016)



7. BIODIVERSITY AND ECOLOGY
(continued)

Sadly, threatened sites and associated threatened species are concentrated within the South African KwaZulu-Natal area of the hotspot, where there is also a high degree of endemism. The loss and degradation of habitat, as well as degradation of marine and estuarine resources, continues to occur due to major threats which include commercial and subsistence farming, timber production, urban development and the increasing threat of mining impacting the region. The unsustainable use of natural resources, the spread of invasive alien species, and human-wildlife conflict are also placing pressure on the hotspot's biodiversity and ecosystems (CEPF, 2016).

In particular, the site falls within the KwaZulu-Natal Coastal Belt, which is reported to have by far the highest portion of Critically Endangered habitat of any of the Maputaland-Pondoland-Albany Hotspot focus areas, i.e. 66% (CEPF, 2016). It is in this context of biological sensitivity that Dube TradePort is located. While the site itself, and some of the surrounding environment, is largely transformed, it does have the potential to contribute to the ecological enhancement of the area and to make a significant contribution to the re-establishment of threatened habitats and species to the area.

It should also be noted that eThekwini Municipality's region has a number of protected species of which the current status is not known. These include the Natal Brachystelma, Burrowing Skink, Black-headed Dwarf Chameleon, and Pickersgill's Reed Frog. These species are rare, threatened and with limited distributions. Of the fourteen (14) vegetation types found in Durban, four (4) are endangered or critically endangered, i.e. KZN Sandstone Sourveld, North and South Coast Grasslands and Swamp Forest. This means that they have an extremely high risk of extinction in the wild. There is an element of North Coast Grassland present on the Dube TradePort site.

Furthermore, the Critical Ecosystem Partnership Fund (2016) reports that the Maputaland-Pondoland-Albany Hotspot contains a number of species that are not only threatened on a local scale, but are globally threatened. Plant species are recorded as having a particularly high percentage of threatened species globally (Figure 21).

FIGURE 21: GLOBALLY THREATENED SPECIES IN THE MAPUTALAND-PONDOLAND-ALBANY HOTSPOT (CEPF, 2016)

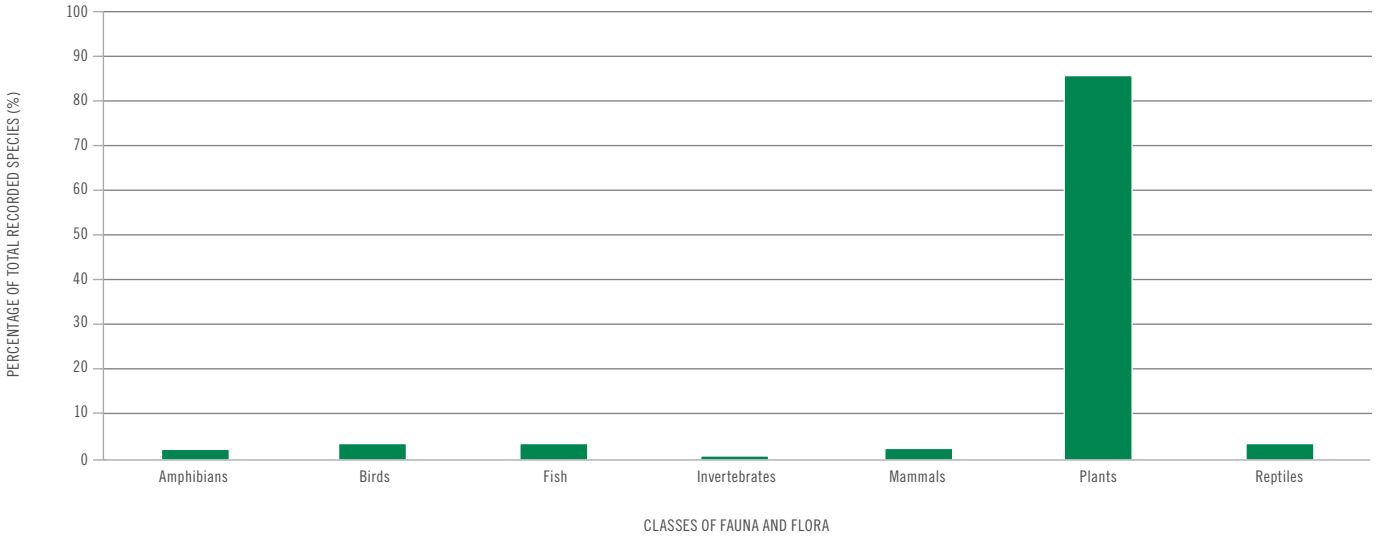


PLATE 1: AERIAL VIEW OF THE MOUNT MORELAND WETLAND

PLATE 2: PICKERSGILL'S REED FROG

PICKERSGILL'S REED FROG
HYPEROLIUS PICKERSGILLI
CRITICALLY ENDANGERED

7. BIODIVERSITY AND ECOLOGY
(continued)

7.2.1 AREAS OF BIOLOGICAL SIGNIFICANCE

The long history of sugarcane farming and subsequent transformation has resulted in the Dube TradePort Corporation site being largely depauperate of flora, with low floristic diversity relative to natural habitats. Whilst habitats are utilised by a range of fauna, most are generalist by nature, with few species of conservation concern identified on the site during specialist studies undertaken as part of the environmental authorization process for King Shaka International Airport.

The exception here is the Mount Moreland wetland (Plate 1) to the south of the site, which provides critical wetland habitat for important frog populations. In particular, the presence of *Hyperolius pickersgilli* (Plate 2) is of national importance, given its critically endangered status. The wetlands also contain a large population of *Afrixalus spinifrons*, *Hemisus guttatus*, large numbers of *Leptopelis natalensis* and a variety of other amphibian species.

These wetlands are also recognised for their importance in providing a roosting site for barn swallows (Plate 3). Indeed, the Durban roost is among the largest recorded in Sub-Saharan Africa, with larger roosts only being located in the Congo and Nigeria (INR, 2007). This site also provides opportunities for the public to enjoy mass evening displays at the barn swallow viewing sites at Mount Moreland. Key concerns raised as part of the environmental authorisation process included destruction of the roost site, change in wetland structure and hydrology, and disturbance of the roost site by aircraft.

Fortunately the barn swallow population continues to utilise the Mount Moreland wetlands, providing fantastic opportunities for barn swallow viewing. Whilst no formal monitoring counts have been conducted, a daily log of activities is maintained by the Mount Moreland Conservancy (www.barnswallow.co.za).

The state of these wetlands was assessed in 2008, revealing that the wetlands were moderately to largely modified (Table 14) due to a range of impacts, including catchment land-use and drainage, and alien plant encroachment within sections of the wetland. Key threats to the wetland include water quality risks linked to upstream development, and erosion linked to changes in run-off from the catchment. Development of a management plan for the site was initiated in 2009 (Texeira-Leite and Cox, 2009) but was not finalised due largely to a lack of clarity on institutional mandates for implementing the plan.

Dube TradePort Corporation acquired this site as part of their landholdings recently and a partnership has been formed between Dube TradePort Corporation and Mount Moreland Conservancy. With the inclusion of much of the landholdings around the wetlands as part of the KSIA conservation zone, this provides an opportunity to improve management and monitoring of the site and associated biodiversity values.

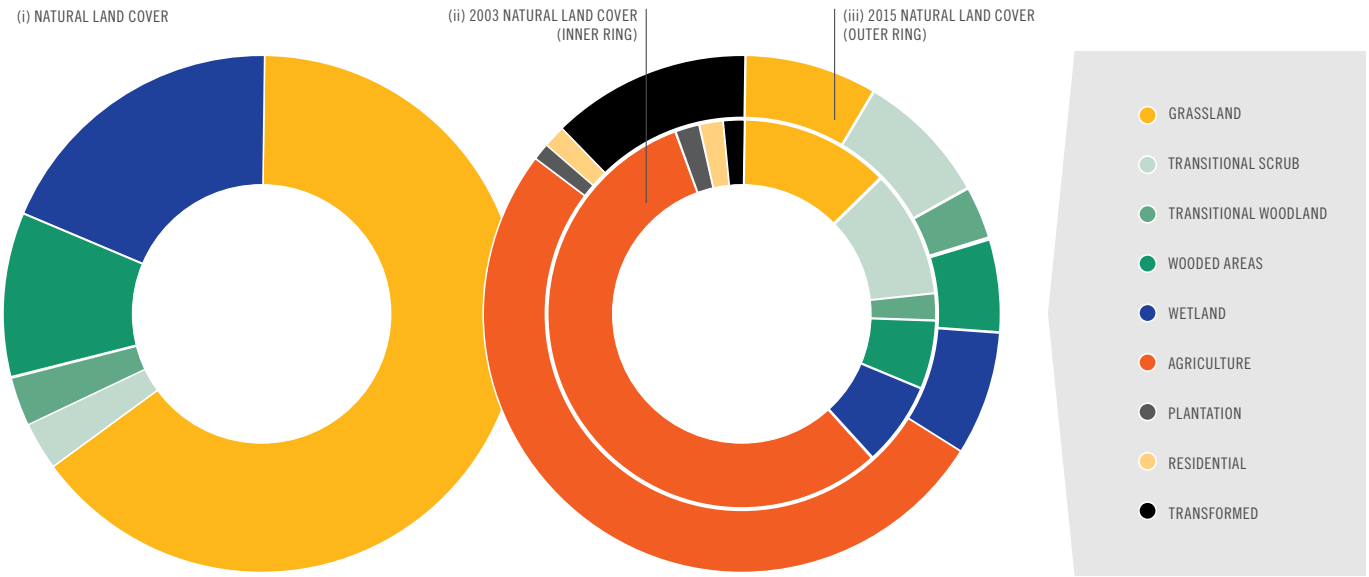
TABLE 14: SUMMARY OF HEALTH SCORES FOR THE MOUNT MORELAND WETLANDS (TEXEIRA-LEITE *ET AL.*, 2008)

	LAKE VICTORIA		FROGGY POND	
	HEALTH SCORE	CLASS	HEALTH SCORE	CLASS
Geomorphology	2.8	C – Moderately modified	3.2	C – Moderately modified
Hydrology	3.0	C - Moderately modified	3.5	C - Moderately modified
Vegetation	1.8	B - Largely natural	5.6	D - Largely modified
Overall Condition	2.6	C - Moderately modified	4.0	C/D – Moderately to largely modified

PLATE 3: BARN SWALLOWS

7. BIODIVERSITY AND ECOLOGY
(continued)

FIGURE 22: ALLOCATION OF LAND COVER CLASSES ACROSS DUBE TRADEPORT CORPORATION LANDHOLDINGS IN 2003 AND 2015 RELATIVE TO PERCEIVED NATURAL 'REFERENCE' CONDITIONS



7.2.2 EXTENT AND CONDITION OF NATURAL HABITATS

The Dube TradePort Corporation site occurs within the Maputaland-Pondoland-Albany Hotspot, which is recognised as the second richest floristic region in Southern Africa (after the Cape Floristic Region, located in the Western Cape) and also the second richest floristic region in Africa on account of its size. At a finer scale, the site falls within the KwaZulu-Natal Coastal Belt, which is the most highly transformed terrestrial habitat type in the KZN Region. This vegetation type is classified as critically endangered, with an estimated <10% high priority natural habitat remaining and <1% of the historic extent under formal conservation (Jewitt, 2014).

It is clear that historic land-use activities have led to substantial transformation and degradation of natural habitats. This change is reflected in Figures 22 and 23, which show how land cover on Dube TradePort Corporation-owned land has changed from 2003 to 2015 and relative to perceived reference habitat conditions[2]. The key shift since 2003 has been an increase in the level of transformation from 2% to 12%, with associated reductions in the extent of natural habitat classes. It is also worth noting that, while there has only been a moderate reduction in grassland, most of the remaining extent is now located around the KSIA runway and managed in a manner that is not compatible with biodiversity conservation objectives (Figure 24).

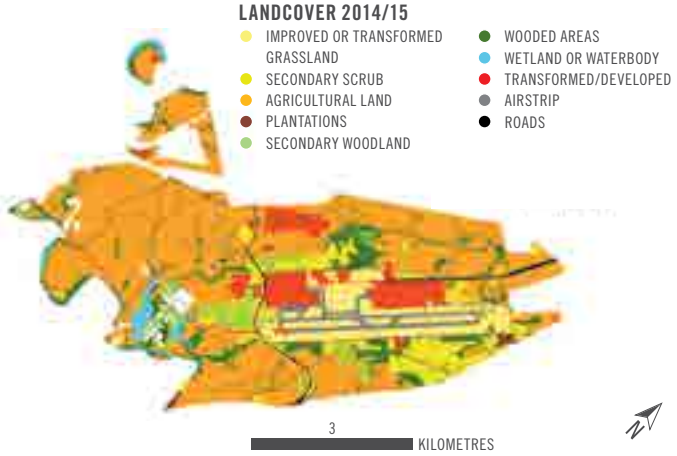
Whilst the development of the site has resulted in a net loss of natural habitat, steps are in place to ensure that large areas of the site are rehabilitated as part of the 'Biodiversity Offset Management Plan and Conceptual Rehabilitation and Restoration Plan' (BOMPCRP) for the site.

[2] The reference extent of habitat components was estimated for the study area based on descriptions of the Indian Ocean Coastal Belt Biome (Mucina & Rutherford, 2006) and associated vegetation types and an understanding of vegetation characteristics in remaining reference sites (e.g. Grasslands at Amatikulu, Ifafa mouth, Fairview Farm (Umzumbe) and Tugela Mouth. Historic land cover mapping undertaken as part of the specialist studies for the KSIA was used as a more recent baseline (prior to DTPC ownership). Current land cover was mapped by RHDHV by interpreting recent 2014/15 aerial photography and national land cover mapping.

(This is elaborated on further in Section 7.4 of this chapter.) Whilst initial progress has been slow, a revised plan has recently been developed and approved by regulating authorities. This will see the restoration and rehabilitation of a total of 878ha of land, an increase of 13.6% on the original 773ha. This revised plan sees conservation efforts focused towards the southern and eastern portions of the site, which will constitute a significant contribution to conservation efforts in the region (SEF, 2015). The revised layout also frees up areas to the north which are important for the long-term economic development of the area.

Whilst rehabilitation activities have been initiated in portions of the site, information on the extent and success of rehabilitation activities has still not been consolidated. As these measures are implemented, the state and condition of natural habitats is expected to improve considerably. The plan is unpacked in further detail in Section 7.4.

FIGURE 23: MAP INDICATING THE DISTRIBUTION OF LAND COVER CLASSES BASED ON 2014/15 AERIAL PHOTOGRAPHY



7. BIODIVERSITY AND ECOLOGY
(continued)

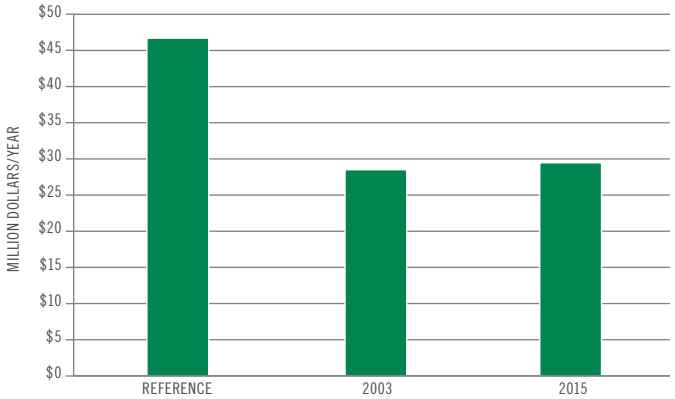
FIGURE 24: CONSERVATION AREA ANTICIPATED TO OFFSET LOSS OF BIODIVERSITY (SEF, 2015)

7.3 IMPACTS

The ecosystem goods and services provided by landscapes are strongly linked to specific habitats, with habitats such as forests performing particularly important climate regulating services whilst wetlands and rivers are critical for freshwater provision. Global and regional estimates of the value of these services have been developed, and were used to obtain a coarse estimate of the values of ecosystem services provided by Dube TradePort Corporation landholdings, and how these have changed over time.

The assessment suggests that natural habitats on Dube TradePort Corporation landholdings could have generated benefits in the region of $45 million per annum. This value had declined by an estimated 40% in 2003 and is attributed largely to early agricultural expansion in the area, which included extensive drainage of wetland habitats for sugarcane production. The value of ecosystem services generated has remained largely consistent in recent years despite moderate changes in land use (Figure 25).

FIGURE 25: COARSE ESTIMATE OF THE VALUE OF ECO-SYSTEM GOODS AND SERVICES PROVIDED BY DUBE TRADEPORT CORPORATION LANDHOLDINGS BASED ON INTERNATIONAL FIGURES

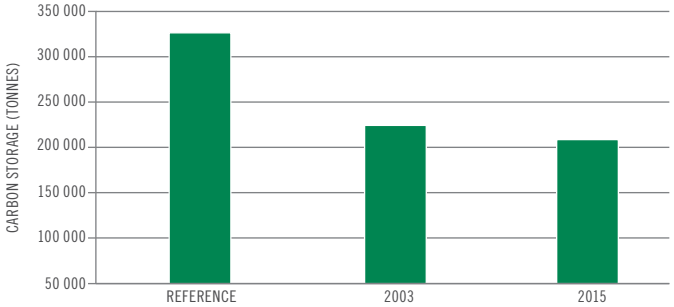


7. BIODIVERSITY AND ECOLOGY
(continued)

Whilst obtaining a broad understanding of ecosystem services values helps to highlight the importance of natural capital, it is also useful to consider some of the key services that are important at the local and regional scale. Here, it is worth reflecting on a recent study undertaken to identify and assess key ecosystem services in the eThekwini North Spatial Development Plan Area (Glenday, 2015). This work, undertaken under a broader project, focuses on innovative approaches to building resilience in eThekwini Municipality.

Carbon capture and storage was highlighted as one of these key services and is important in mitigating the impacts of global warming. Wooded habitats and wetlands are amongst the most important habitats for carbon storage, with estimated storage of 166tC/ha and 149tC/ha reported for these habitats. Even grasslands provide reasonable levels of storage (64tC/ha) relative to sugarcane (37tC/ha) and dense settlements (15tC/ha). Given the levels of reported habitat transformation, carbon storage on Dube TradePort Corporation landholdings had declined by an estimated 37% in 2003, with further declines following airport expansion and associated urban developments (Figure 26). These impacts have been mitigated to some degree through landscaping efforts and green building design, which has included the establishment of an indigenous roof garden on Dube TradePort Corporation's 29° South building. Efforts underway to rehabilitate large portions of Dube TradePort Corporation landholdings, as part of the King Shaka Conservation Zone, will also contribute meaningfully towards carbon storage and climate change mitigation.

FIGURE 26: ESTIMATES OF CARBON STORAGE[3] ON DTPC LANDHOLDINGS AND HOW THESE HAVE CHANGED OVER TIME (GLENDAY, 2008 IN GLENDAY, 2015)



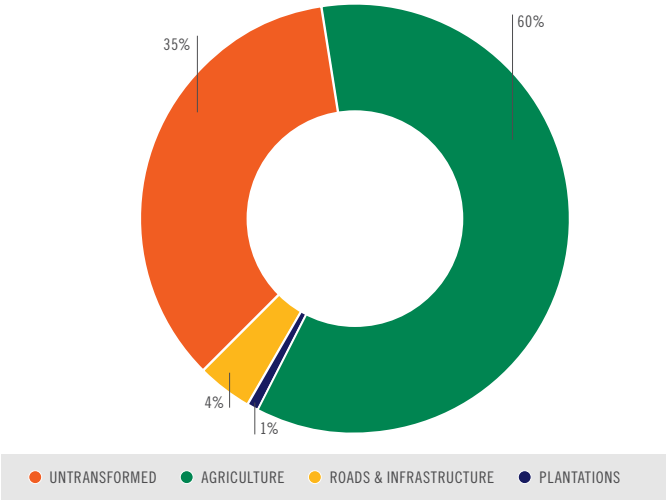
The study also emphasised the importance of key regulating and support services in eThekwini Municipality's North Spatial Development Plan Area, due to a range of serious impacts to rivers and downstream estuaries. Key concerns identified include:

- Sediment yields which are estimated to have increased in the order of 4-5 times above what would be expected with indigenous vegetation cover. This is because of the high sediment yields expected from sugarcane;
- Nutrient exports to rivers which have increased dramatically, with estimates suggesting that nitrate loadings are 5 times higher whilst phosphorous loadings are approximately 30 times higher, in the Mdloti and Tongaati Rivers; and
- Flooding risk which has increased due to habitat transformation, but is moderated by the dams in the upstream catchment.

Wetlands are particularly well placed to provide these services, however they have been degraded to such an extent that their capacity to provide useful services has been drastically reduced (Figure 27). Given the need to enhance wetland functioning, Dube TradePort Corporation has partnered with Tongaat Hulett Developments and the eThekwini Municipality in developing a strategic framework for wetland management (MacFarlane, 2015). This framework seeks to balance the needs for development and enhanced wetland management, and includes a commitment by Dube TradePort Corporation to rehabilitate all wetlands on their landholdings that are not impacted by development. Where impacts do occur, these will be internalised by funding wetland rehabilitation in strategically important wetland offset sites. These initiatives will help to significantly improve the functions provided by wetlands and contribute towards the creation of a functional green space system for local residents.

A better understanding of the role of ecosystem services emphasizes our natural assets as critical components of inclusive wealth, well-being and sustainability. Sustaining and enhancing human well-being requires a balance of all of our assets: individual people, society, the built economy, and ecosystems. In moving forward, Dube TradePort Corporation has an opportunity to develop its landholdings in a manner that is compatible with nature, and to enhance the delivery of critical ecosystem services on its landholdings and in the broader region. This reframing of the way we look at 'nature' is essential to solving the problem of how to build a sustainable and resilient future for humanity (Costanza *et al.*, 2014).

FIGURE 27: OVERVIEW OF CURRENT WETLAND STATUS BASED ON 2015 LAND COVER MAPPING



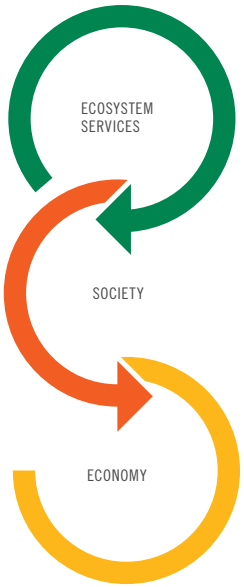
7.4 RESPONSES

In 2015, a key focus was on finalising the extent of the conservation zone and furthering rehabilitation and restoration efforts, in line with the updated and approved rehabilitation and restoration plan for the site. In particular, much consideration was put into the development of a 'Biodiversity Offset Management Plan and Conceptual Rehabilitation and Restoration Plan' (BOMPCRP) that adequately offsets the impact of the KSIA and Dube TradePort developments. This plan will help Dube TradePort Corporation contribute significantly to the rehabilitation and restoration of the ecological functioning and biodiversity of the area, as it continues to expand in line with the Master Plan for Dube TradePort.

[3] These figures were calculated using generic carbon density figures for land cover classes based on values reported from Glenday (2008) as reported in Glenday (2015).

7. BIODIVERSITY AND ECOLOGY
(continued)

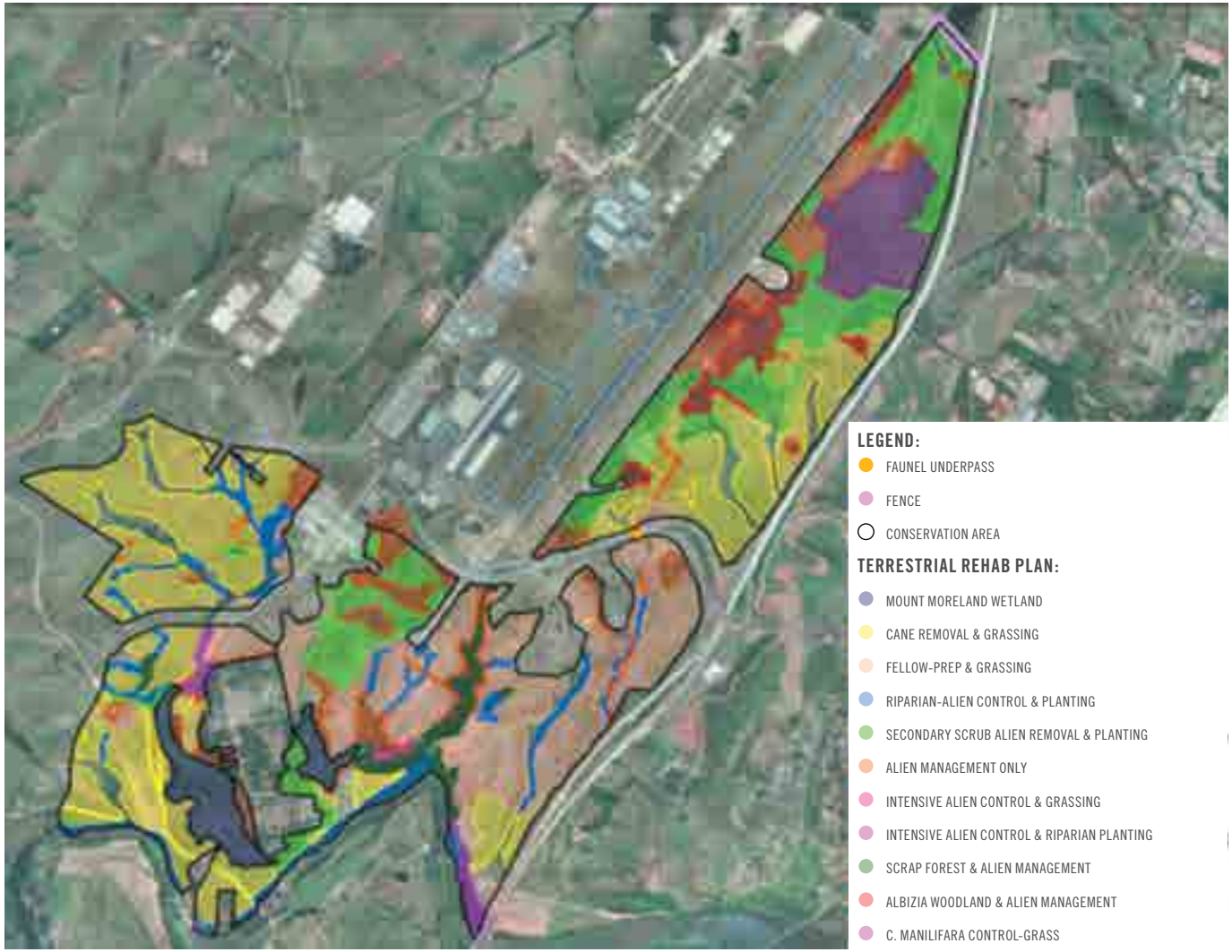
FIGURE 28: RELATIONSHIP BETWEEN ECOSYSTEM SERVICES, SOCIETY AND THE ECONOMY



The BOMPCRP has identified rehabilitation and restoration goals and objectives that guide the specific activities taking place on-site (Figure 29). These specific plans focus on alien invasive clearing, alien invasive management, and rehabilitation of wetlands, grasslands and woodland habitats.

To assist with the establishment of desired and sensitive plant species, various fruit, seed and cuttings of plants occurring in natural grasslands and wetlands are being collected for propagation at the Dube AgriZone Nursery (Plate 4). Plants from the nursery are then used to rehabilitate various areas within the Dube TradePort precinct as described by the Conservation Plan. The nursery also supplies plants for display purposes in formally landscaped areas within the precinct and for outreach projects, such as for schools and community greening initiatives (SEF, 2015; Styles, pers. comm., 2016).

FIGURE 29: DESCRIPTION OF THE REHABILITATION AND RESTORATION ACTIVITIES PLANNED ON ACSA AND DTPC LANDHOLDINGS (SEF, 2015)



7. BIODIVERSITY AND ECOLOGY
(continued)

In the 2013/14 SoER, it was reported that collecting and sowing of seeds was already taking place. Unfortunately, many of these did not germinate satisfactorily. In an attempt to improve germination, grass plugs are being planted on trial plots. The results so far have been promising (Styles, pers. comm., 2016).

Plugs are unfortunately very expensive. Considering this cost and the size of the area to be rehabilitated, this has proved to be a financially unfeasible method. It also needs to be better investigated whether harvesting of grass seed of better quality, with better sowing implementation, will result in still-good results. A range of grass species have been and, are being, collected with the aim of establishing which species will in fact grow the best, and how to grow them best. It is anticipated that the following will be achieved through this process:

- Knowledge and capacity to grow different desirable grass species, including the production of plugs;
- Production of plugs to replace the currently undesirable grass cover; and
- Dube Agrizone Nursery/Dube TradePort will then be in a position to consider increasing production in-house going forward, thus contributing on a larger scale to the rehabilitation within the precinct, at lower cost and with less reliance on contractors (Styles, pers. comm., 2016).

PLATE 4: DUBE AGRIZONE NURSERY

Seeds are sourced from a variety of locations and on a monthly basis (SEF, 2015; Styles, pers. comm., 2016). It is preferable that seeds are sourced as close to the precinct as possible. However, with the exception of the small grassland at Treasure Beach, there appears to be no good grasslands left in the littoral part of the Ethekwini Municipal Area. Coastal grassland has similar species composition, so long as it is south of Mtunzini and north of Port Shepstone, where the Maputaland Coastal Plan or Maputaland Centre of Plant Endemism and Pondoland Centre of Plant Endemism contribute respectively to different compositions. As a result, while most collections have been made closer to Durban, some have been from further afield between Amatikulu and Scottburgh, and as far inland as the coastal escarpment (Styles, pers. comm., 2016).

Formal monitoring of the rehabilitation process and associated outcomes has not been undertaken at this point. With the revision and finalization of the conservation plan, and lessons learned from initial rehabilitation activities, progress is expected to accelerate in the years ahead. Opportunities also exist to improve management of the Mount Moreland wetlands, and to report on the effectiveness of measures taken to secure and enhance biodiversity values and ecosystem services provided by these important wetlands.

7.5 CONCLUSION

TREND: IMPROVING

The overall trend for biodiversity and ecology is clearly improving, and it is anticipated that this improvement will continue well into the future. The indicators, as reported on in the 2013/14 SoER, are: changes in the species diversity; reduction in alien and invasive infestation on the Dube TradePort site; and area of natural habitats rehabilitated. An improving trend has been noted for each of these for the 2015/16 SoER (Table 15).

