

Ministry of Agriculture, Fisheries, Food Security and Rural Development
Department of Fisheries
Saint Lucia

THE PROJECT FOR THE IMPROVEMENT
OF CHOISEUL FISHING PORT
IN
SAINT LUCIA

Final Report (F/R)

AUGUST 2022

JAPAN INTERNATIONAL COOPERATION AGENCY

ECOH CORPORATION

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PREFACE

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey and entrust the survey to ECOH CORPORATON.

The survey team held a series of discussions with the officials concerned of the Government of Saint Lucia, and conducted field investigations at the project site from September 26, 2021 to November 2, 2021. As a result of further studies in Japan, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of Saint Lucia for their close cooperation extended to the survey team.

August, 2022

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Summary

Summary

(1) Country brief

Saint Lucia is a volcanic island located in eastern side of the Caribbean Sea. With the area of 616km², extending 22.4km from east to west and 42.3km from north to south, the country possesses 8,000km² of exclusive economic zone and 176km² of continental shelf.

Saint Lucia was independent in 1979. The northern part of Saint Lucia is relatively flat, but steep mountainous terrain is in the central, and alluvial plain in the southern side.

The weather is tropical oceanic climate with yearly average temperature of approximately 27 degrees. Dry season is from December to May, and rainy season is from June to November. Hurricanes have an impact on the national economy since Saint Lucia has been damaged by hurricanes. Hurricane season starts in the middle of July and ends in the middle of October.

In Saint Lucia, 1,600 to 2,000 tons of marine fish such as tunas, conchs, Spanish mackerels, snappers, and lobsters have been landed from 2008 to 2019. These marine fishes are valuable source of protein for citizens, and provide the tourism industry as local food ingredients. Also, according to statistics from 1997 to 2019, fishery is one of the most important industries in Saint Lucia engaging approximately 3,200 people.

(2) Background and outline of the Project

Several cooperation projects have been conducted for more than 20 years to contribute to the fisheries development in Saint Lucia. For example, out of the 17 fish landing sites, 11 of them were developed through Japanese aid and account for more than 80% of the total fish landing volume.

Choiseul fishing port located in southwestern area of Saint Lucia is one of the ports developed through Grant Aid project in 2001 titled “The Project for Improvement of Coastal Fisheries Development”. After completion, the fishing port equipped with market facility and fish gear lockers was expected to be effectively utilized as one of the main fishing ports in Saint Lucia. However, 19 years after completion so far, sedimentation at the port entrance and pond has been disturbing smooth entry and mooring for fishing boats, causing inconveniences to fish landing as well. In response, the government of Saint Lucia has continuously implemented dredging at the entrance and interior of Choiseul fishing port and constructed the additional breakwater to maintain fisheries activities. However, sedimentation and closure constantly occurred at the port entrance, cost for frequent dredging has become a big burden on the government of Saint Lucia.

On the other hand, the government of Saint Lucia has drawn up National Fishing Plan 2013 which target year is 2022. In the plan, support to the facility development is positioned as a strategy so that fisheries resources which are economically available are used as much as possible. Therefore, the government of Saint Lucia requested support from the Japanese government to improve the function of Choiseul fishing port. Upon the request from October 2017, JICA has conducted “Data Collection Survey on Current Situation of the Project for Improvement of Coastal Fisheries Development in Saint Lucia” (hereinafter called “Data Collection Survey”) to consider technical

feasibility of countermeasures for recovering and improving the functions of Choiseul fishing port.

As a result, JICA has decided to implement a project including construction of submerged breakwater and second groyne (hereinafter referred to as “Project”).

Assuming the application of Grant Aid scheme, JICA has undertaken Outlined Design Survey (hereinafter referred to as “Survey”) to assess background, purpose and components, evaluate effects, technical and financial adequacy, conduct outlined design for appropriate contents and scales, and propose obligations on Saint Lucia side, implementation plan, and consideration points for operation and maintenance. This Project is positioned as an important project in fishery sector.

(3) Summary of survey results and content of the Project

Upon request from the government of Saint Lucia, the government of Japan decided to conduct preparatory survey and dispatched the survey team. The site surveys were carried out as per the following schedule.

Site survey: September 23, 2021 – November 6, 2021

Explanation of Project outline: April 28, 2022 – May 26, 2022

In addition to short-term countermeasure requested by the government of Saint Lucia against sedimentation, contents of this Project (long-term countermeasures) proposed in the Data Collection Survey from 2017 to 2019 are shown below. The short-term countermeasure is carried out in this Survey.

① Short-term countermeasure: conducted in this Survey

As a short-term countermeasure, dredging works of approximately 3,500m³ are implemented at the port entrance and navigation channel. Rubble mound, used as a temporary access road to the dredging area, is constructed at the planned location of second groyne. To decrease sedimentation volume before implementation of the Project, the rubble mound is not removed.

② Long-term countermeasures: conducted in this Project

Components considered in Data Collection Survey and components examined in this Survey are listed in Table S-1.

Table S-1 Proposed components for long-term countermeasures

| | Facility | Data Collection Survey | This Project |
|---|----------------------|--|--|
| 1 | Dredging | <ul style="list-style-type: none"> Dredging volume: 7,000m³ (including 3,000m³ inside the port) | <ul style="list-style-type: none"> Dredging volume: 9,500m³ (inside the port: 3,900m³) (outside the port: 5,600m³) Planned water depth: -2m (excess dredging: 30cm) |
| 2 | Second groyne | <ul style="list-style-type: none"> Length: 70m | <ul style="list-style-type: none"> Length: 55m Structure: rubble stone + concrete blocks Crown height: +2.0m / crown width: 3m Concrete blocks: temporary quay |
| 3 | Submerged breakwater | <ul style="list-style-type: none"> Length: 20m | <ul style="list-style-type: none"> Length: 20m Structure: <ul style="list-style-type: none"> <Temporary> bag materials <Upon completion> bag materials + armor stones Crown height: -0.2m Crown width: 5.4m (Temporary), 6.0m (Upon completion) |
| 4 | Beacon light | <ul style="list-style-type: none"> 2 new beacon lights (at the submerged breakwater and second groyne) | <ul style="list-style-type: none"> 2 new beacon lights (on tips of second groyne and submerged breakwater) 2 beacon lights to be repaired (on tips of existing breakwater and groyne) |

(4) Construction schedule and approximate Project cost

The cost borne by the government of Saint Lucia not using the Grant is Japanese Yen 6 million in this Project. The construction period is expected to be 54 months including 8 months for detailed design and bidding, 10 months for construction, and 36 months for monitoring.

(5) Project evaluation

1) Relevance

① Present conditions and issues of fisheries sector

Choiseul fishing port is located in southwestern area of the island. Following Vieux Fort fishing port, Choiseul is a good fishing area for large migratory fish and demersal fish, and for basket net fishing because there are huge banks in adjacent sea area just approximately 10 miles (16 km) offshore. In Choiseul fishing port, 59 fishing boats and 197 fisherfolks are registered (as of 2019), which are respectively ranked at sixth and seventh from the top in Saint Lucia.

Annual fish intake amount in Saint Lucia is increased to approximately 34.1kg/person in 2020 from 23.7kg/person in 2013. An increasing tendency for sea food import has been observed since 2014. To further increase local fish production, the unexplored fishing area approximately 60 – 100km offshore from Choiseul fishing port is positioned as an expected fishing area.

Under such circumstances, after construction completion of Choiseul fishing port in 2003, sedimentation in the pond was observed, and occasional dredging was conducted from 2003 to 2006. To prevent the sedimentation, the government of Saint Lucia constructed the additional

breakwater at the tip of existing breakwater. Then north beach was shielded by the additional breakwater. Resultantly sedimentation at the port entrance and navigation channel has been accelerated. As a result, navigable water depth is not maintained in the port entrance and navigation channel and operation of fishing boats is hindered. Up to now, the water depth has been somehow maintained by sand mining conducted by a local company.

Fish landing volume was transitioned at 120 tons/year before construction completion in 2003, but it drastically has fell down and been transitioned at 60 – 100 tons/year since 2003.

Therefore, manager of Choiseul fishing port expects to increase the fish landing volume. After this Project, contribution is made to Choiseul district thanks to improvement of sedimentation and augmentation of registered fishing boats and fisherfolks.

Implementation of countermeasures such as construction of second groyne and submerged breakwater lead to proper performance of fishing port, securing safety and efficiency, and contributing to local economy. Thus, necessity and urgency of this Project is confirmed.

② Compliance with overall goal (National Development Plan and Fishery Development Plan)

The Government of Saint Lucia set a goal for the infrastructure development and the tourism development for upgrading the adding value to agriculture and fishery industry, contributing to the economic growth and supporting economic and social development as the mid-term strategy from 2020 to 2023 based on the “National Development Plan” formulated in 2008. And “Fishery Development Plan” targeting for the years of 2013 to 2022 set a development target with the maximum long-term utilization of fishery resources, sustainable fishery industry and its efficiency, economic prosperity of fishery industry and set strengthening the incorporation of opinions from stakeholders, improvement of average income of fisherfolks, development of infrastructure and enhancing the fishery distribution system as the strategy.

This Project mainly aims for solving the sedimentation problem in the port, and the increase of operating fishing boats and fish landing volume is expected. Furthermore, the achievement such as the decrease of damaged fishing boats due to the shallower navigation channel is also expected.

These achievements contribute to the safety for the navigation of fishing boats, and additionally lead to the save of labor of fisherfolks, and the increase of fisheries operation time. Finally, it contributes to the national economic growth through the fishery industry mentioned in “National Development Plan” and “Fishery Development Plan” and development of sustainable fishery industry and its efficiency is expected.

Therefore, this Project intending the solution of sedimentation problem is compliant with the upper level plans.

③ Beneficial Effects

Fish Marketing Corporation (hereinafter called “FMC”) plays a key role in the fishery distribution of Saint Lucia. The main role is to buy surplus fish at the high fishing season, and keep refrigerated and release these fish to domestic market at the low fishing season for covering the demand. In the past, inadequate capacity of the fishery refrigerator was a big trouble of the stock control for the fishery products through a year.

Therefore, the situation is that inevitably most of the domestic fish demand was satisfied by import fish from neighboring countries, and more than 50% of domestic demand was dependent on imports. However, 100 tons capacity refrigerator was added in Castries by means of grant aid from the Government of Japan in 1994, the capacity of refrigerator owned by FMC has increased up to 225 tons. In addition, refrigerator with a capacity of 250 tons was installed in Vieux Fort in 1997. Then it contributed to improvement of the situations, and fish disposed before due to the inadequate capacity of cold facilities became distributed in the market.

According to “Basic design study on the project for coastal fisheries development in Saint Lucia” in 2001, the distribution channel of fishery products from Choiseul fishing port is not limited to the distribution within Choiseul area (consumers) but it is partly distributed to supermarkets, hotels, restaurants, etc. in Vieux Fort and Castries as well.

Therefore, direct beneficiaries are 6,098 people living in Choiseul district and indirect one covers 16,284 people in Vieux Fort area and 4,173 people living in the downtown of Castries (the population of total Castries area is 65,656 people). The total number of beneficiaries is approximately 26 thousand people.

④ Compliance with the policy and direction of Japanese ODA

Many island countries in CARICOM including Saint Lucia have the common ground with Japan in view of the area where natural disasters such as hurricane, earthquake, tsunami happen frequently, also the sustainable use of marine living resources are considered. Therefore, in addition to the vulnerability against climate change and natural disaster, the population and economic scales are small depending on industries such as agriculture, fishery industry, tourism to be easily influenced by external factors.

The past main industry in Saint Lucia was the agriculture and tourism with a focus on the export of banana. However, the industrial diversification has been required due to the vulnerable industrial structure strongly influenced by the external factors like the depression of banana industry by the abolition of preferential tariff by EU.

Under such situation, Japan set a key area to support 1) disaster prevention and environment and 2) fisheries industry as the country development cooperation policy (aid strategy).

Concerning the fisheries industry among them, Japan is to continuously implement the cooperation for the sustainable development and management of fisheries industry in Saint Lucia aiming at the economic revitalization by the industrial diversification and job creation.

With the above, the implementation of this Project leads to the improvement of fisheries work

environment, revitalization of economic activities in Choiseul district and promotion of artisanal fisheries, by solving sedimentation problem. Therefore, this Project is compliant to aid policy of the government of Japan, and the relevance is admitted.

2) Effectiveness

① Quantitative effectiveness

Outputs of the quantitative effectiveness by the implementation of this Project are as shown in Table S-2.

a) Mitigation of annual sedimentation volume

As described in 3-2-1-1, the annual sedimentation volume in Choiseul fishing port is 5,150m³/year (5,150 to 5,400m³/year) in total of 2 sand supply routes: approximately 2,400m³/year from Route-1 transported from north beach which is the protected area after the construction of additional breakwater, and approximately 2,750 m³/year (2,500 to 3,000m³/year) from Route-2 wrapping around the tip of additional breakwater.

Sedimentation amount for 3 months after construction of rubble mound in this Survey was converted to 1,600m³ as a yearly sedimentation amount. Even considering the seasonal conditions, sand from Route-1 is well blocked by second groyne, and the effects are expected.

There is no actual measurement data to evaluate the submerged breakwater at this Survey stage. The detailed mitigation value is possibly estimated by the monitoring in this Project. Since the government of Saint Lucia shows its intention that frequency of dredging is decreased down to 1/10 of the present. Targeting approximately 1/10 of annual port sedimentation volume, the target value is estimated as shown below.

$$\text{Target Value} = 5,150\text{m}^3/\text{year} (\text{Route-1} + \text{Route-2}) \times 1/10 \doteq 500\text{m}^3/\text{year}$$

b) Increase of fish landing volume

The average annual fish landing volume was 59 tons in Choiseul fishing port from 2015 to 2019. It is expected by this Project that fisheries activities are vitalized thanks to improvement of the sedimentation issue. In addition to fisheries activities on daily basis, fisherfolks expect fishing activities in farther unexplored areas by larger fishing vessels in the future. Thus, it is expected fish landing volume is increased, resultantly economic contributions are made in Choiseul district.

Therefore, when the sedimentation issue is improved and fishing port functions are recovered after implementation of this Project, fish landing volume is assumed to increase by approximately 15%.

Reference value: 59 tons (average value from 2015 to 2019)

Target value: 59 tons x 115% = 68 tons

Table S-2 Quantitative effect (direct effect)

| Index | Standard value (actual value in 2020) | Target value (2030) 【3 years after completion】 |
|-----------------------------|--|---|
| Annual sedimentation volume | Approx. 7,000m ³ | Approx. 500m ³ |
| Fish landing volume (ton) | 59 (average from 2015 to 2019) | 68 |

(Remark) Final target value is decided based on the monitoring conducted in this Project.

② Qualitative Effect

Output of the qualitative effect by the implementation of this Project is as follows.

a) Decrease of repair frequency of ship bottom and engine damaged by sedimentation

In case that necessary water depth was not secured for the target fishing boats due to the sedimentation at the existing navigation channel and the port, it was observed that fisherfolks pulled the engine up on boats, got themselves out of the boats to lighten the weight, and moved boats with human power to prevent damages on body of boats.

Although, it is impossible to assert that the repair frequency is related to change of water depth, it is considered that repair frequency and cost are decreased by this Project.

b) Ensuring safety for boat navigation and mitigation of fisheries workload

In case that necessary water depth is not maintained due to sedimentation at navigation channel and the pond for the target fishing boats, it was observed that fisherfolks got out of boats and moved them with human power of several people. Workloads to move boats by human power are eased since the boats become possible to navigate smoothly and safely by the solution of port sedimentation problem through the implementation of this Project.

Then, smooth access and utilization of navigation channel leads to save fisheries working time and it also contributes to the income improvement of fisherfolks.

c) Decrease of cost burden by less dredging frequency

Large scale dredging was carried out 4 times to cope with the sedimentation problem using the fund from the government of Saint Lucia at the Choiseul fishing port after the completion in 2003 and the additional breakwater with the length of approximately 40m was constructed at the tip of breakwater in 2008.

As the sedimentation problem in the fishing port is solved by the implementation of this Project, the maintenance dredging for water depth in navigation channel and the fishing port become lesser, resultantly the cost borne by the government of Saint Lucia is expectedly decreased.

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Abbreviations

| | | |
|---|---------|---|
| A | A/P | Authorization to Pay |
| | AIDS | Acquired Immunodeficiency Syndrome |
| | ASTM | American Society for Testing and Materials |
| B | B/A | Banking Arrangement |
| | BS | British Standard |
| C | CARICOM | Caribbean Community |
| | CBD | Convention on Biological Diversity |
| | CDL | Chart Datum Level |
| | CFU | Colony Forming Unit |
| | CITES | Convention on International Trade in Endangered Species of Wild Fauna and Flora |
| | CMS | The Convention on the Conservation of Migratory Species of Wild Animals |
| | COD | Chemical Oxygen Demand |
| | COVID | Coronavirus Disease |
| | CUBiC | Caribbean Uniform Building Code |
| | CV | Curriculum Vitae |
| D | DCA | Development Control Authority |
| | DL | Datum Level |
| | DO | Dissolved Oxygen |
| | DoF/FD | Department of Fisheries |
| E | E | East |
| | E/N | Exchange of Notes |
| | EC\$ | East Caribbean Dollars |
| | EEZ | Exclusive Economic Zone |
| | EIA | Environmental Impact Assessment |
| | EMoP | Environmental Monitoring Plan |
| | EMP | Environmental Management Plan |
| | ENE | East-northeast |
| | ESE | East-southeast |
| | ESIA | Environmental and Social Impact Assessment |
| | EU | European Union |
| F | FAD | Fish Aggregating Device |

| | | |
|---|---------|--|
| | FAO | Food and Agriculture Organization of the United Nations |
| | FMC | Fish Marketing Corporation |
| | FRP | Fiber Reinforced Plastics |
| G | G/A | Grant Agreement |
| | GII | Gender Inequality Index |
| H | HDI | Human Development Index |
| | HIV | Human Immunodeficiency Virus |
| I | IALA | International Association of Lighthouse Authorities |
| | ICCTA | The International Commission for the Conservation of Atlantic Tunas |
| | IHDI | Inequality-adjusted Human Development Index |
| | IMF | International Monetary Fund |
| | ISO | International Organization for Standardization |
| | IUCN | International Union for Conservation of Nature |
| | IWC | International Whaling Commission |
| J | JICA | Japan International Cooperation Agency |
| | JIS | Japan Industrial Standard |
| | JPY | Japanese Yen |
| | JRA-55 | Japanese Re-analysis |
| L | LCC | Life Cycle Cost |
| | LRTP | Land Registration Titling Project |
| | LUCELEC | Saint Lucia Electricity Service Ltd. |
| M | M.S.L | Mean Sea Level |
| | MOA | Ministry of Agriculture, Fisheries, Food Security and Rural Development |
| | MOI | Ministry of Infrastructure, Ports, Transports, Physical Development and Urban Renewal |
| | MOF | Ministry of Finance, Economic Development, and the Youth Economy |
| | MTDS | Medium Term Development Strategy |
| N | N | North |
| | N/A | Not Applicable |
| | NCAR | The US National Center for Atmospheric Research |
| | NCEP | National Centers for Environmental Prediction |
| | NGO | Non-governmental Organization |

| | | |
|---|--------|---|
| | NO2 | Nitrogen Dioxide |
| | NOAA | National Oceanic and Atmospheric Administration |
| | NPO | Nonprofit Organization |
| O | OECS | Organisation of Eastern Caribbean States |
| | ODA | Official Development Aid |
| P | pH | Potential Hydrogen |
| | PM10 | Particulate Matter 10 |
| | PM2.5 | Particulate Matter 2.5 |
| | PMAO | Pitons Management Area Office |
| | PMR | Project Monitoring Report |
| S | S | South |
| | SASAP | Saint Lucia's Sectoral Adaption Strategy and Action Plan for the Fisheries Sector |
| | SE | Southeast |
| | SFMC | Saint Lucia Fish Marketing Corporation |
| | SLASPA | Saint Lucia Air and Sea Ports Authority |
| | SLNT | Saint Lucia National Trust |
| | SO2 | Sulfur Dioxide |
| | SSE | South-southeast |
| | SSW | South-southwest |
| | SW | Southwest |
| T | TOR | Terms of Reference |
| | TTS | Telegraphic Transfer Selling rate |
| U | UNCLOS | United Nations Convention on the Law of the Sea |
| | UNDP | United Nations Development Program |
| | UNESCO | United Nations Educational, Scientific and Cultural Organization |
| | UNFSA | United Nations Fish Stocks Agreement |
| | US/USA | United States of America |
| V | VAT | Value-added Tax |
| W | W | West |
| | WHO | World Health Organization |
| | WRF | Weather Research and Forecasting |

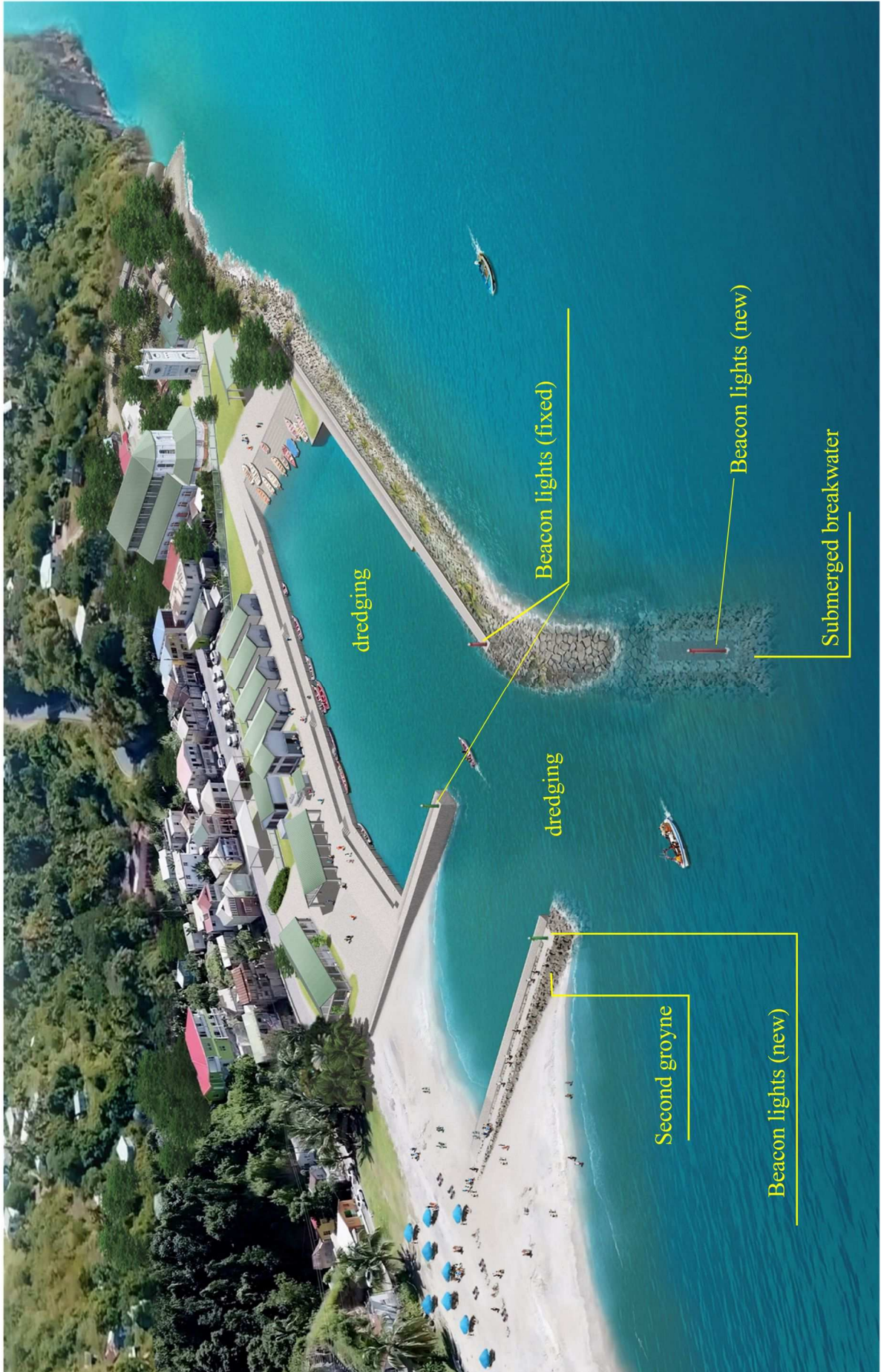
| | | |
|---|-----|-----------------------|
| | WSW | West-southwest |
| | WW3 | Wave Watch III |
| X | XCD | East Caribbean Dollar |

■ Location Map of Project Site



Figure-Intro (1) Location map of Saint Lucia and Choiseul fishing port

■ Completion Forecast Plan



Chapter-1 Project Outline

Chapter-1 Project Outline

1-1 Background and outline of the Grant aid

1-1-1 Background of the Grant aid

From 2008 to 2019, 1,600 – 2,000 tons of tunas, conch, Spanish mackerel, snappers, lobsters, etc. in total were landed according to statistics of Department of Fisheries in Saint Lucia (hereinafter called “DoF”). Those are source of protein for the nationals and tourist attractions as valuable local foods. Also, according to the statistics from 2008 to 2019 by DoF, fishery is one of the important industries where approximately 3,200 people are engaged.

Several cooperation projects have been conducted for more than 20 years to contribute to the fisheries development in Saint Lucia. For example, out of the 17 fish landing sites, 10 of them were developed through Japanese aid and account for more than 80% of the total fish landing volume.

Choiseul fishing port located in southwestern area of Saint Lucia was developed through Grant Aid project in 2001 titled “The Project for Improvement of Coastal Fisheries Development”. After completion, the fishing port equipped with market facility and fish gear lockers were expected to be effectively utilized as one of the main fishing ports in Saint Lucia. However, 19 years after completion so far, sedimentation at the port entrance and interior of the port has been disturbing smooth entry and mooring for fishing boats, causing inconveniences to fish landing as well. In response, the government of Saint Lucia has continuously implemented dredging at the entrance and interior of Choiseul fishing port and constructed the additional breakwater to maintain fisheries activities. However, sedimentation and closure constantly occurred, cost for frequent dredging became a big burden on the government of Saint Lucia.

On the other hand, the government of Saint Lucia drew up National Fishing Plan 2013 of which target year was 2022. In the plan, support to the facility development is positioned as a strategy so that fisheries resources which are economically available are used as much as possible. Therefore, the government of Saint Lucia requested support from the Japanese government to improve the function of Choiseul fishing port. Upon the request from October 2017, JICA has conducted “Data Collection Survey on Current Situation of the Project for Improvement of Coastal Fisheries Development in Saint Lucia” (hereinafter called “Data Collection Survey”) to consider technical feasibility of countermeasures for recovering and improving the functions of Choiseul fishing port.

As a result, JICA has decided to implement a project including construction of submerged breakwater and second groyne (hereinafter referred to as “Project”).

Assuming the application of Grant Aid scheme, JICA has undertaken Outlined Design Survey (hereinafter referred to as “the Survey”) to assess background, purpose and components, evaluate effects, technical and financial adequacy, conduct outlined design for appropriate contents and scales, and propose obligations of Saint Lucia side, implementation plan, and consideration points for operation and maintenance. This Project is positioned as an important Project in Fishery sector.

<History of sedimentation in Choiseul fishing port>

- ① Sedimentation occurred inside the port behind the breakwater before completion in 2003.
- ② Dredging works were conducted from 2005 to 2007 but the situation was not improved.
- ③ Additional breakwater was constructed in 2008 by the government of Saint Lucia.
- ④ After construction of additional breakwater, sedimentation area moved to the port entrance.
- ⑤ Port entrance has been completely closed after 2015, resultantly making the operations of fishing boats impossible.
- ⑥ Sand mining has been conducted since December 2016.

1-1-2 Grant aid request contents

Contents of this Project (long-term countermeasures) proposed in the Data Collection Survey from 2017 to 2019, and short-term countermeasure requested by the government of Saint Lucia against sedimentation. The short-term countermeasure is carried out in this Survey.

(1) Short-term countermeasure: conducted in this Survey

As a short-term countermeasure, dredging works for approximately 6,000m³ are implemented at the port entrance and navigation channel in this Survey. Rubble mound as a temporary access road is constructed at the planned location of second groyne. Therefore, the rubble mound is not removed.

(2) Long-term countermeasure: conducted in this Project

Components considered in Data Collection Survey and components examined after this Survey results are shown in Table 1-1-2(1).

Table 1-1-2(1) Components of long-term countermeasure

| | Facility | Data Collection Survey | This Project |
|---|----------------------|--|---|
| 1 | Dredging | •Dredging volume: 7,000m ³ (including 3,000m ³ inside the port) | •Dredging volume: 9,500m ³ (inside the port: 3,900m ³) (outside the port:5,600m ³) •Planned water depth: -2m (excess dredging: 30cm) |
| 2 | Second groyne | •Length: 70m | •Length: 55m •Structure: rubble stone + concrete blocks •Crown height: +2.0m / crown width: 3m •Concrete blocks: temporary quay |
| 3 | Submerged breakwater | •Length: 20m | •Length: 20m •Structure: <Temporary> bag materials <Upon completion> bag materials + armor stones •Crown height: -0.2m • Crown width: 5.4m (Temporary), 6.0m (Upon completion) |
| 4 | Beacon light | •2 new beacon lights (at the submerged breakwater and second groyne) | • 2 new beacon lights (on tips of second groyne and submerged breakwater) •2 beacon lights to be repaired (on tips of existing breakwater and groyne) |

1-2 Past Official Development Aid from Japanese government

According to the website of Ministry of Foreign Affairs in Japan, governmental aids have been conducted as below. Report on Japanese International Cooperation of 2020 stated that JPY31 million of Grant aid and JPY174 million for technical cooperation in 2018, and JPY205 million of Grant aid and JPY190 million for technical cooperation in 2019 are granted.

- ① Yen loan Projects (until 2017, E/N base) None
- ② Grant aid Projects (until 2017, E/N base) JPY 7,758,000,000
- ③ Technical cooperation(until 2017, JICA base) JPY 3,339,000,000

According to development cooperation policy drawn up by Ministry of Foreign Affairs of Japan, Saint Lucia aims to economic revitalization by diversifying industries and creating employment opportunities. In such circumstances, fisheries sector, which is an important sector for international cooperation for Saint Lucia, plays an essential role in creating job opportunities and providing animal proteins. Considering the sustainable use of marine resources, it is stated that cooperation is continuously implemented for sustainable development and operation of fishery industry in Saint Lucia.

Project implementation plan for Saint Lucia is summarized in Table-1-2(1).

Table 1-2(1) Project implementation plan for Saint Lucia

(Development goal-2 support for sustainable development in fishery sector (as of April 2020))

| Cooperation Program | Outline | Title | Scheme | Fiscal year | | | | | | Amount (JPY mil.) |
|--|--|---|-----------------------|-------------|------|------|------|------|------|-------------------|
| | | | | before 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | |
| Development Program for fishery industry and fishery community | Utilizing developed facilities and equipment by past Grant aids, further aids for fishery industry and fishery community | Economic and Social development plan | Grant aid | ■ | ■ | | | | | 200 |
| | | JOCV in fishery sector | JOCV | ■ | ■ | | | | | |
| | | Training in Fishery sector | Training | ■ | ■ | | | | | |
| | | The Project for Strengthening Sustainable Use and Management of Coastal Fisheries Resource in the CARICOM Countries | Technical Cooperation | | ■ | ■ | ■ | ■ | ■ | ■ |

(Source: Development Cooperation Plan, April 2020)

Past cooperation in fishery sector is shown in Table 1-2(2).

Table 1-2(2) Past cooperation in fishery sector (after 1987)

| Project title | ODA Scheme | Amount (Million) | Financial Year |
|---|---|------------------|----------------|
| Fisheries Development Project (Phase 1) | Grant Aid (Fisheries) | 29 | 1987 |
| Fisheries Development Project (Phase 2) | Grant Aid (Fisheries) | 36 | 1988 |
| Dennerly fish landing-base construction Project | Grant Aid (Fisheries) | 73.8 | 1992 |
| Fisheries Development Project (Phase 3) | Grant Aid (Fisheries) | 38.8 | 1994 |
| Fisheries Center Development Project | Grant Aid (Fisheries) | 52.7 | 1995 |
| Project for construction of Vieux Fort fishery complex (Phase1) | Grant Aid (Fisheries) | 101.5 | 1997 |
| Project for construction of Vieux Fort fishery complex (Phase2) | Grant Aid (Fisheries) | 100.8 | 1998 |
| Project for coastal fisheries development (Phase 1) | Grant Aid (Fisheries) | 27.2 | 2001 |
| Project for coastal fisheries development (Phase 2) | Grant Aid (Fisheries) | 104.6 | 2002 |
| Project for improvement of fishery infrastructure in Anse La Raye | Grant Aid (Fisheries) | 53.6 | 2008 |
| Co-managed Fisheries in the Caribbean Region | Technical Cooperation | | 2013 |
| Project for improvement of fishery equipment and machinery | Grant Aid (Fisheries) | 56 | 2014 |
| Fisheries development assistance | Grant aid (Economic and Social Development) | 20 | 2018 |

(Source: JICA homepage, date of reference: October 1st, 2021)

1-3 Environmental and Social Considerations

1-3-1 Outline of Project components having environmental and social impacts

(1) Purpose of the Project

This Project aims to promote the smooth utilization of the fishing port and resultantly contribute to the improvement of effectiveness of fishery activities and development of fisheries industry in Saint Lucia by developing facilities to address the sedimentation at the port entrance.

(2) Project site

Choiseul fishing port

(3) Project components possibly having adverse environmental and social impacts

The following Project components may have adverse environmental and social impacts.

- Construction of second groyne
- Construction of submerged breakwater
- Dredging works at the port entrance

For construction works of second groyne and submerged breakwater, several impacts such as dust, noise, vibration, increase of traffic volume are assumed since the construction works include use of construction equipment and transportation of construction materials by trucks from hinterland. During construction works, it is inevitable to close the port entrance temporarily. Fishing boats cannot access the fishing port. Due to the dredging works at the port entrance, impacts on water quality and marine biota, and dredged sand are assumed. Additionally, after construction of second groyne, the sand is placed on the north side, and shoreline is expected to advance in the future.

1-3-2 Environmental and social circumstances

(1) Outline

The Project site is the existing Choiseul fishing port in Saint Lucia. Saint Lucia is divided into 11 districts. Choiseul fishing port is in the Choiseul district located in the southwest of the country, facing the Caribbean Sea. The following facilities were constructed and developed through Japanese Grant Aid Project in 2003. The facilities have been properly maintained by the Fishery co-operatives under the supervision of Department of Fisheries.

<Civil Engineering construction>

- Breakwater (100m)
- Wharf (100m)
- Slipway(30m×20m)
- Quay (93m)
- Groyne (27m)

<Functional facilities>

- Administrative building
- Ice machine (plate ice 1.1 tons / day),
ice storage building (2.2 tons)
- Selling building
- Workshops, toilets, showers
- Fishing gear lockers (40 buildings)
- FRP fishing boats (20 boats)

(2) Circumstances on population, inequality and gender

The national census conducted in 2010 enumerated 159,989 population (estimated population: 173,720 including 7,194 non-residents staying in hotels or guest houses). Enumerated population in Choiseul district is 5,766 (estimated population: 6,098) comprising of 2,877 males and 2,889 females.

UNDP (United Nations Development Program) annually announces HDI (Human Development Index) and IHDI (Inequality-adjusted Human Development Index). HDI is an index to evaluate the average degree of achievement of human development in the aspects of health, education, and income. Furthermore, IHDI is an index considering accomplishment gaps and reflecting the seriousness of inequality. The larger the overall loss, the larger is the disparity in a country.

UNDP classifies surveyed countries into 4 different categories in accordance with the HDI from “Very High Human Development”, “High Human Development”, “Medium Human Development” and “Low Human Development”. Saint Lucia is classified as one of the “High Human Development” countries. Table 1-3-2(1) shows comparison of HDI and IHDI among Saint Lucia, “High Human Development” countries, Latin American and Caribbean countries. HDI and IHDI of Saint Lucia is respectively 0.759 and 0.629. Comparing HDI, Saint Lucia is higher than 0.753, which is the average for High Human Development Countries. As for the IHDI, Saint Lucia is higher than 0.618, average of High Human Development countries, and 0.596, average of Latin American and Caribbean countries. Furthermore, the overall loss for “High Human Development” countries is 17.9, 22.2 for Latin American and Caribbean countries, whereas 17.1 for Saint Lucia.

Therefore, it is implied that inequality exists in Saint Lucia, but it is not outstanding compared to other countries in the area.

Table 1-3-2(1) HDI and IHDI of Saint Lucia, High Human Development countries, Latin American and Caribbean countries in 2019

| Region/Country | Human Development Index (HDI) | Inequality-adjusted HDI (IHDI) | |
|---------------------------------|-------------------------------|--------------------------------|------------------|
| | Value | Value | Overall loss (%) |
| Saint Lucia | 0.759 | 0.629 | 17.1 |
| High Human Development | 0.753 | 0.618 | 17.9 |
| Latin America and the Caribbean | 0.766 | 0.596 | 22.2 |

(Source: UNDP Human Development Report, 2020)

Table 1-3-2(2) shows GII (Gender Inequality Index) of Saint Lucia, High Human Development Countries, and Latin American and Caribbean countries in 2019. GII indicates inequality of achievement degree between male and female in the aspects of reproductive health, empowerment and participation in labor market. GII varies from 0 to 1, and as the value is closer to 1, the severity of inequality is meant to be larger.

GI of Saint Lucia in 2019 is 0.401 which is not outstanding but slightly higher than 0.340, average of High Development countries, and 0.389, average of Latin American and Caribbean countries. Assumed causes are higher maternal mortality rate, lower female occupation in parliamentary seats, and lower rate of secondary education for female.

None of those causes are directly related to the Project. However, hearing surveys are necessarily conducted in this Survey so that the Project does not increase the gender inequality.

Table 1-3-2(2) GII of Saint Lucia, High Human Development countries, Latin American and Caribbean countries in 2019

| Region/Country | Gender Inequality Index (GI) | Maternal mortality ratio | Adolescent birth rate | Share of seats in parliament | Population with at least some secondary education | | Labor force participation rate | |
|---------------------------------|------------------------------|---------------------------------|----------------------------------|------------------------------|---|------|--------------------------------|------|
| | | (Death per 100,000 live births) | Birth per 1,000 women ages 15-19 | (% held by women) | (% ages 25 and older) | | (% ages 15 and older) | |
| | | | | | Female | Male | Female | Male |
| Saint Lucia | 0.401 | 117 | 40.5 | 20.7 | 49.2 | 42.1 | 59.5 | 75.0 |
| High Human Development | 0.340 | 62 | 33.6 | 24.5 | 69.8 | 75.1 | 54.2 | 75.4 |
| Latin America and the Caribbean | 0.389 | 73 | 63.2 | 31.4 | 60.4 | 59.7 | 52.1 | 76.9 |

(Source: UNDP Human Development Report 2020)

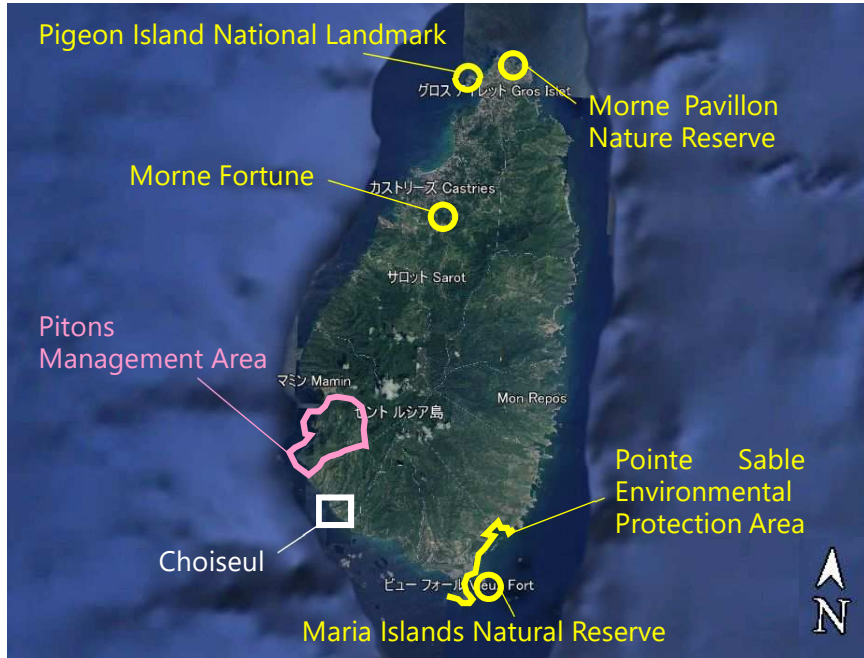
(3) Natural reserves and World Heritage Sites

Saint Lucia's National Trust (SLNT) was established in 1975 to preserve natural and cultural heritage of the country. The target areas regulated by SLNT are as follows (refer to Figure 1-3-2(1)).

- Pigeon Island National Landmark
- Maria Islands Nature Reserve
- Pointe Sables Environmental Protection Area
- Morne Pavillon Nature Reserve
- Morne Fortune

The Pitons Management Area registered as a World Heritage Site by the United Nations Educational, Scientific and Cultural Organization (UNESCO) is in Soufriere, southwestern part of the country.

Figure 1-3-2(1) shows the locations of SLNT-managed areas as well as World Heritage Sites.



(Source: drawn in reference to SLNT website)

Figure 1-3-2(1) Locations of SLNT-managed areas and World Heritage Sites

The Pitons Management Area Office (PMAO) was established in 2006 to efficiently manage the Pitons Management Area. According to the PMAO website, the Piton Management Area is home to 22 reptiles, 33 amphibians and 5 birds that are endemic to Saint Lucia. Table 1-3-2(3) shows the classification of endemic plant species of Saint Lucia listed in the International Union for Conservation of Nature (IUCN) red list inhabiting the Piton Management Area.

Table 1-3-2(3) Endemic plant species and red list classification in the Piton Management Area

| Scientific name | Description | Category in IUCN Red List |
|--|--|---------------------------|
| Endemic plant | | |
| <i>Juniperus barbadensis</i> L. var. <i>barbadensis</i> | Species of a conifer in the family Cupressaceae. | Vulnerable (VU) |
| <i>Bernardia laurentii</i> | Plant genus of the family Euphorbiaceae, endemic to Saint Lucia. | Data Deficient (DD) |
| <i>Acalypha elizabethiae</i> | Plant genus of the family Euphorbiaceae, endemic to Saint Lucia. | Data Deficient (DD) |
| Indigenous plant | | |
| <i>Melothria pendula</i> | Plant genus of the family Cucurbitaceae, prominent to the Caribbean. | Data Deficient (DD) |
| <i>Eupatorium microstemon</i> / <i>Fleischmannia microstemon</i> | Plant genus of the Eupatorium family inhabiting the Caribbean including Gros Piton. | Data Deficient (DD) |
| <i>Guarea glabra</i> Vahl | Evergreen tree of the family Meliaceae, inhabiting Central, South America and tropical Africa. | Least Concern (LC) |
| <i>Amphilophium paniculatum</i> | Vine plant of the family Bignoniaceae found in the Caribbean and South America. | Data Deficient (DD) |
| <i>Krugioidendron ferreum</i> (Vahl) Urban | Species of the family Rhamnaceae found in the Caribbean and South America. | Least Concern (LC) |
| <i>Picrasma excels</i> Planchon | Plant genus of family Simaroubaceae. It is most common in Soufriere. | Vulnerable (VU) |

*) EX: Extinct, EW: Extinct in the Wild, CR: Critically Endangered, EN: Endangered, VU: Vulnerable, NT: Near Threatened, LC: Least Concern
DD: Data Deficient, NE: Not Evaluated (Ordered from higher to lower risk of extinct)

(Source: Website of PMAO, Website of IUCN)

Table 1-3-2 (4) classifies endemics and indigenous animals of Saint Lucia inhabiting the Piton Management Area with the corresponding red list.

Table 1-3-2 (4) Endemic animal species and red list classification in the Piton Management Area

| Scientific name | Description | Category in IUCN Red List |
|---|---|----------------------------|
| Endemic animal | | |
| <i>Myiarchus oberi</i> | Saint Lucia Flycatcher, a species of bird in the family Tyrannidae. | Least Concern (LC) |
| <i>Troglodytes aedon sanctae-luceae</i> | A very small songbird of the wren family, Troglodytidae. | Least Concern (LC) |
| <i>Icterus laudabilis</i> | Saint Lucia Oriole, a species of bird in the Icteridae family. | Endangered (EN) |
| <i>Melanospiza richardsoni</i> | Saint Lucia Black Finch, a species of bird in the family Thraupidae. | Endangered (EN) |
| <i>Ramphocinclus brachyurus</i> | Goj blan in Creole, is a species of bird in the family Mimidae. | Endangered (EN) |
| <i>Anolis luciae</i> | A species of anole lizard in the family Dactyloidae. | Endangered (EN) |
| Indigenous animal | | |
| <i>Didelphis marsupialis</i> | Black-eared opossum of the Didelphidae family. | Least Concern (LC) |
| <i>Rhincodon typus</i> | Whale shark of the Rhincodontidae family. | Endangered (EN) |
| <i>Eretmochelys imbricata</i> | Critically endangered sea turtle belonging to the family Cheloniidae. | Critically Endangered (CR) |

*) EX: Extinct, EW: Extinct in the Wild, CR: Critically Endangered, EN: Endangered, VU: Vulnerable, NT: Near Threatened, LC: Least Concern

(Source: World Heritage Datasheet, Website of IUCN)

The Piton Management Area is a World Heritage Site and a valuable habitat for flora and fauna. Nevertheless, it is located approximately 3.5km apart from Choiseul fishing port in direct distance. After the large-scale construction of the newly built Choiseul fishing port in 2002, sand mining has been carried out by local company since 2016, when sedimentation at the port entrance became significant. Piton Management Area and other protected areas were not impacted. According to stakeholder meeting and hearing with residents, described later, no concerns were confirmed about the impact on endemic species and protected areas. Therefore, it is assessed that this Project does not have any specific impact on protected areas and World Heritage Sites.

1-3-3 Environmental and social considerations system and organization in Saint Lucia

(1) Administrative agency in charge of environment

With the appointment of the new cabinet members following the election of the new Prime Minister in August 2021, the “Ministry of Agriculture, Fisheries, Physical Planning, Natural Resources and Co-operatives” in charge of this Project has been reorganized as the "Ministry of

Agriculture, Fisheries, Food Security, and Rural Development" (hereinafter referred to as "Ministry of Agriculture and Fisheries"). The Department of Fisheries, as the counterpart to this Project, remains under the jurisdiction of the ministry.

The Ministry of Infrastructure, Ports, Transports, Physical Development and Urban Renewal (hereinafter referred to as the "MoI") oversees development Projects.

However, no specific ministries exclusively overseeing environmental matters are organized in Saint Lucia. Therefore, decisions in relation to environment are made after discussion between a counterpart ministry and DCA, Development Control Authority, which is a board of directors under MoI. Figure 1-3-3(1) shows coordination structure between a counterpart ministry and DCA, and organization chart of DCA.

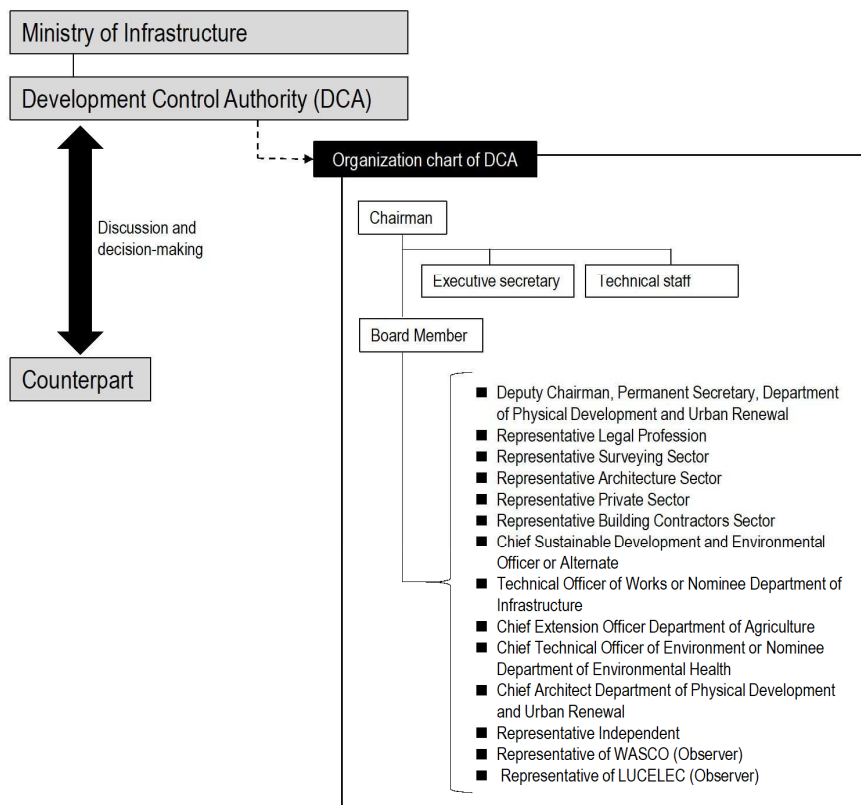


Figure1-3-3(1) Coordination structure between a counterpart ministry and DCA, and organization chart of DCA

(2) Environmental legislations and regulations

Table 1-3-3 (1) below compiles applicable environmental legislations and guidelines in Saint Lucia.

Table 1-3-3 (1) Applicable environmental legislations and guidelines in Saint Lucia

| Title | Date | Content |
|---|--|--|
| Chapter 5.12 Physical Planning and Development Act | Revised edition as of December 31, 2005 | ✓ Procedures for land development permit (section 10 to 21) ✓ Environmental Impact Assessment (section 22, schedule 4) |
| Chapter 6.04 Beach Protection Act | Revised edition as of December 31, 2015 | ✓ Sand Permit conditions of issuance (Section 4) |
| Chapter 108 Crown Lands Act | Revised Edition as of December 31, 2008 | ✓ Provision on survey and disposal of crown lands |
| Chapter 8.12 Public Jetties Act | Revised edition as of December 31, 2015 | ✓ Jetty management, maintenance and repair ✓ Traffic regulations to jetties, etc. |
| Chapter 16.14 Equality of Opportunity and Treatment in Employment and Occupation Act | Revised edition as of December 31, 2001 | ✓ Protection against unlawful discrimination in employment |
| Guide to Obtaining Permission to Develop Land, Department of Physical Planning | Revised on January 2021 | ✓ Construction permit (coastal construction application, coastal reclamation / beach nourishment, coastal dredging) ✓ Environmental impact assessment procedure |

Prior to Project implementation, expectedly construction permit and sand permit are required as stipulated in the Beach Protection Law and the Guide to Obtaining Permission to Develop Land. Based on Equality of Opportunity and Treatment in Employment and Occupation Act on gender protection standard, attention is required so that this Project does not expand gender inequality.

(3) Procedure for environmental permit (EIA) and construction permit

Reviews of development activities in Saint Lucia are stipulated in Physical Planning and Development Act, Chapter 5.12. The 18 Projects shown below basically require EIA.

- Hotels of more than the number of rooms specified in the Regulations;
- Sub-divisions of more than the number of plots specified in the Regulations;
- Residential development of more than the number of units specified in the Regulations;
- Any industrial plant which in the opinion of the Head of the Physical Planning and Development Division is likely to cause significant adverse environmental impact;
- Quarrying and other mining activities;
- Marinas;
- Land reclamation, dredging and filling of ponds;
- Ports;
- Dams and reservoirs;
- Hydro-electric Projects and power plants;
- Sanitary land fill operations, solid waste disposal sites, toxic waste disposal sites and other similar sites;
- Gas pipeline installations;
- Any development Projects generating or potentially generating emissions, aqueous effluent, solid waste, noise, vibration or radioactive discharges;

- Any development involving the storage and use of hazardous materials;
- Coastal zone developments;
- Development in wetlands, marine parks, national parks, conservation areas, environmental protection areas or other sensitive environmental areas.

As mentioned above, there are no ministry nor agency exclusively specialized in environmental matters in Saint Lucia. Guidelines or other documents regulating the details of EIA procedure are not drawn up. Therefore, the Agency in charge of the development and Ministry of Infrastructure decide after discussion the EIA necessity for a Project.

Figure 1-3-3 (2) shows the procedure of application of EIA as stipulated in the above-mentioned laws and regulations. The ministry / agency in charge of structural or land development Project makes an application to the Development Control Authority (DCA), which is the board of directors of the Ministry of Infrastructure. The EIA is approved by the DCA after examination procedures. The parties involved in EIA application are as follows.

- Board: Board of directors organized within DCA
- DCA Officer (Appraising Officer): Planning and Building Officer in charge of each EIA application within DCA
- Referral Agency: organization applying for procedures
- Developer: ministries and agencies in charge of development
- EIA team: team preparing EIA reports on behalf of developers.

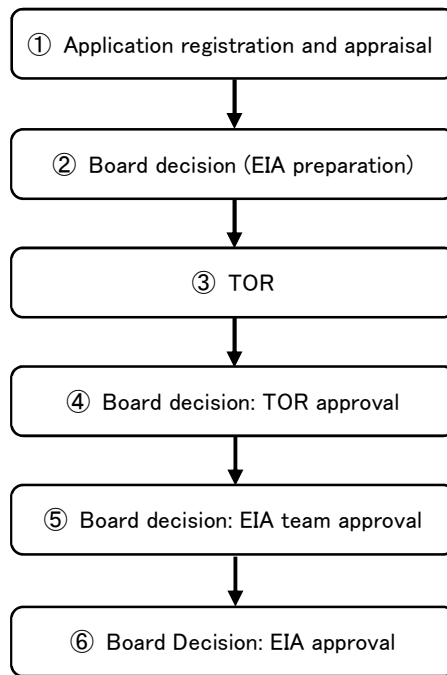


Figure 1-3-3 (2) EIA procedures in Saint Lucia

Details of EIA from each stage ① to ⑥ are as follows.

① Application registration and appraisal

- a. The developer submits the application to DCA for registration and fees payment (if applicable).
- b. The application is assigned to an appraising officer.
- c. Officer reviews the application, undertakes site visit with the developer, consults applicable legislations, review other relevant documents, discuss proposal at technical committee meeting and prepares appraisal for consideration by the DCA board.

② Decision by the board of directors (EIA preparation)

- a. Board consider appraisal recommendations presented by appraising officer
- b. Board makes decision that EIA should be prepared and submitted according to set guidelines
- c. Developer is informed of decision

③ TOR preparation

- a. Appraising officer engages referral agencies on input to form the TOR
- b. Appraising officer organizes site visit with referral agencies and developer
- c. Referral agencies submit input to form TOR to DCA
- d. Appraising officer compiles input from referral agencies, discusses draft TOR at technical committee meeting and prepares an appraisal for consideration by the DCA Board.

④ Board Decision: TOR approval

- a. Board considers and approves with conditions TOR presented by appraising officer
- b. Developer is issued the TOR and informed to identify an appropriate team
- c. Team member's CVs are submitted for consideration
- d. Appraising officer reviews the CVs, discussed CVs at technical committee meeting and prepares an appraisal for consideration by the DCA Board

⑤ Board decision: EIA team approval

- a. Boards considers and approves with conditions and guidelines EIA team presented by appraising officer
- b. Developer is informed of board decision and engages EIA team to undertake EIA report

⑥ Board Decision: EIA Approval

- a. Developers submits EIA to DCA
- b. Appraising officer distributes EIA documents to referral agencies for review and comments
- c. Referral agencies submit comments to appraising officer
- d. Appraising officer reviews EIA, and together with comments from referral agencies discusses EIA report at technical committee meeting and prepares appraisal for consideration by DCA board
- e. Board considers appraisal and approved EIA with conditions

(4) EIA prerequisite for this Project

As stated above, structural or land development activities screening are conducted in accordance with the "Physical Planning and Development Act, Chapter 5.12". However, since no other guidelines or regulations have been established, the Agency in charge of the development and Ministry of Infrastructure have discussed and decided on the EIA.

A joint meeting was held on October 19, 2021 with the DoF and the Ministry of Infrastructure to discuss the necessity of EIA for this Project during the first site survey.

The main components of the Project are the construction of a second groyne on the north side of the existing groyne, construction of a submerged breakwater at the tip of the additional breakwater, and dredging works inside the fishing port as well as around the port entrance. After consultation, it was decided that EIA acquisition was not required for this Project for the following reasons. However, it was required by the Ministry of Infrastructure that this Survey report is submitted to the Ministry of Infrastructure.

- This Project is not a new development Project.
- The scale of the Project is small, and expected impact is limited even though structure construction and dredging works are included.

(5) Required permit for construction works

During this survey, in response to a request from the Government of Saint Lucia, dredging was carried out inside the fishing port and at the port entrance to secure navigation channel from November to December 2021 and from May to June as a short-term countermeasure against sedimentation. In addition, a temporary access road was set up at the planned position of the second groyne during the 1st dredging, and the rubble mound was not intentionally removed to evaluate the effect on sedimentation at an early stage. Dredged sand was placed on north side of the rubble mound.

An infrastructure development permit (coastal dredging) and a sand permit were obtained to carry out the dredging works. The flow of each permit acquisition procedure and required documents are summarized below. The Ministry of Infrastructure holds a board meeting once a week. Permits are obtained within a week at the earliest once all documents are submitted. Since the sand permit application is submitted after issuance of the infrastructure development permit, approximately two weeks are necessary for both permits.

In the Project implementation, acquisition of infrastructure development permit and a sand permit are expected as well.

