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# Asset Management Condition and Performance



19 Apr 2021

TA6551-REG: Strengthening WASH practices and hygiene behavioral change in the Pacific

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# Schedule

Allotted time	
10 min	<b>Introductions:</b> Leah Gutierrez, Director General, Pacific Department, ADB Lusia Sefo-Leau, CEO, Pacific Water & Wastewater Association
10 min	<b>Presentation: Overview of asset management</b> (Dean Taylor)
15 min	<b>Presentation: Condition ratings and assessment</b> (Sharvint Chand)
20 min	<b>Exercise – Condition rating of assets</b> <b>Case Study - Kiribati</b>
15 min	<b>Presentation: Data and decision making</b> (Rhiannon Morgan) <b>Case Study - Nauru</b>
15 min	<b>Discussion &amp; Q&amp;A</b>
5 min	<b>Closing remarks:</b> Jingmin Huang, Director, PAUW, ADB



# Introduction

- Leah Gutierrez, Director General, Pacific Department, ADB
- Lusia Sefo-Leau, CEO, Pacific Water & Wastewater Association



Dean Taylor  
Sector Lead – Asset  
Management



Rhiannon Morgan  
Asset Engineer



Sharvint Chand  
Asset Engineer (Suva)

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# Agenda

- Asset Management Overview
- Standards
- Levels of Service
- Information Management
- Condition Rating and Assessment
- Decision Making