The conditions of the Environmental Authorisation and the Environmental Policy of Dube TradePort Corporation are the main drivers directing the decision-making behind the rehabilitation and restoration process. However, Dube TradePort Corporation is taking the lead in achieving meaningful conservation through its BOMPCRP, over and above these permitted requirements. It is anticipated that progress will continually be assessed, and new goals and objectives will ensure continuous improvement and sustainability.

THE OVERALL TREND FOR BIODIVERSITY AND ECOLOGY IS CLEARLY IMPROVING, AND IT IS ANTICIPATED THAT THIS IMPROVEMENT WILL CONTINUE WELL INTO THE FUTURE.

The implementation of the BOMPCRP, and the various associated initiatives, is being undertaken. The alien invasive plants are being cut down and indigenous flora is being established in their place. Until the indigenous substitutes are flourishing, there will be a deficit of species diversity. The decline will swing to a growth in biodiversity and ecosystem health soon after rehabilitation. It will take only a short while before insects, invertebrates, amphibian, reptiles, mammals and birds begin to colonise the restored and rehabilitated habitats. Considering that rehabilitation efforts commenced in 2012, and planting has continued throughout 2015 and will continue for the foreseeable future until the natural environment is self-sustaining, the biodiversity and ecosystem health is well on its way to restoration.

The current indicators were defined in the 2013/14 SoER, where biodiversity and ecology were reported on for the first time. Although very little monitoring data was available at the time, it was hoped that progress would be made in this area, which would be reflected in the reporting of future SoERs. It is therefore recommended that during the next iteration of reporting these indicators be refined. Some suggestions include redefining the current indicators of “change in alien invasive species” and “change in natural ecosystems” to rather reflect: 1) progress with sugarcane removal; 2) progress with alien plant control; 3) progress with planting of herbs and forbs in target areas; and 4) evaluation of rehabilitation success.

7. BIODIVERSITY AND ECOLOGY
(continued)

TABLE 15: SUMMARY OF THE INDICATORS OF WATER MANAGEMENT AND RECOMMENDATIONS FOR IMPROVEMENT

INDICATORS	TREND	DESCRIPTION	RECOMMENDATIONS
Change in species diversity (number of species)		Dube TradePort has made significant efforts to remove alien plant species, plant locally occurring indigenous species and improve management of natural areas.	Identification of and monitoring of important species or groups of species, to determine the response to rehabilitation activities, e.g. frog population in selected wetlands. Biodiversity assessment undertaken for the entire site to quantify the number of desirable vs undesirable species.
Change in alien and invasive species (ha)		Alien clearing work has been taking place since 2012/13, with 357ha reported to be cleared. In 2013/14, a further 420.38ha were cleared. In 2014/15, efforts expanded to include 150ha of plantation. It is anticipated that a further 85ha will be cleared in 2015/16, supported by ongoing maintenance of areas that have already been cleared.	Cooperative governance is required to ensure well-coordinated efforts, and therefore more effective outcomes. This should include partnerships or cooperation with ACSA and surrounding landowners, with a focus on adoption of a management programme to ensure the surrounding buffer area is also cleared of alien invader species, which will assist with minimising the re-introduction of invasive species. Wider cleared buffer strips reduce the chances of re-introduction of alien invasive species from occurring.
Change in natural ecosystems (ha)		The Biodiversity Offset Management Plan and Conceptual Rehabilitation and Restoration Plan will see a total of 878ha set aside for various conservation activities, a 13.6% increase from the original 773ha indicated in the EIR.	Form relationships with other entities on conservation related aspects. Potential relationships may include: • Surrounding landowners and local communities; and • Research institutes.
Area of critical ecosystems rehabilitated (ha)		As of 2013, 10ha have been prepared and 58.2kg seed sown. In addition, about 30.04ha have been prepared for sowing of 6 484.75kg of grass seed.	

8. WATER MANAGEMENT

CURRENTLY 80% OF GREENHOUSE WATER DEMAND AT DUBE AGRIZONE IS MET BY MEANS OF RAINWATER HARVESTING. OPPORTUNITIES FOR ADDITIONAL RAINWATER HARVESTING WILL ALSO INCREASE, PARTICULARLY WITH EXPANSIONS OF DUBE TRADEZONE (DTPC, 2014A).

Dube TradePort Corporation has taken significant strides in implementing its Water Demand and Conservation Strategy to manage demand-related pressure on the regional water supply. Water demand will undoubtedly increase in parallel with the anticipated industrial development. Currently, 80% of greenhouse water demand at Dube AgriZone is met by means of rainwater harvesting. Opportunities for additional rainwater harvesting will also increase, particularly with expansions of Dube TradeZone (DTPC, 2014a).

Initiatives to supplement the municipal water supply include the following:

- Harvesting of stormwater run-off from the roofs of the greenhouses, the Tissue Culture Laboratory (Dube AgriLab) and other structures within Dube AgriZone, which is collected in covered attenuation ponds for irrigation use. Individual greenhouses are supplied with water for irrigation from their own harvested resources. This includes the water irrigation strategy for all the landscaped areas;
- When of acceptable standard, treated wastewater from the Southern Waste Water Treatment Works is used to supplement water for irrigation. Effluent which is of unacceptable quality is transferred to the Flush Water ponds;
- Groundwater (borehole) resources are also used in circumstances where rainwater and treated effluent is unable to meet desired capacity. Three boreholes are available for use within the Dube AgriZone precinct, and a reverse osmosis plant has been constructed and is now in operation, for the treatment of borehole water to acceptable standards for irrigation purposes;
- As part of the sustainable farming initiative, a brine treatment and recycling project was also initiated. A Brine Reuse Options and Management Plan was developed to determine the best practicable environmental option for brine disposal; and
- An Integrated Waste and Waste Water Management Plan (IWWMP) has been developed for Dube AgriZone in support of authorisation of various water uses according to the National Water Act (NWA). The purpose of the IWWMP is to comprehensively define the water use and waste management practices at Dube AgriZone, evaluate their potential impacts on regional water resources, and highlight the practices requiring formal authorisation (WSP, 2013d).

In addition to these, Dube TradePort Corporation has established a precinct-wide water quality monitoring programme, which incorporates over 15 sample stations and a wide range of parameters. This is to ensure that the water quality standards are being met, and to serve as a mechanism of detection for potentially negative environmental impacts (DTPC, 2014a).

While many water quality parameters are within the specified limits or below the detection limit, others are being exceeded at various points throughout the site, with certain points being more problematic than others. These areas should be prioritised for further investigation and source-specific mitigation measures should be implemented where necessary (DTPC, 2014a).

The Southern Waste Water Treatment Works (SWWTW) is operating according to design standards, and continues to produce treated effluent generally compliant with GLVs. High levels of ammonia require specific attention. Treated wastewater may become a critical supplementary water resource in the future, and to this end it is vital that the water quality standards for effluent are continuously met, and that the waste water treatment works is well maintained (DTPC, 2014a).

ATTENUATION POND IN DUBE AGRIZONE

8. WATER MANAGEMENT
(continued)

Freshwater resources in close proximity to Dube TradePort have been transformed from their natural pristine state through historical human interference and modification of the surrounding landscape. However, many of these ecosystems continue to maintain a level of ecological functioning. Dube TradePort Corporation has the opportunity to enhance these natural ecosystems through extensive rehabilitation and sensitive management of its activities, including effluent and stormwater generation and management (DTPC, 2014a).

8.1 PRESSURES

Through its mission to create a globally competitive multi-modal trade gateway for Southern Africa, Dube TradePort (with its numerous future-planned expansions and new developments) will continue to place increasing pressure on local water resources and the already-stretched regional potable water supply through its growing water requirements.

According to the 2013/2014 Report Card, Dube TradePort's Master Plan may be realised sooner than originally anticipated. This is evident in multiple project areas, but particularly in the phenomenal speed in the uptake of land in Dube TradeZone. To date, approximately 100ha of the 2 040ha footprint has been developed since commencement of construction of King Shaka International Airport in 2007, including bulk service infrastructure. Dube TradeZone, currently at 26ha in extent, is set to increase by an additional 80ha with completion of Phase 2, which is to be launched in 2017.

The escalated progress in terms of future development planning and the demand for industrial land are likely to have significant implications for the future management of water resources. With key developments, such as Dube TradeZone Phase 2 and Dube AgriZone Phase 2, already in the advanced planning stage, as well as the rapid uptake of development stands in Dube City, sufficient water must be sourced and provided to support this economic development and ensure unhindered operations. In addition, an aquaculture production enterprise, including the harvesting and packaging of fish for export, is one of the options being considered in Dube AgriZone Phase 2, to enhance local economic development and create employment opportunities for surrounding communities (2013/2014 Report Card).

It is evident from the above that Dube TradePort is progressing at an unprecedented rate. This implies, however, that the shortfall in water availability predicted post-2020 (BKS, 2012) may also be realised much sooner than expected, unless strategies to improve water demand management, conservation and efficiency are enhanced in parallel with development progress.

In addition to limited water resources, there are several pressures exerted on both the quantity and quality of freshwater resources. Planned developments will also have a direct impact on wetlands and river systems, which will affect the ability of natural resources to control flows and ameliorate water quality impacts. Indirect impacts on water resources are also expected to change, as a result of increased pollutant loads and potential increase in stormwater flow from hardened surfaces into natural water courses.

In keeping with Dube TradePort Corporation's commitment to reducing its impact on the environment, it is thus critical that changes in water quantity (consumed and recovered) and water quality (entering the receiving environment and within aquatic habitats) are monitored and documented in order to identify key pressures and areas of concern, and to initiate effective and appropriate response measures. Dube TradePort Corporation has also committed, together with other partners in the eThekwini North area, to ensuring that opportunities to improve the state of wetlands are realised through on-site rehabilitation and offset activities.

8.2 STATE

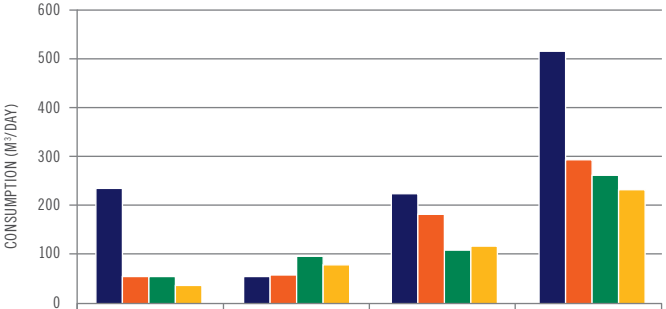
8.2.1 WATER DEMAND

According to the Dube TradePort Corporation Environmental Strategy 2013-2018, the estimated daily water requirement for Dube TradePort is 1.3 million litres[4] (1.3 MgL), of which 87% is utilised at Dube AgriZone for irrigation (WSP, 2013d).

With reference to Figure 30[5], the overall water consumption pattern shows that there has been a decrease in water consumption from municipal sources from 514.4m³/day in 2012, to 229.02m³/day in 2015, which is approximately a 55% decrease in four (4) years. Over the reporting period, there has been a significant decrease in water consumption

[4] The total ROD daily limit is 3.5 MgL. The remainder is used for airport related activities such as the cooling system for the passenger terminal etc.

FIGURE 30: MUNICIPAL WATER CONSUMPTION VOLUMES(M³/DAY) ACCORDING TO EACH DUBE TRADEPORT ZONE FROM 2013-2015



	AGRIZONE	TRADEZONE	SUPPORT ZONE	OVERALL
2012	237.12	54.39	222.87	514.37
2013	56.16	56.41	180.00	292.57
2014	56.88	91.61	109.94	258.43
2015	37.84	75.30	115.88	229.02

within Dube Agrizone which may be attributed to the continued use of alternative sources of water, such as the rainwater harvesting initiative, as well the reuse of treated water from the Southern Works Waste Water Treatment Works (SWWTW). Dube Support Zone is the greatest consumer of municipal water, with fluctuating volume consumed from 2012 to 2014 and an insignificant increase in 2015.

Table 16 shows the water balance of Dube AgriZone with detail on the input and outputs of the system. The water balance shows that the majority of water that enters the system is from rainfall and from borehole sources. This supply is only slightly higher than the supply from treated effluent from the SWWTW. Dube AgriZone is an example of the successful use of alternative sources of water, with a positive water balance. The water balance also indicates that the rainfall patterns are highly unpredictable during this time period, and other sustainable sources of water are needed in order to avoid the predicted shortfall, whilst maintaining a sustainable water supply. At this point, the water balance for the remainder of Dube TradePort is not known.

[5] Please note that for the 2015 figures, data for November 2015 and December 2015 was not recorded therefore average figures were used to calculate the results.

8. WATER MANAGEMENT
(continued)

TABLE 16: AGRIZONE WATER BALANCE (JANUARY 2015-FEBRUARY 2016)

	INPUTS (KL/DAY)				OUTPUTS (KL/DAY)		
DATE	PORTABLE	BOREHOLE	SWWTW	RAINFALL	FLUSH WATER	LANDSCAPING	SEWER WATER
January 2015	30			504	477	67	24
February 2015	44			522	340	51	23
March 2015	34			569	321	46	24
April 2015	30	163	176	99	286	67	20
May 2015	37	155	102	28	244	56	20
June 2015	47	152	130	4	255	49	20
July 2015	45	149	139	1 360	270	27	28
August 2015	35	22	85	14	278	32	25
September 2015	36	300	72	257	303	26	21
October 2015	46	128	135	147	341	22	25
November 2015	45	148	118	385	339	24	27
December 2015	39	126	61	681	331	28	27
January 2016	45	52	55	476	305	29	25
February 2016	72	112	146	298	249	31	22
Daily Av.	42	137	111	382	310	40	24
Annual Total	**15 252**	**50 005**	**40 449**	**139 306**	**113 124**	**14 470**	**8 630**

TOTAL INPUT (KL/ANNUM)	TOTAL OUTPUT (KL/ANNUM)	WATER BALANCE (KL/ANNUM)
245 012	136 223	108 789

8. WATER MANAGEMENT
(continued)

8.2.2 TREATED WASTEWATER QUALITY

The water demand from municipal sources has been declining over the period 2012 to 2015, which is a positive indication that the use of alternative water sources is starting to have an impact. The use of treated effluent from the SWWTW is an important source of water for Dube AgriZone to augment the municipal supply of water. However, this supply may only be used to fulfil irrigation purposes if the quality of water satisfies the fitness for use standards set by Dube AgriZone (DTPC, 2014a).

The water quality parameters are measured against prescribed General Limit Values (GLVs) and Special Limit Values (SLVs). GLVs are used to measure whether the treated effluent can be used for irrigation purposes and subsequently whether the treatment method being applied to the effluent is effective, whereas SLVs are used to determine whether the treated effluent is sufficient to be released into water courses.

The results from the 2013/14 SoER (Table 17) show that most of the parameters were within GLV limits with the exception of ammonia, which exceeded the GLVs. The ammonia limits were exceeded by 5% and 2% (as per the daily records) for 2013 and 2014 respectively. The compliance with the GLVs proved that the treated effluent is being treated to an effective level.

SLVs were difficult to achieve in 2013: the daily nitrate recordings were almost 100% over the SLVs with the rest of the parameters also frequently exceeding the limits, although on a much lower scale. In 2014, there was a marked improvement with most of the overstepping of parameters

TABLE 17: PERCENTAGE OF DAYS (2013-2014) WHEN SELECTED WATER QUALITY PARAMETERS MEASURED AT THE SWWTW EXCEEDED GLVS AND SLVS (DTPC, 2014a)

PARAMETER	AVERAGE	GLV	2013 (%)	2014 (%)	SLV	2013 (%)	2014 (%)
pH	6.11	5.5-9.5	-	-	5.5-7.5	1.4%	-
Conductivity (mS/cm)	63.98	70-150	-	-	50-100	4.3%	-
Total Suspended Solids (mg/l)	4.29	25	-	1.0%	10	10.9%	1.9%
Soluble Reactive Phosphate (mg P/l)	2.15	10	-	-	1-2.5	42.0%	12.6%
Nitrate (mg N/l)	3.20	15	-	-	1.5	97.8%	47.6%
Soluble COD (mg/l)	22.53	75	0.7%	1.0%	30	29.0%	30.1%
Ammonia (mg N/l)	0.89	6	5.1%	2.2%	2	10.1%	2.2%
Nitrite (mg N/l)	0.57	15	-	-	1.5	22.5%	-

8. WATER MANAGEMENT
(continued)

reduced, with the exception of Soluble Chemical Oxygen Demand (COD) which increased slightly. Overall, this was an encouraging sign as it showed that the treatment of effluent has improved during the 2013/14 monitoring period (DTPC, 2014a).

In terms of the 2015 results (Table 18), overall the water quality parameters were within the GLV limits, with the exception of Total Suspended Solids (TSS), Chemical Oxygen Demand (COD) and extant Ammonia. The TSS and COD exceeded the GLV's for almost half the monitoring period and Ammonia exceeded the GLV's to a lesser extent; however, this resulted in the treated effluent not being suitable for irrigation during these periods.

In terms of the SLVs, the water quality parameter readings indicate that most of the average values for the year have been within range, with the exception of TSS, COD and Ammonia which mirror the comparison in terms of GLVs. In daily terms, five (5) of the eight (8) parameters exceeded the daily limits. The daily exceeded percentages increased from 2014 to 2015; attaining the SLV limits are a lot more difficult as these are the ranges required for treated effluent to be discharged directly into watercourses.

As stated in the 2013/14 State of the Environment Report (SoER), there is a predicted shortfall in terms of water supply as operations expand within Dube TradePort, compounded with the shortfall that the province will face due to both anthropogenic and climatic issues. It is therefore imperative that Dube TradePort Corporation find alternative sustainable supplies of water. The use of treated effluent from the SWWTW has proven to be a

TABLE 18: PERCENTAGE OF DAYS (2015) WHEN SELECTED WATER QUALITY PARAMETERS MEASURED AT THE SWWTW EXCEEDED GLVS AND SLVS

PARAMETER	AVERAGE (2015)	GLV	2015 (%)	SLV	2015 (%)
pH	6.79	5.5-9.5	-	5.5-7.5	-
Conductivity (mS/cm)	79.08	70-150	-	50-100	-
Suspended Solids (mg/l)	135.33	25	50%	10	66.67%
O-Phosphate (mg P/l)	1.26	10	-	1-2.5	16.67%
Nitrate (mg N/l)	1.74	15	-	1.5	50%
Chemical Oxygen Demand (mg/l)	136.67	75	58.33%	30	100%
Ammonia (mg N/l)	2.07	6	8.33%	2	41.67%
Nitrite (mg N/l)	0.32	15	-	1.5	-

8. WATER MANAGEMENT
(continued)

viable option, but the treated effluent from this supply may only be used if the water quality standards are consistently met, which is contingent on the effective and efficient monitoring and management of the SWWTW.

8.2.3 STORMWATER RUN-OFF

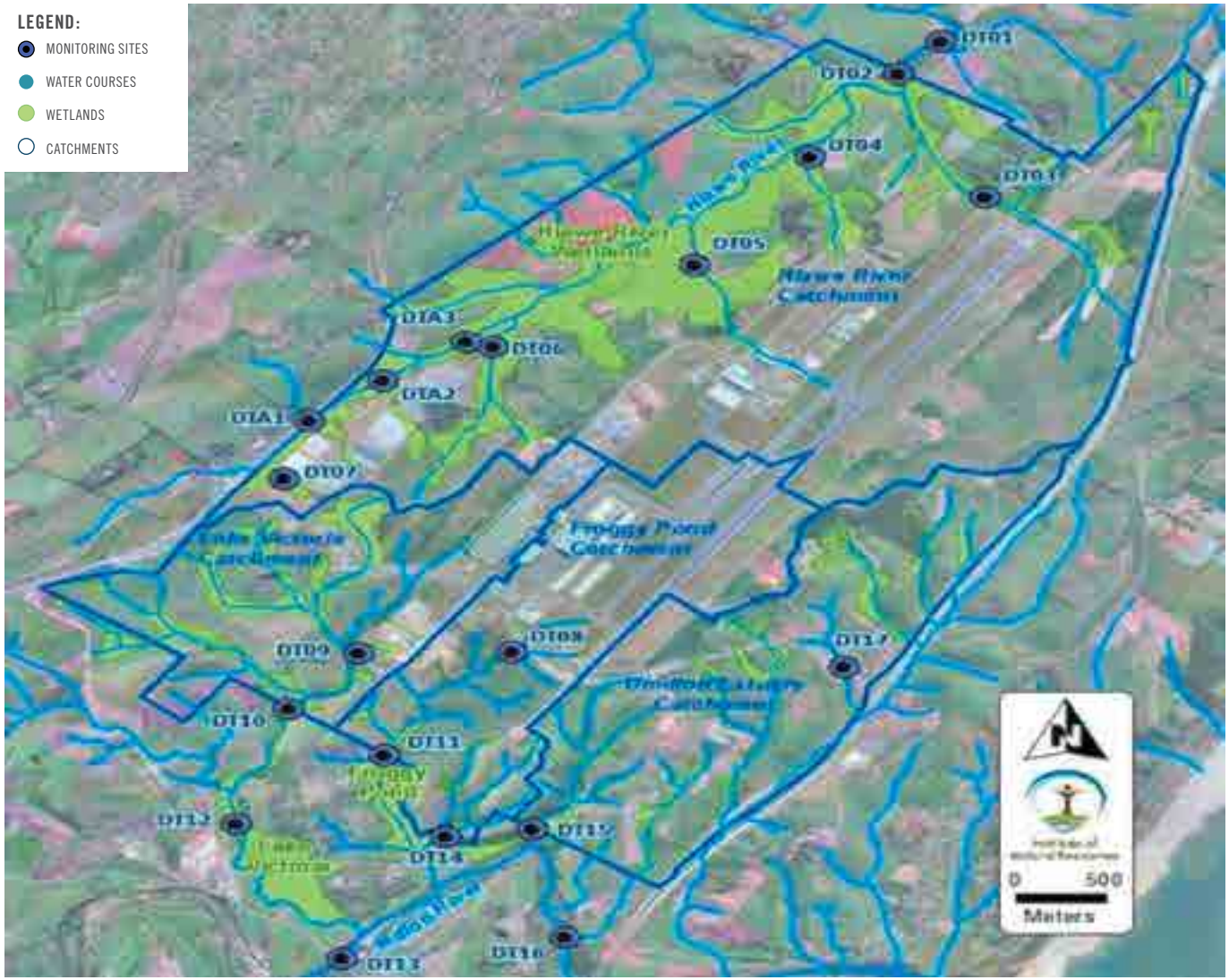
Dube TradePort Corporation has a well-developed monitoring plan that has been implemented since 2013, the aim of which is to ensure firstly that the environment is protected, and secondly that if there are any issues these may be rectified in a timeous manner (DTPC, 2015e). There are twenty (20) monitoring stations (Figure 31) (encompassing both Dube TradePort and King Shaka International Airport) that measure different parameters within the run-off from various activities that occur in these areas.

Figures 32-43 have been taken from Dube TradePort Corporation (2015e). The water quality results have varied through the years. Samples were taken during December 2015, and it was noted that the drought conditions have had an effect on the results as seven (7) out of the twenty (20) monitoring points were dry, whereas previously this was not the case as December usually exhibits adequate rainfall.

In term of the Ammonia concentration trend analysis, Figure 32 shows that these concentrations have consistently been below GLVs with the only exceeded levels occurring in February 2014 at site DT07 and June 2015 at site DTA3. The concentrations for the Chemical Oxygen Demand (Figure 33) has consistently exceeded GLVs throughout the years, with the highest recorded event occurring in May 2014 at site DT12. There has been a decrease to below the GLV in 2015, with the exception of sites DTA3 and DT16.

The dissolved Iron concentrations (Figure 34) have also been recorded as above the GLV throughout the monitoring period, but in 2015 there has been a decrease in the levels to below the GLV with the exception of sites DT14 and DT17 (site DT14 has continued to spike). The dissolved Lead (Figure 35) results show that readings have consistently exceeded GLV's, with November 2014 showing the greatest spike across all sampling points, with 2015 showing a decline to below the GLV.

FIGURE 31: SAMPLING SITES WITHIN THE STUDY AREA (DTPC, 2015e)



8. WATER MANAGEMENT
(continued)

The dissolved Manganese (Figure 36) results show a varied pattern over the monitoring period, with a number of sites exceeding the GLV. There has been a slight decrease noted from November 2014, with the exception of site DT14 which is continuing to spike. The E.coli values (Figure 37) have continued to exceed the South African Water Quality Guideline levels over the time period, with site DT05 showing the greatest exceeded value in August 2013.

In terms of the Conductivity readings (Figure 38), these have been recorded as below the GLV with only a few sites that have been recorded as above this level, but it is important to note that there has been a decrease in these levels in 2015. The Nitrate/Nitrite concentrations (Figure 39) for the majority of the reporting period have been below the prescribed GLV with the exception of sites DTA3 and DTA2, which were recorded above the GLV in 2013 and 2014. Overall, there has been a slight increase in concentrations in 2015 but these have still been below the GLV. The Oil and Grease measurements (Figure 40) have consistently been above the GLV for the majority of the reporting period; there has been a slight decrease in 2015 but these values are still above the GLV. There have been no issues with regards to the Orthophosphate (Figure 41) readings, as these have been recorded below the GLV throughout the years. The Suspended Solid concentrations (Figure 42) have been recorded as above the GLV level, but there has been a slight decrease in 2015. The pH measurements (Figure 43) have been within the prescribed range.

Dube TradePort Corporation (2015e) has noted that there has been an elevated level of Manganese, Iron and Fluoride at site DT14, which is associated with the Froggy Pond Wetland System. This may be due to the wetland being supplied with water from groundwater sources during this drought period, as these trends have not been noted in other wetlands in the immediate area. Although the trend of the different water quality parameters have been shown to be varied and erratic, it is important to note that there is a decreasing trend noted in 2015 for most parameters, even if these may be above prescribed GLV levels.

