

Operations and Maintenance Plan

1. Introduction

To adapt to the severe impacts of climate change on Monrovia's coast which are exacerbating the existing development challenges, the project adopts a comprehensive, integrated approach to the management of the coastal zone that supports cross-sectoral coordination and proactive planning. The project will address climate change impacts on the coastal zone of Monrovia through interventions in three inter-related focus areas. In terms of coastal defense, the project will address one of the most urgent adaptation needs in Monrovia by constructing a rock revetment to defend West Point against coastal erosion and storms. This will be supported by improved and holistic management of the coastal zone through the development of a national Integrated Coastal Zone Management Plan (ICZMP) and implementation of this plan in Monrovia to achieve climate-resilient, sustainable development on the city's coast. Additionally, the project will increase local adaptive capacity by strengthening gender- and climate-sensitive livelihoods and protecting mangroves within the Mesurado Wetland of Monrovia.

This Operation and Maintenance Plan has been prepared for project activities which include operational or maintenance aspects, namely:

- the rock revetment and promenade proposed under Activity 1.2;
- the role of the ICZM for increasing adaptive capacity and climate-resilience proposed under Output 2; and
- the education and innovation centre and cold storage units proposed under Activity 3.1 and 3.5 respectively¹.

2. Operation and maintenance of the rock revetment at West Point



The proposed rock revetment will protect the community of West Point from the impacts of accelerated coastal erosion and extreme weather events resulting from climate change. The construction of a rock revetment at West Point, which will include a promenade as well as associated amenities, will stabilize the shoreline and prevent further coastal erosion. Operations and maintenance costs are estimated to average US\$58,151.19 annually from the first year following project implementation, ranging from a low estimate of US\$9,784.13 per year to a high estimate of US\$106,518.25 per year.

2.1. Monitoring requirements for the revetment

A rock revetment structure is generally subject to very little maintenance with time; however regular monitoring of the structure and its performance is required.

The key items related to the operation and maintenance of the structure itself are:

¹ Recognising the risks of the COVID-19 pandemic, all project activities will operate strictly within government mandated regulations and best practices. All government directives, such as lockdowns and mandatory quarantine will be adhered to, as will any restrictions on travel, organisation of events or sizes of meetings and workshops.

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- a) Monitoring the cross-sectional profiles of the structure. This can be performed with, for example, drone imagery, Lidar or simple topographic surveys. The most relevant aspects are listed below:
 - i. The crest level remains (on average) the same along the complete structure. No local or wide decrease in crest level may be found.
 - ii. The minimum crest width as per design remains in place, which is usually measured in minimum number of horizontally placed rocks.
 - iii. If at a certain location high rock displacement is visible this could be due to undersized rock grading, high wave action or other causes, such as human interventions (stealing). If the rock displacement results in a too low or too narrow local crest, further investigations to the cause of the issue and possible solutions shall be performed, including the possible replacement of rocks.
- b) Checking whether the drain scheme immediately behind the structure is still in place and has not been filled with sand or litter;
- c) Although the design includes sufficient scour protection, the development of large scour holes at the sea-side of the structure should be monitored and around the heads where the revetment ends or is interrupted. Local settlement of the rock structure provides indication of local scouring. Additional bathymetric surveys shall be performed if it is expected that this scour will jeopardize the integrity of the structure, and corrective measures taken as needed.
- d) Growth of larger plants and trees through the rock structure should not be allowed and should be removed.

It is noted that the revetment structure is designed as a dynamically stable structure, therefore some rock movement is expected and allowed. It is mainly relevant that the rock material remains present within the structure's body. Even with some rock displacement the main function of the revetment, being to fix the coastline and prevent erosion by wave attack, will not be at immediate stake and does not pose a significant risk for coastal hazards.

Primary responsibility for monitoring the revetment will lie with the Ministry of Mines and Energy (MME) with the participation of the West Point community (Table 1). Construction workers from the West Point area employed in the construction of the revetment will be trained on the inspection techniques as part of their engagement in the construction of the revetment under Sub-activity 1.2.1. Training will be provided to construction workers and community leaders by the service provider contracted to construct the revetment. The training will include basic monitoring systems, data collection and reporting to the MME. Specifically, this will include capacity to check for wear and tear on a regular basis and after minor weather events, maintenance of the promenade, planting local vegetation species under supervision of relevant authority. This training will also be provided to representatives of fisherfolk in terms of the maintenance of the boat landing sites. The community will report on monitoring activities and maintenance needs to MME, through the Community Stewardship Committee (CSC) and the West Point community leadership. During the construction of the revetment MME (the Responsible Party for this activity) will appoint relevant ministry officials who will be focal points for communication with the CSC and community leadership regarding maintenance. These focal points will be included in the training on monitoring activities.