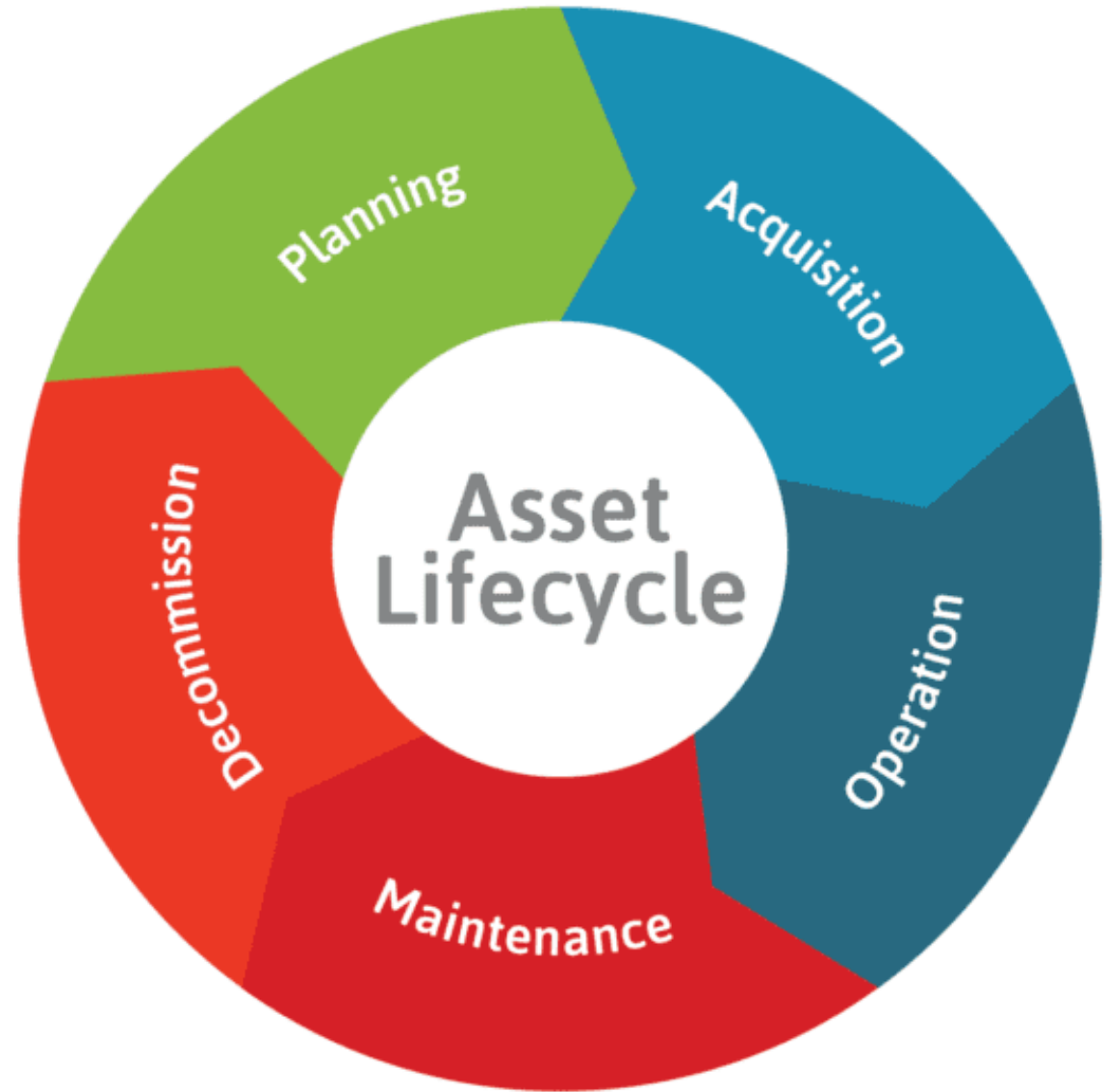


# What is asset management?

*Asset management involves achieving the least cost and least risk of owning and operating assets over their life cycle while meeting service standards for customers.*



# Asset Lifecycle Approach







# ISO 55000 – Asset Management



# ISO Asset Management Standards

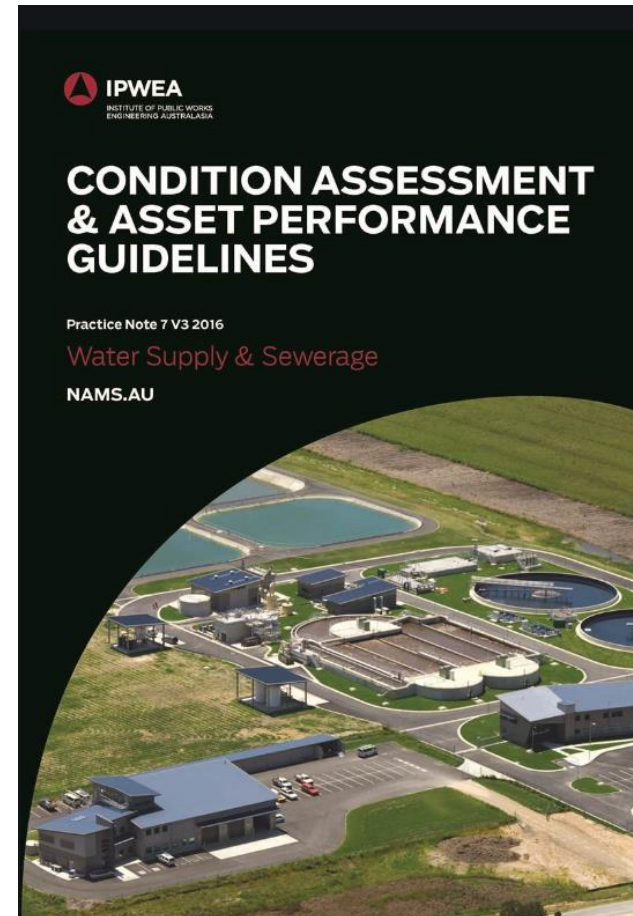
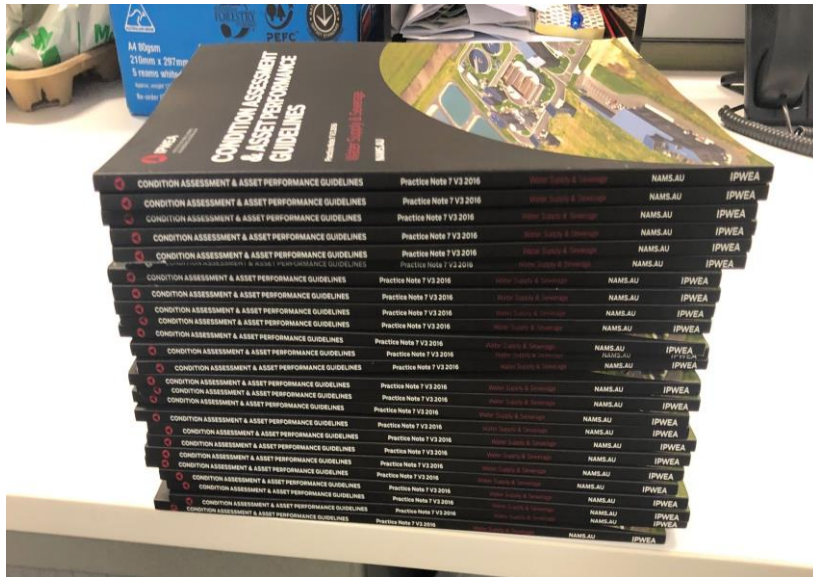
- The three ISO Asset Management (AM) Standards have been developed
  - ISO 55000 Asset management - Overview, principles and terminology
  - ISO 55001 Asset management - Management systems - Requirements
  - ISO 55002 Asset management- Management systems - Guidelines for the application of ISO 55001
- They address the requirements for a **management system** (not software) for the management of assets





