



GREEN AND EFFICIENT PORTS

Standardizing Asset Management: Building the Foundation for Digital Ports

Presented By:

Tauqeer Ahmed

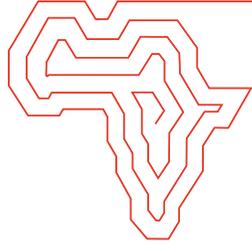
Executive Manager

Head: Engineering Centre of Excellence

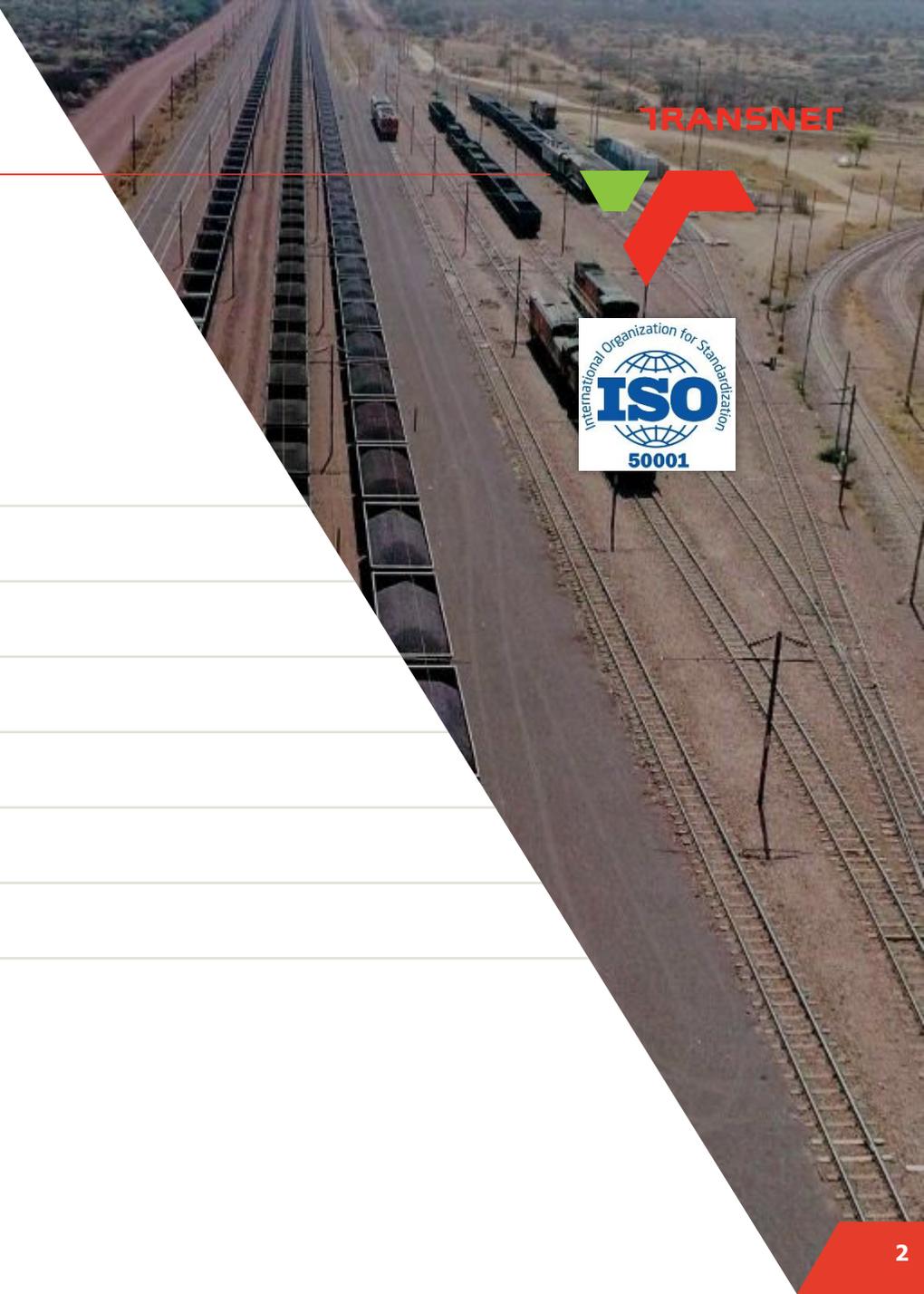
Transnet National Ports Authority



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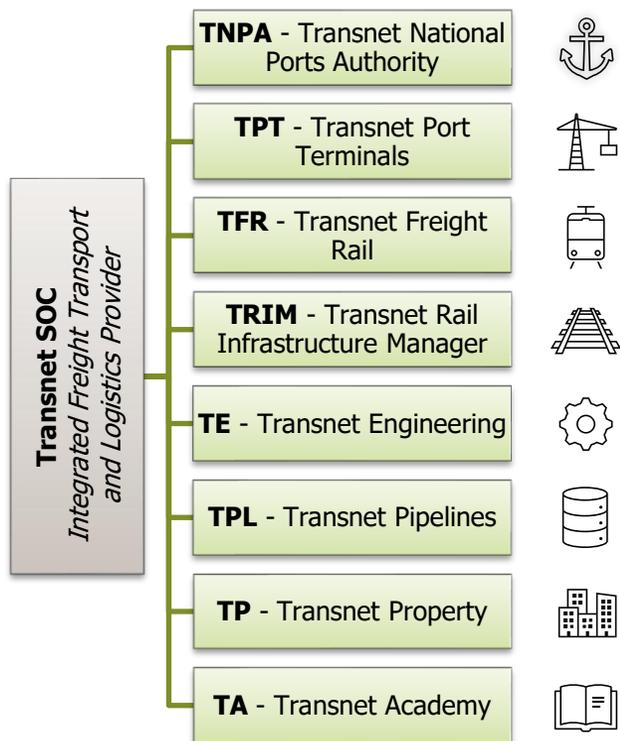


