Q. **Project C-24: Rehabilitate Shoreline Protection – Cat Arm**

With respect to Table 3, set out on page 15 of the Report at Tab 7, Volume II, please provide further data used in the calculation of the CPW for the alternatives identified.

A. The tables below reflect the data used in the calculation of the CPW for the alternatives identified.

Alternative 1 has a higher CPW primarily due to increased upkeep costs with no additional benefit.

Alternative 2, which is Rock Armour, was shown to have the lowest CPW and was, therefore, deemed to be the most favourable alternative. This corresponds to the recommendations set forth in AMEC's feasibility analysis.

The higher CPW for alternatives 3 and 4 are the result of the replacement costs shown as "Other Costs", occurring in 2029 and 2035 respectively. These replacements are anticipated as they are atypical structures for high energy sea states and therefore would have a shorter service life than that of the Rock Armour. Each of these alternatives includes a Benefit equal to the undepreciated capital cost of the assets.

Table 1: Regular Upkeep

PROJECT COST / BENEFIT ANALYSIS TEMPLATE

Refurbish Shoreline Protection

Alt. # 1 - Regular Upkeep

Note: Costs are shown as positive values; Benefits as negative values

Current Year	**2015**
Present Worth Year	2015
Number of Years in Study	20
Discount Rate	7.0%
Total In-service Project Cost	$ 695,700
In-service Year	2017
Replacement Cost (if applicable)	$ -
Replacement Year (if applicable)	
Project cost in Ending (E) or Beginning (B) Year $$	B
O&M costs - Escalation based on mixture of Materials & Labour	More Material Less Labour

Year		Annual O&M Cost $	Other Cost $	Total Costs $	Benefit 1 (specify) $	NET $	P.W. January 2015	Cumulative Present Worth
0	2015	-	-	-	-	-	-	-
1	2016	-	-	-	-	-	-	-
2	2017		-	695,700	-	695,700	607,651	607,651
3	2018		-	-	-	-	-	607,651
4	2019	16,364	-	16,364	-	16,364	11,667	619,319
5	2020		-	-	-	-	-	619,319
6	2021	189,634	-	189,634	-	189,634	118,094	737,413
7	2022		-	-	-	-	-	737,413
8	2023	17,852	-	17,852	-	17,852	9,711	747,124
9	2024	184,182	-	184,182	-	184,182	93,629	840,753
10	2025		-	-	-	-	-	840,753
11	2026	19,057	-	19,057	-	19,057	8,461	849,214
12	2027		-	-	-	-	-	849,214
13	2028	464,440	-	464,440	-	464,440	180,118	1,029,332
14	2029		-	-	-	-	-	1,029,332
15	2030	20,790	-	20,790	-	20,790	7,042	1,036,374
16	2031	235,736	-	235,736	-	235,736	74,628	1,111,002
17	2032		-	-	-	-	-	1,111,002
18	2033	22,193	-	22,193	-	22,193	6,136	1,117,138
19	2034		-	-	-	-	-	1,117,138
20	2035	257,175	-	257,175	-	257,175	62,111	1,179,250

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Table 2: Rock Armour

PROJECT COST / BENEFIT ANALYSIS TEMPLATE

Refurbish Shoreline Protection

Alt. #2 - Rock Armour

Note: Costs are shown as positive values; Benefits as negative values

Current Year	**2015**
Present Worth Year	2015
Number of Years in Study	20
Discount Rate	7.0%
Total In-service Project Cost	$1,142,900
In-service Year	2017
Replacement Cost (if applicable)	$ -
Replacement Year (if applicable)	
Project cost in Ending (E) or Beginning (B) Year $$	B
O&M costs - Escalation based on mixture of Materials & Labour	More Material Less Labour

Year		Annual O&M Cost $	Other Cost $	Total Costs $	Benefit 1 (specify) $	NET $	P.W. January 2015	Cumulative Present Worth
0	2015	-	-	-	-	-	-	-
1	2016	-	-	-	-	-	-	-
2	2017		-	1,142,900	-	1,142,900	998,253	998,253
3	2018		-	-	-	-	-	998,253
4	2019		-	-	-	-	-	998,253
5	2020	16,724	-	16,724	-	16,724	11,144	1,009,397
6	2021		-	-	-	-	-	1,009,397
7	2022		-	-	-	-	-	1,009,397
8	2023	17,852	-	17,852	-	17,852	9,711	1,019,108
9	2024		-	-	-	-	-	1,019,108
10	2025		-	-	-	-	-	1,019,108
11	2026	19,057	-	19,057	-	19,057	8,461	1,027,569
12	2027		-	-	-	-	-	1,027,569
13	2028		-	-	-	-	-	1,027,569
14	2029	20,342	-	20,342	-	20,342	7,373	1,034,942
15	2030		-	-	-	-	-	1,034,942
16	2031		-	-	-	-	-	1,034,942
17	2032	21,715	-	21,715	-	21,715	6,425	1,041,367
18	2033		-	-	-	-	-	1,041,367
19	2034		-	-	-	-	-	1,041,367
20	2035	23,180	-	23,180	-	23,180	5,598	1,046,965