1) Infrastructure development permit

Infrastructure development permit application is submitted by the DoF to DCA. Procedure for issuance of an infrastructure development permit in coastal dredging is as follows.

- a. Application registration
- b. Assignment of registered applications to Technical Officers by Executive Secretary (Planning Officer are assigned to Major Development and Small Subdivision Applications, whereas Building Officers for Minor Development Applications).
- c. Review by Planning Officers and DCA board (site visit, discussions with developers, etc.)
- d. Decisions on the application (public information disclosure, publication in the Saint Lucia Government Gazette, letter of notification to the applicant)
- e. Final procedure (signing / stamping of any outstanding documentation and/or requirement)

Depending on the Project, the submission of following documents is required along the application.

- a. Cover Letter/ scoping report
- b. Project Brief outlining concepts of application
- c. Land Register (from the Land Registry Section) and location for the deposit of soil (if applicable)
- d. Consent from land owner (if applicable)

- e. One (1) copy of Location Map (topographic sheet and LRTP map extract): to be obtained from the Survey and Mapping Section
- f. Three copies of bathymetric map of impacted area, showing existing and proposed levels
- g. Three copies of site plan showing area where material is deposited (if applicable)
- h. Three copies of profiles showing intended final heights for the deposited material
- i. Consent from the Office of the Commissioner of Crown Lands (use of seabed) (if applicable)
- j. Solid Waste Management Plan (if applicable)
- k. Environment and Social Impact Assessment (ESIA) (as directed)

In this Survey, DoF submitted the documents to DCA on October 19, 2021. Approval letter was issued on October 21, 2021.

2) Sand permit

Sand permit is applied to the Chief Engineer of the Department of Infrastructure by DoF. Documents submitted by DoF, consultant and contractor for sand permit in this Survey are as follows.

【Department of Fisheries】

- A request letter stating the amount of dredged sand (signed by the Permanent Secretary of Ministry of Agriculture and Fisheries)
- Infrastructure Development permit issued by the DCA

【Consultant】

- Set of drawings (submitted, approved and stamped) from the Infrastructure Development Permit
- Technical Specification of the Project

【Contractor】

- Insurance details for all equipment
- Copy of drivers' licenses
- Work schedule
- Request Letter

Sand permit was issued by the Ministry of Infrastructure on November 8th, 2021 for the first dredging and on April 25th, 2022 for the second dredging.

(6) Comparison and positioning with JICA Guideline for environmental and social considerations

Expectedly, adverse impacts brought by this Project occurs only in a limited way since the scale of works is small. No involuntary resettlement and land acquisition of private lands are expected, so the seriousness of impacts on environment and society is low. Therefore, this Project is identified as Category B in accordance with JICA Guideline for Environmental and Social Considerations (April, 2010), since potential adverse impacts occur only in a limited way.

Referring to the Appendix-1 Environmental and Social Considerations Required for Projects in the same Guideline from JICA, this Project is judged to be compliant to its principles. However, no standard value for environmental items such as scope, mitigation measures, alternatives, monitoring plan, is set in Saint Lucia as shown in Table 1-3-3 (2) regarding consistency with laws, standards, planning, etc. There are some discrepancies in the fact that international standards such as WHO and ISO and Japanese standards must be referred to when evaluating each environmental item.

Table 1-3-3 (2) Positioning with JICA Guideline

| | JICA Guideline | Saint Lucia's policies | Positioning |
|--|--|--|--|
| Underlying Principles (including information disclosure) | <p>Environmental impacts that may be caused by projects must be assessed and examined in the earliest possible planning stage. Alternatives or mitigation measures to avoid or minimize adverse impacts must be examined and incorporated into the project plan.</p> <p>Such examinations must be endeavored to include an analysis of environmental and social costs and benefits in the most quantitative terms possible, as well as a qualitative analysis; these must be conducted in close harmony with the economic, financial, institutional, social, and technical analyses of projects.</p> | <p>Physical Planning and Development Act Chapter 5.12 defines the types of development projects requiring EIA and the basic procedures. Nevertheless, details on consideration of alternatives and mitigation measures, quantitative evaluation, standard, etc. are not specified. Details are decided after consultation with counterparts for each case.</p> | <p>In this Survey, the Project impact, mitigation measures, alternatives, etc. are examined and reflected in the Project plan.</p> |
| | <p>The findings of the examination of environmental and social considerations must include alternatives and mitigation measures, and must be recorded as separate documents or as a part of other documents. EIA reports must be produced for projects in which there is a reasonable expectation of particularly large adverse environmental impacts.</p> <p>For projects that have a particularly high potential for adverse impacts or that are highly contentious, a committee of experts may be formed so that JICA may seek their opinions, in order to increase accountability.</p> | <p>In the "Guide to Obtaining Permission to Develop Land" (January, 2021) provided by the Department of Fisheries, the acquisition of EIA is judged based on the report submitted to DCA by EIA team (who is entrusted with the investigation by the developer). DCA requests reviews and comments from outsourced organizations. In addition, the Ministry of Infrastructure requests referral Agencies/Ministries to disclose information and documents required by EIA applicants, and applicants can get copies of such documents.</p> | <p>EIA report is submitted to DCA and reviewed in conformity with JICA guidelines. Following discussions with the Ministry of Infrastructure and Department of Fisheries, EIA implementation in this Project is judged unnecessary. This report is submitted to the Ministry of Infrastructure in lieu of the EIA.</p> |

| | JICA Guideline | Saint Lucia's policies | Positioning |
|---------------------------------|--|---|---|
| Examination of Measures | <p>Multiple alternatives must be examined in order to avoid or minimize adverse impacts and to choose better project options in terms of environmental and social considerations. In the examination of measures, priority is to be given to avoidance of environmental impacts; when this is not possible, minimization and reduction of impacts must be considered next. Compensation measures must be examined only when impacts cannot be avoided by any of the aforementioned measures.</p> <p>Appropriate follow-up plans and systems, such as monitoring plans and environmental management plans, must be prepared; the costs of implementing such plans and systems, and the financial methods to fund such costs, must be determined. Plans for projects with particularly large potential adverse impacts must be accompanied by detailed environmental management plans.</p> | <p>Physical Planning and Development Act Chapter 5.12 defines the types of development projects and basic procedures that require EIA. However, details on consideration of alternatives, mitigation measures, and preparation of monitoring plans are not specified.</p> | <p>In this Survey, multiple alternatives and consideration measures (mitigation measures) to minimize unavoidable impacts are considered. In addition, monitoring plan for environmental items that are deemed particularly necessary is created.</p> |
| Scope of Impacts to Be Assessed | <p>The impacts to be assessed with regard to environmental and social considerations include impacts on human health and safety, as well as on the natural environment, that are transmitted 28 through air, water, soil, waste, accidents, water usage, climate change, ecosystems, fauna and flora, including trans-boundary or global scale impacts. These also include social impacts, including migration of population and involuntary resettlement, local economy such as employment and livelihood, utilization of land and local resources, social institutions such as social capital and local decision-making institutions, existing social infrastructures and services, vulnerable social groups such as poor and indigenous peoples, equality of benefits and losses and equality in the development process, gender, children's rights, cultural heritage, local conflicts of interest, infectious diseases such as HIV/AIDS, and working conditions including occupational safety.</p> <p>In addition to the direct and immediate impacts of projects, their derivative, secondary, and cumulative impacts as well as the impacts of projects that are indivisible from the project are also to be examined and assessed to a reasonable extent. It is also desirable that the impacts that can occur at any time throughout the project cycle should be considered throughout the life cycle of the project.</p> | <p>According to Physical Planning and Development Act Chapter 5.12, the scope to be considered is determined for each Project.</p> | <p>In this Survey, we will investigate and examine the scope of impact required by JICA guidelines. Mitigation measures for possible impacts are considered.</p> |

| | JICA Guideline | Saint Lucia's policies | Positioning |
|---|--|---|---|
| Compliance with Laws, Standards, and Plans | Projects must comply with the laws, ordinances, and standards related to environmental and social considerations established by the governments that have jurisdiction over project sites (including both national and local governments). They must also conform to the environmental and social consideration policies and plans of the governments that have such jurisdiction. | Environmental Impact Assessment Act (EIA) is stipulated in Physical Planning and Development Act Chapter 5.12. No specific environmental standards for air, water quality, sediment, noise and vibration are in force in Saint Lucia. | There is a divergence from the JICA guidelines since environmental standards set by Saint Lucia cannot be referred to. In addition to internationally used environmental standards such as WHO and ISO, environmental items are evaluated with reference to Japanese standards too. |
| Social Acceptability (including consideration for the vulnerable) | Projects must be adequately coordinated so that they are accepted in a manner that is socially appropriate to the country and locality in which they are planned. For projects with a potentially large environmental impact, sufficient consultations with local stakeholders, such as local residents, must be conducted via disclosure of information at an early stage, at which time alternatives for project plans may be examined. The outcome of such consultations must be incorporated into the contents of project plans. | Physical Planning and Development Act Chapter 5.12 stipulates that public participation in EIA and screening is decided for each project. | Interviews to fisherfolks and residents at the Choiseul fishing port, stakeholder discussions, and consensus building on project implementation have been undertaken. Stakeholder meeting are conducted in English, which is the official language in Saint Lucia. Opinions confirmed through interviews and stakeholder consultations are reflected in the Project plan. |
| Ecosystem and Biota | Projects must not involve significant conversion or significant degradation of critical natural habitats and critical forests. | According to Physical Planning and Development Act Chapter 5.12, facilities and protected areas managed by SLNT are subject to sufficient information disclosure before deciding on development applications. | Choiseul fishing port where this project is located is not included in the SLNT-managed district and World Heritage (Piton Management Area). However, after conducting an ecosystem survey at the site, the impact on the ecosystem and biological fauna is evaluated. |

| | JICA Guideline | Saint Lucia's policies | Positioning |
|---|--|--|--|
| Monitoring (Including grievance mechanisms) | <p>After projects begin, project proponents etc. monitor whether any unforeseeable situations occur and whether the performance and effectiveness of mitigation measures are consistent with the assessment's prediction. They then take appropriate measures based on the results of such monitoring.</p> <p>In cases where sufficient monitoring is deemed essential for appropriate environmental and social considerations, such as projects for which mitigation measures should be implemented while monitoring their effectiveness, project proponents etc. must ensure that project plans include feasible monitoring plans. Project proponents etc. should make efforts to make the results of the monitoring process available to local project stakeholders.</p> <p>When third parties point out, in concrete terms, that environmental and social considerations are not being fully undertaken, forums for discussion and examination of countermeasures are established based on sufficient information disclosure, including stakeholders' participation in relevant projects. Project proponents etc. should make efforts to reach an agreement on procedures to be adopted with a view to resolving problems.</p> | <p>No details have been set regarding monitoring and grievance mechanisms during the Project period. Nevertheless, Department of Fisheries officers attend a weekly meeting every Tuesday at the Choiseul Fishing Port Co-operative Society to share information, supervise activities of the fishing port, and identify problems. Department of Fisheries is responding to confirmed complaints (discussion with fisherfolk, information disclosure, etc.) according to the degree.</p> | <p>In this Survey, a monitoring plan is prepared for impacted items during the Project period and operation. The contents and implementation system are discussed and decided with the government of the Saint Lucia.</p> <p>In the Project implementation, Department of Fisheries officers continue to participate in regular meetings to hear and respond to complaints. The results of monitoring implemented in this Project and response to complaints status are shared from the Department of Fisheries to the fisheries cooperatives during the weekly meeting.</p> |

1-3-4 Comparison of alternatives

As shown in Table 1-3-4(1), alternatives are compared and evaluated.

<No Project implementation>

If the Project is not carried out, the present sedimentation issue remains.

Access at the port entrance is not improved, and expectedly sand mining by the local company is probably continued. Frequent sand mining causes turbidity in the fishing port, impact on air quality and traffic from trucks carrying sand. Furthermore, not only the port entrance but the shoreline at the northern beach recedes and disappears. Besides, if the sand mining is not conducted, the port entrance is left closed, impacting seriously fisheries activities.

<This Project: Facility construction and dredging>

In this Project, construction of second groyne on the north side of the existing groyne, submerged breakwater at the tip of the additional breakwater, and dredging works inside the port and the navigation channel are carried out.

At the time of construction of second groyne and dredging works, port entrance is temporarily closed. However, in the long run, sedimentation is improved and efficient fisheries activities are expected. Frequency of dredging works is drastically reduced. So, adverse impacts are eased for fisherfolk as well as residents nearby since impacts such as noise and air pollution are improved.

On the other hand, a new sandy beach is formed from the Sand Bypassing system on the northern side of the second groyne. This sandy beach is also expected to be used as a recreational area, which is a positive impact of the Project.

<Alternative: Procurement of a dredger >

The Alternative is an option without facility construction but only procurement of a dredger.

Dredger is useful for removing the sedimentation at the port entrance and inside the fishing port for smooth access of fishing boats. However, the storage space for a dredger is needed, and expenses for continuous maintenance operation are financial burdens for the government of Saint Lucia. Procurement of a dredger is not a fundamental solution for the sedimentation, so dredging works are required regularly and continuously. It causes inconveniences for fisheries activities and turbidity in the port. Additionally, adverse impacts such as dust, noise, traffic by trucks are continuously generated to the residents nearby.

Table1-3-4(1) Comparison of alternatives

| Item | 1) No Project implementation | 2) This Project (Facility construction and dredging) | 3) Alternative (Procurement of dredger) |
|--------------------------------|---|--|--|
| Component | Conditions are kept as they are. | Second groyne and submerged breakwater are constructed and dredging is conducted. | A dredger is procured. |
| Sedimentation at port entrance | Not improved | Improved | Improved |
| Impacts on fisherfolks | Fisherfolks push fishing boats to access the port entrance. If the sand mining is not carried out, port is closed and inaccessible. | Smooth and efficient fishery activities are expected. | Frequent dredging is conducted at the port entrance. Impacts to fishery activities such as temporary closure of the port and turbidity are expected. |
| Utilization of land | Conditions are kept as they are. | Shoreline advances at the north of second groyne, and recreational area are generated. | Conditions are kept as they are. Depending on the dredging volume, north beach disappears. |
| Environmental impacts | Conditions are kept as they are. | Impacts on water quality is reduced thanks to less frequent dredging. During the works, temporary effects including water pollution may occur. | Frequent dredging possibly causes turbidity, air pollution, and noise. During the works, temporary effects including water pollution may occur. |
| Impacts on residents nearby | Continuous impact on air quality and occurrence of noise are of concern. | Less frequent dredging leads to smaller impacts such as air pollution and noise. | Frequent dredging works impact on water quality, air quality, noise, etc. |
| Impacts on traffic | Conditions are kept as they are. Trucks transporting dredged sand circulate frequently. | Traffic of trucks transporting dredged sand is reduced in accordance with the reduced frequency of dredging works. | Frequent circulation of trucks transporting dredged sand. |
| During construction | Non-occurrence | Temporary closure of the port entrance, increase of traffic in the neighboring roads, and impact on air and water quality. | Noise, impact on air and water quality are generated from continuously dredging. |
| Maintenance (*) | Conditions are kept as they are. (Amount of sedimentation: 5,150m ³ /year (equivalent to 26 days work)) | Frequency of dredging works is drastically reduced. (Amount of sedimentation: 500m ³ /year (equivalent to 2 days work)) | Personnel and financial resources for maintenance are necessary. (Amount of sedimentation: 5,150m ³ /year (equivalent to 10 days work)) |
| Cost | <Construction> N/A <Maintenance> Dredging is continuously needed by the government. | <Construction> More expensive than Alternative. <Maintenance> Cost for maintenance dredging is much lower. | <Procurement> Only dredging cost occurs. <Maintenance> Costs for personnel and maintenance continuously occur. |
| Land acquisition | N/A | N/A | N/A |
| Resettlement | N/A | N/A | N/A |
| Evaluation | <Advantage> - None <Disadvantage> - Sedimentation is not improved. - Port is closed if sand mining is suspended. - Impacts on air quality, water quality and noise continuously occur. | <Advantage> - Sedimentation is improved. - Fisherfolks can use the port efficiently - Environmental impacts such as water quality is eased. - Impacts on residents such as air quality and noise are reduced. - Recreational area is established. <Disadvantage> - Impacts extending on the project site is not irreversible and minimized by mitigation measures. - Impacts extending on the project site is not irreversible and minimized by mitigation measures. | <Advantage> - Sedimentation is improved. <Disadvantage> - Maintenance cost continuously occur. - Assignment and training needed for maintenance personnel. - Impacts are brought to fisherfolks and residents continuously. |

(*) In 1) and 2), dredging by a backhoe (200m³/day) is assumed, and in 3), dredging by a dredger (500m³ / day) is assumed.

1-3-5 Scoping

Table 1-3-5(1) shows the scoping results of environmental and social impacts by the Project. Check mark is added for any potential adverse impacts. In this Project, construction of facilities and dredging works are expected. However, the scale of works is small since this is not a new development Project. Therefore, it is extremely unlikely to cause serious adverse impacts.

Table1-3-5(1) Scoping results

| No. | Environmental item | Evaluation | | Reason for evaluation |
|----------------------------|---------------------|---------------------|--------------------|---|
| | | During construction | After construction | |
| Pollution control | | | | |
| 1 | Air quality | ✓ | | <During construction> Dust may occur during construction. <After construction> Since sand deposition is improved, dredging amount and frequency reduced, impacts on air quality are not expected. |
| 2 | Water quality | ✓ | | <During construction> Turbidity in the pond is expected. <After construction> Since sand deposition is improved, dredging amount and frequency reduced, impacts on water quality are not expected. |
| 3 | Waste | ✓ | ✓ | <During and after construction> Generated dredged sand may contain harmful substances. <After construction> Although the frequency and amount of dredging is greatly reduced, dredged sand is generated due to maintenance dredging. |
| 4 | Soil contamination | | | <During and after construction> No soil contamination is expected in this Project since it does not include new work causing soil contamination. |
| 5 | Noise and vibration | ✓ | | <During construction> Noise and vibration are expected by the heavy equipment or trucks. <After construction> Since sand deposition is improved, dredging amount and frequency reduced, noise and vibration are not expected. |
| 6 | Land subsidence | | | <During and after construction> Land subsidence is not expected by the small scale works in this Project. |
| 7 | Odor | | | <During and after construction> No work causing odor is occurring, therefore odor is not generated. |
| 8 | Sediment quality | | | <During and after construction> Heavy metals were not found in this Survey. Impacts in relation to sediment quality are not expected. |
| Natural environment | | | | |
| 9 | Reserve | | | <During and after construction> Impacts are not expected since the Project site is not adjacent to a reserve. |
| 10 | Eco-system | ✓ | | <During construction> Due to the construction and dredging works, impacts on living fish or marine algae may occur. <After construction> Since sand deposition is improved, dredging amount and frequency reduced, impacts on eco-system are not expected. |

| No. | Environmental item | Evaluation | | Reason for evaluation |
|---------------------------|---|---------------------|--------------------|--|
| | | During construction | After construction | |
| 11 | Hydrology | | | <During and after construction> Installation of the submerged breakwater and second groyne temporarily suppress water flow into the fishing port. This is not an adverse effect on hydrology, but rather for the effectivity of sedimentation countermeasures. |
| 12 | Topography and geology | | | <During and after construction> Accumulated sediment at the port entrance is placed at the downdrift side through Sand Bypassing System, allowing a more natural sand movement. |
| Social environment | | | | |
| 13 | Involuntary resettlement and land acquisition | | | <During and after construction> The site plan for Project does not include privately owned land. Involuntary resettlement and land acquisition are not expected. |
| 14 | Vulnerable people | | | <During and after construction> No slums are on the site plan of this Project. Therefore, impacts on vulnerable people are not expected. |
| 15 | Ethnic minorities and indigenous people | | | <During and after construction> As no ethnic minorities and indigenous people are identified on the Project site, no impacts are expected. |
| 16 | Local economy such as employment and sustenance | ✓ | | <During construction> Employment and sustenance may be impacted if fishing activities are interrupted during construction. <After construction> Improvement of the sedimentation at the port entrance contributes to the revitalization of local economy. No impact is expected after construction. |
| 17 | Utilization of land and local resources | ✓ | ✓ | <During construction> Port is temporarily closed so fishery activities are affected. <After construction> Shoreline on the north side of second groyne is expected to advance. |
| 18 | Water utilization | | | <During and after construction> Impacts on water utilization are not expected as there is no work type affecting water utilization. |
| 19 | Existing infrastructure and social services | ✓ | ✓ | <During construction> The port entrance is temporarily closed during the construction period. <After construction> Since sand deposition is improved after construction, impact on existing infrastructure and social services is not expected. |
| 20 | Social capital and organization such as local decision-making agency | | | <During and after construction> This Project improves the existing Choiseul Fishing port. Impacts on social capital and social organization such as local decision-making agency are not expected. |
| 21 | Uneven distribution of damages and benefits/ Deviation of loss and profit | | | <During and after construction> This Project improves the existing Choiseul Fishing port, and does not cause deviation of loss and profit. |
| 22 | Conflict of interest in the area | | | <During and after construction> This Project improves the existing Choiseul Fishing port, without causing |

| No. | Environmental item | Evaluation | | Reason for evaluation |
|---------------|--|---------------------|--------------------|--|
| | | During construction | After construction | |
| | | | | conflict of interest in the area. |
| 23 | Cultural heritage | | | <During and after construction> The world heritage "Piton Management Area" is located on the northern side of the site plan at approximately 3.5km away. Therefore, impacts on cultural heritages are not expected. |
| 24 | Landscape | | | <During and after construction> No structures obstructing the landscape are assumed in this Project. Impacts on landscape are not expected. |
| 25 | Gender | ✓ | | <During construction> It is possible that wage gap may occur between male and female. <After construction> Impacts on gender are not expected. Countermeasure for sedimentation contributes to the revitalization of the local economy and improves the creation of employment opportunities for women. |
| 26 | Children's rights | | | <During and after construction> No school or parks are located at the site plan of this Project, so impacts on children's rights are not expected. |
| 27 | Infection such as HIV/AIDS | ✓ | | <During construction> Probability of COVID-19 infection for on-site workers during the construction. <After construction> Since there is no influx of workers, spread of infectious diseases is not expected. |
| 28 | Labor environment (including labor safety) | ✓ | | <During construction> Accident may occur. <After construction> Since sand deposition is improved, dredging amount and frequency reduced, impacts on labor environment are not expected. |
| Others | | | | |
| 29 | Accident | ✓ | ✓ | <During construction> Due to the increase of traffic by heavy equipment and trucks, traffic accidents may occur around the Project site. <After construction> Since submerged breakwater is not visible, fishing boats may come into collision with it. |
| 30 | Transboundary impact and Climate change | | | <During and after construction> This Project is a small-scale construction at the Choiseul Fishing Project, so transboundary impacts and climate change are not expected. |

1-3-6 TOR of environmental and social considerations survey

In response to the scoping results, environmental and social considerations survey was implemented in accordance with the TOR shown in Table 1-4-6(1) to evaluate potential adverse impacts.

Table 1-3-6(1) TOR of environmental and social considerations survey

| Environmental item | Survey item | TOR |
|---|--|--|
| Air quality | - Applicable standard in air quality (refer to Saint Lucia and other standards) - Site conditions | - Hearing and questionnaire to related agencies and residents - Site survey by subconsultant and analysis of results - Stakeholder meeting |
| Water quality | - Applicable standard in water quality (refer to Saint Lucia and other standards) - Site conditions | - Hearing and questionnaire to related agencies and residents - Site survey by subconsultant and analysis of results - Stakeholder meeting |
| Waste | - Applicable standard on sediment (refer to Saint Lucia and other standards) - Site conditions | - Hearing and questionnaire to related agencies and residents - Site survey by subconsultant and analysis of results |
| Noise and vibration | - Applicable standard on noise and vibration (refer to Saint Lucia and other standards) - Site conditions | - Hearing and questionnaire to related agencies and residents - Site survey by subconsultant and analysis of results |
| Eco-system | - Living fish and marine algae in the site - Rare, endemic and indigenous species living around the site | - Visual survey underwater photography - On-site hearing survey - Survey on past materials |
| Topography and geology | - Utilization of beach - Impact of temporary closure of the port entrance during construction. | - Hearing and questionnaire to residents - Stakeholder meeting |
| Existing infrastructure and social services | - Impact of temporary closure of the port entrance during construction. | - Hearing and questionnaire to residents - Stakeholder meeting |
| Gender | - Existence of gender inequality - Request for Project | - Hearing and questionnaire to fisherfolks and residents |
| Infection such as HIV/AIDS | - Epidemic prevention measures | - Hearing survey - Examination of workers influx by confirming the construction method and period. |
| Labor environment | - Measures for labor environment | - Confirmation of cases |
| Accident | - Confirmation of construction area, methodology and transportation route | - Confirmation of construction methodology, components, period, and transportation route of heavy equipment and trucks |

1-3-7 Results of environmental and social consideration survey

(1) Hearing and questionnaire

1) Hearing and questionnaire to residents

Hearing and questionnaire was conducted to 27 residents living close to the Project site to comprehend ① discomfoting items and causes, ② expectations and concerns on the Project, ③ expectations and concerns on gender aspects, and ④ utilization of Sabwisha Beach which is a potential sand placement area. Survey respondents are composed of 18 male, 8 female and 1 unknown. The ages vary from twenties to seventies. Table 1-3-7(1) shows the results of hearing and questionnaire, and the following points are implied as for ① to ④.

① Discomfoting items and causes

【Noise】

12 out of the 27 residents feel uncomfortable. Most of the residents point out that the noise is generated by young people and passing vehicles playing loud music, rather than attributing it to the sand mining conducted by a local contractor.

【Vibration】

None of the respondents have discomfort regarding vibration. Therefore, it is not a problem for residents.

【Air pollution (generation of dust, etc.)】

4 out of 27 residents feel discomfort. The main cause was the sand mining done by a local contractor.

【Traffic jam】

Nine residents out of the 27 have discomfort. Narrowness of roads, lack of parking lots and high number of vehicles are the causes pointed out.

【Traffic accident】

None of the respondents have discomfort caused by accidents. Occurrence of accidents is not regarded as a problem for residents.

② Expectations and concerns on the Project

【Expectations】

Most of the respondents expect that the resolution of the sedimentation at the port entrance improves fishing activities and catches, as well as reduces damages on fishing boats. In addition, since sand mining has been carried out continuously by a local company, the frequency of dredging decreases after the Project. Some respondents hope that environmental impact is mitigated.

【Concerns】

Only 2 out of the 27 respondents have concerns. Impacts on ecosystem, casting fishing net, and maintenance after the Project implementation are the identified concerns.

③ Expectations and concerns on gender aspects

【Expectations】

1 out of the 27 respondents expect the creation of employment opportunities for women.

④ Utilization of Sabwisha Beach

9 out of the 27 respondents state that the most common use of Sabwisha beach is for walking and swimming. The utilization frequency ranges from once a week to once a year.

Table 1-3-7(1) Results of hearing and questionnaire to local residents

| No | Gender | Age | Items with Discomfort | | | | | Cause | Expectations on Projet Implementation | Concerns on Projet Implementation | Gender aspects | Use of Sabwisha Beach |
|----------------------|--------|-------|-----------------------|-----------|-------------|---------|----------|-------------------------------------|---|--|-------------------------------|--|
| | | | Noise | Vibration | Air quality | Traffic | Accident | | | | | |
| 1 | M | 20-29 | | | | ✓ | | One way street | Solution to fishermen's problem (sedimentation) | | | |
| 2 | M | 40-49 | | | ✓ | | | Dredging works | Reduction of salinity on fish landing facility | Impact on marine ecosystem Impact on netcasting | | |
| 3 | M | 70- | ✓ | | | | | Small size of Choiseul village | Ensuring access, cleanliness in fishing port and longer fishing time | Maintenance | | |
| 4 | M | 60-69 | ✓ | | | | | | Resolution of sedimentation at port entrance | | | |
| 5 | M | 50-59 | | | | ✓ | | Many vehicles & limited parking lot | Solution on sedimentation | | Employment for local resident | |
| 6 | M | 30-39 | | | | ✓ | | Many vehicles | Increased catch | | | |
| 7 | M | 40-49 | | | | ✓ | | Narrow road | Solution on sedimentation | | | |
| 8 | M | 20-29 | | | | ✓ | | Parking | Reduction of enviromental impact by reducing dredging frequency | | | |
| 9 | M | 20-29 | ✓ | | | | | Cars & loud music | Reduction of fishing vessels damage | | | |
| 10 | M | 40-49 | ✓ | | | | | People | Solution to fishermen's problem (sedimentation) | | | Walking once a week |
| 11 | M | 50-59 | ✓ | | | | | People | Employment | | | Swimming once a week |
| 12 | M | 50-59 | ✓ | | | | | | Increased fishing frequency | | | Recreational use once a year |
| 13 | M | 50-59 | | | | ✓ | | | | | | |
| 14 | M | 30-39 | | | | | | | | | | |
| 15 | M | 50-59 | | | | | | | Increased catch | | | Once every 3 months |
| 16 | M | 70- | | | ✓ | | | Car traffic | | | | Swimming once a week |
| 17 | M | 70- | | | | ✓ | | Car traffic | | | | |
| 18 | M | 30-39 | | | ✓ | | | | Increased catch | | | |
| 19 | F | 40-49 | ✓ | | | | | | | | | Walking & swimming once every 6 months |
| 20 | F | 50-59 | ✓ | | | | | | Smooth navigation at port entrance | | | |
| 21 | F | 60-69 | ✓ | | | | | Loud music from young people | Reduction of fishing vessels damage Smooth navigation at port entrance | | | |
| 22 | F | 40-49 | ✓ | | | | | Loud music form cars | Benefit fishermen | | | |
| 23 | F | 60-69 | | | | ✓ | | Many vehicles | Smooth navigation at port entrance | | | |
| 24 | F | 30-39 | ✓ | | | | | Loud music | Increasing number of fishing vessels | | | Swimming once a week |
| 25 | F | 60-69 | | | | ✓ | | Cars and buses | Resolution of issues | | | |
| 26 | F | 60-69 | ✓ | | ✓ | | | | Constant flow of water | | | Walking once every 3 months |
| 27 | M | 40-49 | | | | | | | Expansion of fishing port, improvement of water depth | | | Residing nearby, usage once a week |
| Total (27 residents) | | | 12 | 0 | 4 | 9 | 0 | | | | | |
| Ratio | | | 44.4% | 0.0% | 14.8% | 33.3% | 0.0% | | | | | |

2) Hearing and questionnaire to fisherfolks

Hearing and questionnaire to fishery-related people in Choiseul fishing port are conducted to grasp ① current adverse effects on fishing activities, ② expectations / concerns during Project implementation, ③ expectations / concerns after Project implementation, and ④ fish waste disposal method.

In addition to fisherfolks, the 24 respondents of the survey are also comprised of fishery-related people engaged as buyers, processing, and sales. Since mostly men are directly engaged in the fishing industry, all 24 respondents are men. The age ranges from 20s to 70s. The results of interviews and questionnaire surveys are summarized in Table 1-3-7(2) The following summarizes point ① to ④.

① Current adverse effects on fishing activities

Sand mining was continuously carried out by a local company prior to the first site survey. As a result, 9 out of 24 respondents said that there were adverse effects on water quality (transparency) and lobster cages kept at the fishing port. In addition, sedimentation at the port entrance became a burden for fisherfolks due to the damages on fishing boats and irregularity of fishing activities caused by the shallow water depth.

② Expectations / concerns during Project implementation

Many respondents are concerned about the impact of the temporary closure of the port entrance on fishing activities during the construction. Therefore, it is necessary to take a mitigation measure so that fishing activities are continuously carried out.

③ Expectations / concerns after Project implementation

Most respondents expect improvement on the sedimentation at the port entrance as well as reduction of damages on fishing boats, and therefore maintenance costs. In addition, other respondents hope for nourishment of eroded beach at the northern side of the fishing port. Nevertheless, no past materials have confirmed the existence of a beach on the northern side before the construction of the Choiseul fishing port in 2003.

④ Fish waste disposal method

Only 3 out of the 24 respondents state that fish waste (guts, internal organs, scales...) are used as livestock feed. The other respondents dispose such waste directly at sea or in the fishing port. Concern on water quality deterioration in the fishing port have been raised. It turns out that fish waste is dumped into the fishing port. During the construction period, attention is necessarily given to minimizing the impact on water quality, and it is necessary to ensure that waste is not dumped into the fishing port.

Table 1-3-7(2) Results of hearing and questionnaire to fisherfolks

| No | Gender | Age | Occupation | Current negative impacts on fishery activities | | During Project Implementation | | After Project Implementation | | Fish Garbage Disposal (Guts, Internal organs, scales...) |
|----|--------|-------|--|--|--|---|--|---|------------------------------------|--|
| | | | | Item | Description (if any) | Expected effects | Concerns | Expected Effects | Concerns | Disposal method |
| 1 | M | 50-59 | fisherfolk, fish buyer, processor&seller | Water quality | Impact on lobster cages due to water deterioration | Cooperation | Appropriate water depth at the fishing port | Smooth access of fishing vessels | | Feeding Animal, Throwing at Sea |
| | | | | Damages on fishing vessels | Paint and engine are damaged due to shallow water | | | | | |
| 2 | M | 40-49 | fisherfolk | | | | | | | Throwing at Sea |
| 3 | M | 70- | fisherfolk | Fishing vessel landing | | | Displacement of Boats | Smooth access and safe navigation | | Throwing at Choiseul Port |
| 4 | M | 30-39 | fisherfolk | | | | | Elimination of sedimentation problem | | Throwing at Sea |
| 5 | M | 50-59 | fish buyer, processor&seller | Water quality | Impact on lobster cages | | Noise | Solution on Fish Disposal Method | | Throwing at Choiseul Port |
| | | | | Impact on livelihood | Irregularity of fishing activities | | Damage to the road & parking lots Pollution | Better access and parking | | |
| 6 | M | 50-59 | fisherfolk | Drainage | Impact on drainage flowing into the sea | | Impact on ecosystem Beach erosion | Beach renourishment on the north side of the fishing port | | Throwing at Sea |
| | | | | Coastal Erosion | Beach erosion on the north side of the fishing port | | | | | |
| 7 | M | 30-39 | fisherfolk, fish buyer, processor&seller | Fisherins activities | Docking and fish loading | | | | | |
| 8 | M | 20-29 | fisherfolk, fishery cooperatives | | | | | | | |
| 9 | M | 50-59 | fisherfolk | | | | | | | Throwing at Sea, Throwing at Choiseul Port |
| 10 | M | 60-69 | fisherfolk | | | | | Effectively solve sedimentation problem | | Throwing at Choiseul Port |
| 11 | M | 40-49 | fisherfolk | Water quality | Impact on turbidity | | Safety of fishing vessels Inconvenience in refueling (temporary closure of port entrance) | Effectively solve sedimentation problem | | Throwing at Sea, Throwing at Choiseul Port |
| 12 | M | 50-59 | fisherfolk | | | Prompt resumption of construction works | | Improvement of port entrance | | Throwing at Sea |
| 13 | M | 40-49 | fisherfolk | | | | | Effectively solve sedimentation problem | | Feeding Animal |
| 14 | M | 30-39 | fisherfolk | Water quality | | | | Effectively solve sedimentation problem | | Feeding Animal, Throwing at Sea |
| 15 | M | 50-59 | fisherfolk | | | | | Effectively solve sedimentation problem | | Throwing at Sea, Throwing at Choiseul Port |
| 16 | M | 40-49 | fisherfolk | | | | | | | Feeding Animal, Throwing at Sea |
| 17 | M | 30-39 | fisherfolk | | | | | Reduction of fishing vessels maintenance costs | | Throwing at Sea, Throwing at Choiseul Port |
| 18 | M | 60-69 | fisherfolk | Sedimentation | | | Traffic congestion | Smooth access and safe navigation | | Throwing at Sea, Throwing at Choiseul Port |
| 19 | M | 20-29 | fisherfolk | | | | Access to gas station | | | |
| | | | | | | | Boat circulation in the fishing port) | | | Throwing at Sea, Throwing at Choiseul Port |
| 20 | M | 20-29 | fisherfolk | | | | Construction period (time required) | | | |
| | | | | Water quality | Poor visibility | | Access to the fishing port | Effectively solve sedimentation problem | | Throwing at Sea, Throwing at Choiseul Port |
| 21 | M | 40-49 | fisherfolk | Water quality | Smell from accumulated water | | Access to the fishing port | Effectively solve sedimentation problem | Sedimentation at the port entrance | Feeding Animal, Throwing at Choiseul Port |
| | | | | Safety | Fishing vessels safety | | Environmental impact on seabed | | | |
| | | | | Sedimentation | | | | | | |
| 22 | M | 50-59 | fisherfolk | | | | Fishing port access (closed entrance) | | | |
| | | | | Water quality | Green color of seawater in fishing port Inability to see the seabed | | Safety of lobster cages Safety of fishing vessels and engines | | Sedimentation at the port entrance | Throwing at Sea |
| 23 | M | 50-59 | fisherfolk | | | | Safety of fishing vessels | | | |
| | | | | | | | Fishing port access | | | Feeding Animal |
| 24 | M | 50-59 | fisherfolk | | | | Impact on fishing activity | | | |
| | | | | Water quality | Smell, inability to see the seabed | | Fishing port access Safety of fishing vessels | Effectively solve sedimentation problem | | Feeding Animal |

3) Interview with SLASPA

The Saint Lucia Air and Sea Ports Authority (SLASPA) is a subordinate authority of the Ministry of Infrastructure managing airports such as Georges F.L. Charles Airport and ports such as Castries Port and Port Vieux Fort.

An interview was conducted with Mr. Wilbur Etienne and Mr. Kerwin John from SLASPA on October 21, 2021 during the first site survey. It was advised that beacon lights should be installed at the tips of the submerged breakwater and the second groyne to ensure safe navigation of fishing boats after the construction of the submerged breakwater and the second groyne.

1-3-8 Impact assessment

Impact assessment after the survey on environmental and social considerations is shown in Table 1-3-8(1).

Table 1-3-8(1) Results of impact assessment

| No. | Item | Scoping | | Monitoring | | Evaluation |
|-----------------------------|------------------------|--------------|-----------|--------------|-------------|--|
| | | Construction | Operation | Construction | Supervision | |
| Control of Pollution | | | | | | |
| 1 | Air pollution | ✓ | | B- | D | <During construction> Gas and dust are emitted due to the construction vehicles and dredging work. <After completion> No impact on the atmosphere is expected. |
| 2 | Water pollution | ✓ | | B- | B- | <During construction> Turbidity occurrence is expected in the fishing port due to the dredging work. <After completion> Concern of water quality deterioration due to the dumping of fish waste into the fishing port. |
| 3 | Waste | ✓ | ✓ | D | D | <During construction > As a result of the sediment survey, no harmful substances are detected. In addition, dredged sand is not considered as waste because sediment is transported based on the concept of sand bypassing system. <After completion> Dredged sand generated by maintenance dredging in the future are not considered as waste based on the concept of sand bypassing system. |
| 4 | Soil contamination | | | | | <During construction & After completion> No soil contamination is expected in this Project. |
| 5 | Noise/ Vibration | ✓ | | B- | | <During construction> Noise and vibration from heavy equipment and trucks transporting dredged sand are expected due to the construction work. <After completion> No noise or vibration is expected. |
| 6 | Land subsidence | | | | | <During construction & After completion> Facilities constructed in this Project are small and no land subsidence is expected. |
| 7 | Offensive odor | | | | | <During construction & After completion> No odor is expected in this Project. |
| 8 | Sediment | | | | | <During construction & After completion> Heavy metals on bottom sediment pollution are not used in this Project, and no impact on sediment is expected. |
| Natural Environment | | | | | | |
| 9 | Natural reserve | | | | | <During construction & After completion> The Project site is not adjacent to natural reserve and no impact is expected. |
| 10 | Ecosystem | ✓ | | D | | <During construction> As a result of site survey, no rare species were confirmed around the Project site. No impact on the ecosystem is expected. <After completion> No impact on the ecosystem is expected. |
| 11 | Hydrology | | | | | <During construction & After completion> No impact on hydrology is expected for this Project. |
| 12 | Topography/ Geology | | | | | <During construction & After completion> No impact is expected. |
| Social environment | | | | | | |

| No. | Item | Scoping | | Monitoring | | Evaluation |
|-----|--|--------------|-----------|--------------|-------------|--|
| | | Construction | Operation | Construction | Supervision | |
| 13 | Involuntary resettlement/land acquisition | | | | | <During construction & After completion> Involuntary resettlement of residents and land acquisition are not expected in this Project. |
| 14 | Vulnerable people | | | | | <During construction & After completion> Adverse effect on vulnerable people is not anticipated by the implementation of this Project. |
| 15 | Minorities and indigenous people | | | | | <During construction & After completion> There is no impact on minorities and indigenous people by this Project. |
| 16 | Local economy such as employment and livelihood | ✓ | | D | | <During construction> Impacts on local economy such as employment and livelihood are mitigated during the temporary closure of the port entrance due to construction of submerged breakwater. < After completion> Resolution of sedimentation problem improves fishing opportunities. No impact is expected. |
| 17 | Land use and local resource utilization | ✓ | ✓ | B- | D | <During construction> Fishing activities are affected due the temporary closure of the port entrance during submerged breakwater construction. Impacts are minimized by mitigation measures. <After completion> The shoreline on the north side of the second groyne advances, and a new recreational space is formed. There is no negative impact. |
| 18 | Water utilization | | | | | <During construction & After completion> No adverse impact is expected for this Project. |
| 19 | Existing social infrastructure and social service | ✓ | | B- | | <During construction > Due to the temporary closure of the port entrance during the construction of the submerged breakwater, fishing activities are impacted. Impacts are minimized by mitigation measures. <After completion> This Project is not expected to affect existing social infrastructure or social services. |
| 20 | Social organization like social capital and local decision-making body | | | | | <During construction & After completion> This Project is not expected to affect social organizations such as social capital and local decision-making bodies. |
| 21 | Uneven distribution of damages and benefits | | | | | <During construction & After completion> No adverse impact is expected for this Project. |
| 22 | Conflict of interest in the area | | | | | <During construction & After completion> No adverse impact is expected for this Project. |
| 23 | Cultural heritages | | | | | <During construction & After completion> No adverse impact is expected for this Project. |
| 24 | Landscape | | | | | <During construction & After completion> No adverse impact is expected for this Project. |
| 25 | Gender | ✓ | | B- | | <During construction> Possibility of wage gap between men and women is expected. <After completion> No gender impact is expected after the construction. Rather, it may lead to |

| No. | Item | Scoping | | Monitoring | | Evaluation |
|---------------|--|--------------|-----------|--------------|-------------|---|
| | | Construction | Operation | Construction | Supervision | |
| | | | | | | employment opportunities for women in nearby restaurants. |
| 26 | Children's right | | | | | <During construction & After completion> No adverse impact is expected for this Project. |
| 27 | Infectious disease such as HIV/AIDS | ✓ | | B- | | <During construction> Probability of COVID-19 infection for on-site workers during the construction. Since the construction scale is small and on a short period, no large influx of workers is expected. No impact from infectious disease such as HIV/AIDS is expected. <After construction> Since there is no influx of workers, spread of infectious diseases is not expected. |
| 28 | Working environment (including labor safety) | ✓ | | B- | | <During construction> Accidents may occur during the construction period. <After completion> No adverse impact is expected after the construction. |
| Others | | | | | | |
| 29 | Accident | ✓ | ✓ | B- | B- | <During construction> Accidents may occur on surrounding roads due to increased traffic from heavy equipment and circulating trucks. <After completion> Since the submerged breakwater cannot be seen from the sea, accidents such as collision of fishing boats may occur. |
| 30 | Transboundary impact and climate change | | | | | <During construction & After completion> No adverse impact is expected for this Project. |

A +/-: Serious impact expected

B +/-: Non-serious but expected to have an impact

C: The extent of the impact is unknown

D: No impact expected

1-3-9 Mitigation measures and costs of implementation

(1) Mitigation measures

Table 1-3-9(1) below shows mitigation measures for environmental items expected to have a negative impact on this Project.

Table 1-3-9(1) Mitigation measures

| Environmental items | Evaluation | Adverse impact | Mitigation measures |
|---|------------|---|---|
| Air pollution | B- | Generation of dust | <p>【During construction】</p> <p>(1) Control of dust by regular watering (2) Stop heavy equipment engine outside the working hours</p> |
| Water pollution | B- | Water pollution from turbidity caused by facility construction, dredging, and dumping of fish waste into the fishing port | <p>【During construction】</p> <p>(1) Construction mitigating the occurrence of turbidity as much as possible</p> <p>【After construction】</p> <p>(1) No disposal of fish waste into the fishing port by local residents and fisherfolks</p> |
| Noise and vibration | B- | Noise and vibration generated by the use of heavy equipment and construction vehicles during the construction period | <p>【After construction/ operation】</p> <p>(1) Operate engine of heavy equipment only during construction hours (2) Do not carry out construction at night (3) Traffic deceleration of construction equipment near residential area.</p> |
| Land use and local resource utilization | B- | Temporary closure of the port entrance during construction | <p>【During construction】</p> <p>(1) Installation of a temporary quay for mooring and landing fishing boats</p> |
| Existing social infrastructure and social service | B- | Temporary closure of the port entrance during construction | <p>【During construction】</p> <p>(1) Installation of a temporary quay for mooring and landing fishing boats</p> |
| Gender | B- | Wage gap between men and women during construction | <p>【During construction】</p> <p>(1) Specify gender equality wage in advance in the specifications of the contractor's bid.</p> |
| Infectious disease such as HIV/AIDS | B- | COVID-19 infection for workers | <p>【During construction】</p> <p>(1) Thoroughly implement epidemic prevention measures such as wearing masks and disinfecting.</p> |
| Working environment | B- | Accident for construction workers | <p>【During construction】</p> <p>(1) Enlightenment of safety awareness through safety education for construction workers. (2) Installation of warning signs</p> |
| Accident | B- | Traffic accidents around the site and fishing boat with the submerged breakwater | <p>【During construction】</p> <p>(1) Appointment of traffic control staff on the surrounding roads (2) Installation of beacon lights on the submerged breakwater and the second groyne (3) Reparation of existing beacon lights.</p> <p>【After construction】</p> <p>(1) Operative 4 beacon lights.</p> |

Since the scale of construction work in this Project is rather small, it is expected that adverse impacts on the environment are minimum as well. However, to minimize impacts on air and water

quality, construction considerations are taken to limit the generation of dust by sprinkling water and to abate the diffusion of turbidity.

During the construction period, the port entrance is temporarily closed, so it is impossible to moor or land in the fishing port. Therefore, impact on fishing activities is mitigated by installing a temporary quay in the vicinity.

In addition, traffic of heavy equipment and construction vehicles are expected during the construction period. Since roads around the site are narrow with many curves, traffic control personnel are assigned to areas that are considered dangerous to prevent traffic accidents.

The navigation channel is curved due to the construction of the submerged breakwater and the second groyne. Furthermore, since the submerged breakwater is a structure below the sea surface, it cannot be seen from sea. Therefore, new beacon lights are installed on submerged breakwater and second groyne. Existing beacon lights are repaired to prevent accidents for fishing boats.

The image of mitigation measures is organized in Figure 1-3-9(1).



Figure 1-3-9(1) Image of mitigation measures

(2) Responsible authority and executing agency for mitigation measures and costs

Following Table 1-3-9(2) shows the environmental mitigation measures, responsible organizations, implementing agencies, and costs in this Project.

Table 1-3-9(2) Costs for mitigation measures implementation

| Environmental Items | Influence degree | Mitigation measures | Responsible agency | Executing agency | Cost |
|--|--|---|--------------------|------------------|-------------------------------|
| At the time of planning and during construction | | | | | |
| Air pollution | Generation of dust | (1) Regular watering | DoF | Contractor | Included in construction cost |
| | | (2) Stop equipment and engine outside of working hours | DoF | Contractor | No cost incurrence |
| Water pollution | Occurrence of turbidity due to construction and dredging | (1) Construction limiting the occurrence of turbidity (silt fence, work at low tide, etc.) | DoF | Contractor | Included in construction cost |
| Noise and vibration | Noise and vibration generated by heavy equipment and construction vehicles | (1) Stop engine of heavy equipment outside of working hours | DoF | Contractor | No cost incurrence |
| | | (2) Do not carry out night construction | DoF | Contractor | No cost incurrence |
| Land use and local resource utilization | Temporary closure of the port entrance during construction | (1) Installation of a temporary quay during the construction period | DoF | Contractor | Included in construction cost |
| Existing social infrastructure and services | | | | | |
| Gender | Wage gap between male and female construction workers | (1) Gender equality wages are specified in the bid document to the contractor | DoF | DoF | No cost incurrence |
| Infectious disease such as HIV/AIDS | COVID-19 infection for workers | (1) Thorough implementation of epidemic prevention measures such as wearing masks and disinfecting. | DoF | Contractor | Included in construction cost |
| Working environment | Accidents occurring on construction workers | (1) Awareness raising through safety education | DoF | Contractor | No cost incurrence |
| | | (2) Installation of a warning sign | DoF | Contractor | No cost incurrence |
| | | (3) Epidemic prevention measures in the workplace | DoF | Contractor | Included in construction cost |
| Accident | Traffic accident around the site | (1) Appointment of traffic control staff | DoF | Contractor | Included in construction cost |
| | Accident with the submerged breakwater | (1) Beacon light installation on the submerged breakwater and the second groyne | DoF | Contractor | Included in construction cost |
| | | (2) Reparation of existing beacon lights | DoF | Contractor | Included in construction cost |
| After construction | | | | | |
| Water pollution | Water pollution due to dumping of fish waste | (1) Prevent dumping waste in the fishing port by fisherfolks and residents (waste | DoF | DoF | No cost incurrence |

| Environmental Items | Influence degree | Mitigation measures | Responsible agency | Executing agency | Cost |
|---------------------|-----------------------|--|--------------------|------------------|------|
| | into the fishing port | disposal has been banned, trash boxes are installed, and trash is collected twice a week. These conditions are promoted and continued) | | | |

1-3-10 Environmental monitoring plan (implementation system, method, cost, etc.)

In this Survey, works including dredging at port entrance, construction of rubble mound as a temporary access road and transport of rubble stones were carried out. as to some environmental items, measurement was conducted before and in the middle of the works. Content of the works is similar to the construction to take place in the Project. Therefore, the necessity of environmental monitoring is judged by comparing the results of environmental items obtained before and during the works. Table 1-3-10 (1) summarized the basic concept for judging necessity of environmental monitoring.

For environmental items without measured data during the dredging period, the necessity of environmental monitoring is determined by comprehensively considering the measurement data before the work, the construction scale and type of work in this Project.

Table 1-3-10 (1) Basic concept of necessity judgement of monitoring items

| | Before dredging in this survey | During dredging in this survey | Necessity of environmental monitoring |
|---|--------------------------------|--|---|
| Comparison of environmental items and standard values | Within the standard value | Within the standard value | Monitoring not carried out since there is no impact from this Project. |
| | Within the standard value | Exceeding the standard value | Monitoring carried out during the construction period due to the impact from this Project. |
| | Within the standard value | Survey not conducted | Consideration of the measured values before dredging and in proportion of the construction scale. |
| | Exceeding the standard value | Survey not conducted | Assessment is made by comprehensively considering the degree of impact of this Project. |
| | Exceeding the standard value | Exceeding the standard value | Monitoring not carried out since the cause is considered to be other than this Project. |
| | Exceeding the standard value | Significantly exceeding the standard value | Monitoring carried out due to the significant impact on the environment. |

Table 1-3-10 (2) indicates the survey results of environmental conditions and comparison with standard values. Refer to the Environmental Conditions section of this report for more information on environmental conditions results.

Table 1-3-10(2) Comparison between environmental survey results and standards

| Environment Item | Survey Item | Measured value (*1) | | Standard Value (*2) | Unit | Reference Criteria | Remark and Comments |
|--------------------------|---|---------------------|-----------------|--------------------------------|-----------|---|---|
| | | Outside dredging | During Dredging | | | | |
| Sediment Quality | Mercury or its compounds | <0.05 | - | 0.13 | µg/g | Ministry of Environment-Canada | No issue is confirmed |
| | Cadmium or its compound | <0.05 | - | 0.68 | | Ministry of Environment-Canada | |
| | Lead or its compound | 4.6 | - | 30.2 | | Ministry of Environment-Canada | |
| | Arsenic or its compound | 7.6 | - | 8.2 | | National Oceanic and Atmospheric Administration USA | |
| | PCB | <0.3 | - | 34.1 | | Sediment Standard of Hong Kong | |
| | Organophosphorus compound / Organochlorine compounds/ organic chlorine compound | / | / | / | | / | |
| | Chlordane (Total) | <0.05 | - | 4.5 | | Sediment Standard of Hong Kong | |
| | DDD | <0.05 | - | 3.54 | | Sediment Standard of Hong Kong | |
| | DDE | <0.05 | - | 1.42 | | Sediment Standard of Hong Kong | |
| | DDT | <0.05 | - | 7 | | Sediment Standard of Hong Kong | |
| | Dieldrin | <0.05 | - | 2.85 | | Sediment Standard of Hong Kong | |
| | Endrin | <0.05 | - | 2.67 | | Sediment Standard of Hong Kong | |
| | Heptachlor | <0.05 | - | 0.6 | | Sediment Standard of Hong Kong | |
| | Copper or its compound | 8.4 | - | 18.7 | | Ministry of Environment-Canada | |
| | Zinc or its compound | 31 | - | 124 | | Ministry of Environment-Canada | |
| Chromium or its compound | 12 | - | 52.3 | Ministry of Environment-Canada | | | |
| Nickel or its compound | 3.3 | - | 15.9 | Ministry of Environment-Canada | | | |
| Water Quality | SS (*3) | 59 | 85 | 2(artificial) | mg/L | Japan | Monitoring is required due to measured value exceeding the standard value during dredging. |
| | COD | 4 | - | <8 | | | Implement monitoring due to confirmation of concerns during stakeholder meeting. |
| | Coliform bacilli | 6,000 | 7,400 | 1,000 | CFU/100mL | WHO | Implement monitoring due to confirmation of concerns during stakeholder meeting. |
| | Transparency (*3) | 7.72 | 14 | - | NTU | - | Implement monitoring in regard to transparency |
| | Total Phosphorous | <0.03 | 3.9 | 20 | mg/L | WHO | No issue is confirmed |
| Air quality | SO2 | 344.31 | - | 40 | µg/m3 | WHO | Cause of exceeding measured value outside of dredging period is not directly related to the Project. Lumberjack related works may impact on the slightly exceeding PM2.5 measured value . Confirm by monitoring that the mitigation measures are properly implemented. |
| | NO2 | 226.62 | - | 25 | | | |
| | PM2.5 | 17.79 | - | 15 | | | |
| | PM10 | 31.35 | - | 45 | | | |
| Noise and Vibration | Noise | 66.4 | 79.5 | 70 | Leq(A)dB | WHO | Monitoring is required due to measured value exceeding the standard value during dredging. |
| | Vibration | <0.15 | <0.15 | 5.41 | mm/sec | ISO | No issue is confirmed |

- (*1) Enter the highest measured value if measured in multiple survey points
(*2) Enter the strictest reference value if referene to multiple reference values
(*3) Describe the largest difference of result in the survey points during and outside dredging

[Air]

Regarding NO2 and SO2, standard values are significantly exceeding even before the dredging was carried out. No direct causal relationship with this Project is identified since it is due to volcanic activity in the vicinity and traffic. PM2.5 and PM10 are basically below the standard value. Although the impact extent is not expected to be large, dust may be generated during the construction. Mitigation measures such as regular watering and stopping engine of heavy equipment outside the working hours are adopted. Proper implementation of mitigation measures is confirmed by monitoring during the construction.

[Water quality]

As a result of the site survey, no significant problems were confirmed. Concerns on turbidity in the fishing port were confirmed through stakeholder discussions, etc. Turbidity is subject to monitoring. During the construction period, there are concerns mainly about the effects of turbidity. However, the frequency of dredging is reduced after operation and during the environmental monitoring period. On the other hand, from hearing result with fisherfolks, there is a concern on deterioration of water quality due to fish waste disposal into the fishing port. Therefore, turbidity occurs during the construction period, and environmental monitoring is carried out assuming the environmental monitoring period and the dumping of waste in the

fishing port after the operation.

[Sediment]

As a result of the site survey, neither heavy metals nor persistent organic pollutants were detected from the sediment in Choiseul fishing port. In addition, heavy metals which possibly cause sediment pollution are not used in this Project. Since no new pollution is expected to occur, environmental monitoring is therefore unnecessary.

[Noise and vibration]

The noise level has temporarily exceeded the standard value during the dredging period. However, it is below 85 Leq (A) dB, which does not have a particularly adverse effect on the human body. In addition, it is not continuous noise, but intermittent noise due to the traffic of vehicles, etc. Degree of influence is not large. However, since the measurement performed during the dredging period temporarily exceeded the standard value, monitoring is carried out during the construction period. Vibrations were extremely small compared to the reference values in both surveys conducted before and during the dredging. Therefore, environmental monitoring is unnecessary.

Environmental monitoring plan is divided into two stages: the main construction work and minor improvement work during the monitoring period, and the Project completion. The monitoring plan for this Project is shown in Table 1-3-10 (2).