Standardizing Asset Management: Building the Foundation for Digital Ports

Transnet National Ports Authority Overview

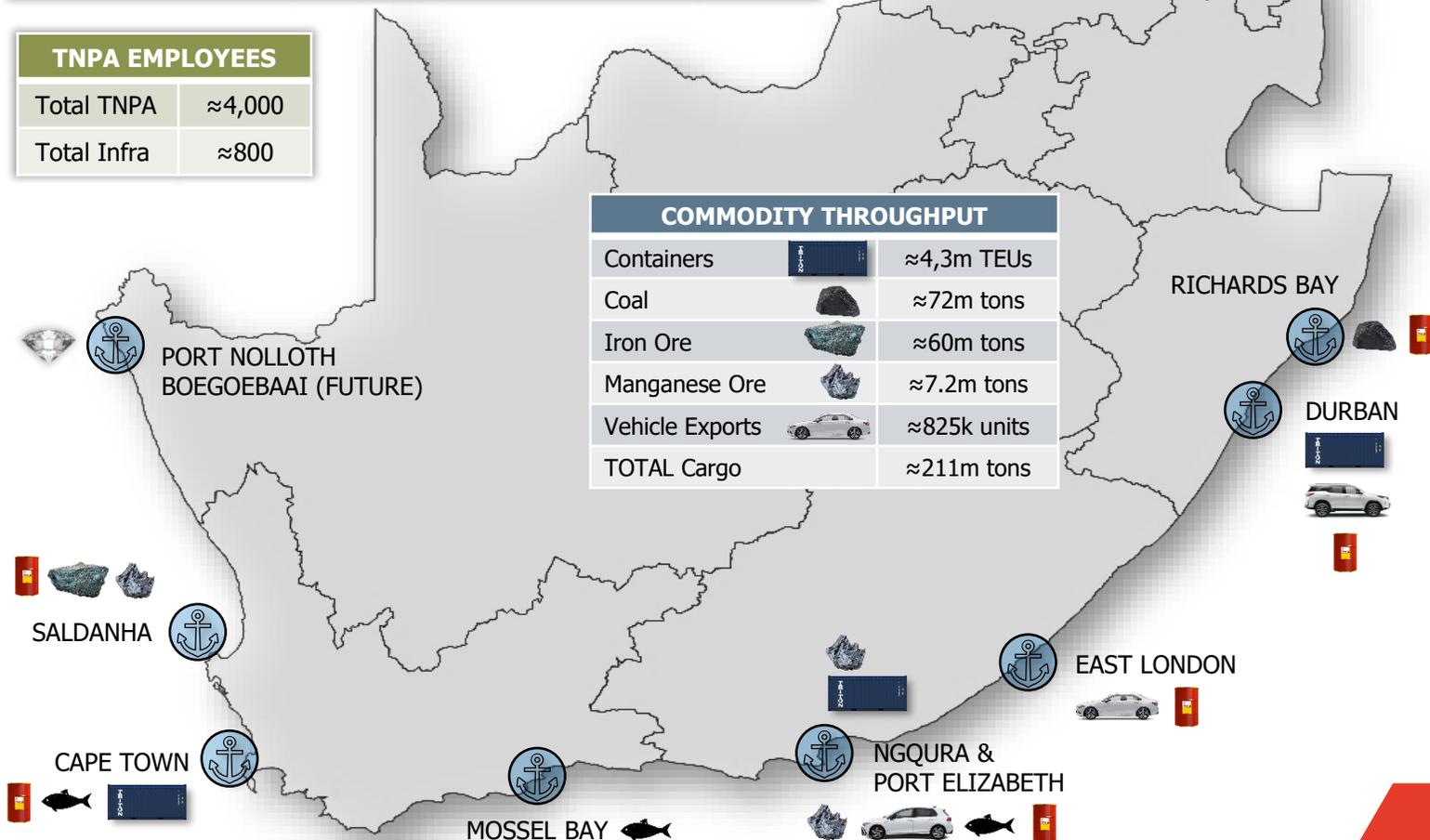
Transnet National Ports Authority (TNPA)

- Landlord Authority. Mandated and governed by the South African National Ports Act of 2005 (Act 12 of 2005).
- Manage, control, and administer South Africa's ports to ensure safe, efficient, and economic operations, including planning, providing infrastructure, and regulating navigation.



TNPA ASSET DATABASE (High Level)			
No. of Berths	169	No. of Substations	227
Length of Quays	40km	No. of Bridges	66
Length of Roads	196km	Length of Sewers	154km
Length of Rail	458km	Length of Water Line	307km
Length of Elec Cables	240km	No. of Buildings	1 360

TNPA EMPLOYEES	
Total TNPA	≈4,000
Total Infra	≈800



Standardizing Asset Management: Building the Foundation for Digital Ports

Problem Statement & Context



Asset Maintenance Principles & Procedures

- National Guidelines first set in 2012.
- Implemented independently across ports.
- Typical challenges:
 - Difficulty in comparing condition ratings nationally. (Variations across ports)
 - Reactive maintenance, poor spending, duplication of specifications at ports.
 - Manual paper based/spreadsheets.
 - Use of young trainees & professionals.
 - Varying and highly subjective condition assessments, asset ratings and reports.
 - Reporting line direct to Port Manager and not National Chief Engineer. (Limited central accountability).
 - Outdated/incomplete asset database.
 - Limited long term maintenance plans.
- Response
 - Reporting line change direct to Chief Engineer.
 - Setup Engineering Centre of Excellence.
 - Standardization of asset management, templates and structure.