Know your  
assets

# IPWEA Practice Note 7



*As stewards of vital infrastructure, utility owners have significant responsibilities to demonstrate compliance with regulations, adherence to guidelines and ability to meet community expectations.*





# Levels of Service

What do you assets need to do?



# Levels of Service

- The reason that assets exist is to provide services at the required levels of service.
- Condition assessment and performance measurement must not only look at the physical condition of the water supply and sewerage system and its components, but more importantly, how well the system is meeting the needs of all who use it.



# Requirements

- Legislation
- Standards
- Community expectations
- Budgets
- Improvement plans





# Information Management

*Develop an information management strategy (IMS) to address the significant amount of data likely to be generated as part of the condition and performance assessment process.*

The logo consists of four stylized, curved shapes in red, blue, green, and yellow, arranged in a circular pattern.

# Asset Data

Asset management is impossible without the support of good asset records (usually known as an asset register or asset database)

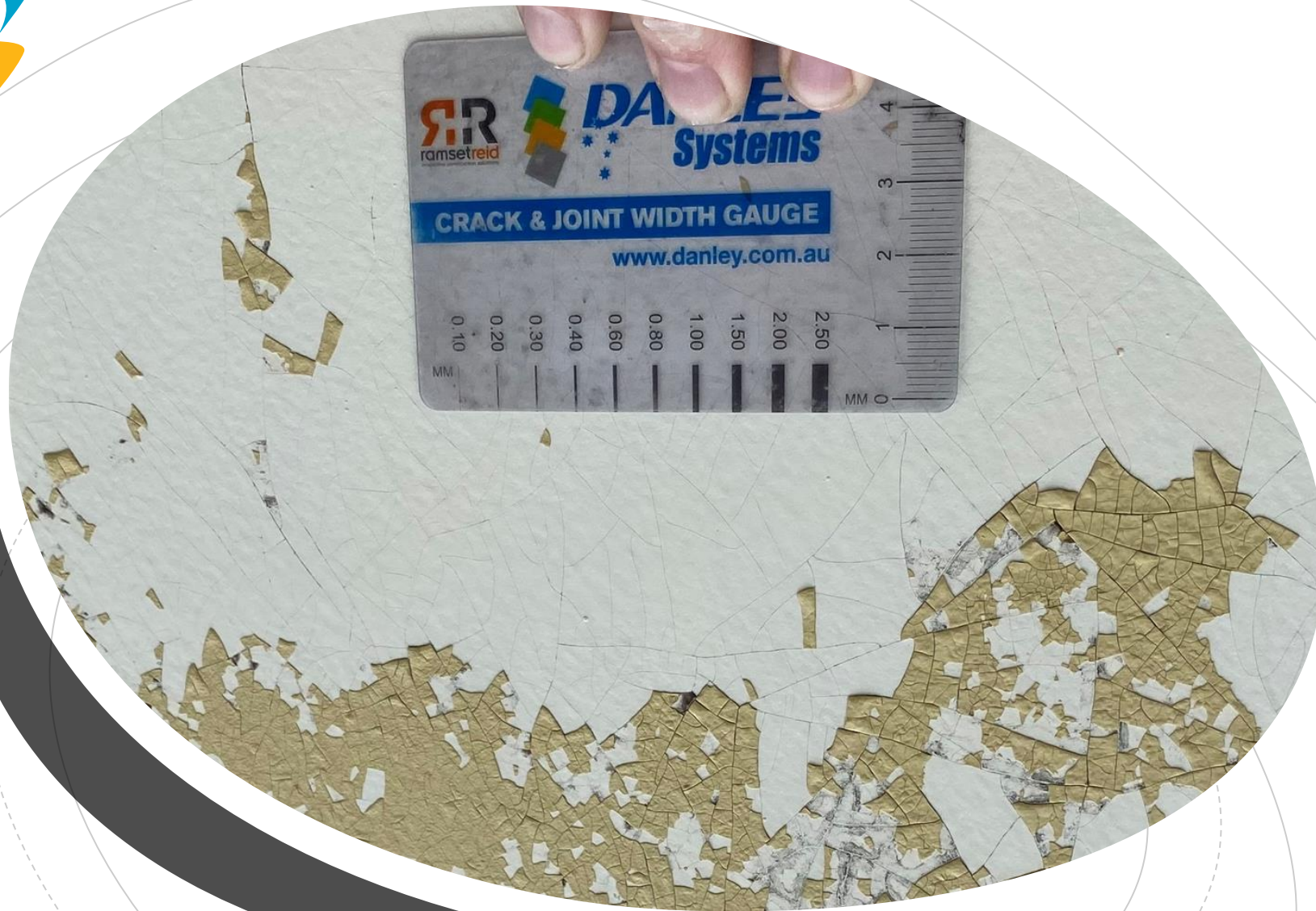
Asset record systems include

- card indexes
- spreadsheets
- customized software from major vendors
- computer applications developed in-house



	A	B	C	D	E	F	G	H	I
1		Asset Register							
2	Functional Area	Facility	Intergroup	Complex Asset	Asset	Asset Type	Asset Sub-Type	Asset Status	Operating Status
3	Water Treatment	Warwick WTP	Raw Water Inlet	Raw Water Bypass	Aeration Inlet Structure	Civil	Structure	Commissioned	Operational
4	Water Treatment	Warwick WTP	Raw Water Inlet	Aerator	Structure	Civil	Structure	Commissioned	Operational
5	Water Treatment	Warwick WTP	Raw Water Inlet	Raw Water Pipeline	Raw Water Pipeline	Civil	Pipework	Commissioned	Operational
5	Water Treatment	Warwick WTP	Raw Water Inlet	Raw Water Pipeline	Access and Handrail	Civil	Structure	Commissioned	Operational
7	Water Treatment	Warwick WTP	Clarification	Clarifier 1	Tank	Civil	Tank	Commissioned	Disused
8	Water Treatment	Warwick WTP	Clarification	Clarifier 1	Pipework	Civil	Pipework	Commissioned	Disused
9	Water Treatment	Warwick WTP	Clarification	Clarifier 1	Bridge & Access	Civil	Structure	Commissioned	Disused
0	Water Treatment	Warwick WTP	Clarification	Clarifier 1	Scrapper and Bridge Mechanism	Mechanical	Scrapper	Commissioned	Disused
