CHAPTER 7

Sustainable port planning

CHAPTER 7: Sustainable port planning

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Executive Summary

Purpose

Ports have experienced phenomenal growth over the past decades, not without negative environmental and societal impacts. With growing public awareness and regulatory pressures, ports around the world are obliged to account for these externalities and can no longer operate without acknowledging and incorporating societal and environmental considerations in their planning and management. Therefore, 'Sustainable Port Development' advocates a balance between economic growth, environmental protection, and social progress to secure their long-term 'license to operate'. Climate change impacts also require improved climate resilience in port planning and development.

In South Africa, Transnet is a State-Owned Company (SOC) signs an annual Shareholder's Compact with the Government. This Compact mandates Transnet to deliver on numerous strategic deliverables, including **sustainable economic, social and environmental outcomes**. As one of the five operating divisions of Transnet SOC Ltd, Transnet National Ports Authority (TNPA) is subject to these strategic deliverables, including sustainability performance at the country's commercial ports. The TNPA, therefore, recognises the importance of sustainability, also in the planning of a port, in this case the proposed Port of Boegoebaai.

The purpose here is to inform sustainability planning for the proposed Port of Boegoebaai. Acknowledging and addressing sustainability early on from the planning phase of a new port development will enable timeous identification of potential challenges and opportunities and inform appropriate interventions and solutions towards achieving sustainability. First a Framework for Sustainable Port Planning and Development (SPP&D) is posed, drawing on best practice (international, regionally and nationally), and aligned with TNPA's current sustainability initiatives. Thereafter, key sustainability criteria specific to the proposed Port of Boegoebaai is provided.

Framework for Sustainable Port Planning and Development

To ensure continuity between port sustainability planning (e.g. for new port development or expansion in existing ports) and sustainability performance assessment and reporting (e.g. for operational ports) such initiative needs to be aligned. This has been achieved aligning the Framework for Sustainable Port Planning and Development (SPP&D) with exiting TNPA sustainability initiatives of the TNPA as illustrated in Figure S-1.

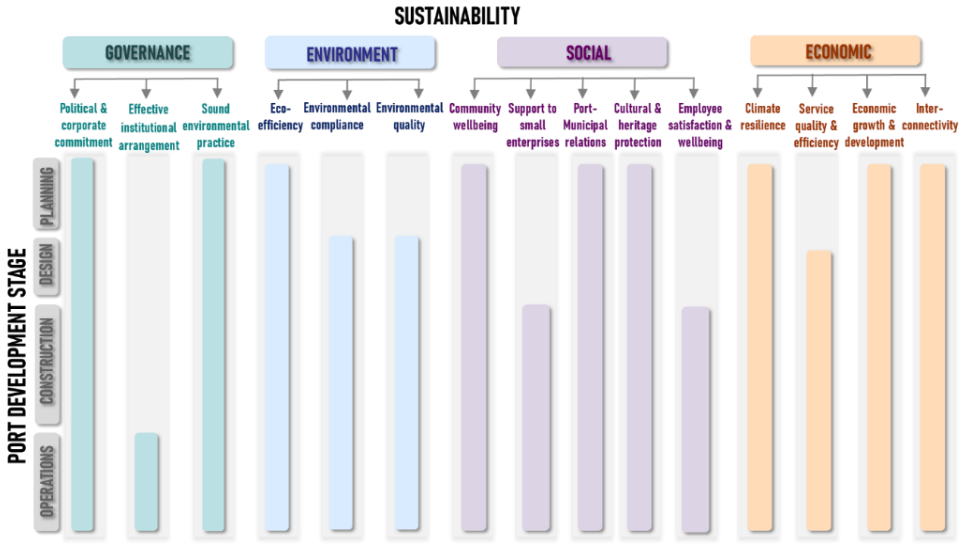

Figure S-1: Framework for SPP&D showing key sustainability domains (governance, environment, social and economic) and associated sustainability outcomes, as well as anticipated relevance across various stages in a port development cycle

Key Sustainability Criteria for proposed Port of Boegoebaai

Key sustainability criteria for the proposed Port of Boegoebaai are presented in Tables S-1 to S-4 below, organised into the four pillars of sustainability and associated sustainability outcomes (see Figure S-1), also showing alignment with relevant SDGs.

Table S-1: Key criteria towards achieving sustainability outcomes within the governance dimension

GOVERNANCE		
Sustainability Outcome	**Related SDGs**	**Key Criteria**
Political & corporate commitment	16: Peace, Justice and Strong Institutions 17: Partnerships for the Goals	• Legislative framework in place to enable sustainable planning, development, and operations in ports • Organizational culture towards sustainable development • Dedicated budget allocation for sustainable development • Public communication mechanisms in place
Effective institutional arrangements	16: Peace, Justice and Strong Institutions 17: Partnerships for the Goals	• Formal in-house institutions overseeing sustainability matters • Dedicated institution to engage with port customers • Dedicated institution to engage with stakeholders outside port boundaries • Dedicated collaborative arrangements between port & adjacent local authorities
Sound management practice	6: Clean Water and Sanitation 7: Affordable and Clean Energy 9: Industry, Innovation and Infrastructure 12: Responsible Consumption and Production 13: Climate Action	• Environmental assessment and management through project lifecycle, including: - Strategic Environmental Assessment and Environmental Screening - Environmental Impact Assessment with associated Environmental Management Plans - Environmental Management Systems • EMPs and/or Standard Operational Procedures (SOPs) addressing sustainability (incl. monitoring) prepared and effectively • Contingency planning

Table S-2: Key criteria towards achieving sustainability outcomes within the environment dimension

ENVIRONMENT		
Sustainability Outcome	**Related SDGs**	**Key Criteria**
Eco-efficiency	6: Clean Water and Sanitation 7: Affordable and Clean Energy 9: Industry, Innovation and Infrastructure 12: Responsible Consumption and Production 13: Climate Action	• Water use efficiency • Energy efficiency • Selection and procuring of eco-friendly materials • Waste management (recycling of other waste) • Recycle/minimize construction and building waste (circular economy concept) • Efficient and responsible land/sea use (spatial planning) • Climate mitigation addressed
Environmental compliance	6: Clean Water and Sanitation 9: Industry, Innovation and Infrastructure 12: Responsible Consumption and Production	• Transparent reporting on potential impact sources monitored and control, including: - Atmospheric emissions - Noise - Wastewater discharges - Solid/hazardous waste • Environmental incidents • Port environmental assurance audits • Compliance to EMS
Environmental quality	14: Life below Water 15: Life on Land	• Environmental quality effectively monitored and evaluate, including: - Air quality - Noise - Marine water quality - Marine sediment quality - Soil & groundwater quality • Status of habitat and biodiversity (terrestrial and marine) • Control marine invasive species

Table S-3: Key criteria towards achieving sustainability outcomes within the social dimension

SOCIAL		
Sustainability Outcome	**Related SDGs**	**Key Criteria**
Community wellbeing	1: No Poverty 2: Zero Hunger 3: Good Health and Well-being 4: Quality Education and Learning Opportunities 8: Decent Work and Economic Growth	• Corporate Social Initiatives planned and undertaken • Access rights for communities, where appropriate • Community-based environmental education and awareness • Support to sustainability related community enterprises • Research, Development and Innovation (RD&I) investment
Support to small enterprises	1: No Poverty 8: Decent Work and Economic Growth	• Support to local/small businesses
Port-municipal relations	8: Decent Work and Economic Growth 11: Sustainable Cities and Communities	• Port-municipal collaboration • Sound port-municipal relationships
Cultural and heritage protection	11: Sustainable Cities and Communities	• Protection of cultural heritage assets
Employee satisfaction & wellbeing	4: Quality Education 5: Gender Equality 8: Decent Work and Economic Growth 10: Reduced Inequalities	• Training (incl. education on sustainability matters) • Employee engagement forums • Employee grievance/satisfaction addressed • Employees recognition • Wellness assistance • Occupational safety awareness • Employee safety • Employment equity • Employee job security

Table S-4: Key criteria towards achieving sustainability outcomes within the economic dimension

ECONOMICS		
Sustainability Outcome	**Related SDGs**	**Key Criteria**
Climate resilience	13: Climate Action	• Climate change (CC) preparedness • CC early warning systems • CC incident assessment
Service quality & efficiency	9: Industry, Innovation and Infrastructure 12: Responsible Consumption and Production	• Technical capacity and efficiency • Good quality potable water supplied • Customer satisfaction • Port security • Cyber security • Digitalisation of port systems • Improvement of port infrastructure maintained at acceptable quality
Economic growth & development	8: Decent Work and Economic Growth 9: Industry, Innovation and Infrastructure	• Port revenue generation through formal port activities • Revenue generation through complementary sectors operating in port • Business growth opportunities for others in port • Corporate tax and VAT generation • Employment opportunities • Economic contribution (gross value added) • New business production
Inter-connectivity	8: Decent Work and Economic Growth 9: Industry, Innovation and Infrastructure	• Effective hinterland connectivity • Effective international port connectivity

Framework for SPP&D (Figure 7-7), together with the key sustainability requirements (Table 7-10) provide a **science-based benchmark** for where to evaluate the extent to which port planning and development processes to be undertaken for the proposed Port of Boegoebaai port would support sustainability. This is relevant to the current SEA process, but also in potential future EIA processes, through construction and ultimately during operations.

All sustainability outcomes are important to consider in the planning of a proposed Port at Boegoebaai, but reflecting on the place-based circumstances at Boegoebaai, the following are likely to requite specially attention:

- Eco-efficiency (e.g. sustainable sources of water and energy)
- Community wellbeing (e.g. local communities rely heavily on natural resources for their livelihood)
- Cultural & heritage protection (e.g. areas support an array of cultural and heritage assets)
- Climate resilience (e.g. west coast likely to be affected by climate change)
- Interconnectivity (e.g. area is very remote with connectivity challenges)

Further, foresight of likely future development plans around the port (for example, industrial, urban and suburban development) should be considered in the spatial planning for the port. This will be key in avoiding future port-city, and port-community conflict, also applying to infrastructure needed to ensure future interconnectivity.

Another key issue crucial to sustainability as it pertains to environmental issues and climate resilience, is access to long-term, inter-seasonal field data on, for example, climate, oceanic processes, environmental quality, and biodiversity. Given the remoteness of the study area, the collection of such data will be a challenge and should be considered and resolved soonest, should this project be approved.

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CHAPTER 7. SUSTAINABLE PORT PLANNING

7.1 INTRODUCTION

7.1.1 Background

With the development of a new port, such as is the case with the proposed Port of Boegoebaai, there is good opportunity to define sustainable trajectories, already in the planning stages, that explicitly strive for environmentally responsible, socially equitable and economically viable port development. This also echoes the aspiration of sustainable development captured in Agenda 2063: The Africa We Want, Africa's blueprint and master plan for transforming the continent into a future global powerhouse by 2063 (African Union 2015).

In South Africa, Transnet is a State-Owned Company (SOC) that signs an annual Shareholder's Compact with the Government, represented by the Minister of Public Enterprises (DPE). This Compact mandates Transnet to deliver on numerous strategic deliverables, including sustainable economic, social and environmental outcomes (Transnet 2024). As one of the five operating divisions of Transnet SOC Ltd, Transnet National Ports Authority (TNPA) is subject to these strategic deliverables, including sustainability performance at the country's commercial ports. In response to this commitment, TNPA has begun engaging in 'Green Port' initiatives. These initiatives include the installation of solar technologies to alleviate the country's power challenges and to support greener operations. This initiative has seen the greening of energy sources at lighthouses and other marine aids to assist with navigation of vessels within port limits and along the coast. TNPA has also acknowledged the importance of monitoring sustainability performance, for example through sustainability reporting, to guide decision making on interventions towards improving sustainability. To assist TNPA with the development of a standardised approach to sustainability performance assessment for the country's commercial ports, the CSIR shared its scientific research and invested in this space. This approach has since been pilot tested in the Port of Ngqura (TNPA 2024), as part of a regional capacity development programme by the Nairobi Convention Secretariat for the development and implementation of a *Toolkit for Sustainable Port Development in a Blue Economy*, in the Western Indian Ocean region (including South Africa) (UNEP et al. 2024).

7.1.2 Purpose

Considering the proposed port development at Boegoebaai, the TNPA recognizes the importance of the new port being sustainable (green). The purpose of this chapter is to inform sustainability planning for the proposed Port of Boegoebaai. Acknowledging and addressing sustainability early on from the planning phase of a new port development will enable timeous identification of potential challenges and opportunities and inform appropriate interventions and solutions towards achieving sustainability. First a Framework for Sustainable Port Planning and Development (SPP&D) is posed, drawing on best practice (international, regionally and nationally), and aligned with TNPA's current sustainability initiatives. Thereafter, key sustainability criteria specific to the proposed Port of Boegoebaai is provided, including useful information sources to support implementation.

7.1.3 Layout of Document

To achieve the above, this introductory chapter (Chapter 1) is followed by a brief contextualisation of sustainable port development (Chapter 2). Thereafter a SPP&D Framework is provided (Chapter 3), followed by key sustainability requirements applicable to the proposed Port of Boegoebaai. Finally, useful documents from the literature are referenced providing guidance on specific activities that can be undertaken to meet key sustainability criteria for the proposed Port of Boegoebaai, as well as useful information sources to support implementation (Chapter 4).

7.2 Contextualising Sustainable Port Development

7.2.1 Need of Sustainability

Ports, by their very nature, are complex environmental systems given the magnitude of potential impacts associated with their activities, including atmospheric emissions, dredging, wastewater discharges, pollution of natural resources, and solid waste. Environmental impacts can occur due to normal port activities or by accident (Darbra et al. 2004; Darbra et al. 2005). According to the United Nations Conference on Trade and Development (UNTACD) the evolution of seaports comprised five main generations (Kaliszewski 2018), characterised as follows by Lee and Lam (2015):

- 1st generation: Simple loading/unloading operational ports
- 2nd generation: Logistic ports providing various services
- 3rd generation: Ports become part of supply chain, making use of electronic data exchange with customers
- 4th generation: Global e-ports transferring information on a global scale with global standards of cargo handling
- 5th generation: Ports focused on customers and local communities offering deep information technology integration with various stakeholders.

Therefore, in their simplest forms ports (1st generation) operated in areas of uncontested spaces, benefiting from seascapes in which they could be situated safely and cost-effectively without competition (Kaliszewski 2018; Lee et al. 2018). However, society has evolved, with rapid coastal urbanisation, growing global trade, stakeholder emancipation and depletion of natural resources (e.g., through physical alteration and destruction of habitat, pollution, and unsustainable levels of exploitation). As a result, port systems can no longer operate without acknowledging and incorporating societal and environmental considerations in their planning and management, having to strive to become 5th generation ports (Lam and Van der Voorde 2012; Roh et al. 2016). Singapore's Tuas Port, officially opened in 2022, is a good example of an emerging 5th generation port (Maritime Port Authority of Singapore 2024).

Driven by these challenges, concepts such as 'Green Ports' emerged with the primary objective of balancing environmental challenges and economic demand (Bergqvist and Monios 2019; Lam and Notteboom 2014) and striving for greater sustainability through increasing both economic and environmental competitiveness (Maritz et al. 2014). While some claim that sustainable port management must include the broader topic of ecosystem protection (Schipper et al. 2017), others argue that green ports implicitly will lead to positive outcomes on their economic performance (Lam and Van de Voorde 2012). The concept of 'Sustainable Ports' builds on 'Green Ports' by considering social sustainability, in essence advocating the need for port development to create a balance between economic growth, environmental protection and social progress to secure its long-term future (Hiranandani 2014; Taljaard et al. 2021). Therefore, with increasing public and regulatory pressures, ports worldwide are being compelled to pursue **sustainable port development** to safeguard their 'license to operate' and to grow their economic and environmental competitiveness (Lam and Van der Voorde 2012; Roh et al. 2016; Darbra et al. 2004). In addition, climate change - specifically sea-level rise and increased storminess (e.g., Azarkamand et al. 2020) – is becoming a major risk facing ports worldwide that must be addressed towards securing sustainability, both in terms of (i) Adaptation (e.g. upgrading infrastructure and designing new infrastructure to withstand projected climate change impacts) and (ii) Mitigation (e.g. reducing greenhouse gas emissions to contribute to reducing future climate change) (HR Wallingford and British Port Association 2021).