FIGURE 34: DISSOLVED IRON CONCENTRATIONS ACROSS SAMPLING POINTS (2013-2015)

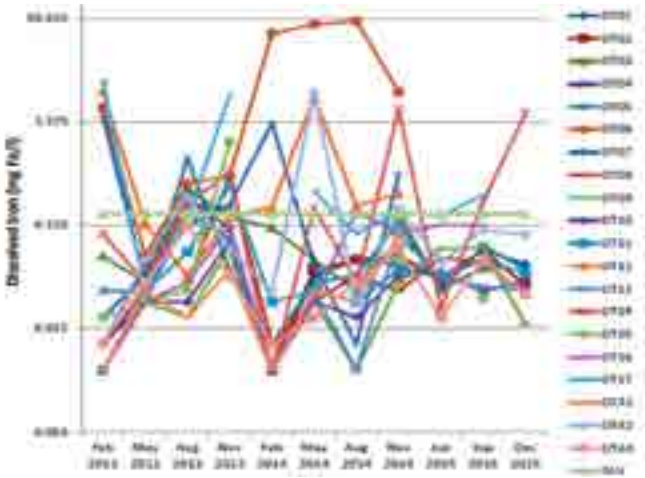


FIGURE 32: AMMONIA CONCENTRATION ACROSS MONITORING STATIONS (2013-2015)

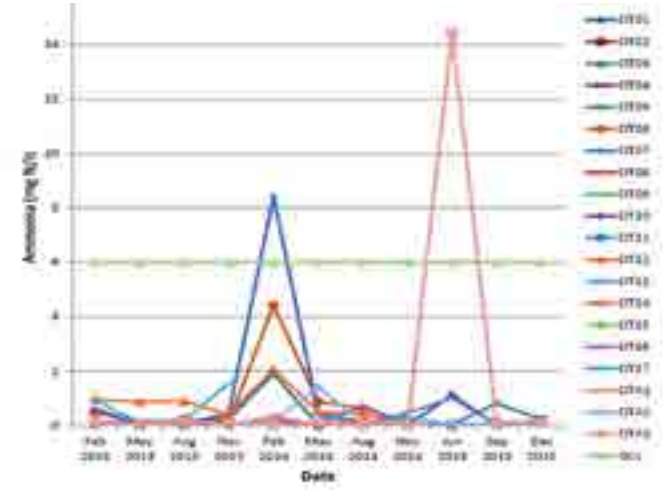


FIGURE 33: CHEMICAL OXYGEN DEMAND CONCENTRATIONS ACROSS MONITORING STATIONS (2013-2015)

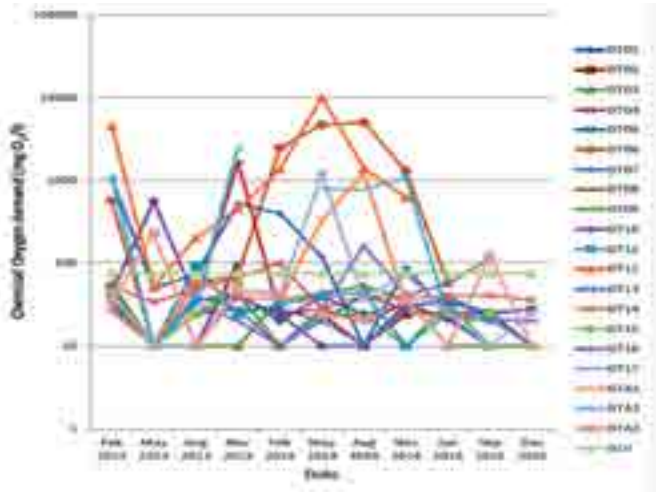
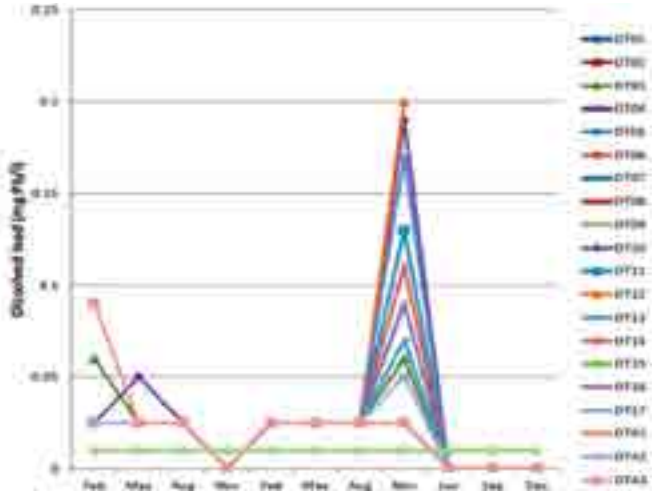


FIGURE 35: DISSOLVED LEAD CONCENTRATIONS ACROSS SAMPLING POINTS (2013-2015)



8. WATER MANAGEMENT
(continued)

FIGURE 36: DISSOLVED MANGANESE CONCENTRATIONS ACROSS SAMPLING POINTS (2013-2015)

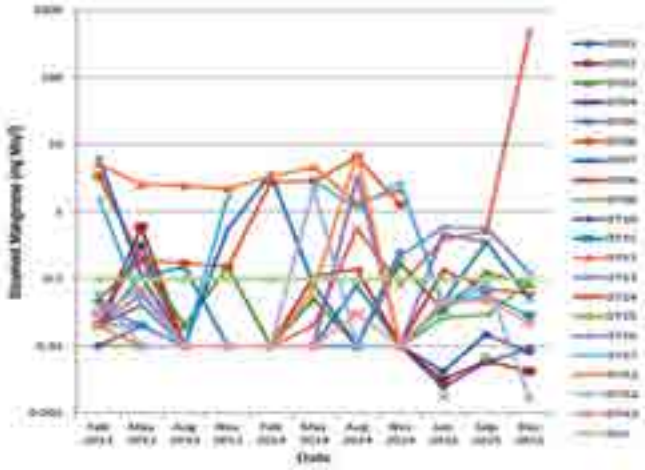


FIGURE 37: E.COLI CONCENTRATIONS ACROSS SAMPLING POINTS (2013-2015)

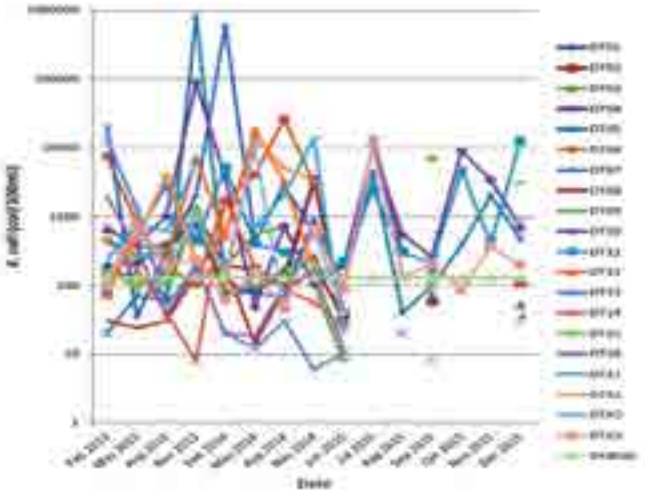


FIGURE 38: CONDUCTIVITY CONCENTRATIONS ACROSS ALL MONITORING POINTS (2013-2015)

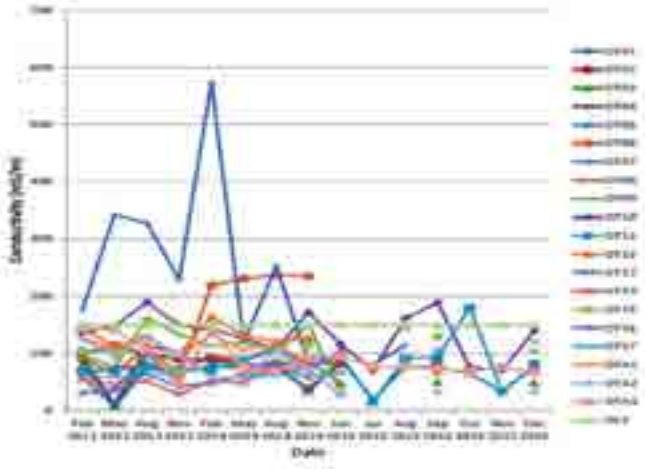


FIGURE 39: NITRATE/NITRITE CONCENTRATIONS ACROSS ALL MONITORING POINTS (2013-2015)

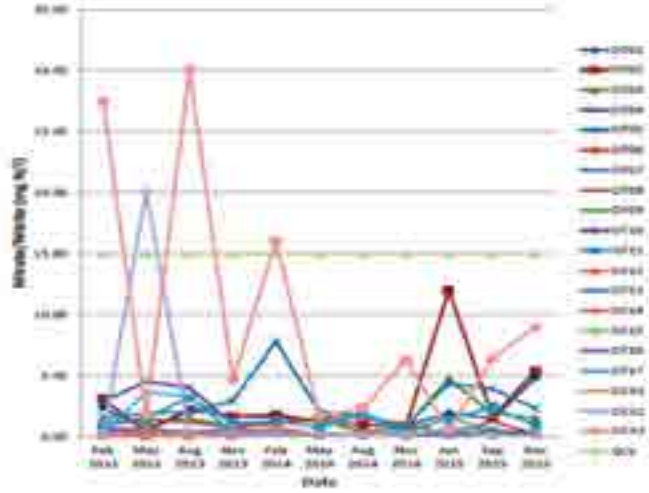


FIGURE 40: OIL AND GREASE MEASUREMENTS ACROSS ALL MONITORING STATIONS (2013-2015)

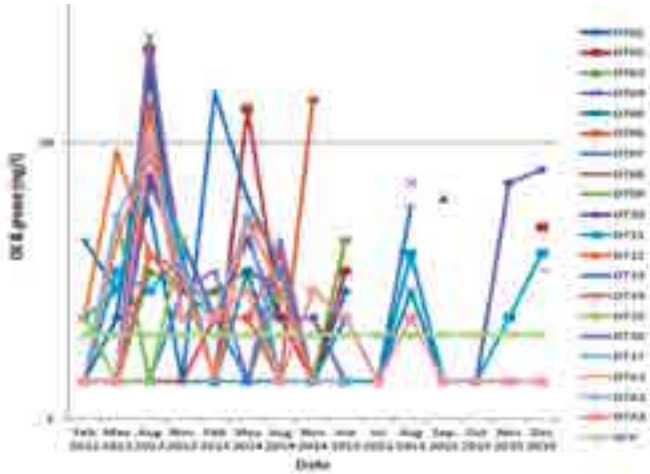
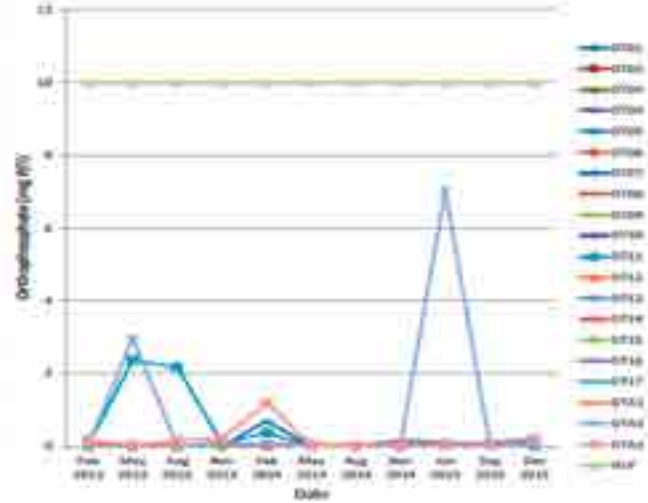


FIGURE 41: ORTHOPHOSPHATE CONCENTRATION ACROSS ALL MONITORING STATIONS (2013-2015)



8. WATER MANAGEMENT
(continued)

FIGURE 42: SUSPENDED SOLID MEASUREMENTS ACROSS ALL MONITORING STATIONS (2013-2015)

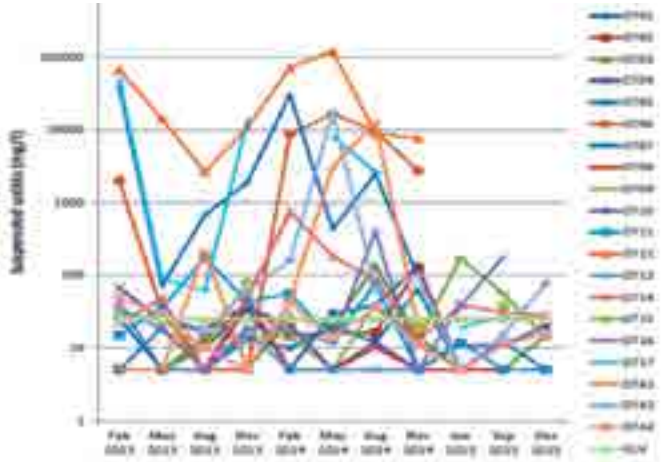
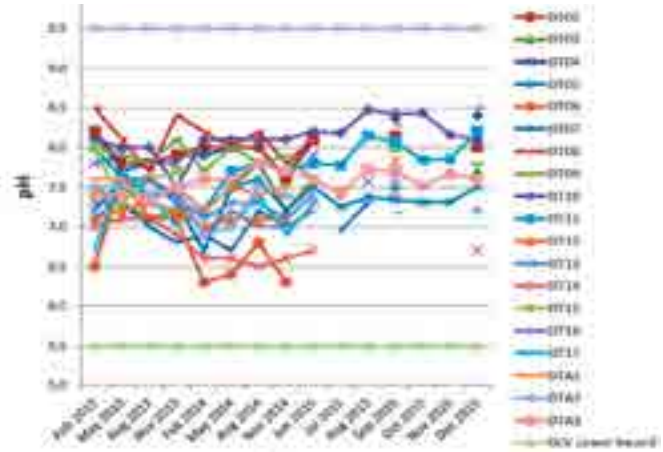


FIGURE 43: PH MEASUREMENTS ACROSS ALL MONITORING STATIONS (2013-2015)



8.2.4 SURFACE WATER RESOURCES

The integrity of freshwater resources surrounding Dube TradePort have been severely affected by agricultural activities, river mineral sand mining and more recent industrial activities, increasing urban human settlements (and associated nutrient loading), and poor land use management within the catchments leading to the pollution and degradation of the river and wetland ecosystems. Consequently these systems have been transformed from their natural pristine state, yet continue to maintain a level of ecosystem function.

Maintaining the health of river and wetland ecosystems is of critical importance as these environments not only host a diversity of aquatic flora and fauna but also constitute a critical component of the region's ecological infrastructure, i.e. the functional natural ecosystems which provide valuable free ecosystem services that are of high value to society. This highlights the need for ongoing monitoring of these resources, as well as Dube TradePort's activities, to ensure that negative and cumulative impacts are averted or minimised wherever possible.

TABLE 19: CHARACTERISTICS OF RIVERS WITHIN THE STUDY AREA[6]

WATERCOURSE	HLAWE RIVER AND TRIBUTARIES	MDLOTI RIVER AND TRIBUTARIES
Region	KwaZulu-Natal	KwaZulu-Natal
Level 1 Ecoregion	North Eastern Coastal Belt	North Eastern Coastal Belt
Level 2 Ecoregion	17:01 17:02	17:01 17:02
Geomorphic Province	South Eastern Coastal Hinterland South Eastern Coastal Platform	South Eastern Coastal Hinterland South Eastern Coastal Platform
Vegetation Type	KwaZulu-Natal Coastal Belt Grassland Sub-tropical Freshwater Wetlands Northern Coastal Forest	KwaZulu-Natal Coastal Belt Grassland Subtropical Freshwater Wetlands Northern Coastal Forest Subtropical Alluvial Vegetation
Quaternary Catchment	U30D	U30B
Slope Class	Tongati - Lower Foothills Hlawe - unclassified	Mdloti - Lower Foothills
Watercourse Classification	Perennial (Hlawe) and non-perennial	Perennial (Mdloti) and non-perennial

[6] Table adapted from GIBB (2016). Dube TradePort Aquatic Assessment-Draft. Pg 6, Table 1. 3

8. WATER MANAGEMENT
(continued)

RIVER HEALTH

A condition stipulated as part of the RoD is the monitoring of watercourses surrounding Dube Tradeport and King Shaka International Airport, and as such GIBB have been appointed to undertake this assessment. The results have been adapted from this report to provide an indication of the current state of the rivers. Dube Tradeport has a well-established stormwater-monitoring programme, which has previously provided an indication of the state of the rivers but this was only in terms of water quality; the current monitoring programme provides a holistic understanding of the current riparian habitat (GIBB, 2016). The study area is located in the Mvoti to Umzimkulu Water Management Area; the main rivers include the Mvoti, Umgeni, Mkomazi and Mzimkulu. The rivers that are of concern in the Dube TradePort Corporation study area are the Mdloti River and Hlawe River and their associated tributaries (GIBB, 2016). Table 19 provides some detail on the characteristics of the rivers within the study area.

As part of the Bio-monitoring for associated watercourses within the Dube TradePort Corporation study area, nine (9) sampling points have been chosen according to GIBB (2016). Three (3) of these sampling points were not assessed during this period as these were impaired due to the drought conditions, with one (1) sampling point not being suitable for further monitoring.

In terms of the Instream Habitat Integrity (IHI), the instream habitat results ranged from 'Moderately Modified' (C) to 'Critically Modified' (F) in the northern Tongaati (Hlawe) Catchment (Table 20). This is mostly due to the influence of urbanisation, with runoff representing the most common impact as this resulted in a decrease in water quality and, with the cumulative effect of increased runoff discharge, resulted in the deterioration of this habitat. Alien invasive fish species have been noted in this habitat, which will adversely impact the naturally occurring biota in the Hlawe River (GIBB, 2016). Dumping of waste has been noted at sites U3HLAW-BELVE and U3HLAW-USTON, which negatively impacts the ecological integrity of the river (GIBB, 2016).

In the Mdloti Catchment in the southern section of the study area, the instream habitat integrity ranged from 'Largely Natural with a few Modifications' (B) noted upstream of the Lake Victoria System (U3MDLO-SITE4) and 'Largely to seriously modified conditions' (D/E) noted at the

TABLE 20: DESCRIPTION OF SAMPLING POINTS INSTREAM HABITAT INTEGRITY DETERMINED FOR THE WATERCOURSES WITHIN THE STUDY AREA[7]

CATCHMENT	NAME	DESCRIPTION	COMPONENT	ECOLOGICAL CATEGORY
Tongati (Hlawe River)	U3HLAW-SITE2	Site located on unnamed tributary originating from the northern catchment within the DTP/KSIA boundary. Site selected to determine potential impact associated with activities within the DTP/KSIA area of operation. Existing River Eco-Status Monitoring Programme (REMP) monitoring site.	Instream Habitat	C
			(Hlawe River)	C
	U3HLAW-BELVE	Site located within the upper reaches of the Hlawe River. Site selected to serve as upstream reference point for potential impacts associated with activities within the DTP/KSIA area of operation on downstream Hlawe River.	Instream Habitat	E
			Riparian Habitat	F
	U3HLAW-USTON	Site located on the Hlawe River below the confluence of the Hlawe River and the tributary originating from the DTP/KSIA boundary, and upstream of the Hlawe River/Tongati River confluence. Site selected to serve as downstream monitoring point on Hlawe River. Site located upstream of REMP monitoring site U3HLAWCTONG (REMP site not accessible at time of survey).	Instream Habitat	D/E
			Riparian Habitat	E
Mdloti	U3MDLO-SITE4	Site located upstream of the wetland area known as 'Lake Victoria' on a tributary of the Mdloti River draining DTP/KSIA study area. Site selected to determine potential impact associated with activities within the DTP/KSIA area of operation. Existing REMP monitoring site.	Instream Habitat	B
			Riparian Habitat	C
	U3MDLO-MLNDB	Site located on the Mdloti River at road bridge leading to Mount Moreland. Site selected to serve as upstream reference point for potential impacts associated with activities within the DTP/KSIA area of operation on downstream Mdloti River. Existing REMP monitoring site.	Instream Habitat	D/E
			Riparian Habitat	E

[7] Figure taken from GIBB, 2016. Dube Tradeport Aquatic Assessment-Draft. Pg 20, Table 5

8. WATER MANAGEMENT
(continued)

IT IS ALSO STATED BY EDWARDS (2015a) THAT, IN TERMS OF THE SEEP WETLANDS, IT WAS NOTED THAT, ALTHOUGH THESE WETLANDS HAVE BEEN CLASSIFIED AS DEGRADED DUE TO THE PREVIOUS SUGAR CANE FARMING AS WELL AS THE RECENT DEVELOPMENTS, THE RESULTANT CONDITIONAL SCORES WERE HIGHER THAN EXPECTED, AS IT WAS DETERMINED THAT THESE WETLANDS STILL HAVE A HIGH FUNCTIONING HYDROLOGICAL COMPONENT.

southernmost sampling point (U3MDLO-MLNDB), which shows that the later sampling point experienced a greater impact due to upstream activities. GIBB (2016) noted that overall conditions in the Mdloti catchment has deteriorated over time.

The riparian integrity within the Hlawe River ranged from 'Moderately Modified' (C) to 'Critically Impaired' (F). GIBB (2016) noted that sites U3HLAW-BELVE and U3HLAW-USTON's deteriorating integrity can be attributed to the transformation of natural vegetation to alien vegetation and bank erosion, which is a direct result of urbanisation. Site U3HLAW-SITE 2 has been described as 'Moderately Modified' (C) due to the preservation of elements of the natural ecology, as there is a limited presence of alien invasive plants and improved bank stability. GIBB (2016) noted that during the initial EIA phase the Hlawe River was not assessed, but conditions have deteriorated largely through the presence of alien vegetation.

In the Mdloti Catchment, the riparian integrity varies from 'Moderately Modified' (C) to 'Seriously Modified' (E). The conditions at site U3MDLO-SITE4 are predominantly composed of natural vegetation with transformed sections noted at road crossings. U3MDLO-MLNDB exhibits a rapidly declining habitat due to a combination of removal of vegetation and proliferation of alien invasive species, due to increased pressure from urban activity; overall, the Mdloti catchment has deteriorated over time (GIBB, 2016).

WETLAND HEALTH

As stated in the previous version of the Dube TradePort Corporation SoER 2013/14, there hasn't been substantial investigation into the wetlands around the study area since the initial EIA (Environmental Impact Assessment) processes but, since then, there have been studies conducted for the new operations within Dube TradePort Corporation, and these studies will be used to provide a current state of wetlands report within the study area.

In terms of the proposed Dube AgriZone 2 (Figure 44), wetlands have been classified according to the Present Ecological State (PES) as being 'largely modified' to 'critically modified' with one wetland system described as 'seriously modified'. The wetland system classified as 'critically modified', according to Edwards (2015a), has been attributed to significant infilling. The wetland system classified as 'seriously modified' is due to increased flow impoundment and habitat transformation compared to base conditions (Edwards, 2015a). It is also stated by Edwards (2015a) that, in terms of the seep wetlands, it was noted that, although these wetlands have been classified as degraded due to the previous sugar cane farming as well as the recent developments, the resultant conditional scores were higher than expected, as it was determined that these wetlands still have a high functioning hydrological component.

FIGURE 44: WETLAND AREAS DELINEATED FOR THE PROPOSED AGRIZONE 2 (EDWARDS, 2015a)

8. WATER MANAGEMENT
(continued)

The assessment of wetlands, in terms of the PES of the proposed Dube TradeZone 2 (Figure 45) development, shows that the majority of the wetland units has been described as 'seriously modified' to 'critically modified' with the exception of one wetland unit described as 'largely modified'. According to Edwards (2015b), the reasons for the poor condition of the wetlands described as 'seriously modified' are the removal of vegetation previously for sugarcane farming with the effects being compounded by these wetlands' use as stormwater mechanisms, as there has been the installation of 'networks of drains/ditches to divert surface and subsurface water rapidly through the wetland and reduce soil saturation' (Edwards, 2015b, pg 14), whereas the wetland unit that has been described as 'largely modified' has been predominantly impacted due to the removal of vegetation. The wetland unit that has been described as 'critically modified' is due to 'substantial incision and widening of the main channel as a result of stormwater inputs from the KSIA that has both scoured out wetland habitat and eliminated channel overtopping' (Edwards, 2015b, pg 14).

The proposed Dube Support Zone 2 development (Figure 46) wetland assessment showed that the wetland unit has been classified as 'moderately modified' to 'largely modified'. These wetlands are in a relatively better condition than the other two zones mentioned above. Natural Scientific Services (2015) states that these are largely due to vegetation and hydrological issues, such as removal of natural vegetation, the presence of alien invasive species, and transformed hydrological regimes.

The wetland assessment delineated for the proposed Link Road Development (Figure 47) indicated that the PES of these wetlands ranges from 'largely modified' to 'critically modified' due to the highly transformed nature of the region. It has been stated that the declining quality of wetlands in this area is due to agricultural activity such as the draining of the wetland, construction of dirt roads as well as cut and fill operations for the development of the King Shaka International Airport and Dube TradePort complexes (INR, 2011). Although it must be noted that, despite the limited functionality that these wetlands exhibit, there appears to be some basic functions that remain intact such as hydrology; with the proper rehabilitation methods these wetlands may be restored to a satisfactory level of functionality.

FIGURE 45: WETLAND AREAS DELINEATED FOR THE PROPOSED TRADEZONE 2 (EDWARDS, 2015b)

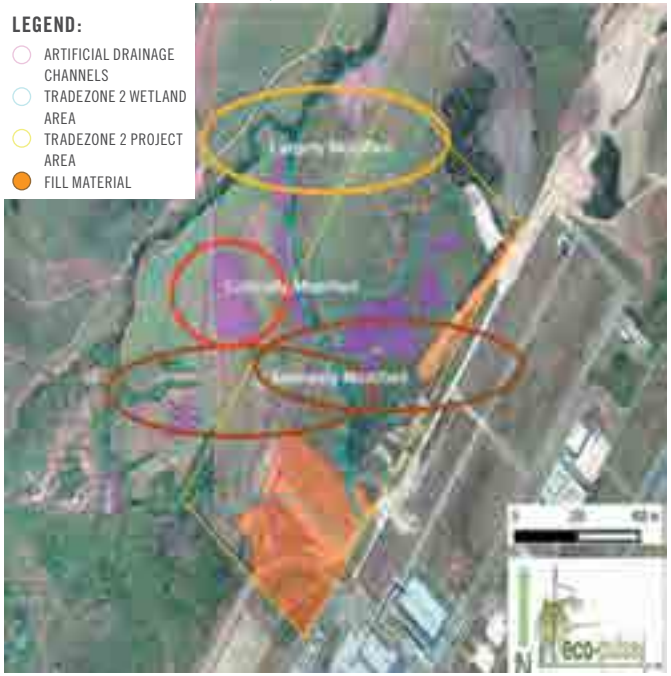
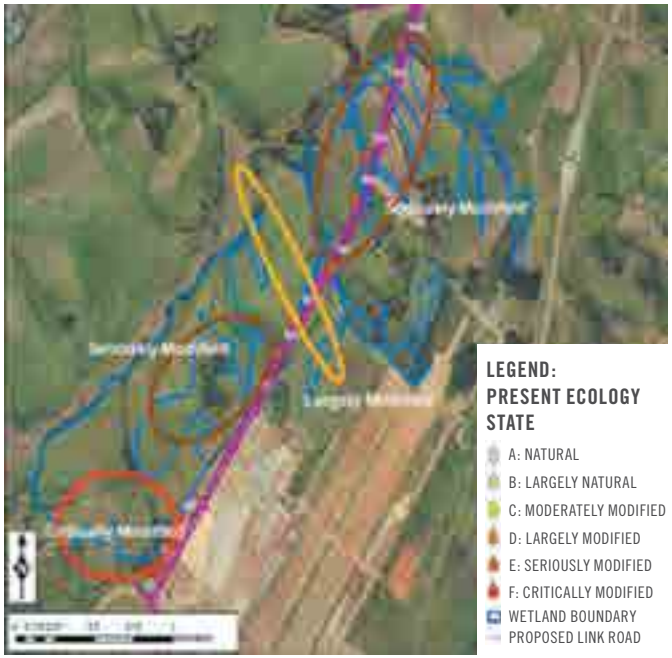


FIGURE 46: WETLAND AREAS DELINEATED FOR SUPPORT ZONE 2 (NATURAL SCIENTIFIC SERVICES, 2015)

FIGURE 47: WETLANDS DELINEATED FOR THE PROPOSED LINK ROAD DEVELOPMENT (INR, 2011)



8. WATER MANAGEMENT
(continued)

COLOUR	KEY
	PES-Critically Modified
	PES-Seriously Modified
	PES-Largely Modified
	Location of new developments

The Dube TradePort Corporation State of the Environment Report 2013/14, shows the health of the entire wetland system within Dube TradePort Corporation: the majority of the Wetlands have been described as 'seriously modified' to 'critically modified', with the off-site wetlands classified as 'largely modified' (Figure 48). The position of the new wetlands assessed can be used as a guide to determine the trend of wetland health within Dube TradePort: the status of wetland health is relatively stable, with only a slight improvement in the area of the proposed Dube Support Zone 2 development.

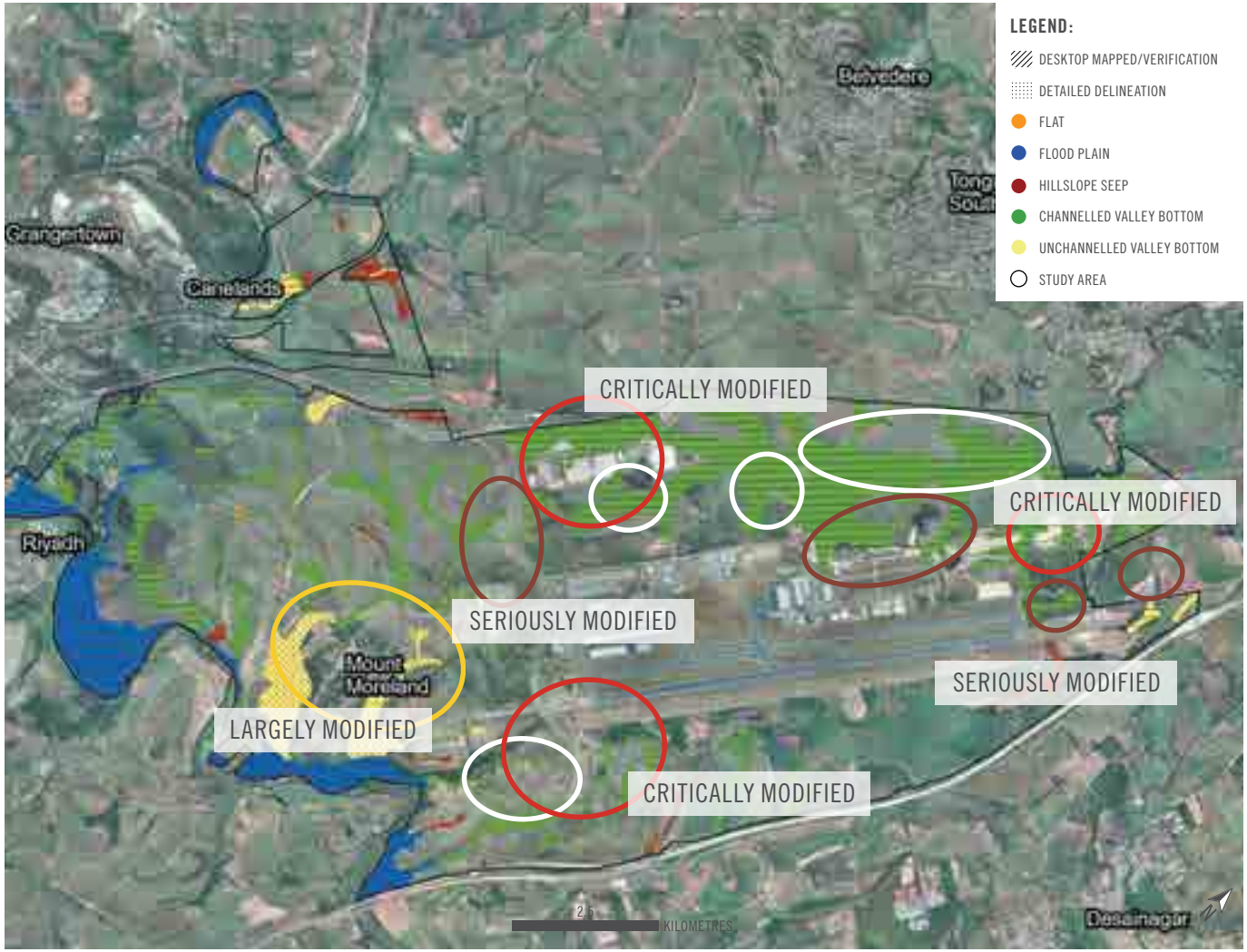
8.3 IMPACTS

Water resources have been severely impacted by historic agricultural activities, with further transformation linked with development of the airport and associated infrastructure. Apart from these direct impacts, discharge from stormwater management systems, diffuse stormwater run-off, incidental spillages from the two operational Waste Water Treatment Works, and alterations to hydrology affect the quantity and quality of water entering downstream water resources. These factors, if left unchecked, could result in further habitat degradation and impairment of ecosystem services. The cumulative effects on sensitive downstream estuarine systems should also be considered.

8.3.1 ECOSYSTEM INTEGRITY

The quality and quantity of water entering the environment are two important drivers that affect the integrity of aquatic ecosystems. The introduction of harmful substances and contaminants contained in

FIGURE 48: WETLAND EXTENT WITHIN DUBE TRADEPORT CORPORATION, INDICATING THE PES CONDITIONS FROM DTPC (2014A) AS WELL AS NEW DTPC DEVELOPMENTS



8. WATER MANAGEMENT
(continued)

stormwater and wastewater discharges may lead to accumulations beyond the tolerance levels of biota. This will negatively affect community composition and structure (i.e. numbers and types of species present) and may ultimately result in undesirable ecosystem change (e.g. proliferation of blue-green algae and aquatic alien invasive plants in response to high nutrient loads), habitat degradation, loss of rare and valuable species, and impaired ecosystem functioning and services provision. While treated wastewater from the SWWTW that does not comply with the SLVs (and is not permitted to be discharged to the natural environment) is utilised for irrigation of the surrounding canelands, contamination of the nearby watercourse through diffuse run-off is a possibility, in addition to spillages and overflows.

The sustained supply of water is clearly required for the functioning of aquatic ecosystems. While removal of run-off through rainwater harvesting schemes is likely to have minimal impact, elevated flows as a result of increased stormwater run-off from impervious surfaces, and purpose-built stormwater systems, may result in erosion impacts and altered hydrology of drainage lines, rivers and wetland systems. This emphasises the importance of adopting and implementing stormwater management practices that are able to mirror natural run-off as closely as possible.