Table 1-3-10 (3) Monitoring plan

| Environmental Item | Monitoring item | Survey point | Frequency | Responsible agency | Executing agency | Note |
|--|--|---|---|--------------------|------------------|---|
| During main construction and minor improvement work (during monitoring period) | | | | | | |
| Air quality | Implementation status of mitigation measures | Inside the fishing port | As required | DoF | Contractor | Mitigation measures: (1) Regular watering (2) Stop engine of heavy machinery outside of working hours |
| Water quality | COD | Two locations inside the fishing port | Twice during the main construction (one time during the minor improvement work) | DoF | Contractor | Cost is included in construction cost |
| | Understanding turbidity (transparency, SS) | Two locations inside and outside the fishing port | Twice during the main construction (one time during the minor improvement work) | DoF | Contractor | |
| Noise | - | Two locations around the site | Twice a day | DoF | Contractor | Survey points: entrance and exit of fishing port, rear main roads Frequency: twice a day (one in the morning and one in the afternoon during the construction) |
| After construction (after Project completion) | | | | | | |
| Water quality | COD | Two locations inside the fishing port | Once/ 3 years | DoF | DoF | Cost: Approximately USD500/time |
| | Escherichia coli bacterium | Two locations inside the fishing port | Once/ 3 years | DoF | DoF | |

Figure 1-3-10 (1) shows the implementation system for environmental monitoring.

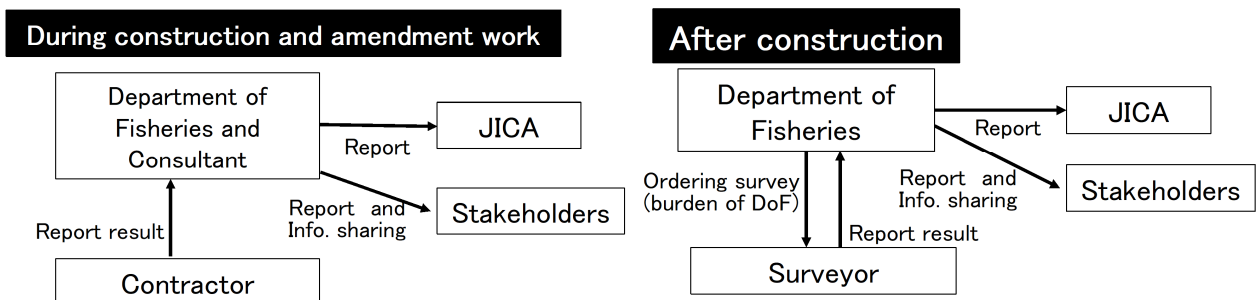


Figure 1-3-10 (1) Environmental monitoring implementation system

1-3-11 Stakeholder meeting

(1) Stakeholder meeting during the first field survey

Stakeholder meeting was held on October 5, 2021 during the first field survey. Details are shown in Table 1-3-11 (1).

Table 1-3-11 (1) Details of stakeholder meeting (October 5, 2021)

| | |
|-----------------------|---|
| Date | October 5, 2021 from 10:30 to 12:50 |
| Location | In Choiseul fishing port |
| Implementation Method | Face-to-face (Presentation and discussion style) |
| Participants | Number: a total of 16 people (DoF, Management office of Choiseul Fishing port, residents, fisherfolk and local police officer) Gender: 10 men and 6 women |
| Notification method | Posters in English language announcing the implementation of stakeholder meeting were displayed in Choiseul fishing port. |
| Language | English (official language in Saint Lucia) |
| Objective | Informing participants on the Project content, expected construction procedure and period, etc., as well as understanding concerns regarding environmental and social considerations. |

Concerns about impact on net casting, lobster cages installed in fishing ports regarding water quality and other local environmental issues (dust, noise, traffic, etc.) occurred. Nevertheless, cooperation on the Project implementation were confirmed. No opinion against the Project has been raised. Collected opinions are as follows.

<Opinion on fishing activities>

- One fisherfolk is engaged in net casting on the northern side of Choiseul fishing port. It was confirmed that fisherfolks expect improvement of sedimentation at the port entrance, and no impact on net casting activities.
- As shown in Photo 1-3-11(1), lobster cages are installed in a corner of the fishing port. If the construction causes turbidity, concern on the lobster cages raises. Nevertheless, it was confirmed during the meeting that the fisherfolks would cooperate with the Project and move the lobster cages during the Project implementation.



Photo 1-3-11(1) Lobster cage in Choiseul fishing port

<Opinion on water quality and hygiene>

- A concern on water quality deterioration by disposing fish scales and internal organs generated at the fish handling area into the fishing port has been raised. According to the port manager, disposal into the fishing port is currently prohibited. Fish garbage is used as livestock feed such as for pigs. In addition, as shown in Photo 1-4-11(2), trash bins are installed in several places in the fishing port, and collection is carried out twice a week (every Monday and Thursday).

(As mentioned above, according to questionnaire survey to fisherfolks, it seems that the dumping of fish garbage into the fishing port is still ongoing.)



Photo 1-3-11(2) Garbage bin and garbage truck in Choiseul fishing port

<Opinion on coastal environment>

- Dredged sand should not be sold and used for inland construction, but for eroded beach.

<Opinion on local environment consideration>

- Since the Choiseul area is a small community, generation of dust and noise when transporting dredged sand and construction materials and equipment is hopefully minimized.
- Since the surrounding roads are narrow, traffic management and safety consideration are important.

<Opinion on gender and minority>

- In some cases, restaurants nearby the Choiseul fishing port were closed due to low catches and insufficient fish supply. Those restaurants provided women with employment opportunity. It is expected that the Project improves catches. So, restaurants are reopened and eventually women employment is improved.
- Hopefully accessibility to the fishing port for disabled people such as those using wheelchairs are secured.

(2) Stakeholder meeting during the second field survey

Stakeholder meeting was held on May 18, 2022 during the second field survey. Details are shown in below Table 1-3-11 (2).

Table 1-3-11 (2) Details of stakeholder meeting (May 18, 2022)

| | |
|-----------------------|---|
| Date | May 18, 2022 from 16:00 to 17:45 |
| Location | In Choiseul fishing port |
| Implementation Method | Face-to-face (Presentation and discussion style) |
| Participants | Number: a total of 19 people (DoF, Management office of Choiseul Fishing port, fisherfolk and local contractors) Gender: 15 men and 4 women |
| Notification method | Posters in English language announcing the implementation of stakeholder meeting were displayed in Choiseul fishing port. (See Photo 1-3-11(3)) |
| Language | English (official language in Saint Lucia) |
| Objective | Informing participants on the second dredging, Project implementation schedule and mitigation measures for environmental impacts, and obtaining consensus from participants |

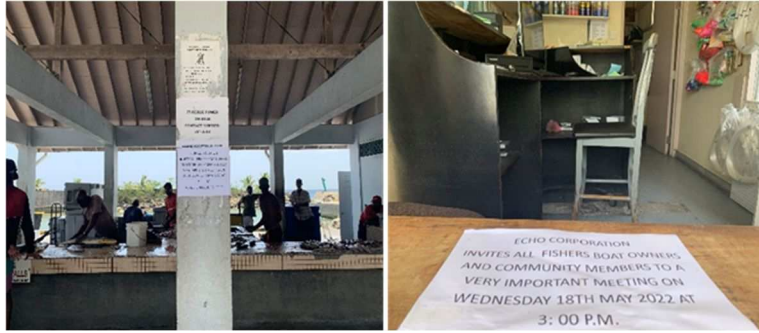


Photo 1-3-11(3) Posters for stakeholder meeting within Choiseul fishing port

It was announced by the manager of Choiseul fishing port that first dredging as a short-term countermeasure went well and sand deposition amount decreased thanks to construction of the rubble mound. Then, Survey Team explained plan of second dredging, contents and schedule of the Project, and mitigation measures against adverse environmental impacts.

Opinions from the stakeholder meeting during the second site survey are summarized as follows. Understanding was obtained for related matters.

<Implementation of regular stakeholder meeting>

- Hopefully stakeholder meeting is held regularly before commencement of the Project to share the progress and expected schedule. In response, regular information sharing is conducted by the DoF

<Scale of temporary quay>

- A question about the mooring capacity of the temporary quay was state, and it was understood that mooring space for fishing boats is enough when fishing boats are vertically moored in two alignments.

<Security measures>

- Concern on security such as theft was stated assuming mooring outside the port. DoF and management office of Choiseul fishing port therefore implement measures such as the installation of surveillance cameras and lights.

<Use of larger fishing boats in the future>

- It was understood that the plan of this Project only considers present fishing boat size.

1-3-12 Others (global issues)

According to Saint Lucia's Sectoral Adaptation Strategy and Action Plan (Fisheries SASAP) 2018 – 2028, most of the fisherfolks who are engaged in the offshore fishing are male. Therefore, fishing is the main source of income for men presently.

After completion of second groyne, as shown in Figure 1-3-12(1), new beach is created on the northern side. This beach expectedly functions as a community space for fisherfolks and people in hinterland, and recreational space for nearby residents. In other words, the value of Choiseul fishing port is improved through utilization of the new beach.

More specifically, efficient fishery activities increase the catch, commercial activities are revitalized and new employment opportunities are created (stores, restaurants, stands like “fish-on-Friday”). Women's empowerment in several aspects, such as creation of additional value by fish processing and sales are expected.

Settlement of sedimentation at port entrance is achieved through this Project. Contributions to productivity improvement and revitalization of social economic activity as well as collaterally gender inequality is improved.

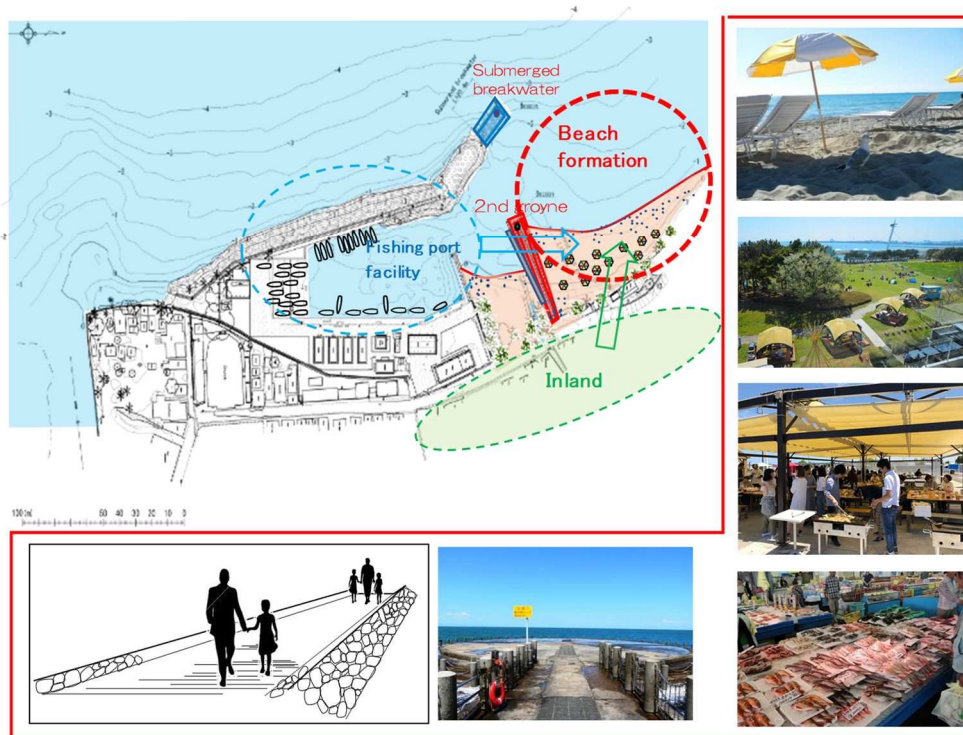


Figure 1-3-12(1) Examples of employment opportunities creation after Project

Chapter-2 Short-term countermeasure

Chapter-2 Short-term countermeasure

Approximately 5,000m³/year out of 8,000m³/year longshore sediment transport into Choiseul fishing port is estimated to deposit at the port entrance and the navigation channel. Presently, fishing boats navigation has been maintained through sand mining conducted by a local company.

Based on above background, since it takes more than 1 year from the completion of this Survey to the commencement of the Project, it was decided to carry out dredging 2 times during this Survey as short-term countermeasure to keep necessary water depth at the port entrance and navigation channel. This short-term countermeasure was requested by the government of Saint Lucia at the end of Data Collection Survey.

2-1 Execution periods of bathymetric surveys and dredging works

Bathymetric surveys were executed before and after the first and second dredging works to confirm dredging results. Table 2-1(1) shows the execution periods of the dredging works and bathymetric survey.

Table 2-1(1) Execution periods of bathymetric surveys and dredging works

| Work | | | Execution periods | Dredging amount |
|-----------------|------------------------------------|------------|----------------------------------|---------------------|
| First Dredging | Bathymetric survey before dredging | survey (1) | September 15, 2021 | |
| | Dredging work | | November 15 to December 14, 2021 | 3,023m ³ |
| | Bathymetric survey after dredging | survey (2) | December 15, 2021 | |
| Second Dredging | Bathymetric survey before dredging | survey (3) | March 15, 2022 | |
| | Dredging work | | May 9, 2022 to May 24, 2022 | 94m ³ |
| | Bathymetric survey after Dredging | survey (4) | June 23, 2022 | |

2-2 Dredging and sand placement areas

Figure 2-2(1) shows dredging and placement areas ^(commentary) to place dredged sand into the original sediment transport system. Temporary access road has been constructed during the first dredging to facilitate dredging at the port entrance and around the navigation channel. It is constructed at the planned location of the second groyne, and used as its mound in the Project. Temporary access road allows to comprehend the efficiency as a countermeasure against sedimentation at an early stage.

Therefore, rubble mound is not removed after the Survey. It is noted, however, that effect of sedimentation countermeasure is evaluated in a limited level since the rubble mound is permeable, and first and second dredging are only three months apart. Furthermore, the dredged sand is placed on the north beach of second groyne.

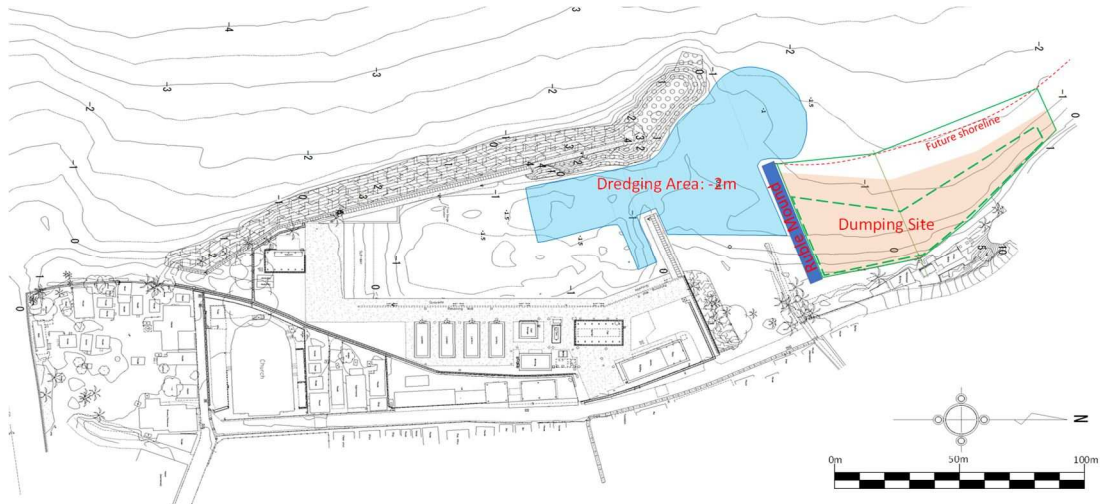


Figure 2-2(1) Locations of dredging area, sand placement area and rubble mound

(Commentary) Placement area for restoring dredged sand to its original system

In a beach where waves come obliquely, sand is transported in longshore direction. Structures constructed in such beach affect the balance of sediment transport system. An example¹⁾ indicated in Figure 2-2(2) is a case where a port is constructed in a beach with longshore sediment transport system. Sand transported from the left wraps around the breakwater and deposits at the port entrance, so beach on the downdrift side is eroded due to a lack of sand supply. As a result of sediment transport unbalance, two problems occur simultaneously: one problem is the sedimentation at port entrance (shoaling of the navigation channel) and the other one is erosion in a beach on downdrift side.

Water depth in the navigation channel can be secured by dredging in sedimentation area, but it does not solve the erosion problem at the downdrift side beach. Aforementioned problems are solved concurrently by transporting sand from sedimentation area to the downdrift side beach. Sand placed on the beach is gradually transported further lee side by the action of waves. In other words, to recover the unbalance of sediment transport due to the sedimentation at the port entrance, dredged sand is artificially placed back to the original flow of sediment transport system. It is called “sand bypassing”, sand transportation is continuously carried out for beach management. Sand bypassing projects, actually conducted at the inlets in Florida in the U.S., are famous.

Sand accrued from dredging inside the fishing port and at the port entrance of Choiseul fishing port should be originally transported along the shoreline. Therefore, based on the concept of sand bypassing, placing the dredged sand on downdrift side beach, in order to give it back to the original sediment transport system, is environment-friendly and in compliance with Saint Lucia Beach Protection Act, since “no sand is removed away from seashore”. In the beginning, it was planned that the dredged sand is placed in Sabwisha beach located outside the shielded area created by the additional breakwater in Choiseul fishing port. After several adjustments, however, the dredged sand has been placed on the northern beach of rubble mound.

It is possible that above intention was not conveyed and understood well because there were

no cases of sand bypassing in Saint Lucia and the explanation of sand bypassing concept was not necessarily enough. Moreover, the place where the sand is placed back to its original sediment transport system was translated as “dumping site” in Inception Report in this Survey, which might have caused misunderstanding that dredged sand was an industrial waste. Therefore, in Final Report, dumping site is corrected to “placement area” according to Shore Protection Manual in the U.S.

Sand bypassing is a method that artificially and mechanically keeps the continuity of sediment transport for beach management when the continuity of sediment transport is cut off by artificial structures. Therefore, while the artificial structures exist, sand must be continued being transported from sedimentation area, which causes continuous financial burdens. Submerged breakwater is to be constructed at the tip of additional breakwater. It is because probability of maintenance of continuous sediment transport due to natural energies by waves and currents as an alternative of sand bypassing has been confirmed through hydraulic model experiments and numerical simulations.

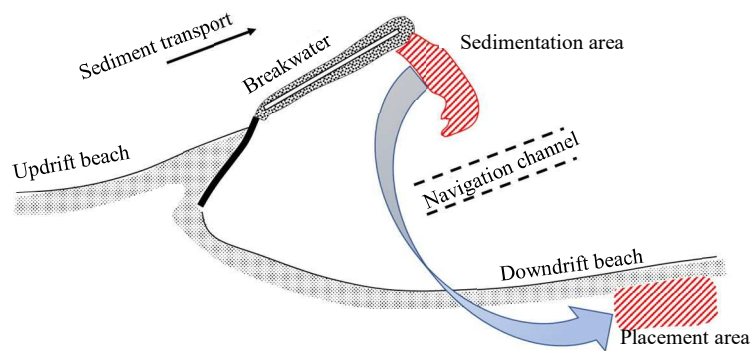


Figure 2-2-(2) Conceptual drawing of sand bypassing

1) Shore Protection Manual, Vol. I (1984): Coastal Engineering Research Center, Dep. of Army, US Army Corps of Engineers.

2-3 Dredging work executed as short-term countermeasure

(1) First dredging result

Figure 2-3(1) and 2-3(2) show the bathymetric drawings before and after the first dredging work (DL reference). Comparing the drawings, in the area of port entrance and channel, wide area where the water depth was shallower than -1.0 m became approximately -1.5 m after the dredging.

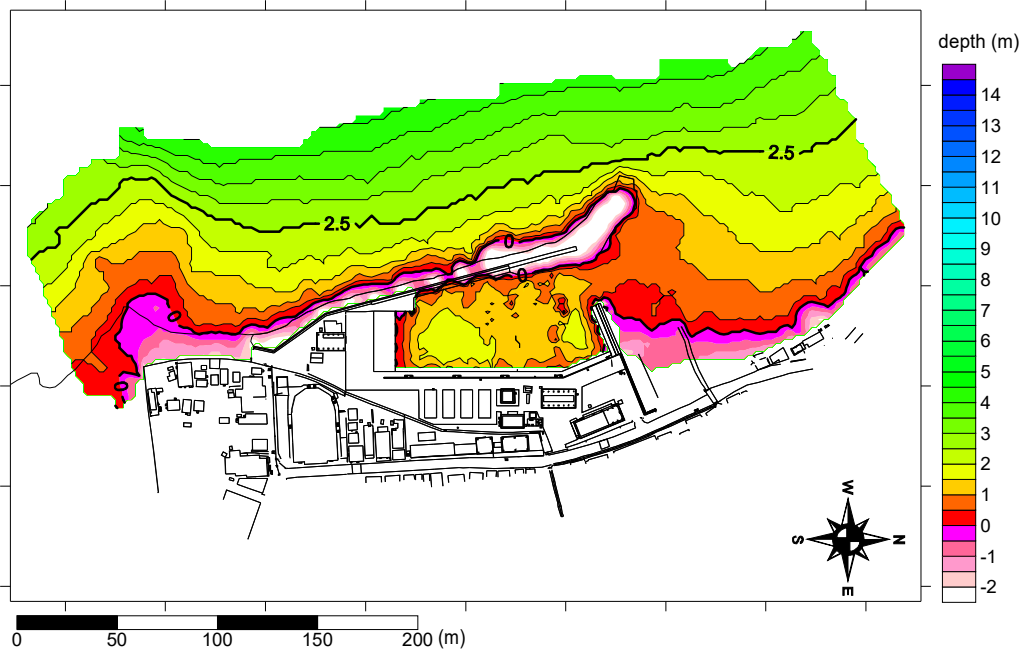


Figure 2-3(1) Bottom topography before first dredging (September 15, 2021)

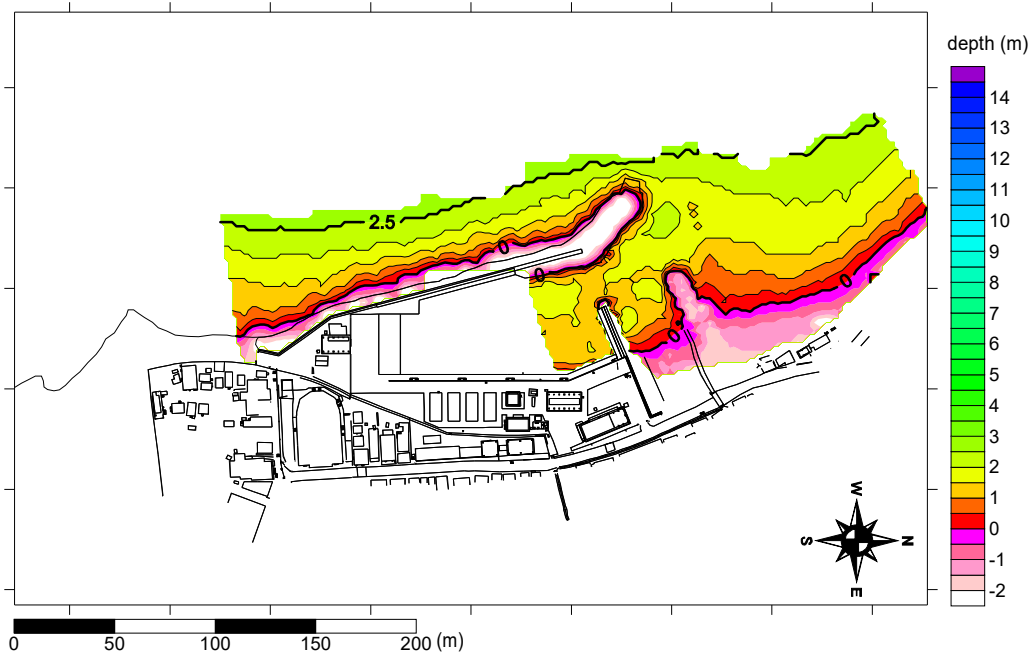


Figure 2-3(2) Bottom topography after first dredging (December 15, 2021)

Figure 2-3(3) indicates differences in water depth before and after first dredging. Table 2-3(1) lists the soil volume changes in the area shown in Figure 2-3(3). Dredging of 3,023m³ in dredged area ① and accumulation of 2,014m³ in placement area ② are confirmed. Difference on dredged and accumulation volumes is probably due to dredged sediment placed in northern beach drifting along the coast and carried further north or local contractor transporting part of the dredged sand to inland.

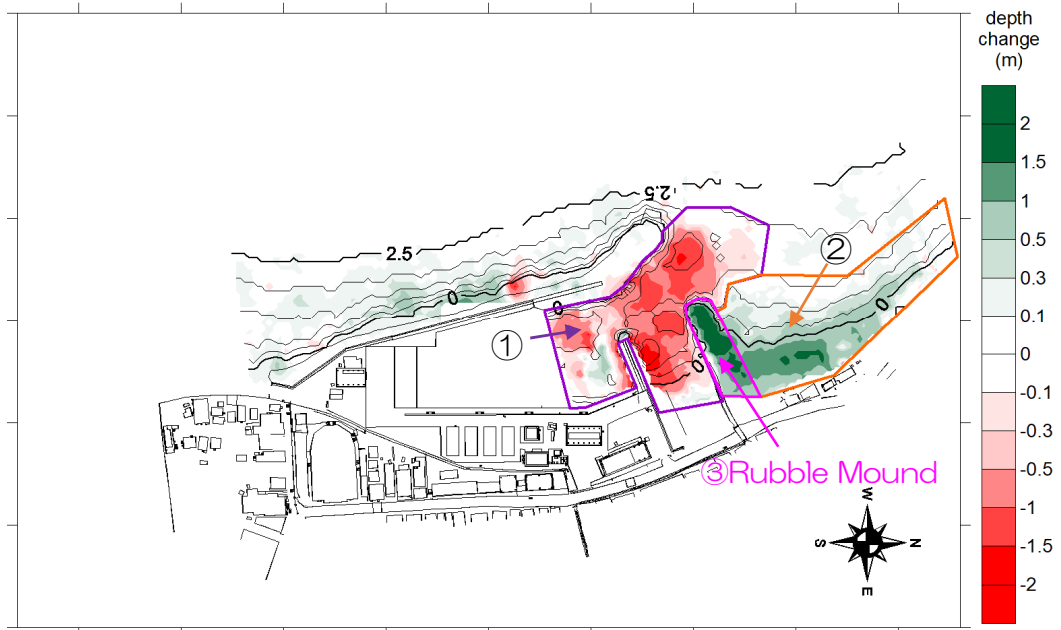


Figure2-3(3) Depth differences before and after first dredging

Table 2-3(1) Result of first dredging

| Sep. 15, 2021 — Dec.15, 2021 | | ① Dredging area | ② Sand Placement area | ③ Ruble Mound |
|------------------------------|------------------------------|-----------------|-----------------------|---------------|
| Volume | Net Volume (m ³) | -3,023 | 2,014 | 945 |
| Area | Net Area (m ²) | 5,704 | 4,476 | 807 |

(2) Second Dredging Result

Figure 2-3(4) and Figure 2-3(5) shows bathymetric survey result conducted before and after 2nd dredging. Comparing these bathymetric drawings, it is confirmed that the area between groyne and rubble mound became 50cm – 1m deeper after second dredging. However, little changes are observed in the area behind the additional breakwater.

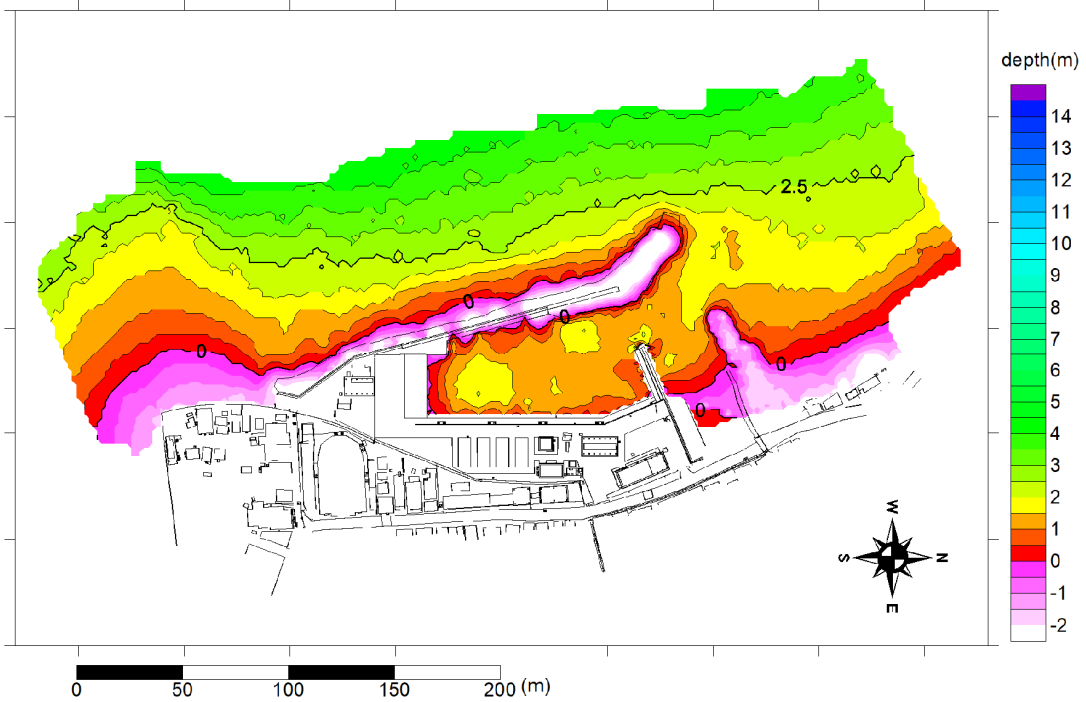


Figure 2-3(4) Bottom topography before second dredging (March 15, 2022)

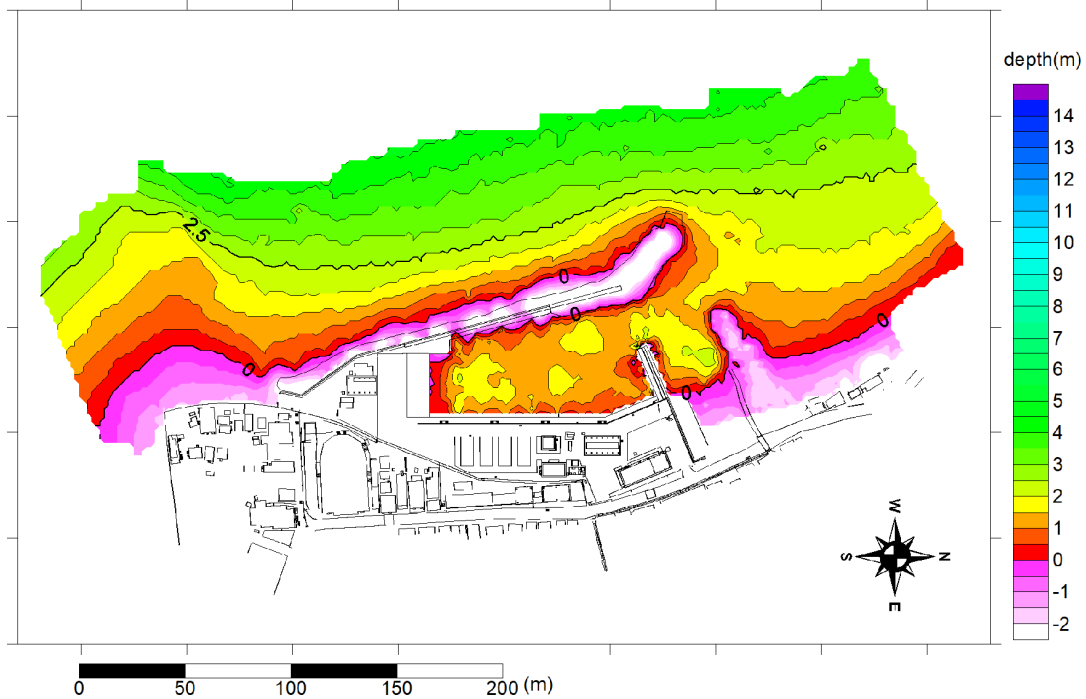


Figure 2-3(5) Bottom topography after second dredging (June 23, 2022)

Figure 2-3(6) indicates differences in water depth before and after second dredging. Table 2-3(2) shows soil volume changes. Area ④ is dredging area, whereas Area ③ is sand placement area. According to this analysis, dredging volume is 94m³ and transportation of dredged sand to sand placement area is 38m³.

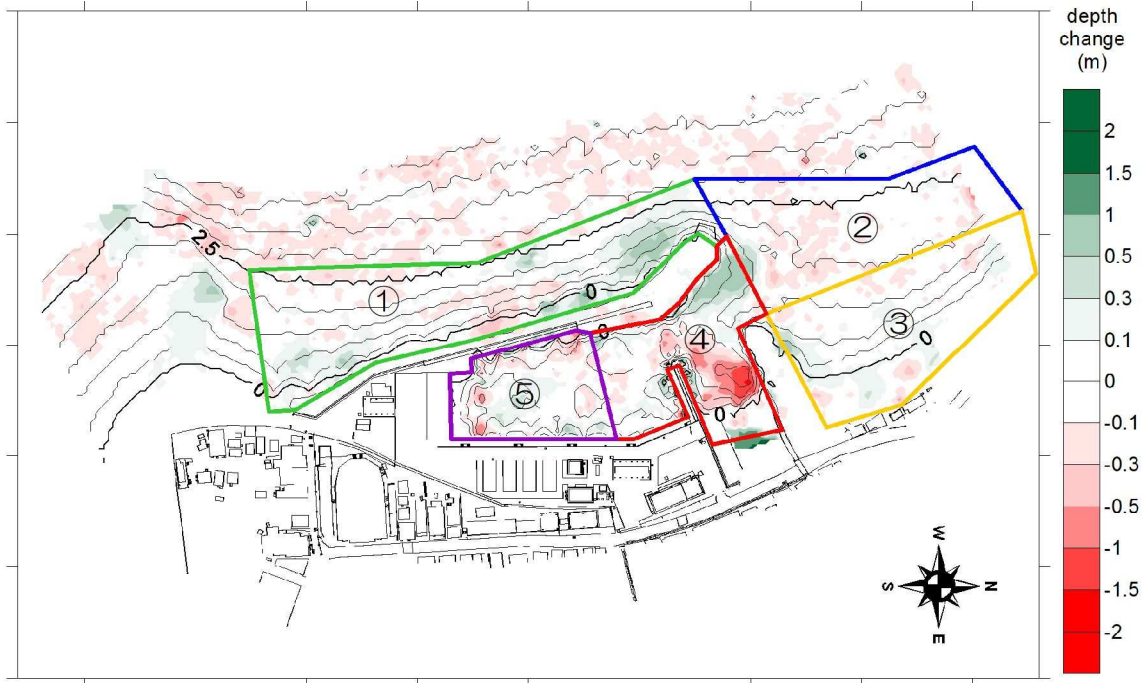


Figure 2-3(6) Depth differences before and after second dredging

Table 2-3(2) Result of second dredging

| Mar. 15, 2022 — June.24, 2022 | | Area ① | Area ② | Area ③ | Area ④ | Area ⑤ |
|-------------------------------|------------------------------|--------|--------|--------|--------|--------|
| Volume | Net Volume (m ³) | 328 | -312 | 38 | -94 | -18 |
| Area | Net Area (m ²) | 8,468 | 5,076 | 4,968 | 4,160 | 2,860 |

Chapter-3 Contents of the Project

Chapter-3 Contents of the Project

3-1 Basic Concept of the Project

3-1-1 Positioning of the Project

Short-term countermeasure – implemented in this Survey – and a long-term countermeasure for sedimentation at the port entrance and pond of Choiseul fishing port are planned. Outline of the Project is summarized subsequently.

(1) Upper goal

The local economic activities are revitalized by promoting efficient utilization of Choiseul fishing port, and resultantly developing artisanal fishery (contribution to fisherfolk and fisheries industry efficiency).

(2) Project goal

Accessibility and safety are improved for fishing boats in navigation channel and port entrance. Conveniences for fisherfolks, opportunities of fishery activities and fish catch are increased by implementing countermeasure against sedimentation in Choiseul fishing port.

(3) Outline of the Project

1) Current status and issues of Choiseul fishing port in the fisheries sector

Choiseul fishing port, located in the southwestern part of Saint Lucia, functions as a regional base for fisheries products distribution. As one of the fishing ports developed through Japanese grant aid (“The Project for Improvement of Coastal Fisheries Development” in 2001), it has been used as a major fishing port, including its market and ancillary facilities such as fishing gear lockers.

After its completion, sedimentation has occurred at the navigation channel and the pond of fishing port, hindering navigation and mooring. To maintain fishing activities, the government of Saint Lucia has taken measures including construction of the additional breakwater and continuous implementation of dredging, and costs for these measures are heavy burden.

The government of Saint Lucia has set out in the “National Fisheries Plan 2013” to maximize the economical use of available fishery resources by 2022. Therefore, facility development support is one of the strategies.

Based on such circumstances, the government of Saint Lucia has requested Japanese cooperation to improve sedimentation issue at Choiseul fishing port. In response, JICA conducted Data Collection Survey from October 2017 to confirm the most effective technical countermeasures for improvement and recovery of the fishing port functionality.

Following Data Collection Survey, this Survey is conducted prior to implementation of the Project. The Project initiated by this Survey is implemented to improve the function of the existing fishing port through the construction of the second groyne and submerged breakwater, studied as the most effective countermeasures to reduce the amount of sedimentation inside the port.

Therefore, this Project is evaluated as important in compliant to “economic thrive of fisheries” and “infrastructure maintenance” of the National Fisheries Plan 2013.

Figure 3-1-1(1) shows the connections of contribution of the Project to the upper related plans, fishery development plan and national development plan. Upper strategies which are closely related are marked in red. Improvement of the sedimentation by the Project is expected to reduce inconveniences for fisherfolks, maintain safety of navigation channel, and reinvigorate fishery activities. Furthermore, newly created beach is used as recreational space for fisherfolks and residents. Revitalization of local economy is expected in the future.

As local economic activities are promoted, it is expected that distribution system of fishery products is strengthened and income is increased. Resultantly, this Project has an aspect of infrastructure improvement supporting economic and social development.

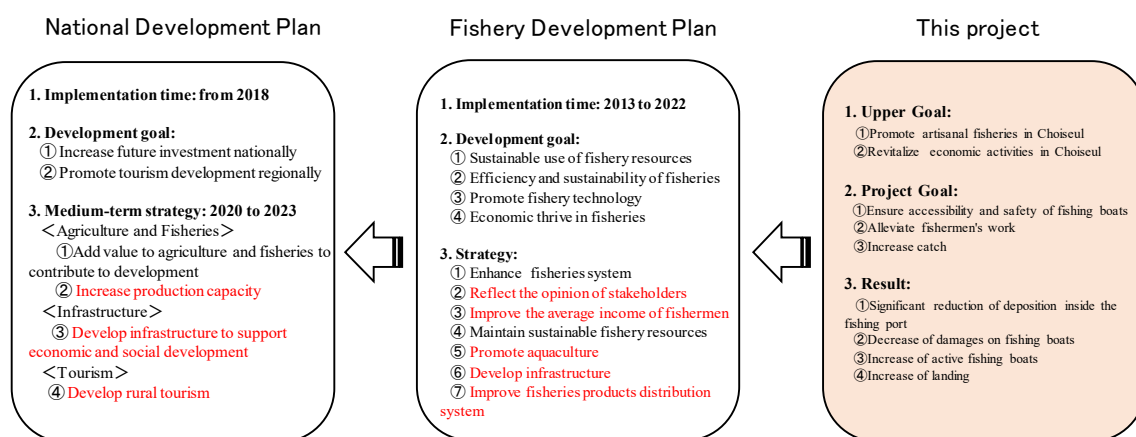


Figure 3-1-1(1) Relations between upper goals and this Project

2) Japanese and JICA’s cooperation policy for fisheries sector

According to the Japanese National Development Cooperation for Saint Lucia (September 2016), continuous cooperation for sustainable development and management of fisheries is stated in “fisheries industry and fishing village community improvement program” in fisheries section as an important area. This Project aims to promote efficient use of Choiseul fishing port by function improvement, resultantly it is expected to contribute to development of fisheries sector in Saint Lucia. Therefore, this Project is compliant to cooperation policy of Japanese government.

In addition, this Project contributes to development of fishery industry which is important for Saint Lucia having vulnerability as an island country, and to the relationship consolidation between the two countries. According to JICA national analysis paper of 2022, promotion of fisheries sector fosters food security and provides employment and livelihoods for the local population. Further use of fisheries facilities developed through past grant aid projects are expected. Also, this Project conduces to the promotion of island countries fisheries blue economy in agricultural and rural development stipulated in JICA’s Global Agenda.

3) Significance of this Project implementation

This Project is in line with the development strategies and policies of Saint Lucia, and cooperation policies of Japan and JICA. By solving the present sedimentation issues in Choiseul fishing port, this Project implementation contributes to the improvement of productivity for fisherfolks and development of fishery industry, leading to the respect of SDG's "No poverty" (1), "Zero hunger" (2) and "Life below water" (14) goals.

Saint Lucia is positioned as an upper middle-income country. It is significant to implement this Project as a grant aid because of frequent occurrence of natural disasters such as hurricanes ("humanitarian needs"), small economic scale and dependence on limited industries ("economic vulnerability"), and diplomatic importance in the same stance as Japan in international discussions for use of fisheries resources ("diplomatic needs").

3-1-2 Cooperation request contents

Necessity and urgency of the facilities are elaborated to examine the appropriateness of development from the point of view of ensuring safety of existing fishing activities and improving functionality based on the Data Collection Survey.

(1) Dredging

- ① Since the completion of Choiseul fishing port in 2003, sedimentation inside the port has occurred. The government of Saint Lucia built an additional breakwater (40m) in 2008 to overcome the sand deposition. Nevertheless, the port entrance and navigation channel had been obstructed, hindering fishing vessels navigation.
- ② Then, large scale dredging was conducted 4 times, and sand mining by a local company had been implemented in recent years. Thus, incurred expense for continuing maintenance dredging is a big burden on the government of Saint Lucia, so prompt implementation of sedimentation countermeasures is required.
- ③ As the water depth in navigation channel got shallow in the process of port entrance closure, safe operation is hindered and damages on fishing boats concerns arose.
- ④ In this Survey, sand deposition countermeasures in a certain level have been implemented such as dredging twice and establishment of rubble mound. However, sedimentation caused by coastal sand wrapping around the tip of additional breakwater to its back side has not been improved. Thus, sand deposition is expected to occur. Besides, in this Project, water depth of -2m is secured in navigation channel and pond.
- ⑤ Dredging is necessary to maintain water depth in front of temporary quay during construction works.

(2) Second groyne

- ① In Data Collection Survey, construction of groyne, has been proposed as a countermeasure facility, which is a well-known method worldwide to prevent sand from the north beach. Also, it has been proven by numerical simulation that the groyne is effective for reducing sedimentation by 2,500m³/year.
- ② During this Survey, rubble mound, as one of the short-term countermeasures, was constructed in the same place as second groyne to be constructed in this Project. Even though the effects of rubble mound have been confirmed, its crown height is still lower. Thus, it is needed to complete the facility in this Project for preventing sand overflow caused by wave runup.
- ③ It is required that the structure of second groyne is impermeable so that the sand is not transported through the groyne.
- ④ Additionally, utilization of second groyne as a temporary quay during construction phase is taken into consideration.

(3) Submerged breakwater

- ① Sedimentation process that transported sand wraps around the tip of additional breakwater toward its back side was analyzed in Data Collection Survey. To prevent this sediment transport, submerged breakwater was proposed. It was turned out by hydraulic model experiments and numerical simulation that submerged breakwater has a) weak wave sheltering function, b) prevention of sand wraparound, c) scouring behind submerged breakwater, and d) generation of fast current of cross-shore direction.
- ② Based on numerical simulations and hydraulic model experiments in Data Collection Survey, submerged breakwater is evaluated to be effective for sedimentation of 2,750m³/year. However, this is going to be the first trial. Thus, carefulness and deliberation for construction is needed with monitoring for some years.

(4) Beacon lights

- ① Navigation channel into Choiseul fishing port goes between the tips of second groyne and submerged breakwater. Considering the aspects that fishing boats are possibly operated during night time and crown of submerged breakwater is lower than water surface, beacon lights are installed to show the facilities locations. Beacon lights are necessary to ensure the safety of fishing boat operation.
- ② Beacon lights have been installed at the tips of existing breakwater and the first groyne, but they are damaged. For safe operation of fishing boats through navigation channel, reparation of existing beacon lights is an urgent matter.

3-2 Outline Design of the Project

3-2-1 Basic policy of design

3-2-1-1 Basic Quantities

(1) Quantities for reference

Figure 3-2-1-1 (1) shows the sediment balance around Choiseul fishing port without the additional breakwater, being before April 2008¹⁾. Amounts of coastal sediment transport in front of breakwater, sediment coming into the fishing port, and sediment transported to the lee-side beach have been estimated. However, the basis of amounts was not explained in the report, so it does not have enough reliability.

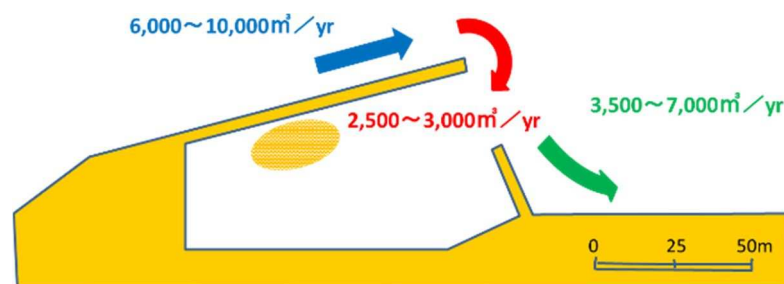


Figure 3-2-1-1 (1) Sediment balance around Choiseul fishing port (before construction of additional breakwater) (quote from Figure 6-24 in report²⁾)

In Data Collection Survey, validity of the amounts has been examined based on the existing data. As a result, it is evaluated that 7,180m³/year (sediment amount in front of breakwater) is supplied from the river and sea cliff, and estimate of 2,764m³/year coming into the port is obtained from dredging volume data for 3.3 years. Therefore, sediment balance indicated in Figure 3-2-1-1 (1) is judged as appropriate ²⁾.

Moreover, in Data Collection Survey, sediment balance after construction of additional breakwater is studied by shoreline change prediction model. Median value of each sediment amount is applied in the calculation assuming the same sediment balance shown in Figure 3-2-1-1 (2) even after construction of additional breakwater. After trials on excavating volume in the place indicated with ☆ in the figure to keep the initial shoreline position on north beach, it turns out that the shoreline is stable when the excavation volume is 200m³/month. This means that sediment of 2,400m³/year is transported from the north beach to the port entrance.

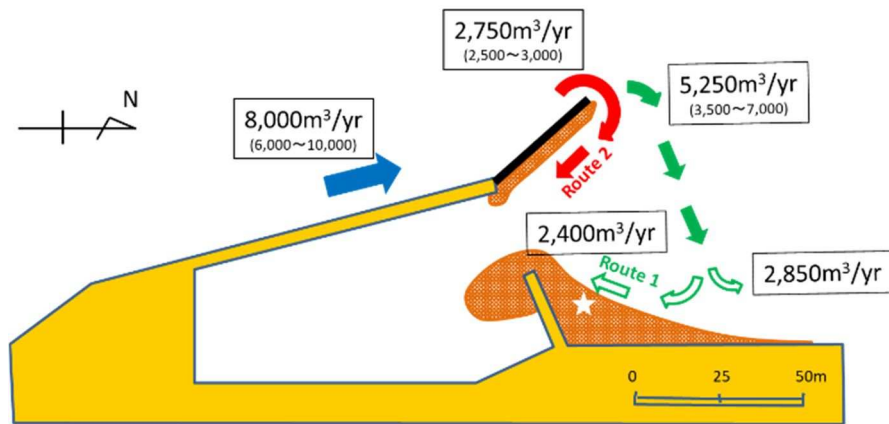


Figure 3-2-1-1 (2) Sediment balance around Choiseul fishing port (at present) (drawn up based on report²⁾)

- 1) ECOH CORPORATION: Proposal of the study for sedimentation mechanism and the maintenance method in Choiseul Fishing Port, 23p. August 2006.
- 2) JAPAN INTERNATIONAL COOPERATION AGENCY and ECOH CORPORATION: Data collection Survey on Current Situation of the Project for Improvement of Coastal Fisheries Development in Saint Lucia, Final Report, March 2020, RD/JR/20-014

1) Annual sedimentation amount: case without countermeasures against sedimentation

When neither countermeasures nor maintenance dredging is implemented, sand of $5,150\text{m}^3/\text{year}$ deposit at the port entrance, which is a total volume of sediments transported along the Route-1 on the north beach and along the Route-2 wrapping around the additional breakwater. If such a condition continues, the port entrance should be completely closed. Such situation has already occurred in 2015. (See Photo 3-2-1-1 (1))



Photo 3-2-1-1 (1) Complete closure of port entrance (November 4th, 2015)

2) Estimation of effect of second groyne

According to the results of shoreline prediction calculation and hydraulic model experiment in Data Collection Survey, it is expected that second groyne and submerged breakwater block sediment transport along Route-1 and Route-2 respectively. In the end, the effects confirmed by analysis during the monitoring period in the Project.

In this Survey, rubble mound installed for dredging work as short-term countermeasure was not removed. There are 2 reasons. The first reason is that the rubble mound is available as a foundation of second groyne since location and length of the rubble mound are the same as those of the second groyne. The second reason is that it is possible to preliminarily estimate the effectiveness of the second groyne referring to bathymetric data as presented in Chapter 2, since dredging is repeatedly carried out at the port entrance. However, it is inevitable that evaluation of sedimentation prevention effects of second groyne is qualitative due to the following aspects.

- Structure of the rubble mound is different from the second groyne. The difference is permeability for the longshore sediment transport. Also, crown height is lower.
- Only sedimentation amount in 3 months is obtained from bathymetric surveys. Somewhat decreasing accuracy is inevitable in the process of estimating yearly sedimentation amount from the 3-month data.
- Effects brought by dredged sand temporarily placed on the north side of the rubble mound are included.

3) Results of analysis on sedimentation amount at port entrance for 3 months

As shown in Figure 3-2-1-1(3), outlined effects of second groyne against sedimentation is estimated by analyzing bathymetric change in 3 months between survey-(2) and survey-(3)

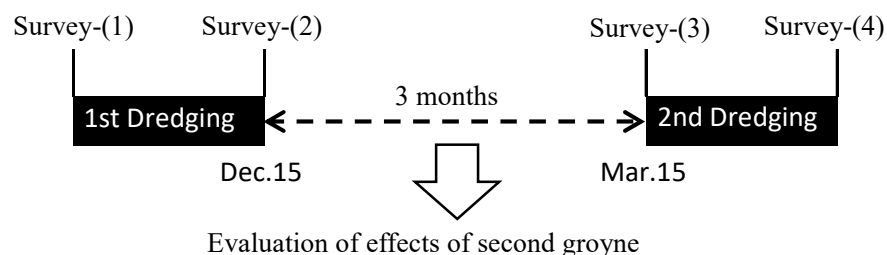


Figure 3-2-1-1 (3) Evaluation of effects of second groyne by analyzing bathymetric results between survey-(2) and survey-(3)

Figure 3-2-1-1 (4) shows bathymetric data of survey-(2) conducted after the first dredging. Figure 3-2-1-1 (5) shows bathymetric data of survey-(3) 3 months after the first dredging. Figure 3-2-1-1 (6) visually indicates changes in 3 months, and Table 3-2-1-1 (1) lists sediment volume change in 3 months.

Following characteristics are interpreted from those figures and table.

- a) The sediment volume in Area ② is nearly zero.
- b) In Area ① and Area ④, sedimentation is confirmed. The sedimentation volume in Area ④ is 400m³.
- c) Significant change in sediment balance in Area ③ is not confirmed. However, erosion on south side and sedimentation on north side occurs in Area ③.

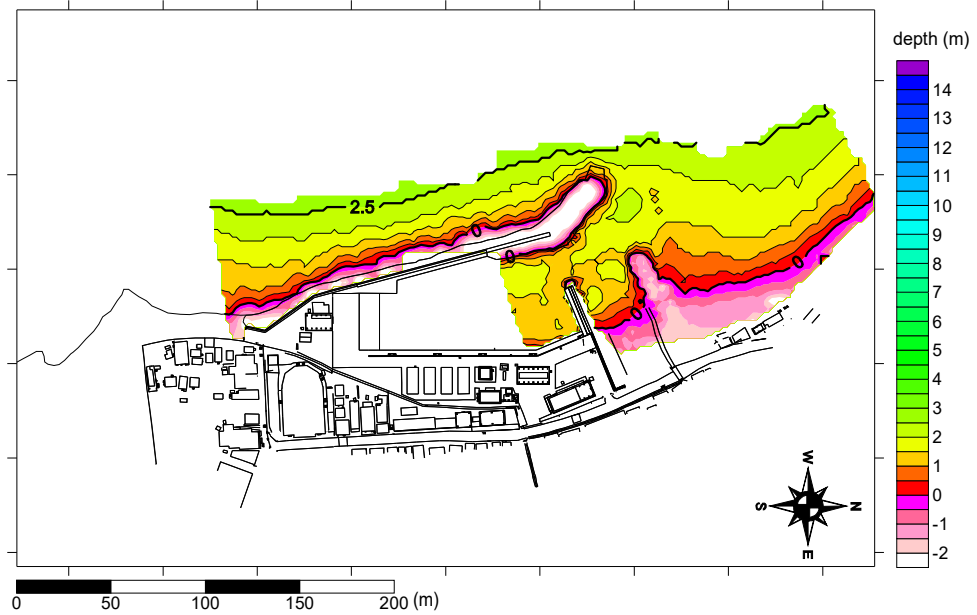


Figure 3-2-1-1 (4) Bathymetric data from survey-(2) <December 15, 2021>

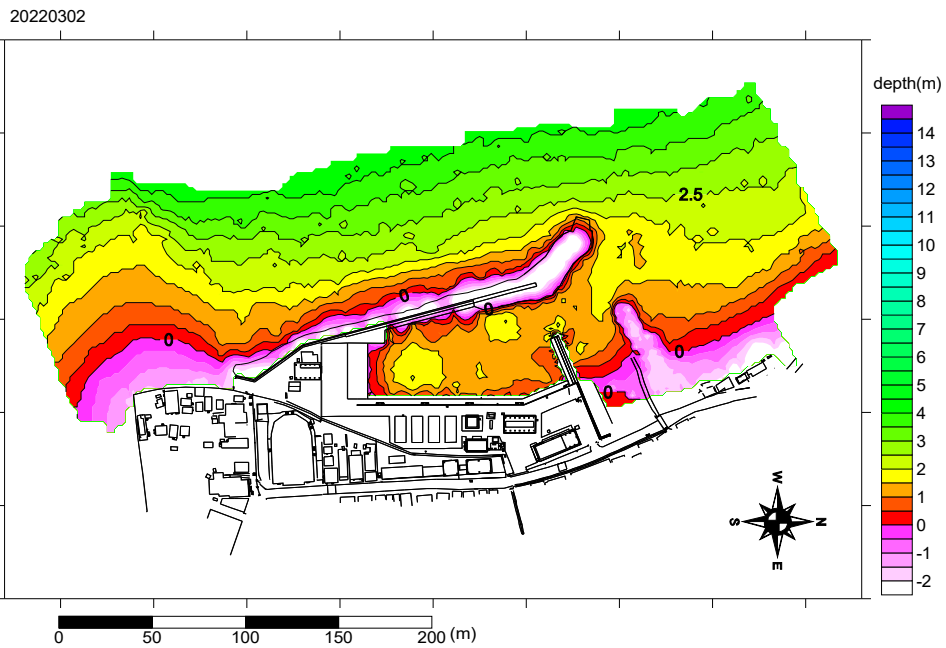


Figure 3-2-1-1 (5) Bathymetric data from survey-(3) <March 15, 2022>

depth change 202112 --> 202203 contour line = 202203

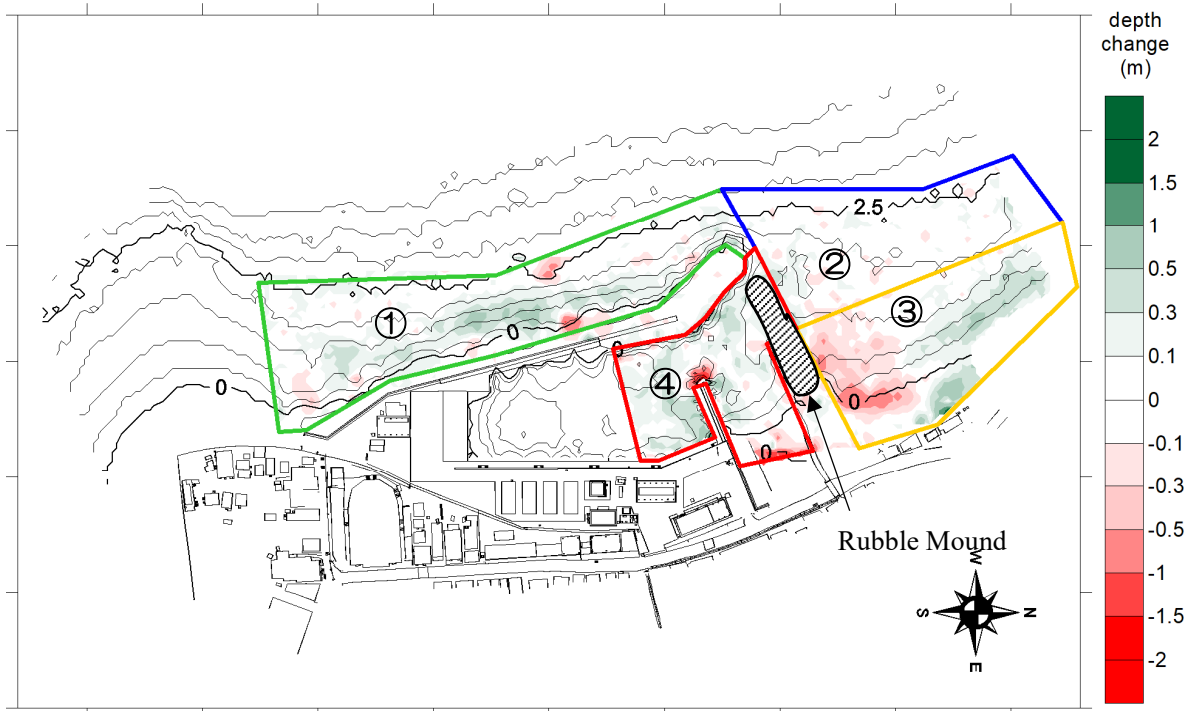


Figure 3-2-1-1 (6) Indication of changes after first dredging and 3 months later

Table 3-2-1-1 (1) Sediment balance in 3 months after first dredging

| Dec. 15, 2021 – Mar.15, 2022 | Area ① | Area ② | Area ③ | Area ④ |
|------------------------------|--------|--------|--------|--------|
| Volume (m ³) | 554 | 7 | 84 | 400 |
| Area (m ²) | 8,264 | 4,392 | 4,928 | 4,112 |

4) Effects estimation of second groyne

Sedimentation amount in Area ④ is 400m³ in 3 months from December 15th, 2021 to March 15th, 2022. By simply multiplying the amount by 4, estimated amount is 1,600m³ per year. It has been estimated that 5,150m³ is the yearly sedimentation amount so far, so just the rubble mound seems to be effective. Therefore, the second groyne is the most probably effective for deposition prevention.