Therefore, sustainable ports can be defined as:

Ports which adhere to the concept of resource saving and environment-friendly development, actively fulfilling its social responsibilities, and comprehensively adopting technologies and management measures that are conducive to saving resources and energy, protecting environment and ecology, and coping with climate change – Guo and Liu (2018)

South Africa also is a signatory to the *International Convention for the Prevention of Pollution from Ships* (1973) of the International Maritime Organization (IMO). Annex VI of the Convention deals with air pollution from ships. As the main international Convention addressing prevention of pollution of the marine environment by ships, it sets the basic regulations for compliance regarding environmental sustainability. As per their 2023 Green House Gas (GHG) Strategy, the IMO aims to reduce CO_2 emissions from international shipping by at least 40% in 2030 (compared with 2008). Further it aims to secure uptake of zero or near-zero GHG emission technologies and fuels to be at least 5% (striving for 10%) of the energy used by international shipping by 2030 (IMO 2023). Ports have a key role to play in achieving this transformation in the energy-maritime value chain, by providing the necessary future infrastructure to support the supply of low and zero carbon fuels at scale for shipping to use and transport.

To this end, Transnet also has committed to climate targets in their Environmental Social & Governance (ESG) Strategy (Transnet 2023). A goal is to achieve net-zero emissions by 2040 with the following interim objectives:

- Reduce carbon footprint by 50% by 2030
- Secure 50% of the financing for decarbonization initiatives by 2026, reaching 100% by 2030
- Complete a climate change vulnerability and risk assessment across the value chain by 2025
- Secure 25% of the financing for climate change adaptation by 2026, increasing to 50% by 2030 and 100% by 2040.

To better understand the type of paradigm shifts required to move from traditional (business-as-usual) port practices to sustainable ports, key differences in typical practices are highlighted in Table 7-1 (Ares Moreno 2018).

Table 7-1: Comparing practices typical of Traditional vs Sustainable Ports (adapted from Ares Moreno 2018)

PRACTICE	TRADITIONAL	SUSTAINABLE
Stakeholders	No meaningful participation of stakeholders or community and normally only during ESIA	Co-creation with communities and stakeholders to generate an added value
Economic driver	Benefits/Economy	Green growth/ Economy, social and environment
Relation with nature	Replacing nature	With nature/develop nature along with port
Mentality	Short term (current benefits)	Long-term (future benefits)
Technology	No use of new and innovative technological developments	Involvement of technological and societal developments to enhance transition towards green growth
Port Authority role	Re-active landlord	Pro-active landlord in development of region and logistic chain
Energy	Energy obtained from fossil fuels	Energy efficiency from alternative (e.g. renewable) sources
Resources	'Take, make and dispose'	Reuse of resources
Air quality	No special measures for reducing air pollution during operation	Improving environmental performance through programmes to reduce emissions to a minimum during operation
Biodiversity	Reduction of negative impact on biodiversity	Enhancement of biodiversity and conservation areas
Cargo	Allowance of any type and origin of cargo	Attract diverse cargo, turnover from non-fossil cargo
Vision of sustainability	Sustainability as a legal obligation	Sustainability as an economic driver where a port is a net benefit, not just about avoiding negative impacts on environment and people, but about providing a net benefit to environment and people (i.e. how can a port be designed and operated to provide a net socio-ecological benefit for a region)
Site location selection	As per land ownership and/or without preliminary studies	As per optimization of material, in harmony with nature, minimum negative biodiversity impact & minimum negative community impacts (e.g., SEA process)

PRACTICE	TRADITIONAL	SUSTAINABLE
Growth approach	Focuses on Gross Domestic Product (GDP) growth	Elimination of sources of inefficiency, promotion of innovation, reboot of new economic opportunities from emergence of new green markets and activities
Environmental impacts	Compensation of impacts	Avoidance of impacts
Sustainable actions extent	Following actual regulations, ESIA	Long-term vision, irrespective of actual regulations
Use of material	No re-use/optimization of material	Use of material efficiently, including naturally present materials and land resources for functional requirements and for added value
Dealing with future uncertainty	Scenario-based planning for making quantitative forecasts	Adaptive planning, including flexibility in planning and design as a means towards sustainability
Design decisions	Based on the project boundaries	Based on understanding whole system
End of life cycle	Subject is left to future generations	Subject is treated from planning phase, reducing restrictions for future urban redevelopment

As illustrated in Table 7-2, these practices can be overarching across the port development cycles, but also can be associated with specific stages in this cycle across planning, design, construction and operations.

Table 7-2: Relevance of practices within the port development cycle (Adapted from Ares Moreno 2018)

PRACTICE	PORT DEVELOPMENT STAGE				
	Overarching	Planning	Design	Construction	Operations
Stakeholders		●	●	●	●
Economic driver	●				
Relation with nature			●		
Mentality	●				
Technology				●	●
Port Authority role	●		●		
Energy					●
Resources				●	●
Air quality					●
Biodiversity		●	●		
Cargo					●
Vision of sustainability	●				
Site location selection		●			
Growth approach	●				
Environmental impacts	●	●	●		
Sustainable actions extent	●				
Use of material		●	●	●	
Dealing with future uncertainty	●				
Design decisions			●		
End of life cycle		●	●		

The need for greater sustainability in ports, already has taken root in South Africa. As one of the five operating divisions of Transnet SOC Ltd, the TNPA is required to deliver on numerous strategic deliverables included in Transnet's Shareholder's Compact with the South African Government, including **sustainable economic, social and environmental outcomes** (Transnet 2024). Towards addressing this commitment, the TNPA has embarked on the installation of solar technologies to alleviate the country's power challenges and to support greener operations in its ports. This includes the greening of energy sources at lighthouses to assist with vessel navigation of vessels along the coast and within port limits. However, much still needs to be done to fully embrace sustainability in South African ports. To inform this process, this chapter proposes a Framework for Sustainable (Green) Port Planning & Development (SPP&D), as well as key sustainability requirements for the proposed Port of Boegoebaai.

7.2.2 *Policy and Legislative Obligations*

Agenda 2030 Sustainable Development, as adopted by all United Nations Member States in 2015, provides a shared blueprint for **global sustainability** offering peace and prosperity for people and the planet, now and into the future. At the centre of Agenda 2030 are the 17 Sustainable Development Goals (SDGs) urgently calling for action by all countries - developed and developing - in a global partnership (Figure 7- 1). The SDGs recognise that efforts to end poverty and other deprivations must go together with strategies that improve health and education, reduce inequality, and spur economic growth, while tackling climate change and working to protect the natural environments (UN 2015). Figure 7-1 illustrates how the SDGs relate to (1) the natural resource base (2) sustainable production and consumption, and equitable distribution of goods and services, and (3) poverty and human well-being (Lucas and Wilting 2018).

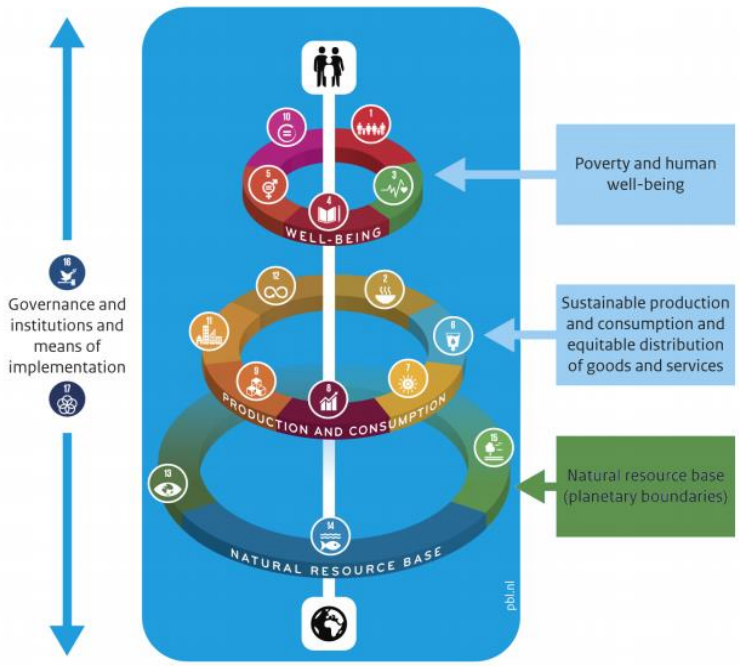

Figure 7-1: UN's SDGs as it relates to (1) the natural resource base (2) production and consumption, and (3) well-being (Source: Lucan and Wilting 2018)

Sustainable development also is a key aspiration of *Agenda 2063: The Africa We Want*, Africa's blueprint and master plan for transforming the continent into a future global powerhouse by 2063 (African Union 2015). Agenda 2063 provides *"the shared strategic framework for inclusive growth and* ***sustainable development*** *& a global strategy to optimize the use of Africa's resources for the benefit of all Africans",* including Africa's port environments. Seven Aspirations encapsulates Agenda 2063, with Aspiration 1 calling for a *'A prosperous Africa based on inclusive growth and sustainable development'*, defined by a set of goals and priorities as set out in Table 7-3.

Table 7-3: Goals and priorities for Agenda 2063's Aspiration 1: 'A prosperous Africa based on inclusive growth and sustainable development' (African Union 2015)

GOAL	PRIORITY
A high standard of living, quality of life and wellbeing for all citizens	• Incomes, jobs and decent work • Poverty, inequality and hunger • Social security and protection, including persons with disabilities • Modern, affordable and liveable habitats and quality basic services
Well educated citizens and skills revolution underpinned by science, technology and innovation	• Education and science, technology and innovation (STI) driven skills revolution
Healthy and well-nourished citizens	• Health and nutrition
Transformed economies	• Sustainable and inclusive economic growth • STI driven manufacturing, industrialization and value addition • Economic diversification and resilience • Tourism/Hospitality
Modern agriculture for increased productivity and production	• Agricultural productivity and production
Blue/ocean economy for accelerated economic growth	• Marine resources and energy • Port operations and marine transport • Marine energy and mining
Environmentally sustainable and climate resilient economies and communities	• Sustainable natural resource management • Biodiversity conservation, genetic resources and ecosystems • Sustainable consumption and production patterns • Water security • Climate resilience and natural disasters preparedness and prevention • Renewable energy

South Africa is a signatory to both the 2030 Agenda for Sustainable Development and the African Union Agenda 2063, and therefore committed to a sustainable development future. At its core sustainable development strives for good governance, environmental responsibility, social equitability and economic viability. It can therefore be argued that legislation that underpins these aspirations, implicitly supports sustainability. Within the South African context, an array of legislation exists in support of responsible and sustainable use of the country's natural resources. Specifically focusing on the coastal and marine environment, the larger domain within which ports are situated, Taljaard et al. (2019) provided a detailed overview of relevant international obligations, as well as key national legislation and policies applying to sound coastal management spanning numerous sectors overlapping in the coastal spaces, including ports and shipping (Figure 7-2) (see Appendix A for details).

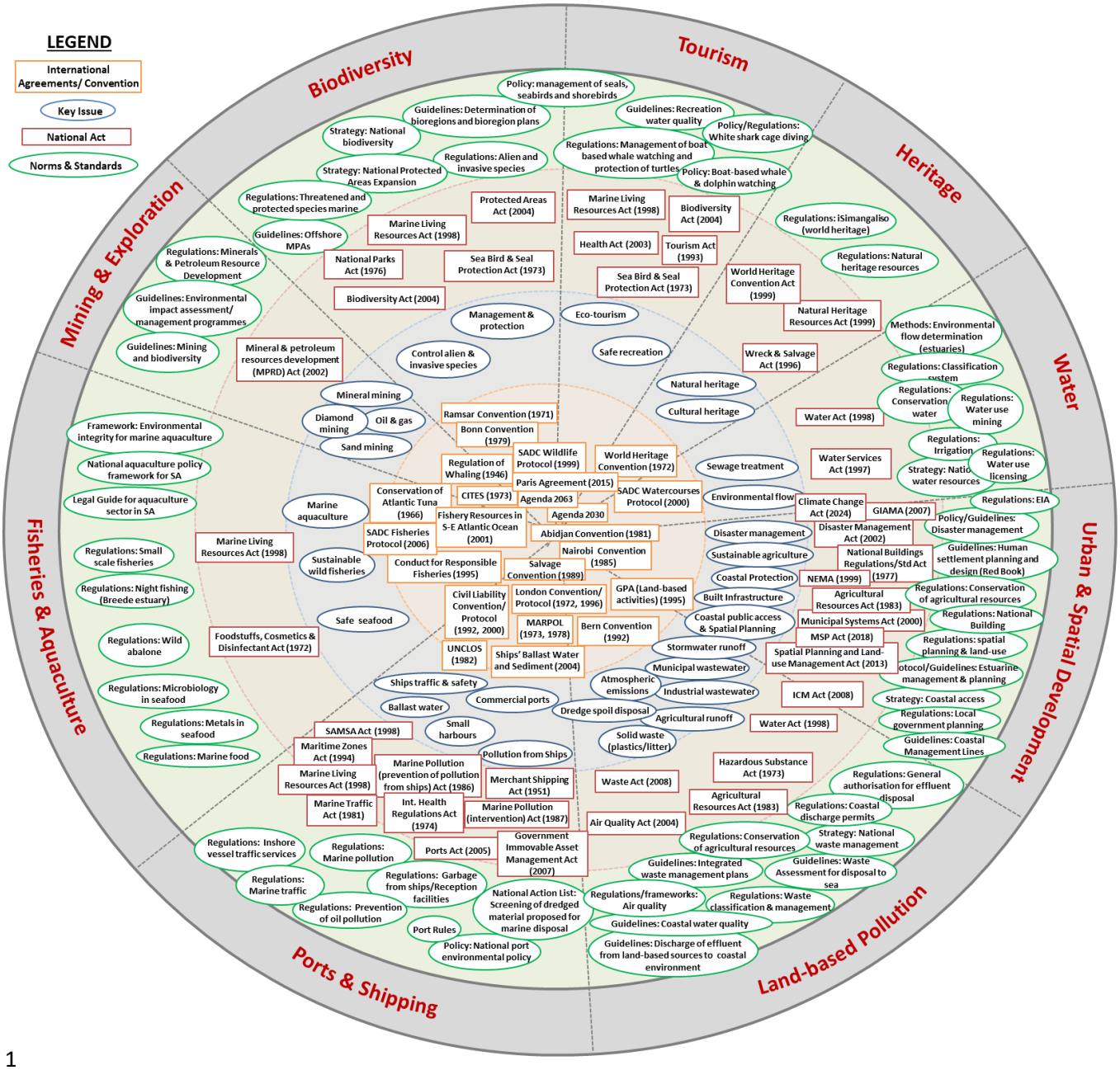

Figure 7-2: Overview of legal landscape governing protection and sustainable use of South Africa's coastal and marine environment (adapted from Taljaard et al. 2019)

As shown in Figure 7-2, legislative obligations pertaining to sustainable development can be vast, especially when including numerous other pieces of legislation, dealing with specific social and economic aspects, that also influence sustainability. Therefore, it is useful to identify the priority pieces of legislation in support of sustainable port development, considering key processes and activities to be governed within commercial ports as listed in Table 7- 4.