8.3.2 INTEGRATED COASTAL SYSTEMS

The impacts of catchment mismanagement and resultant poor water quality often have implications for down-stream environments. Since Dube TradePort is located close to the coastal zone, the uMdloti and Tongati estuaries and the coastal strip may be indirectly affected by the activities of Dube TradePort, predominantly through water quality impacts. The health state of the Tongati Estuary is best described as highly degraded as a result of long-standing and severe anthropogenic impacts including habitat loss, high nutrient loading, sewage pollution and chemical contamination. The uMdloti Estuary is also threatened by these same impacts, compounded by freshwater diversion at the Hazelmere Dam, and its health status is deemed to be poor (DTPC, 2014a). It is therefore imperative to acknowledge the potential contribution of Dube TradePort, as well as other surrounding land uses, to the coastal zone, which may exacerbate the current degraded state of the estuaries if left uncontrolled, with further negative consequences for estuarine functioning, biodiversity and ecosystem services, as well for the marine near-shore environment.

8.4 RESPONSES

Dube TradePort has taken significant strides in implementing its Water Demands and Conservation Management Strategy to reduce demand pressure on the regional water supply. Currently, 80% of greenhouse water demand at Dube AgriZone is met by way of rainwater harvesting. Green initiatives, in terms of supplementing the municipal water supply, include the following (DTPC, 2013b):

- Harvesting of clean stormwater run-off from the roofs of the greenhouses, the Reverse Osmosis Plant, the Tissue Culture Laboratory (Dube AgriLab) and other structures within Dube AgriZone, which is collected in covered attenuation ponds for irrigation use. Individual greenhouses are supplied with water for irrigation from their own harvested resources;
- When of acceptable standard according to the General Limit Values, treated wastewater from the SWWTW will be used to supplement water for irrigation within Dube AgriZone. Effluent which is of unacceptable quality is transferred to the Flush Water ponds;
- Groundwater (borehole) resources used in circumstances where rainwater and treated effluent is unable to meet desired capacity. Three boreholes are available for use at Dube AgriZone, and a reverse osmosis desalination plant has been constructed and awaiting commissioning and operation, for the treatment of borehole water to acceptable standards for irrigation purposes;
- An Integrated Waste and Waste Water Management Plan (IWWMP) has been developed for Dube AgriZone in support of authorisation of various water uses according to the National Water Act (NWA). The purpose of the IWWMP is to comprehensively define the water use and waste management practices at Dube AgriZone, evaluate their potential impacts on regional water resources, and highlight the practices requiring formal authorisation (DTPC, 2014a); and
- As part of the sustainable farming initiatives, a brine treatment project and recycling project were also initiated as proposed under the IWWMP. A Brine Reuse Options and Management Plan has been developed to determine the best practicable environmental option for brine disposal. The IWWMP suggests that waste water from various processes (SWWTW, brine reject, flushwater) that meet required GLVs will be used to irrigate targeted cane plantations in the neighbouring properties (DTPC, 2014a).

In addition to the above, Dube TradePort Corporation has established a precinct-wide water quality monitoring programme (2007-ongoing), which incorporates over 20 sample stations and a wide range of parameters. This is to ensure that the water quality standards are being met, and to serve as a mechanism of detection for potentially negative environmental impacts. A key outcome is the production of a long-term water quality database, as well as a standardised monitoring protocol for future monitoring.

Furthermore, Dube TradePort Corporation is committed to ensuring that its operations are conducted in a sustainable manner, which includes offsetting impacts to wetland ecosystems should they occur.

In the case of existing development impacts, a revised conceptual conservation and rehabilitation plan has been developed which now includes portions of land to the south of the study area down to the Umdloti River. This will see an estimated 838 hectares of wetlands rehabilitated, and includes a conservation buffer around the important Mount Moreland wetlands (SEF, 2015). Dube TradePort Corporation has also partnered with Tongaat Hulett Developments and eThekwini Municipality in developing a strategic framework for wetland management in the eThekwini North Spatial Development Plan Area (MacFarlane, 2015). This plan recognises the need to enhance wetland ecosystems in order to ensure a more resilient future. As part of this strategy, Dube TradePort Corporation has agreed to rehabilitate all wetlands on their landholdings to a reasonable functional state. Where this is not achievable on-site (e.g. due to development impacts), rehabilitation and long-term protection will be directed towards strategically located offset sites in the region. These agreements will be finalised through the environmental authorization processes of new developments to set in motion a rehabilitation programme that will see a net-gain in benefits provided by wetlands in the region.

8. WATER MANAGEMENT
(continued)

ALTHOUGH RAINFALL HAS BEEN A VIABLE SOURCE, IT MUST BE NOTED THAT THE RECENT DROUGHT CONDITIONS IN THE PAST YEAR HAVE HAD AN EFFECT ON THE AMOUNT THAT IS AVAILABLE FOR USE. IT IS HIGHLY RECOMMENDED THAT TREATED STORMWATER RUN-OFF IS UTILISED, AS THIS PROVIDES ANOTHER ALTERNATIVE SOURCE THAT IS READILY AVAILABLE TO DUBE TRADEPORT.

8.5 CONCLUSION

TREND: STABLE, WITH THE RISK OF DECLINING

Overall, the state of water resources appears to be stable but potentially declining. Although monitoring of water resources is improving, the quality of water is declining and an increasing demand for both water resources and land where wetlands occur indicates a declining trend in the state of this resource. As developmental growth of Dube TradePort increases towards achieving the 2030 vision, this finite resource will need to be managed with the greatest of care.

The continued development of this area will result in ongoing pressure on the water resources in the region. As development proceeds there will be increased demand for water resources. Dube TradePort Corporation has shown an improvement with regards to water demand management, with an almost 45% decline in use of water from municipal supplies since 2012. These efforts will need to intensify, particularly given the threats linked with climate change and water shortages as evidenced during the current drought period.

The use of treated effluent and rainfall has proven to be important sources of water in Dube AgriZone, which has led to a significant reduction in municipal water usage over the years. The use of the treated effluent to augment the municipal supply is contingent on the treated water having satisfactory water quality results.

Although rainfall has been a viable source, it must be noted that the recent drought conditions in the past year have had an effect on the amount that is available for use. It is highly recommended that treated stormwater run-off is utilised, as this provides another alternative source that is readily available to Dube TradePort. A sound water-monitoring programme has been implemented by Dube TradePort Corporation to track water quality impacts and identify contamination sources. The stormwater run-off quality has been variable over this reporting period with the majority of parameters exceeding water quality standards, but it must be noted that the declines are starting to decrease. The water-monitoring programme implemented by Dube TradePort Corporation from the outset of operations is instrumental in ensuring that the water quality results will continue to improve.

In terms of wetlands and river systems within the Dube TradePort Corporation study area, these systems are deemed to be stable based on the limited information available. The implementation of wetland rehabilitation measures will serve to improve the status quo and the associated values provided by wetland ecosystems on Dube TradePort Corporation landholdings. The adoption of a 'net-gain' approach will further ensure that any future impacts to wetlands are appropriately offset, and contribute towards protection, rehabilitation and management of key wetland systems in the region. In future, it is imperative that health assessments be carried out regularly to ensure that trends in ecological states can be monitored and reported in a more accurate manner.

8. WATER MANAGEMENT
(continued)

TABLE 21: SUMMARY OF THE INDICATORS OF WATER MANAGEMENT, AND RECOMMENDATIONS FOR IMPROVEMENT

INDICATORS	TREND	DESCRIPTION	RECOMMENDATIONS
Water demand per category (kl/day)		There has been a reduction in the amount of water used from municipal sources with Dube AgriZone showing the greatest improvement. The use of municipal water by DTPC overall has reduced from 514.37kl/day (2012) to 229.02kl/day (2015), which represents approximately a 45% reduction.	The reuse of alternative sources of water for Dube TradeZone and Dube Support Zones must be increased where feasible to ensure that the use of municipal water decreases.
Increase/decrease of quality of stormwater run-off (various)		The water quality of the stormwater run-off is declining, as most of the parameters exceeded the prescribed GLVs, but it is important to note that the level the declining water quality is an improvement to the values noted the previous year.	Effective treatment mechanisms of stormwater run-off to ensure surface water resources are not degraded. The concerns raised as part of the monitoring reports must be addressed.
Increase/decrease of treated water quality (various)		The SWTWW is continuing to improve the quality of treated effluent produced, but the percentage of days that exceeded the GLVs is still an issue.	Effective monitoring and maintenance of the SWTWW to ensure that acceptable quality of treated effluent can be utilised by DTPC to alleviate pressure on municipal and natural resources.
Surrounding wetland health status (various)		The wetland systems that have been assessed have been described as 'Largely Modified' to 'Critically Modified', which is the same condition as the previous iteration.	Effective treatment of run-off to ensure that water quality does not further degrade the wetland. Appropriate stormwater mechanisms to ensure the water inputs mirror natural conditions as far as possible. Removal of alien vegetation from wetland areas. Rehabilitation and enhancement of on-site wetlands to improve functional values. Implementation of strategic offset initiatives to offset any further transformation of wetland areas.
Surrounding river health status (various)		There have not been any comprehensive studies conducted on the rivers surrounding DTPC.	Effective treatment of run-off to ensure that water quality does not further degrade the river. Removal of alien vegetation. Conduct an updated river health assessment.

9. AIR QUALITY

CLIMATE CHANGE IS DEFINED AS THE SHIFT OF WEATHER CONDITIONS OVER TIME. IT IS A SIGNIFICANT AND LASTING CHANGE, RANGING FROM DECADES TO MILLIONS OF YEARS.

The world's attention is on global warming and its implications on the environment, human health and the economy. Corporations, governments, parastatals and individuals alike are taking an active interest in reducing the anthropogenic impacts of climate change. Against this background, it is therefore important that air quality is managed within Dube TradePort through a combination of instruments at different levels, from corporate policy through to different divisions. It is imperative that, in managing air quality, divisions and staff recognise that their programmes and activities occur within a broader framework of management. Thus, for many activities, appropriate management can be achieved at corporate strategy level through appropriate communication and consultation with employees, tenants, and even third-party developers.

Climate change is defined as the shift of weather conditions over time. It is a significant and lasting change, ranging from decades to millions of years. Anthropogenic contributions to climate change are often referred to as 'global warming'. Air quality is defined as the state of pollutants present in the surrounding ambient environment. The state of air quality is degraded by the release of pollutants into the earth's atmosphere, usually through the combustion of non-renewable resources. Climate change and air quality are closely correlated and often influence one another.

Air quality and climate change policies can be mutually beneficial, such that measures and actions taken to reduce air pollution can in turn reduce greenhouse gas emissions, thereby reducing global warming. Increasing concentrations of greenhouse gases alter the energy balance between the earth's surface and the atmosphere, which in turn can lead to temperature changes that affect the chemical composition of the atmosphere (EC, 2010). An example of this relationship is the emission of air pollutants, such as ozone and sulphates, which influence this energy balance. Thus climate change and air quality management have consequences for one another.

South Africa is carbon intensive, and is ranked amongst the top 20 countries for absolute carbon dioxide emissions. It has an emission per capita of 10 metric tons per annum and is highly dependent on its non-renewable energy sources for power generation. As a result of the implications on global warming and climate change, the need to explore renewable energy sources is imperative.

The National Environmental Management: Air Quality Act (No. 39 of 2004) (AQA) tasks national, provincial and local authorities with the management of air quality. Ambient air quality standards and emission limits are set at a national level, and a national framework sets national norms and standards for various air quality management components, including air quality monitoring, management planning and information management. Dube TradePort therefore strives to develop the necessary capabilities and infrastructure to adequately manage air quality within the precinct.

Dube TradePort has committed to being the first green aerotropolis and carbon neutral tradeport in Africa. The indicators identified as a priority issue within the aerotropolis include the emission of carbon dioxide by source (Co_2e/annum), the percentage of energy from renewable sources and the percentage of emissions offset. Based on the findings recorded in the 2011/12 State of the Environment Report, it was noted that the highest contributor of carbon emissions was attributed to aviation, specifically aircraft Landing and Take-Off fuel, while the second highest contributor of greenhouse gas emissions was from the use of electricity to power buildings. Indicators deemed relevant for the 2015/16 State of the Environment Report are as follows:

- Carbon dioxide emission by source;
- Ambient air quality results (concentration of ambient pollutants such as particulate matter and nuisance dust fallout);
- Percentage of emissions offset (%); and
- Activities (transportation and biomass burning).

9.1. PRESSURES

9.1.1 TRANSPORTATION SECTOR

VEHICLE EMISSIONS

Vehicle exhaust emissions are a major source of hazardous and criteria pollutants such as particulate matter (PM), carbon monoxide (CO), carbon dioxide (CO_2), oxides of nitrogen (NO_x), hydrocarbons, lead (Pb) and sulphur dioxide (SO_2). Secondary pollutants are nitrogen dioxide (NO_2), ozone (photochemical smog), sulphate, nitric acid and nitrate aerosols.

9. AIR QUALITY
(continued)

Emissions are related to the use of the engine, the fuel type and the temperature of combustion, so that if an engine is 100% efficient, the products of combustion will be CO_2 and water. Emissions from petrol driven vehicles have been dramatically reduced by the use of catalytic converters, which function to oxidise pollutants such as CO to less harmful gases such as CO_2. Diesel driven vehicles contain more energy per litre and are more efficient than petrol driven vehicles. However, diesel vehicles emit a higher concentration of NO_x and PM than petrol-driven vehicles.

AVIATION

Emissions released from aircraft combustion engines are carbon dioxide (CO_2), nitrogen oxides (NO_x), carbon monoxide (CO), particulates (PM), oxides of sulphur (SO_x), volatile organic compounds (VOC), and trace compounds. These are emitted at various rates and stages of operation such as taxiing, idling, take-off, climbing and landing. NO_x emissions are higher during high power operations such as take-off, when combustion temperatures are high. CO emissions are highest during low power operations such as taxiing and idling, when combustion temperatures are low and less efficient. Studies have indicated that per-minute emission of CO and NO_x is highest when the aircraft engine is idling than at any other stage of flight (EPA, 1992).

A number of aircraft emissions can affect the climate, some directly (such as CO_2 and water vapour (H_2O)), some indirectly (such as production of ozone in the troposphere, alteration of methane lifetime and the formation of cirrus cloudiness). Emissions such as NO_x, PM and H_2O affect the stratospheric ozone by modifying the chemical balance within the stratosphere (IPCC, 1999).

9.1.2 BIOMASS BURNING

The Dube TradePort precinct is surrounded by sugarcane plantations owned by Tongaat Hulett. Biomass burning is usually carried out before harvesting of the cane, as it reduces physical labour and allows for an easier harvest. Once a fire commences, the dry combustible materials are consumed first, with 25% of the cane stalk being burned off (Allen *et al.*, 2004). The burning process allows for the elimination of micro-organisms and for the enhancement of soil. Pollutants emitted from sugarcane burning, due to its less than ideal combustion condition, include soot and particulate matter (PM) which are visible as a smoke plume. Other emissions such as carbon monoxide (CO), methane (CH_4), hydrocarbons, volatile organic compounds (VOC) such as benzene, and semi-volatile organic compounds (SVOCs), including polycyclic aromatic hydrocarbons (PAHs), are also emitted (Lemieux *et al.*, 2003).

9.1.3 FUGITIVE EMISSIONS

The majority of fugitive greenhouse gas (GHG) emissions are specific to various industrial sectors or processes, including that of refrigerant leakage from air conditioning and refrigeration equipment. Hydrofluorocarbons (HFCs) are the primary GHG of concern for refrigerator systems. HFCs are non-toxic and non-flammable and present a minimum risk, even during incidences of leakage (EPA, 2014). Even though HFCs have no effect on the earth's stratosphere or tropospheric ozone, they are in fact greenhouse gases.

Refrigerants and air coolants consume electricity and over their lifecycles contribute to climate change. This indirect effect represents more than 80% of their impact (EPA, 2014). Managing the emissions of HFCs used in refrigerators renders their impact insignificant.

9.2 STATE

9.2.1 CARBON EMISSIONS

Carbon dioxide is the primary greenhouse gas emitted through human activities. It is constantly being exchanged between the atmosphere, ocean, and land surface as it is both produced and absorbed by many microorganisms, plants, and animals. Human activities are altering the carbon cycle both by the addition of CO_2 to the atmosphere and by influencing the ability of natural sinks, like forests, to remove CO_2 from the atmosphere. While CO_2 emissions come from a variety of natural sources, human-related emissions are responsible for the increase that has occurred in the atmosphere since the industrial revolution.

The main human activity that emits CO_2 is the combustion of fossil fuels (coal, natural gas and oil) for energy and transportation. However, certain industrial processes and land-use changes also emit CO_2. Dube TradePort has conducted a carbon footprint analysis between the period of 1 December 2014 and 30 November 2015, which is based on the Greenhouse Gas Protocol (GHGP). The GHGP is based on the following principles:

- **Relevance:** ensure the inventory reflects on the greenhouse gas emissions of the company;
- **Completeness:** account for and report all greenhouse gas emissions sources and activities within the chosen inventory boundary;
- **Consistency:** use consistent methodology to allow for meaningful comparison over time;
- **Transparency:** address all relevant issues in a factual and coherent manner based on a clear audit trail; and
- **Accuracy:** ensure that the quantification of greenhouse gas emissions is systematically neither over nor under the actual emissions, as far as can be judged.

The Dube TradePort Corporation Carbon Footprint Study was carried out within the following organizational boundary, which defines the extent and scope of the carbon analysis:

- Dube Support Zone (29° South, SCB, street lights);
- Dube AgriZone (AgriHouse, AgriLab, Nursery, reverse osmosis plant, street lights);
- Dube Cargo Terminal (Cargo Terminal); and
- Dube TradeZone (TradeHouse, TCB, maintenance buildings, TradeZone 1B and street lights).

DUBE TRADEPORT HEAD OFFICE, 29° SOUTH

9. AIR QUALITY
(continued)

The data presented in Table 22 shows the carbon emissions sources that were considered for each scope during the carbon footprint analysis.

The differentiation of each scope is based on the following GHGP:

- **Scope 1:** direct emissions from the sources owned or controlled by the company;
- **Scope 2:** indirect emissions through the use of purchased electricity or heating; and
- **Scope 3:** other indirect greenhouse gas emissions.

The majority of the sources operating within Dube TradePort fall within the Scope 1 and Scope 2 categories. This can be seen in Table 22.

TABLE 22: CARBON EMISSIONS CALCULATED PER SCOPE

SCOPE	ACTIVITY
Scope 1 (Direct emissions)	• Diesel (stationary and mobile) • Petrol (stationary and mobile) • Oils and lubricants • Fugitive emissions
Scope 2 (Indirect emissions)	• Consumption of purchased electricity
Scope 3 (Indirect emissions, activities associated but not controlled by DTPC)	• Waste generation • Business travel • Employee commuting • Leased goods and services

The data presented in Figure 49 represents the carbon emission calculated for Dube TradePort (Scope 1 and Scope 2) between December 2014 and November 2015. The highest contributor of carbon emissions within Scope 1 and Scope 2 analysis is Dube Cargo Terminal, where most of the emissions are due to energy consumption. Dube Support Zone is the second highest contributor of carbon emissions, which is also due to high levels of energy consumption.

FIGURE 49: SCOPE 1 AND SCOPE 2 CARBON EMISSION (TONNES CO_2e) CALCULATED FOR DUBE TRADEPORT (2016a)

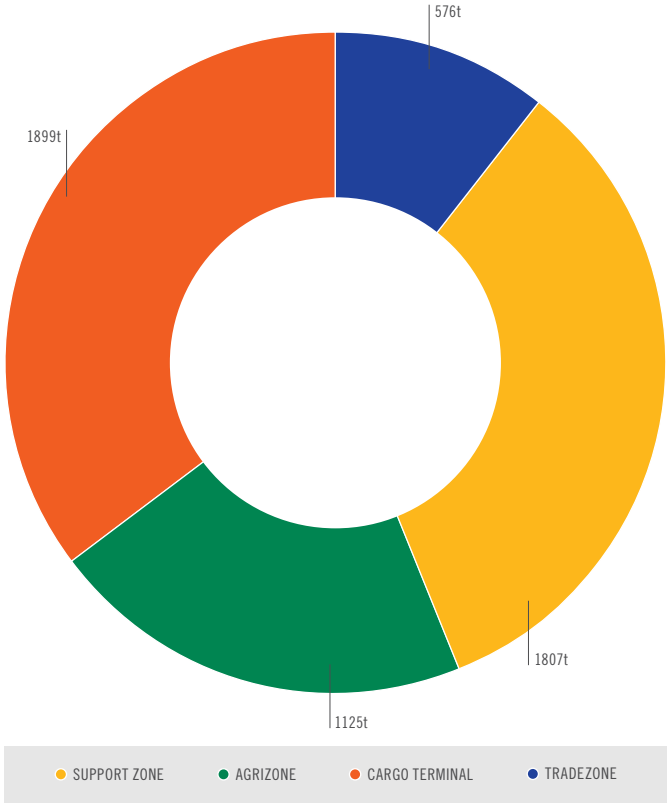
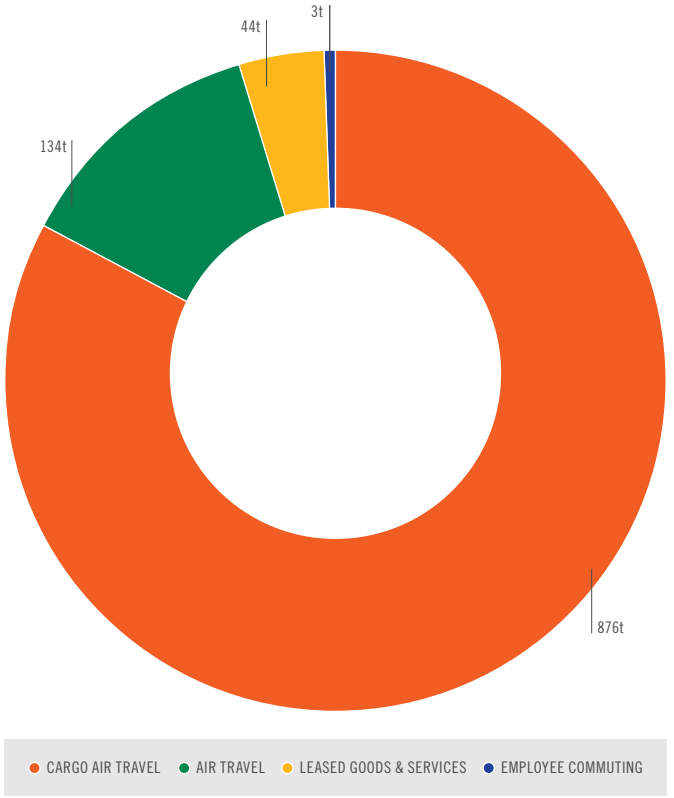


FIGURE 50: SCOPE 3 CARBON EMISSION (TONNES CO_2e) CALCULATED FOR DUBE TRADEPORT (2016a)



The data presented in Figure 50 represents the carbon emissions calculated for all Scope 3 activities. The highest contributor was cargo air travel, which constitutes 83% of the total Scope 3 carbon emissions.

9.2.2 PARTICULATE MATTER

Particulate matter is the collective term given to solid and liquid particles added to the atmosphere by processes at the Earth's surface, and includes smoke, dust, soot, soil particles and pollen. Particulate matter is

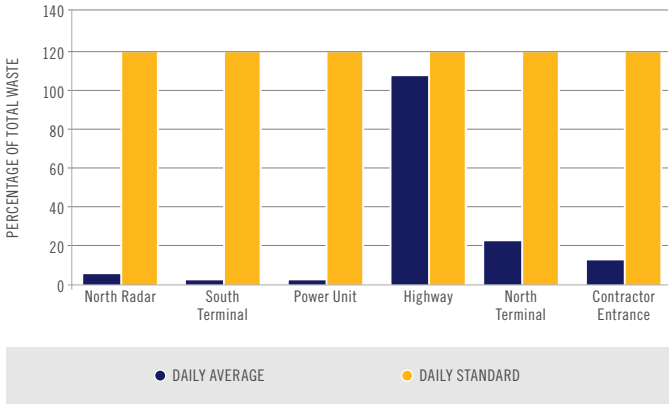
9. AIR QUALITY
(continued)

classified as a criteria pollutant; thus national air quality standards under the auspices of NEM: AQA have been developed in order to protect the public from exposure to the inhalable fractions.

Ambient monitoring was carried out in seven locations within KSIA in accordance with the NIOSH 0600 methodology, ensuring data validity and that an authorised standard was followed, allowing for any further studies to be carried out in a similar manner to allow for comparisons between the data sets.

Figure 51 illustrates the PM_{10} results for each monitored site, with comparisons made to the daily South African Standard of 120µg/m³. All monitored results were below the South African standard. The highest concentration was recorded at the highway monitoring station with 106µg/m³.

FIGURE 51: DAILY TRENDS IN PARTICULATE MATTER (PM_{10}) CONCENTRATION (µg/m³) FOR 2010-2011 MONITORING PERIOD



9.3. IMPACTS

9.3.1 HEALTH EFFECTS

Climate change can impact human health either directly or indirectly. Direct exposure includes excessive heat stress and rainfall, while indirect exposure arises through its impacts on agriculture and by optimising the environment for the prevalence of diseases. The vulnerability of the general public to the impacts of climate change can be defined as the degree to which the public health system is susceptible to the effects of climate change (DEA, 2013).

Climate change impacts on human health are expected to be highest in developing countries due to poor adaptive capacity. Changes in climate lead to changes in the frequency, intensity, duration and timing of extreme weather and climatic events and can result in unprecedented extreme weather conditions.

TABLE 23: IMPACTS OF CLIMATE CHANGE ON HUMAN HEALTH

CLIMATE CHANGE IMPACTS	PATHWAY FOR CLIMATE CHANGE	OUTCOMES
DIRECT IMPACTS		
Increased frequency and intensity of heat stress	Heat stress	Cardiovascular disease Respiratory disease
Increased temperatures and reduced rainfall	Higher ground level of ozone and other air pollutants	Cardiovascular disease Respiratory disease (asthma)
Changes in stratospheric ozone and in precipitation and cloud cover	Increased exposure to solar Ultra Violet Radiation (UVR)	Autoimmune disease
Extreme weather events (fires, floods and storms)	Structural damage	Injuries
INDIRECT IMPACTS		
Drought, Flooding	Impaired agriculture, reduced food yield and nutrition insecurity	Declining health
Extreme weather conditions (fires, floods and storms)	Trauma	Mental health (post-traumatic stress disorder)
Extreme weather conditions (fires, floods and storms)	Impaired livelihood Impoverishment	Mental health (anxiety/depression)

9. AIR QUALITY
(continued)

A rise in temperature can lead to reduced air quality through the increased formation of ground level ozone. Ground level ozone is formed when certain pollutants, such as oxides of nitrogen, carbon monoxide and volatile organic compounds, are exposed and bind to each other in the presence of sunlight. Ground level ozone has been known to damage lung tissue, reduce lung function and cause inflammation of airways.

Malaria has been identified as the disease most likely to be impacted by climate change, as its transmission is sensitive to rainfall and temperature. The proposed risk of malaria is governed by a variety of environmental factors such as seasonal shifts, which affect the transmission and the duration of the high risk season (Turpie *et al.*, 2002).

Table 23 outlines the various direct and indirect impacts on human health as a result of climate change.

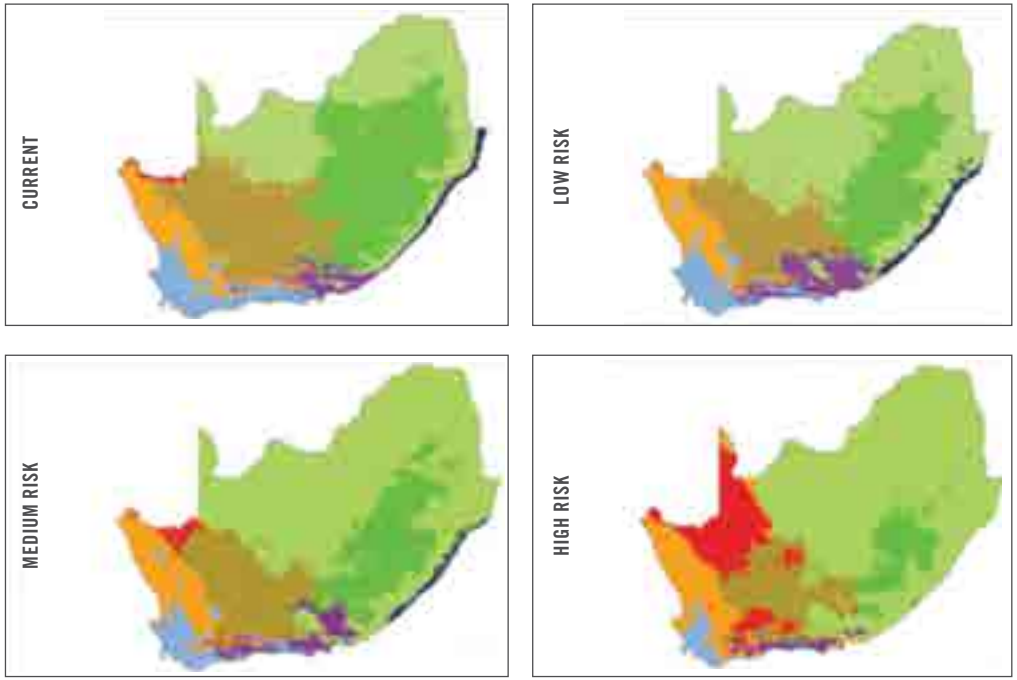
9.3.2 IMPACTS ON BIODIVERSITY

South Africa consists of nine biomes, which are defined as geographical areas comprising a number of ecosystems with related plant and animal groups. Each biome consists of a number of biodiversities specifically adapted to the existing climatic conditions. Excluding climate change, biodiversity and ecosystems are already under pressure from land use changes, related processes causing degradation, and alien invasive species (DEA, 2013). A rise in temperature, changing rainfall patterns and increasing concentrations of CO_2 exacerbates these existing pressures.