Transnet National Ports Authority Standard Operating Procedures		
ENGINEERING: ASSET MAINTENANCE PRINCIPLES & PROCEDURES		
Part 2 – Maintenance Procedures		
Policy Ref: AMPP part 2		
PARA	DESCRIPTION	PAGE
1	PURPOSE	4
2	BACKGROUND	4
3	SCOPE	4
4	RESPONSIBILITIES	4
5	DEFINITIONS	5
6	ABBREVIATIONS	5
7	MAINTENANCE METHODOLOGY	6
		APPENDICES
 REVIEWED BY L Brand (Snr Manager) K Khumalo, K Modipane (Snr Engineers) T Mneney (Dep Chief Engineer)		25 May 2020 DATE
 RECOMMENDED BY S Nhlabathi (Acting Chief Engineer)		25 May 2020 DATE
 APPROVED BY M Ruthenavelu (Acting GM Infrastructure)		7 June 2020 DATE
NEXT REVIEW		AS AND WHEN REQUIRED
AMENDMENT RECORD		
REV.	SECTION AFFECTED/REFERENCE	DATE
9	7.3 Oversight Role updated	25-05-2020
9	8.6 Perway Infrastructure	25-05-2020
9	Various minor changes throughout document	25-05-2020
DOCUMENT NO : PR IE 01 REV 9		PAGE 1 of 204

Asset/Building Number	Location/Description	Floors [15]	Doors & Windows [15]	Sprinkler System [10]	Roof, gutters [20]	Walls (Exterior) [15]	Walls (Interior) [15]	Plumbing [10]	Weighted Average (%)
B5/73	Hainan Road	100	90	100	85	85	85	100	90
B5/186	Honshu Road	100	73	100	75	90	90	100	95
	Freight max	100	95	100	100	90	90	100	96
	R28 Kiosk	100	93	100	95	95	95	100	97
	Tug Jetty	100	95	100	95	90	90	100	98
B4/092	Bayhead road siding	100	95	100	90	90	90	100	97
	Schoemans Bridge	100	93	100	90	93	93	100	97
	L-Shed	100	95	100	89	90	95	100	98
B4/291	Stanger Street	40	50	100	50	50	50	50	55
	Methven Road	90	80	100	75	75	75	100	85
B2/347	Q-Berth	90	90	100	90	90	90	100	95
	NSRI	90	90	100	90	90	90	100	95
B4/11	Bremen	40	40	100	80	86	53	80	77
B4/12	Bremen	40	40	100	80	87	54	80	75
B4/131	Maydon mini Sub	100	100	100	100	95	99	100	99
B4/145	Maaydon mini Sub	100	100	100	100	95	99	100	99
B4/147	Maydon mini Sub	100	100	100	100	95	99	100	99
B4/003	DHI	100	100	100	95	95	95	100	99

TNPA – WORKSHOP/SHED INSPECTION SHEET

Asset No.: B4/55
 Building: Graving Dock
 Type of Inspection: Statutory
 Frequency: Bi-annual for structures less than 2 years; annual for structures older than 2 years
 Regulation: Construction Regulations, 2003; Section 9 – Structures (clause 4)

Asset Condition (%):66

Condition

Condition	< 40%	40-59%	60-79%	80-89%	90-100%
Poor	< 40%	Not safe for use	Major upgrades required	Decision required on future of asset	
Satisfactory	40-59%	Safe	Some urgent work required	Use of current and planned budget	
Good	60-79%	Safe	Moderate ongoing maintenance required	Plan for next cycle	
Very good	80-89%	Safe	Minor maintenance required	Plan for next cycle	
Excellent	90-100%	Safe	No maintenance required	No budget needed	

COMMENTS

- Moderate maintenance required
- Brick seal is required
- Interior and exterior walls to be painted
- Steel doors to be replaced
- Floor to be installed with epoxy
- Ceiling to be painted

Some Ports submitted spreadsheets, others reports.