However, further estimate is not available at this stage for the following reasons.

- a) The estimate is obtained by multiplying the sedimentation amount in 3 months by 4. Thus, seasonal conditions including hurricane seasons and rainy or dry seasons are not considered.
- b) There are 2 possible routes that sand is transported to Area ④. The first route is that coastal sand transported in front of the breakwater to the south direction wraps around the tip of additional breakwater and is carried into the port (Route-2, Figure 3-2-1-1(1)). Another other route is sand placed on the north side of the rubble mound is carried into the port through the rubble mound due to its permeable structure. Sand is transported into the port through these

routes in bed load. Then, it is supposed that sedimentation in salient topography is formed. However, such a salient topography is not observed in Figure 3-2-1-1(6), and deposition evenly takes place over Area ④. Average sedimentation layer thickness, which is obtained by dividing sedimentation amount by area, is approximately 0.1m, so it is possible that any systematic survey errors are included.

(2) The number of fishing boats considered in designing temporary quay

Table 3-2-1-1 (2) lists the numbers of registered fishing boats and fisherfolks in Choiseul fishing port. Fifty-nine fishing boats (2019) and 176 fisherfolks (2018) are registered. According to hearing from Choiseul fishing port management office on September, 2021, 31 fishing boats are active. Therefore, present active 31 fishing boats are taken into consideration for designing temporary quay in the Project.

Table 3-2-1-1 (2) The number of registered fishing boats and fisherfolks

| Survey year | Registered fishing boats | Active fishing boats | Registered fisherfolks | Crews |
|-------------|--------------------------|----------------------|------------------------|-------|
| 2018-2021 | 59 (in 2019) | 31 (in 2021) | 176 (in 2018) | 3 - 4 |

(Source: Department of Fisheries, Saint Lucia)

(3) Specifications of fishing boats

Table 3-2-1-1(3) lists specifications of target fishing boats in 2001 and at present. Temporary quay is considered with the following specifications: average length 8m, average width 1.8m and maximum draft 0.8m.

Table 3-2-1-1(3) Specifications of target fishing boats

| | Length (m) | Width (m) | Draft (m) | Maximum draft (m) |
|-----------------|------------|-----------|-----------|-------------------|
| 2001 (original) | 8 | 2.0 | — | 0.8 |
| 2021 (present) | 6 - 10 | 1.5 - 2.0 | 0.5 - 0.8 | 0.8 |

(Source: questionnaire survey October 2021)

(4) Operation hours of fishing boats (departure and arrival)

Table 3-2-1-1(4) lists a result of questionnaire survey conducted on October 2021 for fishing boats departure and arrival. Answers have been collected from 24 out of 31 active fishing boats. Departure and arrival hours slightly vary, all of them return in a day, many of them depart around 5:00am and come back around 14:00. This fact requires attention for coordination of fisheries activities and construction works in the Project.

Fisheries activities by fishing boats during night time and early morning are also confirmed, so it is essential to install beacon lights at the tips of second groyne and submerged breakwater.

Table 3-2-1-1 (4) Departure and arrival time of fishing boats

| | Time | Number of persons |
|-----------|---------------|-------------------|
| Departure | 2:00 - 4:00 | 4 |
| | 4:00 - 6:00 | 17 |
| | 6:00 - 8:00 | 0 |
| | 8:00 - 10:00 | 1 |
| Arrival | 6:00 - 8:00 | 1 |
| | 8:00 - 10:00 | 2 |
| | 10:00 - 12:00 | 6 |
| | 12:00 - 14:00 | 5 |
| | 14:00 - 16:00 | 7 |
| | 16:00 - 18:00 | 2 |

3-2-1-2 Basic Policy

(1) Basic policy of planning

This Survey aims to plan the necessary minimum facilities for implementation of sand deposition countermeasures based on the following basic policies.

<Basic policies in this Project>

- ① Based on the countermeasures proposed in Data Collection Survey, structures are planned and designed for implementation. Consideration is given to fisheries operation and hinterland.
- ② Submerged breakwater, second groyne and ancillary facilities are constructed.
- ③ To reduce dredging in the future, effects of countermeasures are analyzed and evaluated through monitoring for 3 years, and minor improvement works are carried out when necessary.

(2) Standards for designing

Designing is carried out in compliance with the following Japanese standards, since there are not standards for fishing port facilities in Saint Lucia.

- ① “Guideline for Fishing Port Planning” (National Association of Fisheries Infrastructure, November 1992)
- ② “Guideline for Designing Facilities in Fishing Ports” (National Association of Fisheries Infrastructure, October 2003)
- ③ “Technical Standards and Commentaries for Port and Harbour Facilities in Japan” (The Ports & Harbours Association of Japan, May 2018)
- ④ “Technical Standards and Commentaries for Coastal Protection Facilities” (Agricultural and Coastal Area Protection Association of Japan, September 2018)

(3) Basic policy on designing civil engineering facilities

1) Navigation channel and pond

Sedimentation at the port entrance and navigation channel is intensively caused by sand wrapping around the additional breakwater (Route-2 in Figure 3-2-1-1(2)) and longshore sediment transport from the north beach (Route-1 in Figure 3-2-1-1(2)) in Choiseul fishing port. During this Survey, dredging was conducted 2 times around intensive deposition as a short-term countermeasure prior to implementation of the Project.

It takes more than one year from the completion of this Survey to the commencement of construction work in the Project, so sedimentation possibly occurs. To reduce the volume of sand deposition before Project, access road established in this Survey is not removed because the access road expectedly has the same functions as second groyne to be constructed in the Project and reduces the sediment transport along the Route-1. However, sediment transport along Route-2 still exists, so sedimentation occurs in the navigation channel.

Because of sedimentation for years, water depth overall in the pond of Choiseul fishing port

has been getting shallower. The pond is not dredged in this Survey, so dredging is needed in the Project.

From the above, it is necessary to carry out dredging in navigation channel and pond in the Project. Basic policies on planning, designing, and implementing dredging areas follows.

- Dredging entirely in Choiseul fishing port is conducted to maintain water depth in pond and navigation channel.
- Measures are taken so that impacts from dredging on fisheries activities are minimized.
- Concern that excessive dredging near the existing facilities causes collapse has raised, so the dredging area is limited referring to the plan or completion drawings.
- Minor improvement work judged as necessary during monitoring period possibly includes dredging. However, dredging is not subject to defect liability.

2) Second groyne

Second groyne prevents sediment transport from north beach to inside the port (Route-1 in Figure 3-2-1-1(2)).

Basic policies in planning, designing and constructing second groyne are as follows.

- The layout of second groyne complies to the results of numerical simulations and hydraulic model experiments in Data Collection Survey.
- “The depth of closure” is set at 2.5m (C.D.L = -1 to -1.5m), which is one of the conditions for shoreline change prediction calculation. This condition is unique to shoreline change prediction calculation. Actually, sediment transport in the longshore direction at the area -1m or deeper occurs somewhat. Then, it is needed to comprehend the conditions of sediment transport based on the bathymetric survey data during monitoring. It is possibly needed to extend the second groyne. Even in such case, necessary width of navigation channel is secured for safety of fishing boats.
- The structure of second groyne is impermeable so that the sand does not pass through. The crown is set so that overtopping sediment transport does not happen.
- Upon a request from the government of Saint Lucia, as shown in Figure 3-2-1-2 (1), crown of the second groyne is paved by concrete so that the surface is even and fisherfolks and people can walk on it.

After construction of second groyne, the shoreline of north side beach advances, and resultantly a new beach is created. This new beach is expected as a useful space for residents in Choiseul district.

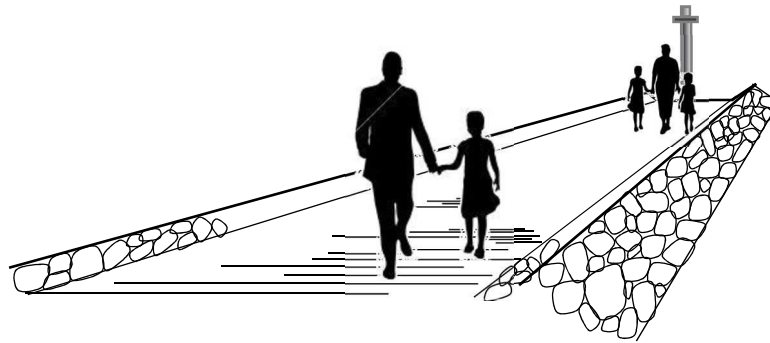


Figure 3-2-1-2 (1) Illustration of walks on crown of second groyne

3) Submerged breakwater

The submerged breakwater prevents the sediment transport along Route-2 wrapping around the tip of additional breakwater as shown in Figure 3-2-1-1(2).

In the Project, the crown height -0.2m is adopted same as the hydraulic model experiment to examine its effects. Conditions used in hydraulic model experiment is $H_{1/3} = 0.82\text{m}$ and $T_{1/3} = 6.99\text{s}$ in average tide level (+0.23m) and unidirectional irregular waves with direction S are generated. Tide level and waves are variant at the site, so occurrence of expected effects is necessarily checked during monitoring period. Depending on the results, minor improvement work is carried out if necessary.

Basic policies in planning, designing and constructing submerged breakwater are as follows.

- Specifications and location are based on the results of numerical simulation and hydraulic model experiment in Data Collection Survey.
- As to the specifications of submerged breakwater (crown height, crown width, length, location (direction, etc.), possibility of minor improvement work is considered in designing and construction.
- The submerged breakwater has impermeable structure to prevent sand from passing through.
- Attention is needed for safety of fishing boats since the submerged breakwater is underwater structure placed at the edge of navigation channel.

4) Ancillary facility (beacon light)

Submerged breakwater and second groyne are located at the entrance of Choiseul fishing port. Especially, the submerged breakwater is constructed underwater and invisible from fishing boats above the water surface. Therefore, it is necessary to clearly show the location of submerged breakwater for safe navigation. As indicated in Figure 3-2-1-2 (2), navigation channel is bent from the existing to the area between second groyne and submerged breakwater. The existing damaged beacon lights as well are fixed to navigate fishing boats safely. Therefore, 4 beacon lights are installed in total: reparation of 2 existing beacon lights, and installation of 2 new beacon lights.

It was confirmed by hearing and questionnaire survey that fisherfolks depart and arrive during night and early morning. The specifications of beacon lights are determined considering operation

during not only day time, but also night time.

Basic policies in planning, designing, and installing beacon lights are as follows.

- Beacon lights are newly installed at the tip of second groyne and submerged breakwater. It is possible that the one installed on submerged breakwater is replaced in accordance with minor improvement work during monitoring period.
- It is difficult to procure commercial electricity, so solar panel is used for power supply.
- For the reparation of beacon lights, existing main bodies are reused, and light and solar panel on head part are fixed.
- Appropriate body color, light color, visible distance and flash interval are selected for safe operation of fishing boats.
- If beacon lights are temporarily removed due to construction or minor improvement work during monitoring period, fisherfolks and governmental authorities (SLASPA, DoF, Choiseul fishing port management office, etc.) are informed in advance.

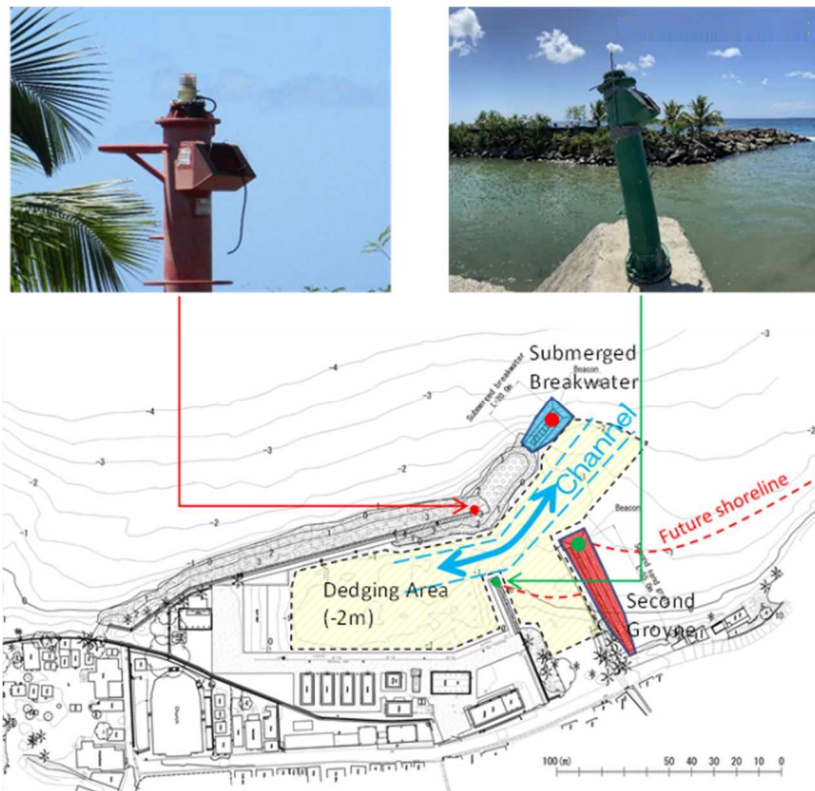


Figure 3-2-1-2 (2) Installation points of existing beacon lights to be fixed and newly installed

5) Temporary quay (for temporary mooring)

Access road is set up across the port entrance for construction works of submerged breakwater and its minor improvement works in the Project. For continuous fisheries activities without problems, temporary quay is needed. It is designed targeting presently operating 31 fishing boats).

As shown in Figure 3-2-1-2 (3) and Photo 3-2-1-2 (1), temporary quay is attached to second groyne. The area between existing groyne and second groyne is relatively calm.

When a hurricane comes while fishing boats are moored to the temporary quay, a part of access road closing the port entrance is opened and fishing boats are moved into the port for evacuation.

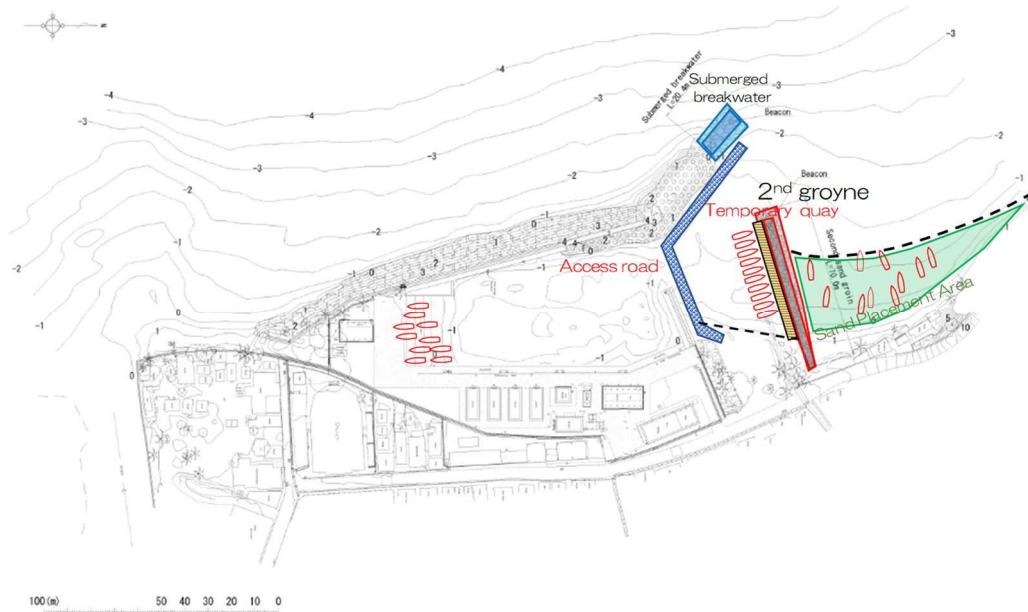


Figure 3-2-1-2 (3) Location of temporary quay

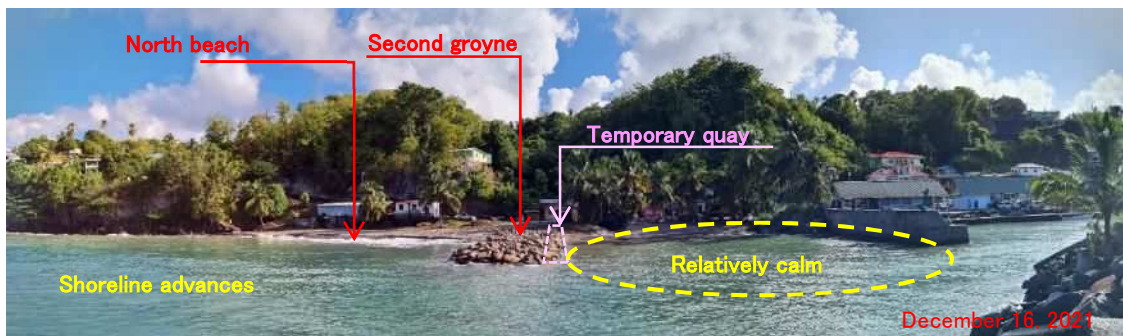


Photo 3-2-1-2 (1) Location of temporary quay

Basic policies in planning, designing, and installing temporary quay are as follows.

- Since temporary quay is not a permanent structure, usually it is removed after completion of Project. However, use of concrete blocks for temporary quay makes the structure of second groyne impermeable, so temporary quay is not removed.
- Accessory facilities such as fenders and bollards are not installed because this is a temporary mooring facility during construction period.

- Water depth and crown height of temporary quay are determined referring to the existing quay in Choiseul fishing port.

(4) Consideration of introduction of equipment (dredging machine)

Effectiveness of countermeasure facilities is evaluated through monitoring period for 3 years after construction. Based on the yearly sedimentation amount after completion of Project, necessity of procurement of dredging machine is judged.

(5) Basic policy to natural conditions

1) Temperature and precipitation

Temperature is between 26.5 and 27.5°C through the year, which does not cause inconvenience to creation of concrete blocks. As to the rainfall, looking back past 5 years, the average number of days that has daily 10mm rainfall is 44 days in a year, so impacts on construction works such as suspension due to rain requires attention. Especially, precipitation increases during rainy season from July to November.

2) Hurricanes

Hurricanes are usually generated in the area of north latitude 15 to 30 degrees, which is further northeast area from Saint Lucia, and proceed to northwest direction. Therefore, hurricanes rarely hit Saint Lucia directly. Still, considering past damages or abnormal waves due to hurricanes, attention is required. Hurricane season in Saint Lucia is from July to October.

3) Tide level

Based on the natural condition survey, when C.D.L = ± 0.0 is referred, mean higher water springs is +0.31m and mean lower water springs is +0.15m.

4) Wave conditions

① Ordinary waves

According to wave hindcast data for 18 years from January 2000 to December 2017, wave conditions of high appearance frequency in front of Choiseul fishing port is as follows: significant wave height 0.3m (61.0%), wave period 7.0s (50.4%), and wave direction S (50.4%).

② Design offshore waves

Table 3-2-1-2 (1) lists waves with return period of 50 years by direction calculated as design offshore waves by extreme values statistics analysis based on the above-mentioned wave hindcast for 18 years. When wave direction is SE – WSW, waves are higher. The maximum appears in the following conditions: direction S, significant wave height 2.39m and wave period 8.4s.

Table 3-2-1-2 (1) Waves with return period of 50 years by wave direction

| Wave direction | Wave hindcast point, Point-01 | |
|----------------|-------------------------------|---------------------------|
| | Wave height $(H_{1/3})_0$ | Wave period $(T_{1/3})_0$ |
| ESE | 1.46 | 6.6 |
| SE | 2.19 | 8.0 |
| SSE | 2.34 | 8.3 |
| S | 2.39 | 8.4 |
| SSW | 2.35 | 8.3 |
| SW | 2.32 | 8.3 |
| WSW | 1.73 | 7.1 |
| W | 1.58 | 6.8 |

③ Equivalent deep-water wave height

To the design offshore waves in deep sea area obtained in ②, wave deformation calculation (irregularity, multi-directional characteristics, refraction, diffraction and reflection of waves) is applied from offshore wave calculation point to target design facility, and equivalent deep-water wave heights are calculated. Energy balance equation, which is the most general calculation method for irregular wave deformation is applied.

Figure 3-2-1-2 (4) to (6) show, as one of examples, equivalent deep-water wave height and direction based for the biggest design offshore wave height in the conditions of $(H_{1/3})_0=2.39\text{m}$, $(T_{1/3})_0=8.4\text{s}$, and direction =S.

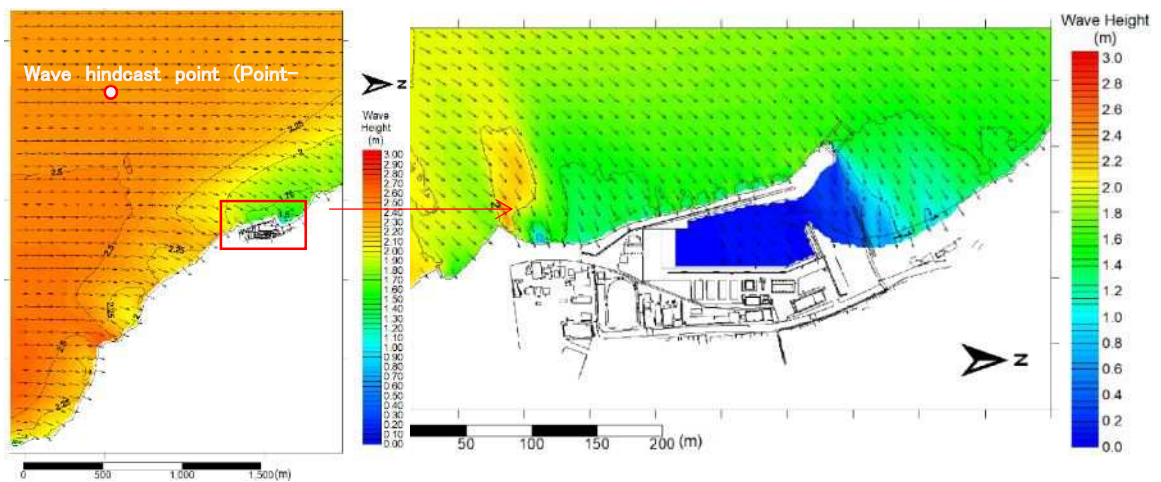


Figure 3-2-1-2 (4) Distribution of equivalent deep-water wave heights and wave directions (incident wave: $(H_{1/3})_0=2.39\text{m}$, $(T_{1/3})_0=8.4\text{s}$, direction=S)

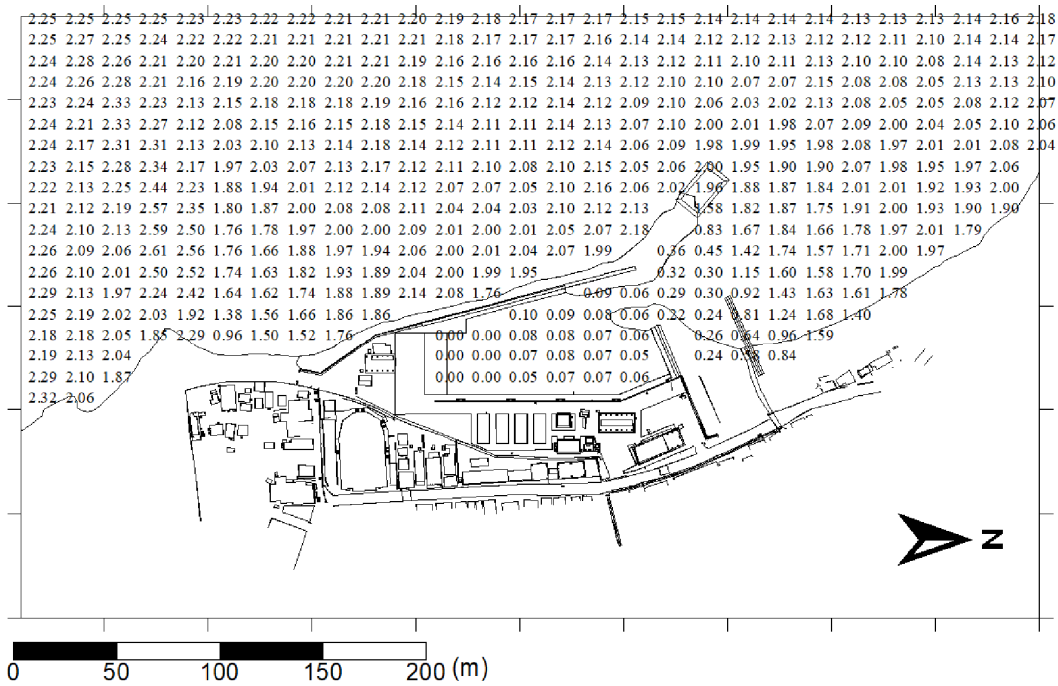


Figure3-2-1-2 (5) Equivalent deep-water wave heights (incident wave: $(H_{1/3})_0=2.32\text{m}$, $(T_{1/3})_0=8.3\text{s}$, and direction=SW)

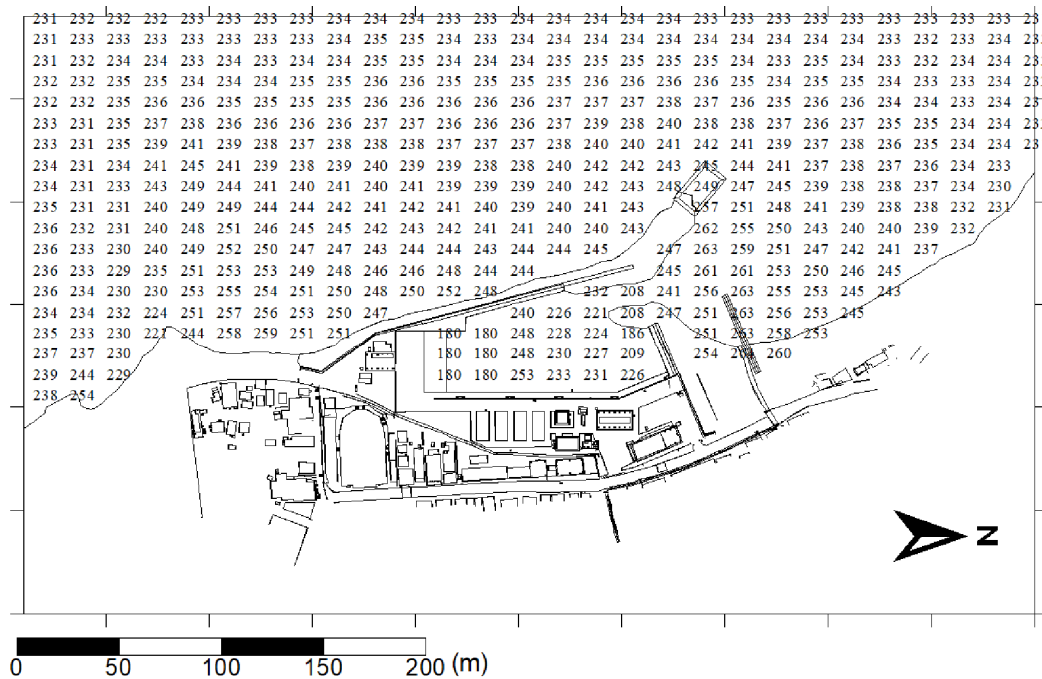
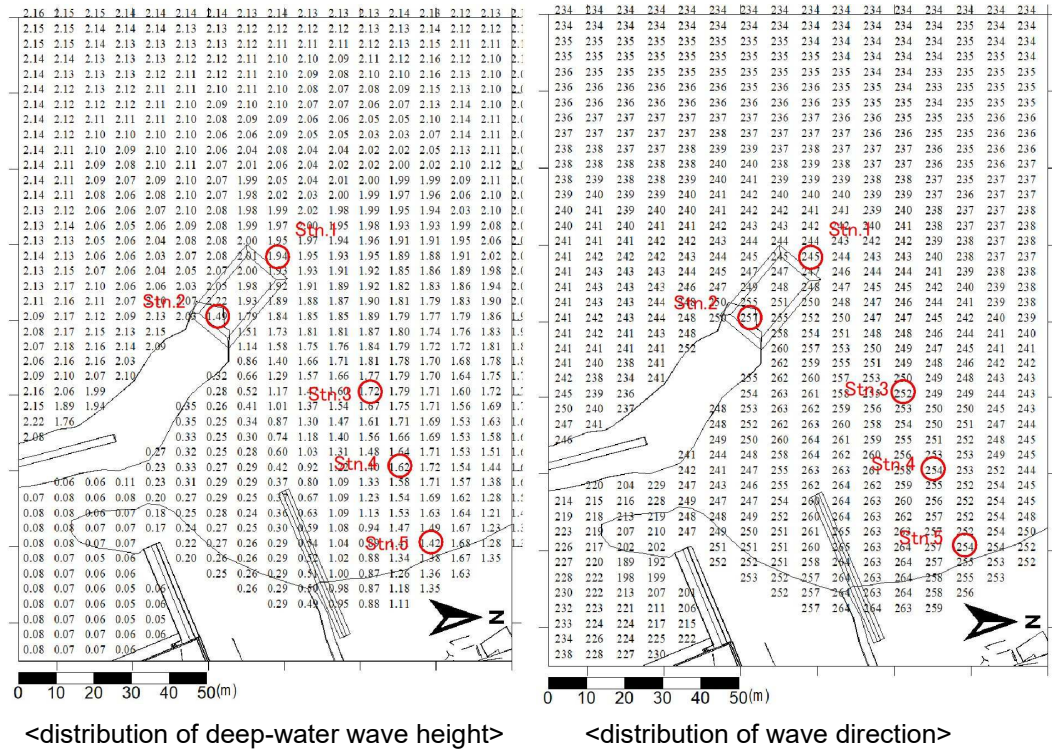


Figure 3-2-1-2 (6) Distribution of wave directions (incident wave: $(H_{1/3})_0=2.32\text{m}$, $(T_{1/3})_0=8.3\text{s}$ and direction= SW)

Figure 3-2-1-2 (7) shows examples of height and direction distribution of equivalent deep-water waves around the design target facilities, which are detailed and extracted from Figure 3-2-1-2 (5) and (6).

Table 3-2-1-2 (2) organizes height and direction of equivalent deep-water waves extracted around the target design facility. Highlight in red means the maximum value of equivalent deep-water wave height in each point.



Conditions of incident waves: $(H_{1/3})_0 = 2.32\text{m}$, $(T_{1/3})_0 = 8.4\text{s}$, direction=SW

Figure 3-2-1-2 (7) Details of height and direction distribution of equivalent deep-water waves around target design facility

Table3-2-1-2 (2) List of height and direction of equivalent deep-water wave at target areas

| incident wave | | stn.1 | | stn.2 | | stn.3 | | stn.4 | | stn.5 | | |
|---------------|--------------------------|--------|---------------------------------------|---------------|---------------------------------------|---------------|---------------------------------------|---------------|---------------------------------------|---------------|---------------------------------------|-----|
| direction | offshore wave height (m) | period | equivalent deep-water wave height (m) | direction (°) | equivalent deep-water wave height (m) | direction (°) | equivalent deep-water wave height (m) | direction (°) | equivalent deep-water wave height (m) | direction (°) | equivalent deep-water wave height (m) | |
| SE | 2.19 | 8 | 0.63 | 229 | 0.53 | 251 | 0.5 | 259 | 0.45 | 263 | 0.39 | 262 |
| SSE | 2.34 | 8.3 | 1.12 | 232 | 0.92 | 252 | 0.91 | 259 | 0.82 | 264 | 0.71 | 262 |
| S | 2.39 | 8.4 | 1.54 | 235 | 1.25 | 253 | 1.27 | 260 | 1.17 | 264 | 1.01 | 262 |
| SSW | 2.35 | 8.3 | 1.79 | 239 | 1.43 | 255 | 1.53 | 261 | 1.42 | 264 | 1.24 | 263 |
| SW | 2.32 | 8.3 | 1.94 | 245 | 1.49 | 257 | 1.72 | 262 | 1.62 | 265 | 1.42 | 263 |
| WSW | 1.73 | 7.1 | 1.52 | 253 | 1.06 | 260 | 1.39 | 263 | 1.3 | 265 | 1.13 | 264 |

(Note) wave direction: clockwise from N

④ Design wave (in front of facility) $H_{1/3}$

Based on the water depth at Stn1 to Stn5 and read-out value of converted offshore wave height, wave in front of structure in each point is calculated.

For the calculation, Goda's simplified equation is applied, and significant wave height $H_{1/3}$ and H_{max} depending incident wave direction is summarized in Table 3-2-1-2 (3) by water depth and facility location.

Significant wave height: $H_{1/3}$

$$H_{1/3} = K_s H'_0 : \quad h/L_0 \geq 0.2$$

$$= \min\{(\beta_0 H'_0 + \beta_1 h), \beta_{max} H'_0, K_s H'_0\} : \quad h/L_0 < 0.2 \quad \dots(3.1)$$

Where, $\min\{ \}$: minimum value in square bracketed, H'_0 : converted offshore wave height, K_s : shallow water coefficient

Coefficients in the above equation is obtained as follows.

$$\beta_0 = 0.028(H'_0/L_0)^{-0.38} \exp[20 \tan^{1.5} \theta]$$

$$\beta_1 = 0.52 \exp[4.2 \tan \theta]$$

$$\beta_{max} = \max\{0.92, 0.32(H'_0/L_0)^{-0.29} \exp[2.4 \tan \theta]\}$$

Maximum wave height: H_{max}

$$H_{max} = 1.8K_s H'_0 : \quad h/L_0 \geq 0.2$$

$$= \min\{(\beta_0^* H'_0 + \beta_1^* h), \beta_{max}^* H'_0, 1.8K_s H'_0\} : \quad h/L_0 < 0.2 \quad \dots(3.2)$$

Where, $\min\{ \}$: minimum value in square bracketed, H'_0 : converted offshore wave height, K_s : shallow water coefficient

Coefficients in the above equation is obtained as follows.

$$\beta_0^* = 0.52(H'_0/L_0)^{-0.38} \exp[20 \tan^{1.5} \theta]$$

$$\beta_1^* = 0.63 \exp[3.8 \tan \theta]$$

$$\beta_{max}^* = \max\{1.65, 0.53(H'_0/L_0)^{-0.29} \exp[2.4 \tan \theta]\}$$

Table 3-2-1-2 (3) Calculation result of waves in front of facility at extracted points

| incident wave (offshore wave) | | | stn.1 | | stn.2 | | stn.3 | | stn.4 | | stn.5 | |
|-------------------------------|------------|------------|------------------|--------------|------------------|--------------|------------------|--------------|------------------|--------------|------------------|--------------|
| direction | height (m) | period (s) | significant wave | maximum wave | significant wave | maximum wave | significant wave | maximum wave | significant wave | maximum wave | significant wave | maximum wave |
| SE | 2.19 | 8.0 | 0.76 | 1.37 | 0.77 | 1.39 | 0.82 | 1.27 | 0.73 | 1.17 | 0.60 | 0.86 |
| SSE | 2.34 | 8.3 | 1.47 | 2.65 | 1.29 | 2.01 | 1.23 | 1.82 | 0.97 | 1.38 | 0.64 | 0.94 |
| S | 2.39 | 8.4 | 1.93 | 3.03 | 1.43 | 2.18 | 1.33 | 1.88 | 1.02 | 1.45 | 0.69 | 1.01 |
| SSW | 2.35 | 8.3 | 2.05 | 3.13 | 1.46 | 2.22 | 1.37 | 1.93 | 1.04 | 1.49 | 0.70 | 1.04 |
| SW | 2.32 | 8.3 | 2.08 | 3.18 | 1.45 | 2.21 | 1.36 | 1.96 | 1.06 | 1.54 | 0.73 | 1.08 |
| WSW | 1.73 | 7.1 | 1.77 | 2.81 | 1.32 | 2.04 | 1.30 | 1.83 | 1.01 | 1.42 | 0.68 | 0.99 |
| water depth (m) | | | -2.5 | | -1.5 | | -1.5 | | -1 | | -0.5 | |

5) Soil conditions

Boring survey was not conducted in this Survey. Therefore, result of boring survey conducted in “Basic Design Study Report on the Project for Coastal Fisheries Development in Saint Lucia (2001)” is referred, and N values from 2 points closest to the site of this Project are extracted for alternatives.

Results are as shown in Table 3-2-1-2 (7).

Table 3-2-1-2 (4) Average N value used to design facilities

| Depth from sea bottom | Soil quality | N value near submerged breakwater | N value near second groyne |
|-----------------------|----------------------|-----------------------------------|----------------------------|
| -1m~-6m | Gravel with boulders | 14 | 20 |
| -6m~-7.5m | Gravel with boulders | 30 | 30 |
| -7.5m~ | Coarse sand | 50 or more | 50 or more |

(6) Basic policy in construction circumstances

Construction machine and material is procured in Saint Lucia as much as possible. It is possible that stone material, cement and aggregates are sufficiently procured in Saint Lucia. JIS or equivalent is applied as standards for materials.

Choiseul district including the Project site is small, so it is difficult to secure temporary yard in the neighborhood of the Project site. Therefore, hopefully, production of concrete blocks is conducted in a yard possessed by a local contractor, then the blocks are transported and installed.

As a result of this Survey over local contractors, there are various contractors from middle class to high class specialized in marine works. Generally, unit prices offered by contractors in Caribbean region are high, so Project cost is estimated in assuming leasing construction machine.

(7) Basic policy in construction method / procurement method, and construction period

Access road established in this Survey is used as mound of second groyne.

Considering the cost, marine heavy machine which is only procurable from other countries is not used, and gradual construction from land side for dredging works and submerged breakwater is judged as the most appropriate.

In this Project, minor improvement works with monitoring for 3 years are expected. Especially, such minor improvement work is likely to happen to submerged breakwater. Therefore, appropriate structure and construction plan is adopted considering minor monitoring works.

Project period is examined so that conclusion of Exchange of Notes to monitoring period is carried out in 5 years.

(8) Basic policy in construction supervision

There are some concerns in mid-class local contractors such as unpunctuality in construction period and quality control. Therefore, traditional style where a Japanese contractor is awarded as a prime company is adopted.

(9) Basic policy in safety measures

Since construction works in the Project are proceeded with fisheries activities ongoing in the port, safety considerations are necessary for fishing boats operation and construction machine such as crawler cranes, especially in case of constructing submerged breakwater and dredging in port entrance or navigation channel.

Also, roads in Choiseul district is narrow and sharply winding. Especially in junctions between construction vehicles and roads used by local residents, attention and safety measure is needed to prevent traffic accidents.

(10) Basic policy in social economic conditions and environmental social consideration

In this Project, construction is implemented in parallel to fishery activities. It is assumed that environmental monitoring on water quality and noise is carried as environmental and social consideration during construction.

To prevent traffic accidents by construction vehicle and private vehicle between a quarry and the Project site, it is obliged to allocate traffic control personnel to some points where a road is narrow or private houses are concentrated.

Additionally, as a consideration to gender aspect, it is instructed in the bidding document that wage gap between male and female is not generated.

3-2-2 Basic Plan

3-2-2-1 Civil engineering facility

(1) Setting of dredging scale

1) Dredging area

As shown in Figure 3-2-2-1 (1), dredging area composes of Area A (3,650m²): inside the port and Area B (2,300m²): navigation channel and front area of temporary quay.

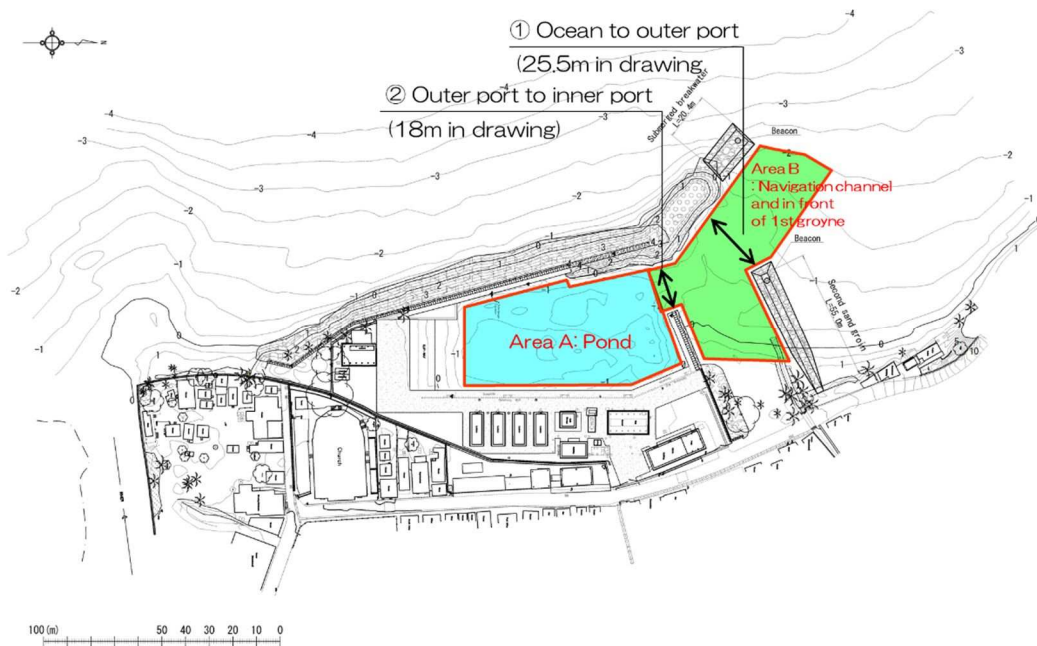


Figure 3-2-2-1 (1) Dredging area

2) Setting of navigation channel

Width of navigation channel in planning fishing ports in general is listed in Table 3-2-2-1 (1). Minimum 10m is necessary at the entrance to Area A, and width of 18m is secured in actual measurement. Minimum requirement in Area B is 12m wide, and 25.5m is secured.

Table 3-2-2-1 (1) Setting of width of navigation channel

| Location of navigation channel | Standard width | | Present width |
|--------------------------------|----------------|-----------|---------------|
| ① Ocean to outer port | 6B – 8B | 12m - 16m | 25.5m |
| ② Outer port to inner port | 5B – 6B | 10m - 12m | 18.0m |

*1 Reference: "Guideline for fishing port planning" in Japan, November 1992

*2 B: Width of target fishing boats. Maximum B of present target fishing boats W=2.0m is applied. (Enlargement of fishing boats in the future is taken into consideration)

Navigation channel is ideally straight for easier operation. Even in case navigation channel is inevitably bent, the angle is limited under 30 degrees. Maximum steering angle of fishing boats is usually more or less 30 degrees. If a boat turns exceeding this angle, stern of a boat is pushed outward (fishtailing called “kick phenomena”) and quarter length of the body is outward from the track. For now, turnover or problems related to maneuvering has not been confirmed. However, after construction of submerged breakwater, current on the back side is expected to be faster, so enough width is hopefully secured for kick phenomena.

From the above, Figure 3-2-2-1 (2) shows the navigation channel which satisfy the minimum requirements in compliance with the standards for normal and width as navigation channel.



Figure 3-2-2-1(2) Setting of navigation channel in minimum requirement

3) Setting of necessary water depth

It is essential to maintain water depth so that full loaded fishing boats are operated without problems in the pond and navigation channel even in low tide. Generally, extra depth for motions or sinkage of fishing boats due to waves are added to the maximum water depth in pond and navigation channel. According to Japanese “Guideline for planning fishing ports (November, 1992)”, 1.0m or more in case of solid sea bottom and 1.0m in case of soft sea bottom is needed for extra depth.

Since the pond is calm and motion of fishing boats by waves is weaker, so 0.5m for extra depth seems enough. However, 1.0m has been applied in Choiseul fishing port. One-meter extra depth is kept for enlargement of fishing boats in the future.

From the above, -2.0m from C.D.L is adopted in the pond and navigation channel.

Water depth in navigation channel and pond

$$\begin{aligned} &= \text{draft of operated maximum fishing boat (0.8m) + extra depth} \\ &= 0.8\text{m} + 1\text{m} = 1.8\text{m} \approx 2.0\text{m} \end{aligned}$$

Water depth of -1.5m is applied to temporary quay attached to second groyne since it is for temporary use, and present condition where water depth is -50cm shallower than the original plan does not cause problems in the existing quays inside the port.

4) Estimation of dredging volume of sand

Table 3-2-2-1 (2) lists estimated dredging volume under the conditions of above 1) and 3).

Table 3-2-2-1(2) Estimated dredging sand volume

| Area | Dredging volume | Dredging volume (including 30cm extra dredging) |
|--------|---------------------|---|
| Area A | 2,600m ³ | 3,900m ³ |
| Area B | 4,600m ³ | 5,600m ³ |
| Total | 7,200m ³ | 9,500m ³ |

(2) Second groyne

1) Structure type

Access road composed of rubble stones, which has prepared for dredging in this Survey is used as mound of second groyne, so the same rubble stone structure is adopted to the second groyne. In this case, construction works from the land is possible.

To prevent the sediment transport through the rubble mound, concrete blocks are used for impermeability. Concrete blocks are also used for temporary quay.

Beach on north side of second groyne is temporarily occupied to stock stones materials during construction.

2) Plan layout

Layout of second groyne is the same as numerical simulations and hydraulic model experiment in case of no submerged breakwater, which have been conducted in Data Collection Survey. In the case that noticeable amount of sand is transported to the south side of groyne during monitoring period, minor improvement work, such as tilting the tip of second groyne to southward or the length is extended, is considered. (See Figure 3-2-2-1(3))

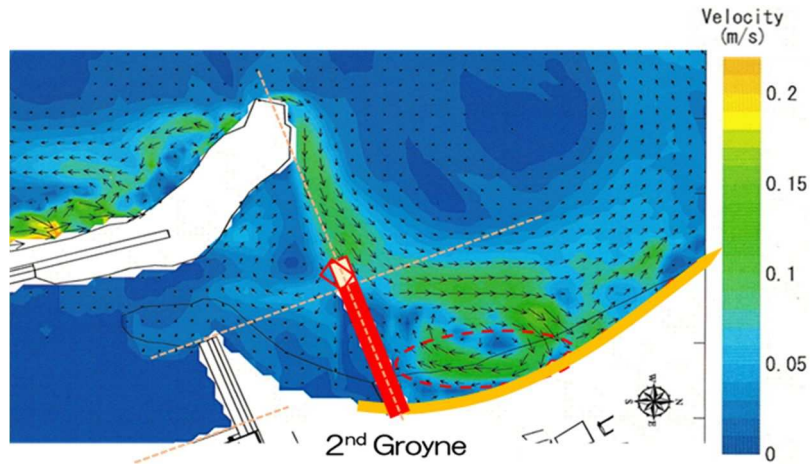


Figure 3-2-2-1(3) Plan layout of second groyne

3) Necessary weight of rubble stones

Waves with return period of 50 years in front of second groyne is as follows at maximum: wave height $H_{1/3} = 1.36\text{m}$, wave period $T_{1/3} = 8.3\text{s}$, and direction SW (see Table 3-2-1-2 (1)).

With these conditions, Hudson formula (4.3) is applied for weight of armor stones, and $W = 0.6\text{t}$ is obtained. Therefore, 600kg - 1t is adopted for armor stones. At the tip of groyne, the weight is multiplied by 1.5 and $W = 1.0\text{t}$ to 1.5t is applied.

$$W = \frac{\rho_r H^3}{K_D (S_r - 1)^3 \cot \alpha} \dots\dots\dots(4.3)$$

Where

- W : necessary weight of armor stones on slope (t)
- ρ_r : unit weight of armor stones on slope (2.60t/m^3)
- H : wave height used for design calculation (1.36m)
- K_D : constant determined by form and damage rate of armor stones (2.4)
- S_r : specific gravity of armor stones on slope to sea water (ρ_r / ρ_0)
- ρ_0 : density of sea water (1.03t/m^3)
- α : angle of slope to the horizontal dimension ($\cot \alpha = 1.5$)

4) Setting of crown height and width

① Crown height

Figure 3-2-2-1(4) shows a superposition of profiles in north beach based on bathymetric and shoreline survey conducted six times from November 14, 2017 to September 25, 2018. Elevation of back shore in Survey line I where hardly shielding effects are brought by the additional breakwater is +1.5m. On the other hand, that in Survey line II where bigger shielding effects are given by the additional breakwater is between +1.0m and +1.5m. This implies that, if crown height of second groyne is higher than +1.5m, sand transportation is prevented over the second groyne. Besides, this implication is based on the data for 1 year, so cautious design on the safe side is necessary.

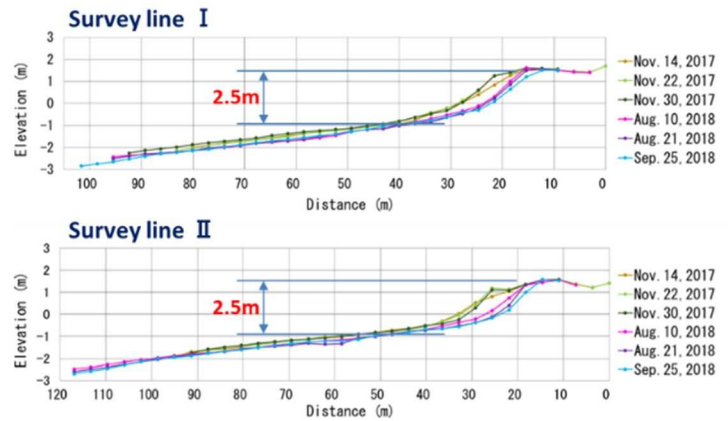


Figure 3-2-2-1(4) Superposition of profiles in north beach

Modified virtual slope method is applied to obtain wave run-up height. With the conditions of $H_0' = 1.72\text{m}$, $T = 8.3\text{s}$ (refer to Table 3-2-1-2(2)), $L_0 = 107.47\text{m}$, $H_0/L_0 = 0.016$, sea bottom slope = $1/10$, and tide level (H.W.L) = $+0.31\text{m}$, in reference with Figure 3-2-2-1(5), $R/H_0 = 0.9$ is obtained by seeking an intersection between sea bottom slope $\cot\alpha = 10$ and H_0/L_0 , and resultantly run-up height $R = 1.548\text{m}$ is obtained. Since the mean higher high water springs on the targeted shoreline is D.L. $+0.31\text{m}$, the wave run-up height in D.L. reference is obtained as follows:

$$R(1.548) + \text{Tide level } 0.31\text{m} = \text{C.D.L.} + 1.86\text{m}$$

Thus, D.L. $+1.86\text{m}$ as crown height of second groyne is enough. However, crown height of C.D.L. $+2.0\text{m}$ is applied with extra height in the Project to prevent also wind-blown sand movement.

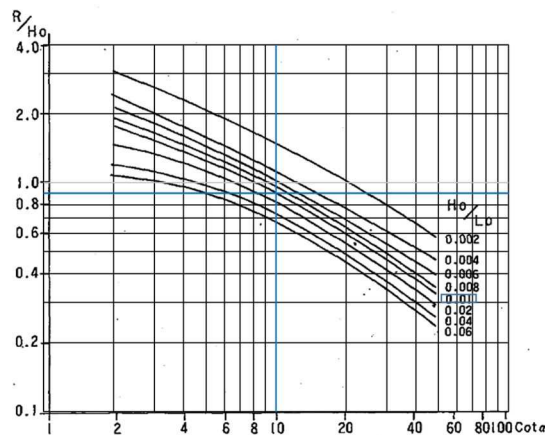


Figure 3-2-2-1(5) Wave run-up height by modified virtual slope method

② Crown width

Based on the evaluation below, crown width of second groyne is 3.0m to ensure safe walks by people.

- In case of 3 pedestrians = $0.6 \text{ m/person} \times 3 \text{ persons} + (\text{extra } 0.5\text{m} \times 2) = 2.8\text{m}$
- In case of 2 pedestrians in wheelchairs = $1.2\text{m} \times 2 \text{ persons} + (\text{extra } 0.5\text{m} \times 2) = 3.2$

Figure 3-2-3-1 (6) shows simplified cross section of second groyne.

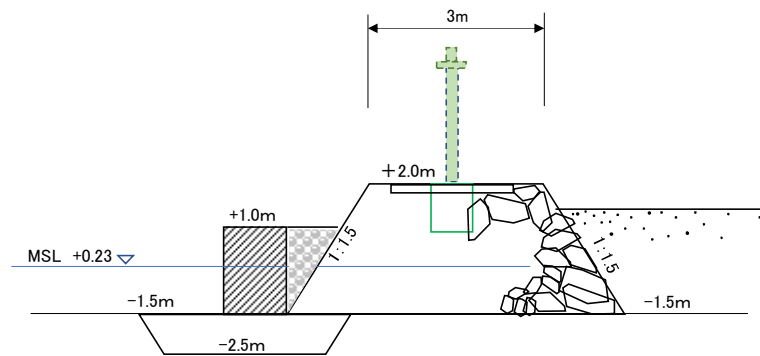


Figure 3-2-2-1(6) Simplified cross section of second groyne

(3) Submerged breakwater

1) Structure type

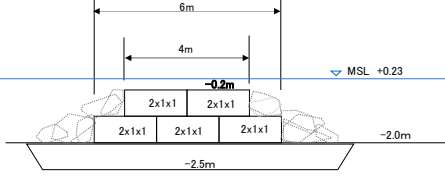
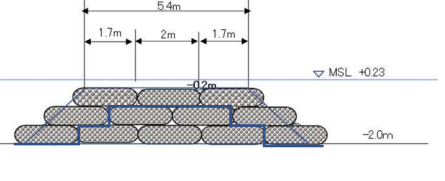
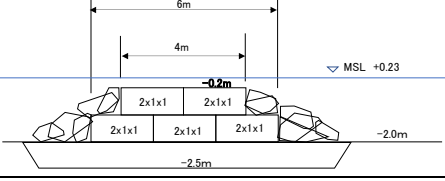
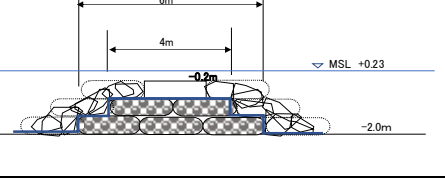
Effects of submerged breakwater at the tip of breakwater were carefully studied through numerical simulation and hydraulic model experiment in Data Collection Survey. However, there are no past experiences globally. Therefore, minor improvement work on submerged breakwater possibly occur during the monitoring period after construction. Thus, occurrence of minor improvement work is taken into consideration for structure type of submerged breakwater.

Additionally, based on the hydraulic model experiment, it is required that submerged breakwater has impermeable structure.

In consideration of easiness of minor improvement work, concrete block structure and bag material structure are compared. The former is completely impermeable with the use of concrete blocks, the latter gets impermeable with sand prevention sheet between armor stones and bag materials.

Table 3-2-2-1(3) is a comparison result between these structures, and bag material structure is adopted as temporary cross section for monitoring period. Finally, this type is completed as “bag material + armor stone” structure.

Table 3-2-2-1(3) Comparison of structural cross section of submerged breakwater

| | “concrete block + rubble stone” structure | “bag material + armor stone” structure |
|--|--|---|
| Temporary cross section (construction phase) |  |  |
| ① Workability | By manufacturing precast concrete blocks (4.6t) outside the site, the difficulty in securing a yard on site is settled. Placement of precast concrete blocks are easy. If scale of 10t/block is required, transport by 10t class trucks, which causes problems, and use of large crane is needed. ----- C: Difficult | By manufacturing bag materials (4t/bag) outside the site, the difficulty in securing a yard on site is settled. There is no problem in transporting from outside of the site by 10t class trucks. Placement is easy. ----- A: Very good |
| ② Stability | If blocks weigh 4.6t, sliding or displacement possibly occur before armoring due to the waves directly hitting the blocks. Even 10t blocks are not stable enough for monitoring period. ----- D: Problematic | Necessary weight in case of all bag materials in cross section is 1.89t per bag to design waves, so there are no problems in stability. ----- B: Good |
| ③ Workability for minor improvement work | If concrete blocks have slings, replacement is easy, but adjustment of height is difficult. ----- C: Difficult | Relocation of bag materials is relatively easy, but damage possibly occurs since they are used for temporary purposes. Height is adjusted by the volume of filling materials. ----- B: Good |
| ④ Realization of impermeability | It is completely impermeable because of used of concrete blocks. ----- A: Very good | It gets impermeable by using sand prevention sheet between armor stones and rubble stones. ----- B: Good |
| Completion cross section (after monitoring) |  |  |
| ⑤ Stability | There are no problems on stability if armor stones (3t/stone) are placed after monitoring and verification of effects. ----- B: Good | There are no problems. ----- B: Good |
| ⑥ Durability | There are no problems. ----- B: Good | Durability is limited to some years since bag materials are used for temporary purposes. However, once armor stones (3t/stone) are placed, there are no problems as a permanent structure. ----- B: Good |
| ⑦ Economic efficiency | Economic efficiency is almost the same as bag material type. ----- B: Good | Economic efficiency is almost the same as concrete block type. ----- B: Good |
| Evaluation | C: Difficult | B: Good |

2) Plan layout

The same layout and extension of 20m examined by numerical simulation and hydraulic model experiment in Data Collection Survey is applied in constructing submerged breakwater. Based on the effects and evaluations analyzed in monitoring period, minor improvement work (such as layout change) is carried out if necessary.