1	Water Treatment	Warwick WTP	Clarification	Clarifier 1	Electrical	Electrical	Electrical	Commissioned	Operational
2	Water Treatment	Warwick WTP	Filtration	Filter 1	Filter Structure	Civil	Tank	Commissioned	Operational
3	Water Treatment	Warwick WTP	Filtration	Filter 1	Filtration-Pipework And Fitting	Civil	Pipework	Commissioned	Operational
4	Water Treatment	Warwick WTP	Filtration	Filter 1	Filtration-Access & Hand Rail	Civil	Structure	Commissioned	Operational
5	Water Treatment	Warwick WTP	Filtration	Filter 1	Filtration-Filter Heads	Civil	Structure	Commissioned	Operational
6	Water Treatment	Warwick WTP	Chemical Dosing	Complex Asset	General Instrumentation	Electrical	Instrument	Commissioned	Operational
7	Water Treatment	Warwick WTP	Chemical Dosing	Complex Asset	General Pipework	Civil	Pipework	Commissioned	Operational
8	Water Treatment	Warwick WTP	Site Services	Service Water	Site Service-Pipework			Commissioned	Operational
9	Water Treatment	Warwick WTP	Site Services	Service Water	Pump 1	Mechanical	Pump	Commissioned	Operational
0	Water Treatment	Warwick WTP	Site Services	Service Water	Site Service-Electrical	Electrical		Commissioned	Operational
1	Water Treatment	Warwick WTP	Backwash	Backwash Recovery	Backwash-Concrete Pond	Civil	Structure	Commissioned	Operational
2	Water Treatment	Warwick WTP	Backwash	Backwash Recovery	Backwash-Pipework	Civil	Pipework	Commissioned	Operational
3	Water Treatment	Warwick WTP	Backwash	Backwash Recovery	Backwash-Pump 2	Mechanical	Pump	Commissioned	Operational
4	Water Treatment	Warwick WTP	Backwash	Backwash Recovery	Backwash-Earth Dam	Civil	Structure	Commissioned	Operational
5	Water Treatment	Warwick WTP	Backwash	Backwash Recovery	Backwash-Electrical	Electrical	Electrical	Commissioned	Operational
6	Water Treatment	Warwick WTP	Site Services	Buildings	WRK-WTP-SITE-Electrical Cabling	Electrical	Electrical	Commissioned	Operational
7	Water Treatment	Warwick WTP	Site Services	Equipment	SITE-Pipework	Civil	Pipework	Commissioned	Operational
8	Water Treatment	Warwick WTP	Site Services	Equipment	SITE-Fencing	Civil	Structure	Commissioned	Operational
9	Water Treatment	Warwick WTP	Site Services	Equipment	SITE-Carpark And Hardstands	Civil	Structure	Commissioned	Operational
0	Water Treatment	Warwick WTP	Clear Water	Lyndhurst Lane Pump Station	Pump 1	Mechanical	Pump	Commissioned	Operational
1	Water Treatment	Warwick WTP	Clear Water	Lyndhurst Lane Pump Station	Pipework	Civil	Pipework	Commissioned	Operational
2	Water Treatment	Warwick WTP	Clear Water	Lyndhurst Lane Pump Station	Electrical	Electrical	Electrical	Commissioned	Operational