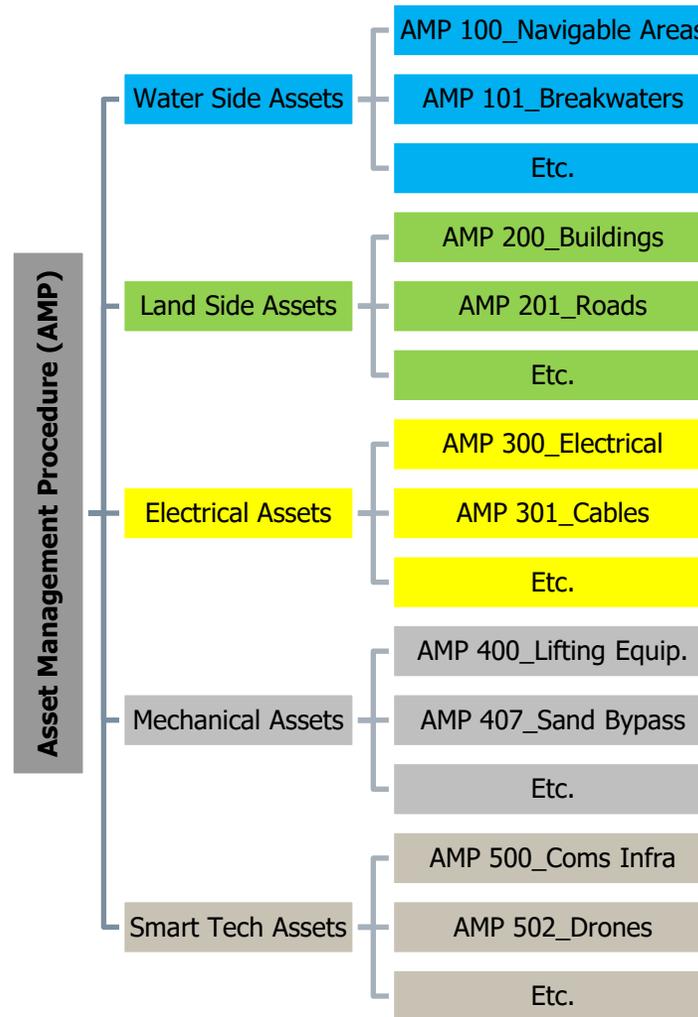
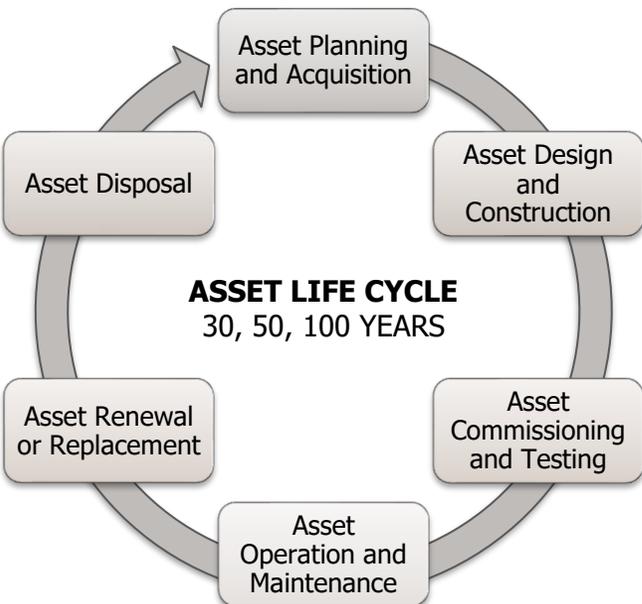
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Codification, Standardization, Guidelines



New "Asset Management Procedure" (AMP)

- Shift from Maintenance focus to Asset Management focus.
- Defining main asset groups and sub-asset groups.
- Standardizing numbering format.
- Identification of all TNPA assets, (450+ types) and create guides.
- Standardize templates.
- Use of common asset rating system.



Creation of Inspection Guidelines

Sub-Asset Group	Typical Assets	Inspection Guidance Notes	Report Reference Number	Supporting Documents Report Number
AMP 501_Met-Ocean Monitoring Stations	Tide Gauges	Inspectors, in their oversight role, must verify the physical integrity and secure mounting of the tide gauge housing and sensor probes, ensuring no visible damage or obstruction. Crucially, they must confirm the presence and validity of current calibration certificates provided by the service provider (CSIR), ensuring the device is accurately measuring sea level. Review maintenance logs from CSIR to ascertain that routine checks and data quality validations are being performed regularly. Observe if the data displayed locally (if applicable) is consistent with expected tidal patterns, noting any anomalies for follow-up with the service provider.	AMP 501_00_Met Ocean Mgmt Rpt_2025_Rev-00	AMP 501_01_Met Ocean Inspect Rpt_2025_Rev-00
	Wave & Current Sensors	Inspectors, acting in an oversight capacity, should visually assess the physical condition of the wave and current sensor bodies, transducers, and mounting structures, looking for signs of corrosion, physical damage, or marine growth that could impede their accuracy. They must verify that CSIR provides valid and current calibration certificates for these sensors, confirming their measurement accuracy. Review service provider maintenance records to ensure proper cleaning, anti-fouling measures, and functional checks are routinely conducted. Confirm that real-time data being transmitted appears logical and consistent with observed sea conditions.		AMP 501_02_Any other supporting reports AMP 501_03_Etc. as required... AMP 501_04_Etc. as required...

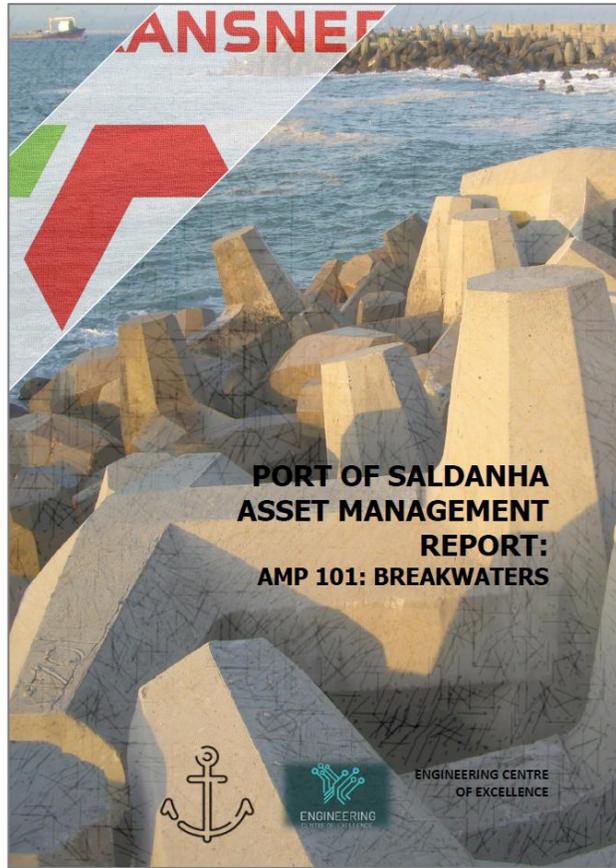
Asset Module Standards	per Asset Group (Future Initiative)
Part 1	• Planning Guidelines
Part 2	• Design Guidelines
Part 3	• Construction Guidelines
Part 4	• Handover and Operationalisation
Part 5	• Maintenance Guidelines
Part 6	• Minor and Major Refurbishment Guidelines
Part 7	• Asset Disposal Guidelines