3) Necessary weight of rubble stones

Conditions of waves with return period of 50 years in front of submerged breakwater are as follows: wave height $H_{1/3} = 2.08\text{m}$, period $T_{1/3} = 8.3\text{s}$, and direction SW (see Table 3-2-1-2 (1)).

With those conditions, $W = 1.84\text{t}$ ($K_D = 2.4$) is obtained after solving Hudson formula (4.3) for weight of armor materials on slope. However, submerged breakwater is attached at the tip of existing additional breakwater so the necessary weight is multiplied by 1.5. Then, $W = 2.76\text{t}$ is obtained, so stones of 3t are used for armoring. On the other hand, necessary weight for bag materials at the time of temporary cross section is $W = 1.3\text{t}$ ($K_D = 3.54$).

4) Setting of crown height and crown width

Submerged breakwater aims to reduce the sand transport into the port utilizing following 4 characteristic functions of submerged breakwater.

- ① weak sheltering function,
- ② wraparound prevention,
- ③ scouring behind submerged breakwater, and
- ④ rapid onshore direction current generated on submerged breakwater

However, it is not easy to determine its representative specifications, crown height and crown width. For example, transmission ratio (ratio of height of transmitted waves and incident waves) is an important factor for above ①. Equation (4.4) shows the transmission ratio of submerged breakwater that Takayama and Ikeda (1998)³⁾ proposed, based on experiment data. The equation means that transmission ratio decreases as the crown height is wider, and the transmission ratio increases as the water depth above the crown is larger. Therefore, infinite combination of (B , h) which realizes specific transmission ratio T_r exists. Moreover, in terms of above ②, ③ and ④, any systematic studies have not been carried out. Therefore, determination of such specification is not based on these facts.

$$T_r = -0.61 B/L_0 + 0.40 h/H_0 + 0.59 \dots\dots\dots(3.4)$$

- Where
- T_r : transmission ratio
 - B : crown width
 - h : water depth above submerged breakwater (crown height)
 - L_0 : wave length of offshore waves
 - H_0 : wave height of offshore waves

3)Takayama,T. and N.Ikeda(1988) : Wave transformation behind a broad submerged breakwater and effects of the breakwater on wave over-topping, Rep. of Port & harbour Res. Inst., Vo.27, No.4, pp.63-92(in Japanese).

It has been confirmed that specifications of submerged breakwater studied in hydraulic model experiments and numerical simulation in Data Collection Survey have the characteristics functions of ① to ④, so implementation cross section (crown height and crown width) is determined following the above-mentioned cross sections.

DL-0.2m, which is the same height used in hydraulic model experiments and numerical simulation, is adopted for the crown height.

Crown width in hydraulic model experiments is confirmed in the document at that time, because it is not clearly indicated in report²⁾ and the hydraulic model has been already removed, so it has been read from the photos. In Photo 3-2-2-1(1), scales are installed so that size of submerged breakwater is measured. Scale of the model was 1/15 without distortion, so it is read that crown width is 5m and distance between slope ends is 11m.

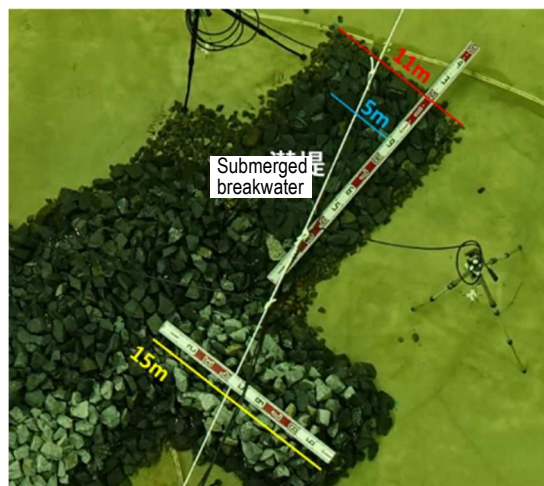


Photo 3-2-2-1 (1) Confirmation of crown width in hydraulic mode experiment

Figure 3-2-2-1(7) is a cross section drawing at the tip of submerged breakwater determined with consideration of cross section drawings of hydraulic model experiments and numerical simulation. Cross section of numerical simulation was decided under the condition that a side of calculation grid is 2m long, and it is bigger than the cross section of hydraulic model experiments.

Therefore, cross section which is intermediate between both is adopted for construction cross section, resultantly crown width is 6m and slope is 1: 1.5.

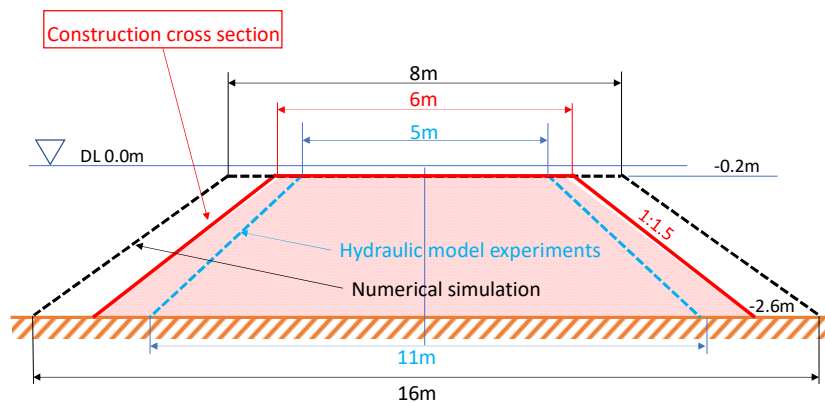


Figure 3-2-2-1 (7) Cross section of submerged breakwater (at the tip of submerged breakwater)

(4) Beacon lights

Based on a meeting with SLASPA (Saint Lucia Air and Sea Ports Authority), new beacon light is installed respectively on submerged breakwater and second groyne, and existing 2 beacon lights are fixed. As to the 2 new beacon lights, considering requests from Choiseul fishing port management office, light visible distance is 8 miles.

Both Saint Lucia and Japan belong to B system in IALA (International Association of Lighthouse Authorities), color of body and light is green on the left side and red on the right side from the point of offshore view.

Table 3-2-2-1(4) shows technical specifications of beacon lights. Same color lights between new and existing beacon lights are designed to blink simultaneously so that users in fishing boats easily distinguish the colors. Reaching distance of new beacon lights is intentionally farther than the existing beacon lights for easy recognition of navigation channel entrance. Elevation of new beacon lights are determined so that the beacon lights are visible from 8 miles away from the fishing port.

Table 3-2-2-1(4) Specifications of beacon lights

| Color of blink and point of installation | | New beacon lights (2 lights) | Existing beacon lights (2 lights) |
|--|---------------------------|--|--|
| Red Beacon | Right side, seen from sea | Rapid blinks colored in red with visible distance of 8 miles | Rapid blinks colored in red with the visible distance of 2 miles |
| Green Beacon | Left side, seen from sea | Rapid blinks colored in green with the visible distance of 8 miles | Rapid blinks colored in green with the visible distance of 2 miles |

For existing beacon lights to be fixed, replacement of head light and solar panel as shown in Photo 3-2-2-1(2) is carried out.



Photo 3-2-3-1 (2) Replacement of repaired beacon lights (example)

(5) Temporary quay (for mooring and landing while the port entrance is closed)

1) Number of target fishing boats

Operating 31 fishing boats out of registered 59 are estimated to use the temporary quay. Table 3-2-2-1 (5) lists specifications of target fishing boats.

For fishing boats which are not frequently operated, use of existing fishing port or landing on north beach is estimated.

Table 3-2-2-1 (5) Specifications of target fishing boats using temporary quay

| | Length (m) | Width (m) | Maximum draft (m) |
|----------------|------------|-----------|-------------------|
| Specifications | 6~10 | 1.8 | 0.8 |

2) Plan layout

Temporary quay is attached to the second groyne and located between existing groyne and second groyne.

3) Length

Generally, fishing boats are moored horizontally to the structure for fish landing. However, since water area is limited and length of temporary quay is the same as the second groyne at maximum, so it is designed assuming vertical mooring in 2 alignments.

Figure 3-2-2-1 (8) shows vertical mooring of fishing boats. Necessary length of berth for each fishing boat is $B + 0.5B = 2.7\text{m/boat}$ (B: boat width: 0.8m). In case 26 targeted fishing boats are moored in 2 alignments, $2.7\text{m/boat} \times 13 \text{ boats} = 35\text{m}$ are needed. Thus, south side of the second groyne is dredged to secure the water depth for the necessary length.

Since 31 fishing boats are operating in 2021, 5 fishing boats (31 boats -26 boats) are planned to be moored in the northern beach or out fishing.

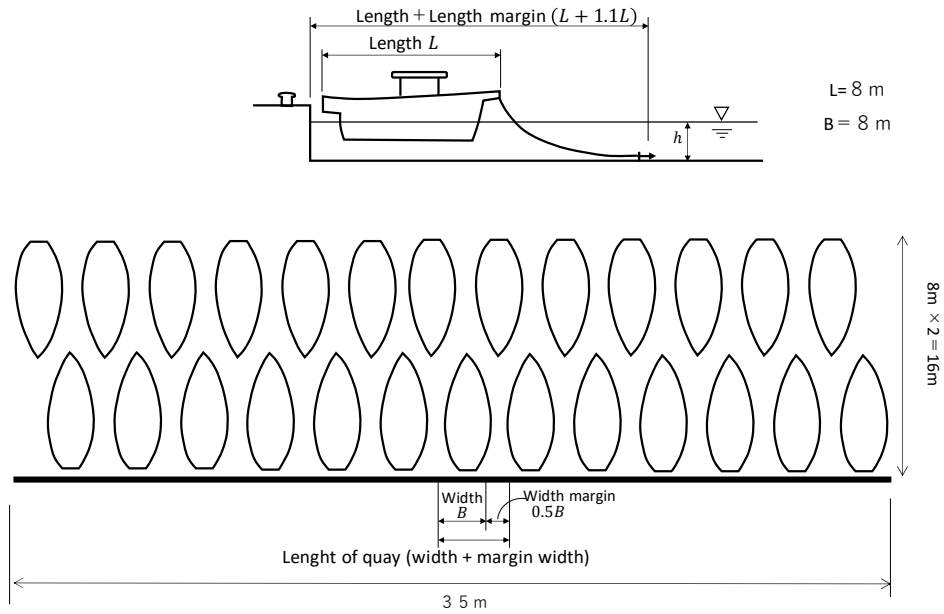


Figure 3-2-2-1 (8) Vertical mooring

4) Basic structure

Concrete block structure is adopted for temporary quay so that the temporary quay functions as a berth, and second groyne has impermeable structure. Figure 3-2-2-1 (9) is the simplified cross section.

Since maximum draft of target fishing boats is 0.8m, so water depth is planned at -1.5m including extra 0.5m. In the installation location of concrete blocks, mound is formulated by extra excavation and aggregates at -1.5m.

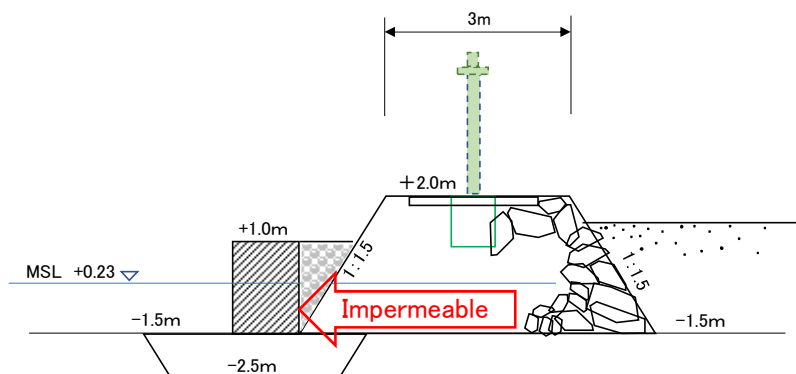


Figure 3-2-2-1 (9) Simplified cross section of temporary quay attached to second groyne (impermeable structure)

5) Period of port entrance closure

It is assumed that temporary quay is used when the construction takes place at the submerged breakwater and port entrance is closed. (See Figure 3-2-2-1 (10).) During such period, boat trailers are used to move fishing boats between inside the port and temporary quay, so 2 boat trailers are procured as temporary equipment.

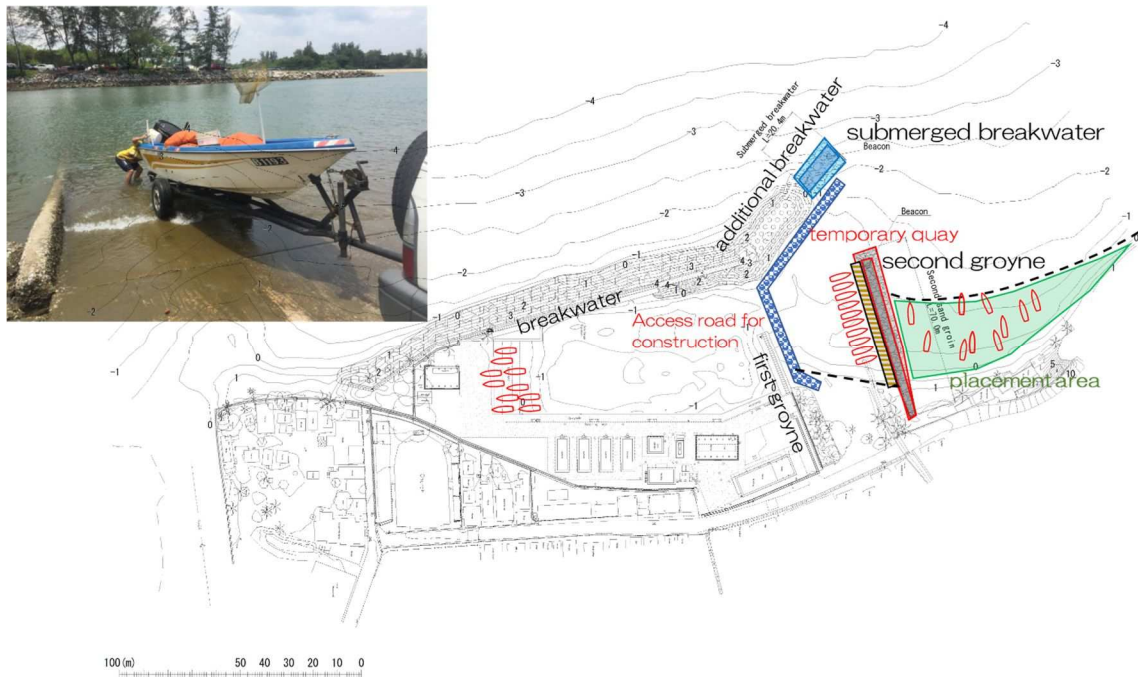


Figure 3-2-2-1 (10) Movement of fishing boats by boat trailers between the port and temporary quay

In case of abnormal conditions such as hurricanes, it is concerned that fishing boats being moored to the temporary quay are damaged, so movement into the port is recommended.

(6) New utilization of north beach

According to numerical simulation in Data Collection Survey, shoreline of north beach advances to offshore after second groyne is constructed. This new beach is expected to be a community space connecting fisheries activities and people in hinterland, and harmonizing fisheries and sightseeing industry. It is possible for fisherfolks to use the new beach for establishing stands to sell fish or enjoying barbecue or swimming.

It is noted that utilization of new north beach including second groyne is not a scope of this Project. It is defined by the fisherfolks and residents in Choiseul district after completion of the Project. Reference in this report is made just to imply possible utilization.

3-2-2-2 Procurement machine (dredging machine)

Procurement of dredging machine is not included in this Project. It is because when sedimentation at port entrance is solved after implementation of this Project, dredging machine is no longer needed. The necessity of such dredging machine is evaluated after the 3 years monitoring conducted in the Project.

3-2-2-3 Monitoring plan

(1) Monitoring method

After construction of second groyne and submerged breakwater, monitoring for 3 years is conducted to continuously track sedimentation situations, and comprehend seasonal variations of wave and precipitation conditions in rainy or dry season which are closely related to sediment transport and sedimentation phenomena. Based on the obtained data, effects for sedimentation prevention of second groyne and submerged breakwater are analyzed. Minor improvement work on these facilities is expected to improve the effectiveness for sedimentation.

1) Surveys

Surveys indicated in Table 3-2-2-3 (1) are carried out during monitoring.

Table 3-2-2-3 (1) Contents and frequency of surveys during monitoring

| Survey | Purpose and contents | Frequency |
|--|--|--|
| 1. Bathymetric and shoreline survey | 1) comprehension of tendency of sand deposition and erosion in the fishing port 2) confirmation of sand deposition and scouring near submerged breakwater 3) comprehension of yearly deposition 4) confirmation of shoreline changes in north beach 5) confirmation of sand deposition outside the breakwater 6) confirmation of sea bottom slope and back shore elevation | 1 st year: 4 time/year 2 nd year: 4 time/year 3 rd year: 4 time/year |
| 2. Fluorescent sand survey and current survey | 1) fluorescent sand survey For comprehension of sand transport and current from additional breakwater and offshore side of submerged breakwater, and sand deposition tendency (measurement on 1st, 5th, and 15th day after injection of fluorescent sand) 2) Current survey (during 10 days) Dyeing material is used. 2 points are selected and shooting by a drone is carried out. | For 1) 2 nd year: 1 time/year For 2) 1 st year: 1 time/year 2 nd year: 1 time/year 3 rd year: 1 time/year |
| 3. Data collection on precipitation, hurricanes, wave hindcast | 1) Data collection on precipitation 2) Data collection on hurricanes such as tracks, central air pressure, and wind velocity 3) wave hindcast for the Project site based on wind data of JRA-55 | For 1) and 2) 1 st year: 1 time/year 2 nd year: 1 time/year 3 rd year: 1 time/year For 3) 1 st year: 1 time/year 2 nd year: 1 time/year |

2) Analysis and evaluation

Based on data obtained in previous section 1), following analyses and evaluation are carried out.

Table 3-2-2-3 (2) Analysis of sedimentation amount and Project evaluation

| | Analysis | Evaluation | Frequency |
|----|--|--|---|
| 1. | Analysis on yearly sedimentation amount in Choiseul fishing port | Ratio of bathymetric survey result to the yearly set sedimentation amount from Route-1 and Route-2 | 1 st year: 1 time/year 2 nd year: 1 time/year 3 rd year: 1 time/year |
| 2. | Areas of sedimentation and erosion, and tendency | Effects of submerged breakwater and second groyne | 1 st year: 1 time/year 2 nd year: 1 time/year 3 rd year: 1 time/year |

3) Effects verification of facilities and currents, and countermeasure by numerical simulation

First year:

Using crown height, crown width, length, direction, etc. of submerged breakwater as initial conditions, and based on the analysis and evaluation in (2), calibration of currents (reproduction of present conditions) are carried out in numerical simulation. In case minor improvement work is necessary, multiple patterns in terms of crown height, crown width, length, direction, etc. are considered. Then, including survey data, fluorescent sand survey, current survey, and sedimentation and erosion tendency, improvement plan is determined. If minor improvement work is not necessary, the only reproduction of present conditions is carried out.

Second year:

Unnecessity of minor improvement work in the first year means that expected effects of submerged breakwater are confirmed. In that case, crown height, crown width, length, direction, etc. are adopted as initial conditions of facility, based on the analysis and evaluation of (2), calibration of currents (reproduction of present conditions) is carried out by numerical simulation. On the other hand, if minor improvement work is needed, plural patterns in terms of crown height, crown width, length, direction, etc. are considered. Then, including survey data, fluorescent sand survey, current survey, and sedimentation and erosion tendency, improvement plan is determined.

Third year:

No minor improvement work is implemented, but Project evaluation is carried out. Yearly sedimentation amount is predicted and setting is reviewed. Then necessity of maintenance dredging in the future and frequency is analyzed.

(2) Drawing up of monitoring plan

Due to limitation of validity of E/N period (5 years from conclusion to completion), third minor improvement work is not expected. Therefore, it is kept in mind that minor improvement work takes place twice in maximum in the first 2 years of monitoring period for 3 years in total. Resultantly, “analysis and evaluation” and “countermeasure” are conducted twice in maximum in 2 years.

Table 3-2-2-3 (3) shows monitoring schedule (draft).

Flexibility is required to the first minor improvement work which is judged by analysis in the first year of monitoring.

Table 3-2-2-3 (3) Monitoring schedule (draft)

| Work Item | 1st Year | | | | | | | | | | | | 2nd Year | | | | | | | | | | | | 3rd Year | | | | | | | | | | | |
|---------------------------|----------|---|---|---|---|---|---|---|---|----|----|----|----------|---|---|---|---|---|---|---|---|----|----|----|----------|---|---|---|---|---|---|---|---|----|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| (1) 1st Monitoring | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ① Surveys and Bathymetric | | | ● | | | ● | | | ● | | ● | | | | | | | | | | | | | | | | | | | | | | | | | |
| ② Analysis and estimate | | | | | | | | | ■ | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ③ Improvement plan | | | | | | | | | ■ | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ④ Improvement Work | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (2) 2nd Monitoring | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ① Surveys and Bathymetric | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ② Analysis and estimate | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ③ Improvement plan | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ④ Improvement Work | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (3) 3rd Monitoring | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ① Surveys and Bathymetric | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ② Analysis and estimate | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ③ Project appraisal | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ④ No Improvement Work | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

3-2-3 Outlined Design Drawings

Figure 3-2-3 (1) to 3-2-3 (8) show outlined design cross section drawings. Since submerged breakwater cross section completion is done during monitoring period, temporary and upon completion cross sections are separately shown.

(1) Overall plan drawing

Figure 3-2-3 (1) Overall plan drawing

(2) Submerged breakwater

Figure 3-2-3 (2) Longitudinal cross section drawing of submerged breakwater (temporary)

Figure 3-2-3 (3) Typical cross section drawing of submerged breakwater (temporary)

Figure 3-2-3 (4) Cross section drawing at tip of submerged breakwater (temporary)

Figure 3-2-3 (5) Longitudinal cross section drawing of submerged breakwater (completed)

Figure 3-2-3 (6) Typical cross section drawing of submerged breakwater (completed)

Figure 3-2-3 (7) Cross section drawing at tip of submerged breakwater (completed)

(3) Second groyne (including temporary quay)

Figure 3-2-3 (8) Plan drawing of second groyne (including temporary quay)

Figure 3-2-3 (9) Longitudinal cross section drawing of second groyne (including temporary quay)

Figure 3-2-3 (10) Typical cross section drawing of second groyne (including temporary quay)

(4) Beacon light

Figure 3-2-3 (11) Typical cross section drawing of beacon lights (newly installed)

Figure 3-2-3 (12) Typical cross section drawing of beacon lights (replacement light)

(1) Overall plan drawing

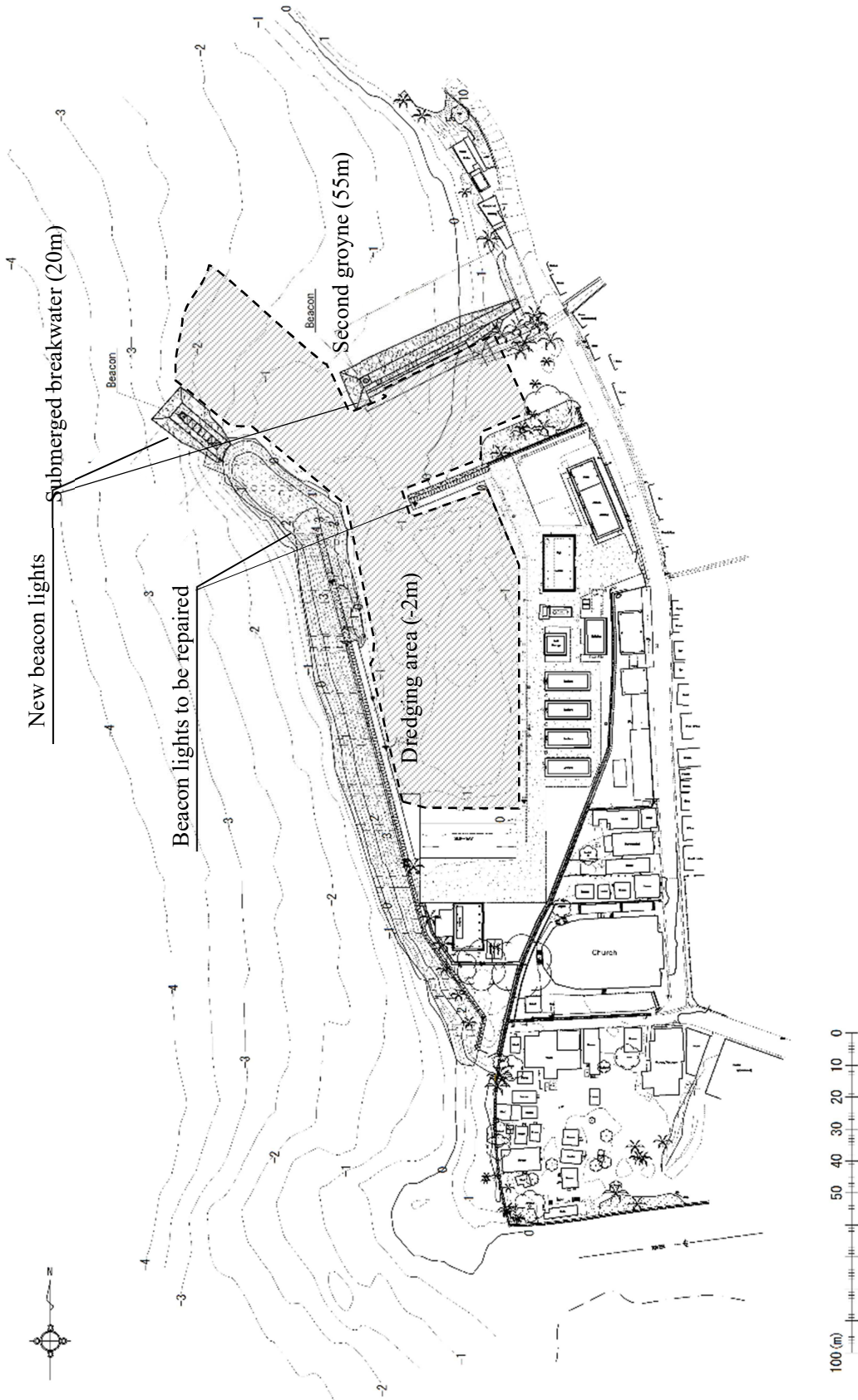


Figure 3-2-3 (1) Overall plan drawing

(2) Submerged breakwater
 1) Construction phase (temporary)

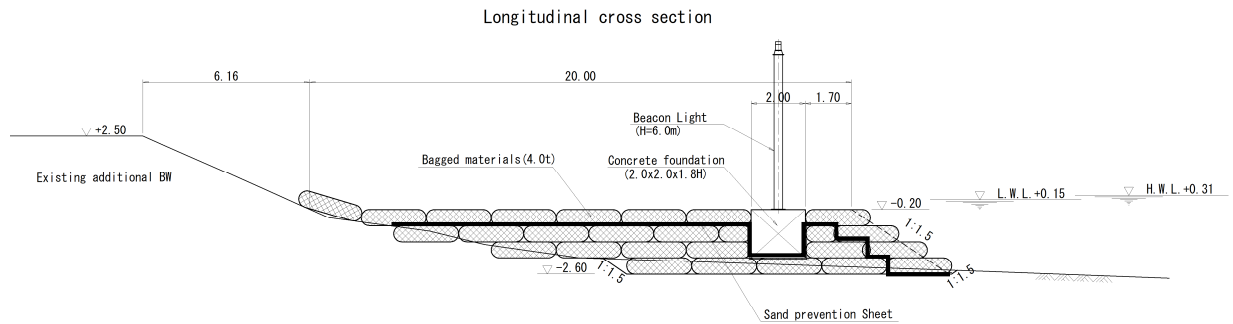


Figure 3-2-3 (2) Longitudinal cross section drawing of submerged breakwater (temporary)

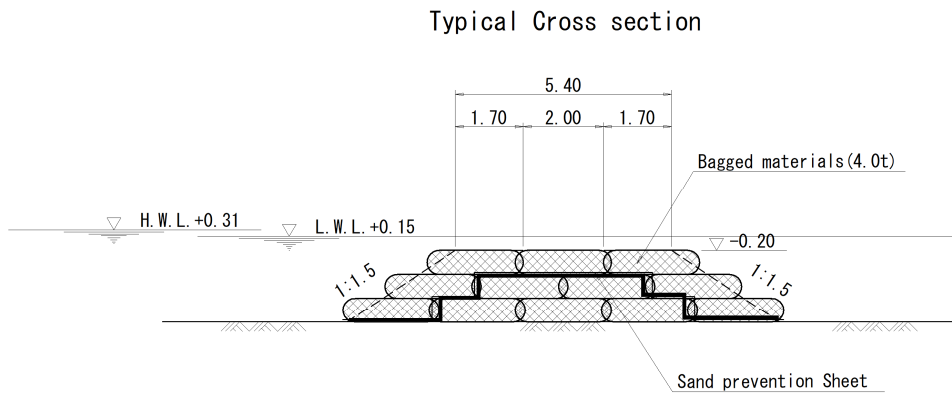


Figure 3-2-3 (3) Typical cross section drawing of submerged breakwater (temporary)

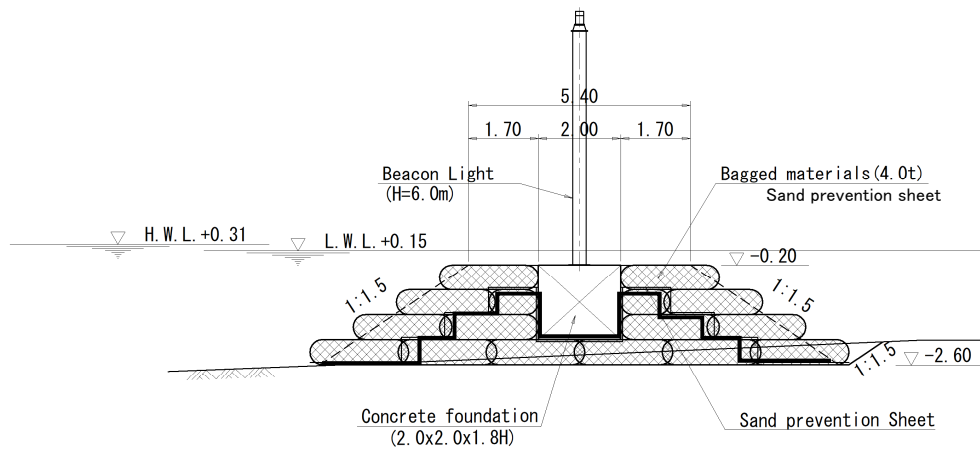


Figure 3-2-3 (4) Cross section drawing at tip of submerged breakwater (temporary)

2) Construction phase (completed)

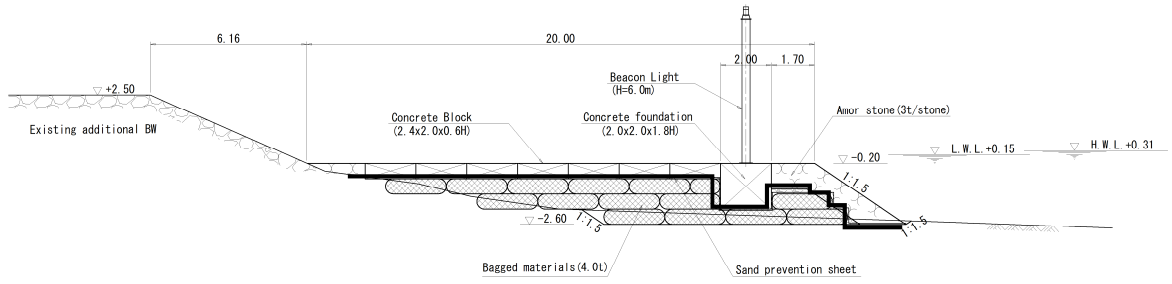


Figure 3-2-3 (5) Longitudinal cross section drawing of submerged breakwater (completed)

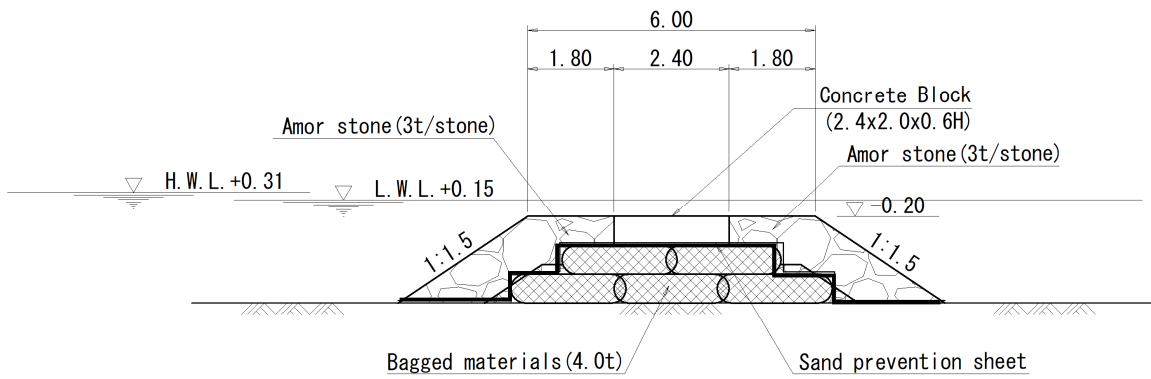


Figure 3-2-3 (6) Typical cross section drawing of submerged breakwater (completed)

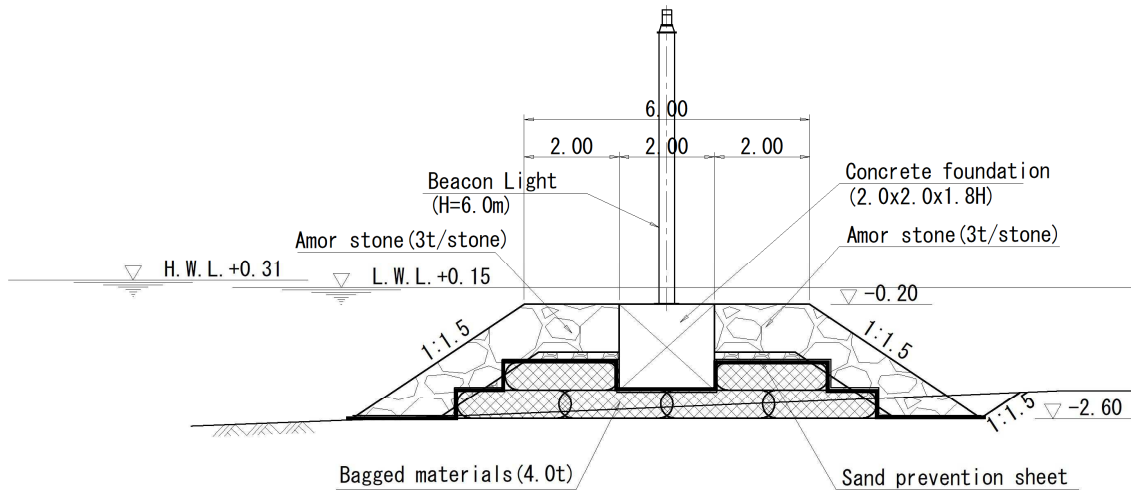


Figure 3-2-3 (7) Cross section drawing at tip of submerged breakwater (completed)

(3) Second groyne

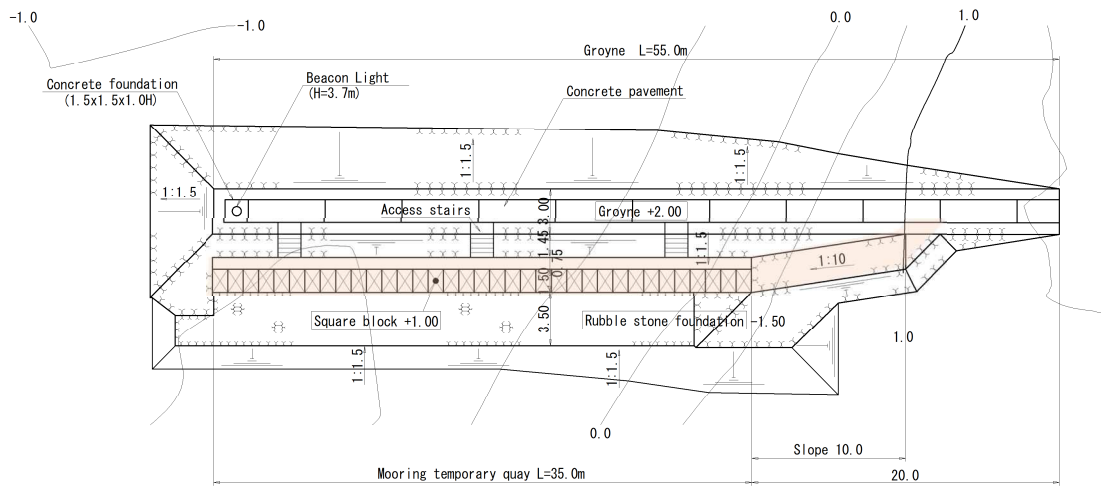


Figure 3-2-3 (8) Plan drawing of second groyne (including temporary quay)

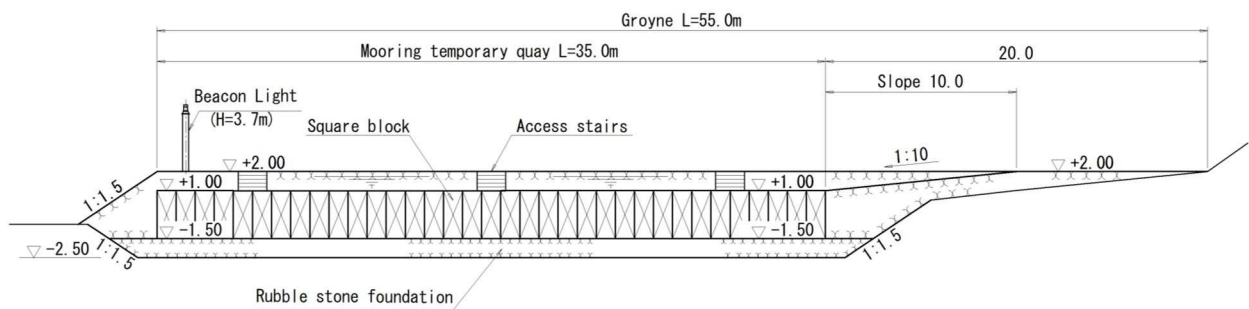


Figure 3-2-3 (9) Longitudinal cross section drawing of second groyne (including temporary quay)

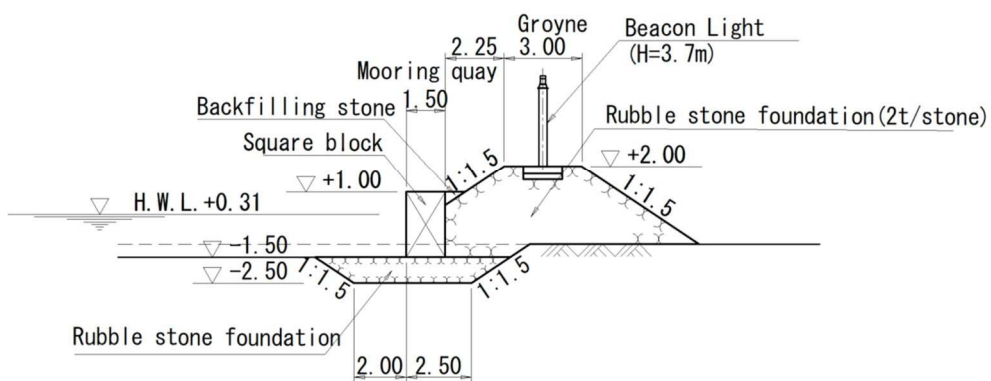
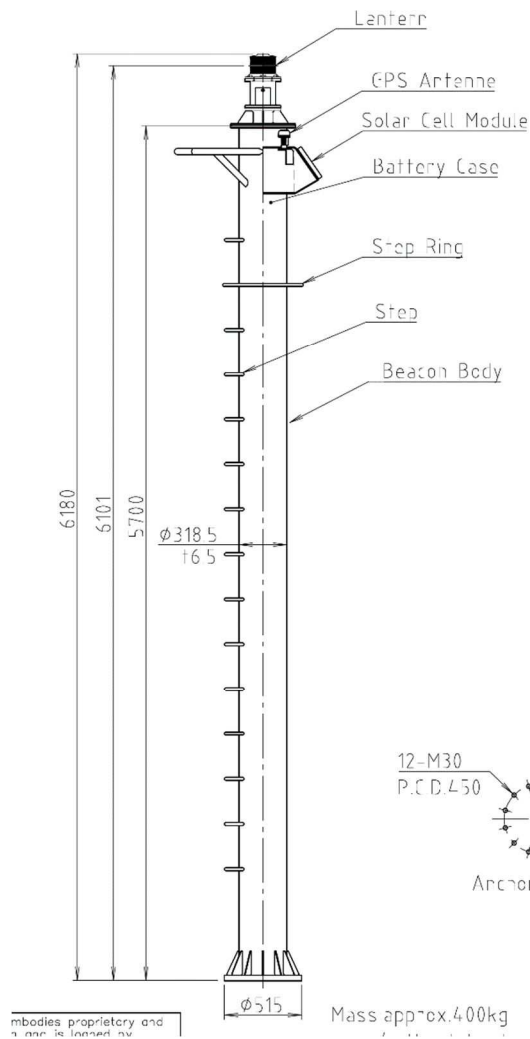


Figure 3-2-3 (10) Typical cross section drawing of second groyne (including temporary quay)

(4) Beacon light

1) For submerged breakwater



2) For second groyne

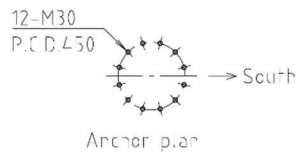
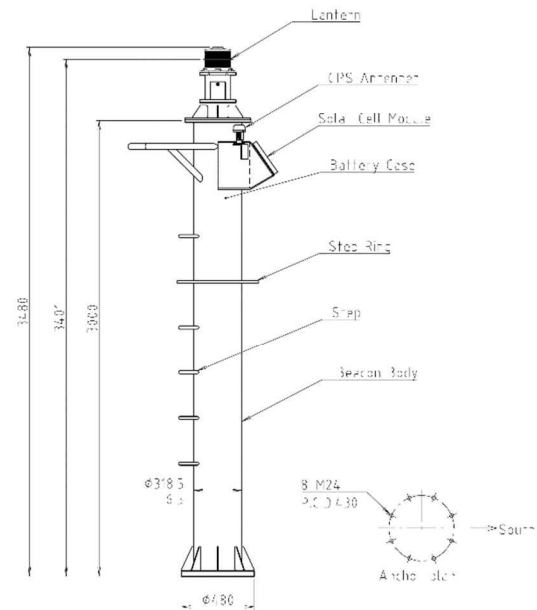


Figure 3-2-3 (11) Typical cross section drawing of beacon lights (newly installed)

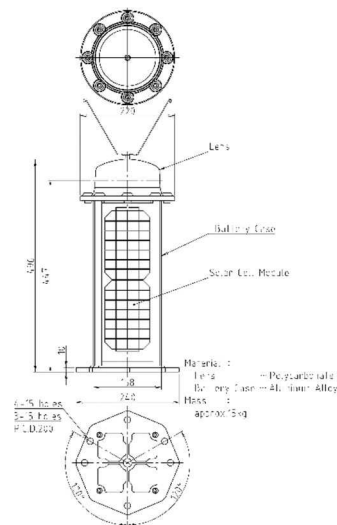


Figure 3-2-3 (12) Typical cross section drawing of beacon lights (replacement light)

3-2-4 Implementation Plan

3-2-4-1 Implementation Policy

(1) Construction policy

Figure 3-2-4-1 (1) to (5) in order of construction. The construction proceeds as follows: 1) second groyne, 2) temporary quay, 3) submerged breakwater, and 4) dredging. Second groyne, which is the most effective for sand deposition is constructed at first, then the secondary effective submerged breakwater is constructed. After construction of the structures, dredging work is carried out.

As to the construction of submerged breakwater, port entrance is closed during not only construction phase, but also minor monitoring work in monitoring period. (See Figure 3-2-4-1(3))

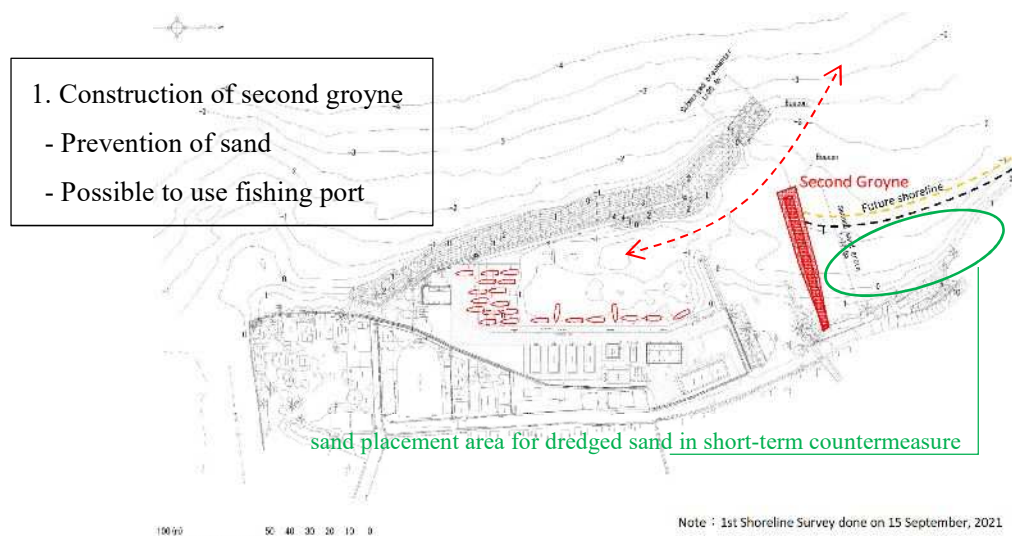


Figure 3-2-4-1(1) Construction of second groyne

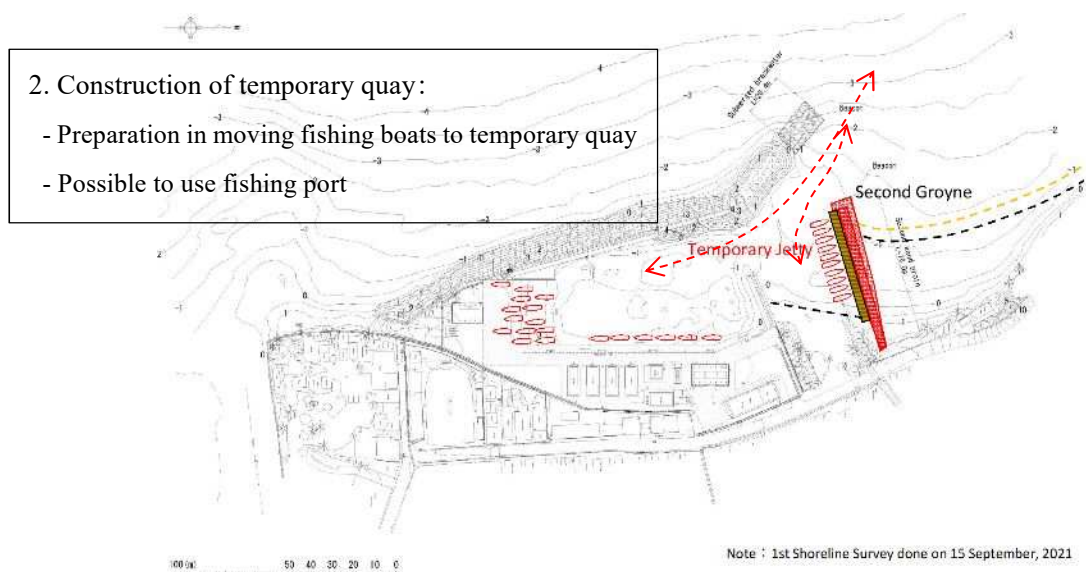


Figure 3-2-4-1(2) Construction of temporary quay

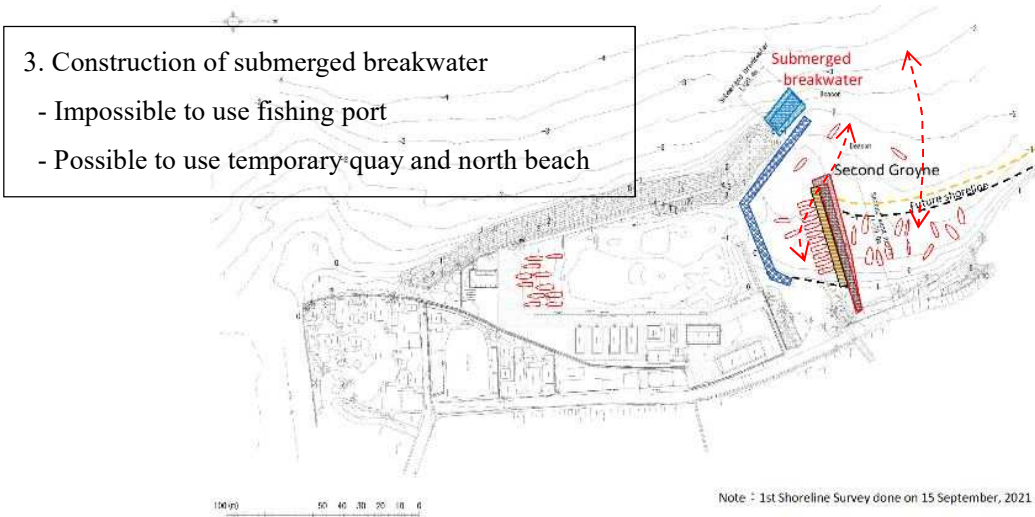


Figure 3-2-4-1 (3) Construction of submerged breakwater (construction phase and minor improvement work)

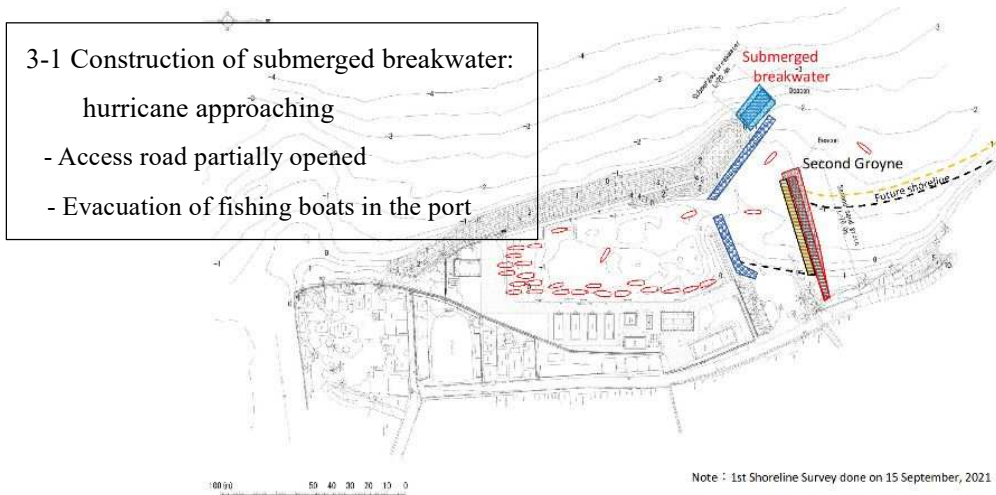


Figure 3-2-4-1(3') In case of hurricane approaching during construction of submerged breakwater (construction phase and minor improvement work)

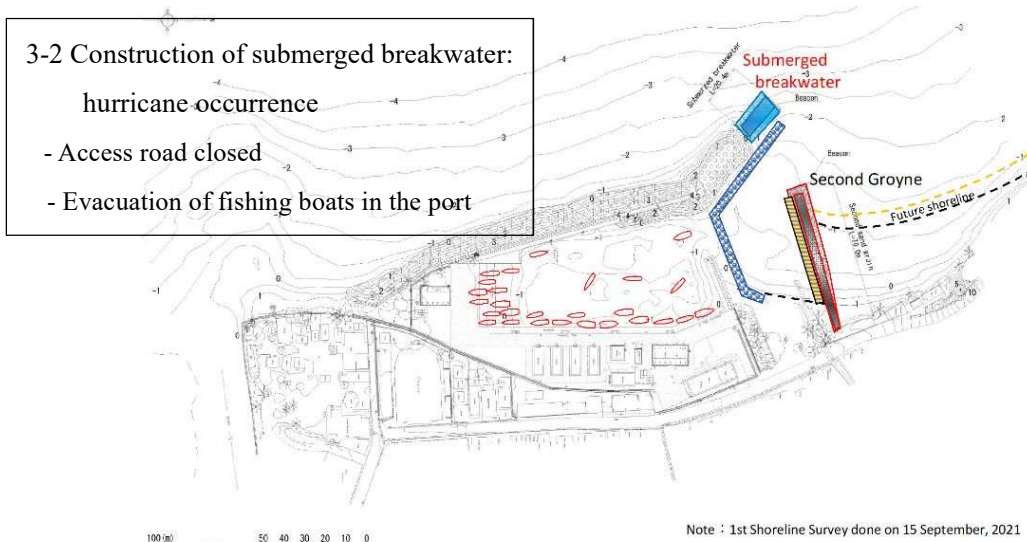


Figure 3-2-4-1(3'') In case of hurricane attack during construction of submerged breakwater (construction phase and minor improvement work)

4. Dredging (inside the port)
- Impossible to use fishing port
 - Possible to use temporary quay and north beach

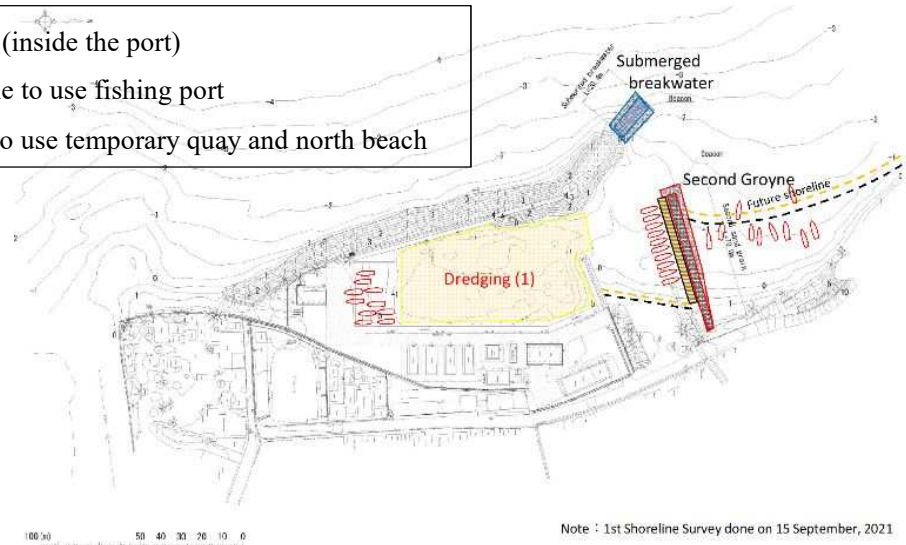


Figure 3-2-4-1(4) Dredging-1 (inside the port)

4. Dredging (outside the port)
- Possible to use fishing port
 - Possible to use temporary quay and north beach

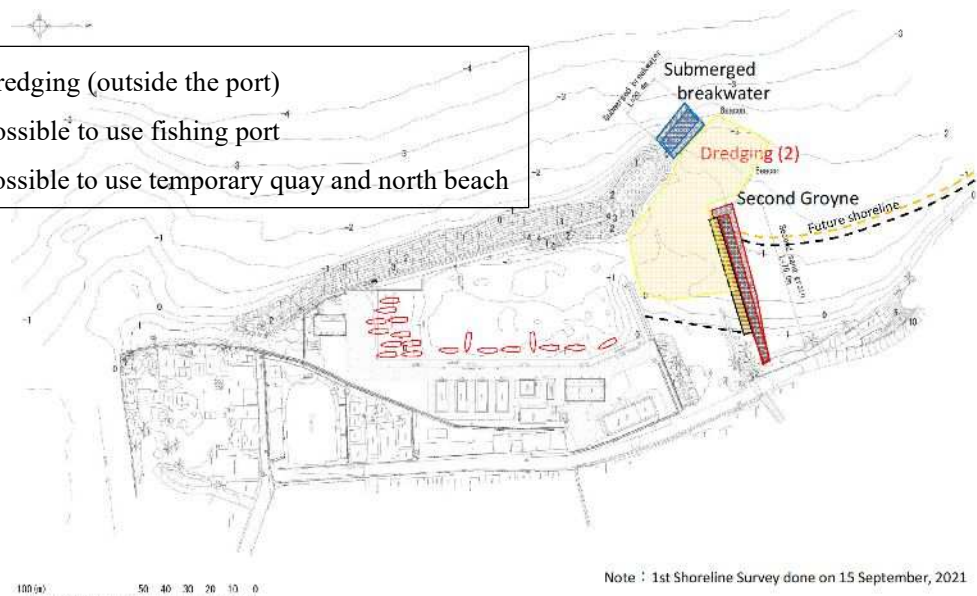
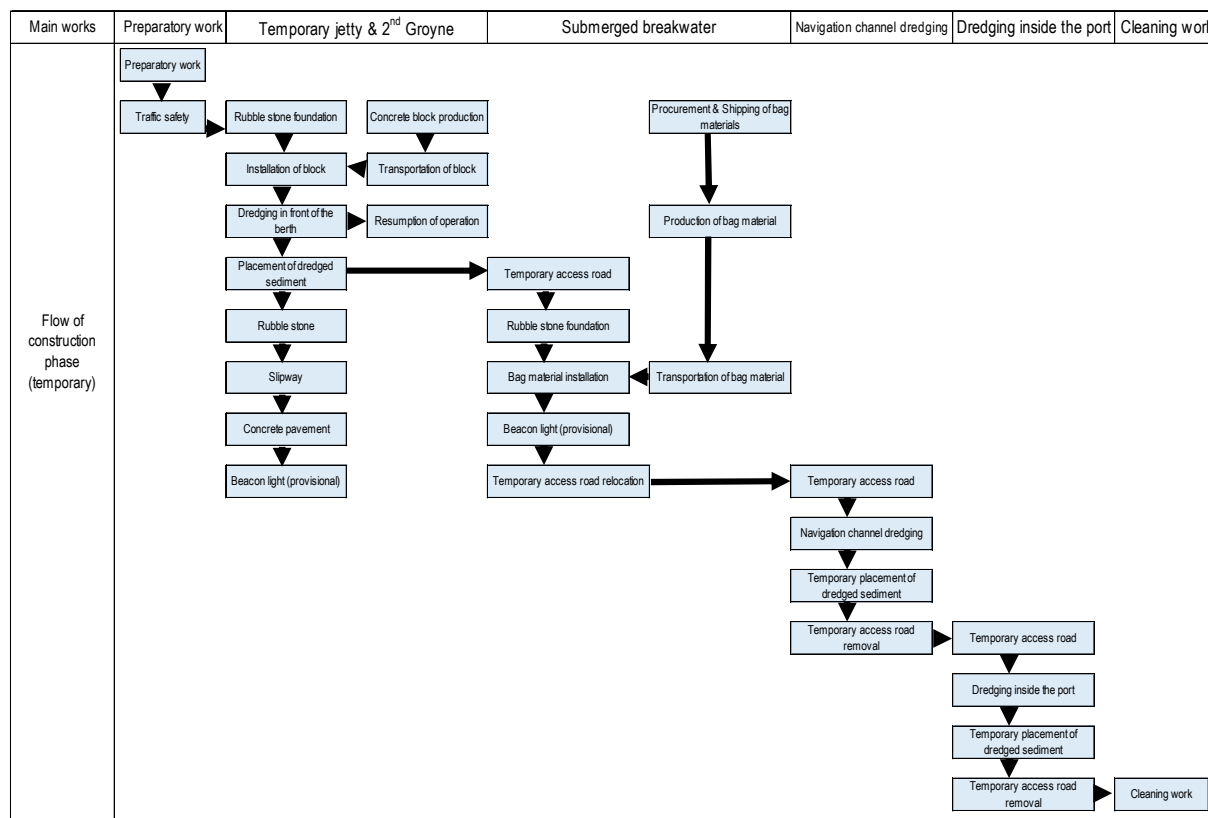


Figure 3-2-4-1 (5) Dredging-2 (outside the port)

Construction in construction phase is carried out in accordance with the following flow.