Climate change is expected to cause significant changes within the grassland biomes. This could lead to significant habitat loss because of susceptibility to warming effects as well as the increase of tree coverage (which out competes the grass species).

Acid deposition, a by-product of sulphur and nitrogen oxide emissions interacting with atmospheric moisture to fall as acid rain, also threatens the local fauna and flora. Acid rain changes the soil and water pH and nutrient concentrations in polluted areas, threatening sensitive species. Further research also indicates a possible impact on agriculture (Embersen *et al.*, 2001).

FIGURE 52: PROJECTED IMPLICATIONS OF CLIMATE CHANGE ON SOUTH AFRICAN BIODIVERSITY (DEA, 2013)



The savannah biome is projected to expand within its geographical range, replacing the grassland biome. However, this projection also provides an opportunity for the movement of alien invasive species into the grassland biome, which has adverse implications for ecosystem goods and water delivery from high catchments and grazing.

Figure 52 indicates the projected implications of climate change on the South African biodiversity at various risk levels.

9.3.3 ECONOMIC IMPACTS

Climate change not only influences human health and the environment but impacts local and global economies. Changes affecting the economic output of a particular sector, and those causing an increase in expenditure, will negatively impact the overall Gross Domestic Product (GDP) of the country.

A change in climate poses a significant risk through increased crop failure and loss of livestock, and impacts local food security. Most of South Africa and Africa's agriculture is dependent on precipitation. As a result of anticipated seasonal shifts, rainfall patterns and climate variability, the agricultural sector is highly vulnerable to the implications of climate change (Van Jaarsveld and Chown, 2001).

Agriculture is a dominant sector within the rural areas. The effects of climate change on agriculture will directly affect rural communities, through reduced income and employment. The resultant strain will then

9. AIR QUALITY
(continued)

be passed to rural and local governments, which are essentially responsible for providing services and promoting development at a local level.

Appropriate adaptation plans are required for local municipalities to cope with the negative impacts of climate change. As the impacts of climate change are localised, local institutions and governance will be the most important drivers of adaptation and coping mechanisms. Taking active measures to reduce atmospheric pollutants and greenhouse gases affords economic benefits, such as reduced human health risk and improved welfare. For example: the economic cost of an increased malaria risk was estimated at R1.03 billion in 2010, which represents approximately 0.1% of the GDP (Turpie *et al.*, 2002).

9.4. RESPONSES

9.4.1 GREEN INITIATIVES

Dube TradePort Corporation has put in place the following green initiatives in order to counter and offset the carbon footprint emanating from the aerotropolis:

- Plans are in place to introduce green leases for all Dube TradePort tenants, whereby the tenants are required to incorporate a clause in their lease to voluntarily disclose data regarding their energy and carbon footprint;
- The use of Euro 5 emission compliant trucks, which run on a low-sulphur diesel fuel with additives that reduce toxic exhaust emissions;
- The installation of solar panels at the rooftops of Dube AgriZone and new Multi-Storey Parkade within Dube Support Zone. The solar panels generate 220 kilowatts at peak and reduce the carbon emissions by 294 tons per year; and
- Green star rating for the design of the Dube TradePort Corporation office building in Dube City, showing innovative technology for reducing energy requirements, such as light sensors, building orientation to maximize natural light, roof garden for absorption of carbon emissions and air pollution, as well as smart metering.

The following green initiatives are still to be developed by Dube TradePort Corporation, or through collaboration with its strategic partners:

- Feasibility for initiating green flights for airlines;
- Research into the development of biofuels from ethanol for public transport;
- A Memorandum of Understanding with eThekwini Municipality, Tongaat Hulett and Airports Company South Africa to develop a Climate Resilient Plan for the Dube TradePort region;
- Collaboration with eThekwini Municipality Energy Office for developing an Eco-Industrial Park within the Dube TradePort precinct;
- Collaboration with the University of KwaZulu-Natal School of Environmental Engineering on Green Ecological Infrastructure Engineering for Dube TradeZone 2; and
- Collaboration with key stakeholders in research and feasibility studies on alternate fuels and Mass Rapid Transport.

9.4.2 CARBON MANAGEMENT STRATEGY

Tricorona was commissioned to develop a carbon management plan for Dube TradePort. The management plan is based on a 4-step model of how to achieve a carbon neutral airport in South Africa (Figure 53).

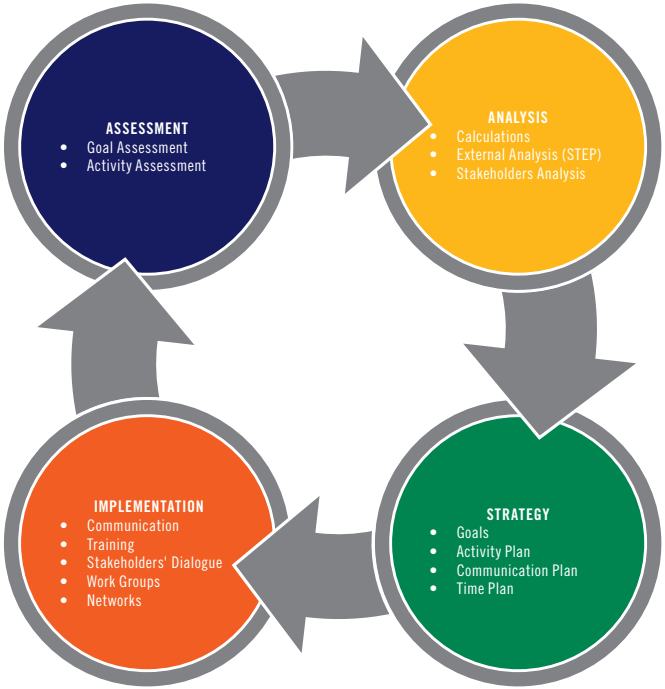
The ultimate goal for the development of the carbon management plan is to ensure that all energy use for all in-house and incoming activities is minimized, most energy sources are renewable, and emissions are kept as low as possible.

9.4.3 DUBE TRADEPORT ENVIRONMENTAL POLICY

The Dube TradePort Corporation Board of Directors has approved an environmental policy and charter for the purpose of managing the environmental issues at Dube TradePort. The policy extends across all divisions. The main objectives of the policy from an air quality perspective are:

- To create a working environment that allows for the efficient use of natural resources such as water and fossil fuel energy;
- To monitor and manage our carbon emissions with a view to becoming carbon neutral; and
- To minimise our emissions to air, water and land.

FIGURE 53: CARBON MANAGEMENT STRATEGY FOR DUBE TRADEPORT



Dube TradePort Corporation intends to mitigate its GHG emissions through the following elements:

- Review and (where feasible) develop renewable energy and energy efficiency projects; and
- Monitor and manage GHG emissions with the ultimate aim of becoming 'carbon neutral', through the implementation of the carbon management strategy.

9. AIR QUALITY
(continued)

IT IS CLEAR FROM THE CHALLENGES ASSOCIATED WITH AIR QUALITY MANAGEMENT THAT IT IS VITAL THAT MONITORING OF ALL EMISSIONS TAKES PLACE.

9.5. CONCLUSIONS

TREND: STABLE

Dube TradePort Corporation is making progress towards reducing its carbon dioxide emissions, through a variety of initiatives to counter and offset the carbon footprint emanating from the aerotropolis. However, it is anticipated that with increasing air and road traffic, air quality will continue to decline, resulting in a stable trend.

The Air Quality chapter is focused on the state of air quality, and provides an overview on the current trends in air quality as well as the drivers and pressures acting upon it. The main aim of this chapter is to identify point sources, priority areas, information gaps and ways in which negative impacts can be remedied. Sources that were identified as being key contributors of criteria pollutants include the transportation sector (vehicles exhaust emissions and aviation) and biomass burning.

The carbon emission footprint was calculated for December 2014-November 2015, which reflected the following results:

- Carbon emission was calculated at 6 464t CO_2e/annum under review;
- The highest contributor of carbon emission within Scope 1 and Scope 2 was from Dube Cargo Terminal, due to high levels of energy usage; and
- The highest contributor of carbon emission within Scope 3 was from cargo air travel, which accounted for 83% of total emissions within Scope 3 activities.

Aviation is responsible for majority of the carbon emissions emanating from Dube TradePort. Emissions should be measured on a yearly basis and compared to previous years, in order to determine trends and compliance. All monitoring and reporting should adhere to the greenhouse gas protocol (GHGP). Continuous monitoring and management should be carried out with the goal of becoming 'carbon neutral'. Offsetting of all emission that cannot be reduced or avoided in the interim should be carried out according to the United Nations Framework.

The high energy demand at Dube TradePort/King Shaka International Airport makes energy efficiency campaigns important, with activities aimed at tenants and partners to ensure emission reductions and energy saving. Renewable energy projects are needed to provide sustainable power generation. These should be informed by the eThekwini renewable energy research and resulting reports. Alternative fuel sources should also be evaluated, such as a switch from petrol and diesel fuel to renewable fuels (bio-fuels) in both vehicles and aviation, wherever feasible from an environmental and financial perspective.

It is clear from the challenges associated with air quality management that it is vital that monitoring of all emissions takes place. The data generated from such monitoring will be critical in terms of informing the development of appropriate management actions, to ensure the improvement of air quality and reductions in Dube TradePort's carbon footprint.

9. AIR QUALITY
(continued)

TABLE 24: SUMMARY OF THE INDICATORS OF AIR QUALITY, AND RECOMMENDATIONS FOR IMPROVEMENT

INDICATORS	TRENDS	DESCRIPTION	RECOMMENDATIONS
Carbon dioxide emissions by source (CO_2e/annum)		The highest contributor of carbon emissions within Scope 1 and Scope 2 analysis is Dube Cargo Terminal, where most of the emissions are due to energy consumption. Dube Support Zone accounts for the second highest contributor of carbon emissions, which is also due to high levels of energy consumption.	DTPC to implement the following green initiatives, or through collaboration with its strategic partners: • Feasibility for initiating green flights for airlines; • Research into the development of biofuels from ethanol for public transport; • A Memorandum of Understanding with eThekwini Municipality and Tongaat Hulett to develop a Climate Resilient Plan for Dube TradePort; • Collaboration with the University of KwaZulu-Natal School of Environmental Engineering on Green Ecological Infrastructure Engineering for TradeZone 2 precinct; and • Collaboration with key stakeholders in research and feasibility studies on alternate fuels and Mass Rapid Transport.
Percentage emissions offset (%)		It is anticipated that an improvement in emissions will be seen as a result of the initiatives DTPC has embarked upon, to counter and offset the carbon footprint emanating from the aerotropolis.	DTPC to implement the following green initiatives or through collaboration with its strategic partners: • Development of a carbon emission footprint in order to offset the carbon footprint of the business; • DTPC tenants and third party developers within the Dube TradePort precinct are encouraged to incorporate green leasing clauses into their lease contracts, in order to disclose data regarding energy and carbon footprint; • The use of Euro 5 emission trucks, which run on a low sulphur diesel fuel and have additives that reduce toxic exhaust emissions; • The installation of solar panels on the rooftops of Dube AgriZone. The solar panels generate 220 kilowatts at peak and reduces carbon emissions by 294 tonnes per year; • Green star rating for the design of DTPC's office building in Dube City, showing innovative technology for reducing energy requirements, such as light sensors, building orientation to maximise natural light and smart metering; and • Continuous air quality monitoring of emissions.

10. WASTE MANAGEMENT

WASTE VOLUMES ARE RECORDED IN ACCORDANCE WITH THE FINANCIAL YEAR OF DUBE TRADEPORT CORPORATION, STARTING IN APRIL AND ENDING IN MARCH OF THE FOLLOWING YEAR.

South Africa is confronted with many challenges, among which is waste management, which is largely driven by exponential population growth and the lack of waste management services, public awareness, landfill space and financial resources. The National Environmental Management: Waste Act (Act 59 of 2008) is the primary legislation that regulates waste management in South Africa. Waste is defined as 'any substance, whether or not that substance can be reduced, reused, recycled and recovered' (RSA, 2014b). The main objectives of the National Environmental Management: Waste Act is to minimise the consumption of natural resources; avoid and minimise the generation of waste and reduce, reuse and recover waste; and to ensure the effective delivery of waste services (DST, 2012).

At Dube TradePort, waste is collected from Dube City, Dube TradeZone, Dube Cargo Terminal, Dube AgriZone and Dube iConnect, and taken to a central waste sorting facility where waste is categorised as recyclable or non-recyclable. Recyclable waste is sorted and further categorised into paper, plastic, metal, glass and compost. Non-recyclable waste consists of inert and hazardous waste.

Waste volumes are recorded in accordance with the financial year of Dube TradePort Corporation, starting in April and ending in March of the following year. As such, this report will document waste volumes generated within a financial year for ease of reference. Furthermore, this chapter will cover waste volumes generated in 2013/14, 2014/15 and 2015/16 across the various operational zones and data available from 2012/13 has been included to identify potential trends.

In the 2013/14 State of the Environment Report (SoER), it was reported that Dube TradePort Corporation produced a total waste volume of 51.80 tonnes of both recyclable and non-recyclable waste across all of the operational zones. This waste volume did not consider the full twelve-month cycle for Dube City, Dube TradeZone, Dube Cargo Terminal and Dube AgriZone, due to absent information at the time of drafting the report. The revised total amount of waste produced for the 2013/14 period amounts to 280.10 tonnes of waste, 33.66% of which was recyclable waste and 66.34% of which was non-recyclable waste.

During the 2014/15 period, a total of 298.62 tonnes of waste was produced, 18.51 tonnes more than the previous year. Approximately 48.29% of this waste was recycled and about 51.71% was sent to landfill. Although Dube TradePort Corporation experienced an increase in the amount of waste generated, the amount of waste entering landfills decreased by about 15% when compared to 2013/14. This means that recyclable waste increased by 15% for the same period.

In terms of the 2015/16 period, Dube TradePort Corporation has produced 152.10[8] tonnes of waste across the operational zones. The total amount of waste, when compared to 2014/15 has decreased by 146.52 tonnes. While the total amount of waste produced has decreased, the percentages of recyclable and non-recyclable waste remained relatively constant at 47.06% and 52.94% respectively.

The waste indicators used as baseline to monitor waste are the same indicators identified in the 2013/14 SoER which are:

- Waste generation by source and type (tpa);
- Percentage waste diverted from landfill, e.g. reduced, reused, recycled (%); and
- Percentage waste disposed (%).

It should be noted that this chapter will only include facilities which fall under the direct operational control of Dube TradePort Corporation. Waste from King Shaka International Airport falls under the operational control of Airports Company South Africa and will not be included in this chapter.

10.1. PRESSURES

The amount of waste generated and the manner in which waste is managed is largely attributed to population growth, followed by the lack of public awareness, waste management services, limited landfill space and financial resources (CCT, 2005).

The exponential growth in population can directly be correlated to the amount of waste generated. Public ignorance and lack of awareness not only hamper efforts to implement waste management initiatives, but also place immense pressure on landfill sites and waste management

[8] Waste volumes for March 2016 for Dube AgriZone not included.

10. WASTE MANAGEMENT
(continued)

services. Waste management can become very expensive and requires a large amount of financial resources to initiate and continue waste management processes.

The subsequent sections consider how each operational zone at Dube TradePort contributes to environmental impacts, by identifying various facilities within these zones and the types of waste that are produced.

10.1.1 DUBE CITY

Dube City, also known as Support Zone 1b, is currently in Phase 1a of development and is striving towards creating an ultra-modern urban 'green' hub (DTPC, 2013c). Even though this zone is currently being developed by the private sector through public-private partnerships, in response to market demand, Dube TradePort Corporation retains ownership and control of common and administrative areas (DTPC, 2013b).

Dube City currently consists of three main facilities: 29° South, the Southern Waste Water Treatment Works (SWWTW), and road infrastructure. The Connect Building and Double Basement parking are two additional facilities within Dube City and are currently under construction. Table 25 provides a detailed description of each existing facility.

Given the size of this zone, and the number of individuals working in this zone, it is expected that most of the waste volumes generated here can be attributed to paper, plastic and general waste. It should be noted that waste from public bins is also considered as waste being generated from this zone. At Dube TradePort, the public and staff alike are encouraged to bring recyclable waste from their homes to be sorted at the central sorting facility.

10.1.2 DUBE TRADEZONE

Dube TradeZone is an advanced export environment and multi-modal logistics platform that provides tenants with premium, fully-serviced real estate. It is ideal for new-generation warehousing, manufacturing, assembling, air-related cargo distribution, high-tech aerospace services, automotive industries, clothing, textiles and cold storage activities (DTPC, 2016b).

TABLE 25: DESCRIPTION OF EACH FACILITY WITHIN DUBE CITY (DTPC, 2013C)

FACILITY	DESCRIPTION
29° South	Dube TradePort Corporation's head office that offers premium retail and hospitality facilities, conference, restaurant, entertainment facilities as well as additional space for other tenants.
Southern Waste Water Treatment Works	A wastewater treatment facility constructed by ACSA as part of bulk infrastructure for the treatment of effluent from the southern portion of the Dube TradePort site. This is therefore managed and operated by ACSA.
Roads and Infrastructure	Tarred roads and parking areas have been developed to service the future Dube City. Future developments include pedestrian friendly zones, Multi-Storey Parkade, Block F Retail and Office Building, bus stops and cycle lanes.

Dube TradeZone forms part of the Dube TradePort Special Economic Zone and consists of five main facilities. Table 26 provides an overview of each facility.

The expected waste types from these facilities include paper and plastic, followed by wood from unserviceable pallets and unused packing cases; cardboard; discarded ropes; steel; glass (i.e. light bulbs); packaging materials (i.e. tin, glass, plastic); and contaminated cleaning rags and absorbent materials, e.g. from hydrocarbon and acid spill cleaning.

TABLE 26: DESCRIPTION OF EACH FACILITY WITHIN DUBE TRADEZONE (DTPC, 2013D)

FACILITY	DESCRIPTION
Dube TradeHouse	A series of warehousing units for a variety of light manufacturing and logistics applications. The warehouses are services by a fleet of gas-powered forklifts.
Fuel Storage Facilities	Lockable storage areas have been constructed for the storage of liquefied petroleum gas.
Roads and Infrastructure	Large outside loading areas, tarred road access between Dube Cargo Terminal and Dube TradeHouse.
Fuel Storage Facility	Above ground storage tanks for the storage of diesel for back-up generators.
Canteen	A full-sized canteen is located within close proximity to Dube TradeHouse and Dube Cargo Terminal.

10. WASTE MANAGEMENT
(continued)

10.1.3 DUBE CARGO TERMINAL

Dube Cargo Terminal is a specific area dedicated to the storage of hazardous cargo. The hazardous materials storage area is designed according to the South African National Standards, with the necessary containment measures and spill kits in the event of a spill of hazardous materials during transit (DTPC, 2013a). A waste sorting area is located outside the Dube Cargo Terminal building.

This Zone consists of three facilities: Dube Cargo Terminal, the Guardhouse and the AiRoad holding area. Table 27 provides a brief description of these facilities.

The expected waste types from Dube Cargo Terminal include general and hazardous waste, wood from unserviceable pallets and unused packing cases; cardboard and plastic.

10.1.4 DUBE AGRIZONE

Dube AgriZone produces vegetables and flowers and therefore the majority of waste generated in this zone is organic (compostable) waste. Activities in Dube AgriZone that are generating waste include: fertilisation of plants; application of herbicides, pesticides and fungicides; disposal of old and damaged plants; offcuts from the packhouse; general waste from the office building and other administration facilities on site; hazardous waste, such as fluorescent light bulbs and batteries, from office buildings and the canteen facility; the canteen facility, which will produce wet and dry waste; and compost from the mushroom facility, greenhouses and tissue culture facility.

The facilities found in this Zone, and the description of associated activities, is provided in Table 28.

It should be noted that Dube AgriZone also produces liquid effluent from its operational and domestic activities, and has been considered under the Water Management Chapter. This chapter, however, will only cover the generation of solid waste at the various operational zones.

DUBE AGRIZONE GREENHOUSE TOMATO HARVEST

TABLE 27: DESCRIPTION OF EACH FACILITY WITHIN DUBE CARGO TERMINAL (DTPC, 2013D)

FACILITY	DESCRIPTION
Dube Cargo Terminal	Dube Cargo Terminal consists of domestic and international sections, with airline carriers having their own areas. Included in Dube Cargo Terminal is a transit shed and a warehouse where containers can be collected by the air freight handling companies and despatched to their final destinations. A high security storage area for the transit of dangerous goods and a valuable cargo facility has also been incorporated into Dube Cargo Terminal. A perishable centre is also found within Dube Cargo Terminal, offering specialised cold storage, handling capacity, inspection and technical support.
Guardhouse	A guardhouse for inbound and outbound traffic is located at the entrance of Cargo Terminal Building
Dube AiRoad	Large outside loading areas, tarred road access between Dube Cargo Terminal and Dube TradeHouse

10. WASTE MANAGEMENT
(continued)

TABLE 28: DESCRIPTION OF EACH FACILITY WITHIN DUBE AGRIZONE

FACILITY	DESCRIPTION
Dube AgriLab	A highly specialised tissue culture laboratory, hardening facility and dispatch area including a technical area under construction.
Greenhouses	Intensive hydroponic growing system. Attributes of this facility include highly sophisticated Priva climate control, a water recirculation system for irrigation, heating and carbon dioxide systems, a fogging system for humidity control and the provision of both screens and natural vents at the top of the structures.
Packing and Distribution Centre	The centre is operated by a private sector company and is equipped with a cold storage unit and photovoltaic panels.
Packhouse (x 3)	Three dedicated packhouses, one for each existing greenhouse. The biggest packhouses are equipped with photovoltaic solar panels so as to reduce reliance on energy from the national grid.
Nursery	The nursery consists of a misting tunnel, potting shed and a staging area. The nursery is used to stock a variety of indigenous plant species aimed for inclusion in Dube TradePort Corporation's precinct-wide rehabilitation and restoration programme, in compliance with the Environmental Impact Assessment regulations.
Water Testing Laboratory	The water testing laboratory consists of a small office and the water quality testing area.
Waste Storage Facility	This facility stores waste until the contractor sorts waste into its various waste streams.

10. WASTE MANAGEMENT
(continued)

10.1.5 DUBE ICONNECT

Dube iConnect is a world-class telecommunications, voice and broadband network which services all of Dube TradePort Corporation's operational zones. Dube iConnect consists of two data centre facilities. Table 29 provides an overview of the data centres. Expected waste types to be generated from Dube iConnect are computer parts, cables, plastic, paper and cardboard i.e. electronic waste. Recyclable waste is expected; however, due to the small-scale nature of the facility, waste will most likely be added to the waste streams of the closest operating zone.

TABLE 29: DESCRIPTION OF EACH FACILITY WITHIN DUBE ICONNECT (DTPC, 2016C)

FACILITY	DESCRIPTION
Data centre (x 2)	There are two data centres which house information technology equipment and software. The data centres contain infrastructure that offers advanced virtualisation platforms as well as co-location (off site data storage)

10.2 STATE

At Dube TradePort Corporation, waste from Dube City, Dube TradeZone, Dube Cargo Terminal and Dube AgriZone is managed by an externally appointed waste management contractor, who collects the waste from Dube TradePort tenants and delivers the waste to a central waste sorting facility (i.e. a satellite storage facility) at each site on a weekly basis (DTPC, 2013e). It is at this central facility that the contractor categorises the waste into its various waste streams, such as recyclable and non-recyclable waste. The recyclable waste (such as glass, metal, plastic and paper) is recycled by an approved contractor, while non-recyclable waste (such as general domestic and hazardous waste) is delivered to licensed landfill sites. Hazardous waste that is safely contained within the relevant zone is removed on a needs basis and safely disposed of at a hazardous waste facility.

For the 2013/14 period, it was reported that Dube TradePort Corporation generated a total of 51.8 tonnes of waste across Dube City, Dube Trade Zone, Dube Cargo Terminal and Dube AgriZone. At the time of drafting this report, the monthly waste volumes for each zone were not available and were therefore not included as part of the total waste volume produced at Dube TradePort Corporation. The revised amount of waste that was produced for this period amounts to 280.10 tonnes, 33.66% of which constitutes recyclable waste and 66.34% non-recyclable waste.

During the 2014/15 period, a total of 298.62 tonnes of waste was generated, 18.51 tonnes more than 2013/14. Approximately 48.29% of this waste volume is attributed to recyclable waste, whereas the remainder (51.71%) is attributed to non-recyclable waste. When comparing 2013/14 to 2014/15, the amount of waste recycled has increased by about 15%. This means that waste entering landfills has also decreased by 15%.

In terms of the current 2015/16 period, Dube TradePort Corporation has produced 152.10 tonnes of waste, 47.06% of which is recyclable waste and 52.94% of which is non-recyclable waste. In comparison to the 2014/15 period, the total amount of waste generated has decreased by 146.52 tonnes. While the total amount of waste produced has decreased for this period, recyclable waste and non-recyclable waste has decreased and increased by about 1% respectively.

The general trend in total waste volumes generated across the four year period, and across the operational zones, is indicating a positive decrease. Dube City and Dube TradeZone indicate a steady increase in the amount of waste being recyclable and a decrease in the amount of waste being sent to landfill. This positive increase in the amount of recyclable waste can be attributed to the effective waste management campaigns being initiated by Dube TradePort Corporation. Dube Cargo Terminal and Dube AgriZone indicate a sharp increase, followed by a subtle decrease, in the amount of waste being recycled. These areas require further focus in terms of the waste management strategy.

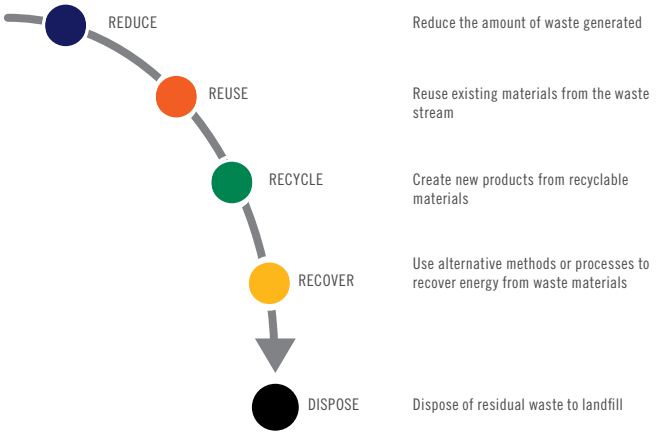
The subsequent sections provide insight into the current state of waste management at Dube TradePort Corporation in terms of the indicators identified: waste generation by source and type, percentage of recycled waste and percentage of non-recycled waste.

10.2.1 WASTE MINIMISATION

Waste minimisation is a national objective and is the process of reducing the amount of waste generated (eThekwini Municipality, 2004). When solid waste management services are planned for and implemented, the waste management hierarchy should always be considered. Figure 54 provides an illustration for the waste management hierarchy.

Waste management and minimisation is a shared responsibility of government, the business sector and all stakeholders (RSA, 2014a). Dube TradePort Corporation recognises that it has wide and varied impacts on the environment, and has committed to the management and minimisation of such impacts to ensure that development meets the needs and expectations of all stakeholders (DTPC, 2015d).

FIGURE 54: WASTE MANAGEMENT HIERARCHY (UNEP, 2005)



10. WASTE MANAGEMENT
(continued)

The extent of Dube TradePort Corporation's commitment to environmental issues is demonstrated through the development of a long term Environmental and Sustainability Strategy, which looks at integrated waste management and makes use of a cradle-to-cradle approach across the spectrum of Dube TradePort developments (DTPC, 2013d; DTPC, 2014c). The objectives of the strategy in terms of waste include (DTPC, 2013d):

- Managing various general solid waste streams to ensure efficient handling, separation and disposal for the prevention of pollution and the promotion of recycling and waste reduction;
- Minimising discharges into the environment and meeting minimum standards as set out in national environmental legislation; and
- Applying the waste hierarchy to all waste streams.

Waste generated from Dube City, Dube TradeZone, Dube Cargo Terminal, Dube AgriZone and Dube iConnect is managed by an external private contractor. Waste is collected from the tenants and delivered to an onsite central waste sorting facility (satellite storage and sorting facility at each site). The frequency of waste collected is determined by the amount of waste generated in a specific period of time. This waste management method been deemed successful and will continue to be used in the foreseeable future.

In the 2013/14 SoER, Dube TradePort Corporation had introduced nine environmental initiatives with the aim of reducing the amount of waste being generated. Table 30 provides a list of these initiatives and their status in terms of where they are in the project cycle, i.e. feasibility, planning, design, implementation or rehabilitation phase.

TABLE 30: STATUS OF ENVIRONMENTAL INITIATIVES AT DUBE TRADEPORT CORPORATION

ENVIRONMENTAL INITIATIVE	DESCRIPTION AND STATUS
Dube AiRoad's Euro 5 Emissions Truck	Dube AiRoad provides seamless air-to-road and road-to-air logistics for making critical deliveries. The Euro 5 emission compliant trucks offer customers the opportunity to 'green' their supply chain. **Status:** *Planning Stage*
Dube City: A Green Precinct	Dube City has been conceived as a green business district from the outset, with the vision of creating a walkable precinct amendable to public transport and active public spaces. The precinct will consist of hotels, businesses, retail, trade and entertainment. **Status:** *Implementation Stage*
Dube AgriZone's Green Initiative	The initiative looks at developing recycling systems that are capable of converting waste into energy, and working with surrounding stakeholders to create a sustainable waste management system (DTPC, 2016d). **Status:** *Implementation Stage*
Dube Cargo Terminal Paperless Trade	The purpose of the initiative is to reduce the amount of paper use and recorded all items digitally. **Status:** *Feasibility Stage*
Dube City: Green Star Rating at 29° South	In order for 29° South (Dube TradePort Corporation's Head Office) to obtain a Green Star rating, Dube TradePort needs to exhibit innovative technology for reducing energy, waste and water consumption. **Status:** *Design Stage*
Dube Rehabilitation and Restoration	This project comprises of alien clearing, the re-creation of grassland and wetland habitats through the active planting of locally endemic indigenous plants, species rescue and active management **Status:** *Implementation Stage*

10. WASTE MANAGEMENT
(continued)

IN THE 2013/14 SOER, DUBE TRADEPORT CORPORATION HAD INTRODUCED NINE ENVIRONMENTAL INITIATIVES WITH THE AIM OF REDUCING THE AMOUNT OF WASTE BEING GENERATED. TABLE 30 PROVIDES A LIST OF THESE INITIATIVES AND THEIR STATUS IN TERMS OF WHERE THEY ARE IN THE PROJECT CYCLE, I.E. FEASIBILITY, PLANNING, DESIGN, IMPLEMENTATION OR REHABILITATION PHASE.