TNPA Adopted Standard Asset Condition Rating System for All Assets

1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Unsafe	Very Poor to Unsafe	Very Poor	Poor	Fair to Poor	Fair	Good to Fair	Good	Perfect to Good	Perfect

Standardizing Asset Management: Building the Foundation for Digital Ports

Standard Reporting and Maintenance Planning Across all Ports



PORT OF EAST LONDON ASSET MANAGEMENT INSPECTION REPORT:
AMP 100-NAVIGABLE AREAS
FINANCIAL YEAR 2025/26

DOCUMENTATION CONTROL PAGE

Document Control

Prepared by:	Kaelan Veerasamy
Title:	Port of East London Asset Management Inspection Report: AMP 101: Breakwaters
Department:	Infrastructure
Divisions:	Transnet National Ports Authority
Location:	Port of East London

Version History

Version No.	Date	Changed By	Nature of Amendment

Signatories

SIGNATORIES	NAME	DESIGNATION	SIGNATURE	DATE
PREPARED BY:	Kaelan Veerasamy	CIVIL ENGINEER		27/06/2025
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APPROVED BY:	Zanele Ntantala	PORT ENGINEER		29 June 2025

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PORT OF PORT ELIZABETH ASSET MANAGEMENT REPORT:
AMP 101: BREAKWATERS
FINANCIAL YEAR 2025/26

**PORT OF PORT ELIZABETH ASSET MANAGEMENT REPORT:
BREAKWATERS**

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Table 3: Key Inspection Findings
Table 4: Consequence Risk Rating
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Table 6: Key Findings Risk Assessment
Table 7: Routine Maintenance and Special Inspections
Table 9: 10 Year Budget Plan

AMP 101_00_Breakwater Asset Management Report Template_Rev-01_KV Page 1 of 13
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PORT OF DURBAN ASSET MANAGEMENT INSPECTION REPORT:
AMP 300: SUBSTATION AND MINI SUBSTATION EQUIPMENT- FIRE SYSTEMS
FINANCIAL YEAR 2025/26
ANNEXURE AMP 300_01

NO.	PHOTOS	COMMENTS
		<ul style="list-style-type: none"> There are covers missing on LT side and the wiring is exposed, there also cables that are not terminated. The LV compartment is in poor condition and not compliant with SANS 10142-1.
		<ul style="list-style-type: none"> Panels are very dusty, and the substation floors are full of dirt. Interior walls are dull need to be repainted. Paint on fins flaking.

PORT OF CAPE TOWN ASSET MANAGEMENT REPORT:
AMP 101: BREAKWATERS
FINANCIAL YEAR 2025/26

10. 10 YEAR BUDGET PLAN

Below is an estimate of the required OPEX budget plan over a 10 year period, incorporating projects as required from the inspection findings, routine maintenance, special inspections to be conducted and spares & materials required to be stocked in the port for maintenance works. Year on year escalation has been estimated as 6% per annum (or as per recommendation from Finance).

Table 8: 10 Year Budget Plan

Item	Activity	Cost in R/m									
		26/27	27/28	28/29	29/30	30/31	31/32	32/33	33/34	34/35	35/36
A	Inspection Findings										
A1	Project 1: Repairs to the Main Breakwater		8.7								
A2	Project 2: Repairs to the Eastern Mole Breakwater		19.656	2.184							
B	Routine Maintenance										
B1	Painting of lines on the breakwaters	0.005	0.0053	0.005618	0.005955	0.006312	0.006691	0.007093	0.007518	0.007969	0.008447
B2	Sealing of cracks on the breakwaters	0.1	0.106	0.11236	0.11910	0.12625	0.13382	0.14185	0.15036	0.15938	0.16894
C	Special Inspections & Testing										
C1	Structural Condition Assessments		1				1.338				
C2	CSIR Breakwater Monitoring	0.45		0.5056		0.5681		0.6383		0.7172	
TOTAL		1.555	28.4673	2.8076	0.1251	0.7007	1.4785	0.7872	0.1579	0.8845	0.1774