For smooth execution of minor improvement work, submerged breakwater is constructed to the temporary cross section using bag materials in construction phase.



Source: JICA Survey Team

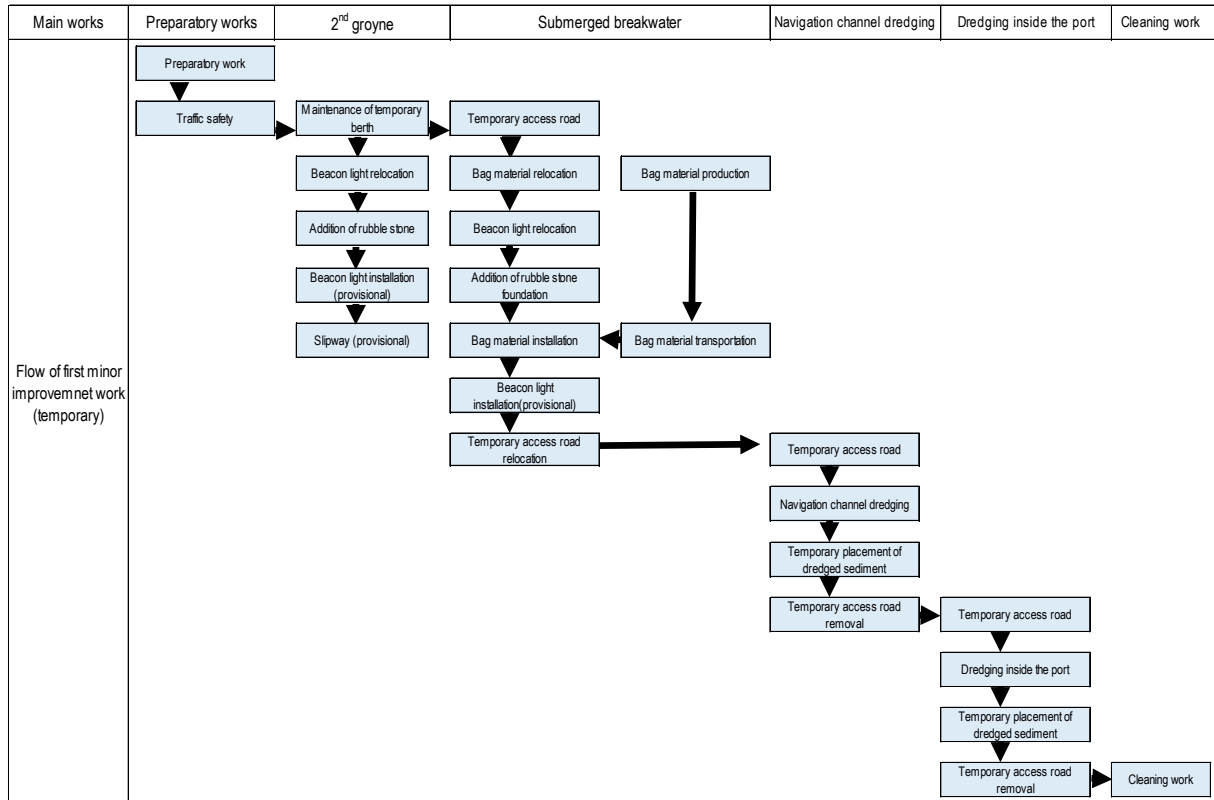
Figure 3-2-4-1 (6) Construction flow in construction phase

Monitoring is implemented, and in case sand deposition in fishing port and navigation channel is confirmed, minor improvement work is carried out twice at maximum.

Minor improvement work expectedly includes the following.

- ① Dredging inside the port
- ② Dredging in navigation channel
- ③ Change of layout, length, crown height, etc. of submerged breakwater (relocation of beacon lights)
- ④ Change of layout, length, crown height, etc. of second groyne (relocation of beacon lights)

Figure 3-2-4-1 (7) shows flow of first minor improvement work.

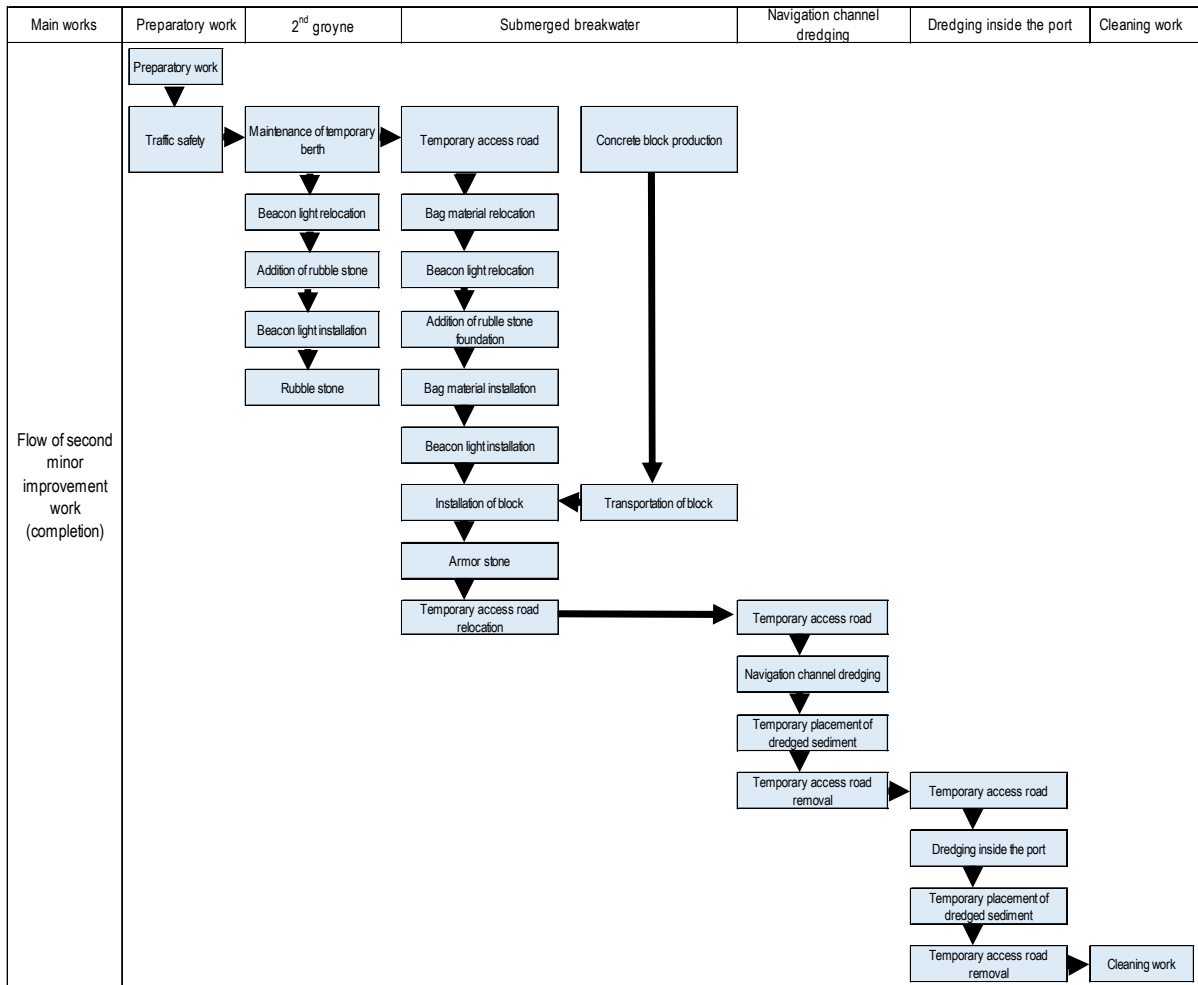


Source: JICA Survey Team

Figure 3-2-4-1 (7) Construction flow of first minor improvement work

In case sedimentation occurs in navigation channel or inside the port even after first minor improvement work, second minor improvement work is implemented. In addition to the same construction contents in first minor improvement work, bag materials are partially removed, the top part is replaced by concrete blocks, and armor stones are installed to get completed cross section. Beacon lights are fixed.

Figure 3-2-4-1 (8) shows flow of first minor improvement work.



Source: JICA Survey Team

Figure 3-2-4-1 (8) Construction flow of second minor improvement work

(2) Procurement policy

Locally procurable construction materials excluding stones are relatively expensive since these materials are imported. Therefore, quality and supply capacity are well considered, and procurement in Saint Lucia is prioritized as much as possible. Procurement in Japan is limited to bag materials and beacon lights considering quality and easiness of procurement. Regarding the machines to be used, since minor improvement work during monitoring period occurs, machines which are procurable in Saint Lucia are selected.

3-2-4-2 Implementation Conditions (Consideration points on construction / procurement)

(1) Consideration points on construction

1) Preparatory works

In this Project, production of concrete blocks used for temporary quay is a key to shorten the construction period. It is important to smoothly make a contract with a local sub-contractor which has its own concrete plant and production yard for concrete blocks. However, most of the local contractors do not have own laboratory for concrete testing, so tests such as compressive strength test is conducted in material laboratory of Ministry of Infrastructure. Thus, attention is paid to quality control.

2) Safety in navigation channel during construction

To secure the safety of fishing boats utilizing the fishing boat, areas affected by the construction are clearly indicated by buoys. Especially during construction of submerged breakwater and dredging in navigation channel, attention is paid so that operation of fishing boats using temporary quay is not disturbed.

3) Traffic safety during construction period

There are 2 main roads to the Project site. Access from south side is dangerous for construction vehicles, since the road is narrow and there are many pedestrians and general traffic.

Therefore, traffic safety personnel are assigned to corners in town, junction with the main road, and entry and exit point of the site.

4) Construction in the Project site with limited space

The area of Project site is limited, so it is impossible to secure production yard in the Project site regardless the structure of facilities. Therefore, it is basically assumed that production is conducted outside the Project site such as production yard possessed by a local contractor.

It is expected that north beach is temporarily used as a stock yard for stone materials which are used for armoring or foundation of facilities.

(2) Consideration points on procurement

1) Procurement of construction equipment and material

Locally procurable stone materials such as rubble stones, armor stones, and aggregates for concrete are more expensive in Japan. Cement, fine aggregates for concrete, steel and woods are imported, and the prices are drastically increased after 2021 due to rapid price escalation for shipping along with skyrocket of fuel price. Attention is needed to the fact that generally prices for imported items are increased.

Besides, construction equipment and materials are procured in Saint Lucia on a priority basis since minor improvement work possibly takes place twice during monitoring period.

2) Prediction of price variation

Growth rate and predicted value of price escalation published by IMF (International Monetary Fund) is used. (Refer to <https://www.imf.org/external/datamapper/PCPIPCH@WE O/OEMDC/ADVEC/WEOWORLD/LCA>)

Estimated inflation rate to the average prices in Saint Lucia is 2.525% for 2021, 2.972% for 2022, and 1.968% for 2023.

Price variation between 17 months from the bidding and implementation of cost estimate on December 2021 to expected bidding in April 2023 is obtained by the following equation.

Coefficient of price variation in 2021 = $1 + 2.525/100 \times 1/12 = 1.002104$

Coefficient of price variation in 2022 = $1 + 2.972/100 \times 12/12 = 1.02972$

Coefficient of price variation in 2023 = $1 + 1.968/100 \times 4/12 = 1.00656$

Therefore, $1.002104 \times 1.02972 \times 1.00656 = 1.039$ is obtained, resultantly ratio of price variation is 3.9%.

3-2-4-3 Scope of Works (Scope of construction / scope of procurement and installation)

(1) Scope of Japan side

- ① Consulting activities such as detailed design, bidding assistance, construction supervision
- ② Procurement of construction materials and services necessary for construction works in scope of Japan side
- ③ Implementation of marine shipment of import materials and equipment necessary for construction works in scope of Japan side, and shipment insurance premium
- ④ Quality inspection necessary for construction works in scope of Japan side
- ⑤ Construction: dredging, submerged breakwater, second groyne and beacon lights
- ⑥ Monitoring of sand deposition (erosion) in the port and navigation channel and analysis
- ⑦ Determination, design and construction supervision of countermeasure works

(2) Scope of Saint Lucia side

- ① Securing construction site for the Project
- ② Application assistance for work permits for workers with the nationality of Japan or third countries and tax exemption
- ③ Implementation of Environmental Impact Assessment (if necessary)
- ④ Acquisition of environmental permit and construction permit

3-2-4-4 Consultant Supervision (Construction supervision plan / procurement supervision plan)

Based on the policy of Japanese government on Grant Aid projects, a consultant that deeply understands the points of Data Collection Survey and this Survey conducts the detailed design and construction supervision for entire smooth management of the Project. At the time of construction supervision, the consultant assigns a resident engineer for supervising the construction works who has enough expertise and experiences, and specific engineers are dispatched in accordance with the progress of construction works in necessary timings to carry out inspections and instructions.

3-2-4-5 Quality Control Plan

Materials used in the construction are compliant or equivalent to Standard Specifications for Port & Harbor Works (Ministry of Land, Infrastructure, Transport and Tourism in Japan) or Japanese Industrial Standard (JIS).

Mix design is carried out to the concrete used in the construction in advance. Prior to use in the concrete works, quality tests such as compression strength, temperature, and air contents are implemented by trial mixing. Also, after commencement of works, quality maintenance and control are conducted by making test and result table by mix ratio, concrete strength control table, and control figure (X-R control figure).

Attention is needed to the following points in terms of quality control.

- ① A Japanese staff who has experiences of supervising marine or related works and is equivalent to third grade or higher is assigned to the resident supervising engineer.
- ② Contractor appoints a Japanese staff who has experiences of managing marine or related works and is equivalent to third grade or higher as site manager.
- ③ Acceptance inspections, stage inspections, and completion inspection in accordance with the bidding documents (notes, drawings and technical specifications) are certainly implemented, and the specified construction performance is obtained.

3-2-4-6 Procurement plan of equipment and materials

(1) Procurement circumstances

1) Local contractors

It was confirmed that procurement of local contractors related to general civil works or small scale works in fishing ports is feasible in Saint Lucia, and ranking issues by public organizations or professional associations did not exist. Therefore, local contractors who were questioned in Data Collection Survey and answered to inquiries in this Survey and were introduced by the executing agency of this Project, DoF, were targeted for hearing survey to comprehend labor price, material price, equipment lease price, material and construction price for specific type of works, and procurement circumstances for equipment and materials.

2) Labor

Engineers and labors can be procured in Saint Lucia for general civil works or small scale works in fishing ports.

The Employer is obliged to be compliant to labor laws applicable in Saint Lucia, prevent labor troubles by respecting appropriate labor conditions and local customs, and maintain safety in relation to work accidents.

Labor conditions in accordance with the Labor Code 2006 (2011 amendment) are listed below.

- ① Working hours: maximum 40 hours a week (maximum 8 hours a day)
- ② Overwork allowance: 1.5 times for weekdays, 2 times for holidays
- ③ Holidays: 1 day a week, national holidays
- ④ Others: medical leave, retirement pay for employees working 2 years or longer, etc.

Also, the Employer deducts the following expenses from the Employee's salary.

- ① Pension, provident foundation, etc.
- ② Social security, etc.

3) Equipment and materials for construction

It is possible to procure all equipment and materials used in this Project in Saint Lucia except for beacon lights and bag materials.

① Materials procurable in Saint Lucia

- Stones, sand aggregates: some contractors have quarries. Use of a specific supplier close to the site is assumed.
- Concrete: Some contractors have concrete plants. However, considering transport distance to Choiseul fishing port, it is difficult to move it within 90 minutes. Thus, use of specific supplier close to the Project site or on-site mixing is assumed.
- Cement: Cement is imported from the United States, South Africa, etc. and sold by suppliers in Saint Lucia, so price variation is large due to its own or transport price variations.
- Steel materials: Steel materials are imported from the United States, Venezuela, Mexico, etc. and sold by suppliers in Saint Lucia, so price variation is large due to their own or transport price variations.
- Fuel: All diesel fuel, gasoline, etc. are imported, and the price for sale is fixed.

② Equipment procurable in Saint Lucia

In case that dredging is conducted from the land, implementation is feasible with general civil heavy equipment which is possessed by several local contractors.

- Bulldozer: 20-ton class
- Excavator: crawler type, 0.6m³-class for flat stacking, 1.2 m³-class for flat stacking

- Wheel loader: 1.0 to 2.0 m³
- Dump truck: 10-ton class, 20-ton class
- Rough terrain crane: 16-ton suspension, 25-ton suspension, 35 to 45-ton suspension
- Crawler crane: 35 to 45-ton suspension, 50 to 55-ton suspension
- Grab bucket: 0.8m³
- Boat for divers and compressor for diving

In case that marine dredging is carried out, only 1 company has capacity to conduct such marine dredging. Regardless the scale of dredging, this company has been awarded for dredging in the Caribbean region. Therefore, equipment lease and transport cost a lot, and it is necessary to adjust the timing for procuring dredging equipment.

(2) Others

1) Impacts from skyrocketing fuel price

According to a supplier at the time of first site survey in this Survey, shipment cost was increased from skyrocketing fuel price. Resultantly, prices of imported materials such as cement, steel materials, and woods were increased by 20% compared to the previous month during August to December 2021.

Also, the supplier implied such price escalation would continue after December 2021 as well.

2) Construction yard

In this Project, even though construction yard is needed for concrete blocks used for submerged breakwater and temporary quay and production of bag materials, it is difficult to secure enough land in the Project site. Local contractors have their own construction yards, so involvement of local contractor is required.

3-2-4-7 Operational Guidance Plan (Instruction plan for initial operation and maintenance)

Procurement of equipment is not included in this Project, so neither instruction for initial operation nor maintenance are implemented.

3-2-4-8 Plan for soft component

It was supposed that instruction as a soft component would be conducted from the perspective of LCC through monitoring period for 3 years so that the government of Saint Lucia could independently implement maintenance dredging in the future. However, the government of Saint Lucia regards the condition where maintenance dredging is rarely needed as success in this Project, and monitoring for 3 years is conducted by a consultant, thus soft component is supposed to be unnecessary.

3-2-4-9 Implementation schedule

In case this Project is implemented in the scheme of Japanese Grant Aid (B-type), Exchange of Notes (E/N) is signed by both governments at first, Grant Agreement (G/A) is signed by the government of Saint Lucia and JICA, then Consultant Agreement between the government of Saint Lucia and a Japanese legal person is concluded for consulting services of detailed design, bidding assistance, construction supervision in construction phase, monitoring implementation and supervision of minor improvement works. During the Consultant Agreement, the consultant carries out the detailed design and bidding document is drawn up. Then, bidding is held with assistance of the consultant to select a Japanese contractor, and monitoring for 3 years is conducted after construction phase.

Project implementation schedule is shown in Figure 3-2-4-9 (1) and (2).

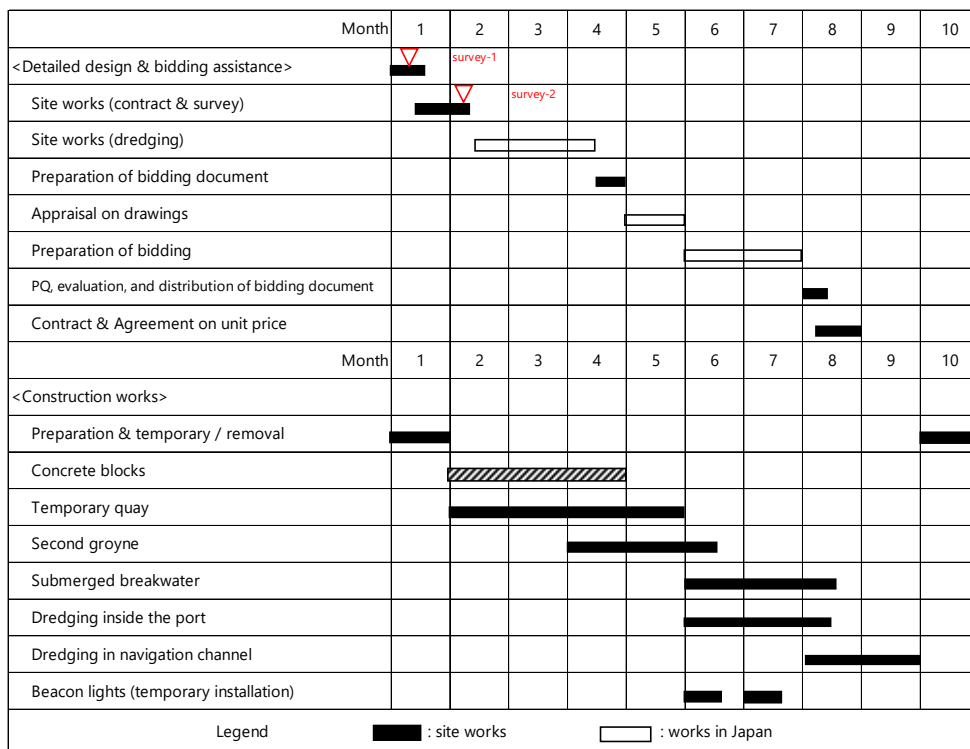


Figure 3-2-4-9 (1) Project implementation schedule (detailed design to construction phase)

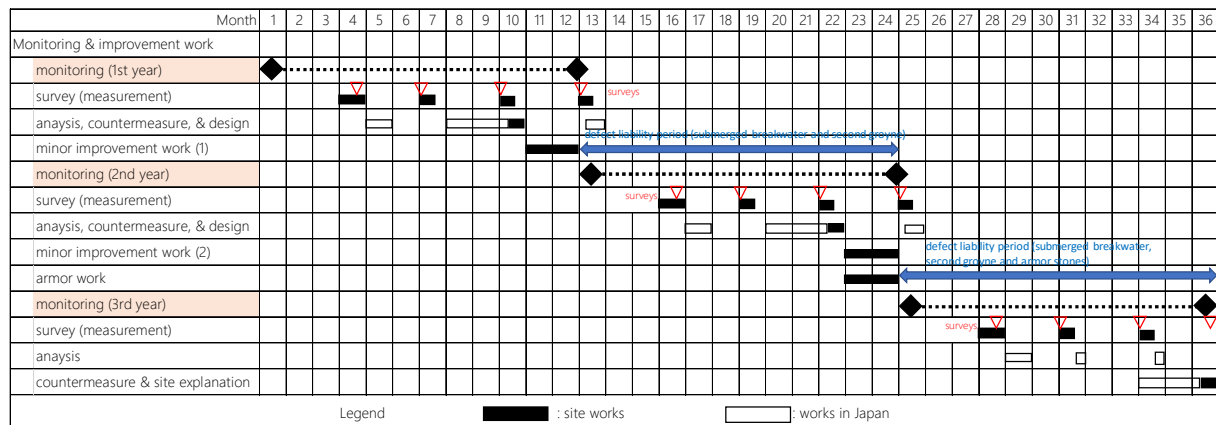


Figure 3-2-4-9 (2) Project implementation schedule (monitoring and minor improvement works)

(1) Detailed design

After conclusion of Consultant Agreement between the executing agency in Saint Lucia and a Japanese consultant, the Consultant Agreement is reviewed by JICA. Upon JICA's concurrence, the consultant starts detailed design to draw up bidding document including design drawings, technical specifications, bidding notes, etc. During the detailed design, discussions are held with the government of Saint Lucia, and finally the entire bidding document is approved by the government of Saint Lucia. Approximately 4.0 months are required for the detailed design process.

(2) Bidding

A Japanese contractor is awarded through bidding process. The bidding is proceeded with in the following sequence: announcement, application from bidders, pre-qualification review, distribution of bidding document, submission of bid, evaluation, nomination of a contractor, conclusion of contract, and agreement on unit price. This entire process takes approximately 4.0 months.

(3) Construction works

After contract conclusion and JICA's concurrence, the construction is commenced. Considering the facility scales and construction circumstances at site, in the assumption that any events in relation to force majeure do not occur, the construction period is expectedly 10 months.

In this Project, monitoring for 3 years follows the construction phase, and minor improvement works possibly occur especially to direction, length, crown height, etc. of second groyne and submerged breakwater. Therefore, during the construction phase, the facilities are partially completed so that minor improvement works including relocation are implemented easily during monitoring period.

(4) Monitoring and minor improvement works

Monitoring for 3 years is conducted after completion of construction phase.

3-3 Summary of specific obligations of the recipient country

Tables 3-3(1) to (3) show the obligations of the government of Saint Lucia in each stage between “Before Construction”, “During the Project Implementation and Monitoring” and “After the Project” which are confirmed by the Minutes of Discussions during this Survey.

For smooth implementation of the Project, the government of Saint Lucia is required to undertake necessary measures since this Project is implemented by Japanese Grant Aid.

Table 3-3(1) Specific Obligations of the Recipient Country (Before Construction)

| No. | Items | Deadline | In charge |
|-----|--|--|-----------|
| 1 | To sign the banking arrangement (B/A) with a bank (the Agent bank) to open a bank account | within 1 month after the signing of the G/A | MOF |
| 2 | To issue Authorization to Pay (A/P) to a bank in Japan (the Agent Bank) for the consultant's payment. | within 1 month after signing of the contract | MOA |
| 3 | To bear the following commission to the Agent Bank for the banking services based upon the B/A | | |
| | 1) Advising commission for A/P | within 1 month after the signing of the contract | MOF |
| | 2) Payment commission for A/P | every payment | MOF |
| 4 | To approve and secure the necessary budget for implementation for Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMoP) (and fulfilling conditions of approval, if any) | within 1 month after the signing of the G/A | MOA |
| 5 | To submit Project Monitoring Report (with the result of the Detailed Design) | before preparation of the bidding documents | FD |
| 6 | To obtain the construction permit, sand permit and ensure the relocation site of the material dredged through the Project | within 1 month after the signing the G/A | MOA |

Table 3-3(2) Specific Obligations of the Recipient Country (During the Project Implementation and Monitoring)

| No. | Items | Deadline | In charge |
|-----|---|---|-----------|
| 1 | To issue Authorization to Pay (A/P) to the Agent Bank for the payment to the supplier and the contractor. | within 1 month after signing the Contract(s) | MOF |
| 2 | To bear the following commissions to the Agent Bank for the banking services based upon the B/A | | |
| | 1) Advising commission of A/P | Within 1 month after the signing of the contract(s) | MOF |
| | 2) Payment commission for A/P | Every payment for consultant | MOF |
| 3 | To ensure prompt unloading and customs clearance at ports of disembarkation in the country of the Recipient and to assist the Supplier(s) with the internal transportation therein | during the Project | MOA |
| 4 | To accord Japanese physical persons and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services, such facilities as may be necessary for their entry into the country of the Recipient and stay therein for the performance of their work. | during the Project | MOA |
| 5 | To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services are exempted or be borne by its designated authority without using the Grant. | during the Project | MOF |
| 6 | To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project. | during the Project | MOF |
| 7 | To notify JICA promptly of any incident or accident, which has, or is likely to have, a significant adverse effect on the environment, the affected communities, the public or workers. | during the construction | FD |
| 8 | To submit Project Monitoring Report | Every month | FD |
| 9 | To submit Project Monitoring Report (final) (including as-built drawings, equipment list, photographs, etc.) | within 1 month after signing of Certificate of Completion for the works under the contract(s) | FD |
| 10 | To submit a report concerning completion of the Project | within 6 months after completion of the Project | FD |
| 11 | To ensure the safety of persons engaged in the implementation of the Project | during the construction | MOI |
| 12 | To implement EMP and EMoP | during the construction | FD |
| 13 | To submit results of environmental monitoring to JICA, by using the monitoring form, on a quarterly basis as part of Project Monitoring Report | during the construction | FD |

Table 3-3 (3) Specific Obligations of the Recipient Country (after the Project)

| No. | Items | Deadline | In charge |
|-----|--|------------------------------------|-----------|
| 1 | To implement EMP and EMoP | for a period based on EMP and EMoP | FD |
| 2 | To submit results of environmental monitoring to JICA, by using the monitoring form, semi-annually ※ <i>The period of environmental monitoring may be extended if any significant negative impacts on the environment are found. The extension of environmental monitoring will be decided based on the agreement between Department of Fisheries and JICA.</i> | for 3 years after the Project | FD |
| 3 | To properly maintain and utilize the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine check/Periodic inspection | After completion of the Project | FD |

3-4 Project Operation and Maintenance Plan

3-4-1 Operation and maintenance system

Figure 4-4-1(1) shows operation and maintenance organization structure of Choiseul fishing port after completion of this Project. Same as the present Choiseul fishing port management office, it is operated by following 6 members: 1 Manager, 1 Assistant to Manager, 2 Customer Assistants, 1 Maintenance Personnel/Gas Attendant and 1 Building Care Taker.

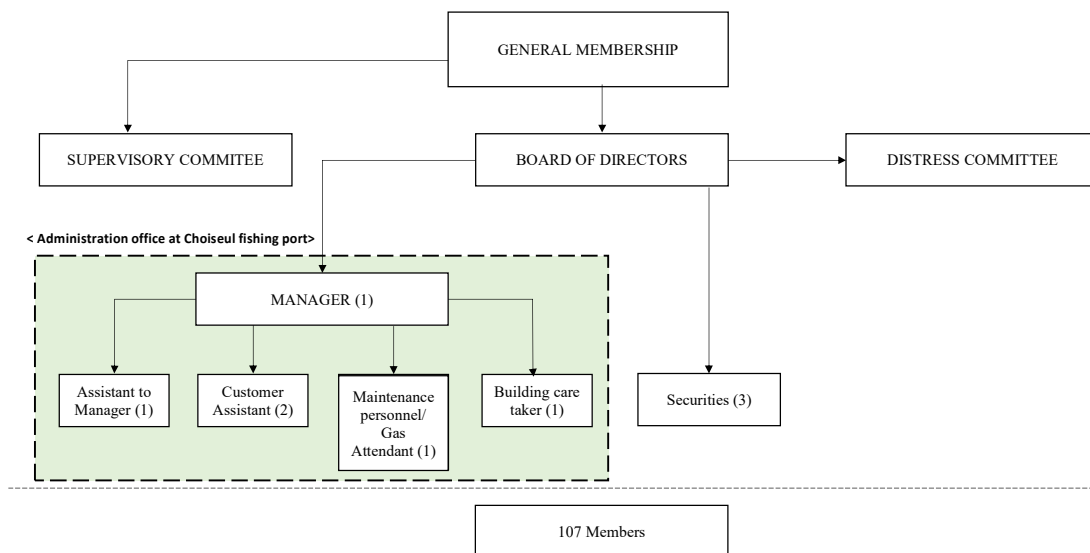


Figure 3-4-1(1) Organization Chart of Existing Choiseul Fishery Cooperative (including fishing port office)

Table 3-4-1(1) Financial Condition of Choiseul Fishery Cooperative (2015 to 2020)

| Income and Expenditure | | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|-------------------------------------|---|----------------|----------------|----------------|----------------|----------------|----------------|
| Income: | Schedule of income | 1,366,413 | 1,263,674 | 1,280,264 | 1,414,868 | 1,579,108 | 1,490,110 |
| Less: | Cost of sales | 1,239,173 | 1,117,923 | 1,131,348 | 1,274,663 | 1,415,717 | 1,316,741 |
| Gross profit | | 127,240 | 145,751 | 148,916 | 140,205 | 163,391 | 173,369 |
| Income: | Other (Interest earned, Locker rental, Ice, etc.) | 72,781 | 93,297 | 81,782 | 76,902 | 70,476 | 78,930 |
| Less: | Administrative, Selling and General expenses | 206,400 | 199,243 | 137,803 | 151,289 | 206,096 | 219,119 |
| Net (Surplus) / defect for the year | | -6,379 | 39,805 | 92,895 | 65,818 | 27,771 | 33,180 |

(EC\$)

Existing facilities which are subject to maintenance are shown below. Although approximately 20 years from the completion passed by, there are no apparent big damages to the facilities in general. However, due to the loss (theft) of solar panel, existing beacon lights do not provide light during night time which has been causing continuous dangers for fishing boat navigation.

Maintenance of water depth inside the port has been an issue for the government of Saint Lucia since the sedimentation occurred right after the completion of construction of the port. Originally, Saint Lucia side recognized maintenance-free.

【Existing maintenance facilities】

Civil structure: Wharf, Slipway, Breakwater, First Groyne, Additional breakwater, Beacon lights.

Building structure: Workshop, Fishing gear lockers, Ice making building, Fish handling site, Management office (including shop, meeting room).

Based on above circumstances, submerged breakwater, second groyne (including impermeable quay) and beacon lights (new installation and reparation) are developed in this Project. When the sedimentation is improved, it is assumed that the operation and maintenance structure is kept in the same way as present.

Therefore, it is unnecessary to establish new operation and maintenance system or allocate new personnel.

【Target maintenance facilities at the time of this Survey】

Civil structure: Submerged breakwater, Second groyne and gravity type impermeable structure (except temporary quay)

Ancillary facility: Beacon lights (existing and new installation)

Besides, necessity of maintenance works against sedimentation in the future after completion of this Project is evaluated through monitoring period for 3 years from construction of facilities, thus no reference is made at the stage of this Survey.

3-4-2 Method of maintenance and management

MOA accordingly conducts monitoring to see the conditions of developed facilities. In Choiseul fishing port, regular weekly meeting is held on every Tuesday with attendance of fisherfolks and Fisheries Officer from DoF. In accordance with the seriousness or scale, complaints or defects are reported to Chief Fisheries Officer in DoF. The second groyne and submerged breakwater is concrete structure, not requiring highly sophisticated maintenance technique, so there are no concerns in technical aspects. Besides, it is supposed that MOA allocates budget for maintenance.

Maintenance and management methods of facilities developed in this Project are as follows.

(1) Submerged breakwater

“Submerged breakwater” attached to the head of the existing additional breakwater is an underwater structure. So, it is hardly seen by fishing boats navigating the channel. Surroundings of the structure is dangerous with grounding risk. Therefore, a beacon light is installed at the head of the submerged breakwater.

The structure of submerged breakwater is rubble stone foundation shaped as a sloping breakwater. Surroundings are covered by armor stones for outward flow protection and concrete blocks to level the height of top surface. Also, sand prevention sheets are installed inside to prevent sand movement through the structure.

The height, direction and length of submerged breakwater in this Project are finally decided and completed based on the effect and analysis as a countermeasure facility against sedimentation during the monitoring period. It is one of the conditions that the form is maintained in the future.

Subsequently, inspection items are as follow.

1) Inspection at normal time

- Raise attention not to navigate fishing boats between the existing additional breakwater and the beacon lights at the head of submerged breakwater
- Confirm sedimentation in the submerged breakwater inner port side

2) Inspection at abnormal time

It is ideal to inspect the followings after safety confirmation in the event of unexpected abnormal wave or grounding of a fishing boat.

- Armor stone: visually confirm large change of armor
- Concrete block (height): presence or absence of patching, damage, subsidence or crack

(2) Second groyne

The structure of the second groyne is composed of ① Sloping breakwater with rubble stones, and ② gravity type concrete block attached to the sloping breakwater.

The upper surface ① of sloping breakwater is structured with concrete pavement for people to walk on easily. Impermeable structure is the base structure of above ② gravity type concrete block to prevent sand deposition within the groyne. It is used as temporary access road during execution period of this Project. Therefore, the function of this temporary access road is going to be excluded as temporary quay after the completion of this Project.

Since the construction location of the second groyne is in the back of the existing additional breakwater and the submerged breakwater, impact of abnormal wave is considered minor.

Periodical inspection is therefore necessary for the following items.

① Sloping part

- Armor stone: confirm the overall shape and subsidence
- Upper surface (concrete pavement): crack, damage, subsidence, scour

② Concrete block (it functions as temporary quay during Project construction which function is not maintained after Project completion)

- Concrete: presence or absence of crack, damage, deformation (lean)

When fishing boats use the temporary quay during construction period, fishing boats should be moved in the fishing port or in a safe area inland in the event of an abnormal wave such as a hurricane.

(3) Beacon light

Beacon light is an ancillary facility of this Project comprising reparation of the two existing ones (one at the breakwater and the other at the tip of the groyne) and new installation of two at the tip of submerged breakwater and second groyne. Main power supply of those beacon lights is solar.

Solar panel may be subject to theft, and always exposed to wind and rain. Besides, the beacon light at the tip of submerged breakwater is the most subject to damage from severe wave condition and probable collision from fishing boats.

Inspection items are as follows.

1) Inspection at normal time

① Beacon light at the tip of submerged breakwater

- Raise attention for fishing boats not to navigate nearby
- Theft prevention of solar panel
- Head part: confirm lightning condition

② Head part of existing beacon lights and the one at the tip of second groyne

- Confirm the lighting condition at night

- Theft prevention of solar panel
- Head part: confirm lightning condition

2) Inspection at abnormal time

It is ideal to execute the followings after safety confirmation in the event of unexpected abnormal wave and grounding accident by fishing boat.

- ① New installation of beacon lights (submerged breakwater and at the tip of second groyne)
 - Main unit of beacon: presence or absence of damage, inclination, subsidence of foundation
 - Head part: confirm lighting condition
- ② Existing beacon lights (breakwater and at the tip of first groyne)
 - Head part: confirm lighting condition

3-5 Project Cost Estimation

3-5-1 Estimated cost for the Project

(1) Costs covered by the Japanese government

Project for the Improvement of Choiseul Fishing Port in Saint Lucia

<Confidential until concurrence of Contract of a contractor>

(2) Costs covered by the government of Saint Lucia

| Item | Amount (EC\$) | Conversion to Japanese Yen (million yen) |
|--|---------------|--|
| ① Fees in relation to Banking Arrangement (B/A, A/P, etc.) | EC\$142,000 | Approx. 6.0 |
| Total | EC\$142,000 | Approx. 6.0 |

(3) Conditions for cost estimate

- 1 Time of cost estimate : November 2021
(period for accumulation of exchange rates: Aug. to Oct. 2021)
- 2 Exchange rate : US\$1.00 = ¥112.06 (TTS rate)
EC\$1.00 = ¥41.97 (US\$1.00 = EC\$2.6822 (fixed rate))
- 3 Construction period : Period for detailed design and construction work is indicated in the construction schedule.
- 4 Others : Cost estimate is carried out in accordance with Japanese Grant Aid scheme.

3-5-2 Operation and maintenance cost

Maintenance cost including dredging after this Project is shown in Table 3-5-2(1), and EC\$3,000 (approximately Japanese Yen 150,000) is estimated as necessary for regular inspection. Additionally, in case maintenance dredging is carried out once in 6 years for 3,000m³, it is assumed that EC\$420,000 (approximately Japanese Yen 20,000,000) every 6 years occurs.

In such circumstances, after technical evaluation by the Ministry of Infrastructure, necessary budget is incorporated as Capital Expenditure or Project Expenditure.

Solar type LED lights are used for beacon lights in this Project. If it is not damaged, maintenance cost is not expected for 30 years, which is the same as durable years of fishing port facilities.

Table 3-5-2(1) Maintenance cost estimate after this Project

| Item | Frequency | Work content | Maintenance cost (EC\$) |
|--|-------------------------|--|---|
| Regular inspection | Once a year | | EC\$3,000/year |
| Replacement of lighting parts of beacon lights | Once in 30 years | Replacement of lamps (4 lamps in total) | EC\$36,000/year |
| Maintenance dredging | Once / 6 years (target) | Dredging in pond and navigation channel * when sedimentation amount reaches 3,000m ³ , hopefully maintenance dredging is carried out. Assuming 500m ³ sand deposition in a year, dredging once in 6 years is suggested. | EC\$420,000/6 years EC\$70,000/year |
| Cost in conversion to annual average | | | Regular: EC\$3,000 Once in 6 years: EC\$423,000 Yearly conversion: EC\$109,000 |

Chapter-4 Project Evaluation

Chapter-4 Project Evaluation

4-1 Preconditions for the project implementation

Preconditions for the Project implementation are as shown below.

- ① To acquire the land to be used as construction site and restrict the utilization of front water area
- ② To obtain Sand Permit and Construction Permit related to this Project construction (compliant to obtaining the EIA when necessary)
- ③ To secure necessary site, temporary yard and sand placement area for the Project.
- ④ To prepare Banking Arrangement (B/A), Authority to Pay (A/P) and proper payment without delay based on the Contract
- ⑤ To provide convenience related to the procedures of work permit, corporate registration, tax exemption, etc. for Japanese and/or persons in third countries who work for this Project and their applications support
- ⑥ To facilitate the exemption of taxes and duties for the purchase and import of construction materials and equipment and the tax return of VAT
- ⑦ To coordinate among relevant agencies and bodies
 - To coordinate with Choiseul district government to control nearby roads and police officer related to the road regulations
 - To disseminate the advice for the safe navigation related to the utilization by the existing fishing boats during the construction period
 - To coordinate with Saint Lucia Air and Sea Ports Authority (SLASPA/ Maritime Division)

4-2 Necessary Inputs by Recipient Country (Specific obligation items of Recipient Country for the accomplishment of total project plan)

The specific obligation items of Recipient Country for the development and maintenance of the Project effect are as shown in Table 4-2(1).

Table 4-2(1) Specific obligation items of Recipient Country for the Project accomplishment

| Period | Item |
|-------------------------|--|
| (1) Before construction | ① To acquire the land used as construction site and restrict the utilization of front water area ② To obtain Sand Permit and Construction Permit related to the facility construction (compliant to obtaining the EIA when necessary) ③ To secure necessary cite, temporary yard and yard for dredged sand (sand placement area) ④ To issue Banking Arrangement (B/A) and Authority to Pay (A/P) ⑤ To support for obtaining the work permit, engineers registration, corporate registration and tax exemption of Japanese and persons in third countries ⑥ Tax exemption for the construction materials and equipment and the procedure |

| Period | Item |
|-------------------------|--|
| | for tax return when fuel is purchased ⑦ To coordinate among relevant agencies and bodies |
| (2) During construction | ① To coordinate with State Government to control roads and police officer to regulate roads ② To restrict the utilization of water area in front of project site ③ To secure safety of fishing boats in Choiseul during construction period ④ To authenticate the payment works based on the A/P and Contract |
| (3) After construction | ① To utilize facilities constructed by Grant Aid properly and effectively ② To check and maintain submerged breakwater, second groyne, beacon light and port water depth periodically ③ To allocate personnel for the maintenance and management after construction |

4-3 Important Assumption

The other conditions to develop and maintain the effect of Project after the completion of the facilities are as shown below.

- ① Sand deposition is small at the navigation channel, pond and mooring basin, maintenance works are conducted to sustain the water depth in the future and the maintenance dredging is carried out when necessary.
- ② Proper utilization is made by target fishing boats.
- ③ The maintenance works are properly performed for submerged breakwater, second groyne and beacon lights.
- ④ Non-occurrence of marine accidents disturbing the port utilization in navigation channel and neighboring quay.
- ⑤ Neither large scale natural disasters nor abnormal waves are generated.
- ⑥ No political instabilities occur.

4-4 Project Evaluation

4-4-1 Relevance

(1) Current status and the issues

Choiseul fishing port is located at southwestern area of the island and there are large size banks inshore at approximately 10 miles (16 km). Choiseul is a good fishing ground with large migratory and bottom fish with pod fisheries following the largest Vieux Fort fishing port. The number of registered fishing boats in Choiseul is 59 and 197 for fisherfolks, respectively ranked 6th and 7th nationwide (as of 2019).

While annual fish intake per person in Saint Lucia has increasing from 23.7kg/person in 2013 to approximately 34.1kg/person in 2020, t import of fishery products trend has been increasing since 2014. Therefore, to increase the volume of national fishery product, underexploited pelagic fishing ground located 60 to 100 km offshore of Choiseul fishing port is positioned as expected fishery area to increase fishery products volume in the future.

Accordingly, present Choiseul fishing port has suffered from sedimentation in the port after construction completion in 2003. Dredging works were carried out during 2003 to 2006 and the additional breakwater at the tip of existing breakwater was constructed by the Government of Saint Lucia in 2008 for the prevention of sand inflow to the port. The construction of the additional breakwater led to the creation of the protected area at the backside water area and resulted in increasing the sedimentation at the navigation channel and port entrance. Necessary water depth could not be secured at the navigation channel and port entrance, so it became an obstacle for the navigations of target boats. The blockage at the port entrance has just been escaped by the sand excavation carried out by a local company up to the present day.

Although the fish landing volume in Choiseul fishing port remained at 120 tons /year before the completion in 2003, it declined sharply in between 60 to 100 tons/year after the completion in 2003 and has been stayed at low level since then.

Therefore, the management of Choiseul Fishing Port expects that this project implementation solves the shoaling problem and the fish landing volume will be increased more than before and it contributes to the Choiseul local economy by the increase of the registered fishing boats and the operating fishing boats.

For the reasons above, when the countermeasures to the sedimentation problem by the installation of the second groyne and the submerged breakwater are carried out, Choiseul Fishing Port is not only performing the proper function of fishing port by securing the safety and efficiency of navigating ships but also leading to the contribution to the local economy. In view of the contribution to the local economy, the implementation of this project is well convinced in its necessity and urgency.

(2) Compliance with overall goal (National Development Plan and Fishery Development Plan)

The Government of Saint Lucia set a goal for the infrastructure development and the tourism development for upgrading the adding value to agriculture and fishery industry, contributing to the economic growth and supporting economic and social development as the mid-term strategy from 2020 to 2023 based on the “National Development Plan” formulated in 2008. And “Fishery Development Plan” targeting for the years of 2013 to 2022 set a development target with the maximum long-term utilization of fishery resources, sustainable fishery industry and its efficiency, economic prosperity of fishery industry and set strengthening the incorporation of opinions from stakeholders, improvement of average income of fisherfolks, development of infrastructure and enhancing the fishery distribution system as the strategy.

This Project mainly aims for solving the sedimentation problem in the port, and the increase of operating fishing boats and fish landing volume is expected. Furthermore, the achievement such as the decrease of damaged fishing boats due to the shallower navigation channel is also expected.

These achievements contribute to the safety for the navigation of fishing boats, and additionally lead to the save of labor of fisherfolks, and the increase of fisheries operation time. Finally, it contributes to the national economic growth through the fishery industry mentioned in

“National Development Plan” and “Fishery Development Plan” and development of sustainable fishery industry and its efficiency is expected.

Therefore, this Project intending the solution of sedimentation problem is compliant with the upper level plans.

(3) Beneficial Effect

Fish Marketing Corporation (hereinafter called FMC) plays a key role in the fishery distribution of Saint Lucia. The main role is to buy surplus fish at the high fishing season, and keep refrigerated and release these fish to domestic market at the low fishing season for covering the demand. In the past, inadequate capacity of the fishery refrigerator was a big trouble of the stock control for the fishery products through a year.

Therefore, it is the situation that the import fish from neighboring countries had to make satisfied the most of domestic consumption at the low fishing season and more than 50% of the domestic demand of fishery products has been relied on imports. However, 100 tons capacity refrigerator was added in Castries by means of grant aid from the Government of Japan in 1994, the capacity of refrigerator owned by FMC has increased up to 225 tons. In addition to that, 250 tons’ refrigerator was installed in Vieux Fort in 1997. The environment that the fish disposed before due to the inadequate capacity of cold facilities became distributed in the market has been developed.

According to “Basic design study on the project for coastal fisheries development in Saint Lucia” in 2001, the distribution channel of fishery products in Choiseul fishing port is not limited to the distribution within Choiseul area (consumers) but it is partly distributed to supermarkets, hotels, restaurants etc. in Vieux Fort and Castries as well.

Therefore, direct beneficiaries are 6,098 people living in Choiseul area and indirect one covers 16,284 people in Vieux Fort area and 4,173 people living in the downtown of Castries (the population of total Castries area is 65,656 people). The total number of beneficiaries is approximately 26 thousand people.

(4) Compliance with the policy and direction of Japanese ODA

Many island countries in CARICOM including Saint Lucia have the common ground with Japan in view of the area where natural disasters such as hurricane, earthquake, tsunami are frequently generated, also the sustainable use of marine living resources are considered. Therefore, in addition to the vulnerability against climate change and natural disaster, the population and economic scales are small and the industries such as agriculture, fishery industry, tourism to be easily influenced by external factors becomes a foundation.

The past main industry in Saint Lucia was the agriculture and tourism with a focus on the export of banana. However, the industrial diversification has been required due to the vulnerable industrial structure to be strongly influenced by the external factors like the depression of banana industry by the abolition of preferential tariff by EU, etc.

Under such situation, Japan set a key area to support ①disaster prevention and environment and ②fishery industry as the country development cooperation policy (aid strategy).

Concerning the fishery industry among them, Japan is to continuously implement the cooperation for the sustainable development and management of fishery industry in Saint Lucia that aims at the economic revitalization by the industrial diversification and job creation.

With the above, the implementation of this project is to lead to the improvement of fishery works environment by solving the sedimentation problem and contributes to the vitalization of Choiseul area economic activity and the promotion of artisanal fisheries. The relevance for the implementation of Japan's grant aid cooperation can be confirmed by ensuring the compliance with Japan's aid policy and direction.

4-4-2 Effectiveness

(1) Quantitative effectiveness

Outputs of the quantitative effectiveness by the implementation of this Project are as shown in Table4-4-2(1).

① Mitigation of annual sedimentation volume

As described in previous 3-2-1-1, the annual sedimentation volume in Choiseul fishing port is 5,150m³/year 5,150 to 5,400m³/year in total, approximately 2,400m³/year that comes from Route-1 to inflow to port entrance from north side beach which is the protected area after the construction of additional breakwater, and approximately 2,750 m³/year (2,500 to 3,000m³/year) that comes from Route-2 wrapping around the head of additional breakwater.

Sedimentation amount for 3 months after establishment of rubble mound in this Survey was converted to 1,600m³ as a yearly sedimentation amount. Even considering the seasonal conditions, sand from Route-1 is well blocked by second groyne, and the effects are expected.

There is no actual measurement data evaluated to the submerged breakwater at this Survey stage. The detailed mitigation value is possibly estimated by the monitoring in this Project. Since the government of Saint Lucia shows its intention that frequency of dredging is decreased down to 1/10 of the present, the target value when setting approximately 1/10 of annual port sedimentation volume is estimated as shown below.

$$\text{Target Value} = 5,150\text{m}^3/\text{year} (\text{Route-1} + \text{Route-2}) \times 1/10 \doteq 500\text{m}^3/\text{year}$$

② Increase of fish landing volume

The average annual fish landing volume was 59 tons in Choiseul fishing port from 2015 to 2019. It is expected by this Project that fisheries activities are vitalized thanks to improvement of the sedimentation issue. In addition to fisheries activities on daily basis, fisherfolks expect fishing activities in farther unexplored areas by larger fishing vessels in the future. Thus, it is expected fish landing volume is increased, resultantly economic contributions are made in Choiseul district.

Therefore, when the sedimentation issue is improved and fishing port functions are recovered after implementation of this Project, fish landing volume is assumed to increase by approximately 15%.

Reference value: 59 tons (average value from 2015 to 2019)

Target value: 59 tons x 115% = 68 tons

Table 4-4-2 (1) Quantitative effect (direct effect)

| Index | Standard value (actual value in 2020) | Target value (2030) 【3 years after completion】 |
|-----------------------------|--|---|
| Annual sedimentation volume | Approx. 7,000m ³ | Approx. 500m ³ |
| Fish landing volume (ton) | 59 (average from 2015 to 2019) | 68 |

(Remark) Final target value is decided based on the monitoring conducted in this Project.

(2) Qualitative Effect

Output of the qualitative effect by the implementation of this project is as follows.

① Decrease in number for the repairs of ship bottom and engine due to the influence of the sedimentation

In case that necessary water depth was not secured for the target fishing boats due to the sedimentation at the existing navigation channel and the port, conditions that fisherfolks pushed the engine up onto boat, got out of the boat to lighten the ship body and moved boat with human power for preventing the damages to ship body were confirmed.

Although, it is impossible to insist that the change of water depth and the frequency of repair of ship body are related each other, it is considered that the number of repairs and their costs are to be decreased by the implementation of the Project.

② Safety ensuring of ship's navigation and mitigation of fishery labor

In case that the sand deposited at the existing navigation channel and the port and the necessary water depth is not secured for the target fishing boats, it was found that fisherfolks got out of boat and moved it with human power of several people. Labor works to move boats by human power are eased since the boat becomes possible to navigate smoothly and safely by the solution of port

sedimentation problem through the implementation of this Project.

Then, smooth access and utilization of navigation channel leads to time saving of fishery working time and it also contributes to the income improvement of fisherfolks.

③ Reduction of Government cost burden by decreasing the dredging frequency

4 times large scale dredging works were carried out to cope with the sedimentation problem using the fund from Government of Saint Lucia at the Choiseul fishing port after the completion in 2002 and the additional breakwater with the extension of approximately 40m was constructed at the head of breakwater in 2008.

If the sedimentation problem in the fishing port is solved by the implementation of this Project, the dredging works for the maintenance of necessary water depth in navigation channel and the fishing port become lesser. Resultantly, the cost borne by the government of Saint Lucia is expectedly decreased.