## Condition Rating



# Condition Rating – Core Approach

- Tables are provided in the manual with descriptions of asset condition to allow users to rate the condition of assets.
- 1 to 5 condition rating is used where 1 is very good and 5 is very poor







# Generic Ratings – Practice Note 7

- Civil
  - Water Mains
  - Sewer Gravity
  - Mechanical and electrical
- 
- Other tables can be developed for specific asset types



Table 9-2 Condition Grading and Estimated % Useful Life Remaining –Water Mains

Grade	Condition	Description	Response	Estimated % Asset Useful Life Remaining
0	Not Rated	Asset has been properly decommissioned, no longer exists (or should be removed from inaccurate plans), has not been condition rated (or assigned an extrapolated condition), or is unable to be rated due to serviceability issues.	Response will vary subject to circumstances, eg an abandoned asset may experience infiltration, voids, collapse etc. and pose a real danger that should be both monitored and managed.	NA
1	Very Good	Excellent physical condition. Observable deterioration insignificant. No reported failures of pipeline and zero leaks recorded. In the absence of any other information the asset will be at Condition Grade 1 at an age of less than 20% of the design useful life.	Continue with any routine maintenance	100% to 80%
2	Good	Sound physical condition; minor or insignificant surface imperfections, corrosion or delamination. Deterioration for this grading would be restricted to only the protective coatings and not to the parent material itself. External coating showing signs of aging (minor). No reported failures of pipeline. In the absence of any other information the asset will be at Condition Grade 2 at an age of between 20% and 50% of the design useful life.	Continue with any routine maintenance and any minor repairs	80% to 50%
3	Fair or Moderate	Moderate level of corrosion. Obvious signs of deterioration of pipe wall, and delamination evident. Surface coating damaged or signs of deterioration with some blistering. Some loss of internal diameter in unlined mains (less than 5%) Joints generally watertight but some minor weeping. Some surface softening of AC pipe (less than 5% of wall thickness) One burst or leak recorded in past 5 years (reticulation main – typically with length less than 200m) In the absence of any other information the asset will be at Condition Grade 3 at an age of between 50% and 80% of the design useful life.	Continue with any routine maintenance and undertake repairs Investigate reasons for asset deterioration or failure. Take remedial action where appropriate and cost-effective (e.g. improve water treatment, pressure reduction)	50% to 20%