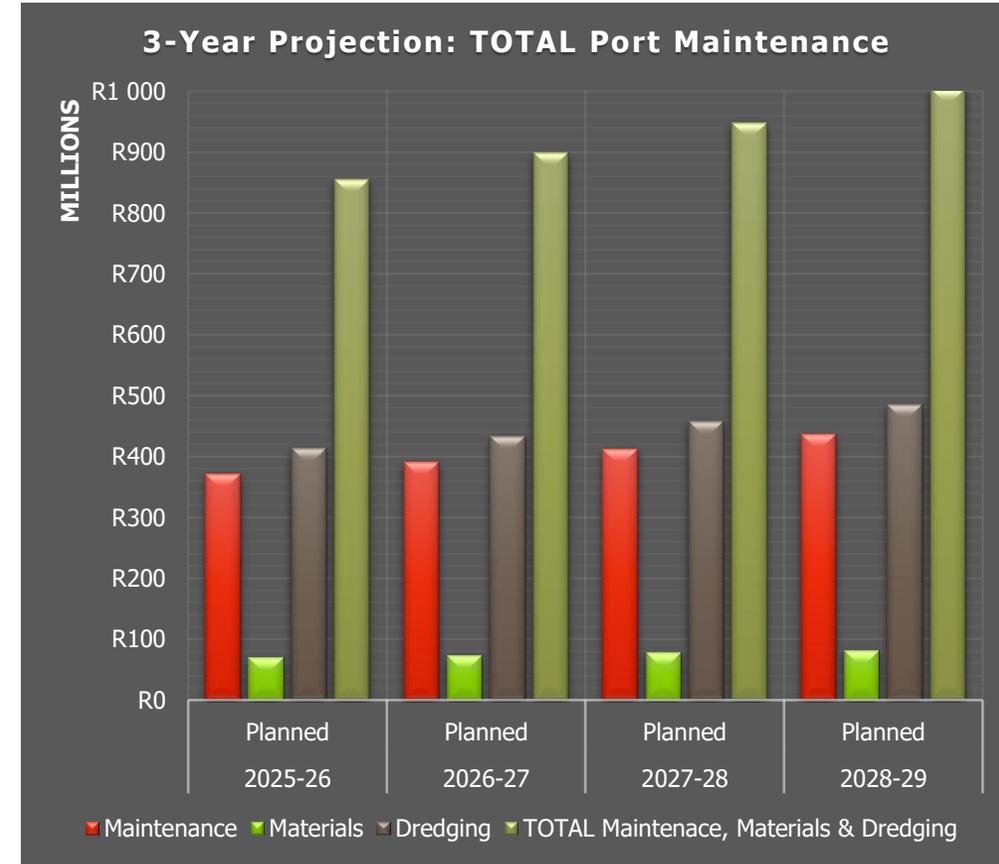
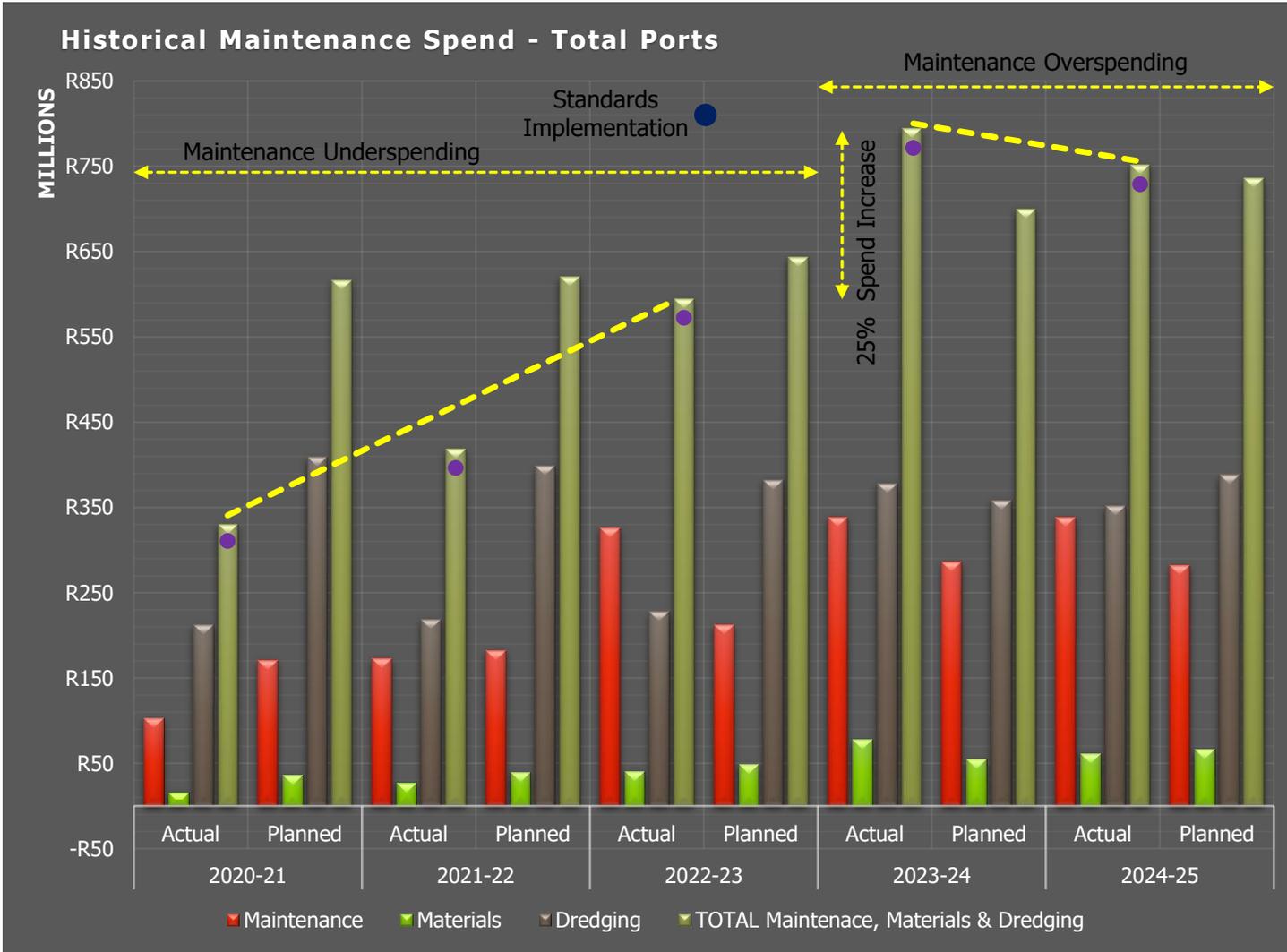
AMP 101_00_Breakwater Asset Management Report Template_Rev-01 Page 14 of 15
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Standard Reporting and Maintenance Planning

- Consistency across all ports and all asset types.
- Focus on key findings, risk analysis of them and prioritisation of maintenance.
- High level scoping of maintenance mitigations.
- Identification of routine maintenance, spares to hold in the port, and 10 year maintenance plan projection.