Appendices

【Appendices】

| | |
|-------------|--|
| Appendix-1 | Member List of the Study Team |
| Appendix-2 | Survey Schedule |
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| Appendix-4 | Minutes of Discussion (M/D) |
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| Appendix-11 | Water and Sediment Quality |

Appendix-1 Member List of the Study Team

(1) This Survey

The team members for this Survey are as follows:

| Name | Assignment | Affiliation |
|------------------|--|---|
| Hiroyuki Tanaka | Team Leader | Director Team 2, Agricultural and Rural Development Group 1, Rural Development Department, JICA |
| Tetsuya Miyahara | Planning and Management | Associate Expert, Team 2, Agricultural and Rural Development Group 1, Rural Development Department, JICA |
| Kazumasa Kato | Chief Consultant/ Fishing Port Planning | ECOH CORPORATION |
| Kenji Kuroki | Facility Design/ Environmental & Social Considerations (2)/ Tax Exemption Survey (2)/ Survey Management for Sedimentation (2) | ECOH CORPORATION |
| Shuji Sakai | Construction Planning/ Equipment Planning/ Cost Estimation/ Survey Management for Sedimentation (1) | ECOH CORPORATION |
| Vero Rama | Tax Exemption Survey (1)/ Environmental & Social Considerations (1)/ Gender Consideration (1) | ECOH CORPORATION |

(2) Overview explanation

The survey team members for the Overview explanation survey is as follows.

| Name | Assignment | Affiliation |
|------------------|--|---|
| Hiroyuki Tanaka | Team Leader | Director Team 2, Agricultural and Rural Development Group 1, Rural Development Department, JICA |
| Tetsuya Miyahara | Planning and Management | Associate Expert, Team 2, Agricultural and Rural Development Group 1, Rural Development Department, JICA |
| Kazumasa Kato | Chief Consultant/ Fishing Port Planning | ECOH CORPORATION |
| Kenji Kuroki | Facility Design/ Environmental & Social Considerations (2)/ Tax Exemption Survey (2)/ Survey Management for Sedimentation (2) | ECOH CORPORATION |
| Vero Rama | Tax Exemption Survey (1)/ Environmental & Social Considerations (1)/ Gender Consideration (1) | ECOH CORPORATION |

Appendix -2 Survey Schedule

(1) First Survey Schedule

| Day | Date | Full moon: ● New moon: ○ | Holiday | Officials | | Consultant Members | | | |
|-----|------------|-----------------------------|---------|------------------|--|---|---|---|---|
| | | | | ***** | ***** | Kazumasa Kato | Kenji Kuroki | Vero Rama | Shuji Sakai |
| | | | | General Overview | Planning & Management | Chief consultant/ Fishing Port Planning | Facility Design/ Environment & Social Consideration (2)/ Tax Exemption Survey (2)/ Management for Sand Sedimentation Survey (2) | Tax Exemption Survey(1)/Environmental & Social Considerations (1)/ Gender Consideration (1) | Construction & Equipment Planning/ Cost Estimation/ Management for Sand Sedimentation Survey (1) |
| 2 | 2021/9/24 | Fri | | | | ATL 09:43 → UVF 14:20 (DL), Dredging contract | | | |
| 3 | 2021/9/25 | Sat | | | | AM: Site inspection, Dredging contract PM: EIA & Gender hearing, BOD test | | | |
| 4 | 2021/9/26 | Sun | | | | AM: Drone, Meeting with Environmental Consultant PM: EIA/ Gender hearing, Team Meeting | | | |
| 5 | 2021/9/27 | Mon | | | | AM: Choiseul Fishing Port Management Office, EIA hearing PM: Choiseul → Hearing Ando Hazama → Rodney Bay (evening) | | | |
| 6 | 2021/9/28 | Tue | | | | AM: meeting with JICA PM: meeting with Fisheries Department | | | |
| 7 | 2021/9/29 | Wed | | | | Meeting with Fisheries Department | Meeting with Fisheries Department, data collection Ministry of Environment | | |
| 8 | 2021/9/30 | Thu | | | | Meeting with Fisheries Department | Data collection: Construction companies, Ministry of Environment | | |
| 9 | 2021/10/1 | Fri | | | | Meeting with Fisheries Department | | Tax exemption survey | |
| 10 | 2021/10/2 | Sat | | | | Rodney Bay → Cul-De-Sac (tax exemption) → Choiseul Meeting & Contract with Skelly | | | |
| 11 | 2021/10/3 | Sun | | | | Site reconnaissance, sea condition observation | Subcontractor & dumping site management | EIA & Gender hearing | |
| 12 | 2021/10/4 | Mon | PH | | | Meeting with Choiseul Fishing Port Office | Subcontractors, Workshop Time lapse camera | EIA & Gender hearing | |
| 13 | 2021/10/5 | Tue | | | | Meeting with Choiseul Fishing Port Office | Subcontractors, Cable stone Survey: water quality & bathymetry | EIA & Gender hearing | |
| 14 | 2021/10/6 | Wed | ○ | | | Choiseul → Rodney Bay, JICA interim report | | | |
| 15 | 2021/10/7 | Thu | | | | Meeting with Fisheries Department | | Ministry of Environment Documents collection | |
| 16 | 2021/10/8 | Fri | | | | Meeting with Fisheries Department | | Ministry of Environment Documents collection | |
| 17 | 2021/10/9 | Sat | | | | Rodney Bay → Choiseul, Ando Hazama, Team meeting | | | PCR Test result |
| 18 | 2021/10/10 | Sun | | | | Document organization, team meeting | | | HND 16:45 → ATL 16:05 (DL) |
| 19 | 2021/10/11 | Mon | | PH | | Meeting with Fisheries Department | | Min. of Env. Documents collection | ATL 09:43 → UVF 14:20 (DL) |
| 20 | 2021/10/12 | Tue | | | | Meeting with Fisheries Department | | Construction Company Hearing | |
| 21 | 2021/10/13 | Wed | | | | Meeting with Fisheries Department | Min. of Env. Documents collection | | Construction Company Hearing |
| 22 | 2021/10/14 | Thu | | | | Meeting with Fisheries Department | | | Fisheries Department & Construction Company Hearing |
| 23 | 2021/10/15 | Fri | | | 0155HND-0625LHR 1325L GW-1715UVF | Meeting with Fisheries Department | | | Fisheries Department & Construction Company Hearing |
| 24 | 2021/10/16 | Sat | | | | Meeting Choiseul Site visit | | | Rodney Bay → Choiseul Dredging management |
| 25 | 2021/10/17 | Sun | | | | Document organization | | | |
| 26 | 2021/10/18 | Mon | | | | JICA Meeting with Fisheries Department, Minutes Consultation | | | |
| 27 | 2021/10/19 | Tue | | | | Meeting with Fisheries Department, Minutes Consultation | | | |
| 28 | 2021/10/20 | Wed | ● | | | Meeting with Fisheries Department, Minutes Consultation | | AM: PCR Test PM: Settlement (car, Euthalia) | Dredging management, Quarry Choiseul → Rodney Bay |
| 29 | 2021/10/21 | Thu | | | | Minutes Consultation, Signature JICA report | | AM: JICA report PM: PCR Test result | AM: meeting with JICA Hearing |
| 30 | 2021/10/22 | Fri | | | Minutes Signature (preliminary) JICA report s | Minutes (preliminary), Rodney Bay → Choiseul, UVF 15:15 → ATL 20:18 (DL) | | | Fisheries Department, Construction Company Hearing |
| 31 | 2021/10/23 | Sat | | | Fishing Ports visit (other than Choiseul) | ATL stay (PCR Test → result) | | | |
| 32 | 2021/10/24 | Sun | | | 1850UVF- -0810L GW | ATL 11:10 → | | | |
| 33 | 2021/10/25 | Mon | | | 1530LHR- 1055HND | → HND 14:20 (DL) | | | |
| 34 | 2021/10/26 | Tue | | | | / | | | |
| 35 | 2021/10/27 | Wed | | | | | | | |
| 36 | 2021/10/28 | Thu | | | | | | | |
| 37 | 2021/10/29 | Fri | | | | | | | |
| 38 | 2021/10/30 | Sat | | | | | | | |
| 39 | 2021/10/31 | Sun | | | | | | | |
| 40 | 2021/11/1 | Mon | | | | | | | |
| 41 | 2021/11/2 | Tue | | | | | | | |
| 42 | 2021/11/3 | Wed | | PH | | | | | |
| 43 | 2021/11/4 | Thu | | | | | | | |
| 44 | 2021/11/5 | Fri | ○ | | | | | | |
| 45 | 2021/11/6 | Sat | | | | | | | |
| 46 | 2021/11/7 | Sun | | | | | | | |

(2) Overview Explanation: Second Survey schedule

| Day | Date | Full moon: ● New moon: ○ | Holiday | | JICA | | Consultant | | |
|-----|--------------|-----------------------------|--|-----------------------|-------------|-----------------------|--|---|--|
| | | | S a i n t L u c i a | J a p a n | TANAKA | MIYAHARA | Kazumasa Kato | Vero Rama | Kenji Kuroki |
| | | | | | Team Leader | Planning & Management | Chief Consultant/ Fishing Port Planning | Tax Exemption Survey (1)/ Environmental & Social Considerations (1)/ Gender Consideration (2) | Facility Design/ Environmental & Social Considerations (2)/ Tax Exemption Survey (2)/ Management for Sand Sedimentation Survey (2) |
| | 2022/4/27 | Wed | | | | | | | PCR Test |
| 1 | 2022/4/28 | Thu | | | | | | | PCR test result HND 16:30 → ATL |
| 2 | 2022/4/29 | Fri | | | | | | | ATL 10:00 → UVF 14:28 Site visit at Micoud |
| 3 | 2022/4/30 | Sat | | | | | | | Site visit at Choiseul |
| 4 | 2022/5/1 | Sun | | | | | | | Documentation |
| 5 | 2022/5/2 | Mon | | | | | | | Documentation |
| 6 | 2022/5/3 | Tue | | | | | | | 9am-12am: Meeting with DoF. 14pm: Meeting with Skelly |
| 7 | 2022/5/4 | Wed | | | | | | | 9am-11am: Meeting with Skelly. |
| 8 | 2022/5/5 | Thu | | | | | | | 9am:Courtesy call to JICA 14pm: Meeting with DoF |
| 9 | 2022/5/6 | Fri | | | | | | | Rodney Bay → Choiseul Meeting with Port office |
| 10 | 2022/5/7 | Sat | | | | | | | Dredging supervision |
| 11 | 2022/5/8 | Sun | | | | | | | Dredging supervision |
| 12 | 2022/5/9 | Mon | | | | | | | Web Meeting with JICA HQ & DoF Dredging supervision |
| 13 | 2022/5/10 | Tue | | | | | | | Dredging supervision |
| 14 | 2022/5/11 | Wed | | | | | | | Dredging supervision |
| 15 | 2022/5/12 | Thu | | | | | | | Dredging supervision |
| 16 | 2022/5/13 | Fri | | | | | | | PCR Test |
| 17 | 1 2022/5/14 | Sat | | | | | | | PCR test result HND 16:45 → ATL 16:05(DL) |
| 18 | 2 2022/5/15 | Sun | | | | | | | AM:Dredging supervision PM: Choiseul→Rodney Bay |
| 19 | 3 2022/5/16 | Mon | | | | | | | AM: JICA&DoF Minutes of meeting, PM: Minutes of meeting |
| 20 | 4 2022/5/17 | Tue | | | | | | | Minutes of meeting |
| 21 | 5 2022/5/18 | Wed | | | | | | | AM: Rodney Bay⇄Choiseul, PM: Stakeholder meeting |
| 22 | 6 2022/5/19 | Thu | | | | | | | Minutes of meeting |
| 23 | 7 2022/5/20 | Fri | | | | | | | Minutes of meeting signature, Report to Trinidad and Tobago 16:30~ |
| 24 | 8 2022/5/21 | Sat | | | | | | | Team meeting, Document organization |
| 25 | 9 2022/5/22 | Sun | | | | | | | AM: PCR test (at Bay Garden Hotel) |
| 26 | 10 2022/5/23 | Mon | | | | | | | PCR test result, JVF 15:59 →ATL 20:54(DL) |
| 27 | 11 2022/5/24 | Tue | | | | | | | PCR Test in ATL→PCR test result |
| 28 | 12 2022/5/25 | Wed | | | | | | | ATL 11:35 →HND 14:20(DL) |
| 29 | 13 2022/5/26 | Thu | | | | | | | →HND 14:20(DL) |

Appendix -3 List of Parties Concerned in the Recipient Country

(1) Ministry of Agriculture, Fisheries, Food Security and Rural Development

| Name | Affiliation | Position |
|-------------------------------|--|--------------------------------|
| Hon. Alfred Prospere | Ministry of Agriculture, Fisheries, Food Security, and Rural Development | Minister |
| Mr. Julian Barrymore Felicien | Ministry of Agriculture, Fisheries, Food Security, and Rural Development | Permanent Secretary |
| Ms. Soriah Niles-Regis | Ministry of Agriculture, Fisheries, Food Security, and Rural Development | Deputy Permanent Secretary |
| Ms. Sarahlyn Ismond | Accounting Unit | Accountant III |
| Ms. Sarita Williams-Peter | Department of Fisheries (DoF) | Chief Fisheries Officer |
| Mr. Thomas Nelson | Department of Fisheries (DoF) | Deputy Chief Fisheries Officer |
| Ms. Rita Straughn | Department of Fisheries (DoF) | Extension Officer |
| Ms. Monique S. Calderon | Department of Fisheries (DoF) | Fisheries Biologist |
| Ms. Shamza Daniel | Department of Fisheries (DoF) | Extension Officer |
| Ms. Aurelia Theodore | Choiseul Fishing Port Management Office | Manageress |
| Ms. Emma | Choiseul Fishing Port Management Office | Clerk |
| Ms. St. Rose | Choiseul Fishing Port Management Office | Clerk |
| Mr. Richardson Jean Baptiste | Choiseul district | Community President |

(2) Ministry of Infrastructure, Ports, Transports, Physical Development and Urban Renewal

| Name | Affiliation | Position |
|-------------------------|---|---------------------------|
| Hon. Stephenson King | Ministry of Infrastructure, Ports, Transports, Physical Development and Urban Renewal | Minister |
| Mr. Ivor Daniel | Department of Infrastructure, Ports and Transport | Permanent Secretary |
| Mr. Hildreth Lewis | Department of Physical Planning and Urban Renewal | Permanent Secretary |
| Ms. Karen Augustin | Development Control Authority | Executive Secretary |
| Mr. Albert Jn. Baptiste | Department of Infrastructure, Ports and Transport | Chief Engineer |
| Mr. Werner Houson | Physical Planning Section | Physical Planning Officer |

| Name | Affiliation | Position |
|---------------------------|--|------------------------------|
| Mr. Eddie Parsade | Technical Department, Southern Division | Civil Engineer |
| Mr. Daren Cenac | Saint Lucia Air and Sea Ports Authority (SLASPA) | General Manager |
| Mr. Christopher Alexander | Saint Lucia Air and Sea Ports Authority (SLASPA) | Director of Maritime Affairs |
| Ms. Sephora Auguste | Saint Lucia Air and Sea Ports Authority (SLASPA) | Maritime Assistant |
| Mr. Wilbur Etienne | Saint Lucia Air and Sea Ports Authority (SLASPA) | Maritime Officer |
| Mr. Kerwin John | Saint Lucia Air and Sea Ports Authority (SLASPA) | Maritime Officer |

(3) Ministry of Finance, Economic Development and the Youth Economy

| Name | Affiliation | Position |
|----------------------|--|----------------------|
| Ms. Esther Rigobert | Department of Finance | Permanent Secretary |
| Ms. Jemma Lafeuille | Department of Finance, Research and Policy Unit | Director |
| Mr. Janai Leonce | Department of Finance, Research and Policy Unit | Chief Economist |
| Mr. Anthony D. Jean | Procurement Administration Unit, Department of Finance, Economic Growth & Job Security | Director |
| Ms. Marcia Vite | Inland Revenue Department | Comptroller |
| Mr. Cleveland Emanus | Inland Revenue Department, Strategic Design, Planning & Monitoring Division | Deputy Comptroller |
| Mr. Larry Andrew | Inland Revenue Department, Audit Large and Medium Taxpayer Section | Senior Tax Inspector |
| Mr. Sherman Emmanuel | Customs and Excise Department | Comptroller (Ag) |
| Ms. Anita Montoute | Customs and Excise Department | Comptroller |

(4) Embassy of Japan in Trinidad and Tobago

| Name | Affiliation | Position |
|-------------------------------------|---|--|
| His Excellency Mr. Tatsuo Hiramaya | Embassy of Japan in Trinidad and Tobago | Ambassador Extraordinary and Plenipotentiary (First Survey) |
| His Excellency Mr. Yutaka Matsubara | Embassy of Japan in Trinidad and Tobago | Ambassador Extraordinary and Plenipotentiary (Second Survey) |
| Mr. Katsuya Sato | Embassy of Japan in Trinidad and Tobago | Second Secretary |

(5) JICA Saint Lucia Office

| Name | Affiliation | Position |
|-----------------------|-------------------------|-------------------------------------|
| Mr. Hiroyasu Tonokawa | JICA Saint Lucia Office | Chief Representative |
| Mr. Akimasa Matsuzaki | JICA Saint Lucia Office | Representative |
| Ms. Hitomi Urushihata | JICA Saint Lucia Office | Planning Researcher |
| Mr. Erland J. George | JICA Saint Lucia Office | Training & Public Relations Officer |

(6) Sub-consultants

| Name | Affiliation | Position |
|-----------------------------|---|--------------------------------------|
| Mr. Robert Gajadhar | Skelly Construction Services Ltd. | Managing Director |
| Mr. Miguel Horne | Skelly Construction Services Ltd. | Civil Engineer/ Operations Manager |
| Mr. Andres Simons Griffith | Environmental Hygiene & Safety Co. Ltd. | Director |
| Mr. Gregory StC. Hutchinson | HHF (Hart, Hutchinson & Field) (Barbados) | Director |
| Mr. Robin Yearwood | HHF (Hart, Hutchinson & Field) (Barbados) | Land Surveyor |
| Ms. Ermine Herman | IDEQ Caribbean Limited | Chief Executive Officer |
| Mr. Taheim Herman | IDEQ Caribbean Limited | Indoor Environmentalist |
| Dr. Kim M Newton-James | CARPHA (Caribbean Public Health Agency) | Officer in charge, Technical Officer |
| Mr. Kareem Charlemagne | CARPHA (Caribbean Public Health Agency) | Laboratory Manager |

(7) Construction Company

| Name | Affiliation | Position |
|---------------------------------|-------------------------------|-------------------|
| Mr. Gilbert Wilson | Wilrock Ltd. | General Manager |
| Mr. Stephen Shingleton-Smith | C.O. Williams | General Manager |
| Mr. Steve Brinkhurst | C.O. Williams | Contracts Manager |
| Mr. Crispin Brown | C.O. Williams | Quantity Surveyor |
| Mr. Martin Renee | Renee's Construction Co. Ltd. | Managing Director |

(1) First Site Survey (Signed on October 22nd, 2021)

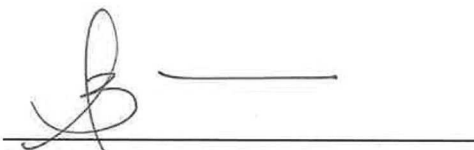
**Minutes of Discussions
on the Preparatory Survey for the Project for
Improvement of Choiseul Fishery Port**

Based on the preliminary discussions between the Government of Saint Lucia (hereinafter referred to as “the Government of Saint Lucia”) and the country office of Japan International Cooperation Agency (hereinafter referred to as “JICA”) in Saint Lucia, JICA dispatched the Preparatory Survey Team (hereinafter referred to as “the Team”) for the Outline Design of the Project for Improvement of Choiseul Fishery Port in Saint Lucia (hereinafter referred to as “the Project”). The Team held a series of discussions with the officials of the Government of Saint Lucia and conducted a field survey. In the course of the discussions, both sides have confirmed the main items described in the attached sheets.

Castries, 22 October, 2021



Mr. TANAKA Hiroyuki
Leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan



Mr. Barrymore FELICIEN
Permanent Secretary
The Ministry of Agriculture, Fisheries,
Food Security and Rural Development
Saint Lucia

ATTACHMENT

1. Objective of the Project

The objective of the Project is to improve the usability of the Choiseul fishery port by countermeasure works for reducing the current sedimentation in Choiseul fishery port, thereby contributing to the productivity for fisher folk and development of fisheries sectors.

2. Title of the Preparatory Survey

Both sides confirmed the title of the Preparatory Survey as “the Preparatory Survey for the Project for Improvement of Choiseul Fishery Port” (hereinafter referred to as “the Preparatory Survey”).

3. Project site

Both sides confirmed that the site of the Project is the Choiseul fishery port, which is shown in Annex 1.

4. Responsible authorities for the Project

Both sides confirmed the authorities responsible for the Project are as follows:

- 4-1. The Fisheries Department will be the executing agency for the Project (hereinafter referred to as “the Executing Agency”). The Executing Agency shall coordinate with all the relevant authorities to ensure smooth implementation of the Project and ensure that the undertakings for the Project shall be managed by relevant authorities properly and on time. The organization charts are shown in Annex 2.
- 4-2. The line ministry of the Executing Agency is the Ministry of Agriculture, Fisheries, Food Security and Rural Development (hereinafter referred to as “MoA”). MoA shall be responsible for supervising the Executing Agency on behalf of the Government of Saint Lucia.

5. Items requested by the Government of Saint Lucia

As a result of discussions, both sides confirmed that the items requested by the Government of Saint Lucia, which is based on the results of the Final Report for “Data collection survey for current situation of Choiseul Fishing Port” (hereinafter referred to as “the Data Collection Survey”) are as follows:

- Dredging works : Approx. 7,000 m³
- Second groyne : Approx. 70 m

- Submerged breakwater: Approx. 20 m
- Navigational aids: beacons
- 3 years of monitoring, assessment and adjustment works after construction is completed

5-1. JICA will assess the feasibility of the above requested items through the Preparatory Survey and will report the findings to the Government of Japan. In consultation with the Government of Saint Lucia, the final scope of the Project will be decided by the Government of Japan.

5-2. The Government of Saint Lucia shall submit an official request to the Government of Japan through a diplomatic channel before the appraisal of the Project.

6. Procedures and Basic Principles of Japanese Grant

6-1. The Government of Saint Lucia agreed that the procedures and basic principles of Japanese Grant (hereinafter referred to as the “Grant”) as described in Annex 3 shall be applied to the Project.

As for the monitoring of the implementation of the Project, JICA requires the Executing Agency to submit the Project Monitoring Report. This form is attached as Annex 4.

6-2. The Government of Saint Lucia agreed to take the necessary measures, as described in Annex 5, for smooth implementation of the Project. The contents of the Annex 5 will be elaborated and refined during the Preparatory Survey and be agreed in the mission dispatched for explanation of the draft Preparatory Survey Report. The contents of Annex 5 will be updated as the Preparatory Survey progresses, and eventually, will be used as an attachment to the Grant Agreement.

7. Schedule of the Preparatory Survey

7-1. The Team will conduct the Preparatory Survey in Saint Lucia until 3 November, 2021.

7-2. An official request to the Government of Japan will be submitted before December, 2021.

7-3. JICA will prepare a draft Preparatory Survey Report in English and dispatch a mission to Saint Lucia in order to explain its contents around February, 2022.

7-4. If the contents of the draft Preparatory Survey Report is accepted and the undertakings for the Project are fully agreed by the Government of Saint Lucia, JICA will finalize the Preparatory Survey Report and submit it to the MOA around April 2022.

April 2022.

7-5. The above schedule is tentative and subject to change.

8. Environmental and Social Considerations

8-1. The MOA confirmed to give due environmental and social considerations during implementation, and after completion of the Project, in accordance with the JICA Guidelines for Environmental and Social Considerations (April, 2010; https://www.jica.go.jp/english/our_work/social_environmental/guideline/ref.html) and also in accordance with Saint Lucia's National Environmental Guidelines

8-2. The Project is categorized as "B" from the following considerations:

The project is not likely to have significant adverse impact on the environment under the JICA Guidelines for Environmental and Social Considerations in terms of its sectors, characteristics and areas.

8-3. The necessary procedures for the permission to undertake coastal works including the environmental assessment shall be conducted as follow;

- JICA will send the draft Preparatory Survey Report to the MOA inclusive of the social impact assessment and mitigation works to be undertaken during the Project.
- JICA provides the copies of the construction details, coastal profile, bathymetric map of the impacted area, site plan, coastal study and any additional technical details as required in Guide to Obtaining Permission to Develop Land to MOA.
- MOA will obtain the certification for above mentioned documents as required in Guide to Obtaining Permission to Develop Land.
- The MOA will submit the application for permission inclusive of an outline of the Project Brief outlining concepts of application and relevant documents as required by the Development Control Authority (DCA).
- Development Control Authority will review the Preparatory Survey Report and the Result of the Data Collection Survey for the Environmental Impact Assessment and make EIA Review report of the Project.

9. Other Relevant Issues

9-1. Short-term countermeasures as a part of the Preparatory Survey

- The Government of Saint Lucia agreed that dredging work will be conducted two times and a temporary access road will be constructed during the Preparatory Survey. The temporary access road will be constructed at the

planned location of the second groyne.

- JICA agreed that social impacts (vessels, noise, air, water quality...) should be monitored during the preparatory survey and will form part of the Preparatory Survey Report.

9-2 Gender Mainstreaming

- Gender considerations should be included in the social impact component of the Preparatory Survey Report.
- Both sides agreed that if any women are hired as part of the unskilled labor force during the construction period, the payment rate will be same regardless of gender.

9-3 The title of the Project

Both sides agreed that the title of the Project shall be changed to “Project for Improvement of Choiseul Fishing Port”.

9-4 Consideration for fishing activities

Both sides agreed that the Project will take into consideration adverse effects to fishing activities. A temporary jetty will be prepared for fishers if the port is closed due to the Project.

9-5 Sediment dump site

Both sides agreed that the Government of Saint Lucia will select a sediment dump site. The location will be determined based on the result of the assessment of sand and land ownership.

Annex 1 Project Site

Annex 2 Organization Chart

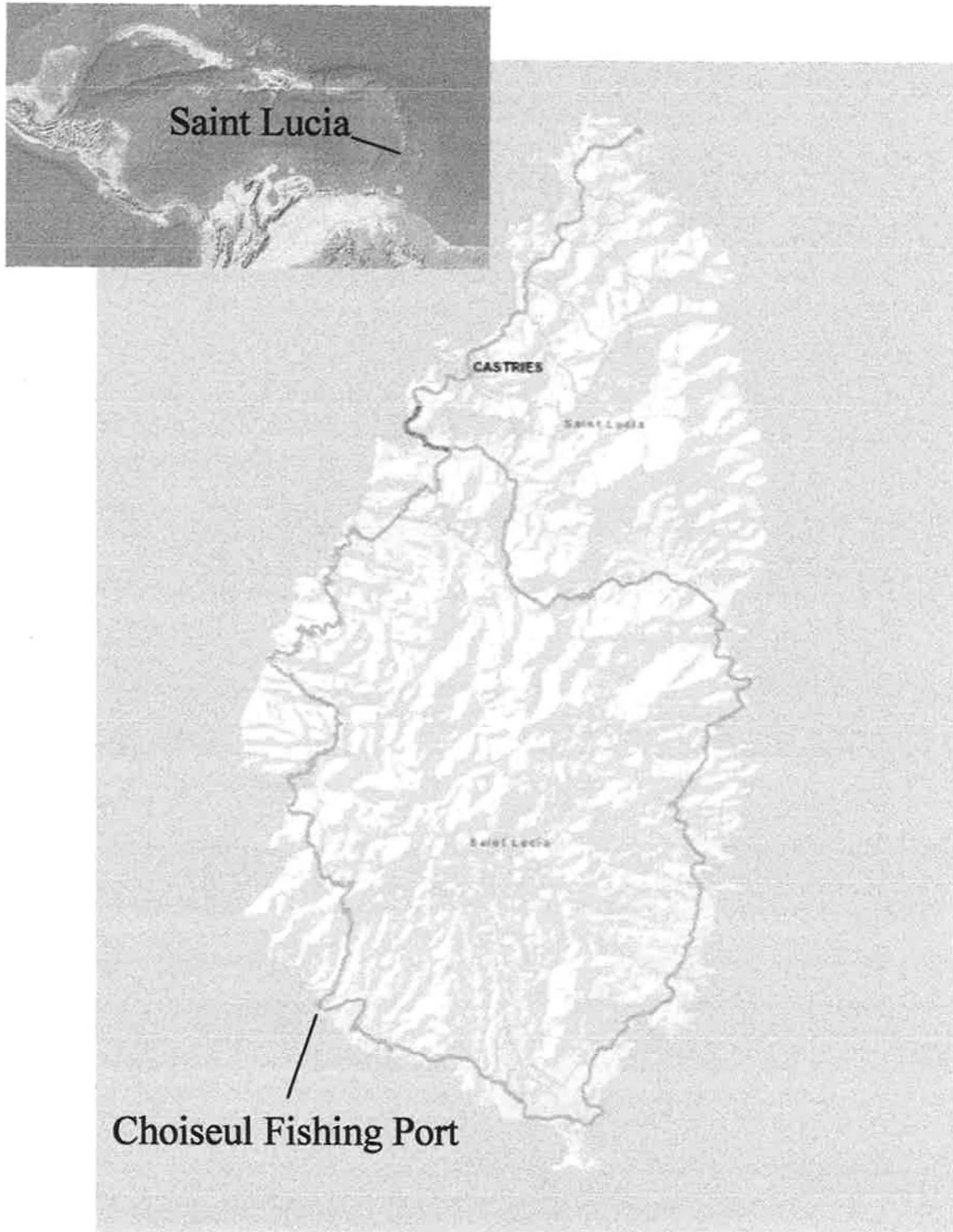
Annex 3 Japanese Grant

Annex 4 Project Monitoring Report (template)

Annex 5 Major Undertakings to be taken by the Government of St. Lucia

End

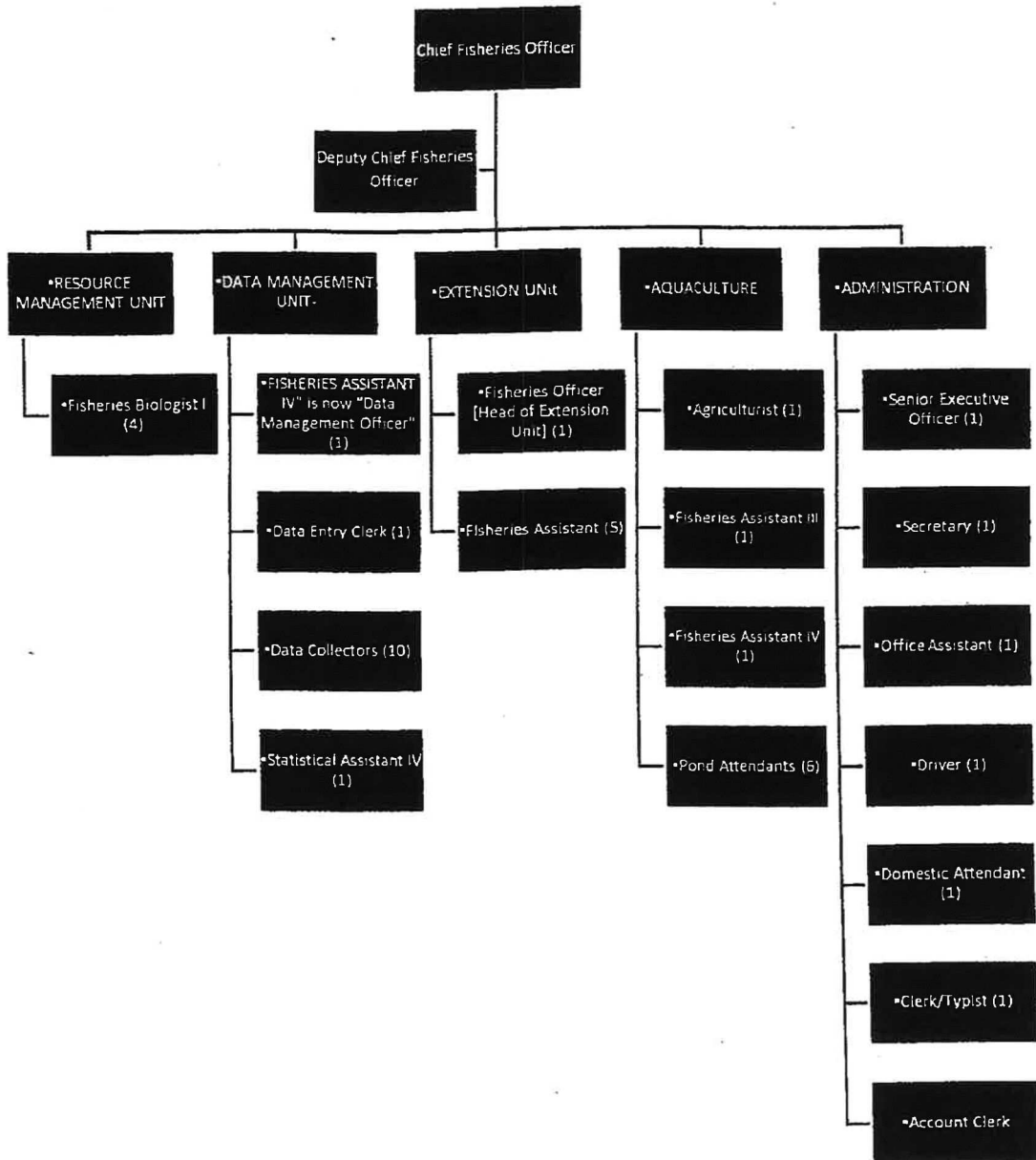
Project Site



Am

d.

Organization Chart



JAPANESE GRANT

The Japanese Grant is non-reimbursable fund provided to a recipient country (hereinafter referred to as “the Recipient”) to purchase the products and/or services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. Followings are the basic features of the project grants operated by JICA (hereinafter referred to as “Project Grants”).

1. Procedures of Project Grants

Project Grants are conducted through following procedures (See “PROCEDURES OF JAPANESE GRANT” for details):

(1) Preparation

- The Preparatory Survey (hereinafter referred to as “the Survey”) conducted by JICA

(2) Appraisal

- Appraisal by the government of Japan (hereinafter referred to as “GOJ”) and JICA, and Approval by the Japanese Cabinet

(3) Implementation

Exchange of Notes

- The Notes exchanged between the GOJ and the government of the Recipient

Grant Agreement (hereinafter referred to as “the G/A”)

- Agreement concluded between JICA and the Recipient

Banking Arrangement (hereinafter referred to as “the B/A”)

- Opening of bank account by the Recipient in a bank in Japan (hereinafter referred to as “the Bank”) to receive the grant

Construction works/procurement

- Implementation of the project (hereinafter referred to as “the Project”) on the basis of the G/A

(4) Ex-post Monitoring and Evaluation

- Monitoring and evaluation at post-implementation stage

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide basic documents necessary for the appraisal of the the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of

relevant agencies of the Recipient necessary for the implementation of the Project.

- Evaluation of the feasibility of the Project to be implemented under the Japanese Grant from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.
- Confirmation of Environmental and Social Considerations

The contents of the original request by the Recipient are not necessarily approved in their initial form. The Outline Design of the Project is confirmed based on the guidelines of the Japanese Grant.

JICA requests the Recipient to take measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the executing agency of the Project. Therefore, the contents of the Project are confirmed by all relevant organizations of the Recipient based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA contracts with (a) consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the feasibility of the Project.

3. Basic Principles of Project Grants

(1) Implementation Stage

1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as "the E/N") will be signed between the GOJ and the Government of the Recipient to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Recipient to define the necessary articles, in accordance with the E/N, to implement the Project, such as conditions of disbursement, responsibilities of the Recipient, and procurement conditions. The terms and conditions generally applicable to the Japanese Grant are stipulated in the "General Terms and Conditions for Japanese Grant (January 2016)."



2) Banking Arrangements (B/A) (See “Financial Flow of Japanese Grant (A/P Type)” for details)

a) The Recipient shall open an account or shall cause its designated authority to open an account under the name of the Recipient in the Bank, in principle. JICA will disburse the Japanese Grant in Japanese yen for the Recipient to cover the obligations incurred by the Recipient under the verified contracts.

b) The Japanese Grant will be disbursed when payment requests are submitted by the Bank to JICA under an Authorization to Pay (A/P) issued by the Recipient.

3) Procurement Procedure

The products and/or services necessary for the implementation of the Project shall be procured in accordance with JICA's procurement guidelines as stipulated in the G/A.

4) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the Recipient to continue to work on the Project's implementation after the E/N and G/A.

5) Eligible source country

In using the Japanese Grant disbursed by JICA for the purchase of products and/or services, the eligible source countries of such products and/or services shall be Japan and/or the Recipient. The Japanese Grant may be used for the purchase of the products and/or services of a third country as eligible, if necessary, taking into account the quality, competitiveness and economic rationality of products and/or services necessary for achieving the objective of the Project. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm, which enter into contracts with the Recipient, are limited to "Japanese nationals", in principle.

6) Contracts and Concurrence by JICA

The Recipient will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be concurred by JICA in order to be verified as eligible for using the Japanese Grant.

7) Monitoring

The Recipient is required to take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and to regularly report to JICA about its status by using the Project Monitoring Report (PMR).

8) Safety Measures

The Recipient must ensure that the safety is highly observed during the implementation of the Project.

9) Construction Quality Control Meeting

Construction Quality Control Meeting (hereinafter referred to as the “Meeting”) will be held for quality assurance and smooth implementation of the Works at each stage of the Works. The member of the Meeting will be composed by the



Recipient (or executing agency), the Consultant, the Contractor and JICA. The functions of the Meeting are as followings:

- a) Sharing information on the objective, concept and conditions of design from the Contractor, before start of construction.
- b) Discussing the issues affecting the Works such as modification of the design, test, inspection, safety control and the Client's obligation, during of construction.

(2) Ex-post Monitoring and Evaluation Stage

- 1) After the project completion, JICA will continue to keep in close contact with the Recipient in order to monitor that the outputs of the Project is used and maintained properly to attain its expected outcomes.
- 2) In principle, JICA will conduct ex-post evaluation of the Project after three years from the completion. It is required for the Recipient to furnish any necessary information as JICA may reasonably request.

(3) Others

1) Environmental and Social Considerations

The Recipient shall carefully consider environmental and social impacts by the Project and must comply with the environmental regulations of the Recipient and JICA Guidelines for Environmental and Social Considerations (April, 2010).

2) Major undertakings to be taken by the Government of the Recipient

For the smooth and proper implementation of the Project, the Recipient is required to undertake necessary measures including land acquisition, and bear an advising commission of the A/P and payment commissions paid to the Bank as agreed with the GOJ and/or JICA. The Government of the Recipient shall ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the Recipient with respect to the purchase of the Products and/or the Services be exempted or be borne by its designated authority without using the Grant and its accrued interest, since the grant fund comes from the Japanese taxpayers.

3) Proper Use

The Recipient is required to maintain and use properly and effectively the products and/or services under the Project (including the facilities constructed and the equipment purchased), to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Japanese Grant.

4) Export and Re-export

The products purchased under the Japanese Grant should not be exported or re-exported from the Recipient.

A handwritten signature in black ink, consisting of a stylized, cursive 'M' followed by a horizontal line.A small, handwritten signature in black ink, appearing to be a stylized 'J' or 'E'.

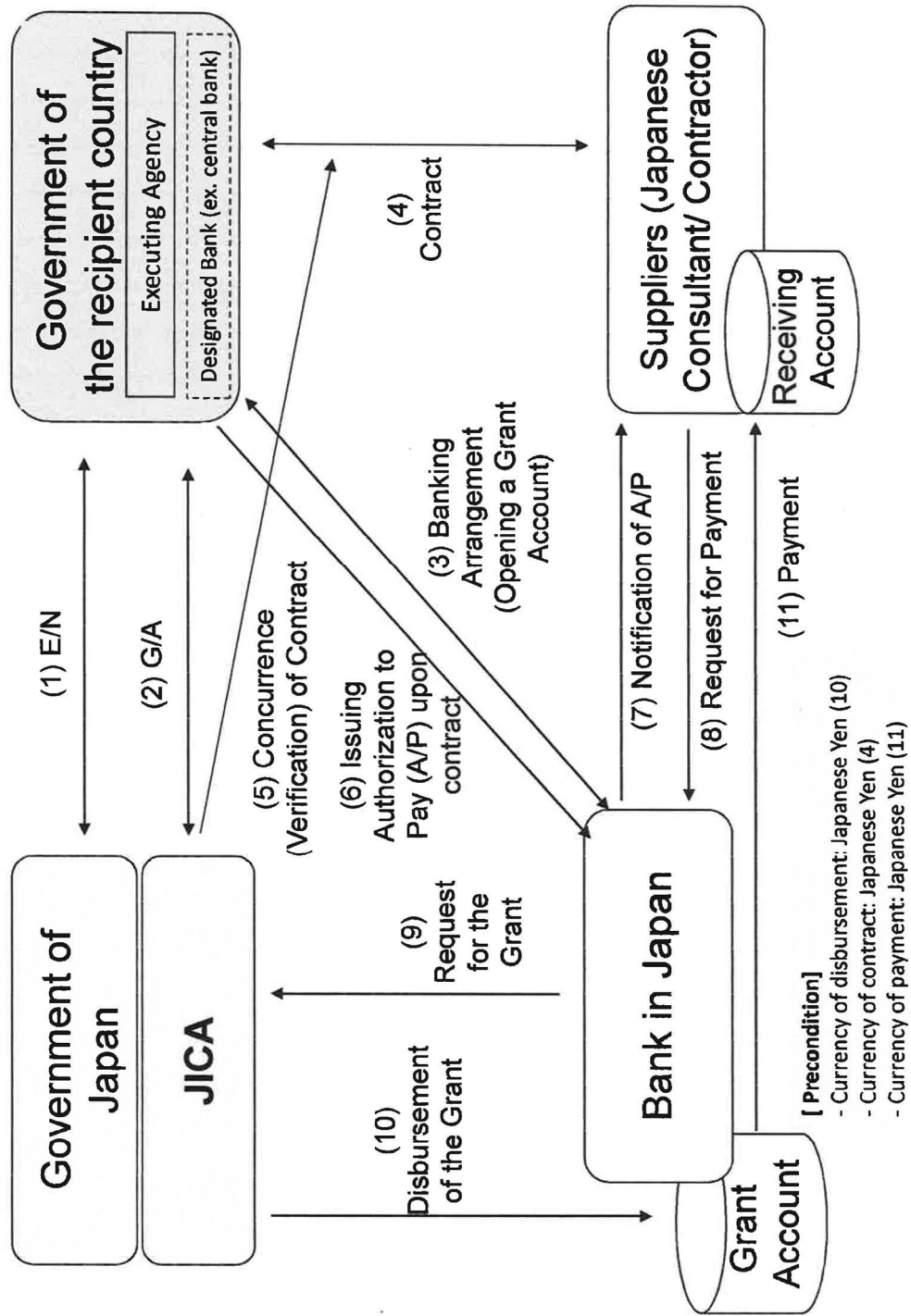
PROCEDURES OF JAPANESE GRANT

| Stage | Procedures | Remarks | Recipient Government | Japanese Government | JICA | Consultants | Contractors | Agent Bank |
|------------------------------------|--|--|----------------------|---------------------|---------|-------------|-------------|------------|
| Official Request | Request for grants through diplomatic channel | Request shall be submitted before appraisal stage. | x | x | | | | |
| 1. Preparation | (1) Preparatory Survey Preparation of outline design and cost estimate | | x | | x | x | | |
| 2. Appraisal | (2) Preparatory Survey Explanation of draft outline design, including cost estimate, undertakings, etc. | | x | | x | x | | |
| | (3) Agreement on conditions for implementation | Conditions will be explained with the draft notes (E/N) and Grant Agreement (G/A) which will be signed before approval by Japanese government. | x | x (E/N) | x (G/A) | | | |
| | (4) Approval by the Japanese cabinet | | | x | | | | |
| 3. Implementation | (5) Exchange of Notes (E/N) | | x | x | | | | |
| | (6) Signing of Grant Agreement (G/A) | | x | | x | | | |
| | (7) Banking Arrangement (B/A) | Need to be informed to JICA | x | | | | | x |
| | (8) Contracting with consultant and issuance of Authorization to Pay (A/P) | Concurrence by JICA is required | x | | | x | | x |
| | (9) Detail design (D/D) | | x | | | x | | |
| | (10) Preparation of bidding documents | Concurrence by JICA is required | x | | | x | | |
| | (11) Bidding | Concurrence by JICA is required | x | | | x | x | |
| | (12) Contracting with contractor/supplier and issuance of A/P | Concurrence by JICA is required | x | | | | x | x |
| | (13) Construction works/procurement | Concurrence by JICA is required for major modification of design and amendment of contracts. | x | | | x | x | |
| | (14) Completion certificate | | x | | | x | x | |
| 4. Ex-post monitoring & evaluation | (15) Ex-post monitoring | To be implemented generally after 1, 3, 10 years of completion, subject to change | x | | x | | | |
| | (16) Ex-post evaluation | To be implemented basically after 3 years of completion | x | | x | | | |

notes:

1. Project Monitoring Report and Report for Project Completion shall be submitted to JICA as agreed in the G/A.
2. Concurrence by JICA is required for allocation of grant for remaining amount and/or contingencies as agreed in the G/A.

Financial Flow of Japanese Grant (A/P Type)



Project Monitoring Report
on
Project Name
Grant Agreement No. XXXXXXX
20XX, Month

Organizational Information

| | |
|--|---|
| Signer of the G/A (Recipient) | <p>Person in Charge (Designation) _____</p> <p>Contacts _____</p> <p style="margin-left: 100px;">Address: _____</p> <p style="margin-left: 100px;">Phone/FAX: _____</p> <p style="margin-left: 100px;">Email: _____</p> |
| Executing Agency | <p>Person in Charge (Designation) _____</p> <p>Contacts _____</p> <p style="margin-left: 100px;">Address: _____</p> <p style="margin-left: 100px;">Phone/FAX: _____</p> <p style="margin-left: 100px;">Email: _____</p> |
| Line Ministry | <p>Person in Charge (Designation) _____</p> <p>Contacts _____</p> <p style="margin-left: 100px;">Address: _____</p> <p style="margin-left: 100px;">Phone/FAX: _____</p> <p style="margin-left: 100px;">Email: _____</p> |

General Information:

| | |
|--------------------------|---|
| Project Title | |
| E/N | Signed date: Duration: |
| G/A | Signed date: Duration: |
| Source of Finance | Government of Japan: Not exceeding JPY _____ mil. Government of (_____): _____ |

1: Project Description

1-1 Project Objective

| |
|--|
| |
|--|

1-2 Project Rationale

- Higher-level objectives to which the project contributes (national/regional/sectoral policies and strategies)
- Situation of the target groups to which the project addresses

| |
|--|
| |
|--|

1-3 Indicators for measurement of "Effectiveness"

| Quantitative indicators to measure the attainment of project objectives | | |
|---|----------------|--------------|
| Indicators | Original (Yr) | Target (Yr) |
| | | |
| | | |
| Qualitative indicators to measure the attainment of project objectives | | |
| | | |

2: Details of the Project

2-1 Location

| Components | Original <i>(proposed in the outline design)</i> | Actual |
|------------|---|--------|
| 1. | | |

2-2 Scope of the work

| Components | Original* <i>(proposed in the outline design)</i> | Actual* |
|------------|--|---------|
| 1. | | |
| | | |
| | | |

Reasons for modification of scope (if any).

| |
|-------|
| (PMR) |
|-------|

Any

J

2-3 Implementation Schedule

| Items | Original | | Actual |
|-------|---|---|--------|
| | <i>(proposed in the outline design)</i> | <i>(at the time of signing the Grant Agreement)</i> | |
| | | | |

Reasons for any changes of the schedule, and their effects on the project (if any)

| |
|--|
| |
|--|

2-4 Obligations by the Recipient

2-4-1 Progress of Specific Obligations

See Attachment 2.

2-4-2 Activities

See Attachment 3.

2-4-3 Report on RD

See Attachment 11.

2-5 Project Cost

2-5-1 Cost borne by the Grant (Confidential until the Bidding)

| Components | | | Cost (Million Yen) | |
|------------|---|--|--|--------|
| | Original <i>(proposed in the outline design)</i> | Actual <i>(in case of any modification)</i> | Original ^{1),2)} <i>(proposed in the outline design)</i> | Actual |
| 1. | | | | |
| | | | | |
| | | | | |
| Total | | | | |

Note: 1) Date of estimation:
 2) Exchange rate: 1 US Dollar = Yen

2-5-2 Cost borne by the Recipient

| Components | | | Cost (1,000 Taka) | |
|------------|---|--|--|--------|
| | Original <i>(proposed in the outline design)</i> | Actual <i>(in case of any modification)</i> | Original ^{1),2)} <i>(proposed in the outline design)</i> | Actual |
| 1. | | | | |
| | | | | |
| | | | | |
| | | | | |

- Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar =

Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

(PMR)

2-6 Executing Agency

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

| |
|---|
| Original (at the time of outline design) name: role: financial situation: institutional and organizational arrangement (organogram): human resources (number and ability of staff): |
| Actual (PMR) |

2-7 Environmental and Social Impacts

- The results of environmental monitoring based on Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- The results of social monitoring based on in Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- Disclosed information related to results of environmental and social monitoring to local stakeholders (whenever applicable).

3: Operation and Maintenance (O&M)

3-1 Physical Arrangement

- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spareparts, etc.)

| |
|---|
| Original (at the time of outline design) |
| Actual (PMR) |

3-2 Budgetary Arrangement

- Required O&M cost and actual budget allocation for O&M

Original (at the time of outline design)



Actual (PMR)

4: Potential Risks and Mitigation Measures

- Potential risks which may affect the project implementation, attainment of objectives, sustainability
- Mitigation measures corresponding to the potential risks

Assessment of Potential Risks (at the time of outline design)

| Potential Risks | Assessment |
|--------------------------|--|
| 1. (Description of Risk) | Probability: High/Moderate/Low |
| | Impact: High/Moderate/Low |
| | Analysis of Probability and Impact: |
| | |
| | Mitigation Measures: |
| | |
| | Action required during the implementation stage: |
| 2. (Description of Risk) | Probability: High/Moderate/Low |
| | Impact: High/Moderate/Low |
| | Analysis of Probability and Impact: |
| | |
| | Mitigation Measures: |
| | |
| | Action required during the implementation stage: |
| 3. (Description of Risk) | Probability: High/Moderate/Low |
| | Impact: High/Moderate/Low |
| | Analysis of Probability and Impact: |
| | |
| | Mitigation Measures: |
| | |
| | Action required during the implementation stage: |

| | |
|---|-----------------------------------|
| | Contingency Plan (if applicable): |
| | |
| Actual Situation and Countermeasures | |
| (PMR) | |

5: Evaluation and Monitoring Plan (after the work completion)

5-1 Overall evaluation

Please describe your overall evaluation on the project.

| |
|--|
| |
|--|

5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

| |
|--|
| |
|--|

5-3 Monitoring Plan of the Indicators for Post-Evaluation

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

| |
|--|
| |
|--|



Attachment

1. Project Location Map
2. Specific obligations of the Recipient which will not be funded with the Grant
3. Monthly Report submitted by the Consultant
- Appendix - Photocopy of Contractor's Progress Report (if any)
 - Consultant Member List
 - Contractor's Main Staff List
4. Check list for the Contract (including Record of Amendment of the Contract/ Agreement and Schedule of Payment)
5. Environmental Monitoring Form / Social Monitoring Form
6. Monitoring sheet on price of specified materials (Quarterly)
7. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (PMR (final) only)
8. Pictures (by JPEG style by CD-R) (PMR (final) only)
9. Equipment List (PMR (final) only)
10. Drawing (PMR (final) only)
11. Report on RD (After project)

Major Undertakings to be taken by the Government of St. Lucia

1. Specific obligations of the Government of St. Lucia which will not be funded with the Grant

(1) Before the Tender

| NO | Items | Deadline | Incharge | Estimated Cost | Ref |
|----|---|---|----------|----------------|-----|
| 1 | To submit request to MOF for signing of the banking arrangement (B/A) with a bank in Japan (the Agent Bank) to open a bank account | within 1 month after the signing of the G/A | MOA | | |
| 2 | To submit request to MOF for Authorisation to Pay (A/P) to a bank in Japan (the Agent Bank) for the consultant's payment | within 1 month after the signing of the contract | MOA | | |
| 3 | To submit payment request to the MOF for the following commissions or charges to the Agent Bank in Japan for the banking services based upon the B/A | | MOA | | |
| | 1) Payment of advising commission or charge for A/P | within 1 month after the signing of the contract(s) | MOF | | |
| | 2) Payment of commission or charges for A/P | every payment | MOF | | |
| 4 | To facilitate approval from the Development Control Authority (DCA) for the IEE/EIA (Conditions of approval should be fulfilled, if any) and secure the necessary budget for implementation for Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMoP) (and fulfilling conditions of approval, if any). | within 1 month after the signing of the G/A | MOA | | |
| 5 | To submit Project Monitoring Report (with the results of the Detailed Design) | before preparation of the bidding documents | FD | | |
| 6 | To assist in obtaining the construction permit including dumping site for sediment dredged by the project. | within 1 month after the signing of the G/A | FD | | |

MOF: Ministry of Finance, Economic Growth, Job Creation, External Affairs and the Public Service

FD: Fisheries Department

MOI: Ministry of Infrastructure, Ports, Transports, Physical Development and Urban Renewal.

(2) During the Project Implementation

| NO | Items | Deadline | In charge | Estimated Cost | Ref. |
|----|--|---|-----------|----------------|------|
| 1 | To request issuance of A/P by the MOF to the Agent Bank in Japan for the payment to the supplier and the contractor | within 1 month after the signing of the contract(s) | MOA | | |
| 2 | To submit payment request to the MOF for the following commissions or charges to the Agent Bank in Japan for the banking services based upon the B/A | | MOA | | |
| | 1) Payment of advising commission or charge for A/P | within 1 month after the signing of the contract(s) | MOF | | |
| | 2) Payment of commission or charges for A/P | every payment | MOF | | |

| | | | | | |
|----|---|---|-----|--|--|
| 3 | To conduct necessary procedures such as “Request for disbursement” to JICA (upon contract with construction firms and/or procurement firms (suppliers)), “Application of remittance” to Bank (upon contract with construction firms and/or procurement firms (suppliers)) | during the Project | FD | | |
| 4 | To facilitate unloading and customs clearance in a timely manner at ports of disembarkation in the country of the Recipient and to assist the Supplier(s) with internal transportation therein | during the Project | MOA | | |
| 5 | To facilitate the entry and stay of Japanese physical persons and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services into the country of the Recipient and stay therein for the performance of their work | during the Project | MOA | | |
| 6 | To facilitate the exemption of customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services | during the Project | MOA | | |
| 7 | To request funding from the MOF for expenses, other than those covered by the Grant, necessary for the implementation of the Project | during the Project | MOA | | |
| 8 | To notify JICA promptly of any incident or accident, which has, or is likely to have, a significant adverse effect on the environment, the affected communities, the public or workers. | during the construction | FD | | |
| 9 | To submit Project Monitoring Report | every month | FD | | |
| 10 | To submit Project Monitoring Report (final) (including as-built drawings, equipment list, photographs, etc.) | within 1 month after signing of Certificate of Completion for the works under the contract(s) | FD | | |
| 11 | To submit a report concerning completion of the Project | within 6 months after completion of the Project | FD | | |
| 12 | To assist in ensuring the safety of persons engaged in the implementation of the Project | during the construction | MOA | | |
| 13 | To implement EMP and EMoP | during the construction | FD | | |
| 14 | To submit results of environmental monitoring to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report | during the construction | FD | | |

(3) After the Project

| NO | Items | Deadline | In charge | Estimated Cost | Ref. |
|----|--|------------------------------------|-----------|----------------|------|
| 1 | To implement EMP and EMoP | for a period based on EMP and EMoP | FD | | |
| 2 | To submit results of environmental monitoring to JICA, by using the monitoring form, semi-annually - The period of environmental monitoring may be extended if any significant negative impacts on the environment are found. The extension of environmental monitoring will be decided based on the agreement between Fisheries Department and JICA. | for 3 years after the Project | FD | | |
| 3 | To properly maintain and utilize the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine check/Periodic inspection | After completion of the Project | FD | | |

2. Other obligations of the Government of St. Lucia funded with the Grant

| NO | Items | Deadline | Amount (Million Japanese Yen)* | |
|-------|--|----------|--------------------------------------|--|
| 1 | Construction of improved Choiseul Fishing Port Dredging works : Approx. 7,000 m ³ Second groin : Approx. 70 m Submerged breakwater: Approx. 20 m Navigational aids: beacons | | | |
| 2 | To implement detailed design, bidding support and construction supervision (Consulting Service) | | | |
| 3 | 3 years of monitoring, assessment and adjustment works after construction is completed | | | |
| 4 | Adjustment works | | | |
| 5 | Contingencies | | | |
| Total | | | | |

*The Amount is provisional. This is subject to the approval of the Government of Japan.

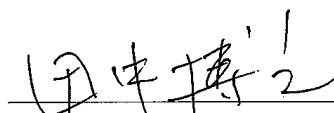
(2) Second Site Survey (Signed on May 20th, 2022)

**Minutes of Discussions
on the Preparatory Survey for the Project for
Improvement of Choiseul Fishing Port
(Explanation on Draft Preparatory Survey Report)**

With reference to the minutes of discussions signed between The Ministry of Agriculture, Fisheries, Food Security and Rural Development and the Japan International Cooperation Agency (hereinafter referred to as "JICA") on 22 October, 2021 and in response to the request from the Government of Saint Lucia, JICA dispatched the Preparatory Survey Team (hereinafter referred to as "the Team") for the explanation of Draft Preparatory Survey Report (hereinafter referred to as "the Draft Report") for the Project for Improvement of Choiseul Fishing Port (hereinafter referred to as "the Project").

As a result of the discussions, both sides agreed on the main items described in the attached sheets.