Grade	Condition	Description	Response	Estimated % Asset Useful Life Remaining
4	Poor	Serious level of corrosion. Obvious delamination. Surface coating has deteriorated with blistering occurring Pipe wall is soft (AC) (less than 25% of wall thickness) Significant loss of internal diameter of unlined mains (less than 15%) Joints not watertight allowing some weeping from joints One failure recorded in current year and failures averaging about one per year over the past 3 years (reticulation main – typically with length less than 200m) Asset is now moving into zone of failure In the absence of any other information the asset will be at Condition Grade 4 at an age of between 80% and 95% of the design useful life.	Identify main as a potential candidate for renewal in the medium term Review risk mitigation strategies  Monitor main performance and escalate/ prioritise for renewal if the failure rate continues to increase	20% to 5%
5	Very Poor	Major deterioration of the structural integrity of the main Two or more failures recorded per year (reticulation main – typically with length less than 200m) Significant water leakage.	Take immediate action commensurate with level of risk. Undertake renewal in the short term (within 2 years)	5% to 0%



# Condition Assessment

# Condition Assessment

- Undertake condition assessment at three levels:
  - **Level 1 - Routine operation and maintenance data assessment.**
  - **Level 2 - Formalised asset inspection/ condition assessment.**
  - **Level 3 - Detailed investigation.**





# Level1 Assessment – Core Approach

- Data from operational monitoring
- Maintenance inspections





# Level 2 Assessment – Formalised Inspection

- Planned inspections of critical assets
- Risk based samples





# Level 3 Assessment – Detailed Investigation

- Issues identified under level 2 assessments





# Condition Assessment Exercise





# Exercise

- Go to breakout rooms
- Our asset management team will present a series of photos
- How would you rate the condition of these assets?
- What would you recommend?



# Exercise Outcomes

- How did you score the assets?
- What would you recommend?
- How difficult would it be for you to do this for your own assets?

# Kiribati – Case Study







# Asset Management Decision Making

# Data to Information

- Turning the data gathered into information to assist in decision-making is a critical outcome of a successful assessment process
- These outcomes would include
  - An updated register and condition rating of each asset and estimate of the remaining useful life
  - a risk rating for each asset
  - predictions of timing of future renewals and replacements of various components
  - maintenance frequencies