Standardizing Asset Management: Building the Foundation for Digital Ports

Improved Maintenance Spending Following Standardization





Automation after Standardization: Road Inspection App Pilot



Standardizing Asset Management: Building the Foundation for Digital Ports Infrastructure Management System – Road Inspection App Pilot (2023 to 2025)



Proof of Concept

The screenshots illustrate the following steps in the road inspection app:

- Login:** Welcome screen for Anwar Rodrigues with buttons for 'Capture Inspection', 'Edit Inspection', and 'Help'.
- Select Asset:** 'Inspection Settings' screen with dropdowns for Port (Durban), Asset Category (Pavement), Asset Type (Flexible), and Asset (*New Asset). Includes a 'Save' button and a note about the 'Pavement' asset category.
- TMH9 Criteria:** 'Road Inspections' screen with 'Form has unsaved changes' and a 'save' button. Lists criteria: Current Surfacing, Surfacing Failures, Surfacing Patching, Surfacing Cracks, Binder Condition, and Aggregate Loss, each with Degree and Extent dropdowns.
- Degree and Extent*:** 'Surfacing Failure' screen showing a 'Degree/Severity' grid with images of road damage and a scale from 1 to 5.
- Comments and Photographic Evidence:** 'Road Inspections' screen with 'Form has unsaved changes' and a 'save' button. Includes a 'Summary' section, 'Overall Pavement Condition' dropdown, a 'Comments' text area, and an 'Attachments' section for adding photos.
- Success:** 'Inspection Successfully Submitted.' screen with buttons for 'Capture New Inspection' and 'Back to Home Page'.



The low code platform that spans Microsoft 365, Azure, Dynamics 365, and standalone apps.



Power BI
Business analytics



Power Apps
App development



Power Automate
Process automation



Power Pages
External-facing websites



Data connectors



AI Builder



Dataverse

Standardizing Asset Management: Building the Foundation for Digital Ports Infrastructure Management System – Road Inspection App Pilot (2023 to 2025)



Output

Type of Attention Required
Light Rehabilitation

Structural Condition Index

6.35

Visual Condition Index

38.16

Surfacing Condition Index

4.10

Vetch Road

Overall Condition

A few defects with degree of defects seldom severe. Extent is only local if degree is severe (excluding surfacing defects).

Required Intervention

Reseal

Traffic Volume

Medium

Texture

Medium

Other Concerns

1. Severely blocked kerb and channel on either side of the road. Frequent ponding.
2. Severe surface cracking near Methven Road intersection.
3. Damaged manholes and concrete manhole covers on either si.

Lanes

2

Voids

Many - Many voids are visible, surfacing is open. Aggregates are well pr.

Comments

Stormwater services require urgent cleaning to ensure that ponding is mitigated. The section near Methven Road requires some patching. Crack sealing would be beneficial to prolong the lifespan of the road.

Riding Quality

Ride very smooth and very comfortable, no unevenness of the road profile, no potholes, raveling or uneven patching.

Surface Drainage

Visual Condition Index

59.09

Structural Condition Index

37.70

Surfacing Condition Index

34.60

Road Length (m)

440

Road Width (m)

9

Surface Area (m²)

3.96K

Celebes Road

Visual Condition Index

10.89

Structural Condition Index

31.05

Surfacing Condition Index

9.70

Road Length (m): 575

Road Width (m): 7.36

Surface Area (m²): 4,231

Structural Defects Distribution

Surfacing Defect Distribution

Standardizing Asset Management: Building the Foundation for Digital Ports Infrastructure Management System – Road Inspection App Pilot (2023 to 2025)



Output

Durban

Worst Performing Roads

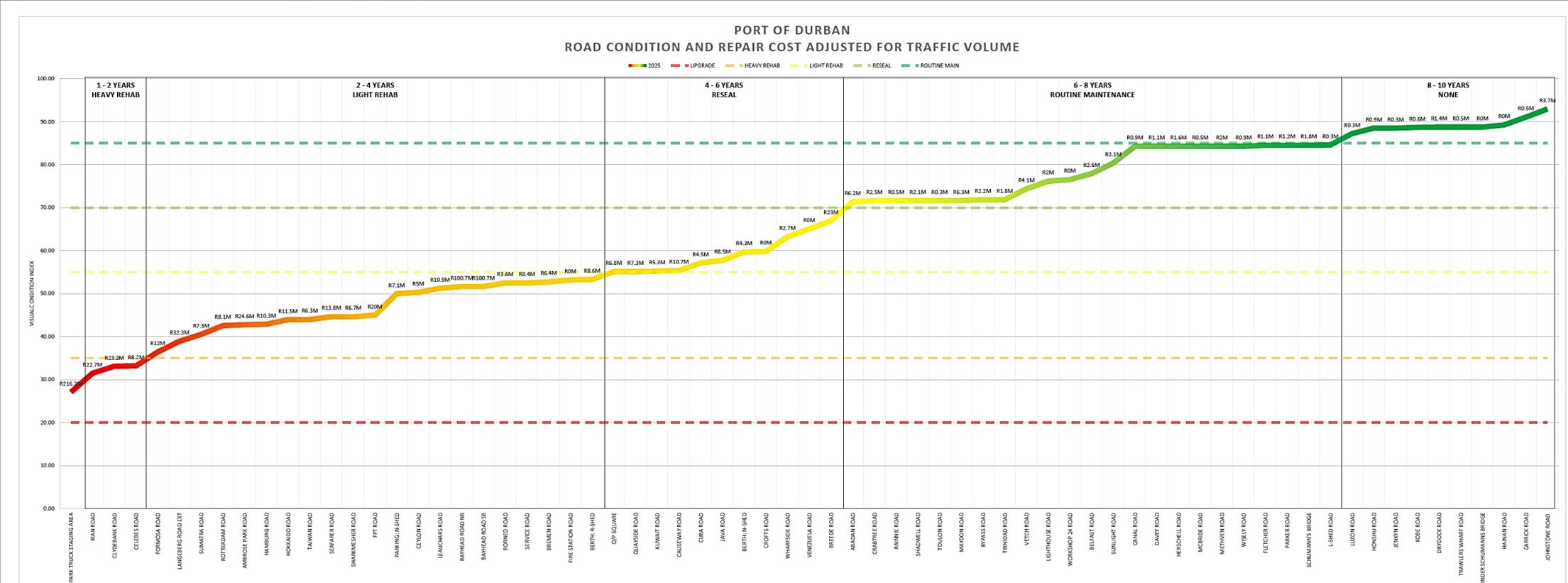
Asset	VCI
Mcbride Road	5.20
Parker Road	8.94
Celebes Road	10.89
N-Shed	11.12
Wisely Road	13.53
Rotterdam Road	19.73
Hokkaido Road	22.41
Formosa Road	24.70
Langenberg Road	25.05