Table 7-4: Priority pieces of South African legislation in support of sustainable port development, considering key processes and activities to be governed within commercial ports (adapted from Taljaard et al. 2019)

SECTOR	ACT	LEAD AGENT	SHORT DESCRIPTION
Port & Shipping	National Ports Act (No. 12 of 2005)	Transport (through National Port Authority)	Provides for management of commercial ports, including environmental matters.
	South African Maritime Safety Authority Act (No. 5 of 1998)	Transport	Provides for establishment and functions of the South African Maritime Safety Authority (SAMSA)
Conservation	National Environmental Management: Biodiversity Act (Act 10 of 2004)	Environment	Provides for conservation of biological diversity and regulates the sustainable use of biological resources and to ensure a fair and equitable sharing of the benefits arising from the use of genetic resources.
	National Environmental Management: Protected Areas Act (No. 57 of 2003)	Environment	Provides for protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes.
Heritage	National Heritage Resources Act (No. 25 of 1999)	Environment (through South African Heritage Resources Agency)	Provides for an integrated and interactive system for management of national heritage resources (which include landscapes and natural features of cultural significance), providing opportunity for communities to participate in identification, conservation and management of cultural resources.
Water	National Water Act (No. 36 of 1998)	Water	Provides for protection of aquatic ecosystems of water resources, including estuaries.
	Water Services Act (No. 108 of 1997)	Water & Sanitation	Provides for right of access to basic water supply and basic sanitation necessary to secure sufficient water and an environment not harmful to human health or well-being.
Urban & spatial development	Climate Change Act (No. 22 of 2024)	Environment	Enables development of an effective climate change response and a long-term, just transition to a low-carbon and climate-resilient economy and society for South Africa in context of sustainable development
	Disaster Management Act (No. 57 of 2002)	Cabinet	Provides for integrated and co-ordinated disaster management policy that focusses on preventing or reducing the risk of disasters, mitigating the severity of disasters, emergency preparedness, rapid and effective response to disasters and post-disaster recovery.
	Local Government: Municipal Systems Act (No. 32 of 2000)	Provincial and Local Government	Provides for integrated development planning intended to encompass and harmonise planning over a range of sectors such as water, transport, land use and environmental management.
	Spatial Planning and Land Use Management Act (No. 16 of 2013)	Rural Development and Land Reform	Provides for a framework to govern planning permissions and approvals, sets parameters for new developments and provides for different lawful land uses.
	National Environmental Management Act (No. 107 of 1998)	Environment	Provides that sensitive, vulnerable, highly dynamic or stressed ecosystems require specific attention in management and planning procedures, especially where subjected to significant human resource usage and development, through mandating EIAs for specific listed activities.
	Marine Spatial Planning Act	Environment	Provides national framework for marine spatial planning and for development of marine spatial plans and for institutional

SECTOR	ACT	LEAD AGENT	SHORT DESCRIPTION
	(No. 16 of 2018)		arrangements required for governance and implementation.
	National Environmental Management: Integrated Coastal Management Act (No. 24 of 2008)	Environment	Provides for (amongst other matters) development and use of coastal resources that is socially and economically justifiable and ecologically sustainable.
Marine- and Land-based pollution	National Environmental Management: Integrated Coastal Management Act (No. 24 of 2008)	Environment	It stablishes a system of integrated coastal and estuarine management in South Africa to promote the conservation of the coastal environment and maintain the natural attributes of coastal landscapes and seascapes, and to ensure that development and the use of natural resources within the coastal zone is socially and economically justifiable and ecologically sustainable. Specifically, it controls dumping at sea (including dredge disposal), land-based pollution, inappropriate development and other adverse effects on coastal environment.
	National Environmental Management: Waste Act (No. 59 of 2008)	Environment	Regulates (solid) waste management to protect health and environment by providing reasonable measures for prevention of pollution and ecological degradation and for securing ecologically sustainable development.
	National Environmental Management: Air Quality Act (No. 39 of 2004)	Environment	Regulates air quality to protect environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development.
	National Water Act (No. 36 of 1998)	Water	Identifies certain land uses (e.g. activities resulting in stream-flow reduction such as afforestation and cultivation of crops), infrastructural developments (e.g. altering the bed, banks, course or characteristics of a watercourse), water supply/demand and waste disposal to estuaries (from land-based activities) as 'water uses' that require authorisation (licensing)
	Hazardous Substances Act (No. 15 of 1973)	Health	Provides for control of substances which may cause injury or ill health to, or death, of human beings by reason of their toxic, corrosive, irritant, strongly sensitising or flammable nature.
	Marine Pollution (Control and Civil Liability) Act (No. 6 of 1981)	Transport (prevention) and Environment (combating)	Provides for protection of marine environment from pollution by oil and other harmful substances
	International Health Regulations Act (No. 28 of 1974)	Ports Authority	Requires seaports to be provided with a system for removal and disposal of excrement, refuse, wastewater, condemned food and other matter dangerous to health.

7.2.3 Embedding Sustainability in Port Development Cycle

Traditionally, capital in ports mostly comprised physical infrastructure, operations & management, and services as described by Taneja et al (2012) in their port infrastructure system (referred to as the port 'inframodel'). Taljaard et al (2021) offered a conceptual change by including natural (environmental) infrastructure as another integral capital to consider within the port system, as conceptualised in Figure 7-3.

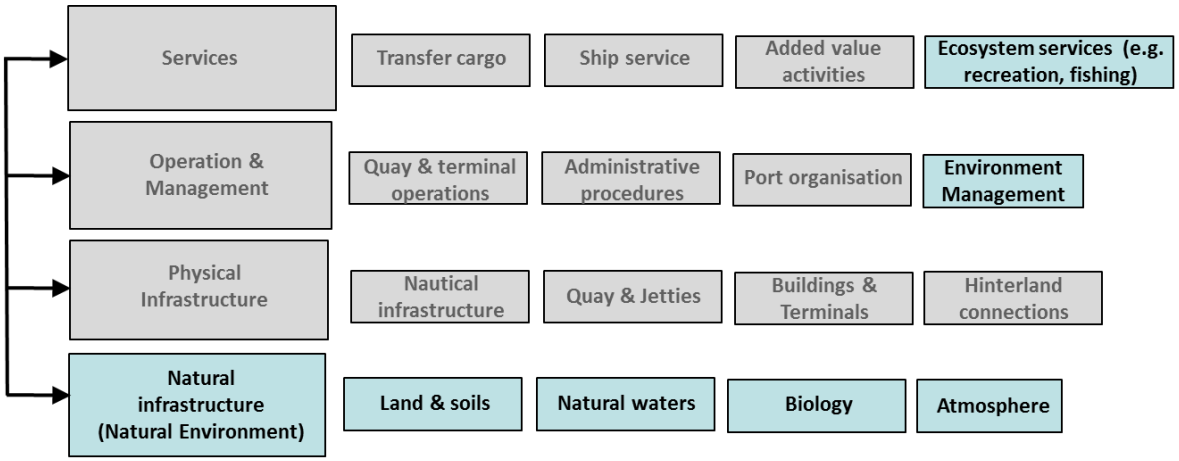

Figure 7-3: Positioning natural (environmental) infrastructure (blue shaded cells) in port inframodel (Source: Taljaard et al. 2021)

In this extended port inframodel, it is not only aspects within the natural infrastructure layer that is incorporated, but the operation and management, and services layers also expand. For example, *environmental management* becomes an integral component in port management and operations, with services no longer only relate to shipping and added value activities, but also recognise other ecosystem services within sheltered coastal environments occupied by ports, including benefits such as, recreation, fishing and serving as nursery areas to various marine biota (Taljaard et al. 2021). Therefore, instead of environmental (including social) issues being viewed as 'add-ons', often perceived as 'green handbrakes' to development and growth, the natural environment becomes an 'equal partner' in the port system (Audouin et al. 2011; Taljaard et al. 2021) allowing for sustainability (including environmental and social) considerations to be timeously addressed, acknowledged and incorporated in the port planning and management (de Boer et al. 2019).

Taljaard et al. (2021) proposed a framework for Integrated Port Management (IPM Framework) that conceptualises alignment of various environmental (including social) assessment processes with the port development phases (Figure 7-4). Specifically, these include **strategic environmental assessment** (SEA) (e.g., Dublin Port Company 2012a, 2012b), **environmental and social impact assessment** (ESIA), and **environmental management systems** (EMSs) (e.g., Gupta et al. 2005; Darbra et al., 2004; Darbra et al., 2005; Hossain 2018; Lawer et al. 2019) and **sustainability performance assessments** (e.g., Taljaard et al. 2024a), embracing inclusion of the SDGs of Agenda (2030) (e.g., Nitsenko et al. 2017).

The IMP Framework recognizes the different time frames in the port development cycle, where the larger cycle, involving site selection, planning, design and construction of new or expansive port infrastructure, represents stages typically occurring at 5-year (or longer) intervals (i.e. longer time scales). The smaller cycle (operations and maintenance and monitoring and auditing) nested within the larger cycle, represents the stages that occur continuously, on much shorter (i.e. day-to-day) time scales (Taljaard et al. 2021). Therefore, to achieve more sustainable ports, key environmental processes must become integrated into port development processes as early as during site selection (e.g. SEAs), through design and construction (e.g. EIAs), operations (EMS) and ultimately monitoring and auditing (Sustainability performance assessment). Also, flow of information and knowledge among various environmental assessment processes is critical for continual improvement to sustainable environmental practice through learning-by-doing. The solution, therefore, requires proper alignment and inclusion of environmental matters in port development, but also continuity and coordination across the different environmental assessment processes, as conceptualised in the IPM Framework (Figure 7-4).

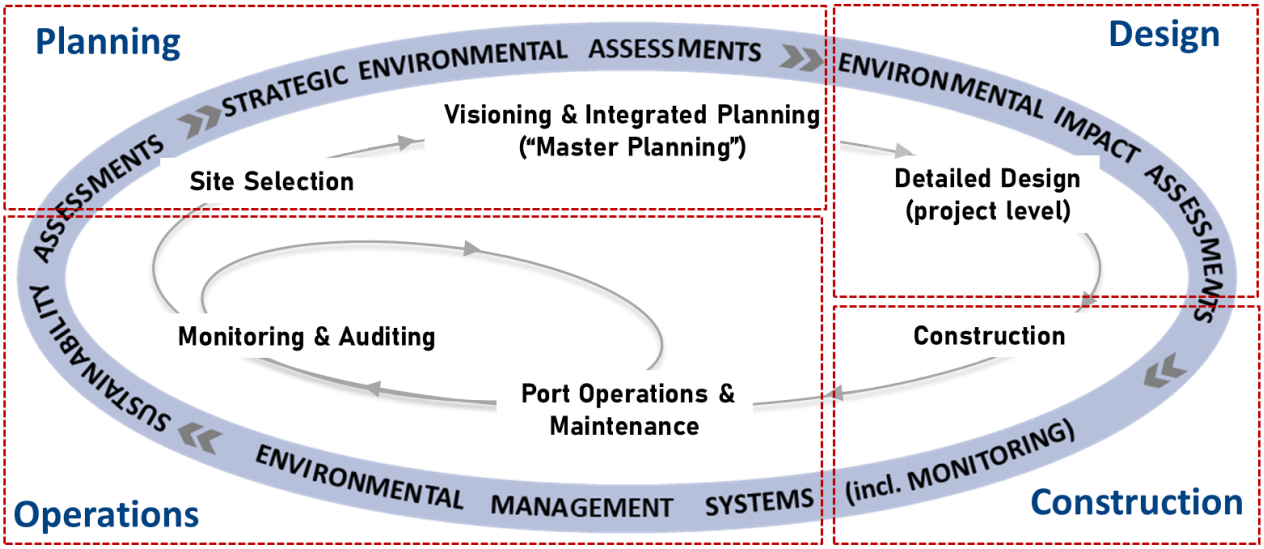

Figure 7-4: Key environmental (including social) assessment processes allowing for continuous consideration of sustainability matters across with various traditional port development stages, depicted as a IPM Framework (Source: Taljaard et al. 2021 & UNEP et al. 2024)

The acquisition of environmental data and information - underpinning all environmental and social assessment processes in ports - is expensive. Thus, institutional investment to develop coordinated long-term port monitoring strategies across the various assessment processes is critical. In doing so, the monitoring programme can be coordinated and conducted in a cost-effective manner geared for multi-purpose use. Finally, the value of investing in accessible institutional **environmental data and information management systems** to facilitate cross-sectoral flow of information and knowledge informing decision-making towards improving port sustainability should not be underestimated (Taljaard et al. 2021).

7.2.4 Implementation Mechanisms and Funding Opportunities

Implementation mechanisms that can be employed by relevant authorities to facilitate effective operationalisation of sustainable port measures and actions by operators, tenants, ships and land transport can be grouped broadly into (Table 7- 5):

- Regulations and standards *(ultimate backstop for sustainability and technological implementation)*
- Incentives and disincentives including grants
- Voluntary and compulsory agreements
- Training and information sharing.

Table 7-5: Implementation mechanisms for sustainable port development (Source: Alamoush et al. 2021)

MECHANISM	EXAMPLE
Regulations and standards	• International conventions and agreements • National regulations and standards • Port specific standards, procedures and guidelines
Incentives and disincentives	• Indices to incentivise ship and port operators who implement safety, security, and environmentally friendly measures (e.g., environmental shipping index - ESI) • Extra tariffs on polluters to incentivise cleaner performance (Warning: Without uniform application disincentive can compromise port competitiveness)
Voluntary and compulsory agreements	• Compulsory agreements with port operators, ships, and land transport, through concession contracts and licences to operate, that must include sustainability actions and measures • Voluntary agreements (e.g., speed reductions when approaching port, stakeholder involvement)
Training and information sharing	• Outreach of sustainability awareness to employees, port operators, ships and land transport • Develop training courses and seminars aim at changing behaviour toward better uptake of sustainability actions • Disseminate sustainability information and promote the sustainable port concept (e.g., seminars) within adjacent communities

In essence, sustainable port development aims to be environmentally responsible, socially equitable and economically viable, ultimately to safeguard a port's 'license to operate' and to grow its competitiveness (Lam and Van der Voorde 2012; Roh et al. 2016; Guo and Liu 2018). While it is argued that sustainable port development implicitly will lead to positive outcomes on economic performance (Lam and Van de Voorde 2012; Alamoush et al. 2021), 'sustainable' best practice typically comes with higher initial costs, often making motivation for feasibility an obstacle because project funding is traditionally based on short-term financial gain. This is especially relevant in developing regions of the world where public financial resources are often limited. Therefore, innovation in acquiring additional financial resources is critical for effective sustainable port development, including (Ares Moreno, 2018) for example:

- Blended finance - strategically using development finance to mobilise additional finances towards sustainable port development in developing countries
- Investment from stakeholders - operators, municipalities or industries investing especially where there is added value
- Green Bonds – such as offered by development banks (e.g. World Bank, South African Development Bank).

Further, international banks, insurers, and investors often source investment opportunities linked to sustainable development, including (UNEP-FI 2021):

- Green transport
- Green technology
- Responsible spatial management (considering sensitive natural ecosystems)
- Green supply chains
- Emissions incentives.

In order to access these funding opportunities early design plan must clearly indicate sustainability end points. The processes and tools discussed in this chapter provide guidance in this regard.