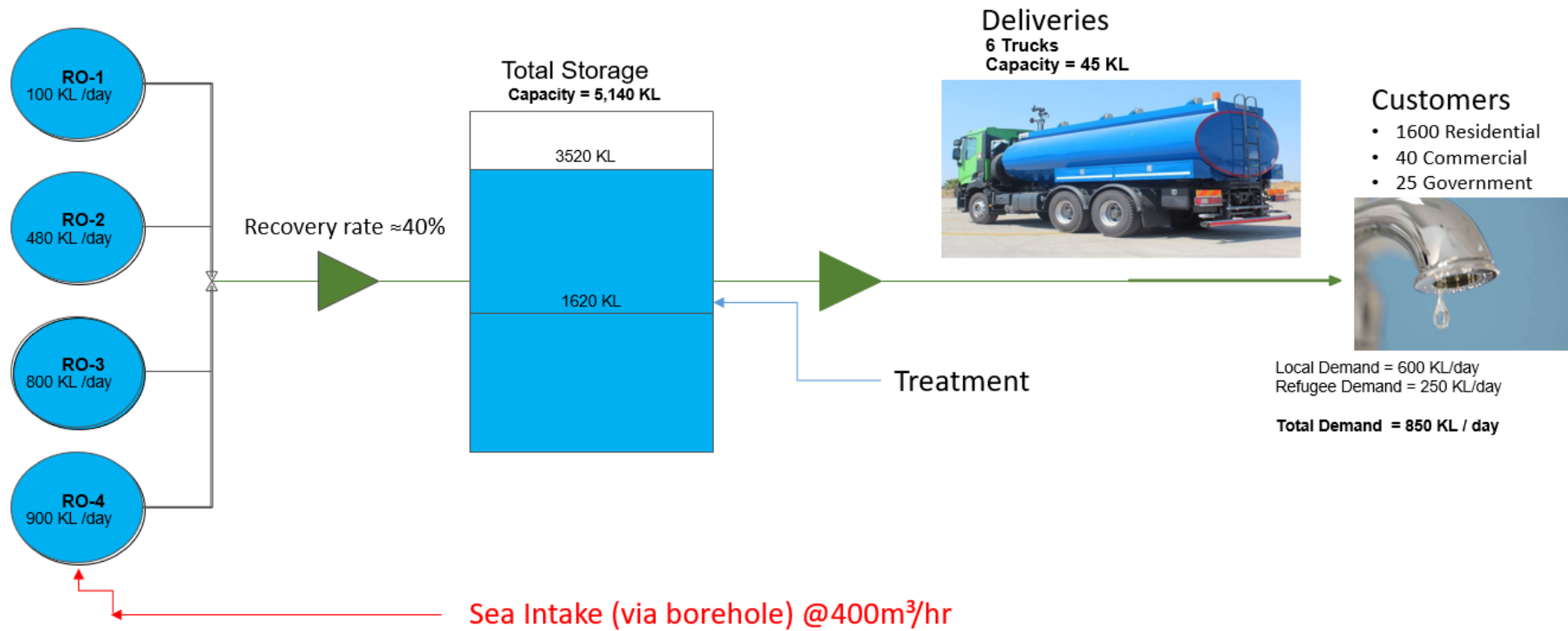


	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	<b>Mechanical Condition Assessment</b>																
2	Station / Parent equipment number	System description	Equipment reference	Equipment description	Installation year	Make	Model	Duty / capacity / size	Serial number	Urgency rating (criticality to site)	Operations & maintenance history rating (feedback, operational and maintenance data)	Structural appearance rating (leakage, support, shunt, bearing etc.)	Symptoms rating & measurement results (vibration, temperature, noise)	Overall Condition Rating	Estimated remaining useful life (years)	Comments / observations	Description of defects / deficiencies / issues applicable)
3	<b>Ferodate No. 1 WPS</b>																
10			HS-FEO-01A-PS1-PU02	PUMP, CENTRIFUGAL DRY MNT, 02	TBC	Kelly & Lewis / WEG	20 MFD / 355CDE	61 ML/d & 330 kW	23772.1 / 1019306538	4	3	3	1	3	20	The pump is in good condition considering its age. The estimated remaining life is a minimum and it's possible that it may last 20 or more years with a moderate level of	Corrosion observed on the motor stool. The motor has been re-coated and in good condition.
11			HS-FEO-01A-PS1-PU03	PUMP, CENTRIFUGAL DRY MNT, 03	TBC	Kelly & Lewis / WEG	20 MFD / 355CDE	67 ML/d & 330 kW	91526 / 1019257092	4	3	3	5	5	20	Vibration testing indicates that there may be an issue with a loose shaft connection (not likely the impeller). The pump is still in good condition considering its age. The estimated remaining life is a minimum and it's possible that it may last 20 or more years with a	Vibration testing indicates there may be an issue with a loose shaft connection. Loss of the protective coating at the pipe penetration into the wall. Corrosion evident.
12			HS-FEO-01A-PS1-PU04	PUMP, CENTRIFUGAL DRY MNT, 04	TBC	Kelly & Lewis / WEG	TBC / 355CDE	68 ML/d & 330 kW	TBC & 1019257093	4	3	3	1	7	20	Vibration testing indicates that there may be a few issues with the bearings. The pump details are assumed to be the same as Pump 3 but the nameplate is missing. The pump is still in good condition considering its age. The estimated remaining life is a minimum and it's possible that it may last 20 or more years with a moderate level of maintenance.	Vibration testing indicates that there is an issue with the bearings. Loss of the protective coating at the pipe penetration into the wall. Corrosion evident.
13			HS-FEO-01A-PS1-PU05	PUMP, CENTRIFUGAL DRY MNT, 05	1990	Kelly & Lewis / WEG	SBVM990x1	141 ML/d & 900 kW	14987/1 & 1019518993	4	3	3	1	3	30	The pump is in good condition considering its age. The estimated remaining life is a minimum and it's possible that it may last 30 or more years with a moderate level of	The mechanical seal has failed.
14			HS-FEO-01A-PS1-PU06	PUMP, CENTRIFUGAL DRY MNT, 06	1990	Kelly & Lewis / WEG	SBVM990x1	143 ML/d & 900 kW	14987/2 & 1019542616	4	3	3	1	3	30	The pump is in good condition considering its age. The estimated remaining life is a minimum and it's possible that it may last 30 or more years with a moderate level of	None.
15			HS-FEO-01A-PS1-PUSU1	PUMP, SUMP, 1	TBC	Davey	TBC	TBC	TBC	2	5	1	1	5	5	The pump was reported as operating adequately. Typically this type of submersible pump lasts around 5 years.	None.
16			HS-FEO-01A-PS1-PUSU2	PUMP, SUMP, 2	TBC	Davey	TBC	TBC	TBC	2	5	1	1	5	5	The pump was reported as operating adequately. Typically this type of submersible pump lasts around 5 years.	None.