In addition to developing capacity for community-based monitoring and maintenance of the revetment, the Terms of Reference for the service provider will include working with the Ministry of Mines and Energy (MME) and other relevant government institutions to develop technical capacity for inspecting and maintaining the West Point revetment. The MME will be responsible for periodically inspecting and monitoring the revetment and maintaining the revetment based on these inspections and reporting on community monitoring activities. The above items can be monitored properly by regular site visits (taking pictures) and drone inspections and communication with the local community during site visits.



Following construction, an as-built drone survey of the revetment will be undertaken at about 30-50 m height and overall orthogonal imaging at an altitude of about 100-150 m by the service provider responsible for the construction. Over the first three years after completion, drone inspections will be done just before, halfway and by the end of the wet season. This will be done together with the site monitoring visits. Drone images of all structures should be taken during low water level, having the best visibility of the structure. After this period, regular monitoring should take place in 2-3 year intervals and following severe weather events over the complete lifetime.

The MME will be responsible for procuring any equipment needed to perform monitoring and maintenance tasks (including the hiring or purchase of a drone). Technical skills transfer for managing these inspections and processing data will be undertaken by the service provider contracted to construct the revetment to ensure that technical experts in the MME can manage the operation and maintenance of the revetment. These experts will review the gathered data and recommend whether corrective and/or protective interventions are required. Special attention will be given at the fishing landing sites to check whether the situation is suitable for its purpose.

Following the detailed design of the construction, a monitoring schedule will be developed by the construction company as part of the project delivery package, and, in consultation with the MME and the West Point community, roles and responsibilities for monitoring and data collection will be reviewed and revised.

Table 1. Roles and responsibilities for monitoring and maintenance required for the West Point revetment. Training for all activities will be provided by the service provider contracted under Sub-activity 1.2.1

#	Action	Primary responsibility	Frequency
	Monitoring drainage behind revetment	West Point community	Annually and after storms
	Monitoring rock movement and wear and tear		
	Monitoring cross-sectional profile and sea-side scouring using site visits and drones	MME	2-3 years and after severe storms
1.	Minor revetment work including rock replacement	MME	Annually
	Monitoring of boat launching sites	West Point fisherfolk	Annually and after storms
2.	Sand replenishment of boat launching sites	MME	Every 15 years
	Monitoring promenade trees and amenities	West Point community	Annually and after storms
3.1.	Minor promenade maintenance	MME	Annually

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3.2.	Major promenade maintenance	MME	Every 10 years
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2.2. Operation and maintenance costing of the revetment

The cost of the operation and maintenance includes the costs of the corrective and preventive interventions necessary to maintain the infrastructure (labour and/or equipment) at the necessary operating levels. It also includes all logistical costs required for maintenance operations as well as overhead and administration costs attributable. The revetment as well as the promenade and drainage are two components of the project which require operations and maintenance costs.

2.2.1. Revetment

For coastal protection, OPEX costs are in general very low. The expected maintenance is estimated between 0% and 0.5% per year for the rock works. The maintenance that is expected consists mainly of reshaping the revetment locally as well as placement of additional rocks. This can be performed with relatively simple equipment like excavators and dumper trucks, which are nationally available and can be rented locally. As part of its responsibility for maintaining coastal protection infrastructure as it is doing elsewhere in Liberia, MME will maintain access to this equipment. In the case of large maintenance being required, additional supply of rock may be necessary, which is also nationally available and can be obtained from existing quarries.

2.2.2. Sand at boat landing sites

Boat landing sites may require sand replenishment approximately every 15 years as a result of the gradual movement of sediments. This will be monitored by fisherfolk under the guidance of MME as described in Section 2.1. When the sand at the landing sites is depleted below a minimum threshold — to be determined by the service provider constructing the revetment in consultation with MME and the fisherfolk — MME will replenish sand at the boat landing sites. The volume of sand is expected to be small enough that bulldozers and excavators can be used to transport and place the sand. As described above (2.2.1), it is expected that MME maintains access to this equipment. Additionally, there may be scope for collaboration with maintenance conducted the National Port Authority. This collaboration will be explored as part of the work of the Cross-Sectoral Working Group (Activity 2.2.).