7.2.5 Sustainability Performance Assessment and Reporting

In 2015 the United Nations adopted the 2030 Agenda for Sustainable Development with 17 Sustainable Development Goals (SDGs) (UN 2015). With the adoption of these goals, it became necessary to embed these concepts in port planning and operations and to develop tools to measure progress, and so the concept of **sustainability performance assessment** emerged (Sala et al. 2015; Villeneuve et al. 2017). Various sustainability assessment tools have been developed, including the Sustainable Development Analytical Grid, which is recognised by the UN as part of their SDG Acceleration Toolkit (UNDG 2019). Not surprisingly, sustainability performance assessment has been finding its way into port systems globally, aligned with the SDGs of Agenda 2030 (e.g. Nitsenko et al. 2017). It has featured in numerous research studies ranging from the selection of port-specific indicators or criteria (e.g., Peris Mora et al. 2005; Shiau and Chuang 2015; Lu et al. 2016; Roh et al. 2016; Puig et al. 2017; Roos and Neto 2017; Stein and Acciaro 2020; Fobbe et al. 2020) to performance assessment methods (e.g., Lirn et al. 2013; Chiu et al. 2014; Asgari et al. 2015; Laxe et al. 2017; Schipper et al. 2017; Xiao and Lam 2017; Chen and Pak 2017; Oh et al. 2018; Brunila et al. 2023). However, formal top-down approaches often applied to sustainability performance assessment, come with challenges as their universal, techno-scientific approaches often become difficult to apply in local or smaller-scale contexts - sustainability may mean different things to different people (James 2015; Bell and Morse 2018), often discouraging place-based application.

To address this challenge, Taljaard et al. (2024a), in collaboration with the TNPA, developed a port sustainability performance (PSP) Index that combines global comparability and local relatability for use in sustainability performance assessment and reporting (Figure 7-5). In constructing the globally comparable framework for the PSP Index, they used the *four key pillars of sustainability* (governance, environment, social and economic) as main dimensions and recognisable (port related) *sustainability outcomes* as sub-categories, matched with globally representative sustainability indicators.

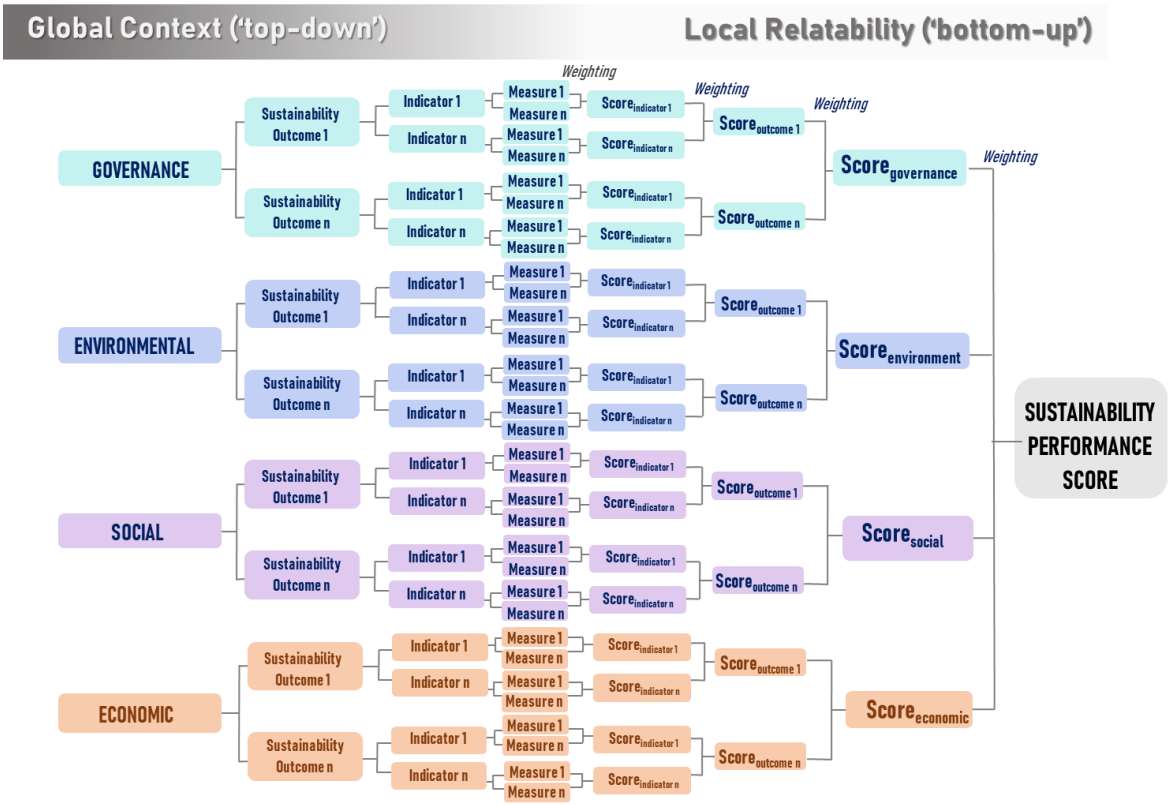

Figure 7-5: Conceptualisation of PSP Index, showing globally comparable dimensions, sustainability outcomes, and representative indicators, matched with locally relatable measures scored against agreed targets (Source: Taljaard et al. 2024a)

To achieve localisation of the PSP index, a set of locally relatable measures and agreed targets were identified, in this case by the TNPA through interaction with staff from the Economics, Planning and Development, Project Delivery unit, Security, Utilities Development, Real Estate, New Business Development, Port Operations, Harbour Master, Human Resource, Customer Relation Management and Corporate Affairs. In many instances the TNPA could use data and information already being monitored in ports for legal and/or auditing purposes, it just required re-orientation into the four-pillar, sustainability outcome structure that has been globally adopted for science-based sustainability performance assessments (see Taljaard et al. 2024a for details).

A simple spreadsheet model is used to capture performance ratings for each of the measures using an incremental rating system to quantify performance against agreed targets. This incremental rating system ranges from full compliance [4] to targets to non-compliance [0]. For ease of interpretation, the rating allocated to a measure (i.e. potentially ranging from 0 to 4) is then normalised to 100 (4 = 100; 0 = 0). These are then aggregated to derive scores for selected sustainability outcomes, and finally for specific sustainability pillars, and finally into an overall sustainability performance score that can be used for temporal (within a port) or spatial (across ports) comparisons provided that the same measures, targets and ratings systems are applied. To visually display outputs a radar diagram is used showing performance per suitability outcomes within each of the four pillars of sustainability - so-called *Circles of Port Sustainability* (Figure 7-6).

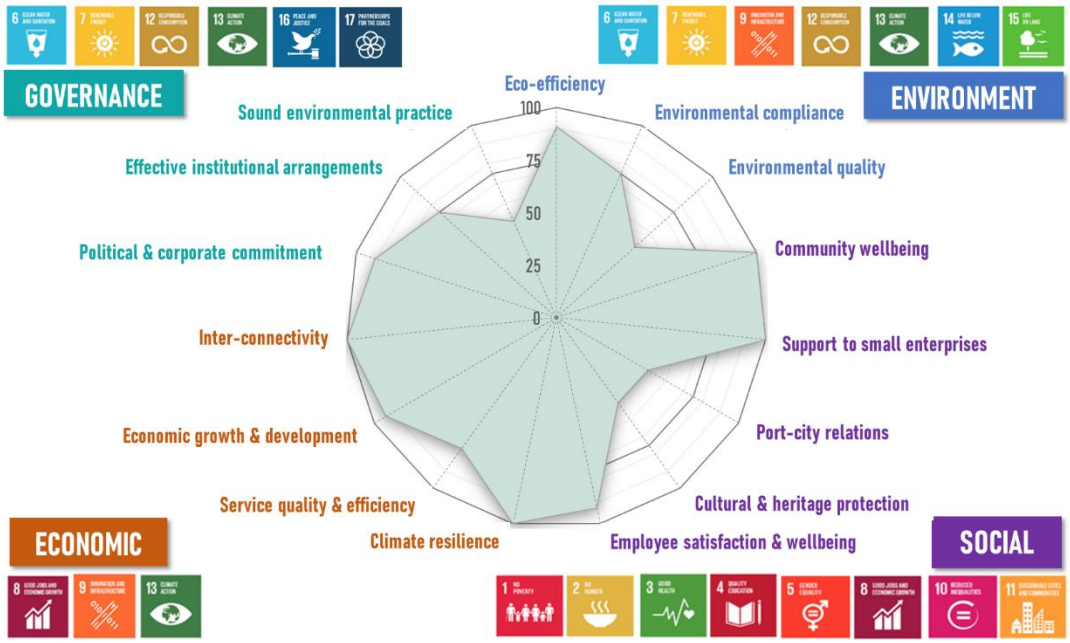

Figure 7-6: Demonstration of *Circles of Port Sustainability* visualizing a port's performance against various sustainability outcomes (expressed as a percentage, where 100% reflects full compliance) (Source: Taljaard et al. 2024a)

Further, it addresses alignment with SDGs. This method, therefore, provides an easy-to-use and structured approach for **reporting on port sustainability performance**, both over time in a specific port, or for comparing performance across ports, provided that the same indicators, measures, targets are applied. The application of the PSP Index in sustainability reporting and assessment has been pilot tested in the Port of Ngqura (TNPA 2024) as part of an initiative funded through UNEP Nairobi Convention Secretariat aimed at promoting sustainable port development in the Western Indian Ocean (UNEP et al. 2024). This PSP Index has been successfully pilot tested by the TNPA's Environment and Sustainability Unit in the Port of Ngqura.

7.3 Framework for Sustainable Port Planning & Development

Importantly, a SPP&D Framework needs to align with the thinking and sustainability approaches, both internationally and nationally. To best achieve this, two key aspects are important (i) Ensure alignment of port development stages with related environmental (including social) assessment processes, and (ii) Align SPP&D Framework (developed in this report and aimed at informing new port developments such as the proposed Port of Boegoebaai) with sustainability performance assessments currently undertaken by TNPA's Environment and Sustainability Unit in operational ports (e.g. Port of Ngqura). Therefore, it is best to coordinate and align initiatives to ensure a structured, standardised approach for sustainability across TNPA, from new port development through to operational ports. Failing to do so may result in various port initiatives having its own measures and targets towards achieving sustainability.

To ensure continuity between port sustainability planning (e.g. for new port development or expansion in existing ports) and sustainability performance assessment and reporting (e.g. for operational ports) such initiative needs to be aligned. For this reason, the SPP&D Framework developed in this report for new port developments such as the proposed Port of Boegoebaai, draws strongly on learning gained through the development of the PSP Index (Taljaard et al. 2024a), and its localization for the South African situation in collaboration with TNPA (coordinated through the Environment & Sustainability Department). To achieve such alignment, the SPP&D, therefore was framed similar to the PSP Index. First the four key pillars of sustainability (that is governance, environment, social and economic) are used as their main dimensions, reflecting the primary goals of sustainability, that is *good governance, environmental responsibility, socially equitability, and economic viability* (Stein and Acciaro 2020). Within each of these dimensions, logical *sustainability outcomes* are defined, also derived from international best practice and considered most identifiable and relevant to port systems (Taljaard et al. 2024a) (Figure 7-7). A description of sustainability outcomes, customized for the proposed Port of Boegoebaai, in provided in Table 7- 6.

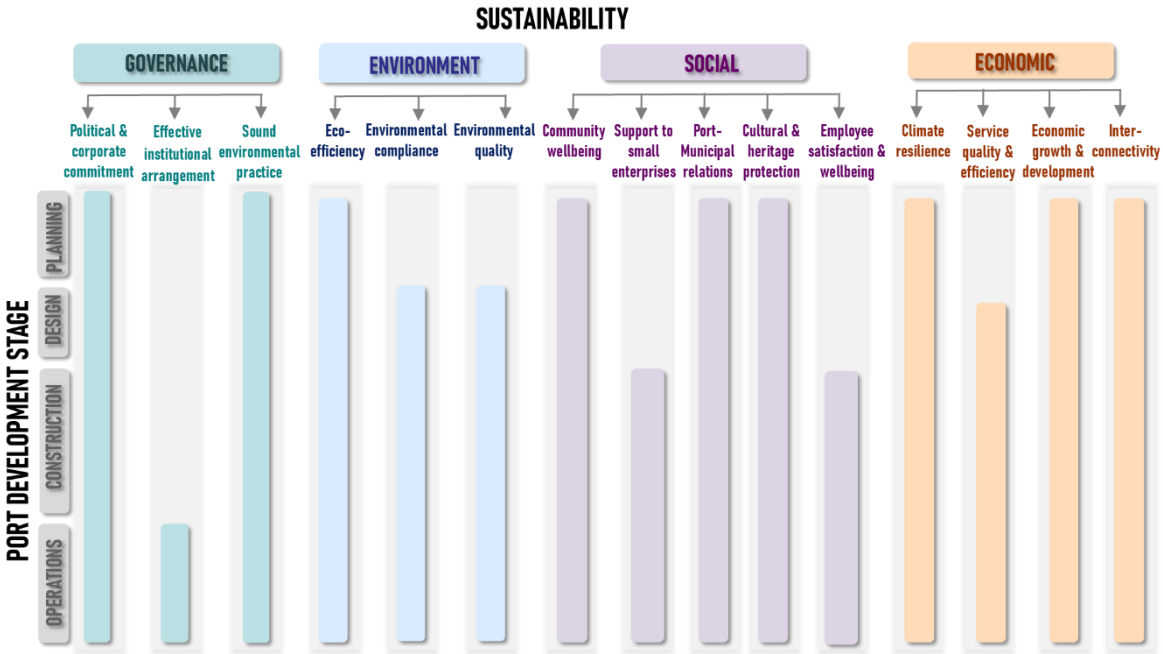

Figure 7-7: Framework for Sustainable Port Planning & Development, showing key sustainability domains (governance, environment, social and economic) and associated sustainability outcomes, as well as anticipated relevance across various stages in a port development cycle

Table 7-6: Description of key sustainability outcomes within each of the four key dimensions of sustainability presented in the SPP&D Framework, applicable to proposed Port of Boegoebaai - related SDGs listed in brackets (Source: Taljaard et al. 2024a)

DIMENSION	SUSTAINABILITY OUTCOME	DESCRIPTION
GOVERNANCE	Political & corporate commitment (SDG 16, 17)	Legislative framework and policies in place to enforce sustainability, with formal organizational commitment supported by dedicated resource allocations
	Effective institutional arrangement (SDG 16, 17)	Dedicated in-house institutions established to oversee sustainability matters, including engagement with port customers, related stakeholders outside port boundaries
	Sound environmental practice (SDG 6, 7, 9, 12, 13)	Formal environmental assessment processes are undertaken, with measures in place for effective implementation, such as management plans/ programmes, standard operating procedures, and contingency plans
ENVIRONMENT	Eco-efficiency (SDG 6, 7, 9, 12, 13)	Implementation of technologies supporting, for example efficient water use, mitigates climate change (e.g. emissions and fuel efficiency), using eco-friendly materials, minimizing/recycling waste, as well as greening and efficient land-use within ports
	Environmental compliance (SDG 6, 9, 12)	Effective compliance and enforcement to minimize potential environmental impact (e.g. through atmospheric emissions, waste and wastewater discharges, or spills) through sound environmental management systems and regular environmental audits
	Environmental quality (SDG 14, 15)	Good environmental health maintained, including air quality, water and groundwater quality, soil and sediment quality and habitat/biodiversity
SOCIAL	Community wellbeing (SDG 1, 2, 3, 8)	Wellbeing of affected communities are addressed (including access to support livelihoods, where appropriate), with open communication channels and community-based environmental education and awareness
	Support to small enterprises (SDG 1, 8)	Support to sustainability-related community and small business enterprises
	Port-Municipal relations (SDG 11)	Effective collaboration and communication across port-municipal nexus
	Cultural & heritage protection (SDG 11)	Protection of cultural heritage assets, including areas used for traditional practices
	Employee satisfaction & wellbeing (SDG 4, 5, 8, 10)	Wellbeing of employees are addressed in terms of health, safety, job security, and equity including open communication channels with adequate training, and education and awareness programmes
ECONOMIC	Climate resilience (SGD 13)	Climate change (CC) preparedness in terms of infrastructure and operations, as well as effective early warning climate systems
	Service quality & efficiency (SDG 9, 12)	Satisfied customers, achieved through good port infrastructure, technological efficiency, as well as sound port and cyber security
	Economic growth & development (SDG 8, 9)	Economically viable port, reflected in good revenue generation, growth opportunities and tax generation
	Interconnectivity (SDG 8, 9)	Well-connected port, both in terms of hinterland connectivity and international port connectivity (block chain), as well as regional infrastructure integration

