



Group Exercise (Feb 10)

Wharfs and Jetties



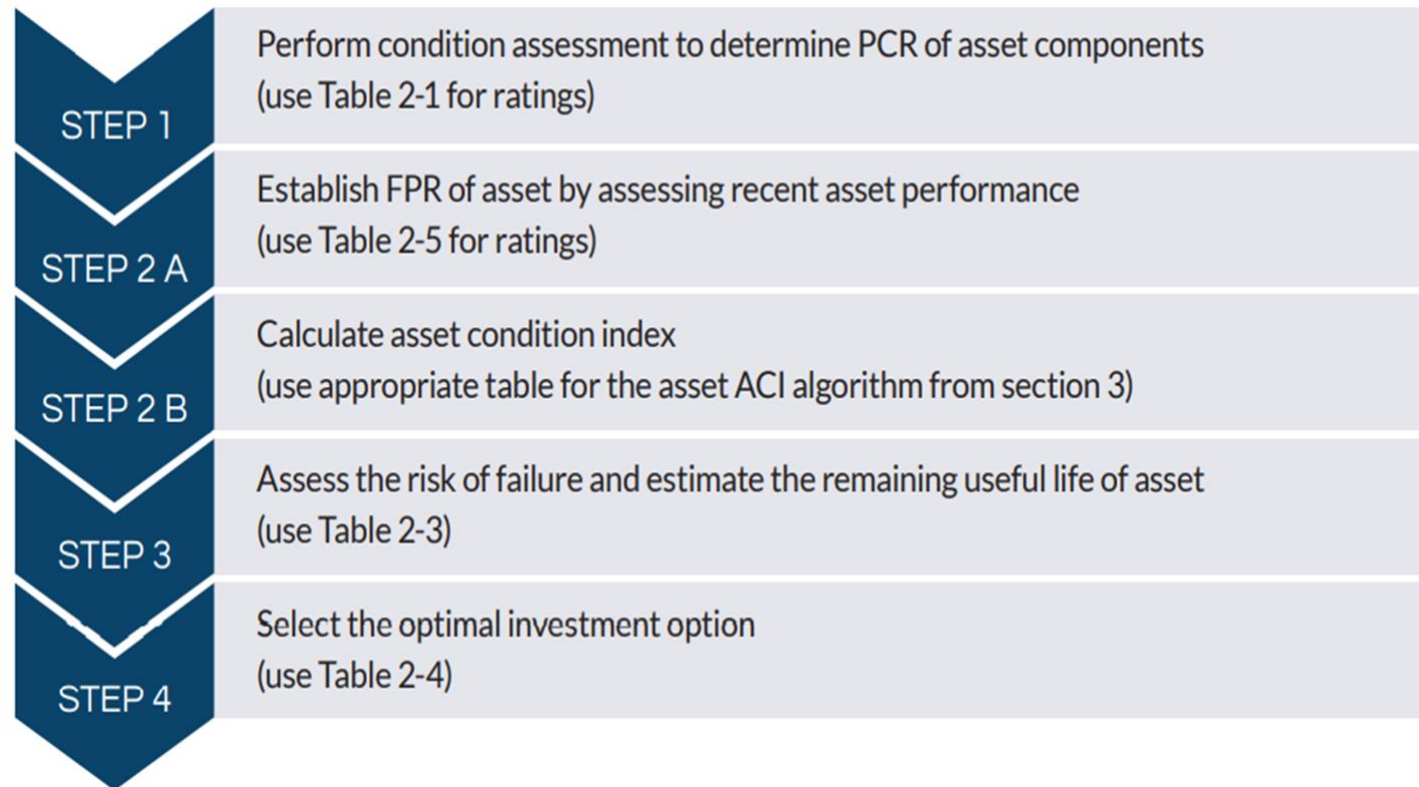
Asset Condition Assessment For Jetty

- A jetty used for commercial fishing in Vanuatu is constructed with timber decking on timber supports, with deck dimensions of 80 m long and 5 m wide.
- The support structure and decking have suffered from significant wood rot, which has reduced the strength and it presents a serious public safety hazard.
- Determine its asset condition index and develop an investment plan



Asset Condition Assessment of Jetty

Since we have been given information about both the physical condition and functional performance of the jetty, to calculate condition assessment index and develop investment plan for this jetty we will use the second approach, which requires the following steps (Figure 2-2, Section 2):



Step 1

- Perform condition assessment to determine PCR of asset components (use Table 2-1, Section 2 for ratings)

To assess the condition of the jetty, we will first need to assign physical condition ratings to the jetty's components, by using **Section 2: Table 2-1**. The main components of a Jetty are described in **Section 3.5**.