2.2.3. Promenade and Drainage

The OPEX costs for the promenade are mainly influenced by the estimated frequency for replacing the surface layer. Generally, the surface layer is replaced between 8-15 years, this is dependent of traffic conditions. The purpose of the promenade at West Point is for general pedestrian access and an extended lifetime of the surface layer is expected. Minor interventions will cover small maintenance and repairs of landscape and drainage. Based on this, the estimated maintenance costs are:

- 1% per year for minor interventions; and
- 10% every 10 years.

Table 1 below provides the average operating expenditure estimates per return period for the works at West Point, based on the Engineering Sub-assessment (Annex II C).



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Table 2. Average OPEX estimates per return period and average per year at West Point (US\$)

Item	Primary Responsibility	Return period (year)			
		1	10	15	Average per year
1. Revetment works	MME	US\$44,723.06	-	-	\$44,723.06
2. Sand at boat landing sites	MME	-	-	US\$64,940.00	US\$4,329,33
3.1 Minor promenade and drainage works	MME	US\$4,549.40	-	-	US\$4,549.40
3.2 Major promenade and drainage works	MME	-	US\$45,494.00	-	US\$4,549.40
Total		\$49,272.46	\$45,494.00	\$64,940.00	\$58,151.19

3. Institutional responsibility for Operation and Maintenance activities

The Ministry of Mines and Energy (MME) has the primary responsibility for the infrastructural components of the project, and will be responsible for the operations and maintenance activities beyond the project. However, these could be redefined and reassigned during the implementation phase of the project. Under Output 2: *Institutional capacity building and policy support for the implementation of Integrated Coastal Zone Management (ICZM) across Liberia*, the project will strengthen the capacity of national government institutions in Liberia to develop and implement a national Integrated Coastal Zone Management Plan (ICZMP) and support cross-sectoral coordination among the 10 relevant government institutions responsible for coastal management.

The ICZMP will define strategic and operational objectives to be achieved through a set of actions; and an action plan will be developed to facilitate its implementation. The Cross-Sectoral Working Group (CSWG) set up under Sub-activity 2.1.3 will refine roles and responsibilities of various stakeholders related to Operation and Maintenance of the coastal protection infrastructure. Operation and Maintenance activities shall also be identified and covered as part of the ICZM framework. These would also include technical capacity strengthening through training programmes to build capacity in the application of techniques, maintenance of coastal protection structures, and maintenance of all coastal monitoring equipment. It will also include improving access to spatial data for vulnerability mapping through the procurement of high-resolution remote sensing data to monitor coastal erosion and mangrove ecosystem health and degradation in the MMA as defined in Sub-activity 2.3.1. In order to optimize the long-term effectiveness of the project, an evaluation on lessons learned, including those relating to O&M, will be conducted annually as per Sub-activity 2.4.2. These lessons will be incorporated into the Environmental Knowledge Management System and disseminated to government and private sector stakeholders to inform future coastal adaptation initiatives. In addition, reports on training for O&M of the revetment and cold storage facilities, as well as a report on the detailed O&M plans for the education and innovation centre (to be finalized after the centre has been renovated) have been incorporated as deliverables into the project logical framework and will be included in the monitoring and evaluation of the project.

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To foster sustainability and local ownership, regular monitoring of the structure and its performance will be done in collaboration with the local communities through local leadership and representatives, including representatives of fisherfolk. During the construction phase, training will be provided to labourers from local communities and community leaders on basic monitoring systems, data collection and reporting to the lead government institution as per the ICZMP. This will include capacity to check for wear and tear on a regular basis and after minor weather events, maintenance of the promenade, planting local vegetation species under supervision of relevant authority. This training will also be provided to representatives of fisher folk in terms of the fish landing sites. All community training activities on maintenance of the revetment will be in collaboration with the education centre.

4. Operations and maintenance requirements relating to the strengthening of climate-resilience in the community

To foster climate-resilience amongst the community, the project includes an output for strengthening adaptive capacity. Of particular relevance for operations and maintenance requirements are the education and innovation centre, which will require general building maintenance, and maintenance of the cold storage units, which will require technical maintenance and regular servicing.