TABLE 30: STATUS OF ENVIRONMENTAL INITIATIVES AT DUBE TRADEPORT CORPORATION (CONTINUED)

ENVIRONMENTAL INITIATIVE	DESCRIPTION AND STATUS
Dube Corporate Social Investment (CSI) Projects	Dube TradePort Corporation's CSI initiatives focus on meeting socio-economic objectives such as conservation, environmental awareness, waste management, infrastructure development, urban renewal, education and skills development to name a few. CSI Programmes include: • Food for recyclables programme; • Employee involvement initiatives; • School uniforms and provision of text books programmes; • Solar power installations; • Bursary and internship programmes; • Provision of science laboratory kits; and • Provision of rain water harvesting facilities. **Status:** *Implementation Stage*
Dube Unit Load Device Design	Piloted at Dube AgriZone and proving to be successful with massive savings for anchor tenants. **Status:** *Feasibility Stage*
Dube AgriZone Reverse Osmosis Plant	The plant has recently been commissioned and treats waste water from the Waste Water Treatment Works. **Status:** *Implementation Stage*
Dube Environmental Waste Management Campaign	This initiative is currently in process and is being monitored monthly by Dube TradePort Corporation's internal environmental compliance team. **Status:** *Implementation Stage*

10. WASTE MANAGEMENT
(continued)

10.2.2 DUBE CITY

Since 2013/14, Dube City has produced a total waste volume of 27.75 tonnes. The distribution of this waste volume is represented by Figure 55.

In 2013/14, the total waste volume produced amounted to 8.33 tonnes and decreased by 2.28 tonnes compared to the previous year (i.e. 10.60 tonnes in 2012/13). Of this waste volume, 58.44% of waste was recycled and 41.46% sent to landfill. During the 2014/15 period, waste volumes increased to 9.11 tonnes. Although waste volumes increased, recyclable waste continued to increase to 63.74% and non-recyclable waste continued to decrease to 36.26%. However, in 2015/16, recyclable waste decreased slightly to 60.37% while non-recyclable waste increased to 29.63%. About 10.33 tonnes of waste was generated during this period.

10.2.3 DUBE TRADEZONE

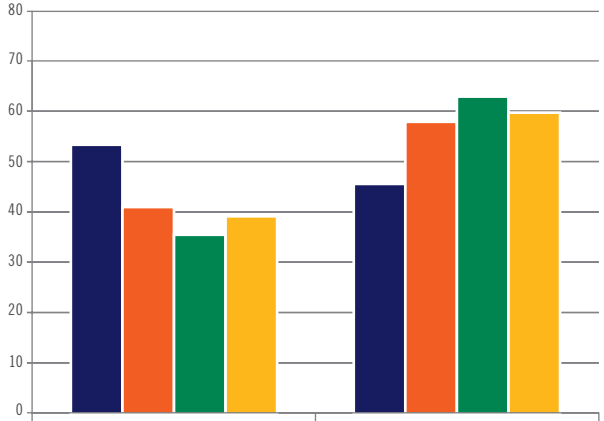
Figure 56 illustrates the distribution of non-recyclable and recyclable waste for Dube TradeZone. Dube TradeZone has generated approximately 40.7 tonnes of waste since 2013/14. In 2013/14, 15.23 tonnes of waste was produced. 59.31% was diverted from landfills and remainder of 40.69% entered landfills. Waste volumes had increased by 3.59 tonnes compared to 2012/13. Total waste volumes for 2014/15 decreased to 12.73 tonnes. Recyclable waste increased positively to 67.57% whereas non-recyclable waste decreased to 32.43%. By 2015/16, waste volumes have further increased to 12.81 tonnes. 68.48% of waste was recycled and 31.52% sent to landfill. Based on these figures, Dube TradeZone illustrates a positive reflective trend in its recyclable versus non-recyclable waste.

10.2.4 DUBE CARGO TERMINAL

Dube Cargo Terminal has produced approximately 152.66[9] tonnes of both non-recyclable and recyclable waste since 2013/14. Figure 57 illustrates the percentage distribution across the period. No waste volumes were recorded for the 2012/13 period.

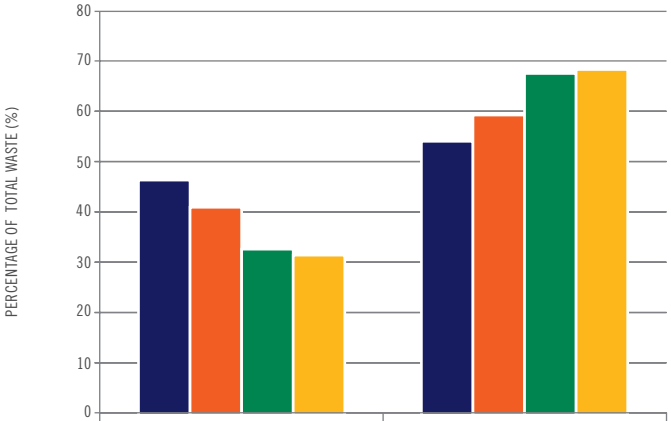
In 2013/14, Dube Cargo Terminal produced 39.99 tonnes of waste. 74.90% was not recyclable and 25.10% was recyclable. For the 2014/15 period, the total waste produced increased to 55.94 tonnes. During this period, more waste was recycled (46.93%) and less waste sent to landfill (53.07%). Waste volumes had increased to 56.73 tonnes in 2015/16, with 52.94% of waste not being recycled and 47.06% of waste being recycled.

FIGURE 55: NON-RECYCLABLE AND RECYCLABLE WASTE FOR DUBE CITY



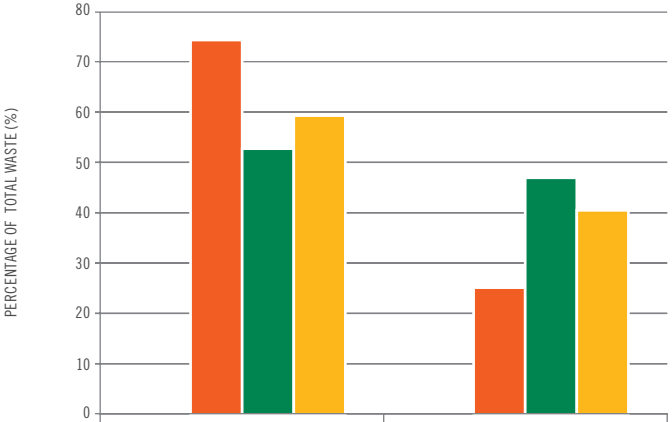
	TOTAL NON-RECYCLABLE WASTE	TOTAL RECYCLABLE WASTE
2012/2013	53.73%	46.27%
2013/2014	41.56%	58.44%
2014/2015	36.26%	63.74%
2015/2016	39.63%	60.37%

FIGURE 56: NON-RECYCLABLE AND RECYCLABLE WASTE FOR DUBE TRADEZONE



	TOTAL NON-RECYCLABLE WASTE	TOTAL RECYCLABLE WASTE
2012/2013	46.24%	53.76%
2013/2014	40.69%	59.31%
2014/2015	32.43%	67.57%
2015/2016	31.52%	68.48%

FIGURE 57: NON-RECYCLABLE AND RECYCLABLE WASTE FOR DUBE CARGO TERMINAL



	TOTAL LANDFILL WASTE	TOTAL RECYCLABLE WASTE
2012/2013	-	-
2013/2014	74.90%	25.10%
2014/2015	53.07%	46.93%
2015/2016	59.51%	40.49%

[9] This amount excludes February and March 2016.

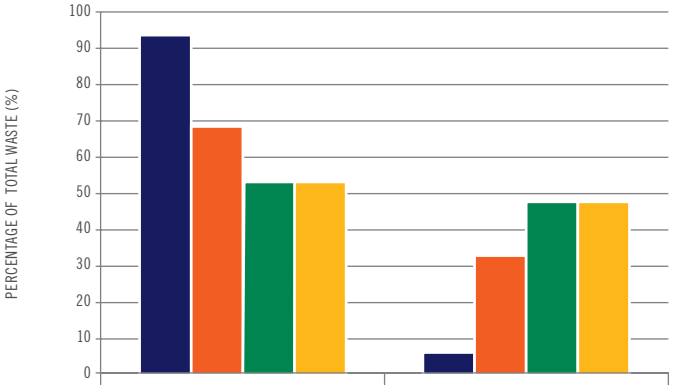
10. WASTE MANAGEMENT
(continued)

10.2.5 DUBE AGRIZONE

Represented by Figure 58, the percentage waste volume distribution of non-recyclable and recyclable waste is illustrated. Dube AgriZone has generated 509.62 tonnes of waste since 2013/14.

In 2012/2013, Dube AgriZone produced about 82.00 tonnes of waste. 93.64% of this waste was sent to landfill and only 6.36% was recycled. The total waste volumes had more than doubled in 2013/14 (216.53 tonnes). Although the total waste volume had increased, Dube AgriZone had largely decreased its amount of non-recyclable waste from entering landfills to 67.52% and had improved recycling waste to 32.48%. Dube AgriZone maintained this positive trend in 2014/15 by further decreasing the amount of non-recyclable waste to 53.12% and further improving recyclable waste to 46.88%. Waste volumes for 2014/15 increased slightly by about 4.30 tonnes amounting to 220.83 tonnes of waste. By 2015/16, the total waste generated drastically dropped to 72.26[10] tonnes.

FIGURE 58: NON-RECYCLABLE AND RECYCLABLE WASTE FOR DUBE AGRIZONE



	TOTAL NON-RECYCLABLE WASTE	TOTAL RECYCLABLE WASTE
2012/2013	93.64%	6.36%
2013/2014	67.52%	32.48%
2014/2015	53.12%	46.88%
2015/2016	53.43%	46.57%

[10] This amount excludes February and March 2016.

10.2.6 DUBE ICONNECT

It is assumed that the small amount of recyclable and non-recyclable waste (excluding electronic waste) collected from Dube iConnect is added to the Dube Cargo Terminal waste streams due to its close proximity.

10.3. WASTE CHARACTERISATION

Schedule 3 of the National Environmental Management: Waste Amendment Act (Act No. 26 of 2014) provides two categories of waste types: general waste and hazardous waste (RSA, 2014b):

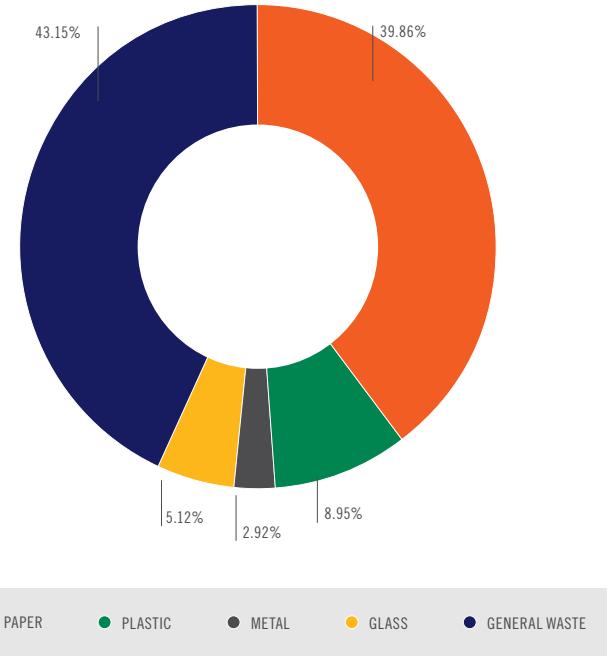
GENERAL WASTE	Waste that does not pose an immediate hazard or threat to human health or the environment and includes domestic, building and demolition, business, inert and any other waste classified as non-hazardous.
HAZARDOUS WASTE	Waste that contains organic or inorganic elements or compounds made up of physical, chemical or toxicological characteristics which may have a detrimental impact on human health or the environment.

Waste is further sub-divided into recyclable and non-recyclable waste. Recyclable waste has been categorised into:

- Paper – cardboard, newspaper, brown paper, Heavy Letter One (HL1), tetrapak and Common Mixed Waste (CMW);
- Plastic – polyprop, clear and colour plastic, shrink-wrap, High Density (HD) bottles, polystyrene and polyethylene terephthalate (PET);
- Metal – cooldrink cans;
- Glass; and
- Compost such as vegetable waste.

The quantities of these various types of waste, and qualification of the quantities being recycled, are presented in the subsections that follow.

FIGURE 59: DISTRIBUTION OF WASTE TYPES WITHIN DUBE CITY FROM 2012/13 TO 2015/16



10.3.1 DUBE CITY

In terms of the distribution of recyclable and non-recyclable waste in Dube City, Figure 59 illustrates that, since 2012/13, most of the waste volumes generated are attributed to general waste (43.15%), followed by paper (39.86%), plastic (8.95%), glass (5.12%) and metal (2.92%).

The recyclable waste at Dube City is further broken down into percentage waste types, which are represented in Figure 60. It is clearly seen that HL1 is generated the most, followed by cardboard, newspaper, glass, CMW, PET, cans, tetrapak, coloured and clear plastic, shrink wrap, HD bottles, brown paper, polystyrene and polyprop.

10. WASTE MANAGEMENT
(continued)

FIGURE 60: DETAILED BREAKDOWN OF RECYCLABLE WASTE TYPES GENERATED AT DUBE CITY FROM 2012/13 TO 2015/16

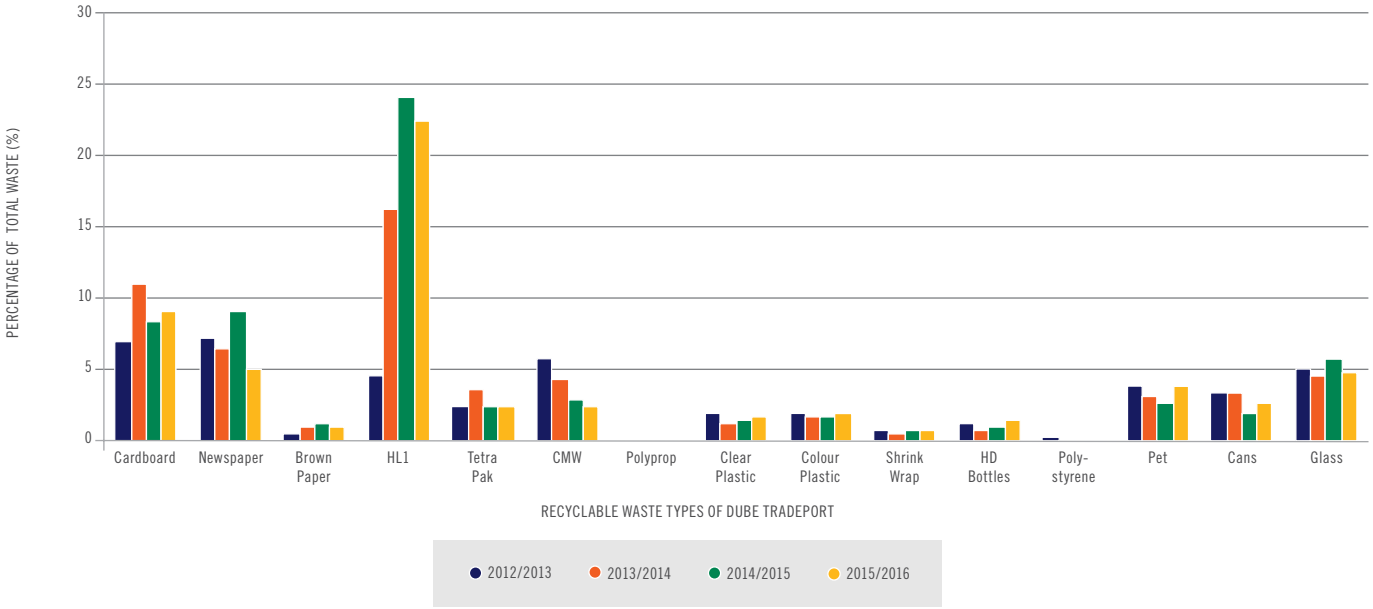
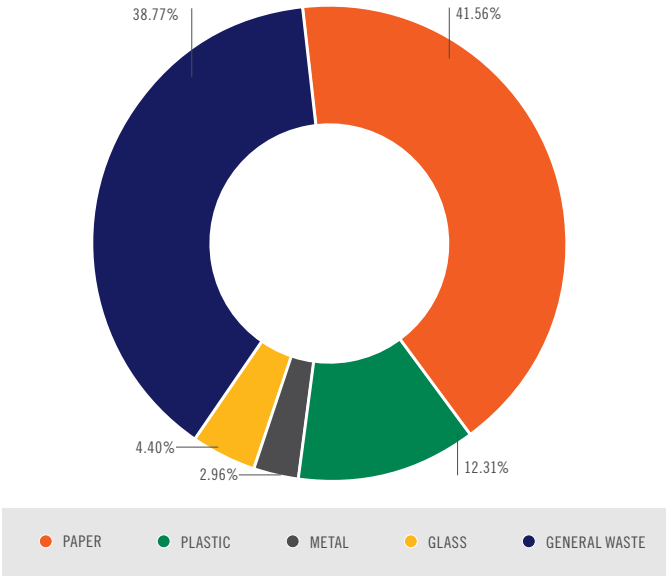


FIGURE 61: DISTRIBUTION OF WASTE TYPES WITHIN DUBE TRADEZONE FROM 2012/13 TO 2015/16



HL1 consists of unprinted sheets of paper, shavings originating from printers or office records, and increased exponentially from 4.64% in 2012/13 to 24.16% in 2014/15, after which it experienced a slight decline in 2015/16 (22.43%). Cardboard and newspaper volumes fluctuate sporadically from 5% to about 10% across the period. CMW appears to be declining from a maximum of 5.97% in 2012/14 to a minimum of 2.45% in 2015/16. Glass remains stable averaging just less than 5%. Tetra Pak, PET and cans fluctuate around 4% of the total waste volume, while clear plastic and colour plastic remain stable under 2%. Brown paper, shrink wrap and HD bottles remain stable at an average below 1%. No polyprop and polystyrene volumes were recorded for this zone since 2012/13.

10.3.2 DUBE TRADEZONE

Since 2012/13, the distribution of recyclable and non-recyclable waste within Dube TradeZone (in order of magnitude) includes paper (41.56%), general waste (38.77%), plastic (12.31%), glass (4.40%) and metal (2.96%). This is represented by Figure 61.

In terms of specific volumes, Figure 62 provides a breakdown of the percentage of waste types produced at Dube TradeZone. Cardboard is used the most in Dube TradeZone and increased from 17.00% in 2012/13 to 32.54% in 2014/15, while in 2015/16, it experienced a slight decline to 30.69%. HL1 remains stable, averaging above 6% since 2012/13. Glass increased constantly from 2012/13 (3.47%) to 2014/15 (5.57%), while decreasing slightly in 2015/16 (4.72%). PET, cans, shrink wrap and CMW are fluctuating under a maximum of 3%, while HD bottles, colour and clear plastic, tetrapak and newspaper are constantly averaging below 3%. Polyprop was only generated in 2013/14 at 0.14%. No brown paper and polystyrene was generated across the period for Dube TradeZone.

10.3.3 DUBE CARGO TERMINAL

Figure 63 provides a graphic illustration of the non-recyclable and recyclable waste distribution, by type, for Dube Cargo Terminal since 2013/14 to 2015/16. No waste volume reports were generated for 2012/13. Figure 63 indicates that 61.15% of the total waste volumes at Dube Cargo Terminal are attributed to general waste, 23.96% paper, 12.66% plastic, 1.66% glass, 0.54% metal and 0.03% hazardous waste.

10. WASTE MANAGEMENT
(continued)

FIGURE 62: DETAILED BREAKDOWN OF RECYCLABLE WASTE TYPES GENERATED AT DUBE TRADEZONE FROM 2012/13 TO 2015/16

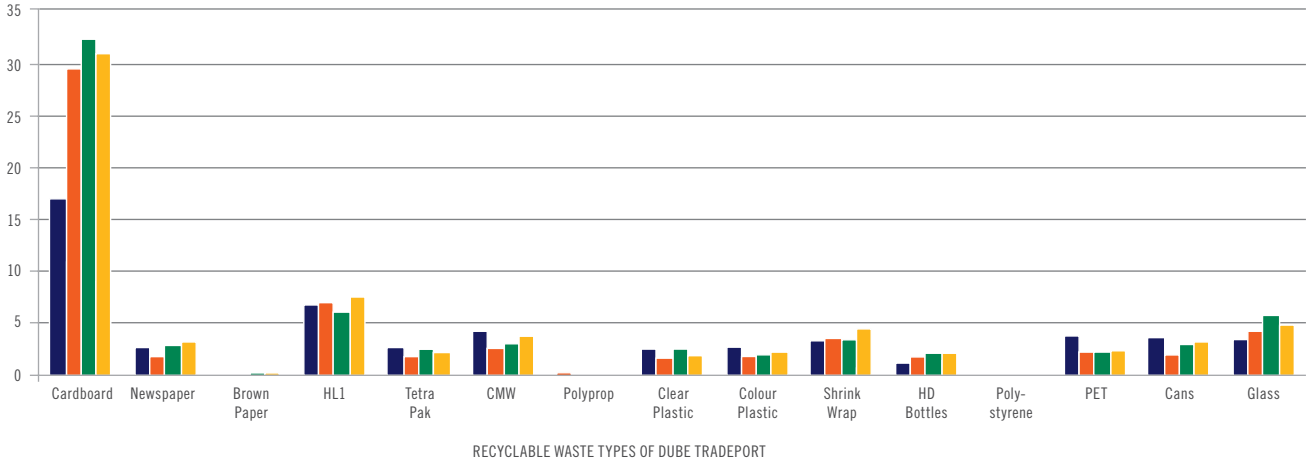


FIGURE 63: DISTRIBUTION OF WASTE TYPES WITHIN DUBE CARGO TERMINAL FROM 2012/13 TO 2015/16

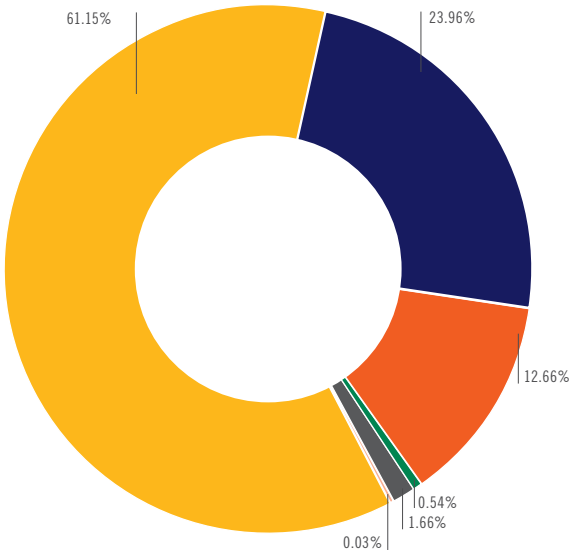
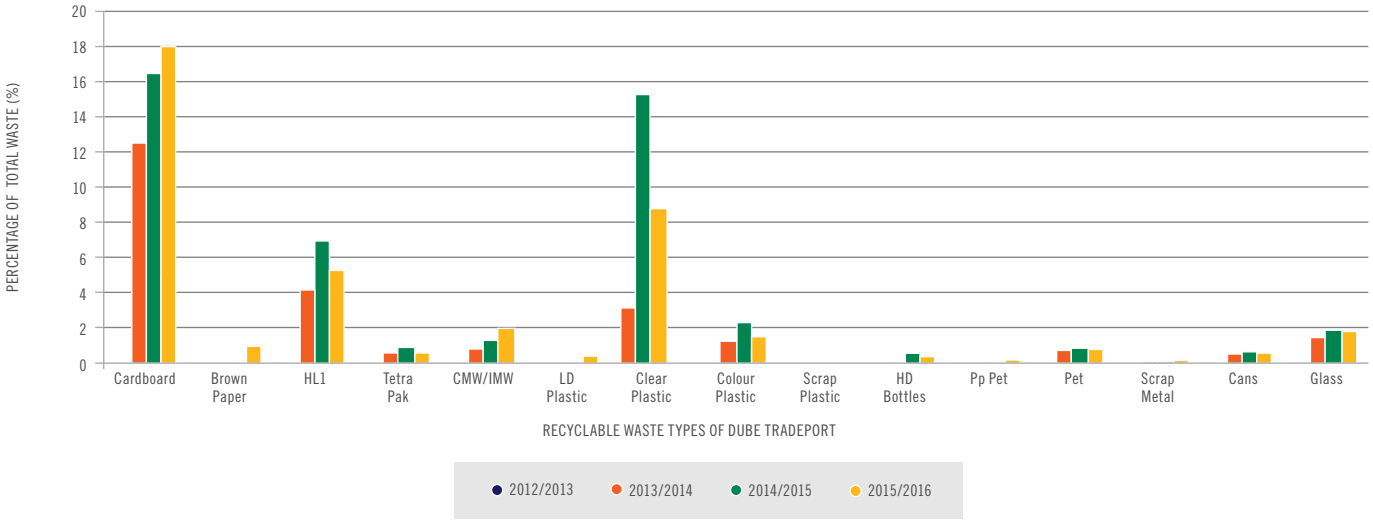


FIGURE 64: DETAILED BREAKDOWN OF RECYCLABLE WASTE GENERATED AT DUBE CARGO TERMINAL FROM 2012/13 TO 2015/16



A percentage breakdown of each recyclable waste type is provided for in Figure 64. It is clear that cardboard and clear plastic form the majority of waste at Dube Cargo Terminal. Cardboard has constantly increased from 12.59% in 2013/14 to 17.96% in 2015/16. Clear plastic fluctuated over this period, increasing from 3.24% (2013/14) to 15.30% (2014/15) and then decreasing to 8.79% (2015/16). HL1 fluctuates across the period and averages above 5%. Colour plastic, glass, CMW/IMW, brown paper, and tetrapak average above 1%, followed by PET, cans, HD bottles, LD Plastic, PP PET and scrap metal which average below 1% of total waste volume. No waste volumes were recorded for scrap plastic.

10. WASTE MANAGEMENT
(continued)

10.3.4 DUBE AGRIZONE

The waste type distribution for Dube AgriZone since 2012/13 is illustrated by Figure 65. Surprisingly, 46.96% of waste is characterised as general waste. This is followed by paper, which generates 31.43% of waste, hazardous waste (17.08%), plastic (4.24%), metal (0.19%) and glass (0.09%). No volumes were recorded for compost across this period.

A detailed breakdown of each recyclable waste type since 2012/13 is illustrated in Figure 66. Cardboard generates the majority of waste for Dube AgriZone and has drastically increased from 3.49% in 2012/13 to 41.57% in 2015/16. Cardboard is followed by CMW/IMW, which leaped from 0.98% in 2012/13 to 10.22% in 2013/2014, and polyprop and LD plastic, which averaged below 2%. Newspaper, tetrapak, shrink wrap, HD bottles, PVC, foam, strapping, PET, glass, scrap metal and cans remain constant under 1%.

10.4 IMPACTS

Waste minimisation is a national objective and involves reducing the amount of waste generated as well as the amount of waste entering

FIGURE 65: DISTRIBUTION OF WASTE TYPES WITHIN DUBE AGRIZONE FOR 2012-2016

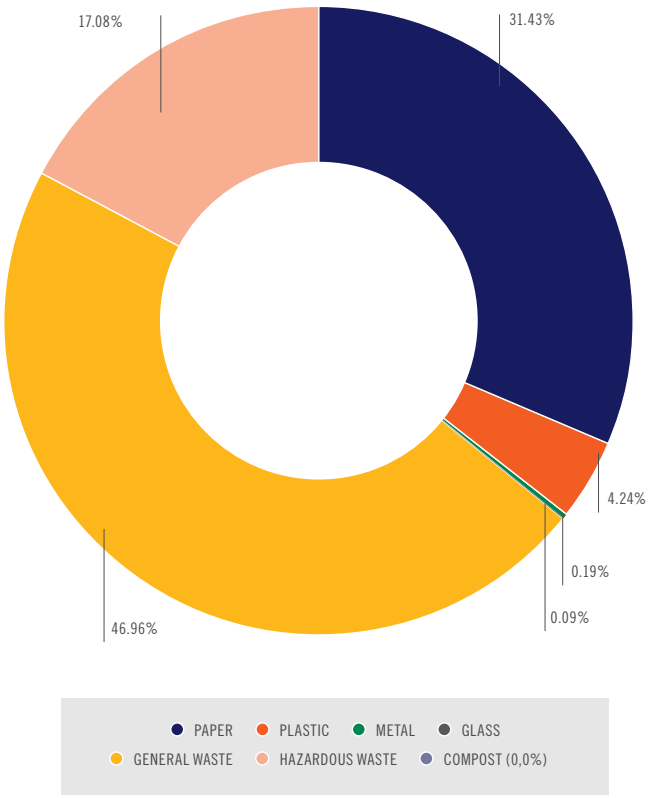
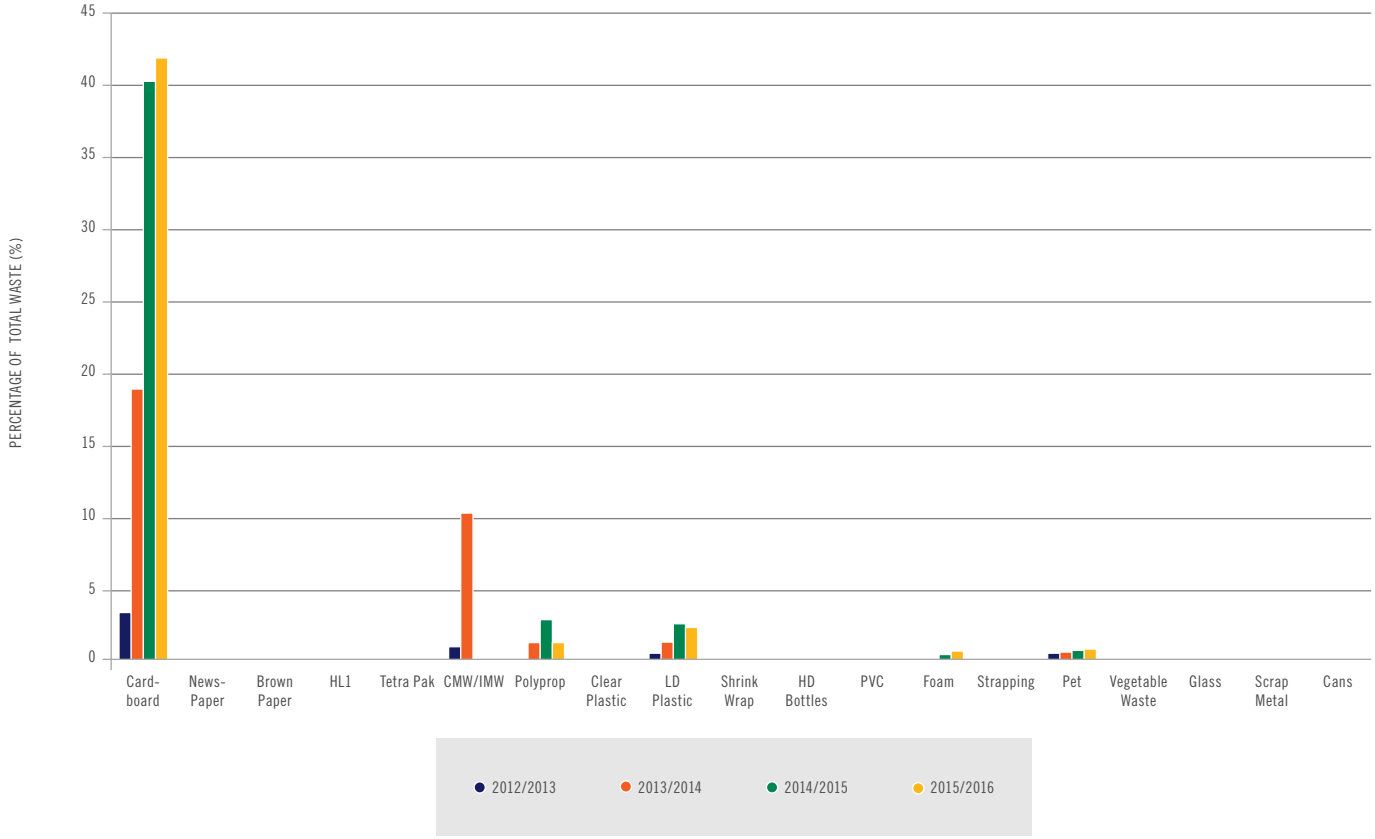


FIGURE 66: DETAILED BREAKDOWN OF THE TYPES OF RECYCLE WASTE GENERATED AT DUBE AGRIZONE



10. WASTE MANAGEMENT
(continued)

THE CURRENT MANNER IN WHICH SOUTH AFRICA MANAGES ITS WASTE IS UNSUSTAINABLE.

landfills (eThekweni Municipality, 2004). When waste is not properly managed, more often than not it results in illegal dumping. The dumping of waste attracts various vectors of disease, which may spread to the human population as well as the environment.