Table 2-1 (Section 2)

Asset Component Condition	Physical Condition Rating	Interpretation
Asset Component in brand new condition, with no wear, no damage, no deformation, no defects, no deterioration, no impairment	5	Excellent
Asset Component in "like new" condition, with minor wear and no damage, no defects, no deformation, no deterioration and no impairment	4	Good
Asset Component shows minor wear, minor deformation, minor damage, minor defects, minor deterioration, minor impairment, asset condition can be maintained through normal preventative maintenance	3	Fair
Asset Component with major deformation, degradation, deterioration, damage or defects and serious impairment in condition; however component condition can be restored through economically efficient rehabilitation/refurbishment of degraded/faulty components.	2	Poor
Asset Component with major degradation, deterioration, damage or defects and serious impairment in condition, and it is not possible to restore the component condition through economically efficient rehabilitation/refurbishment	1	Very Poor

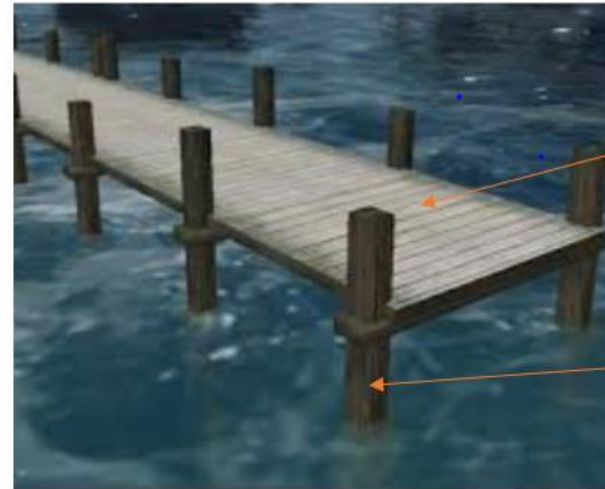
Step 1

- Perform condition assessment to determine PCR of asset components (use Table 2-1, Section 2 for ratings)

Section 3.5 describes the following components of jetty, for which condition assessment needs be carried out and an appropriate condition rating assigned:

- Support structure
- Decking

Let's visually assess condition of the support structure and the decking on this jetty



Decking

Support Structure

Step 1

- Perform condition assessment to determine PCR of asset components (**use Table 2-1, Section 2 for ratings**)



Physical Condition Rating	Interpretation
5	Excellent
4	Good
3	Fair
2	Poor
1	Very poor

- Which rating would you give to the wood support structure (badly decayed)?
- Please discuss within your group and assign a rating.

Step 1

- Perform condition assessment to determine PCR of asset components (use Table 2-1, Section 2 for ratings)



Physical Condition Rating	Interpretation
5	Excellent
4	Good
3	Fair
2	Poor
1	Very poor

- Which rating would you give to the wood decking (decayed)?
- Please discuss within your group and assign a rating.



Step 2A

- Establish FPR of asset by assessing recent asset performance (use **Table 2-5, Section 2** for ratings)

To establish the Functional Performance Rating, we need recent performance assessment. Based on the initial description, we know that due to wood decay the jetty is unsafe to use. What Functional Performance Rating would you assign this jetty?

Table 2-5: Asset Functional Performance Ratings

Asset Functional Performance Rating	Condition Score	Interpretation
Asset's functional performance exceeds the upper limit of the desired service levels.	5	Excellent
Asset's functional performance meets the upper limit of the desired service levels.	4	Good
Asset's functional performance meets the lower limit of the service level requirements.	3	Fair
Asset's functional performance does not meet the lower limit of the service level requirements, however through refurbishment/renewal it is possible to restore the performance to acceptable level.	2	Poor
Asset's functional performance does not meet the lower limit of the service level requirements, and it is not possible to restore the performance to acceptable levels through renewal/refurbishment.	1	Very poor



• Calculate the Asset Condition Index

Now that we have assigned the physical condition ratings to Jetty's components and also determined its functional performance rating, which we will input into **Table 3-14, Section 3** to calculate the Asset Condition Index. In the Excel worksheet, insert condition ratings in cells marked with "?" It will calculate the asset condition index

Table 3-14 (Section 3)

Condition Criteria		Weight	Condition Ratings	Maximum Score	Actual Score
Component Physical Condition	Structure	6	?	30	#VALUE!
	Decking	4	?	20	#VALUE!
Asset Functional Performance		3	?	15	#VALUE!
Total Score		13		65	#VALUE!
Asset Condition Assessment Index (ACI) = (Actual Score / Maximum Score) x 100					#VALUE!