Port Road Network

Total Number of Roads	Road Network Length (m)	Road Network Area (m ²)
71	43303	438,208

Road Condition Indices

Average Visual Condition Index	Average Structural Condition Index	Average Surfacing Condition Index
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Conclusion: Top Three Lessons & Recommendations



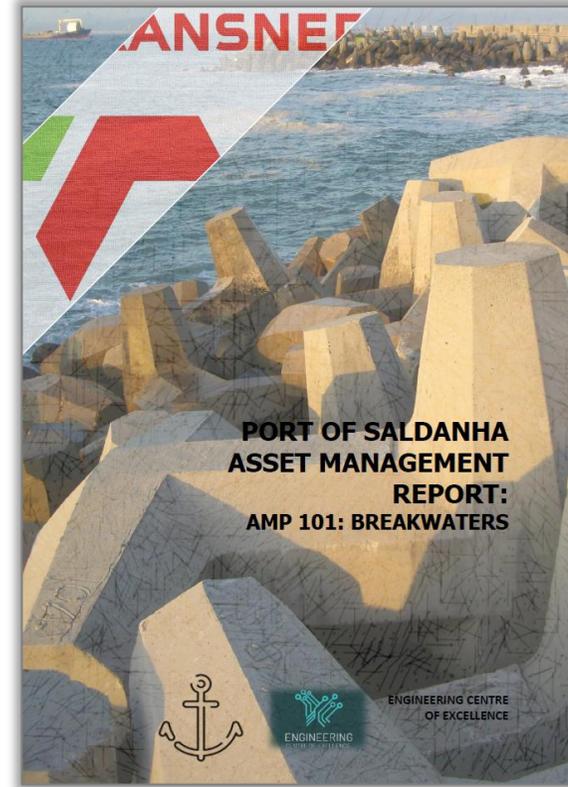
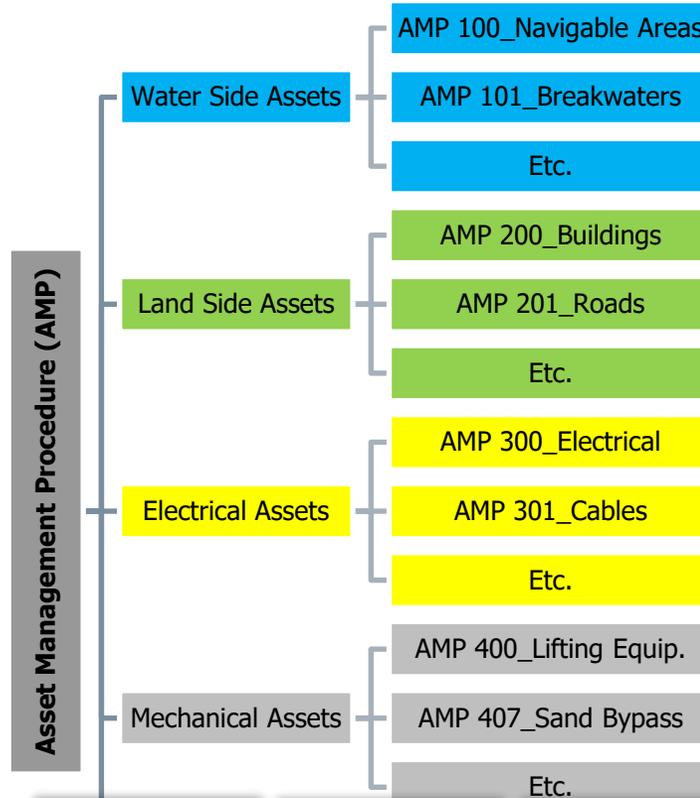
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Conclusion: Top Three Lessons and Recommendations



TOP 3 Lessons and Recommendations

1. Standardize, Categorize and Codify your Assets.
2. Create Standards & Templates.
 - Inspection Reports,
 - Inspection Check Lists,
 - Guidelines,
 - Condition ratings,
 - Etc.
3. Digitize your system. Work smarter, not harder.



... and create a Centre of Excellence.



TRANSNET

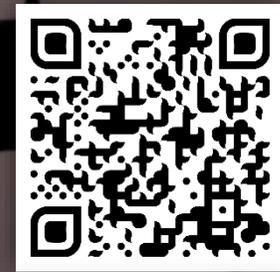


Thank you

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Connect with me



ENGINEERING

CENTRE OF EXCELLENCE

Delivering best practice guidance for Port Infrastructure Performance through Innovation, Safety, Reliability, Affordability & Availability