4.1. Education and Innovation Centre

The education and innovation centre will be established under Sub-activity 3.1.1 by renovating an existing government- or community-owned building in the West Point area. The internal operations of the education and innovation centre, which functions as a knowledge hub and training facility will be taken care of by the ten-person Community Stewardship Committee (CSC) established under Sub-activity 3.1.2. The CSC will be primarily responsible for the routine up-keep of the centre and will have access to small amounts of funds for this purpose through the sale of energy-efficient cookstoves under Sub-activity 3.4.2 (bank accounts for the CSC will be set up under Sub-activity 3.1.2). During the collaboration workshop for government representatives, CSC members and NGOs under Sub-activity 3.1.4, the specific roles and responsibilities of the CSC in terms of maintaining the education and innovation centre will be allocated among the CSC members. Maintenance for the education and innovation centre is expected to be low-cost as facilities are planned to be basic and durable. The required maintenance will depend on the nature of the building selected to accommodate the centre and will be set out in further detail as part of the renovation and establishment of the centre under Sub-activity 3.1.1 and will be refined by the CSC in collaboration with the PMU during project implementation. Also under this sub-activity, the owner of the building will sign a Memorandum of Understanding to undertake all maintenance required for the centre. Maintenance tasks will include: i) annual inspections and small-scale maintenance of furniture and fittings as needed; ii) general works on ventilation, electrical systems, plumbing and painting every five years; and iii) replacement of zinc roofing and window fittings² every 10 years. Given the close proximity to the ocean, it is also necessary to prepare for storm damage as well as general wear and tear

² because of the coastal location, metal fittings corrode quickly and require periodic replacement



associated with coastal infrastructure. This will also include general maintenance of the cookstove manufacturing site/s near to the education centre. The CSC members will have the primary responsibility for the routine up-keep of the facilities, working with the owners of the facilities thereby ensuring their sustainability. At the same time, the MME will provide support for additional maintenance needs in cases where these costs become excessive and go beyond the capability of the community, including the replacement of the roofing and window fittings. Estimated costs associated with the maintenance of the education and innovation centre are provided in Table 2.

4.2. Cold storage units

The project will reduce fish spoilage and stress on mangroves through the introduction of solar-powered cold storage units near fish processing sites to increase the flexibility of fishmongers and to enable the sale of fresh fish to new markets (Activity 3.5). The units will require routinised maintenance to maintain optimal functioning. The units will be designed by a service provider in consultation with fisherfolk in the local community (Sub-activity 3.5.1). Under Sub-activity 3.5.2, the service provider will develop a community-tailored management plan and provide training to the community on the use, management and maintenance of the units. Two members of the CSC (established under Sub-activity 3.1.2) will have the responsibility for the day-to-day management and maintenance of the facilities, including managing nominal fees charged to fisherfolk for the use of the cold storage facilities. The CSC bank account (opened under Sub-activity 3.1.2) will be used to keep track of the income from the cold storage units and the funds will be used to cover routine maintenance of the units by the CSC members. Once the units have been established, under Sub-activity 3.5.3, the service provider will provide technical training and skills development to the dedicated CSC members and government officials on the technical maintenance of the cold storage units. The maintenance costs for the cold storage units are expected to average 1–3% of the capital cost per year (Table 3). While the CSC members will have the primary responsibility for maintaining the cold storage units, thereby ensuring the sustainability of the facilities, the MME will provide support for additional maintenance needs in cases that these costs go beyond the capabilities of the community.

Table 3. Average maintenance costs per return period for West Point education and innovation centre and cold storage facilities (US\$)

Cold storage facilities (US\$)					
#	Action	Primary responsibility	Cost	Frequency	Notes
4.1	Regular maintenance of Education and Innovation Centre fittings and furniture	CSC	US\$1,000	Annually	Maintenance roles and responsibilities elaborated under Sub-activity 3.1.4
4.2	Maintenance of ventilation, electrical systems, plumbing and painting	CSC	US\$2,500	Every 5 years	
4.3	Replacement of zinc roofing and window fittings	MME	US\$10,000	Every 10 years	
Average annual cost			US\$2,500		

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5.1	Regular maintenance of cold storage facilities	CSC	US\$1,500 ³	Annually	Training for maintenance provided to CSC by service provider contracted under Sub-activity
5.2	Replacement of cold storage facilities parts	CSC	US\$10,000	Every 10 years	
Average annual cost			US\$2,500		
Total			US\$5,000		

5. Government financing and commitment to operations and maintenance



Government commitment to finance the operations and maintenance of the coastal protection measures after construction is key to the sustainability of the infrastructure. This includes financing the maintenance and replacement of equipment required for monitoring, materials and labor for maintenance and coordinating the contributions of local communities (Table 4). Government has therefore made commitments to finance the operations and maintenance of the coastal protection measures beyond the project.