# Nauru – Case Study

## Water Production & Dispatch

Nauru Water Supply & Demand March 2021  
(Aiwo Operations)





# Take Action

- Works orders to initiate reactive maintenance activities of those defects requiring attention as part of the current maintenance program, including timelines for completion
- Capital expenditure projects for both renewals/replacement and new/upgrade
- Development of projects to make sure they are incorporated into the organisation's asset management programs for ongoing operation, maintenance and financial management.



# Planning

Life-cycle costing analysis and long-term financial planning are important financial information outcomes

- short term, urgent maintenance expenditure needs
- follow up pro-active maintenance planning and budget needs
- longer term capital expenditure for renewals or replacement of assets





# Challenges and Opportunities - Discussion





# Zoom Poll

Edit Poll 1

×

Asset Management

☐ Anonymous? ⓘ

1.

Would you like us to run more workshops on asset management or provide some assistance?

☐ Single Choice ☒ Multiple Choice

No thanks

More information on condition assessment

Asset information management

Maintenance planning

Operating and capital budgeting

Asset data analysis

Answer 7 (Optional)

Answer 8 (Optional)

Answer 9 (Optional)

Answer 10 (Optional)

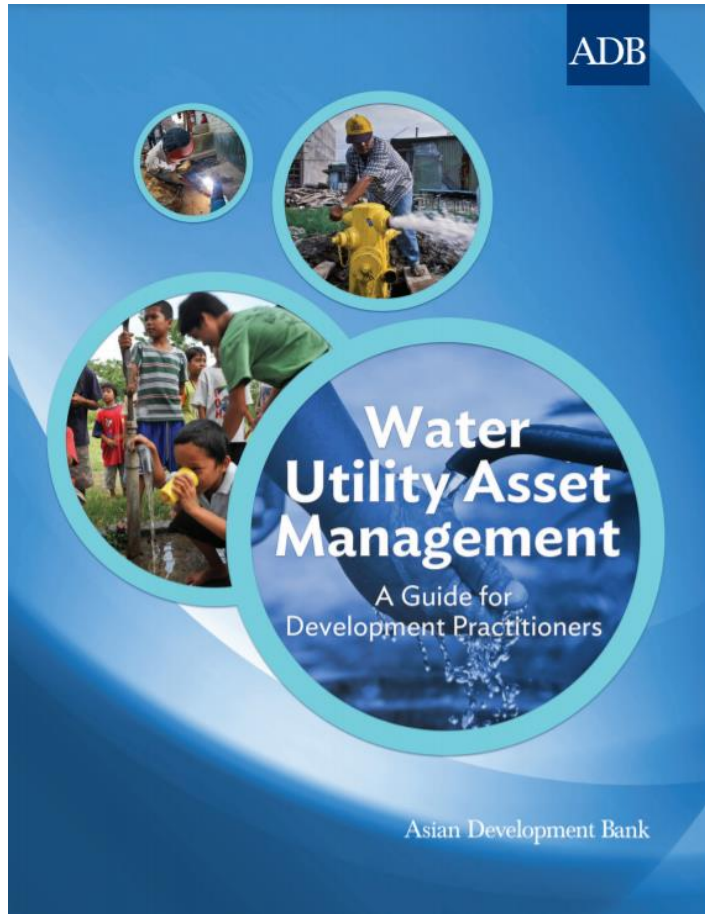
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# Other References



## [Water Utility Asset Management Guide](#)



# Conclusion

- Vivian Castro-Woolridge, Senior Urban Development Specialist, Pacific Department, ADB
- Jingmin Huang, Director, PAUW, ADB





Thank you.