The achievement of these sustainability outcomes does not occur automatically, it needs to be planned for and implemented by port authorities and other related role players across various components within the port development as depicted in the IPM Framework (Figure 7-4). These components can broadly be grouped into four key stages, that is planning, design, construction, and operations (e.g. Ares Moreno 2018, UNEP et al. 2024). The SPP&D Framework, therefore, also reflects alignment between *port development stages* and various *sustainability outcomes* (Figure 7-7). As is evident, a significant number of sustainability outcomes spans all stages of port development. For example, within the *governance* dimension, *political and corporate commitment* must feature early on in planning stages, already addressing commitment to sustainability at site selection and master planning; Similarly *Eco-efficiency* (*Environment* dimension), *Community wellbeing, Port-city relations*, and *Cultural and heritage protection* (*Social* dimension), and *Climate resilience, Economic growth & development* and *Inter-connectivity*

(*Economic* dimension) must be addressed from the early planning stage. Within this SPP&D Framework, details on **key requirements for securing related sustainability outcomes in the proposed Port of Boegoebaai is provided in the next section.**

7.4 Sustainability Planning for Proposed Port of Boegoebaai

7.4.1 Key Sustainability Criteria

To ensure further alignment between port sustainability planning (e.g. for new port development or expansion in existing ports) and sustainability performance assessment and reporting (e.g. for operational ports), it is not only important to frame planning and performance in a similar manner. Also critical is the alignment of key sustainability requirements within planning (i.e. SPP&D Framework) with the indicators, measures and targets applied in performance assessment (i.e. PSP Index - Taljaard et al. 2024a). As a result, the *key sustainability requirements* for the proposed Port of Boegoebaai, were largely informed by the sustainability indicators and measures applied the PSP Index, as derived in consultation with the TNPA (see Taljaard et al. 2024a for details). The key sustainability criteria for the proposed Port of Boegoebaai are presented in Tables 7-7 to 7-10. These are organised into the four pillars of sustainability and associated sustainability outcomes (see Table 7- 6), also showing alignment with relevant SDGs.

Table 7-7: Key criteria towards achieving sustainability outcomes within the governance dimension (adapted from Taljaard et al. 2024a)

GOVERNANCE		
Sustainability Outcome	**Related SDGs**	**Key Criteria**
Political & corporate commitment	16: Peace, Justice and Strong Institutions 17: Partnerships for the Goals	• **Legislative framework in place to enable sustainable planning, development, and operations in ports** (see Appendix A on national legislation and policies potentially applying to port environments) • **Organizational culture towards sustainable development** (e.g. adopting a TNPA sustainability outcomes framework), e.g. establish supply chain partnerships for ensuring CSR values throughout chain • **Dedicated budget allocation for sustainable development**, through: - Funding allocated to environmental issues (e.g. monitoring and reporting) - Funding allocated to social issues (e.g. Corporate Social Investment) • **Public communication mechanisms in place** through transparent internal and external communications (e.g. media releases and public documents reporting on environmental and social matters (e.g. TNPA News Bulletin)
Effective institutional arrangements	16: Peace, Justice and Strong Institutions 17: Partnerships for the Goals	• **Formal in-house institutions overseeing sustainability matters** through: - Dedicated department addressing sustainability - TNPA Sustainability Forum at port level • **Dedicated institution to engage with port customers** (tenants/terminal operators) through: - TNPA customer engagement meetings implementation at port level • **Dedicated institution to engage with stakeholders** outside port boundaries through: - Port consultative forum or committee • **Dedicated collaborative arrangement between port & adjacent local authority** through MoU or other formal arrangement
Sound management practice	6: Clean Water and Sanitation 7: Affordable and Clean Energy 9: Industry, Innovation and Infrastructure 12: Responsible Consumption and Production 13: Climate Action	• **Environmental assessment and management through the project lifecycle**, through: - Strategic Environmental Assessment and Environmental Screening in the conceptual planning and pre-feasibility stage - Environmental Impact Assessment at a project level in the Feasibility Phase with associated Environmental Management Plans (EMP) for the construction and operations phases - Environmental Management System implemented for the operations phase, e.g. Transnet Integrated Management Systems (TIMS) • **EMPs and/or Standard Operational Procedures (SOPs) addressing sustainability** (incl. monitoring) prepared and effectively implemented for: - Air quality - Marine environmental quality - Soil/groundwater - Biodiversity management

GOVERNANCE		
Sustainability Outcome	**Related SDGs**	**Key Criteria**
		- Wastewater - Solid Waste, including marine litter and - Hazardous Waste - Hull cleaning - Ballast water - Dredging (Capital and Maintenance) - SMME (small, medium, and micro-enterprises) • **Contingency planning** through: - Oil/fuel spill management - Emergency preparedness plan to ensure business continuity

Table 7-8: Key criteria towards achieving sustainability outcomes within the environment dimension (adapted from Taljaard et al. 2024a)

ENVIRONMENT		
Sustainability Outcome	**Related SDGs**	**Key Criteria**
Eco-efficiency	6: Clean Water and Sanitation 7: Affordable and Clean Energy 9: Industry, Innovation and Infrastructure 12: Responsible Consumption and Production 13: Climate Action	• **Water use efficiency** through: - Integration of desalination planning into the port design - Generation of water from alternative resources (e.g., desalination) - Monitor and ensure water use efficiency by TNPA, tenants and Capital Projects • **Energy efficiency** through: - Produce and/or source renewable energy sources (solar, wind green hydrogen) - Monitoring and minimise of energy consumption by TNPA & tenants - Encourage third parties to avoid or reduce use of fossil fuels and use renewable energy • **Selection and procuring eco-friendly materials** through supply-chain that promotes such use • **Waste management** (recycling of other waste) through optimising port processes/ operations/services to avoid, recycle and/or minimise waste (e.g. grey water recycled) • **Recycle/minimize construction and building waste** (circular economy concept) • **Efficient and responsible land/sea use** (spatial planning through implementing efficient occupation planning and consider sensitive ecosystems & areas of cultural importance) • **Climate mitigation** through: - Control greenhouse gas emissions by TNPA, tenants, non TNPA trucks and visiting ships (CC mitigation) - Use of environmentally friendly fuels for tugs, vehicles dredger & (e.g. low S fuel <500 ppm)
Environmental compliance	6: Clean Water and Sanitation 9: Industry, Innovation and Infrastructure 12: Responsible Consumption and Production	• **Environmental compliance monitored, reporting and control**, including: - Atmospheric emissions (port operations & visiting ships) - Noise - Wastewater discharges - Solid/hazardous waste (e.g. NCR's and Audit findings and non-compliance reports issued to tenants by SHE Department as per related legislation) • **Environmental incidents** limited (e.g. spills) (Level 1 and 2 - NEMA Section 30 and Section 20; Level 3 and 4) • **Port environmental assurance audits** performed and evaluated and communicated to stakeholders • **Compliance to EMS,** specifically TNPA's internal TIMS
Environmental quality	14: Life below Water 15: Life on Land	• **Environmental quality** effectively monitored and evaluate, including: - Air quality - Noise (e.g. impact on marine mammals) - Marine water quality (e.g. using CSIR health index for ports) - Marine sediment quality (e.g. using CSIR health index for ports) - Shoreline erosion and accretion - Soil & groundwater quality, especially for fuel storage areas • **Status of habitat and biodiversity** such as: - Protect coastal and marine habitat and biodiversity effectively monitored and evaluated (e.g. using CSIR health index for ports) - Support protection and recovery of disturbed terrestrial habitats and biodiversity (e.g. areas effected by wind-blown sand). • **Control marine invasive species** (e.g. ballast water management)

Table 7-9: Key criteria towards achieving sustainability outcomes within the social dimension (adapted from Taljaard et al. 2024a)

SOCIAL		
Sustainability Outcome	**Related SDGs**	**Key Criteria**
Community wellbeing	1: No Poverty 2: Zero Hunger 3: Good Health and Well-being 4: Quality Education and Learning Opportunities 8: Decent Work and Economic Growth	• **Corporate Social Initiatives planned for and undertaken** through: - Support of cultural activities and NGOs - Proactive community engagement programmes and partnerships with local communities to strengthen port-region relations - Cooperate with schools, universities and research centres in educational programmes - Internships and port visits • **Access rights for communities (where appropriate)** through identifying and resolving community interests (e.g. fishing, harvesting, cultural activities) • **Community-based environmental education and awareness** through related programmes and events pertaining to sustainability • **Support to sustainability related community enterprises** through: - Providing opportunities for skills development and training for members of the local communities to support their potential employment in the port and associated economic activities - Providing opportunities for communities to engage in and benefit from the port and associated development • **RD&I investment** (studentship/intern opportunities and collaboration) through: - Creating synergies with universities in port RD&I projects - Joint research and development projects involving port stakeholders, academia, industry and authorities
Support to small enterprises	1: No Poverty 8: Decent Work and Economic Growth	• **Support to local/small businesses** through: - Awarding contract to SMMEs (small, medium, and micro-enterprises) - Supporting local enterprise development (e.g. proportional allocation from net profits) - Supporting supplier development (e.g. proportional allocation from net profits)
Port-municipal relations	8: Decent Work and Economic Growth 11: Sustainable Cities and Communities	• **Port-municipal collaboration** through joint sustainability-related events and/or programmes undertaken with municipal and provincial authorities • **Port municipal relationship** managed through identifying and resolving Issues/conflicts with municipal/provincial authorities through established forums
Cultural and heritage protection	11: Sustainable Cities and Communities	• **Protection of cultural and heritage assets** through: - Identifying mapping protecting and monitoring of assets - Integrating port development into the cultural heritage and landscape planning for the region (e.g. tourist routes)
Employee satisfaction & wellbeing	4: Quality Education 5: Gender Equality 8: Decent Work and Economic Growth 10: Reduced Inequalities	• **Training (incl. education on sustainability matters)** through: - Cooperating with other ports for educational/training purposes (e.g., joint port training programs and centres) - Offering training to port professionals through regional and national institutions - Ensuring eligible employees are trained - Monitoring and evaluating time spend on training - Ensuring eligible employees receive promotion as per employment equity targets • **Employee engagement forms** through: - Establishing and running employee Imbizo-type forums - Employee grievances/ satisfaction Business forums with employees as prescribed by recognition agreement • **Employee grievance and satisfaction addressed** through: - Establishing grievance procedures and registration - Conducting employee satisfaction surveys - Logging legitimate employee complaints (e.g. HR Complaints App) • **Employees recognition** (e.g., long service rewards, performance awards) • **Wellness assistance** through usage of employee assistance programmes • **Occupational safety awareness** ensured through safety culture initiatives (e.g. International Labour Organisation Health and Safety Day) • **Employee safety** achieved as per TNPA targets • **Employment equity** promoted as per TNPA targets • **Employee job security** (e.g. not only contract work)

Table 7-10: Key criteria towards achieving sustainability outcomes within the economic dimension (adapted from Taljaard et al. 2024a)

ECONOMICS		
Sustainability Outcome	**Related SDGs**	**Key Criteria**
Climate resilience	13: Climate Action	• **Climate change (CC) preparedness** through: - Planning and design of infrastructure for enhanced climate resilience to be undertaken using the future climate change scenarios (e.g. in terms of changes in, temperatures, sea level rise and intense storms) as prepared by the Intergovernmental Panel on Climate Change (IPCC) scenarios. TNPA is currently undertaking a project on climate change adaptation including downscaling relevant IPCC climate scenarios for application at specific port planning and design scales along South Africa's coast. - Establishing CC cluster as per TNPA's systems - Establishing operational CC business continuity management (BCM) plan as per TNPA systems • **CC early warning systems** implemented (e.g., weather (waves, wind, flooding), seasonal forecasting, also addressing shorter term CC effects, plus local wind, waves in real time (e.g. IPOSS) to protect vessels and port infrastructure • CC incidents assessment through logging and addressing incidents, such as extreme sea-state, intense storms, and dry periods with strong winds and dust storms (Business Impact Analysis, Mission Critical Activities)
Service quality & efficiency	9: Industry, Innovation and Infrastructure 12: Responsible Consumption and Production	• **Technical capacity and efficiency** achieved as per TNPA targets for: - Ship turnaround times - Marine service delays - Anchorage - Cargo volumes handled • **Good quality potable water supplied** to tenants/ships • **Customer satisfaction** achieved through addressing issues arising through meetings of established institutional structures • **Port security** achieved by limiting criminal and security incidents • **Cyber security** achieved by preventing potential security incidents • **Digitalisation** of port systems • **Improvement of port infrastructure** through: - Maintaining at acceptable quality - Industrial innovation to ensure resilient and future-fit infrastructure
Economic growth & development	8: Decent Work and Economic Growth 9: Industry, Innovation and Infrastructure	• **Port revenue generation through formal port activities as** per targets set as per TNPA's financial system (e.g. Operation Ratios, Cash Interest Cover, Margin, Return on invested capital) • **Revenue generated through complementary sectors** (e.g. energy, transport services and tourist activities) • Business growth opportunities for others in port and wider region through: - Availability of a port to wider region: - Access to port facilities for private sector in the region (reduced travel distance to get export products to port) - Opportunities for Broad-Based Black Economic Empowerment • **Corporate Tax and VAT generation** through national and provincial revenue • **Employment opportunities** created through CAPEX employment opportunities as per TNPA target • **Economic contribution (gross value added)** created through CAPEX: Contribution to gross domestic product as per TNPA target • New business production through CAPEX creating new business opportunities as per TNPA target
Inter-connectivity	8: Decent Work and Economic Growth 9: Industry, Innovation and Infrastructure	• **Effective hinterland connectivity** addressed and resolved (e.g. railway lines, road transport routes, potential gas pipeline) • **Effective international port connectivity** through addressing and resolving international links, enhancing such as link with intended green hydrogen development in southern Namibia

Framework for SPP&D (Figure 7-7), together with the key sustainability requirements (Table 7-10) provide a **science-based benchmark** for where to evaluate the extent to which port planning and development processes to be undertaken for the proposed Port of Boegoebaai port would support sustainability. This is relevant to the current SEA process, but also in potential future EIA processes, through construction and ultimately during operations.

All sustainability outcomes are important to consider in the planning of a proposed Port at Boegoebaai, but reflecting on the place-based circumstances at Boegoebaai, the following are likely to requite specially attention:

- Eco-efficiency (e.g. sustainable sources of water and energy)
- Community wellbeing (e.g. local communities rely heavily on natural resources for their livelihood)
- Cultural & heritage protection (e.g. areas support an array of cultural and heritage assets)
- Climate resilience (e.g. west coast likely to be affected by climate change)
- Interconnectivity (e.g. area is very remote with connectivity challenges)

Further, foresight of likely future development plans around the port (for example, industrial, urban and suburban development) should be considered in the spatial planning for the port. This will be key in avoiding future port-city, and port-community conflict, also applying to infrastructure needed to ensure future interconnectivity.