The current manner in which South Africa manages its waste is unsustainable. Not only does waste have financial implications, it also results in social or health impacts and, importantly, environmental impacts.

These impacts fail to consider the needs of future generations as stated in the Constitution, National Environmental Management Act, and other environmental laws, and therefore need to be addressed.

Dube TradePort Corporation is aware that their operations and activities contribute to environmental impacts, and therefore has an Environmental and Sustainability Strategy in place which aims to alleviate and address some of these impacts.

This section highlights some of the environmental, social, health, as well as financial implications of waste production at Dube TradePort Corporation.

10.4.1 ENVIRONMENT

Dube TradePort Corporation is located within an area rich in fauna (animals) and flora (plant) biodiversity species. Considering that the various operational zones are involved with importing and exporting fruit, vegetables and flowers (to name a few), it is vitally important that waste is managed correctly in order to avoid a potential outbreak of fauna and flora disease.

Table 31 provides a list of environmental considerations that should be taken into account when managing waste at Dube TradePort Corporation.

TABLE 31: ENVIRONMENTAL ASPECT AND DESCRIPTION OF IMPACT (GRID-ARENDAL, 2014)

ENVIRONMENTAL ASPECT	DESCRIPTION OF IMPACT
Surface Water Contamination	Surface water contamination changes the chemistry of water, which affects all levels of an ecosystem starting from organisms lower in the food chain. This affects the health of organisms as well as the availability of food up the food chain.
Groundwater Contamination	Depending on the water table or geology of an area, water contaminated from man-made processes can adversely affect humans, animals and plants.
Air Contamination	Air pollution contaminants can harm animals and plants that rely on respiration for growth.
Soil Contamination	Contaminated soil can harm plants when nutrients are taken up from the roots of the plants. This may have a ripple effect if humans or animals ingest these contaminated plants.
Leachate	Leachate is the liquid that forms as water trickles through contaminated areas, leaching out chemicals. If uncontrolled, landfill leachate can be responsible for contaminating ground water and surface water.
Landfill methane	Waste disposal facilities are one of the largest anthropogenic sources of methane (CH_4). Landfill methane is produced when organic materials are decomposed by bacteria under anaerobic conditions (i.e. in the absence of oxygen). Methane is a powerful greenhouse gas, with approximately 72 times as much global warming potential than carbon dioxide over a 20-year period.
Illegal dumping and littering	Solid waste material that is illegally or incorrectly dumped, or even littered, is easily diffused in the natural or built-up environment. This has negative consequences for both the social and natural environments. Impacts include: • Marine pollution when discarded waste is transported via the stormwater drain system into the coastal marine environment. This necessitates beach clean-ups or interventions to deal with coastal water contamination; • Decline of aquatic health in the receiving water bodies; and • Decline of water quality of riparian environments, which results in higher treatment cost for potable water. Illegal dumping and littering is also often a major indicator of neighbourhood decline and disorder, alongside graffiti, vandalism and abandoned buildings. This leads to a decline in property values and a potential rise in criminality due to the perception of reduced authoritative control.

10. WASTE MANAGEMENT
(continued)

10.4.2 HEALTH IMPACTS

Although Dube TradePort Corporation has appointed an external contractor to manage waste volumes at the central sorting facility, it is imperative to ensure that staff who are collecting, sorting and storing the various waste streams are indeed suitably attired in personal protective equipment (PPE). PPE may include overalls, reflective vests, masks, latex gloves and safety boots, to name a few. In addition, Dube TradePort Corporation should ensure that the contractor abides to the guidelines outlined in the National Environmental Management: Waste Act (Act 59 of 2008) and the Occupational Health and Safety Act (Act 85 of 1993).

Pathogens such as viruses, bacteria and protozoans breed in areas where waste is not managed correctly. These pathogens are spread by vectors attracted by waste, such as flies, rats, cockroaches, and other creatures that spread infectious diseases. Waste that is not disposed of correctly will create breeding grounds for these vectors, which will pass diseases on to human beings. Some of the health effects associated with pathogens, vectors and waste include: skin and blood infections from direct contact with waste and infected wounds; eye and respiratory infections from exposure to infected dust; diseases from bites from animals feeding on waste; intestinal infections transmitted by flies feeding on waste; bronchitis and flu-like diseases; fatigue and coughing; birth defects associated with individuals living on or close to landfill sites; and exposure to heavy metals such as lead, mercury and cadmium, which could lead to neurological development problems and neurotoxicity (UNEP, 1996; DEFRA, 2004).

10.4.3 ECONOMIC IMPACTS

Managing waste can become a costly affair, especially when unsustainable practices are being implemented. Dube TradePort Corporation, in conjunction with the eThekwini Municipality, has established a partnership so that the burden of waste management does not lie solely with the municipality.

Based on the volumes and types of waste produced, officials at Dube TradePort Corporation will be able to gauge from the amount of paper being produced how much financial resources are being wasted on overhead costs (such as unnecessary printing).

In so doing, initiatives can then be established on how to reduce overhead costs, thereby providing a financial saving to the corporation as well as reducing its carbon footprint.

10.5 RESPONSES

The National Environmental Management: Waste Act (Act 59 of 2008) has led to a number of requirements for both the public and private sector in terms of the management of waste in South Africa.

The current state of waste, provided in 'State' of this chapter, infers that Dube TradePort Corporation been able to effectively record and characterise waste. However, Dube TradePort Corporation needs to take this a step further by reducing the overall generation of waste, reusing waste where possible, recycling more, and ultimately minimising the amount of waste entering landfills. To date, Dube TradePort Corporation has taken a proactive approach to waste management by establishing environmental management objectives, policies, plans and initiatives. These collectively fall under the umbrella of the Environmental Management Framework for Dube TradePort Corporation.

The subsequent sections provide an overview of each environmental management structure and its response to sustainable waste management practices. In addition, the subsequent sections will highlight opportunities and the way forward for Dube TradePort Corporation, which can be considered for incorporation into current waste management strategies and initiatives.

10.5.1 ENVIRONMENTAL MANAGEMENT FRAMEWORK

Dube TradePort Corporation has striven towards reducing environmental impacts resulting from operations and activities, by establishing an Environmental Management Structure. The structure involves numerous environmental legislative plans, policies and guidelines, aimed at reducing the carbon footprint and impact on the environment as a result of Dube TradePort's activities. A summary of the six major elements of the Environmental Management Structure at Dube TradePort is illustrated by Table 32.

TABLE 32: EXISTING ENVIRONMENTAL MANAGEMENT FRAMEWORK OF DUBE TRADEPORT CORPORATION

MANAGEMENT STRUCTURE	DESCRIPTION
Environmental Management Policy	Guides the implementation of environmental and sustainability concepts at Dube TradePort.
Environmental Strategy and Action Plan	Establishes a framework in order to achieve objectives and targets of the environmental policy.
Master Plan	The main planning tool to future development at Dube TradePort.
Environmental Management System	System established to manage environmental issues at Dube TradePort Corporation i.e. ISO 14001.
Operational Environmental Management Plans	Tools for ensuring regulatory compliance and monitoring requirements, such as waste management plans, environmental auditing, environmental monitoring and reporting, and green procurement, to name a few.

10. WASTE MANAGEMENT
(continued)

ENVIRONMENTAL POLICY

The purpose of an Environmental Management Policy is to formalize the overarching vision for the management of environmental issues at Dube TradePort. In so doing, Dube TradePort Corporation has committed itself to (DTPC, 2015d):

- Promoting development in a way that is sensitive to our natural ecosystems and the goods and services they provide;
- Creating a working environment which allows for the efficient use of natural resources;
- Monitoring and managing our greenhouse gas emissions with a view to becoming carbon neutral;
- Minimizing our emissions to air, water and land;
- Balancing the needs of the environment against other Dube TradePort Corporation sustainability mandates; and
- Fostering an environmentally responsible culture amongst employees, tenants, third parties and developers.

Furthermore, the Environmental Management Policy has set environmental objectives in terms of land use and ecology, water, energy and greenhouse gas emissions, the built environment, discharges to the environment, procurement, and stakeholder engagement. Objectives specific to waste management interlink with these objectives, and state that Dube TradePort Corporation will (DTPC, 2015d):

- Work with tenants and partners to monitor and reduce resource (water, waste and energy) consumption and adequately address cross cutting issues; and
- Apply the waste hierarchy to all waste streams, which includes first avoiding then reducing, re-using, and recycling the waste stream where possible, with disposal as the last option.

Dube TradePort Corporation has to date honoured these commitments since inception, and will continue to do so into the future.

ENVIRONMENTAL MANAGEMENT STRATEGY

An Environmental Management Strategy essentially serves as a roadmap and action plan which guides environmental management at Dube TradePort. The Strategy ensures that potential environmental impacts and risks arising from activities within the operational zones are managed responsibly, effectively and efficiently. In addition, the Environmental Management Strategy ensures that environmental management commitments made in the Environmental Management Policy are incorporated into corporate government regimes.

Dube TradePort Corporation's Environmental Management Strategy has identified three waste management objectives and their required actions. The required actions form part of Dube TradePort Corporation's five-year implementation programme, i.e. 2013-2018.

TABLE 33: STRATEGIC WASTE MANAGEMENT OBJECTIVES (DTPC, 2013A)

	OBJECTIVE	REQUIRED ACTION
1.	To manage various solid waste streams ensuring efficient handling, separation and disposal of waste for the prevention of pollution and promotion of recycling and waste reduction.	Implement waste management plans for each operational zone.
2.	To minimise discharges to the environment, including air, water and land, and meeting the minimum standards as set out in national environmental legislation.	Reduce solid waste delivered to landfill across all operational zones.
3.	To apply the waste hierarchy to all waste streams, which includes avoiding waste, reducing, reusing and recycling waste where possible, with disposal being the last option.	Develop a sustainable procurement system for Dube TradePort.

Dube TradePort Corporation has achieved objective 1 by developing facility wide waste management plans for each of its operational zones in 2013. It is recommended that, at the end of the five-year implementation period, these documents be reviewed and updated. Objectives 2 and 3 have not yet fully been achieved; however, Dube TradePort Corporation is taking steps towards fully achieving objectives 2 and 3.

ENVIRONMENTAL MANAGEMENT SYSTEM

An Environmental Management System (EMS) is a structured system designed to help organisations manage their environmental impacts and improve environmental performance caused by their products, services, and activities. The ISO 14001 EMS: Requirements with Guidance for Use is the internationally recognised EMS, which provides guidance on the establishment, implementation, maintenance and improvement of an EMS, and its coordination with other management systems (SANS 14004, 2005).

The EMS is based on the methodology of the Plan-Do-Check-Act (PDCA) model for continual improvement. Table 34 outlines the guidelines for each step of the PDCA model.

Dube TradePort Corporation has developed and adapted its own EMS and is constantly and consistently Planning, Doing, Checking and Acting. As such, Dube TradePort Corporation has developed a number of environmental monitoring programmes and plans to ensure environmental impacts are anticipated and planned for before they occur. For example, Dube TradePort has developed a number of Operational Environmental Management Plans, which are either facility-wide or specific to each operational zone. This will be elaborated on in the subsequent section.

10. WASTE MANAGEMENT
(continued)

TABLE 34: PLAN-DO-CHECK-ACT MODEL FOR CONTINUAL IMPROVEMENT (SANS 14004, 2005)

OBJECTIVE	REQUIRED ACTION
Planning	Planning involves the establishment of objectives and processes necessary to deliver results, in accordance with the organisation's environmental policy. This will enable an organisation to: • Identify environmental aspects and associated environmental impacts; • Identify and monitor applicable legal requirements and other requirements to which the organization subscribes, and set internal performance criteria where appropriate; • Set environmental objectives and targets, and formulate programmes to achieve them; and • Develop and use performance indicators.
Doing	Planning involves implementing processes and will enable an organisation to: • Create management structures, assign roles and responsibilities with sufficient authority; • Provide adequate resources; • Train persons working for, or on behalf of, the organisation and ensure their awareness and competence; • Establish processes for internal and external communication; • Establish and maintain documentation; • Establish and implement document control; • Establish and maintain operational control; and • Ensure emergency preparedness and response.
Checking	Checking involves monitoring and measuring processes against the environmental policy, objectives, targets, legal and other requirements, and reporting the results. As such, it enables an organisation to: • Conduct ongoing monitoring and measurement; • Evaluate status compliance; • Identify nonconformity and take corrective and preventative actions; • Manage records; and • Conduct periodic internal audits.
Acting	Acting involves taking action to continually improve performance of the environmental management system: • Conducting management reviews of the EMS at appropriate intervals; and • Identification of areas for improvements.

10. WASTE MANAGEMENT
(continued)

OPERATIONAL ENVIRONMENTAL MANAGEMENT PLANS

An Operational Environmental Management Plan is a tool used to ensure that adverse impacts arising from organisations' activities are prevented. The key objectives of the OEMP are to ensure (Lochner, 2005):

- Compliance with environmental law and project commitments;
- Avoidance, minimisation and/or mitigation of environmental impacts;
- Facilitation of the timely distribution of information, increasing awareness;
- Management of assets in accordance with design criteria;
- Provision of a guide to the management and notification of environmental incidents;
- Effective response to community requests and complaints; and
- General improvements in environmental maintenance methods.

To ensure compliance with the Environmental Impact Assessment Recommendations and Record of Decision (also known as the Environmental Authorisation under the National Environmental Management Act (Act 107 of 1998 as amended by 2014)), Dube TradePort Corporation has OEMPs for each operational zone. This ensures that key indicators are monitored and reported on annually, and that action is taken when required.

10.5.2 OPPORTUNITIES FOR IMPROVEMENT

Opportunities for improvement at Dube TradePort lie within each operational zone. Dube TradePort Corporation has improved its ability to record waste types and waste volumes for each zone.

Overall waste volumes have decreased, with an increase in the amount of waste being recycled and a decrease in the amount of waste sent to landfill. However, the ratio of recyclable to non-recyclable waste across all operational zones is still low, i.e. 2:3. Dube TradePort Corporation should strive towards reversing this ratio to 3:2, where more waste is recycled and less waste is sent to landfill. In other words, reduce the amount of waste sent to landfill by at least one third (1/3) by 2018.

Table 35 provides a list of potential strategies that Dube TradePort Corporation should consider, or has considered, across a number of aspects.

TABLE 35: WASTE MANAGEMENT STRATEGIES (AGAMUTHU, 2013)

ASPECT	STRATEGY					
Education	Electronic media and campaigns	Job creation	Billboard adverts, workshops	Extender producer responsibility	Waste innovation	Incentives-based approach
Infrastructure	Recycling bins			Recycling collection centre		
Enforcement/regulation	Information management and reporting	Source separation		Use of recycled products, greening the supply chain/ green procurement or purchase products with 3R's indication label	Extender producer responsibility	
Environment	Emerging technologies			Emerging waste streams		

LEGEND:

	Should consider implementing		Currently taking place

EDUCATION

Dube TradePort Corporation launched an Environmental Waste Management Campaign in 2015. The intention of the campaign is to create public awareness of waste management and inform staff of the applicable waste legislation, as well as to motivate the staff and public alike to start applying the waste management hierarchy. Such innovations should be welcomed and should continually be motivated for. A suggestion would be for the various zones to compete with each other to determine which zone can divert the most waste from landfills. In so doing, a prize for the winning zone could serve as an incentive. For example, the winning zone could receive the prestigious Platinum, Gold and Silver status along with other incentives. This will not only generate camaraderie between employees, but also tap into innovative ideas of how to reduce the amount of waste generated within the operational zone.

In addition, Dube TradePort Corporation has taken a positive advantage of its position and has created opportunities for employment. For the 2015/16 financial year, Dube TradePort Corporation has created approximately 718 temporary employment opportunities and approximately 300 permanent employment opportunities (DTPC, 2015f).

10. WASTE MANAGEMENT
(continued)

It is recommended that Dube TradePort Corporation consider billboard advertisements and workshops to create awareness on waste, while at the same time providing a marketing opportunity for Dube TradePort Corporation. Furthermore, Dube TradePort Corporation is in the position to facilitate Extender Producer Responsibility (EPR) initiatives, where the manufacturer's responsibility for a product extends beyond the sale of the product (CCT, 2011). This concept yields impressive recycling results and is applicable to all waste streams (Dubois, 2013). This initiative will work hand in hand with Dube TradePort Corporation's current Green Office and Recycling initiatives. The EPR initiatives include: product take-back programmes such as printer cartridges (especially within the administration areas of Dube TradePort Corporation), deposit-refund systems such as with glass bottles (applicable to canteen/restaurant areas of Dube TradePort Corporation), product fees and taxes, and minimum recycle-content rules.

INFRASTRUCTURE

Dube TradePort Corporation has a central waste sorting facility. It is uncertain at this stage whether the Corporation has coloured recycled bins within the various zones and office facilities. This too would create awareness and reduce the amount of time taken to sort waste.

ENFORCEMENT

Critical to the success of Dube TradePort Corporation is the correct capturing and management of data, more specifically waste type volume data. Since 2013/14, waste volume data have consistently been recorded. As such, correct analysis can be determined, i.e. whether Dube TradePort Corporation has increased or decreased its waste generation, diversion from landfill, or disposal to landfill.

As part of Dube TradePort Corporation's commitment to sustainability, a key aspect that should be considered is green procurement to ensure that contractors are using recyclable materials (products with the Reduce, Reuse and Recycle labels) within the operational zones, thereby decreasing the carbon footprint.

ENVIRONMENT

Dube TradePort Corporation should also consider emerging waste treatment technologies such as anaerobic digestion, fermentation or composting as well as thermal processes such as plasma converters, gasification and pyrolysis (DST, 2012). A description of these alternatives is given in Table 36.

The development of Dube iConnect has formalised the need to consider electronic waste as a separate waste stream. Electronic waste, also known as e-waste, has been identified as a rapidly emerging key environmental concern in South Africa that needs to be addressed (DEAT, 2006b). At present, there are no facilities provided for the storage of e-waste because there are not enough e-waste recycling facilities in South Africa. This is in addition to the absence of clear e-waste legislation or policies. Therefore, it is recommended that Dube TradePort Corporation consider initiatives that look at the storage, recycling and disposal of electronic waste.

TABLE 36: ALTERNATIVE TECHNOLOGY USED FOR WASTE MANAGEMENT

TECHNOLOGY	DESCRIPTION
BIOLOGICAL PROCESSES	
Anaerobic Digestion	Fermentation of organic waste to produce biogas, which is a mixture of methane and carbon dioxide in the ratio of ±2:1. The result is stable sludge that can be used as manure. The biogas can be used for heat or in engines for transport or power generation.
Fermentation	Aerobic biological process uses yeast to produce ethanol or methanol from organic waste. The process releases carbon dioxide and sludge as a by-product.
Composting	Composting is the biological decomposition of biodegradable solid waste, under controlled aerobic conditions, to a state that is stable enough for storage and handling.
THERMAL PROCESSES	
Plasma Converters	This process decomposes waste to its constituents at very high temperatures. Plasma converters make use of plasma torches, which produces syngas, exhaust heat, and slag. Syngas is a mixture of carbon monoxide and hydrogen, which can be used to generate power, while slag can be converted to useful by products such as construction material.
Incineration	This process involves the burning of combustible waste in air to produce energy and ash, which releases carbon dioxide. The heat that is released can be used to generate power.
Waste to Energy	Involves the breakdown of solid organic waste in a controlled supply of oxygen to make syngas. The gas can be used in engines, process heat or an industrial chemical feedstock.
Pyrolysis	Thermal decomposition of solid organic waste in the absence of oxygen to produce char, pyrolysis oil and syngas.

10. WASTE MANAGEMENT
(continued)

OVERALL, THE TREND RELATED TO WASTE MANAGEMENT APPEARS TO BE IMPROVING. WASTE VOLUMES ARE DECREASING, WASTE RECYCLING IS INCREASING AND WASTE DIVERSION FROM LANDFILL APPEARS TO BE DECREASING.

10.6 CONCLUSION

TREND: IMPROVING

Fluctuating productivity within various zones of Dube TradePort is resulting in fluctuating waste volumes. Nonetheless, there does seem to be an increasing amount of waste being recycled, and therefore there is an improving trend perceived.

During the 2013/14 period, Dube TradePort Corporation produced 280.10 tonnes of waste, 33.66% of which was recycled and 66.34% of which was sent to landfill. In 2014/15, 298.62 tonnes of waste was generated: 48.29% was recycled and 51.71% was not recycled. By 2015/16, waste volumes had dropped to 152.10[11] tonnes: 47.06% was recyclable and 52.94% was non-recyclable. Overall, the trend related to waste management appears to be improving. Waste volumes are decreasing, waste recycling is increasing and waste diversion from landfill appears to be decreasing.

[11] The amount excludes March 2016 waste volumes of Dube AgriZone

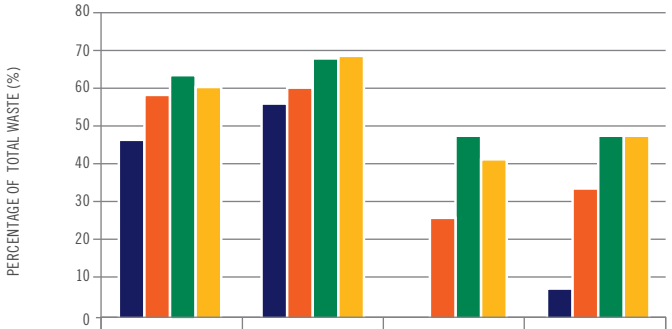
Figure 67 provides a comparative summary of recyclable waste for Dube City, Dube TradeZone, Dube Cargo Terminal and Dube AgriZone since 2012/13. Dube TradeZone takes the lead in recycling waste at Dube TradePort, and has positively increased from 53.76% (2012/13) to 68.20% (2015/16). Dube City has taken the second place, increasing positively from 2012/13 (46.27%) to 2014/15 (63.74%), then decreasing in 2015/16 (60.37%). Dube AgriZone has positively increased recycling from 6.36% in 2012/13 to 46.88% in 2014/15, and decreasing slightly to 46.57% in 2015/16. Dube Cargo Terminal illustrated a fluctuating trend, with no volumes recorded in 2012/13 but increasing from 25.10% in 2013/14 to 46.93% in 2015/16. In 2015/16, waste volumes decreased to 40.49%.

Since Dube TradeZone and Dube City generated the most recyclable waste, it is expected that these zones have the least amount of waste entering landfills, and vice versa for Dube AgriZone and Dube Cargo Terminal. Nonetheless, Figure 68 illustrates the waste volumes that were disposed of at landfills for Dube TradePort. All operational zones indicate a decrease in the amount of waste disposed of at landfills. Dube TradeZone decreased consistently from 46.24% in 2012/13 to 31.80% in 2015/16. Non-recyclable waste decreased from 53.73% in 2012/13 to 36.26% in 2014/15, but increasing slightly in 2015/16 to 39.63%. Dube AgriZone experienced a drastic decrease from 93.64% in 2012/13 to 53.43% in 2015/16. The reason for this drastic decrease is the previous waste contractor not categorising waste and recording these volumes.

The next iteration of this report would need to use the same indicators that have been used for the past three years to identify if Dube TradePort Corporation has been able to reduce non-recyclable waste by at least one third (1/3) by 2018.

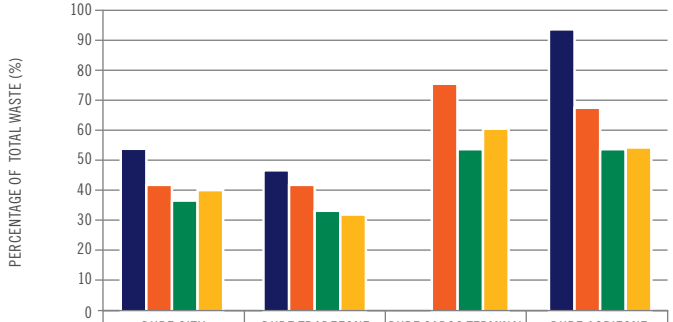
Figure 68 provides a summary of the indicators used to draft this chapter, a description of the trend of the indicator, as well as recommendations on how to enhance the status of the indicator.

FIGURE 67: COMPARISON OF RECYCLABLE WASTE ACROSS OPERATIONAL ZONES



	DUBE CITY	DUBE TRADEZONE	DUBE CARGO TERMINAL	DUBE AGRIZONE
2012/2013	46.27%	53.76%	0.00%	6.36%
2013/2014	58.44%	59.31%	25.10%	32.48%
2014/2015	63.74%	67.57%	46.93%	46.88%
2015/2016	60.37%	68.20%	40.49%	46.57%

FIGURE 68: COMPARISON OF NON-RECYCLABLE WASTE ACROSS OPERATIONAL ZONES



	DUBE CITY	DUBE TRADEZONE	DUBE CARGO TERMINAL	DUBE AGRIZONE
2012/2013	53.73%	46.24%	0.00%	93.64%
2013/2014	41.56%	40.69%	74.90%	67.52%
2014/2015	36.26%	32.43%	53.07%	53.12%
2015/2016	39.63%	31.80%	59.51%	53.43%

10. WASTE MANAGEMENT
(continued)

TABLE 37: SUMMARY OF WASTE MANAGEMENT INDICATORS

INDICATORS	TREND	DESCRIPTION	RECOMMENDATIONS
Waste generation by source and type (tpa)		Waste generation and characterisation has improved across all operational zones compared to the 2013/14 SoER. During the 2013/14 period, a total waste volume (recyclable and non-recyclable waste) of 280.10 tonnes of waste was produced. By 2014/15, waste volumes had increased to 298.62 tonnes, while in 2015/16 waste volumes had decreased to 152.10[12] tonnes. In terms of waste separation, the current ratio of recyclable to non-recyclable waste across all the operational zones is 2:3.	It is recommended that Dube TradePort Corporation further reduce the total amount of waste generated, and attempt to reverse the ratio of recyclable waste to non-recyclable waste to 3:2 across all operational zones, i.e. reduce its non-recyclable waste by at least one third (1/3) by 2018. In addition, it is recommended that Dube TradePort Corporation further 'green' its supply chain management by ensuring that the contractors are abiding with sustainable principles and are considering supplies made from recyclable materials. Furthermore, it is recommended that Dube TradePort Corporation continue to maintain Strategic Objective 1 – separation of waste into solid waste streams – and ensure that the correct waste volumes are recorded by the contractors.
Percentage waste diverted from landfill, e.g. reduced, reused, recycled (%)		Waste being diverted from landfill/recyclable waste has improved compared to the 2013/14 SoER. In 2013/14, 94.28 tonnes of recyclable waste was produced across all operational zones. This amounts to 34% of the total waste volume. By 2014/15, the amount of waste increased to 144.19 tonnes. Although waste volumes increased, approximately 48% of total waste was recycled across all operational zones. This is an improvement compared to the previous year. During the 2015/16 period, waste volumes decreased to 71.58 tonnes. Recyclable waste decreased slightly to 47.06% across all operational zones.	It is recommended that the next iteration of this report should see a further increase in the amount of waste being recycled across the operational zones. It is therefore imperative that correct waste sorting and recording procedures be applied. Furthermore, it is recommended that Dube TradePort Corporation continues to maintain Strategic Objective 3 and continues to apply the waste management hierarchy, i.e. reduce, reuse, recover and only then dispose to landfill.
Percentage waste disposed (%)		The percentage of waste being disposed at landfills has improved and is constantly decreasing. During the 2013/14 period, 185.82 tonnes of waste was produced. Approximately 66% of total waste was considered non-recyclable. Non-recyclable waste volumes decreased to 154.43 tonnes in 2014/15. This amounts to 52% of total waste across all operational zones. By 2015/16, waste volumes further decreased to 80.52 tonnes. This amounts to 52.94% of the total waste volumes.	It is recommended that Dube TradePort Corporation continue to maintain Strategic Objective 2 – minimise discharges into the environment – by reducing the amount of non-recyclable waste by at least one third by 2018.