1 **Table 3: Gabion Retention Structure**

PROJECT COST / BENEFIT ANALYSIS TEMPLATE

Refurbish Shoreline Protection

Alt. #3 - Gabion Retention Structure

Note: Costs are shown as positive values; Benefits as negative values

Current Year	**2015**
Present Worth Year	2015
Number of Years in Study	20
Discount Rate	7.0%
Total In-service Project Cost	$1,184,100
In-service Year	2017
Replacement Cost (if applicable)	$ -
Replacement Year (if applicable)	
Project cost in Ending (E) or Beginning (B) Year $$	B
O&M costs - Escalation based on mixture of Materials & Labour	More Material Less Labour

Year		Annual O&M Cost $	Other Cost $	Total Costs $	Benefit 1 (specify) $	NET $	P.W. January 2015	Cumulative Present Worth
0	2015	-	-	-	-	-	-	-
1	2016	-	-	-	-	-	-	-
2	2017		-	1,184,100	-	1,184,100	1,034,239	1,034,239
3	2018		-	-	-	-	-	1,034,239
4	2019		-	-	-	-	-	1,034,239
5	2020	16,724	-	16,724	-	16,724	11,144	1,045,383
6	2021		-	-	-	-	-	1,045,383
7	2022		-	-	-	-	-	1,045,383
8	2023	17,852	-	17,852	-	17,852	9,711	1,055,093
9	2024		-	-	-	-	-	1,055,093
10	2025		-	-	-	-	-	1,055,093
11	2026	19,057	-	19,057	-	19,057	8,461	1,063,555
12	2027		-	-	-	-	-	1,063,555
13	2028		-	-	-	-	-	1,063,555
14	2029		1,583,977	1,583,977	-	1,583,977	574,106	1,637,661
15	2030		-	-	-	-	-	1,637,661
16	2031		-	-	-	-	-	1,637,661
17	2032	21,715	-	21,715	-	21,715	6,425	1,644,086
18	2033		-	-	-	-	-	1,644,086
19	2034		-	-	-	-	-	1,644,086
20	2035	23,180	-	23,180	(897,167)	(873,987)	(211,079)	1,433,006

Table 4: Anchor Wall Structure

PROJECT COST / BENEFIT ANALYSIS TEMPLATE

Refurbish Shoreline Protection

Alt. #4 - Anchor Wall

Note: Costs are shown as positive values; Benefits as negative values

Current Year	**2015**
Present Worth Year	2015
Number of Years in Study	20
Discount Rate	7.0%
Total In-service Project Cost	$1,278,100
In-service Year	2017
Replacement Cost (if applicable)	$ -
Replacement Year (if applicable)	
Project cost in Ending (E) or Beginning (B) Year $$	B
O&M costs - Escalation based on mixture of Materials & Labour	More Material Less Labour

Year		Annual O&M Cost $	Other Cost $	Total Costs $	Benefit 1 (specify) $	NET $	P.W. January 2015	Cumulative Present Worth
0	2015	-	-	-	-	-	-	-
1	2016	-	-	-	-	-	-	-
2	2017		-	1,278,100	-	1,278,100	1,116,342	1,116,342
3	2018		-	-	-	-	-	1,116,342
4	2019		-	-	-	-	-	1,116,342
5	2020	16,724	-	16,724	-	16,724	11,144	1,127,486
6	2021		-	-	-	-	-	1,127,486
7	2022		-	-	-	-	-	1,127,486
8	2023	17,852	-	17,852	-	17,852	9,711	1,137,197
9	2024		-	-	-	-	-	1,137,197
10	2025		-	-	-	-	-	1,137,197
11	2026	19,057	-	19,057	-	19,057	8,461	1,145,658
12	2027		-	-	-	-	-	1,145,658
13	2028		-	-	-	-	-	1,145,658
14	2029	20,342	-	20,342	-	20,342	7,373	1,153,031
15	2030		-	-	-	-	-	1,153,031
16	2031		-	-	-	-	-	1,153,031
17	2032		1,819,711	1,819,711	-	1,819,711	538,387	1,691,418
18	2033		-	-	-	-	-	1,691,418
19	2034		-	-	-	-	-	1,691,418
20	2035	23,180	-	23,180	(1,549,422)	(1,526,242)	(368,607)	1,322,811