Another key issue crucial to sustainability as it pertains to environmental issues and climate resilience, is access to long-term, inter-seasonal field data on, for example, climate, oceanic processes, environmental quality, and biodiversity. Given the remoteness of the study area, the collection of such data will be a challenge and should be considered and resolved soonest, should this project be approved.

In the next section, examples of specific activities or actions that could be undertaken to meet the key sustainability requirements, linked to sustainability outcomes and SDGs, as provided by the World Ports Sustainability Program and the regional Nairobi Convention.

7.4.2 Useful Information Sources to Support Implementation

7.4.2.1 World Ports Sustainability Program

The World Ports Sustainability Program (PSP) was established in May 2017, managed by the International Association of Ports and Harbors (IAPH). The Program aims to demonstrate global leadership of ports in contributing to the SDGs of Agenda 2030. Its web-based platform (https://sustainableworldports.org/) serves as a reference database of best practices of ports, focusing on environmental care and climate and energy (Environment), health safety and security and community building (Social), as well as digitalization and infrastructure (Economic). Their aim is for port authorities to engage with business, governmental and society in creating sustainable added value for the local communities and wider regions in which their ports are embedded, much aligned with the sustainability outcomes as proposed in the SPP&D Framework. Table 7-11 captures practical examples of types of activities that could be undertaken in support of specific SDGs across the four key pillar or dimensions of sustainability (WPSP 2020).

Table 7-11: Type of activities supporting SGDs within governance, environment, social and economic dimensions for consideration in the proposed Port of Boegoebaai (adapted from WPSP 2020)

SUNSTANABILITY DIMENSION & SDGS		TYPE OF ACTIVITY
GOVERNANCE	16: Peace, Justice and Strong Institutions	• Constructive dialogue between employer and employees • Good governance (a clear policy statement, stakeholder analysis, defined measurements, consistent reporting) • Peace initiatives (e.g., peace education on the work floor, prevention of illegal arms trafficking) • Addressing security: cyber security measures, commercial and operational data protection, improving the careful use and protection of personal data • Open dialogue and collaboration with all stakeholders (including emergency services, customs and armed forces) and availability of a hotline for complaints and questions • Transparent internal and external communication
	17: Partnerships for the Goals	• Partnerships with local communities for port-city relation initiatives • Partnering with other ports and parties in the logistics chain in joint projects of common interest • Public-private partnerships for funding and implementing sustainability projects • Establishing supply chain partnerships for ensuring CSR values throughout the chain • Cooperating with other ports for educational/training purposes (e.g., joint port training programs and centres) • Joint research and development projects involving port stakeholders, academia, industry and authorities
ENVIRONMENT	6: Clean Water and Sanitation	• Providing drinking water and clean sanitation facilities for port employees and visitors (e.g., vessels' crew, truck drivers) • Minimizing/optimizing water consumption in the port area • Harvesting rainwater for port use • Protecting water-related ecosystems (e.g., estuaries, wetlands, mangroves) in and around the port area • Projects protecting freshwater resources (e.g., wastewater and stormwater treatment)
	7: Affordable and Clean Energy	• Locally producing and/or sourcing renewable energy • Supporting research and development on clean energy technology • Producing and/or recovering energy from industrial waste streams • Investing in energy-efficient port equipment (stationary and mobile material handling equipment, lighting and technology) • Encouraging clean energy initiatives from third parties (vessels, tenants and operators) through appropriate instruments (incentives, clauses in lease/concession agreements) • Providing Onshore Power Supply from renewable sources • Providing cleaner (marine) fuels in a safe and efficient manner • Optimizing port operations and processes (logistics, port calls)
	9: Industry, Innovation and Infrastructure	• Devising sustainable port development policies supported by relevant key performance indicators • Digitally optimizing infrastructure and port operations/processes/services • Piloting, testing and implementing innovative IT and digital technologies in the port for public and private use • Foreseeing the adaptation of port infrastructure to withstand climate change • Adapting port infrastructure and processes to meet market demands (such as increasing ship size) • Sustainable port development projects • Investing in infrastructure for all transport modes to enable a balanced modal split • Minimizing environmental impact of the port activities
	12: Responsible Consumption and Production	• Sustainably managing natural resources, chemicals and waste • Implementing responsible procurement and sustainable investments in port area management and development as well as the end-to-end supply chain etc. • Encouraging circular economy and industrial reuse and mutually beneficial use of resources in the port community • Optimizing port operations/processes/services • Reducing food wastage and food loss in the production / supply chain (e.g., connecting the cruise industry with an NGO addressing poverty in your city or region)
	13: Climate Action	• Improving energy efficiency of port operations, processes and services • Enabling the reduction of carbon and greenhouse gas emissions within the port area • Providing services to reduce greenhouse gas emissions at sea and on the waterways, as well as the hinterland part of the supply chain • Producing and/or sourcing renewable energy • Encouraging third parties (vessels, tenants and operators) to take clean energy initiatives, by providing incentives and integrating clauses in lease and concession agreements
	14: Life below Water	• Taking measures to prevent waste from ending up in the oceans (e.g., port reception facilities, fishing for litter, cleanup actions) • Promoting sustainable fishing activities • Supporting research regarding sustainable use of maritime resources • Reducing the emission of CO_2, SO_2, NO_x, NH_3 from port- related activities to avoid acidification of the oceans • Minimizing water pollution through adequate wastewater treatment facilities • Protecting coastal and estuarine ecosystems • Minimizing disturbing factors such as underwater noise for marine mammals
	15: Life on Land	• Supporting local projects regarding nature development and biodiversity • Recovering and protecting nature and biodiversity in the port surroundings • Preventing deforestation through the usage/procurement of sustainably certified wood and paper • Offering nature and environmental education programs to employees • Port area development in balance with ecosystems • Minimising environmental externalities of port operations (e.g., air pollution, noise)
SOCIAL	1: No Poverty	• Setting a good minimum wage for the port employees and encouraging similar practices in the port community • Taking responsibility for the application of ethical standards throughout the supply chain (e.g., working conditions and human rights in developing countries) • Including sustainability requirements (e.g., Fairtrade label) in procurement

SUNSTANABILITY DIMENSION & SDGS		TYPE OF ACTIVITY
		• Supporting local communities in need through social projects targeting sustainable growth • Supporting local social institutions (e.g., schools, orphanages, NGOs)
	2: Zero Hunger	• Supporting local projects targeting the provision of food to families/communities in need • Encouraging the transfer of food surpluses out of the warehouses in the port to charities, food banks and community organizations • Supporting the trade/storage of Fairtrade and other ethically produced agricultural products in cooperation with NGOs and community organizations • Sourcing Fairtrade food products for own catering
	3: Good Health and Well-being	• Improving health and safety awareness of employees and local communities through training and transparent communication on health and safety risks • Minimizing environmental externalities (e.g., air pollution, water pollution, noise) of port operations and greening of the port and urban areas • Initiatives on sustainable / safe mobility and projects targeting congestion • Enhancing port safety and security and minimizing risks • Awareness raising and actions against the use of addictive substances (e.g., tobacco, alcohol, drugs) • Protecting habitats and biodiversity in and around the port area
	4: Quality Education and Learning Opportunities	• Competence and talent policy for port employees • Enhance life-long learning for the port employees • Cooperating with local schools, universities and research centres in educational programs, internships and port visits. • Offering training to port professionals through dedicated institutions • Creating synergies with universities in port research and development projects
	5: Gender Equality	• Gender-neutral hiring and remuneration policies • Promoting women to leadership roles; training and hiring more women for port operational positions (e.g., crane operators) • Leveling the male/female ratio of port employees for operational and managerial positions • Taking measures that make the port working environment more attractive to women (e.g., separate toilets, promotional campaigns, family-friendly HR-policy)
	8: Decent Work and Economic Growth	• Ensuring that economic growth positively impacts local communities economically and socially • Promoting employment, including opportunities for disadvantaged groups and young people • Striving for a healthy and safe working environment for all: specific actions related to safety and ergonomics, and creating a good work/life balance • Taking responsibility for applying ethical standards throughout the end-to-end suply chain (e.g., working conditions and human rights in developing countries)
	10: Reduced Inequalities	• Achieving equality within the port independent of gender, origin, belief, conviction etc. • Port community initiatives being all inclusive irrespective of socio-economic background (e.g., supporting sensitive social groups) • Social background-neutral hiring and renumeration policies • Taking responsibility for the application of ethical standards throughout the supply chain (e.g., working conditions and human rights in third world countries) • Financial support to local communities in need and social projects targeting sustainable growth of neighbouring communities • Ethical investment and banking
	11: Sustainable Cities and Communities	• Improving sustainable mobility and reducing congestion for both employees and goods • Restoring ecosystems and making the port accessible and attractive for people in neighbouring urban areas • Minimizing environmental externalities of port operations (e.g., air pollution, water pollution, noise) • Disaster recovery planning • Community engagement programs and initiatives • Supporting local communities in need through social projects targeting decent living and working opportunities that generate sustainable growth of neighbouring communities • Supporting local social institutions (e.g., schools, orphanages, NGOs)
ECONOMIC	8: Decent Work and Economic Growth	• Achieving economic growth through diversification, innovation and technological modernization • Generating economic growth in an environmentally sustainable manner • Generating a sustainable model for cruise tourism • Taking responsibility for applying ethical standards throughout the end-to-end supply chain (e.g., working conditions and human rights in developing countries)
	9: Industry, Innovation and Infrastructure	• Devising sustainable port development policies supported by relevant key performance indicators • Digitally optimizing infrastructure and port operations/processes/services • Piloting, testing and implementing innovative IT and digital technologies in the port for public and private use • Foreseeing the adaptation of port infrastructure to withstand climate change • Adapting port infrastructure and processes to meet market demands (such as increasing ship size) • Sustainable port development projects • Investing in infrastructure for all transport modes to enable a balanced modal split • Minimizing environmental impact of the port activities
	13: Climate Action	• Improving energy efficiency of port operations, processes and services • Enabling the reduction of carbon and greenhouse gas emissions within the port area • Adapting port infrastructure and port related operations to Climate Change • Providing services to reduce greenhouse gas emissions at sea and on the waterways, as well as the hinterland part of the supply chain • Producing and/or sourcing renewable energy • Encouraging third parties (vessels, tenants and operators) to take clean energy initiatives, by providing incentives and integrating clauses in lease and concession agreements

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7.4.2.2 Nairobi Convention's Toolkit for Sustainable Port Development

The need to accelerate regional efforts towards sustainable port development in the Western Indian Ocean (WIO) also became a recent concern of the Contracting Parties to the Nairobi Convention (Odhiambo 2018). Signatories to this convention are Comoros, Kenya, Mauritius, Mozambique, Madagascar, Seychelles, Somalia, **South Africa**, and Tanzania. The aim of this Convention being to address accelerating degradation of ocean and coastal areas in the WIO region through promoting and guidance of sustainable us and management practices.

Contracting parties called for the development of a toolkit for sustainable port development, and in response the Nairobi Convention Secretariat initiated the development of a ***'Toolkit for Sustainable Port Development in a Blue Economy'*** in partnership with the CSIR (UNEP 2024, in press). This toolkit was developed in consultation with port authorities in the region, including the TNPA. The output of this project was recently endorsed by contracting parties for uptake in the region at the 10th Conference of Parties held in Madagascar in August 2024 and is currently in press, shortly to be officially released by the Nairobi Convention Secretariat to be available for countries in the region to consider for implementation, also by the proposed Port of Boegoebaai.

The toolkit offers a range of 'tools', primarily consolidated from international practice, that port authorities can consider in the implementation of sustainable port planning and development (**UNEP et al. 2024, in press**; Taljaard et al. 2024b). Aligned with the core mandate of the Nairobi Convention, i.e. to advance sustainable management and use of the *coastal and marine resources*, the ***Toolkit*** primarily focuses on 'tools' to advance sustainability in the **environment dimension**, but with obvious ripple effects into aspects of governance, social and economic sustainability. Table 7-12 provides an overview of the tools captured in the ***Toolkit***, as well as a list of key information sources from which to learn more (full references to these sources are provided in Appendix B.

Table 7-12: Overview of 'tools' contained in the Nairobi Convention's *'Toolkit for Sustainable Port Development in a Blue Economy'* for consideration in the proposed Port of Boegoebaai (see Appendix B for detailed reference list) (Source: UNEP et al. 2024, in press; Taljaard et al. 2024b)

		TOOL	INFORMATION SOURCE
PORT DEVELOPMENT STAGE	Planning	Guidance on Strategic Environmental Assessment	Senécal et al. 1999; Dalal-Clayton and Sadler 1999, 2005; CEC 2001; IAIA 2002; Partidário 1999, 2003; ODPM 2005; OECD 2006; GHD 2013; UNEP 2018
		Site selection and Master Planning	PIANC 2014a, 2019a; ALG Transport & Infrastructure 2021
		Planning for Climate Change	Asariotis et al. 2019; Azarkamand et al. 2020a; PIANC 2020, 2022
		Concept of Nature-Based solution	WWF 2016; Cohen-Shacham et al. 2016, 2019
		Scenario Analysis Tools for Planning	Alcamo 2001; Walker 2019; Elsawah et al. 2020; UNEP et al. 2024
	Design	Guidance on Environmental and Social Impact Assessment	UN 1992; Morrison-Saunders et al. 2007; UNEP 2018; Bishoge &Mvile 2022; Tarr n.d.
		Design for Biodiversity Offsets	IUCN 2004; Ten Kate et al. 2004; BBOP 2009; World Bank Group 2016; Nairobi Convention. 2018; Jacob et al. 2020
		Building-with-Nature Design Approach	Waterman et al. 1998; Waterman 2010; de Vriend and Van Koningsveld 2012; Vikolainen et al. 2014; de Vriend et al. 2015; PIANC 2018; De Boer et al. 2019; Oerlemans et al. 2021; Ecoshape 2021, 2022
		Ecological Enhancement Options	Paalvast et al. 2012; Browne and Chapman 2014; Ido and Perkol-Finkel 2015; Coombes et al. 2015; Naylor et al. 2017; Morris et al. 2019; Hall et al. 2018; Perkol-Finkel et al. 2018; Chee et al. 2020; EcoShape 2020; MacArthur et al. 2020
	Construction	Construction Environmental Management Plans	LPC 2019; EPA South Australia 2021; Nihon Kaetsu 2022; Notteboom et al. 2022
		Dredge Management (also in Operations)	IMO 2014; PIANC 2006, 2009a, 2009b, 2009c, 2010, 2014b; IADC 2019; EPA South Australia 2020
		Considerations for Port Decommissioning	IOGP 2017; Melbourne-Thomas et al. 2021; da Cunha Jácome Vidal et al. 2022