Beyond direct cash financing, community contributions in kind will also be harnessed to undertake basic monitoring and inspection of the revetment, and reporting to the Ministry of Mines and Energy (MME). The schedules for these contributions will be developed through consultations with local communities and with the leadership of local representatives. The Community Stewardship Committee (CSC) will also be responsible for the day-to-day operation and management of the education and innovation centre and cold storage units established under Output 3. Community involvement will help to ensure the sustainability of these facilities and that they are equipped and operated to meet the needs of the community. To ensure that all maintenance requirements for the centre and cold storage units are met, the MME has agreed to facilitate maintenance of these facilities when circumstances beyond the control of the communities prevent them from being able to technically or financially perform particular maintenance tasks.

Technical capacity development for the operation, monitoring and maintenance for the revetment, education and innovation centre, and cold storage units has been built into the logical framework of the project. In this way, skills transfer from contracted service providers to community members and government officials will contribute to ensuring the sustainability of the infrastructure and assets beyond the project implementation period.

Both MME and the CSC will be formally committed to undertaking the necessary O&M for project assets. It is expected that the combination of these obligations and the incentives for the CSC and MME to undertake O&M will ensure that their responsibilities will be effectively carried out (Table 4). The MME has signed a letter of commitment for maintaining project assets and will be obliged to maintain the revetment as part of its statutory mandate. In addition to these formal

³ Annual maintenance costs of the cold storage facilities are estimated at 1–3% of the capital cost, which is US\$25,000 per unit for two units. This amounts to US\$250–750 per unit per year. The upper estimate is used in this document as a conservative approach to ensuring sufficient resources are available for maintenance



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obligations, the MME will be accountable to the local community for timely maintenance and dedicated communication channels between the West Point community and MME for reporting on maintenance needs will be established during project implementation. The MME is also incentivized to undertake effective and timely O&M to ensure the sustainability of the project investments and reduce expenditure through regular, timely O&M. Similarly, the O&M commitments of the CSC (for the education and innovation centre and cold storage facilities) will be included in the CSC Constitution and the mandate of its members. The CSC will be incentivized to ensure the efficient operation of the education and innovation centre and cold storage facilities as income for the CSC will be derived from the use of these facilities.

Table 4. Summary of responsibilities, incentives and obligations of parties engaged in O&M

Responsibility	Components of the O&M Plan	Incentives	Obligations
Ministry of Mines and Energy	<ul style="list-style-type: none"> Overall O&M⁴ Revetment maintenance (items 1, 2, 3.1 and 3.2) Education and Innovation Centre maintenance (item 4.3) 	<ul style="list-style-type: none"> Safeguard project assets for optimal performance and longevity Project success and sustainability Reduced O&M expenses from timely and effective O&M Budgetary allocation from treasury for O&M 	<ul style="list-style-type: none"> Statutory mandate Minimal damage to facilities Timely reporting on implementation of O&M to Executing Entity
Community Stewardship Committee	<ul style="list-style-type: none"> Education and innovation centre maintenance (items 4.1 and 4.2) Cold storage facilities (items 5.1 and 5.2) 	<ul style="list-style-type: none"> Income from cookstoves and cold storage facilities Authority to lead community and work with fisherfolk Capacity from MME 	<ul style="list-style-type: none"> CSC Constitution and contracts of CSC members Ensuring use of mangroves is sustainable Guaranteeing proper utilization and safeguarding condition of facilities Timely reporting

⁴ Overall responsibility for O&M will include: i) procuring equipment needed for monitoring and maintenance of the revetment; ii) involvement in training for community monitoring; iii) liaison with communities; iv) data collection, processing, storage and reporting; v) monitoring and ensuring the CSC plays it's O&M roles and meets financial obligations; and vi) providing information and coordinating with project monitoring and evaluation activities.