[12] The amount excludes March 2016 waste volumes of Dube AgriZone.

11. CONCLUDING STATEMENTS

OVERALL TREND: STABLE, WITH AREAS OF IMPROVEMENT REPORTED ACROSS THE VARIOUS THEMES

RECOMMENDATIONS HAVE BEEN OFFERED THROUGHOUT THIS REPORT TO ASSIST DUBE TRADEPORT CORPORATION WITH ACHIEVING ITS GOALS.

In the 2013/14 SoER the future outlook of Dube TradePort was relatively positive, although admittedly much work and commitment was still required. It was anticipated that Dube TradePort would progress to an 'improving' trend within the next reporting cycle, i.e. 2014/15. Although much work has been done in the way of planning and reporting, it is still felt that far more is to be realised through implementation before an improving trend can be reported. For this reason, the trend for Dube TradePort SoER 2015/16 (compared with the last reporting cycle) is perceived to be stable.

Recommendations have been offered throughout this report to assist Dube TradePort Corporation with achieving its goals. However, it is also perceived that there are gaps in what has been presented in this report, and that through better monitoring and reporting, future SoERs could show a significant improvement in the status quo.

Lastly, it is recommended that future reports consider grading the status of the various aspects that are reported on. This may assist with illustrating activities that are in an excellent state, but may not necessarily be improving, i.e. the trend may be reported to be stable, but the condition is good. This may better represent Dube TradePort and its various activities.

29° SOUTH WITH BLOCK D CONSTRUCTION IN THE FOREGROUND

12. ABBREVIATIONS

µg/m³	Micrograms Per Cubic Metre
ACSA	Airports Company South Africa
APP	Annual Performance Plan
B-BBEE	Broad-Based Black Economic Empowerment
CBAs	Critical Biodiversity Area(s)
CFC	Chlorofluorocarbon
CFL	Compact Fluorescent Lamp
CH_4	Methane
CMW	Mixed Paper
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
COD	Chemical Oxygen Demand
COP	Conference of the Parties
CSI	Corporate Social Investment
DAEA	Department of Agriculture and Environmental Affairs (KwaZulu-Natal Province)
DDT	Dichlorodiphenyltrichloroethane
DEA	National Department of Environmental Affairs
DEAT/DEA	National Department of Environmental Affairs and Tourism – now known as the Department of Environmental Affairs
DEDECT	Department of Economic Development, Environment, Conservation and Tourism
DEDT	Department of Economic Development and Tourism (KwaZulu-Natal Province)
DFI	Direct Foreign Investment
DPSIR	Driver, Pressure, State, Impact, Response
DTP	Dube TradePort
DTPC	Dube TradePort Corporation
DTPCA	Dube TradePort Corporation Act (Act No. 2 of 2010)
EA	Environmental Authorisation
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMA	eThekwini Metropolitan Area
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
EMS	Environmental Management System
FEPA	See NFEPA
GHG	Greenhouse Gas
GHGP	Greenhouse Gas Protocol
GNR	Government Notice Regulation
GLV	General Limit Value
ha	Hectares
HCRW	Health Care Risk Waste
HD	High Density
HL1	Heavy Letter One
IDP	Integrated Development Plan
IDZ	Industrial Development Zone
IEM	Integrated Environmental Management
IHI	Instream Habitat Integrity
IMW	Carton Board Cuttings
ISO	International Standards Organisation
IUCN	International Union for Conservation of Nature and Natural Resources

12. ABBREVIATIONS
(continued)

IWMP	Integrated Waste Management Plan
IWWMP	Integrated Waste and Waste Water Management Plan
KPI	Key Performance Indicator
KSIA	King Shaka International Airport
KZN	KwaZulu-Natal
KZN DAEA	KwaZulu-Natal Department of Agriculture and Environmental Affairs
LD	Low Density
MRO	Maintenance, Repair and Operations
MSW	Municipal Solid Waste
NAAQS	National Ambient Air Quality Standard
NDP	National Development Plan
NEM:AQA	National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
NEM:BA	National Environmental Management: Biodiversity Act
NEM:PA	National Environment Management: Protected Areas Act
NEM:WA	National Environmental Management: Waste Act
NEMA	National Environmental Management Act
NFEPA	National Freshwater Ecosystem Priority Area
NFEPA	National Freshwater Ecosystem Priority Area(s), shortened to FEPAs
NGO	Non-Government Organization
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NO	Nitrogen Oxide
NO_2	Nitrogen Dioxide
NPC	National Planning Commission
NSBA	National Spatial Biodiversity Assessment (2004)
NTU	Nephelometric Turbidity Units
NUCS	Non-User Conservation Servitudes
NWMS	National Waste Management Strategy
OEMP	Operational Environmental Management Plan
PAs	Protected Area(s)
Pb	Lead
PDIP	Development Planning and Infrastructure
PES	Present Ecological State
PET	Polyethylene Terephthalate
PFMA	Public Finance Management Act (Act No. 1 of 1999, as amended)
PI	Performance Indicator(s)
PIWMP	Provincial Integrated Waste Management Plan
PM	Particulate Matter
PM10	Particulate Matter with an aerodynamic diameter of less than 10µm
PM2.5	Particulate Matter with an aerodynamic diameter of less than 2.5µm
PP	Polypropylene
PSEDS	Provincial Spatial Economic Development Strategy
PV	Photovoltaic
PVC	Polyvinyl Chloride
RoD	Record of Decision
SANBI	South African National Biodiversity Institute
SAHRA	South African Heritage Resource Agency

12. ABBREVIATIONS
(continued)

SANRCBD	South Africa's Fourth National Report to the Convention on Biological Diversity
SAWIS	South African Waste Information System
SDF	Spatial Development Framework
SEZ	Special Economic Zone
SHEQ-IMS	Safety Health Environment and Quality – Implementation Management System
SLV	Special Limit Value
SMME	Small, Medium and Micro Enterprise
SO_2	Sulphur Dioxide
SoER	State of the Environment Report
SWWTW	Southern Waste Water Treatment Works
THD	Tongaat Hulett Development
tpa	Tonnes per annum
TSS	Total Suspended Solids
UNFCCC	United Nations Framework Convention on Climate Change
VOC	Volatile Organic Compounds
WHO	World Health Organization
WMP	Waste Management Plan
WULA	Water Use License Application
WWTW	Waste Water Treatment Works

13. GLOSSARY

AEROTROPOLIS
An urban plan in which the layout, infrastructure and economy is centred on an airport and existing as an airport city. It's similar in function to a metropolis, which contains a central city core and its commuter-linked suburbs.

AIR QUALITY
A measure of exposure to air which is not harmful to people's health. Air quality is measured against health risk thresholds (levels) which are designed to protect ambient air quality. Various countries, including South Africa, have Air Quality Standards (legally binding health risk thresholds) which aim to protect human health due to exposure to pollutants within the living space.

AMBIENT AIR
The air of the surrounding environment.

BIODIVERSITY
The diversity of animals, plants and other organisms found within and between ecosystems, habitats and the ecological complexes.

BUILDING AND DEMOLITION WASTE
Waste, excluding hazardous waste, produced during the construction, alteration, repair or demolition of any structure. It includes rubble, earth, rock and wood displaced during that construction, alteration, repair or demolition.

BY-PRODUCT
A substance that is produced as part of a process that is intended to produce another substance or product, that has the characteristics of an equivalent virgin product or material.

CARBON OFFSET
A reduction in emission of carbon dioxide, or greenhouse gases, in order to compensate for, or to offset, an emission made elsewhere.

CARTON BOARD CUTTINGS (IMW)
Consists of new cuttings of paperboard as are used in the manufacture of folding paper cartons and similar boxboard products.

CONCENTRATION
When a pollutant is measured in ambient air it is referred to as the concentration of that pollutant in air. Pollutant concentrations are measured in ambient air for various reasons, i.e. to determine whether concentrations are exceeding available health risk thresholds (air quality standards), to determine how different sources of pollution contribute to ambient air concentrations in an area, to validate dispersion modeling conducted for an area, to determine how pollutant concentrations fluctuate over time in an area, and to determine the areas with the highest pollution concentrations.

CRITERIA POLLUTANT
Criteria pollutants are air pollutants which cause smog, acid rain and health hazards. Primary pollutants are emitted by sources, such as mining, industry, power generation, agricultural activities and transportation. These include Particulate Matter, Oxides of Nitrogen, Sulphur Dioxide, Carbon Monoxide, Lead and Benzene. Secondary pollutants are formed as a result of chemical interactions of primary pollutants and these include Ozone and Particulate Matter.

DRY WASTE
Recyclable waste materials, which include: Paper products, Plastics, Glass and Metals.

ECOSYSTEM INTEGRITY
Ecological integrity refers to a condition in which biotic and abiotic components of ecosystems and the composition and abundance of native species and biological communities are characteristic for their natural regions and rates of change and ecosystem processes are unimpeded.

ECOSYSTEM SERVICES
Ecosystem services can be simply defined as 'the benefits people derive from ecosystems'. These include provisioning services or goods like food, water, wood and other raw materials, while plants, animals, fungi and micro-organisms also provide essential regulating services, such as crop pollination, flood attenuation and water purification, supporting services like nutrient cycling, and a vast array of cultural services, such as recreational, spiritual and cultural benefits (www.sanbi.org).

EMISSIONS
The production and discharge of pollution from a source of pollution.

ENVIRONMENT
In terms of the National Environmental Management Act (Act No. 107 of 1998) (as amended) (NEMA), 'environment' means the surroundings within which humans exist, made up of:

(i) The land, water and atmosphere of the earth;
(ii) Micro-organisms, plant and animal life;
(iii) Any part or combination of (i) and (ii) and the inter-relationships among and between them; and
(iv) The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

ENVIRONMENTAL MANAGEMENT
The identification, assessment and control of environmental aspects and impacts, compliance to environmental legislation and adherence to other components within an Environmental Management System (EMS), such as environmental monitoring and incident reporting.

EUTROPHICATION
The process whereby a water body becomes enriched in dissolved nutrients, such as phosphates and nitrates, which stimulates excessive growth of algae and other aquatic plants, usually resulting in the depletion of dissolved oxygen.

GENERAL WASTE
Waste that does not pose an immediate hazard or threat to health or the environment, including:

- Domestic waste;
- Building and demolition waste (excluding asbestos);
- Business waste; and
- Inert waste.

13. GLOSSARY
(continued)

GOVERNANCE
Within an organization, this includes issues of corporate social responsibility, along with improved management of corporate social and environmental impacts and improved stakeholder engagement. Support is garnered for this new management style as it promises to create long-term shareholder value by embracing opportunities and managing risks derived from ongoing economic, environmental and social developments.

GREEN WASTE
Biodegradable waste that can be composed of garden or park waste, such as grass, flower cuttings and hedge trimmings, as well as domestic and commercial food waste.

GREENFIELD
Undeveloped land in a city or a rural area, used either for agriculture or urban development.

GREENHOUSE GASES
Greenhouse gases are gases in the earth's atmosphere which absorb and emit radiation within the thermal infrared range. Greenhouse gases are Methane, Water Vapour, Carbon Dioxide, Nitrous Oxide and Ozone.

HAZARDOUS WASTE
Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.

HEAVY LETTER ONE (HL1)
Consists of white printed or unprinted sheets, shavings originating from printers, or office records. This grade must be free of heavily printed or coloured stock and non-water-soluble adhesives.

INDUSTRIAL SYMBIOSIS
The sharing of services, utility and by-product resources among industries in order to add value, reduce costs and improve the environment.

LEACHATE
Any liquid material that drains from land or stockpiled material and contains significantly elevated concentrations of undesirable material derived from the material that it has passed through.

MIXED PAPER (CMW)
A mixture of various grades of paper and board without restriction on fiber content.

PARTICULATE MATTER (PM)
The collective name for fine solid or liquid particles added to the atmosphere by processes at the earth's surface and includes dust, smoke, soot, pollen and soil particles. Particulate matter is classified as a criteria pollutant, thus national air quality standards have been developed in order to protect the public from exposure to the inhalable fractions. PM can be principally characterized as discrete particles spanning several orders of magnitude in size, with inhalable particles falling into the following general size fractions:

- PM10 (generally defined as all particles equal to and less than 10 microns in aerodynamic diameter; particles larger than this are not generally deposited in the lung);
- PM2.5, also known as fine fraction particles (generally defined as those particles with an aerodynamic diameter of 2.5 microns or less);
- PM10-2.5, also known as coarse fraction particles (generally defined as those particles with an aerodynamic diameter greater than 2.5 microns, but equal to or less than a nominal 10 microns); and
- Ultra-fine particles (generally defined as those with an aerodynamic diameter of less than 0.1 microns).

POLICY
The Dube TradePort Corporation's Environmental Policy.

REVERSE OSMOSIS
Reverse Osmosis is a water purification process typically used for the removal of salts (desalination) from borehole water or seawater to produce drinking water. Water is forced through a semi-permeable membrane, against the natural osmotic gradient, which separates and removes dissolved solids, organics, viruses and bacteria from the water.

SUSTAINABLE DEVELOPMENT
The integration of social, economic and environmental factors into planning, implementation and decision-making, so as to ensure that development serves present and future generations.

TRIPLE BOTTOM LINE
Refers to the three spheres of social, economic and environmental.

WASTE
Any substance, whether or not that substance can be reduced, reused, recycled or recovered, that is:

- Surplus, unwanted, rejected, discarded, abandoned or disposed of;
- Which the generator has no further use of for the purposes of production;
- That must be treated or disposed of; or
- That is identified as a waste by the Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector.

But:

- A by-product is not considered waste; and
- Any portion of waste, once reused, recycled and recovered, ceases to be waste.

WET WASTE
Non-recyclable waste material.

14. REFERENCES

Allen, A.G., Cardosa, A.A., and Da Rocha, G.O., 2004. Influence of sugarcane burning on aerosol soluble ion composition in South Eastern Brazil. Atmospheric Environment, 30, 5025-5038.

Agamuthu, P., 2013. Waste management and recycling performance indicators: Priorities and Challenges. Kuala Lumpur: University of Malaya.

BKS, 2012. Dube TradePort Water Conservation and Demand Management Strategy. BKS.

CCT (City of Cape Town), 2005. State of Environment Report: Waste and Sanitation. City of Cape Town: City of Cape Town Metropolitan Municipality

CCT (City of Cape Town), 2011. SMART Living Handbook: Making Sustainable Living A Reality in Cape Town Homes Fourth Edition. Environmental Resource Management Department.

CEPF., 2016. Maputaland-Pondoland-Albany. Critical Ecosystem Priority Funding (CEPF). Website: http://www.cepf.net/where_we_work/regions/africa/maputaland/Pages/default.aspx

Constable, L. and Cartwright A., 2009. eThekwini Municipality: Municipal Adaptation Plan Health and Water. Environmental Management Department – Development Planning, Environment and Management Unit, Durban.

Costanza *et al.*, 2014. Changes in the global value of ecosystem services. Global Environmental Change 26 (2014).

Cox, C.B. and Moore, P.D., 2000. Biogeography: An ecological and evolutionary approach, ed. 6. Blackwell, Oxford. P22

Croucamp, P., 2009. Our Biodiverse City 2008/2009. Environmental Management Department – Development Planning, Environment and Management Unit, Durban.

DEA, 2011. National Strategy for Sustainable Development and Action Plan (NSSD 1) 2011–2014. Pretoria, South Africa.

DEA, 2013. SANBI (South African National Biodiversity Institute) and GIZ. Climate Change and Biodiversity. International Climate Initiative. Department of Environmental Affairs (DEA).

DEA, 2014. South Africa's Fifth National Report to the Convention on Biological Diversity. Ministry of Water and Environment Affairs, Pretoria http://www.cbd.int/doc/world/za/za-nr-05-en.pdf

DEAT, 2004. Integrated Environmental Management Series 0. Department of Environment and Tourism (DEAT).

DEAT, 2006a. South African Environmental Outlook. A report on the state of the environment. Pretoria, South Africa: DEAT.

DEAT, 2006b. Guide to State of Environment Reporting for Municipalities. Department of Environmental Affairs and Tourism (DEAT).

DEAT, 2008. A National Framework for Sustainable Development in South Africa. Pretoria.

DEFRA, 2004. Review of Environmental and Health Effects of Waste Management. Department of Environment, Food and Rural Affairs (DEFRA).

Deloitte, 2013. Deloitte on Africa Collection: Issue 1.

DST, 2012. A National Waste Research, Development and Innovation Roadmap for South Africa: Phase 1 Status Quo Assessment. Department of Science and Technology (DST).

DTPC, 2012. Dube TradePort State of Environment Report 2011/2012. Dube TradePort Corporation.

DTPC, 2013a. DTPC Environmental Policy and Strategy 2013-2018 Action Plan Version 1-August 2013. Durban: Dube TradePort Corporation.

DTPC, 2013b. Annual Performance Plan 2013/2014. eThekwini: Dube TradePort Corporation.

DTPC, 2013c. DTPC Policy and Strategy, Baseline Review, 2013. Dube TradePort Corporation (DTPC).

DTPC, 2013d. Environmental Policy and Strategy: Risk and Opportunity Assessment Report. eThekwini: Dube TradePort Corporation.

DTPC, 2013e. One Goal: to move your business forward – 2012/13 Annual Report. Dube TradePort Corporation (DTPC).

DTPC, 2014a. The Dube TradePort State of the Environment Report 2013/2014. Dube TradePort: Dube TradePort Corporation (DTPC) and Royal HaskoningDHV.

DTPC, 2014b. Annual Performance Plan 2013/4. Dube TradePort Corporation (DTPC).

DTPC, 2014c. Dube TradePort Corporation's commitment to the environment. Dube TradePort Corporation (DTPC).

DTPC, 2014d. The Dube TradePort Corporation CSI: Annual Report 2013/14. Dube TradePort Corporation (DTPC).

DTPC, 2015a. Dube TradePort Corporation: Annual Report 2014/2015. Dube TradePort Corporation (DTPC).

DTPC, 2015b. Dube TradePort Corporation: CSI Annual Report 2014/2015. Dube TradePort Corporation (DTPC).

DTPC, 2015c. Dube TradePort Corporation: Strategic Plan for the fiscal years 2015/16 – 2019/20. Dube TradePort Corporation (DTPC).

DTPC, 2015d. Environmental Policy. Durban: Dube TradePort Corporation.

DTPC, 2015e. Dube TradePort Corporation: Surface Water Quality Monitoring Report. Dube TradePort Corporation: Dube TradePort Corporation, Aurecon and Institute of Natural Resources.

14. REFERENCES
(continued)

DTPC, 2015f. Annual Performance Plan. Durban: Dube TradePort Corporation.

DTPC, 2016a. Dube TradePort Corporation 2015 Carbon Footprint Analysis Draft Report. February 2016. Dube TradePort Corporation, triplo4, Aeon Nexus (Pty) Ltd

DTPC, 2016b. Dube TradePort Corporation. Retrieved from TradeZone: http://tradezone.dubetradeport.co.za/Pages/Home

DTPC, 2016c. Dube TradePort Corporation. Retrieved from Dube connect: http://iconnect.dubetradeport.co.za/Pages/Home

DTPC, 2016d. Dube TradePort Corporation. Retrieved from http://www.dubetradeport.co.za/Pages/Environment/Green-Initiatives

Dubois, M., 2013. Extended Producer Responsibility: The Gap Between Economic Theory and Implementation.

EC, 2010. Air pollution and climate change. Science for environmental policy. Vol. 24. November 2010. European Commission (EC) – Environment.

Edwards, R., 2015a. Proposed Dube TradePort AgriZone 2: Development in the eThekwini Municipality, KwaZulu-Natal: Conceptual Wetland Rehabilitation Plan. Dube TradePort: Dube TradePort Corporation and Eco-Pulse Environmental Consulting Services.

Edwards, R., 2015b. Proposed Dube TradePort TradeZone 2: Development in the eThekwini Municipality, KwaZulu-Natal: Conceptual Wetland Rehabilitation Plan. Dube TradePort: Dube TradePort Corporation and Eco-Pulse Environmental Consulting Services.

Emerson, L.D., Ashmore, M.R., Simpson, D., Tuovinen, J.P., & Cambridge, H.M., 2001. Modelling and mapping ozone deposition in Europe. Water, Air and Soil Pollution, 130, 577-582.

EPA, 1992. Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures. Environmental Protection Agency (EPA). United States.

EPA, 2014. Direct Fugitive Emissions from refrigeration, air conditioning, fire suppression and industrial gases. Environmental Protection Agency (EPA). United States.

eThekwini Metropolitan Municipality, 2004. Integrated Waste Management Plan. Available [Online] http://www.durban.gov.za/Documents/CityServices/Cleansing%20and%20Solid%20Waste/Integrated_Waste_Management_Plan.pdf [24 April 2014]. eThekwini Metropolitan Municipality.

eThekwini Metropolitan Municipality, 2015. Integrated Development Planning 2015/2016. eThekwini Metropolitan Municipality. Final adopted document, dated 27 May 2015.

eThembeni Cultural Heritage, 2015 (August 28). King Shaka International Airport Ecological and Wetland Rehabilitation and Restoration Plan Heritage Resources Impact Assessment. Email correspondence. eThekwini Municipality, KwaZulu-Natal, South Africa: eThembeni Cultural Heritage.

Fuggle, R.F. and Rabie, M.A., 2000. Environmental Management in South Africa. Juta & Co, Ltd, Cape Town.

GDARD, 2011. Gauteng State of Environment Report. Gauteng Department of Agriculture and Rural Development (GDARD).

GIBB, 2016. Dube TradePort Aquatic Assessment-Draft. Dube TradePort Corporation: GIBB and Dube TradePort Corporation.

Glenday, J., 2015. EThekwini Municipality Northern Entity Development Biomimicry Project: Ecosystem Process Modelling with InVEST. Unpublished Report Submitted to Informal South & Biomimicry SA.

Govender, N., 2013. Durban: State of Biodiversity Report: 2012/2013. eThekwini Environmental Planning Climate Protection Department, Durban.

GRID-Arendal, 2014. Waste and Public Health – What are the Dangers? Available [Online]: http://www.grida.no/publications/vg/waste/page/2856.aspx [23 April 2014].

Hoogervorst, A., 2004. Biodiversity in the Enviropaedia. Ecologic Publishing, Simonstown. P21.http://www.westerncape.gov.za/other/2012/7/nrta.pdf [24 April 2014].

Hughes, G.R., 2001. Democratization: Biodiversity Conservation for all People – A case study from KwaZulu-Natal in Pierce, S.M., Cowling, R.M., Sandwith, T. and MacKinnon, K., 2001. Mainstreaming biodiversity in Development. The World Bank Environment Development, Washington. P67.

INR, 2007. Water Resources Specialist study for the Environmental Impact Assessment for the Dube TradePort Development proposal. Institute of Natural Resources (INR).

INR, 2011. Environmental Impact Assessment for the Proposed TradeZone-Watson Highway Link Road: Terrestrial Ecological and Wetland Impact Assessment. Dube TradePort Corporation: Dube TradePort Corporation, King Shaka International Airport, Institute of Natural Resources (INR) and Virtual Consulting Engineers.

IPCC, 1999. Aviation and the global atmosphere. Summary for policy makers. A special report for IPCC working group 1 and 2 in collaboration with the scientific assessment panel to the Montreal Protocol on substances that deplete the ozone layer.

Jewitt, D., 2014. KZN Vegetation Types: Targets, statistics & conservation status (December 2014). Unpublished report, Biodiversity Research and Assessment, Ezemvelo KZN Wildlife.

14. REFERENCES
(continued)

KPMG, 2012. Sustainable Reporting Systems: A Market Review. KPMG Advisory NV.

Lemieux, P.M., Lutes, C.C. and Santoianni, D.A., 2003. Emissions of organic air toxics from open burning: a comprehensive review. Progression energy and combustion science. Vol. 30. 14 August 2003.

Lochner, P., 2005. Guideline for Environmental Management Plans. Cape Town: CSIR.

MacFarlane, D.M., 2015. A strategic framework for improved wetland management in eThekwini's Northern Spatial Development Plan Area. Unpublished report prepared by Eco-Pulse Environmental Consulting Services. Version 0.3. December 2015.

Mbengashe, M., 2009. South Africa's Fourth National Report to the Convention on Biological Diversity. Department of Environmental Affairs and Tourism, Pretoria.

McNulty Consulting, 2014. Durban Our Bio Diverse City.

Mucina, L. and Rutherford, M.C. (eds), 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia No. 19. South African biodiversity Institute, Pretoria. P32.

National Treasury, 2015. Media statement: Publication of the Draft Carbon Tax Bill for public comment. http://www.treasury.gov.za/comm_media/press/2015/2015110201%20%20Media%20Statement%20Carbon%20Tax%20Bill.pdf

Natural Scientific Services, 2015. Support Zone 2: Wetland Assessment. Dube TradePort: Dube TradePort Corporation, Khwezela and Natural Scientific Services.

Nel, J.L., Roux, D.J., Maree, G., Kleynhans, C.J., Moolman, J., Reyers, B., Rouget, M. and Cowling, R.M. (2007) Rivers in peril inside and outside protected areas: a systematic approach to conservation assessment of river ecosystems. Diversity and Distributions 13: 341–352.

North West University, 2014. Centre for Environmental Management Course Notes – Auditing, 2014

NPC, 2011. National Development Plan 2030: Our Future – Make it Work. National Planning Commission.

Pauw, J.C. (Ed.), 2011. Combat Change with Change: Translating Observations on Environmental Change in South Africa into Long-Term Policy Considerations for Sustainable Development. SAEON (South African Environmental Observation Network), Pretoria. Available: [Online]: http://www.saeon.ac.za/Combat%20Change%20with%20Change.pdf. Accessed 20 April 2014.

Raimondo, D., von Staden, L., Foden, W., Victor, J.E., Helme, N.A., Turner, R.C., Kamundi, D.A. & Manyama Roberts, D., 2007. eThekwini Environmental Services Management Plan (EESMP) - From Planning to Implementation: Protecting Biodiversity in eThekwini Municipality. Environmental Planning and Climate .

Roberts, D., Mander, M. and Boon, R., 2001. An Urban Challenge: Conserving biodiversity in the eThekweni Municipality, KwaZulu-Natal. In Pierce. S.M., Cowling. R.M., Sandwith, T. and MacKinnon, K., 2001.

RSA, 2014a. Medium term Strategic Framework 2014-2019. Republic of South Africa.

RSA, 2014b. National Environmental Management: Waste Amendment Act (Act 26 of 2014). Pretoria: RSA.

SANS 14004, 2005. Environmental Management Systems - General Guidelines on Principles, Systems and Support. Pretoria: SABS Standards Division.

SEF, 2015. Interim Report 2: Preliminary Assessment and Delineation of the Additional Areas-KSIA Ecological and Wetland Rehabilitation and Restoration Plan. Dube TradePort: Airports Company South Africa SOC Ltd and SEF.

SSI, 2009. Strategic Environmental Assessment for the Northern Urban Development Corridor. eThekwini Municipality. SSI Engineers and Environmental Consultants (SSI).

Statista: The Statistics Portal. Available [Online]: http://www.statista.com/statistics/268750/global-gross-domestic-product-gdp/

Sustainable Cities International, 2012. Infrastructure Costs and Urban Growth Management.

Texeira-Leite & Cox, 2009. Mount Moreland Wetlands Management Plan. Unpublished draft plan prepared by the Institute of Natural Resources.

Texeira-Leite, A., Froneman, A. and Nichols, G., 2008. Baseline Wetland Assessment for the Mount Moreland Wetland System, uMdloti, KwaZulu-Natal. Institute of Natural Resources: Unpublished Report.

Turpie, J., Winkler, H., Spalding–Fecher, R. and Midgley, G., 2002. Economic impacts of climate change in South Africa: A preliminary analysis of unmitigated damage costs. Southern waters and energy development research centre.

UNEP, 2005. Solid Waste Management. Volume 1

UNEP, 1996. Environmental Pollution and Impacts on Public Health

UNEP/GRID-Arendal Maps and Graphics Library, 2002. DPSIR framework for State of the Environment Reporting. Retrieved September 2011, 2011, from http://maps.grida.no/go/graphic/dpsir_framework_for_state_of_environment

Van Jaarsveld, A.S and Chown, S.L., 2001. Climate change and its implications in South Africa. Trends in ecology and evolution. Vol. 16, No. 1, January 2001.

WCG, 2013. Western Cape State of Environment Outlook Report. Western Cape Government (WCG), Department of Environmental Affairs and Development Planning, Sustainability Directorate.

14. REFERENCES
(continued)

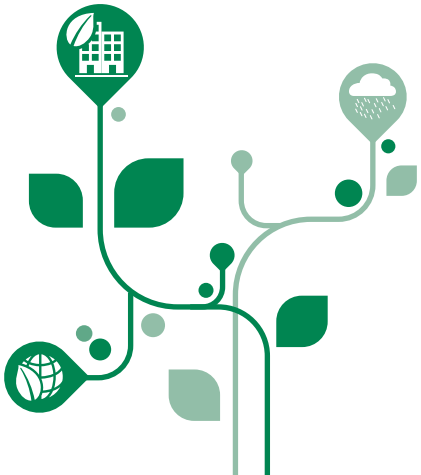
WSP, 2013a. The DTPC Draft Policy Report. Dube TradePort Corporation (DTPC).

WSP, 2013b. The DTPC Peer Benchmarking Report. Dube TradePort Corporation (DTPC).

WSP, 2013c. Dube TradePort Corporation Environmental Strategy 2013 – 2018. WSP Environmental.

WSP, 2013d. The DTPC Environmental Strategy, Final Report. Dube TradePort Corporation (DTPC).

Yawitch, J., 2010. National Climate Change Response Green Paper. Department of Environment Affairs, Pretoria.



29° South, 7 Umsinsi Junction, Dube City, La Mercy, KwaZulu-Natal, 4399
Tel: +27 32 814 0000, Fax: +27 32 814 0100
Email: info@dubetradeport.co.za, Web: www.dubetradeport.co.za