		TOOL	INFORMATION SOURCE
	Operations	Guidance on Environmental Management Systems	Whitehead 2000; Darbra et al. 2004; Brouwer and van Koppen 2008; Iraldo et al. 2009; ESPO 2012b,2020; Rebelo et al. 2014; ISO 2020a, 2020b; Petrosillo et al. 2012; Testa et al. 2014; Arabi et al. 2022
		Circular Economy in Ports	De Langen and Sornn-Friese 2019; Obura et al. 2017; Schönborn & Junge 2021; Ellen MacArthur Foundation 2022; Ali 2023
		Examples: Sustainable Port Development Actions	WPSP 2020; Liu et al. 2023; Guo et al. 2024; Zhang et al. 2024
		Securing External Finance for Port Development Projects	UNEP-FI 2021
		Sustainable Use of Materials and Land	NSW Port Authority 2017
		Energy Efficiency Management	ESPO 2012a; Boile et al. 2016; AIEA Bioenergy 2017; NSW Port Authority 2017; Iris and Lam 2019; Bjerkan and Seter 2019; PIANC 2019b; Sdoukopoulos et al. 2019; IMO 2020; Macía et al. 2021
		Management of Carbon Footprint	WPCI 2010; PIANC 2019c; Azarkamand et al. 2020b; De los Reyes et al. 2020; Fadiga et al. 2024
		Management of Water Consumption	ESPO 2012a; NSW Port Authority 2017; Sensiba 2021
		Waste Management	UNEP 2013; NSW Port Authority 2017; ESPO 2012a
		Ballast Water Management	IMO 2022a, 2022b
		Guidance on Sustainable Hull Cleaning	IMO 2011, 2012; US-EPA 2011; Commonwealth of Australia 2015; BIMCO 2021a, 2021b
		Towards Improving Port Environmental Quality	ESPO 2012a; PEMA 2016; NSW Port Authority 2017; NIOSH 2022; Mont-Mégantic International Dark Sky Reserve 2022
		Ecosystem Restoration	Keenleyside et al. 2012; Fitzsimon et al. 2019; Gann et al. 2019, 2022; Léocadie et al. 2020; UNEP-Nairobi Convention/ WIOMSA 2020a, 2020b; González et al. 2020; UNEP 2021a, 2021b; Eger et al. 2022; Escovar-Fadul et al. 2022
		Marine Litter Clean up Technologies	Armitage and Rooseboom 2000; Barnardo and Ribbink 2020; Barcelo and Pico 2020; Schmaltz et al. 2020
		Oil Spill Contingency Planning	UNEP/OCHA 1996a, 1996b; Swanepoel 2020; UNEP et al. 2020a, 2020b; Marine Coast Maritime and Coastguard Agency, UK 2021; IMO 2022c; ITOPF n.d.
		Environmental Monitoring and Evaluation	ANZECC 2000; Kusek and Rist 2004; Barentine 2019; Capelli et al. 2019; Mocerino et al. 2020; WHO 2021; Ferrario et al. 2022; UNEP et al. 2022a, 2022b
		Environmental Information Systems	Günter 1998; El-Gayar and Fritz 2006; Pitt et al. 2011; Baholli et al. 2013; Coman and Cioruța 2013; Bourgeois 2019
		Effective Capacity Development	OECD 2008, African Union 2015, 2016; EU 2019; Thapa et al. 2019; Bob-Manuel 2020
		Introduction to Natural Capital Accounting	UN 2014a, 2014b, 2019; Eigenraam et al. 2016; Chenoweth et al. 2018; GOAP 2019; Chen et al. 2020; Taljaard et al. 2023
		Sustainability Performance Index for Ports	Peris Mora et al. 2005; Lirn et al. 2013; Chiu et al. 2014; Shiau and Chuang 2015; Asgari et al. 2015; Laxe et al. 2017; Lu et al. 2016; Roh et al. 2016; Roos and Neto 2017; Schipper et al. 2017; Xiao and Lam 2017; Puig et al. 2017; Chen and Pak 2017; Oh et al. 2018; Stein and Acciaro 2020; Alamoush et al. 2021; Brunila et al. 2023; Taljaard et al. 2024a

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Appendix A: Relevant International Obligations, National Legislation & Policies

Taljaard et al. (2019) provided details on each of the entries in the illustration above as extracted below. Entries directly related to port and shipping have been highlighted.

Important international obligations and agreements

INTERNATIONAL OBLIGATION/AGREEMENT	SHORT DESCRIPTION
Agenda 2030 (2015)	**This agenda is a plan of action for people, planet and prosperity. It also seeks to strengthen universal peace in larger freedom with goals and targets aimed at stimulating action in areas of critical importance for humanity and the planet (as expressed in the sustainable development goal – SDGs) (2015-2030).**
Agenda 2063: The Africa we want (2015)	**This agenda is Africa's blueprint and master plan for transforming the continent into a future global powerhouse by 2063. It provides for a shared strategic framework for inclusive growth and sustainable development with a global strategy to optimize the use of Africa's resources for the benefit of all Africans, including Africa's port environments.**
International Convention for the Regulation of Whaling (1946)	This Convention provides for the conservation of whale stocks and makes possible the orderly development of the whaling industry.
International Convention for the Conservation of Atlantic Tunas (ICCAT) (1966)	The Convention provides for the conservation of tunas and tuna-like species in the Atlantic Ocean.
Civil Liability Convention (1969) as replaced by its 1992 Protocol and amended in 2000	The Convention provides for adequate compensation to persons who suffer oil pollution damage resulting from maritime casualties involving oil-carrying ships, placing the liability for such damage on the owner of the ship from which the polluting oil escaped or was discharged.
Convention on Wetlands of International Importance especially as Waterfowl Habitat (1971) (Ramsar Convention)	The Ramsar Convention promotes wise use of all wetlands and to prevent loss (includes estuaries and coastal lakes in its definition of wetlands).
Convention Concerning the Protection of the World Cultural and Natural Heritage (1972) (World Heritage Convention)	This Convention holds state party to recognising the duty of ensuring the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage situated in its territory (which may include estuaries).
Convention on the Prevention of Marine Pollution by Dumping of	**The Convention (and its Protocol) is an international treaty that limits the discharge of waste that are generated on land and disposed of at sea. The 1996 Protocol is a separate agreement that modernised and updated the London**

INTERNATIONAL OBLIGATION/AGREEMENT	SHORT DESCRIPTION
Waste and Other Matter (1972, as amended) (London Convention)	**Convention, following a detailed review that began in 1993. In 1996 Protocol replaced the London Convention.**
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (1973)	CITES provides for the protection of endangered plants and animals, including marine organisms. It also governs the trade in critically endangered and endangered species such as seahorses, eels, hard corals, abalone and great white sharks.
International Convention for the Prevention of Pollution from Ships (MARPOL) (1973/1978)	**The Convention is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. It is a combination of two treaties adopted in 1973 and 1978 respectively and updated by amendments through the years. The Convention includes regulations aimed at preventing and minimising pollution from ships and includes various technical annexes.**
Convention of Migratory Species of Wild Animals (1979) (Bonn Convention)	The Convention provides for cooperation of nations in the conservation of animals that migrate across their borders. These include terrestrial mammals, reptiles, marine species and birds.
Abidjan Convention (1981)	These regional Conventions were developed as part of the United Nations Environment Programme's Regional Seas Programme to improve the control of marine pollution and management of marine and coastal resources (including estuaries) in countries of the West and Central African region (Abidjan Convention) and the Eastern African or West Indian Ocean region (Nairobi Convention).
Nairobi Convention (1985)	
United Nations Convention on the Law of the Sea (UNCLOS) (1982)	**The Convention provides for regulation by the international community of all aspects of the resources of the sea and its uses, such as navigational rights, territorial sea limits, economic jurisdiction, legal status of resources on the seabed beyond the limits of national jurisdiction, passage of ships through narrow straits, conservation and management of living marine resources, protection of the marine environment, a marine research regime and, a more unique feature, a binding procedure for settlement of disputes between States.**
International Convention on Salvage (1989)	The Convention provides for matter relating to marine salvage, that is the recovering a ship and its cargo after a shipwreck or other maritime casualty.
Southern African Developing Countries (SADC) Protocol on Fisheries (1992)	The Protocol promotes responsible and sustainable use of the living aquatic resources and ecosystems of interest to state parties in order to promote and enhance food security and human health, safeguard the livelihood of fishing communities, to generate economic opportunities for nationals in the region, to ensure that future generations benefit from these renewable resources and to alleviate poverty with the ultimate objective of its eradication.
Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (1992) (Basel Convention)	The Convention provides for the reduction of the production of hazardous waste and the restriction of transboundary movement and disposal of such waste. It also aims to ensure that any transboundary movement and disposal of hazardous waste, when allowed, is strictly controlled and takes place in an environmentally sound and responsible way.
United Nations Framework Convention on Climate Change (1992)	**The Convention sets an '"ultimate objective' by stabilising greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system, taking into account in such**

INTERNATIONAL OBLIGATION/AGREEMENT	SHORT DESCRIPTION
	matters as agriculture, energy, natural resources, and activities involving sea coasts.
United Nations Convention on Biological Diversity (1993)	The Convention provides for the conservation of biological diversity, the sustainable use of biological resources and the fair and equitable sharing of benefits arising from the use of genetic resources.
Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA) (1995)	The international programme provides assistance to states in taking action, individually or jointly, within their respective policies, priorities and resources, that will lead to the prevention, reduction, control or elimination of the degradation of the marine environment, as well as to its recovery, from the impacts of land-based activities (including pollution and developments/activities leading to the destruction of marine habitat). The Regional Seas Programme of UNEP is used as framework for delivery of this programme at regional level.
Code of Conduct for Responsible Fisheries (1995)	The Code takes cognisance of the state of world fisheries and aquaculture and proposes actions towards implementing fundamental changes within the fisheries sector to encourage the rational and sustainable utilisation of fisheries and aquaculture. The Code is a voluntary instrument rather than a legally binding international agreement.
Convention on the Conservation and Management of Fishery Resources in the Southeast Atlantic Ocean (2001)	The Convention provides for long-term conservation and sustainable use of fish stocks other than highly migratory stocks found in areas of the South East Atlantic beyond the limits of national jurisdiction.
International Convention for the Control and Management of Ships' Ballast Water and Sediments (2004)	**The Convention provides for control and reduced transfer of harmful aquatic organisms and pathogens in ships' ballast water.**
Paris Agreement (2015)	This agreement is a legally binding international treaty on climate change that was adopted by 196 Contracting Parties at the 21st United Nations Climate Change Conference held in 2015, with the aim of limiting global warming to well below 2^{o}C compared with pre-industrial levels and to pursue efforts to limit this increase even further to 1.5^{o}C
Sothern African Development Community (SADC) Protocol on Wildlife Conservation and Law Enforcement (Wildlife Protocol) (1999)	The Protocol aims to establish a common framework for conservation and sustainable use of wildlife in the region.
Protocol on Shared Watercourses in the SADC (Watercourse Protocol) (2000)	The Protocol aims to foster closer cooperation for judicious, sustainable and coordinated management, protection and utilisation of shared watercourses and advance the SADC agenda of regional integration and poverty alleviation.
SADC Protocol on Fisheries (2006)	The Protocol aims to support national initiatives taken and international conventions for the sustainable use and protection of the living aquatic resources and aquatic environment of the region

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1 Key National Legislation (Acts)

SECTOR	ACT	LEAD AGENT	SHORT DESCRIPTION
Conservation	National Environmental Management: Biodiversity Act (Act 10 of 2004)	Environment	The Act gives legal status to Convention on Biological Diversity, Convention on Wetlands of International Importance especially Waterfowl Habitat (Ramsar Convention) and Convention on Migratory Species (Bonn Convention). It provides for the conservation of biological diversity and regulates the sustainable use of biological resources and to ensure a fair and equitable sharing of the benefits arising from the use of genetic resources. According to the Act the state is the custodian of South Africa's biological diversity and is committed to respect, protect, promote and fulfil the constitutional rights of its citizens.
	National Environmental Management: Protected Areas Act (No. 57 of 2003)	Environment	The Act provides for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes, the establishment of a national register of all national, provincial and local protected areas and for management of those areas in accordance with national norms and standards.
	Marine Living Resources Act (Act 18 of 1998, as amended in 2000)	Fisheries (delegated to Environment)	The Act provides for the declaration of marine protected areas to facilitate fisheries management by protecting spawning stock, allowing stock recovery, enhancing stock abundance and providing pristine communities for research. These functions are currently delegated to Department responsible for Environment.
	National Parks Act (No. 57 of 1976)	Environment (through South African National Parks)	The Act provides for the establishment of National Parks. National Park status establishes the strongest claim to permanent protection that is possible. Areas above and below the intertidal zone may be included in a National Park.
	Sea Bird and Seal Protection Act (No. 46 of 1973)	Environment	The Act governs the protection and control of the capture, killing and products produced from seabirds and seals. Parts of this act is now been repealed under the Marine Living Resources Act (Act 18 of 1998).
Tourism	Marine Living Resources Act (Act 18 of 1998, as amended in 2000)	Fisheries (delegated to Environment)	The Act provides for control of tourism activities related to marine living resource (e.g. sharks, whales and dolphins). This includes the control of fishing activities and appointment of harbour masters in the small fishing harbours.
	Sea Bird and Seal Protection Act (No. 46 of 1973)	Environment	The Act governs the protection and control of the capture, killing and products produced from seabirds and seals. Parts of this act is now been repealed under the Marine Living Resources Act (Act 18 of 1998).
	National Health Act (No. 61 of 2003)	Health &t Municipalities	The Act delegates responsibility for environmental health to metropolitan and district municipalities, where these organs of state must ensure that appropriate municipal health services are effectively and equitably provided in their respective areas. These include (insofar as it influences human health, except in ports) water quality monitoring, waste management and environmental pollution control.

SECTOR	ACT	LEAD AGENT	SHORT DESCRIPTION
Heritage	World Heritage Convention Act (No. 49 of 1999)	Environment	The Act provides for the incorporation of the World Heritage Convention into South African Law, as well as for recognition and establishment of world heritage sites and related authorities The Act acknowledging the urgent national need for development and poverty alleviation. The Act requires government to find innovative and effective ways of combining the conservation of South Africa's extraordinary endowment of natural resources with wealth-creating sustainable economic development. iSimangaliso Wetland Park was entered on the World Heritage List in 1999.
	National Heritage Resources Act (No. 25 of 1999)	Environment (through South African Heritage Resources Agency)	The Act provides for an integrated and interactive system for the managements of national heritage resources (which include landscapes and natural features of cultural significance), providing opportunity for communities to participate in the identification, conservation and management of cultural resources. Anyone who intends to undertake a development must notify the heritage resources authority and if there is reason to believe that heritage resources will be affected, an impact assessment report must be compiled at the developer's cost.
Water	National Water Act (No. 36 of 1998)	Water	This Act ensures protection of the aquatic ecosystems of South Africa's water resources, including estuaries and groundwater. It requires establishment of resource quality objectives, i.e. specifying targets for freshwater inflow, water quality, habitat integrity, biotic composition and functioning requirements. The act does not recognise the coastal or marine environment as a receiving environment or water resource in need of an allocation.
	Water Services Act (No. 108 of 1997)	Water & Sanitation	This Act amongst other matters provides for right of access to basic water supply and basic sanitation necessary to secure sufficient water and an environment not harmful to human health or well-being. Management and control of water services, in general, including water supply and sanitation.
Urban & spatial development	**Climate Change Act (No. 22 of 2024)**	**Environment**	**The Act enables the development of an effective climate change response and a long-term, just transition to a low-carbon and climate-resilient economy and society for South Africa in the context of sustainable development**
	Disaster Management Act (No. 57 of 2002)	Cabinet	The Act provides for an integrated and co-ordinated disaster management policy that focusses on preventing or reducing the risk of disasters, mitigating the severity of disasters, emergency preparedness, rapid and effective response to disasters and post-disaster recovery; the establishment of national, provincial and municipal disaster management centres; disaster management volunteers; and matters incidental thereto. The act also governs artificial breaching of estuary mouths in urban settings once approval have been granted under the National Environmental Management Act (No. 107 of 1998).
	Local Government: Municipal Systems Act (Act 32 of 2000)	Provincial and Local Government	The Act provides for integrated development planning (which municipalities are obliged to prepare and to update regularly) intended to encompass and harmonise planning over a range of sectors such as water, transport, land use and environmental management.
	Spatial Planning and Land Use Management Act	Rural Development	The Act provides for a framework to govern planning permissions and approvals, sets parameters for new developments and provides for different lawful land uses.