Risk of Failure and Remaining Useful Life

Step 3

- Assess the risk of asset failure and remaining useful life Use **Table 2-3 (Section 2)** shown below

Based on the Asset Condition Index value calculated in the previous slide, find the correct row in the first column of the table and then move to column 3 in the same row to find the remaining useful and move to column 4 in the same row to find the risk of asset failure.

Table 2:3 (Section 2)

Asset Condition Index	Interpretation	Remaining Useful Life	Risk of Failure in Service
0 to 20	Very Poor	< 5% of TUL	Very High
21 to 40	Poor	<20% and ≥5% of TUL	High
41 to 60	Fair	<50% and ≥20% of TUL	Moderate
61 to 80	Good	<85% and ≥50% of TUL	Low
81 to 100	Excellent	≥85% of TUL	Very Low

Investment plan

Step 4

- Select the optimal investment plan Use **Table 2-4 (Section 2)** shown below
- Based on the Asset Condition Index value calculated in the previous slide, what is the recommended action?

Table 2-4 (Section 2)

Asset or Component Condition	Recommended Action for Investment Planning
ACI = 0 to 20	Plan Asset Replacement - with High Priority
ACI = 21 to 40	Plan Asset Replacement
ACI > 40, but one or more component's Rating 2 or Less	Plan Renewal of Components with Condition Rating of 2 or Less
ACI > 50 and all components with rating of 3 or higher	Only Scheduled Maintenance and inspections are Required

Timber Jetty – Estimate of Investment Needs

Jetty Dimensions			Units
Length	L	80	m
Width	W	5	m
Area	$A = L \times W$	400	m^2
Unit Costs for Jetty Construction(From Section 4)			
Unit cost jetty structure (Table 4-10)	C_{js}	\$600.00	USD/ m^2
Unit cost jetty decking (Table 4-10)	C_{jd}	\$200.00	USD/ m^2
Price Adjustment Factor for Vanuatu (Table 4-2)	P_{af}	1.1	
Cost Estimate			
Estimated Cost of jetty structure	$A \times C_{js} \times P_{af}$	\$ 264,000	USD
Estimated Cost of jetty decking	$A \times C_{jd} \times P_{af}$	\$ 88,000	USD
Total Estimated Cost		\$ 352,000	USD

4.3 Bridges and Culverts

Because of the significant variations in design and capacity of bridges and culverts, it is not possible to develop reasonably accurate estimates for bridge replacement or renewal based on unit costs of construction. Therefore, it is recommended to obtain records of original bridge or culvert construction cost, which can be used to determine bridge/culvert renewal or replacement cost by adjusting the original construction costs for inflation.

The unit cost for construction of road bridges and culverts provided in Table 4-7 and Table 4-8 have been derived from the recent bridge construction costs in the United States and can be used to prepare rough cost estimates for bridge/culvert replacement or component renewal. These costs are expressed in US dollars based on 2019 cost base. The unit of measurement is the surface area spanned by the bridge.

Table 4-7: Per-unit Cost for Bridge Construction

Predominant Construction Material	Steel or Steel Reinforced Concrete	Timber
Components	\$/ m^2 of Deck Area	\$/ m^2 of Deck Area
Sub-structure	\$1,200	\$600
Super-structure	\$1,500	\$800
Decking	\$400	\$200
Total Bridge Cost	\$3,100	\$1,600

Note: m^2 = square meter.

Table 4-8: Per-Unit Cost for Culverts Crossings

Predominant Construction Material	Reinforced Concrete Pipe	Steel Pipe
Asset	\$/ m^2 of Deck Area	\$/ m^2 of Deck Area
Culverts	\$1,000	\$1,000

Note: m^2 = square meter.

The per unit costs indicated in Table 4-7 and Table 4-8 should be multiplied with a country specific correction factor, indicated in Table 4-2, to adjust the prices for freight and local construction costs.



Group 2 Exercise Results

Visual Condition Assessment of a Jetty:

- A jetty used for commercial fishing in Vanuatu is constructed with timber decking on timber supports, with deck dimensions of 80 m long and 5 m wide.
- The support structure and decking have suffered from significant wood rot, which has reduced the strength and it presents a serious public safety hazard.



Physical Condition Ratings	
Structure	
Decking	
Functional Performance Rating	
Asset Condition Index	
Remaining Useful Life	
Risk of Failure	
Estimated Investment	