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6. Summary of operation and maintenance costs for project duration

As described in the sections above, the Ministry of Mines and Energy (MME) will have the primary responsibility for the operation and maintenance of the West Point revetment and will support and guarantee the maintenance of the education and innovation centre and cold storage facilities, which will be primarily maintained by the Community Stewardship Committee (CSC). The total cost of the maintenance conducted by the MME is estimated at US\$1,482,678 over the 30 year project duration. The estimated total cost to the CSC of maintaining the education and innovation centre and cold storage facilities is US\$101,000 over the period. A breakdown of the annual activities and costs is provided in Table 5 below.

Table 5. Annual maintenance activities and costs for the duration of the project period (30 years).

Maintenance activity		1. Minor revetment work including rock replacement	2. Sand replenishment of boat launching sites	3.1. Minor promenade maintenance	3.2. Major promenade maintenance	4.1. Regular maintenance of Education and Innovation Centre fittings and furniture	4.2. Maintenance of ventilation, electrical systems, plumbing and painting	4.3. Replacement of zinc roofing and window fittings	5.1. Regular maintenance of cold storage facilities	5.2. Replacement of cold storage facilities parts	Total annual cost (US\$)
Primary responsibility		MME	MME	MME	MME	CSC	CSC	MME	CSC	CSC	
Project period (6 years)	2021										0
	'22										0
	'23					1,000					1,000
	'24					1,000			1,500		2,500
	'25					1,000			1,500		2,500
	'26	54,723 ⁵		4,549.40		1,000			1,500		61,772.40
Post project	'27	44,723		4,549.40		1,000	2,500		1,500		54,272.40
	'28	44,723		4,549.40		1,000			1,500		51,772.40

⁵ An additional US\$10,000 has been incorporated into the first year of revetment maintenance costs to cover the procurement of any necessary equipment.





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period (24 years)	'29	44,723		4,549.40		1,000			1,500		51,772.40
	'30	44,723		4,549.40		1,000			1,500		51,772.40
	'31	44,723		4,549.40		1,000			1,500		51,772.40
	'32	44,723		4,549.40		1,000	2,500	10,000	1,500		64,272.40
	'33	44,723		4,549.40		1,000			1,500	10,000	61,772.40
	'34	44,723		4,549.40		1,000			1,500		51,772.40
	'35	44,723		4,549.40	45,494	1,000			1,500		97,266.40
	'36	44,723		4,549.40		1,000			1,500		51,772.40
	'37	44,723		4,549.40		1,000	2,500		1,500		54,272.40
	'38	44,723		4,549.40		1,000			1,500		51,772.40
	'39	44,723		4,549.40		1,000			1,500		51,772.40
	'40	44,723	64,940	4,549.40		1,000			1,500		116,712.40
	'41	44,723		4,549.40		1,000			1,500		51,772.40
	'42	44,723		4,549.40		1,000	2,500	10,000	1,500		64,272.40
	'43	44,723		4,549.40		1,000			1,500	10,000	61,772.40
	'44	44,723		4,549.40		1,000			1,500		51,772.40
	'45	44,723		4,549.40	45,494	1,000			1,500		97,266.40
	'46	44,723		4,549.40		1,000			1,500		51,772.40
	'47	44,723		4,549.40		1,000	2,500		1,500		54,272.40
	'48	44,723		4,549.40		1,000			1,500		51,772.40
	'49	44,723		4,549.40		1,000			1,500		51,772.40
	'50	44,723	64,940	4,549.40		1,000			1,500		116,712.40
Project period total		54,723	-	4,549.40	-	4,000	-	-	4,500	-	67,772.40
Post project total		1,073,352	129,880	109,185.6	90,988	24,000	12,500	20,000	36,000	20,000	1,515,905.60

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Project duration total	1,128,075	129,880	113,735	90,988	28,000	12,500	20,000	40,500	20,000	1,583,678
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The revetment at West Point has been designed to protect the coastline from erosion for ~50 years, considering the projected impacts of climate change. This Operation and Maintenance Plan provides for the maintenance of the revetment for the first 30 years, after which a major performance evaluation of the revetment will be conducted by the Ministry of Mines and Energy (MME) and plans for further operation and maintenance will be developed.