SECTOR	ACT	LEAD AGENT	SHORT DESCRIPTION
	(No. 16 of 2013)	and Land Reform	
	National Environmental Management Act (No. 107 of 1998)	Environment	The Act amongst other matters provides that sensitive, vulnerable, highly dynamic or stressed ecosystems require specific attention in management and planning procedures, especially where subjected to significant human resource usage and development, through mandating EIAs for specific listed activities.
	Marine Spatial Planning Act (No. 16 of 2018)	Environment	The Act provides South Africa's framework for marine spatial planning (MSP) and for the development of marine spatial plans and for the institutional arrangements required for governance and implementation
	National Environmental Management: Integrated Coastal Management Act (No. 24 of 2008)	Environment	The Act amongst other matters ensures that development and the use of natural resources within the coastal zone is socially and economically justifiable and ecologically sustainable.
	National Buildings Regulations and Building Standards Act (No. 103 of 1977, as amended)	Economic Affairs and Technology	The Act provides for promotion of uniformity in the law relating to the erection of buildings in municipal areas, including coastal areas.
	Conservation of Agricultural Resources Act (No. 43 of 1983)	Agriculture	The Act provides for conservation of the natural agricultural resources in South Africa through for example, combating and preventing erosion and weakening or destruction of water sources, and the protection of the vegetation and the combating of weeds and invader plants.
	Conservation of Agricultural Resources Act (No. 43 of 1983)	Agriculture	The Act provides for conservation of the natural agricultural resources in South Africa through for example, combating and preventing erosion and weakening or destruction of water sources, and the protection of the vegetation and the combating of weeds and invader plants.
Land-based pollution	National Environmental Management: Integrated Coastal Management Act (No. 24 of 2008)	Environment	The Act gives legal status to South Africa's international obligations related to coastal matters. It stablishes a system of integrated coastal and estuarine management in South Africa in order to promote the conservation of the coastal environment, and maintain the natural attributes of coastal landscapes and seascapes, and to ensure that development and the use of natural resources within the coastal zone is socially and economically justifiable and ecologically sustainable. It defines rights and duties in relation to coastal areas and determines the responsibilities of organs of state in relation to coastal areas. It prohibits incineration at sea, and controls dumping at sea, land-based pollution in the coastal, inappropriate development in coastal environment and other adverse effects on the coastal environment.

SECTOR	ACT	LEAD AGENT	SHORT DESCRIPTION
	National Environmental Management: Waste Act (No. 59 of 2008)	Environment	The Act regulates (solid) waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development, as well as governance of thereof.
	National Environmental Management: Air Quality Act (No. 39 of 2004)	Environment	The Act regulates air quality in South Africa in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development and governance therefor.
	Conservation of Agricultural Resources Act (No. 43 of 1983)	Agriculture	The Act provides for conservation of the natural agricultural resources in South Africa through for example, combating and preventing erosion and weakening or destruction of water sources, and the protection of the vegetation and the combating of weeds and invader plants.
	National Water Act (No. 36 of 1998)	Water	The Act (section 21) identifies certain land uses (e.g. activities resulting in stream-flow reduction such as afforestation and cultivation of crops), infrastructural developments (e.g. altering the bed, banks, course or characteristics of a watercourse), water supply/demand and waste disposal (from land-based activities) as 'water uses' that require authorisation (licensing).
	Hazardous Substances Act (No. 15 of 1973)	Health	The Act provides for the control of substances which may cause injury or ill health to, or death, of human beings by reason of their toxic, corrosive, irritant, strongly sensitising or flammable nature. Also it provides for the prohibition and control of the importation, manufacture, sale, use, operation, application, modification, disposal or dumping of such substances and products.
Port & Shipping	**National Ports Act (No. 12 of 2005)**	**Transport (through National Port Authority)**	**The Act provides for management of commercial ports, including environmental matters.**
	Government Immovable Asset Management Act (No. 19 of 2007)	**Public Works**	**The Act provides for the maintenance and repairs of infrastructure in proclaimed fishing (or small) harbours along the coast (also other coastal land and properties owned by the state). However the control of fishing activities and appointment of harbour masters falls under the Marine Living Resources Act (Act 18 of 1998, as amended in 2000).**
	Marine Living Resources Act (Act 18 of 1998, as amended in 2000)	**Fisheries**	**The act regulates the control of fishing activities (e.g. selling of fish, compliance management) and appointment of harbour masters in the small fishing harbours.**
	South African Maritime Safety Authority Act (Act 5 of	**Transport**	**The Act provides for the establishment and functions of the South African Maritime Safety Authority (SAMSA)**

SECTOR	ACT	LEAD AGENT	SHORT DESCRIPTION
	1998)		
	Maritime Zone Act (No. 15 of 1994)	**Transport**	**The Act provides for the demarcation of maritime zones of the Republic (e.g. internal waters, territorial waters, contiguous zone, maritime cultural zone, exclusive economic zone, continental shelf) and to provide for matters relating to installations, maritime casualties and self-defence.**
	International Convention for Prevention of Pollution from Ships Act (No. 2 of 1986)	**Transport**	**The Act gives legal effect to MARPOL in South Africa, as well as Annex I (regulations on oil) and Annex II (regulations on noxious liquid substances in bulk) of the Convention.**
	Marine Traffic Act (No. 2 of 1981)	**Transport**	**The Act regulates marine traffic in South Africa and provides for matters such as regulating ship traffic and the stopping or anchoring of ships outside fishing harbours and the sinking and abandoning of ships.**
	Marine Pollution (Control and Civil Liability) Act (No. 6 of 1981)	**Transport (prevention) and Environment (combating)**	**The Act provides for the protection of the marine environment from pollution by oil and other harmful substances, the prevention and combating of such pollution; as well as the determination of liability in certain respects for loss or damage caused by the discharge of oil from ships, tankers and offshore installations. It prohibits the discharge of oil from ships, tankers and offshore installations, but provides exemptions in the case of, for example, the oil being released as a result of damage and steps being taken as soon as practicable to stop or reduce the escape of oil.**
	International Health Regulations Act (No. 28 of 1974)	**Ports Authority**	**The Act requires seaports to be provided with a system for the removal and disposal of excrement, refuse, wastewater, condemned food and other matter dangerous to health.**
	Wreck and Salvage Act (No. 94 of 1996)	**Transport**	**The Act provides for the salvage of certain vessels and for the application and incorporates requirements of International Convention on Salvage.**
Fisheries & Aquaculture	Marine Living Resources Act (Act 18 of 1998, as amended in 2000)	Fisheries	The Act governs the utilisation, conservation and management of marine living resources which includes any aquatic plant or animal, and any mollusc, crustacean, coral, sponge, holothurian or other echinoderm, reptile and marine mammals (all life stages), except sea birds and seals. Currently orderly control and development of marine aquaculture is also regulated under this Act (sections 18 and 27).
	Foodstuffs, Cosmetics and Disinfectant Act (No. 54 of 1972)	Health	The Act regulates the limits of chemical and microbiological constituents in the flesh of different marine organisms used for human consumption.
Mining &	Mineral and Petroleum	Mineral	The Act, in addition to regulating mining and petroleum resource exploitation, also regulates environmental protection

SECTOR	ACT	LEAD AGENT	SHORT DESCRIPTION
petroleum exploration	Resources Development Act (No. 28 of 2002)	Resources	and management of mining impacts, including sand, diamond, heavy minerals, phosphate, manganese, oil and gas in coastal and marine environments. It requires environmental management programmes (EMPs) that must identify environmental impacts, based on and EIA, and must provide a clear programme on how these will be managed. To ensure compliance with environmental issues, the act requires consultation with relevant departments charged with administration of any law that relates to any matter affecting the environment before approval of EMPs.

1
2 Important Policies, Regulations and Guidelines

SECTOR	ACT	IMPORTANT POLICIES, REGULATIONS AND GUIDELINES
Conservation	National Environmental Management: Biodiversity Act (2004)	Guidelines regarding the determination of bioregions and the preparation of and publication of bioregional plans (Government Gazette, 16 March 2009)
		South Africa's National Biodiversity Strategy and Action Plan (2015 – 2025) (July 2015)
		Alien and invasive species Regulations (Government Gazette, 1 August 2014)
		Threatened and protected species marine Regulations (Government Gazette, 30 May 2017)
	National Environmental Management: Protected Areas Act (2003)	Guidelines for offshore marine protected areas in South Africa (2008)
		National Protected Areas Expansion Strategy (NPAES), currently in the process of being revised with revised strategy in commenting phase (2008)
Tourism	Marine Living Resources Act (1998)	Regulations for the management of boat based whale watching and protection of turtles (Government Gazette, 4 July 2008)
		Regulations for the management of white shark cage diving (Government Gazette, 4 July 2008)
		Policy on white shark cage diving (Government Gazette, 31 May 2017)
	National Environmental Management: Biodiversity Act (2004)	Policy on boat-based whale and dolphin watching (Government Gazette, 31 May 2017)
	National Health Act (2003)	South African water quality guidelines for coastal marine waters. Volume 2: Recreational use (March 2012)
	Sea Bird and Seal Protection	Policy on the management of seals, seabirds and shorebirds (Government Gazette, 7 December 2007)

SECTOR	ACT	IMPORTANT POLICIES, REGULATIONS AND GUIDELINES
	Act (1973)	
Heritage	World Heritage Convention Act (1999)	Regulations in connection with the Greater St Lucia Wetland Park (Government Gazette, 24 November 2000)
	National Heritage Resources Act (1999)	National Heritage Resources Act Regulations (Government Gazette, 2 June 2000)
Water	National Water Act (1998)	Water Resource Protection and Assessment Policy Implementation Process. Resource Directed Measures for protection of water resources: Methodology for the Determination of the Ecological Water Requirements for Estuaries. Version 2 (2008)
		National Water Resources Strategy. 2nd Edition (June 2013, as reviewed in Government Gazette, 16 August 2013)
		Regulations for establishment of the classification systems (Government Gazette, 17 September 2010)
		Regulations on use of water for mining and related activities aimed at protection of water resources (Government Gazette, 4 June 1999)
		Regulations requiring that the taking of water for irrigation purposes be measured, recorded and reported (Government Gazette 17 February 2017)
		Water use licence and appeals Regulations (Government Gazette (24 March 2017)
	Water Services Act (1997)	Regulations relating to compulsory national standards and measures to conserve water (Government Gazette, 8 June 2001)
Urban & spatial development	Disaster Management Act (2002)	Disaster management policy framework (Government Gazette, 29 April 2005)
		Guidelines on the development and structure of a disaster management plan (Government Gazette, 26 May 2017)
	National Environmental Management: Integrated Coastal Management Act (No. 24 of 2008)	National Estuarine Management Protocol (Government Gazette, 10 May 2013)
		Guidelines for Development and Implementation of Estuarine Management Plans in terms of National Estuarine Management Protocol (March 2015)
		National Strategy for the facilitation of coastal access (March 2014)
		National guidelines National Guideline Towards the Establishment of coastal management lines (August 2017)
	Local Government: Municipal	Local government: Municipal planning and performance management Regulations (Government Gazette, 24 August 2001)

SECTOR	ACT	IMPORTANT POLICIES, REGULATIONS AND GUIDELINES
	Systems Act (2000)	
	Spatial Planning and Land Use Management Act (2013)	Regulations in terms of the Spatial Planning and Land Use Management Act (Government Gazette, 23 March 2015)
	National Environmental Management Act (1998)	Environmental Impact Assessment Regulations (Government Gazette, 4 December 2014)
	National Buildings Regulations and Building Standards Act (1977)	Guidelines for human settlement planning and design (Red Book) (2000, under review)
		National Building Regulations and the application of the National Building Regulations (SANS10400)
Land-based pollution	National Environmental Management: Integrated Coastal Management Act (2008)	Guidelines for the assessment of wastes or other material that may be considered for dumping at sea (Schedule I of ICM Act)
		National Guideline for the Discharge of Effluent From Land-based Sources into the Coastal Environment (2014)
		National Action List: Screening of dredged material proposed for marine disposal (2012)
		South African water quality guidelines for coastal marine waters: Natural Environment & Mariculture (1995, under revision)
		Coastal Waters Discharge Permit Regulations (Government Gazette, 15 March 2019)
	National Environmental Management: Waste Act (2008)	Guideline for the development of Integrated Waste Management Plans (IWMP)
		National Waste Management Strategy (November 2011)
		Waste classification and management Regulations (Government Gazette, 23 August 2013)
	National Environmental Management: Air Quality Act (2004)	List of activities which result in atmospheric emissions which have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage (Government Gazette, 31 March 2010)
		National Dust Control Regulations (Government Gazette, 1 November 2013)
		National pollution prevention plans Regulations (Government Gazette, 21 July 2017)
		National framework for air quality assessment in the Republic of South Africa (Government Gazette, 26 October 2018)
	Conservation of Agricultural	Regulations: Conservation of agricultural resources (Government Gazette, 25 May 1984, as amended)

SECTOR	ACT	IMPORTANT POLICIES, REGULATIONS AND GUIDELINES
	Resources Act (1983)	
	National Water Act (1998)	Revision of general authorisation in terms of section 39 of the National Water Act (Government Gazette, 6 September 2013) (estuaries)
	Hazardous Substances Act (1973)	Hazardous substances Regulations (Government Gazette, 25 March 1977)
Port & Shipping	**National Ports Act (2005)**	**National Safety, Health and Environmental Corporate Requirements for commercial Ports (http://www.transnetnationalportsauthority.net/DoingBusinesswithUs/SafetyHealthEnvironment/Pages/Introduction.aspx)**
		Port rules (Government Gazette, 6 March 2009)
	International Convention for Prevention of Pollution from Ships Act (1986)	**Prevention of pollution from garbage from ships Regulations (Government Gazette, 29 May 1992)**
	Marine Traffic Act (1981)	**Marine traffic (inshore vessel traffic services Regulations (Government Gazette, 5 May 2000)**
		Marine traffic Regulations (Government Gazette, 1 February 1985)
	Marine Pollution (Control and Civil Liability) Act (1981)	**Marine pollution Regulations (linked to Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk) Government Gazette, 23 January 1998)**
		Regulations under the prevention and combating of pollution at sea by oil Act (Government Gazette, 29 June 1984)
Fisheries & Aquaculture	Marine Living Resources Act (1998)	Regulations in terms of Marine Living Resources Act (Government Gazette, September 1998, as amended)
		Regulations for the protection of wild abalone (Government Gazette, February 2008)
		Regulations on the prohibition of fishing at night in estuary of Breede River (Government Gazette, 18 November 2013)
		Regulations relating to small-scale fishing (Government Gazette, 8 March 2016)
		Environmental integrity framework for marine aquaculture (2012)
		Aquaculture policy framework (Government Gazette, 11 October 2013)
		Legal guide for the aquaculture sector in South Africa. 1st Edition (2013)

SECTOR	ACT	IMPORTANT POLICIES, REGULATIONS AND GUIDELINES
	Foodstuffs, Cosmetics and Disinfectant Act (1972)	Regulations governing microbiological standards for foodstuffs and related matters (Government Gazette, 16 May 1997, and as amended)
		Regulations related to maximum levels of metals and foodstuffs (Government Gazette, 15 June 2018)
Mining	Mineral and Petroleum Resources Development Act (2002)	Mineral and Petroleum Resources Development Regulations (Government Gazette, 24 April 2004)
		Guidelines for the compilation of an environmental impact assessment and an environmental management programme (2013)
		Mining and biodiversity guidelines: Mainstreaming biodiversity into the mining sector (2013)

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Appendix B: Information Source List for Nairobi Convention Toolkit

(Extracted from UNEP et al. 2024; Taljaard et al. 2024b)

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