Castries, 20 May, 2022



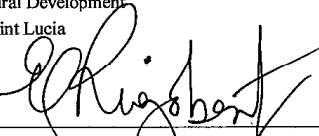
Mr. TANAKA Hiroyuki
Leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan



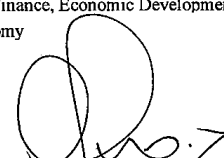
Mr. Barrymore FELICIEN
Permanent Secretary
Ministry of Agriculture, Fisheries, Food Security and
Rural Development
Saint Lucia



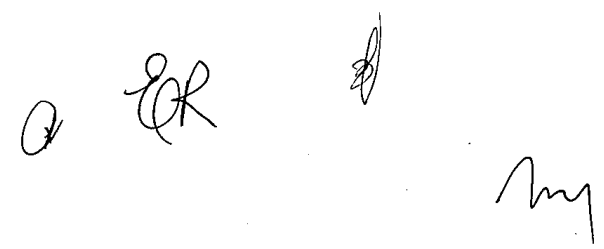
Mr. Ivor DANIEL
Permanent Secretary
Department of Infrastructure, Ports and Transport
Ministry of Infrastructure, Ports, Transport, Physical
Development and Urban Renewal
Saint Lucia



Ms. Esther RIGOBERT
Permanent Secretary
Department of Finance
Ministry of Finance, Economic Development, and the
Youth Economy
Saint Lucia



Mr. Hildreth LEWIS
Permanent Secretary
Department of Physical Planning and Urban Renewal
Ministry of Infrastructure, Ports, Transport, Physical
Development and Urban Renewal
Saint Lucia



ATTACHEMENT

1. Objective of the Project

The objective of the Project is to improve the usability of the fishing port by reducing the current sedimentation in Choiseul Fishing Port, thereby contributing to the productivity for fisher folk and development of fisheries sectors.

2. Title of the Preparatory Survey

Both sides confirmed the title of the Preparatory Survey as “the Preparatory Survey for the Project for Improvement of Choiseul Fishing Port”.

3. Project site

Both sides confirmed that the site of the Project is in Choiseul Fishing Port, which is shown in Annex 1.

4. Responsible authority for the Project

Both sides confirmed the authorities responsible for the Project are as follows:

- 4-1. The Fisheries Department will be the executing agency for the Project (hereinafter referred to as “the Executing Agency”). The Executing Agency shall coordinate with all the relevant authorities to ensure smooth implementation of the Project and ensure that the undertakings for the Project shall be taken care by relevant authorities properly and on time. The organization charts are shown in Annex 2.
- 4-2. The line ministry of the Executing Agency is the Ministry of Agriculture, Fisheries, Food Security and Rural Development (hereinafter referred to as “MoA”). MoA shall be responsible for supervising the Executing Agency on behalf of the Government of Saint Lucia.

5. Contents of the Draft Report

After the Team explains the contents of the Draft Report, the Saint Lucia side agreed to its contents. JICA will finalize the Preparatory Survey Report based on the confirmed items. The report will be sent to the Saint Lucia side around August 2022.

6. Cost estimate

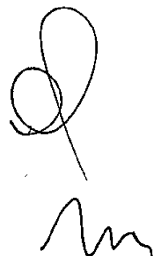
Both sides confirmed that the cost estimate including the contingency explained by the Team is provisional and will be examined further by the Government of Japan for



2







its approval. The contingency would cover the additional cost against natural disaster, unexpected natural conditions, etc.

7. Confidentiality of the cost estimate and technical specifications

Both sides confirmed that the cost estimate and technical specifications of the Project should never be disclosed to any third parties until all the contracts under the Project are concluded.

8. Procedures and Basic Principles of Japanese Grant

The Saint Lucia side agreed that the procedures and basic principles of Japanese Grant (hereinafter referred to as “the Grant”) as described in Annex 3 shall be applied to the Project. In addition, the Saint Lucia side agreed to take necessary measures according to the procedures.

9. Timeline for the project implementation

The Team explained to the Saint Lucia side that the expected timeline for the project implementation is as attached in Annex 4.

10. Expected outcomes and indicators

Both sides agreed that key indicators for expected outcomes are as follows. The Saint Lucia side will be responsible for the achievement of agreed key indicators targeted in year 2030 and shall monitor the progress for Ex-Post Evaluation based on those indicators.

[Quantitative indicators]

| Indicator | Baseline (in 2020) | Target (in 2030) |
|--|-----------------------------------|---------------------|
| Amount of sedimentation inside Choiseul Fishing Port (in a year) | 7,000m ³ | 500m ³ |
| Annual fish landing (MT) | (Average from 2015 to 2019) 59 | 68 |

[Qualitative indicators]

- Fishing activities will be more efficient because fishers don't need to transport the boat over long distances.
- Boat and engine breakdown caused by sedimentation will be reduced, thereby the operating cost of fishing will be reduced.

3

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- Financial burden will be reduced due to the reduction of frequency of dredging works

11. Ex-Post Evaluation

JICA will conduct ex-post evaluation after three (3) years from the project completion, in principle, with respect to five evaluation criteria (Relevance, Effectiveness, Efficiency, Impact, Sustainability). The result of the evaluation will be publicized. The Saint Lucia side is required to provide necessary support for the data collection.

12. Undertakings of the Project.

12-1. Both sides confirmed the undertakings of the Project as described in Annex 5.

With regard to exemption of customs duties, internal taxes and other fiscal levies as stipulated in 1.-(2)-6 of Annex 5, both sides confirmed that such customs duties, internal taxes and other fiscal levies, which shall be clarified in the bid documents by Ministry of Finance, Economic Development, and the Youth Economy (MOF) during the implementation stage of the Project.

The Saint Lucia side assured to take the necessary measures and coordination including allocation of the necessary budget which are preconditions of implementation of the Project. It is further agreed that the costs are indicative, i.e. at Outline Design level. More accurate costs will be calculated at the Detailed Design stage.

12-2. Both sides confirmed that the Annex 5 will be used as an attachment of G/A.

12-3. As shown in Annex 5, Both sides confirmed that MOI shall take necessary measures to ensure and maintain the security of the Project site and the persons related to the implementation of the Project, in cooperation with relevant authorities such as police.

13. Monitoring during the implementation

The Project will be monitored by the Executing Agency and reported to JICA by using the form of Project Monitoring Report (PMR) attached as Annex 6. The timing of submission of the PMR is described in Annex 5.

14. Project completion

Both sides confirmed that the Project is completed when all the facilities are constructed and the secondary improvement work is completed by the Grant. The completion of the Project will be reported to JICA promptly, but in any event not later

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than six months after the completion of the Project.

15. Environmental and Social Considerations

15-1 General Issues

15-1-1 Environmental Guidelines and Environmental Category

The Team explained that 'JICA Guidelines for Environmental and Social Considerations (April 2010)' (hereinafter referred to as "the Guidelines") is applicable for the Project. The Project is categorized as "B" because the Project is not likely to have significant adverse impact on the environment under the JICA guidelines for environmental and social considerations (April 2010) in terms of its sectors, characteristics and areas.

15-1-2 Environmental Checklist

The environmental and social considerations including major impacts and mitigation measures for the Project are summarized in the Environmental Checklist attached as Annex 7. Both sides confirmed that in case of major modification of the content of the Environmental Checklist, the Saint Lucia side shall submit the modified version to JICA in a timely manner.

15-2 Environmental Issues

15-2-1 Environmental Impact Assessment (EIA)

EIA report is not required for the Project.

15-2-2 Environmental Management Plan and Environmental Monitoring Plan

Both sides confirmed Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMoP) of the Project is as Annex8, respectively. Both side agreed that environmental mitigation measures and monitoring shall be conducted based on the EMP and EMoP, which may be updated during the detailed design stage.

15-3 Social Issues

Both sides confirmed that the Project takes into consideration the adverse effects to fishing activities. As a counter measure, a temporary jetty will be prepared for fishers while the port is closed during the construction phase of the Project Schedule.

15-4 Environmental Monitoring

15-4-1 Environmental Monitoring

Both sides agreed that the Saint Lucia side will submit results of environmental monitoring to JICA by using the monitoring form attached as Annex 9. The timing of submission of the monitoring form is described in Annex 5.

15-4-2 Information Disclosure of Monitoring Results

Both sides confirmed that the Saint Lucia side will disclose results of environmental monitoring to local stakeholders through their website. The Saint Lucia side agreed

JICA will disclose results of environmental monitoring submitted by the Saint Lucia side as the monitoring forms attached as Annex 9 on its website.

16. Other Relevant Issues

16-1 Disclosure of Information

Both sides confirmed that the Preparatory Survey Report from which project cost is excluded will be disclosed to the public after completion of the Preparatory Survey. The comprehensive report including the project cost will be disclosed to the public after all the contracts under the Project are concluded.

16-2 Gender Mainstreaming

Both sides confirmed that if any women are hired as part of the unskilled labor force during the construction period, the payment rate will be same regardless of gender.

16-3 VAT exemption

Both sides agreed that the MOA will request VAT exemption by the end of May 2022 for the Project through the Ministry of Finance to obtain cabinet approval.

16-4 Climate change adaptation

Both sides confirmed that the Project contributes to climate change adaptation. The Project mitigates the effect of the drifted sand that has accumulated in the Choiseul Fishing Port. This will allow the port to operate more efficiently.

16-5 Dredging Works

Both sides confirmed that the Project will reduce a significant amount of sedimentation in the Choiseul Fishing Port as indicated in "10. Expected outcomes and indicators". If the need arises for more dredging work after the completion of the Project, the Executing Agency will dredge the sediment.

Annex 1 Project Site

Annex 2 Organization Chart

Annex 3 Japanese Grant

Annex 4 Project Implementation Schedule

Annex 5 Major Undertakings to be taken by the Government of Saint Lucia

Annex 6 Project Monitoring Report (template)

Annex 7 Environmental Check List

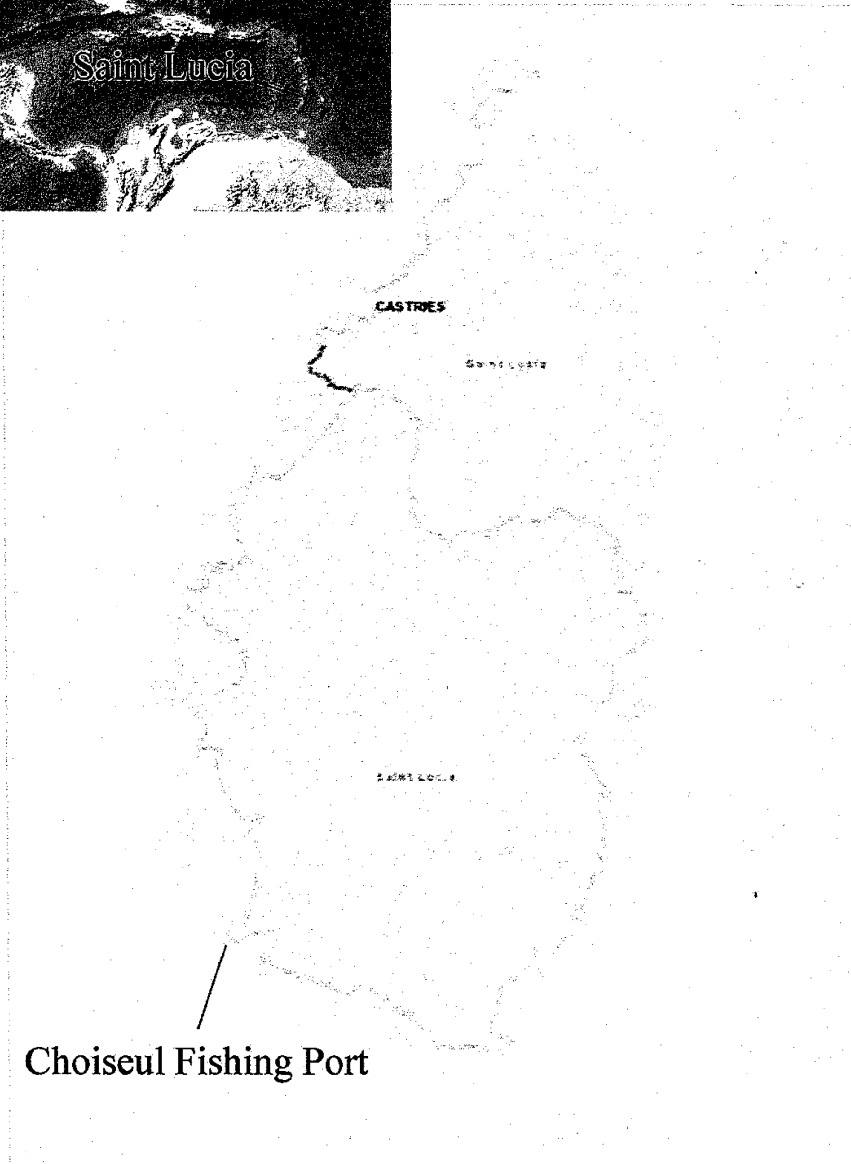
Annex 8 Environmental Management Plan/Environmental Monitoring Plan

Annex 9 Environmental Monitoring Form

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Project Site

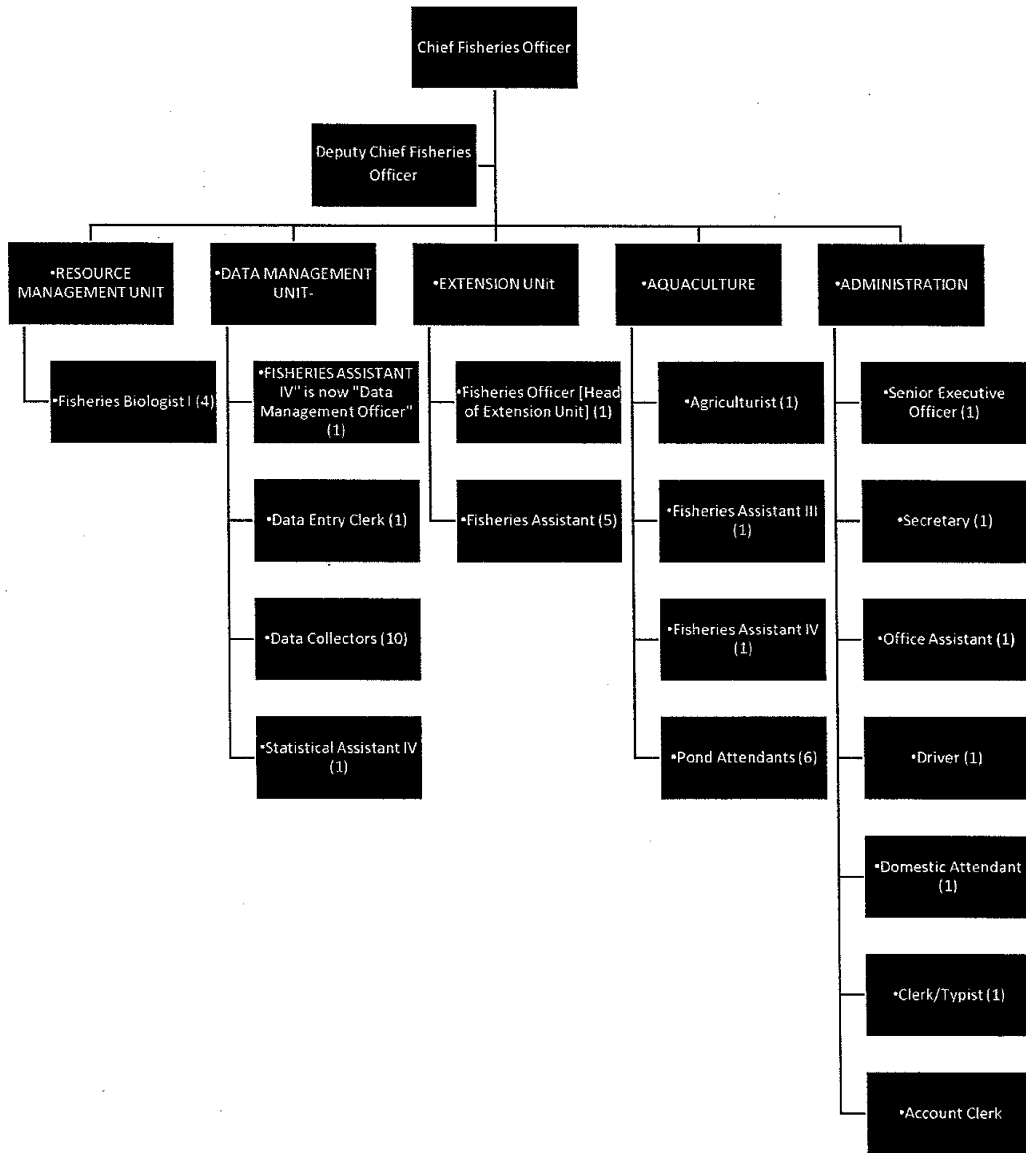


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ER

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JAPANESE GRANT

The Japanese Grant is non-reimbursable fund provided to a recipient country (hereinafter referred to as “the Recipient”) to purchase the products and/or services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. Followings are the basic features of the project grants operated by JICA (hereinafter referred to as “Project Grants”).

1. Procedures of Project Grants

Project Grants are conducted through following procedures (See “PROCEDURES OF JAPANESE GRANT” for details):

(1) Preparation

- The Preparatory Survey (hereinafter referred to as “the Survey”) conducted by JICA

(2) Appraisal

- Appraisal by the government of Japan (hereinafter referred to as “GOJ”) and JICA, and Approval by the Japanese Cabinet

(3) Implementation

Exchange of Notes

- The Notes exchanged between the GOJ and the government of the Recipient

Grant Agreement (hereinafter referred to as “the G/A”)

- Agreement concluded between JICA and the Recipient

Banking Arrangement (hereinafter referred to as “the B/A”)

- Opening of bank account by the Recipient in a bank in Japan (hereinafter referred to as “the Bank”) to receive the grant

Construction works/procurement

- Implementation of the project (hereinafter referred to as “the Project”) on the basis of the G/A

(4) Ex-post Monitoring and Evaluation

- Monitoring and evaluation at post-implementation stage

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide basic documents necessary for the appraisal of the the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of

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relevant agencies of the Recipient necessary for the implementation of the Project.

- Evaluation of the feasibility of the Project to be implemented under the Japanese Grant from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.
- Confirmation of Environmental and Social Considerations

The contents of the original request by the Recipient are not necessarily approved in their initial form. The Outline Design of the Project is confirmed based on the guidelines of the Japanese Grant.

JICA requests the Recipient to take measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the executing agency of the Project. Therefore, the contents of the Project are confirmed by all relevant organizations of the Recipient based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA contracts with (a) consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

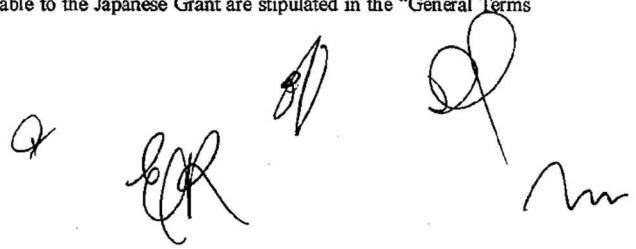
JICA reviews the report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the feasibility of the Project.

3. Basic Principles of Project Grants

(1) Implementation Stage

1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as "the E/N") will be signed between the GOJ and the Government of the Recipient to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Recipient to define the necessary articles, in accordance with the E/N, to implement the Project, such as conditions of disbursement, responsibilities of the Recipient, and procurement conditions. The terms and conditions generally applicable to the Japanese Grant are stipulated in the "General Terms and Conditions for Japanese Grant (January 2016)."

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2) Banking Arrangements (B/A) (See "Financial Flow of Japanese Grant (A/P Type)" for details)

- a) The Recipient shall open an account or shall cause its designated authority to open an account under the name of the Recipient in the Bank, in principle. JICA will disburse the Japanese Grant in Japanese yen for the Recipient to cover the obligations incurred by the Recipient under the verified contracts.
- b) The Japanese Grant will be disbursed when payment requests are submitted by the Bank to JICA under an Authorization to Pay (A/P) issued by the Recipient.

3) Procurement Procedure

The products and/or services necessary for the implementation of the Project shall be procured in accordance with JICA's procurement guidelines as stipulated in the G/A.

4) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the Recipient to continue to work on the Project's implementation after the E/N and G/A.

5) Eligible source country

In using the Japanese Grant disbursed by JICA for the purchase of products and/or services, the eligible source countries of such products and/or services shall be Japan and/or the Recipient. The Japanese Grant may be used for the purchase of the products and/or services of a third country as eligible, if necessary, taking into account the quality, competitiveness and economic rationality of products and/or services necessary for achieving the objective of the Project. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm, which enter into contracts with the Recipient, are limited to "Japanese nationals", in principle.

6) Contracts and Concurrence by JICA

The Recipient will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be concurred by JICA in order to be verified as eligible for using the Japanese Grant.

7) Monitoring

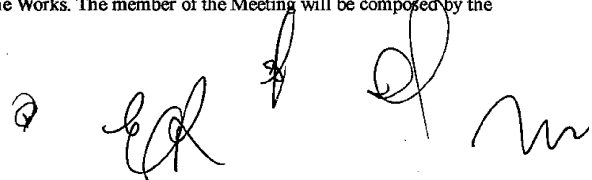
The Recipient is required to take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and to regularly report to JICA about its status by using the Project Monitoring Report (PMR).

8) Safety Measures

The Recipient must ensure that the safety is highly observed during the implementation of the Project.

9) Construction Quality Control Meeting

Construction Quality Control Meeting (hereinafter referred to as the "Meeting") will be held for quality assurance and smooth implementation of the Works at each stage of the Works. The member of the Meeting will be composed by the



Recipient (or executing agency), the Consultant, the Contractor and JICA. The functions of the Meeting are as followings:

- a) Sharing information on the objective, concept and conditions of design from the Contractor, before start of construction.
- b) Discussing the issues affecting the Works such as modification of the design, test, inspection, safety control and the Client's obligation, during of construction.

(2) Ex-post Monitoring and Evaluation Stage

- 1) After the project completion, JICA will continue to keep in close contact with the Recipient in order to monitor that the outputs of the Project is used and maintained properly to attain its expected outcomes.
- 2) In principle, JICA will conduct ex-post evaluation of the Project after three years from the completion. It is required for the Recipient to furnish any necessary information as JICA may reasonably request.

(3) Others

1) Environmental and Social Considerations

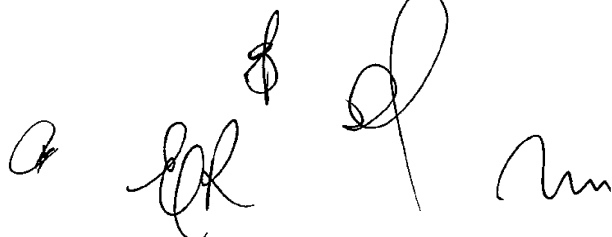
The Recipient shall carefully consider environmental and social impacts by the Project and must comply with the environmental regulations of the Recipient and JICA Guidelines for Environmental and Social Considerations (April, 2010).

2) Major undertakings to be taken by the Government of the Recipient

For the smooth and proper implementation of the Project, the Recipient is required to undertake necessary measures including land acquisition, and bear an advising commission of the A/P and payment commissions paid to the Bank as agreed with the GOJ and/or JICA. The Government of the Recipient shall ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the Recipient with respect to the purchase of the Products and/or the Services be exempted or be borne by its designated authority without using the Grant and its accrued interest, since the grant fund comes from the Japanese taxpayers.

3) Measures to ensure more efficient implementation of the Grant

- i) In the event that the E/N and the G/A concerning a project cannot be signed by the end of the following Japanese fiscal year of the cabinet decision concerned by the GOJ, the authorities concerned of the two Governments will discuss the cancellation of the project.

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ii) In the event that the period, specified in the G/A, during which the grant is available expires before the completion of the disbursement, the authorities concerned of the GOJ will thoroughly review the status, situation and perspective of the implementation of the project concerned before extending the said period. The authorities concerned of the two Governments will discuss the termination of the project including a refund, unless there are concrete prospects for its completion.

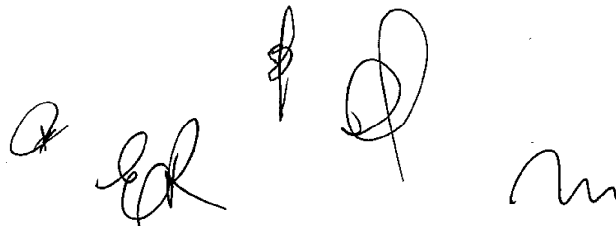
iii) Regardless of the period mentioned in 2) above, the authorities concerned of the two Governments will, in the event that five years have passed since the cabinet decision concerned by the GOJ before the completion of the disbursement, except as otherwise confirmed between them, discuss the termination of a project including a refund, unless there are concrete prospects for its completion.

4) Proper Use

The Recipient is required to maintain and use properly and effectively the products and/or services under the Project (including the facilities constructed and the equipment purchased), to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Japanese Grant.

5) Export and Re-export

The products purchased under the Japanese Grant should not be exported or re-exported from the Recipient.



Major Undertakings to be taken by the Government of St. Lucia

1. Specific obligations of the Government of St. Lucia which will not be funded with the Grant

(1) Before the Bidding

| NO | Items | Deadline | In charge | Estimated Cost (XCD) | Ref |
|----|---|---|-----------|----------------------|-----|
| 1 | To sign the banking arrangement (B/A) with a bank in Japan (the Agent Bank) to open a bank account | within 1 month after the signing of the G/A | MOF | 10,000 | |
| 2 | To issue A/P to a bank in Japan (the Agent Bank) for the consultant's payment | within 1 month after the signing of the contract | MOA | | |
| 3 | To bear the following commissions to the Agent Bank for the banking services based upon the B/A | | | | |
| | 1) Advising commission of A/P | within 1 month after the signing of the contract(s) | MOF | 33,000 | |
| | 2) Payment commission for A/P | every payment | MOF | 33,000 | |
| 4 | To approve and secure the necessary budget for implementation for Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMoP) (and fulfilling conditions of approval, if any). | within 1 month after the signing of the G/A | MOA | | |
| 5 | To submit Project Monitoring Report (with the results of the Detailed Design) | before preparation of the bidding documents | FD | | |
| 6 | To obtain the construction permit, sand permit and ensure the relocation site of the material dredged through the Project | within 1 month after the signing of the G/A | MOA | | |
| 7 | To submit Project Monitoring Report (with the result of Detailed Design) | before preparation of the bidding documents | FD | | |

FD: Fisheries Department

MOA: Ministry of Agriculture, Fisheries, Food Security and Rural Development

MOF: Ministry of Finance, Economic Development, and the Youth Economy

MOI: Ministry of Infrastructure, Ports, Transports, Physical Development and Urban Renewal.

(2) During the Project Implementation

| NO | Items | Deadline | In charge | Estimated Cost (XCD) | Ref. |
|----|---|---|-----------|----------------------|------|
| 1 | To issue A/P to the Agent Bank for the payment to the supplier and the contractor | within 1 month after the signing of the contract(s) | MOF | | |
| 2 | To bear the following commissions to the Agent Bank for the banking services based upon the B/A | | | | |

| | | | | | |
|----|---|---|-----|--------|--|
| | 1) Advising commission of A/P | within 1 month after the signing of the contract(s) | MOF | 33,000 | |
| | 2) Payment commission for A/P | every payment for consultant | MOF | 33,000 | |
| 4 | To ensure prompt unloading and customs clearance at ports of disembarkation in the country of the Recipient and to assist the Supplier(s) with internal transportation therein | during the Project | MOA | | |
| 5 | To accord Japanese physical persons and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the country of the Recipient and stay therein for the performance of their work | during the Project | MOA | | |
| 6 | To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services are exempted or be borne by its designated authority without using the Grant. | during the Project | MOF | | |
| 7 | To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project | during the Project | MOF | | |
| 8 | To notify JICA promptly of any incident or accident, which has, or is likely to have, a significant adverse effect on the environment, the affected communities, the public or workers. | during the construction | FD | | |
| 9 | To submit Project Monitoring Report | every month | FD | | |
| 10 | To submit Project Monitoring Report (final) (including as-built drawings, equipment list, photographs, etc.) | within 1 month after signing of Certificate of Completion for the works under the contract(s) | FD | | |
| 11 | To submit a report concerning completion of the Project | within 6 months after completion of the Project | FD | | |
| 12 | To ensure the safety of persons engaged in the implementation of the Project | during the construction | MOI | | |
| 13 | To implement EMP and EMOp | during the construction | FD | | |
| 14 | To submit results of environmental monitoring to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report | during the construction | FD | | |

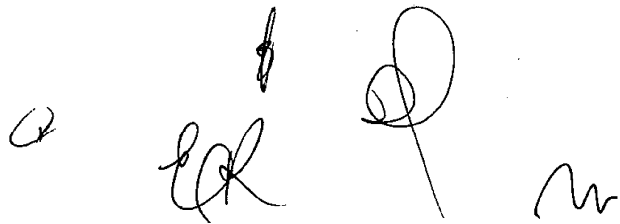
(3) After the Project

| NO | Items | Deadline | In charge | Estimated Cost | Ref. |
|----|--|------------------------------------|-----------|----------------|------|
| 1 | To implement EMP and EMOp | for a period based on EMP and EMOp | FD | | |
| 2 | To submit results of environmental monitoring to JICA, by using the monitoring form, semi-annually - The period of environmental monitoring may be extended if any significant negative impacts on the environment are found. The extension of environmental monitoring will be decided based on the agreement between Fisheries Department and JICA. | for 3 years after the Project | FD | | |
| 3 | To properly maintain and utilize the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine check/Periodic inspection | After completion of the Project | FD | | |

2. Other obligations of the Government of Saint Lucia funded with the Grant

This Page is closed due to the confidentiality.

* The Amount is provisional. This is subject to the approval of the Government of Japan.

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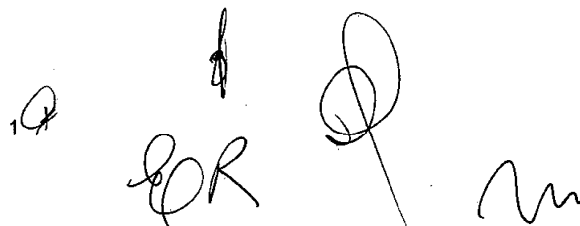
Project Monitoring Report
on
Project Name
Grant Agreement No. XXXXXXXX
20XX, Month

Organizational Information

| | |
|--|--|
| Signer of the G/A (Recipient) | Person in Charge (Designation) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____ |
| Executing Agency | Person in Charge (Designation) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____ |
| Line Ministry | Person in Charge (Designation) _____ Contacts Address: _____ Phone/FAX: _____ Email: _____ |

General Information:

| | |
|--------------------------|---|
| Project Title | |
| E/N | Signed date: Duration: |
| G/A | Signed date: Duration: |
| Source of Finance | Government of Japan: Not exceeding JPY _____ mil. Government of (): _____ |



1: Project Description

1-1 Project Objective

| |
|--|
| |
|--|

1-2 Project Rationale

- Higher-level objectives to which the project contributes (national/regional/sectoral policies and strategies)
- Situation of the target groups to which the project addresses

| |
|--|
| |
|--|

1-3 Indicators for measurement of "Effectiveness"

| Quantitative indicators to measure the attainment of project objectives | | |
|---|----------------|--------------|
| Indicators | Original (Yr) | Target (Yr) |
| | | |
| | | |
| Qualitative indicators to measure the attainment of project objectives | | |
| | | |

2: Details of the Project

2-1 Location

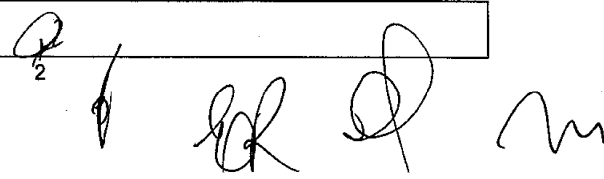
| Components | Original <i>(proposed in the outline design)</i> | Actual |
|------------|---|--------|
| 1. | | |

2-2 Scope of the work

| Components | Original* <i>(proposed in the outline design)</i> | Actual* |
|------------|--|---------|
| 1. | | |
| | | |
| | | |

Reasons for modification of scope (if any).

| |
|-------|
| (PMR) |
|-------|



2-3 Implementation Schedule

| Items | Original | | Actual |
|-------|---|---|--------|
| | <i>(proposed in the outline design)</i> | <i>(at the time of signing the Grant Agreement)</i> | |
| | | | |

Reasons for any changes of the schedule, and their effects on the project (if any)

| |
|--|
| |
|--|

2-4 Obligations by the Recipient

2-4-1 Progress of Specific Obligations
 See Attachment 2.

2-4-2 Activities
 See Attachment 3.

2-4-3 Report on RD
 See Attachment 11.

2-5 Project Cost

2-5-1 Cost borne by the Grant(Confidential until the Bidding)

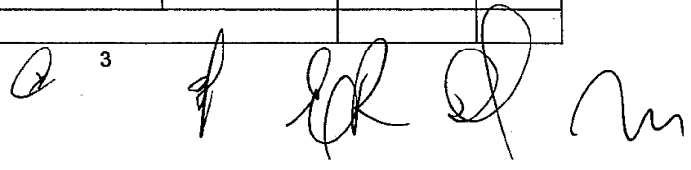
| Components | | | Cost (Million Yen) | |
|------------|---|--|--|--------|
| | Original <i>(proposed in the outline design)</i> | Actual <i>(in case of any modification)</i> | Original ^{1),2)} <i>(proposed in the outline design)</i> | Actual |
| 1. | | | | |
| | | | | |
| | | | | |
| Total | | | | |

Note: 1) Date of estimation:
 2) Exchange rate: 1 US Dollar = Yen

2-5-2 Cost borne by the Recipient

| Components | | | Cost (1,000 Taka) | |
|------------|---|--|--|--------|
| | Original <i>(proposed in the outline design)</i> | Actual <i>(in case of any modification)</i> | Original ^{1),2)} <i>(proposed in the outline design)</i> | Actual |
| 1. | | | | |
| | | | | |
| | | | | |

3



- Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar =

Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

| |
|-------|
| (PMR) |
|-------|

2-6 Executing Agency

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

| |
|---|
| Original (at the time of outline design) name: role: financial situation: institutional and organizational arrangement (organogram): human resources (number and ability of staff): |
| Actual (PMR) |

2-7 Environmental and Social Impacts

- The results of environmental monitoring based on Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- The results of social monitoring based on in Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- Disclosed information related to results of environmental and social monitoring to local stakeholders (whenever applicable).

3: Operation and Maintenance (O&M)

3-1 Physical Arrangement

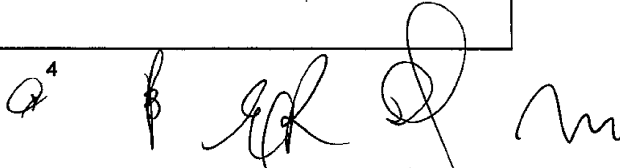
- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spareparts, etc.)

| |
|---|
| Original (at the time of outline design) |
| Actual (PMR) |

3-2 Budgetary Arrangement

- Required O&M cost and actual budget allocation for O&M

| |
|---|
| Original (at the time of outline design) |
|---|

4


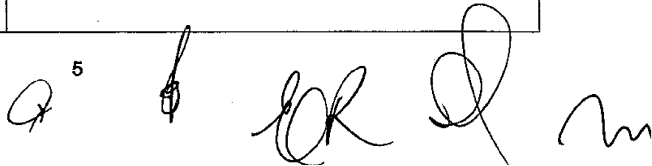
Actual (PMR)

4: Potential Risks and Mitigation Measures

- Potential risks which may affect the project implementation, attainment of objectives, sustainability
- Mitigation measures corresponding to the potential risks

Assessment of Potential Risks (at the time of outline design)

| Potential Risks | Assessment |
|--------------------------|--|
| 1. (Description of Risk) | Probability: High/Moderate/Low |
| | Impact: High/Moderate/Low |
| | Analysis of Probability and Impact: |
| | |
| | Mitigation Measures: |
| | |
| | Action required during the implementation stage: |
| 2. (Description of Risk) | Probability: High/Moderate/Low |
| | Impact: High/Moderate/Low |
| | Analysis of Probability and Impact: |
| | |
| | Mitigation Measures: |
| | |
| | Action required during the implementation stage: |
| 3. (Description of Risk) | Probability: High/Moderate/Low |
| | Impact: High/Moderate/Low |
| | Analysis of Probability and Impact: |
| | |
| | Mitigation Measures: |
| | |
| | Action required during the implementation stage: |

5 

| | |
|---|-----------------------------------|
| | Contingency Plan (if applicable): |
| Actual Situation and Countermeasures (PMR) | |

5: Evaluation and Monitoring Plan (after the work completion)

5-1 Overall evaluation

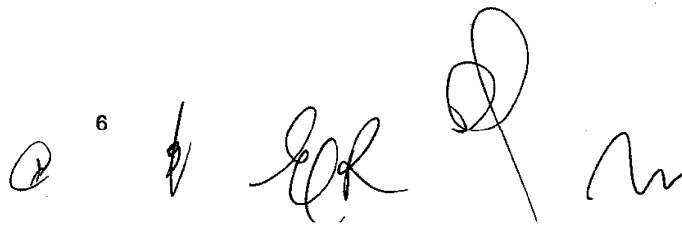
Please describe your overall evaluation on the project.

5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

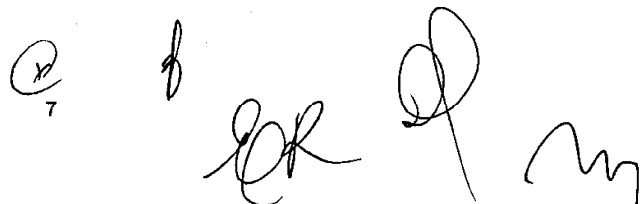
5-3 Monitoring Plan of the Indicators for Post-Evaluation

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

6 

Attachment

1. Project Location Map
 2. Specific obligations of the Recipient which will not be funded with the Grant
 3. Monthly Report submitted by the Consultant
- Appendix - Photocopy of Contractor's Progress Report (if any)
- Consultant Member List
 - Contractor's Main Staff List
4. Check list for the Contract (including Record of Amendment of the Contract/ Agreement and Schedule of Payment)
 5. Environmental Monitoring Form / Social Monitoring Form
 6. Monitoring sheet on price of specified materials (Quarterly)
 7. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (PMR (final) only)
 8. Pictures (by JPEG style by CD-R) (PMR (final) only)
 9. Equipment List (PMR (final) only)
 10. Drawing (PMR (final) only)
 11. Report on RD (After project)

Handwritten signatures and initials in black ink, including a circled 'R' with a '7' below it, and several other stylized signatures.

Date:
Ref. No.

JAPAN INTERNATIONAL COOPERATION AGENCY
JICA Saint Lucia OFFICE
[Address specified in the Article 5 of the Grant Agreement]

Attention: Chief Representative

Ladies and Gentlemen:

NOTICE CONCERNING PROGRESS OF PROJECT

Reference : Grant Agreement, dated (signed date of the G/A), for (name of the Project).

In accordance to the Article 6 (3) of the Grant Agreement, we would like to report on the progress of the Project up to the following stages:

[Common]

- Preparation of bidding documents - result of detailed design
- Completion of final works under construction/procurement contract

[Construction]

- Monthly progress [Month/Year]

[Procurement of Equipment]

- Shipping/delivery, hand-over (take over) of equipment
- Installation works
- Operational training

- Other _____

Please see the details as per attached Project Monitoring Report (PMR).

Very truly yours,

[Signature]

[Name of the signer]

[Title of the signer]

[Name of the executing agency]

cc:
Director General



Environmental checklist

| | Environmental Item | Main Check Item | Yes: Y No: N Not applicable: N/A | Confirmation of Environmental Considerations (Reasons, Mitigation Measures) |
|---------------------------|---|--|---|--|
| 1 Permits and Explanation | (1) EIA and Environmental Permit | a) Have EIA reports been already prepared in official process? b) Have EIA reports been approved by authorities of the host country's government? c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government? | a) N/A b) N/A c) N/A d) N | a) EIA is not required. b) EIA is not required. c) EIA is not required. d) Infrastructure Development Permit and Sand Permit are required prior construction. |
| | (2) Explanation to the Local Stakeholders | a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders? b) Have the comment from the stakeholders (such as local residents) been reflected to the project design? | a) Y b) Y | a) Stakeholder meeting were held during both first and second site survey, understanding of parties involved was obtained. b) Opinions from hearing and stakeholder meeting are reflected in the project. |
| | 3) Examination of Alternatives | a) Have alternative plans of the project been examined with social and environmental considerations? | a) Y | a) In the comparison of alternatives, environmental related items were also compared and optimal plan was selected. |
| 2 Pollution Control | (1) Air Quality | a) Do air pollutants, such as sulfur oxides (SOx), nitrogen oxides (NOx), and soot and dust emitted from ships, vehicles and project equipment comply with the country's emission standards? Are any mitigating measures taken? | a) N | a) Both NO2 and SO2 exceeded WHO standard values. Nevertheless, it is presumed that possible causes are not directly related to this project. PM2.5 and PM10 are basically within the standard values. Generation of dust is suppressed by regular watering and turning off heavy equipment engine outside of the working hours. |

| | | | |
|-------------------------|---|---|--|
| (2) Water Quality | <p>(a) Do effluents from the project facilities comply with the country's effluent and environmental standards?</p> <p>(b) Do effluents from the ships and other project equipment comply with the country's effluent and environmental standards?</p> <p>(c) Does the project prepare any measures to prevent leakages of oils and toxicants?</p> <p>(d) Does the project cause any alterations in coastal lines and disappearance/appearance of surface water to change water temperature or quality by decrease of water exchange or changes in flow regimes?</p> <p>(e) Does the project prepare any measures to prevent polluting surface, sea or underground water by the penetration from reclaimed lands?</p> | <p>a) N/A</p> <p>b) N/A</p> <p>c) Y</p> <p>d) N</p> <p>e) N/A</p> | <p>a) No effluent is generated from the facility.</p> <p>b) No effluent is generated from the ships or project equipment.</p> <p>c) Silt-fence is installed during the dredging to limit the occurrence of turbidity.</p> <p>d) In the future, it is expected that the shoreline (waterfront line) will advance at the beach on the north side of the fishing port, but this will not cause any changes in water temperature or quality.</p> <p>e) No landfill is generated.</p> |
| (3) Wastes | <p>(a) Are wastes generated from the ships and other project facilities properly treated and disposed of in accordance with the country's regulations?</p> <p>(b) Is offshore dumping of dredged soil properly disposed in accordance with the country's regulations?</p> <p>(c) Does the project prepare any measures to avoid dumping or discharge toxicants?</p> | <p>a) N/A</p> <p>b) Y</p> <p>c) N/A</p> | <p>a) Waste is not generated from ships and project facilities.</p> <p>b) Dredged sediment generated by this project will be placed on the north side of the fishing port. Since this is a sand bypassing system, it does not affect the surrounding water area. In the sand bypassing system, dredged sediment is not recognized as waste.</p> <p>c) Dredged sediment does not contain harmful substances.</p> |
| (4) Noise and Vibration | <p>a) Do noise and vibrations comply with the country's standards?</p> | <p>a) N</p> | <p>a) Slight exceedance of noise level during dredging was confirmed. As to the vibration, Saint Lucia uses ISO standards. Results were significantly low both before and during the dredging conducted in this survey.</p> |
| (5) Land subsidence | <p>a) In the case of extraction of a large volume of groundwater, is there a possibility that the extraction of groundwater will cause land subsidence?</p> | <p>a) N/A</p> | <p>a) Extraction of a large volume of groundwater is not generated.</p> |
| (6) Odor | <p>a) Are there any odor sources? Are adequate odor control measures taken?</p> | <p>a) N</p> | <p>a) Since there is no source of bad odor, no countermeasures will be taken.</p> |
| (7) Sediment | <p>(a) Are adequate measures taken to prevent contamination of sediments by discharges or dumping of hazardous materials from the ships and related facilities?</p> | <p>a) N</p> | <p>a) In this project, dredging work will occur at existing fishing port and navigation channel. However, in this survey, no harmful substances were contained in the sediment, and no emissions from related facilities were confirmed.</p> |

| | | | | |
|-----------------------|---------------------------------|--|--|--|
| 3 Natural Environment | (1) Reserve/ Protected areas | (a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas? | a) N | a) The project site is not located in a reserve. Since the construction scale is small and the Piton Management Area, a World Heritage Site, is located about 3.5km north of the project site, no impact is expected. |
| | (2) Ecosystem | (a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g.: coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (d) Is there a possibility that the project will adversely affect aquatic organisms? Are adequate measures taken to reduce negative impacts on aquatic organisms? (e) Is there a possibility that the project will adversely affect vegetation or wildlife of coastal zones? If any negative impacts are anticipated, are adequate measures taken to reduce the impacts on vegetation and wildlife? | a) N b) N c) N/A d) N e) N | a) The project site does not include primeval forests, tropical rain forests or ecologically valuable habitats. b) As a result of the ecosystem survey (visual survey) in this survey, no rare species inhabit the site. c) There are no concerns about significant impacts on the ecosystem. d) No adverse effects on aquatic life are expected. e) No adverse effects on coastal vegetation and wildlife are expected. |
| | (3) Hydrology | a) Do the project facilities affect adversely flow regimes, waves, tides, currents of rivers and etc if the project facilities are constructed on/by the seas? | a) Y | a) After the construction of the existing fishing port and the additional breakwater, the flow conditions are such that sand is likely to accumulate in the port. This project will return the sediment transport system to its original state. Thus, there are no adverse impacts, and the project is effective against deposition. |
| | (4) Topography and Geology | a) Does the project require any large-scale changes of topographic/geographic features or cause disappearance of the natural seashore? | a) Y | a) Dredging ensures the water depth inside the port at the port entrance. In addition, the shoreline on the northern side of the second groynes will advance, creating a new beach. Topographical changes will have a positive effect on fishermen and local residents. |

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| | | | | |
|----------------------|-----------------|--|---|---|
| 4 Social Environment | 1) Resettlement | <p>a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement?</p> <p>b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement?</p> <p>c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement?</p> <p>d) Are the compensations going to be paid prior to the resettlement?</p> <p>e) Are the compensation policies prepared in document?</p> <p>f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples?</p> <p>g) Are agreements with the affected people obtained prior to resettlement?</p> <p>h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan?</p> <p>i) Are any plans developed to monitor the impacts of resettlement?</p> <p>j) Is the grievance redress mechanism established?</p> | <p>a) N/A b) N/A c) N/A d) N/A e) N/A f) N/A g) N/A h) N/A i) N/A j) N/A</p> | <p>a) Involuntary resettlement is not generated.</p> <p>b) Involuntary resettlement is not generated.</p> <p>c) Involuntary resettlement is not generated.</p> <p>d) Involuntary resettlement is not generated.</p> <p>e) Involuntary resettlement is not generated.</p> <p>f) Involuntary resettlement is not generated.</p> <p>g) Involuntary resettlement is not generated.</p> <p>h) Involuntary resettlement is not generated.</p> <p>i) Involuntary resettlement is not generated.</p> <p>j) Involuntary resettlement is not generated.</p> |
|----------------------|-----------------|--|---|---|

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| | | | |
|---|---|--|--|
| 2) Living and Livelihood | <p>a) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary?</p> <p>b) Is there a possibility that changes in water uses (including fisheries and recreational uses) in the surrounding areas due to project will adversely affect the livelihoods of inhabitants?</p> <p>c) Is there a possibility that port and harbor facilities will adversely affect the existing water traffic and road traffic in the surrounding areas?</p> <p>d) Is there a possibility that diseases, including infectious diseases, such as HIV will be brought due to immigration of workers associated with the project? Are considerations given to public health, if necessary?</p> | <p>a) N b) N c) N d) N</p> | <p>a) No negative impact on the living conditions of inhabitants is expected. If the deposition at the port entrance is improved, it will contribute to the promotion of fisheries.</p> <p>b) No adverse effect on the livelihood of the inhabitants is expected. If the port entrance is closed during the construction period, fishing activities can be continued by using a temporary pier.</p> <p>c) No adverse effects on existing water traffic and road traffic are expected. Although the navigation channel will be curved due to the installation of the submerged breakwater and the second groyne, installation of beacon light will ensure safe operation.</p> <p>d) Disease outbreak due to immigration of workers is not expected. Since the construction is on a small scale and a short-period, a large-scale of workers immigration from other areas will not occur during the construction period.</p> |
| 3) Heritage | <p>a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?</p> | <p>a) N</p> | <p>a) There is no risk of damaging archeological, historical, cultural or religious valuable heritage or sites.</p> |
| 4) Landscape | <p>a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?</p> | <p>a) N/A</p> | <p>a) There is no consideration for landscape on the project site.</p> |
| 5) Ethnic Minorities and Indigenous Peoples | <p>a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples?</p> <p>b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?</p> | <p>a) N/A b) N/A</p> | <p>a) No adverse effects on ethnic minority or indigenous people are expected.</p> <p>b) No adverse effects on land and resources of ethnic minorities and indigenous people are expected.</p> |

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| | | | | |
|----------|--------------------------------|---|--|--|
| | 6) Working Conditions | <p>a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project?</p> <p>(b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials?</p> <p>(c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.?</p> <p>(d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?</p> | <p>a) Y b) Y c) Y d) Y</p> | <p>a) The project will be in compliance with Saint Lucia legislation on working environment. The contractors of this project are required to comply with legislation on working environment.</p> <p>b) Installation of safety equipment, management of hazardous materials, and safety considerations in terms of hardware will be taken, which are also required to the contractors of this project.</p> <p>c) Software measures such as formulation of safety and health programs and implementation of safety education for workers are planned and implemented, which are also required to the contractors of this project.</p> <p>d) Measures are taken in bidding materials for security personnel not to infringe on safety of related parties and local residents.</p> |
| 5 Others | 1) Impacts during Construction | <p>a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)?</p> <p>b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts?</p> <p>c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?</p> | <p>a) Y b) N c) Y</p> | <p>a) Silt-fence will be used to control turbidity expected to occur generated by the dredging. In addition, regular watering will be conducted at the project site to control dust generation during construction. Impacts of noise and vibration is not expected, but as a consideration for local residents, engine of heavy equipment will be turned off outside of working hours and night work will not be carried out.</p> <p>b) No adverse effect on the ecosystem is expected.</p> <p>c) Construction vehicles pass through residential areas and narrow roads. A traffic control staff will be assigned to prevent accidents.</p> |

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| | | | | |
|--------|---------------------------------------|--|--|---|
| | 2) Monitoring | <p>a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts?</p> <p>b) What are the items, methods and frequencies of the monitoring program?</p> <p>c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)?</p> <p>d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?</p> | <p>a) Y b) Y c) Y d) Y</p> | <p>a) Monitoring on air quality, water quality, and noise will be conducted. For the monitoring on air quality, implementation of mitigation measures is monitored.</p> <p>b) Monitoring is performed twice during the construction period (once during the amendment work period). There will be a total of two survey location inside and outside the fishing port.</p> <p>c) Monitoring system of the Department of Fisheries will be established. Research company entrusted with the survey by the Department of Fisheries shall carry out the survey and report to JICA. During the construction period, consultant will assist in conducting survey.</p> <p>d) Each survey stage will be reported.</p> |
| 6 Note | Note on Using Environmental Checklist | <p>a) Where necessary, impacts on groundwater hydrology (groundwater level drawdown and salinization) that may be caused by alteration of topography, such as land reclamation and canal excavation should be considered, and impacts, such as land subsidence that may be caused by groundwater uses should be considered. If significant impacts are anticipated, adequate mitigation measures should be taken.</p> <p>b) If necessary, the impacts to transboundary or global issues should be confirmed, if necessary (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).</p> | <p>a) N/A b) N/A</p> | <p>a) No impact on land reclamation, groundwater hydrology or land subsidence due to the alteration of topography is expected.</p> <p>b) The construction is on a small scale. No impact on transboundary or global environment issues is expected.</p> |

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Environment Management Plan

1. Impact Assessment

(1) Categorization based on JICA Guidelines for Environmental and Social Considerations

This Project is classified as Category B since adverse impacts on the environmental and society only occur in a limited way.

(2) Impact Assessment

The results of impact assessment after surveying environmental and social aspects are as shown in the following table.

| No. | Item | Scoping | | Monitoring | | Evaluation |
|-----------------------------|--------------------|--------------|-----------|--------------|-------------|--|
| | | Construction | Operation | Construction | Supervision | |
| Control of Pollution | | | | | | |
| 1 | Air pollution | ✓ | | B- | D | <During construction> Gas and dust are emitted due to the construction vehicles and dredging work. <After completion> No impact on the atmosphere is expected. |
| 2 | Water pollution | ✓ | | B- | B- | <During construction> Turbidity occurrence is expected in the fishing port due to the dredging work. <After completion> Concern of water quality deterioration due to the dumping of fish waste into the fishing port. |
| 3 | Waste | ✓ | ✓ | D | D | <During construction > As a result of the sediment survey, no harmful substances are detected. In addition, dredged sediment is not considered as waste because sediment is transported based on the concept of sand bypassing system. <After completion> Dredged material generated by maintenance dredging in the future are not considered as waste based on the concept of sand bypassing system. |
| 4 | Soil contamination | | | | | <During construction & After completion> No soil contamination is expected in this project. |
| 5 | Noise/ Vibration | ✓ | | B- | | <During construction> Noise and vibration from heavy equipment and trucks transporting dredged sand are expected due to the construction work. <After completion> No noise or vibration is expected. |
| 6 | Land subsidence | | | | | <During construction & After completion> Facilities constructed in this project are small and no land subsidence is expected. |
| 7 | Offensive odor | | | | | <During construction & After completion> No odor is expected in this project. |
| 8 | Sediment | | | | | <During construction & After completion> Heavy metals on bottom sediment pollution are not used in |

| | | | | | | |
|---------------|--|---|---|----|----|---|
| 23 | Cultural heritages | | | | | <During construction & After completion> No adverse impact is expected for this project. |
| 24 | Landscape | | | | | <During construction & After completion> No adverse impact is expected for this project. |
| 25 | Gender | ✓ | | B- | | <During construction> Possibility of wage gap between men and women is expected. <After completion> No gender impact is expected after the construction. Rather, it may lead to employment opportunities for women in nearby restaurants. |
| 26 | Children's right | | | | | <During construction & After completion> No adverse impact is expected for this project. |
| 27 | Infectious disease such as HIV/AIDS | ✓ | | B- | | <During construction> Probability of COVID-19 infection for on-site workers during the construction. Since the construction scale is small and on a short period, no large influx of workers is expected. No impact from infectious disease such as HIV/AIDS is expected. <After construction> Since there is no influx of workers, spread of infectious diseases is not expected. |
| 28 | Working environment (including labor safety) | ✓ | | B- | | <During construction> Accidents may occur during the construction period. <After completion> No adverse impact is expected after the construction. |
| Others | | | | | | |
| 29 | Accident | ✓ | ✓ | B- | B- | <During construction> Accidents may occur on surrounding roads due to increased traffic from to heavy equipment and circulating trucks. <After completion> Since the submerged breakwater cannot be seen from the sea, accidents such as collision of fishing boats may occur. |
| 30 | Transboundary impact and climate change | | | | | <During construction & After completion> No adverse impact is expected for this project. |

A +/-: Serious impact expected
B +/-: Non-serious but expected to have an impact
C: The extent of the impact is unknown
D: No impact expected

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2. Environment Mitigation Measures

(1) Mitigation measures

Mitigation measures against the concerned environmental items are summarized in the following table.

| Environmental items | Evaluation | Adverse impact | Mitigation measures |
|---|------------|---|--|
| Air pollution | B- | Generation of dust | 【During construction】 (1) Control of dust by regular watering (2) Stop heavy equipment engine outside the working hours |
| Water pollution | B- | Water pollution from turbidity caused by facility construction, dredging, and dumping of fish waste into the fishing port | 【During construction】 (1) Construction mitigating the occurrence of turbidity as much as possible 【After construction】 (1) No disposal of fish waste into the fishing port by local residents and fisherfolks |
| Noise and vibration | B- | Noise and vibration generated by the use of heavy equipment and construction vehicles during the construction period | 【After construction/ operation】 (1) Operate engine of heavy equipment only during construction hours (2) Do not carry out construction at night (3) Traffic deceleration of construction equipment near residential area. |
| Land use and local resource utilization | B- | Temporary closure of the port entrance during construction | 【During construction】 (1) Installation of a temporary quay for mooring and landing fishing boats |
| Existing social infrastructure and social service | B- | Temporary closure of the port entrance during construction | 【During construction】 (1) Installation of a temporary quay for mooring and landing fishing boats |
| Gender | B- | Wage gap between men and women during construction | 【During construction】 (1) Specify gender equality wage in advance in the specifications of the contractor's bid. |
| Infectious disease such as HIV/AIDS | B- | COVID-19 infection for workers | 【During construction】 (1) Thoroughly implement epidemic prevention measures such as wearing masks and disinfecting. |
| Working environment | B- | Accident for construction workers | 【During construction】 (1) Enlightenment of safety awareness through safety education for construction workers. (2) Installation of warning signs |
| Accident | B- | Traffic accidents around the site and fishing boat with the submerged breakwater | 【During construction】 (1) Appointment of traffic control staff on the surrounding roads (2) Installation of beacon lights on the submerged breakwater and the second groyne (3) Reparation of existing beacon lights. 【After construction】 (1) Operative 4 beacon lights. |

(2) Responsible / executing agency for mitigation countermeasures and costs

The environmental mitigation measures, responsible organizations, implementing agencies, and costs in this Project is shown in the following table.

| Environmental Items | Influence degree | Mitigation measures | Responsible agency | Executing agency | Cost |
|--|--|--|--------------------|------------------|-------------------------------|
| At the time of planning and during construction | | | | | |
| Air pollution | Generation of dust | (1) Regular watering | DoF | Contractor | Included in construction cost |
| | | (2) Stop equipment and engine outside of working hours | DoF | Contractor | No cost incurrence |
| Water pollution | Occurrence of turbidity due to construction and dredging | (1) Construction limiting the occurrence of turbidity (silt fence, work at low tide, etc.) | DoF | Contractor | Included in construction cost |
| Noise and vibration | Noise and vibration generated by heavy equipment and construction vehicles | (1) Stop engine of heavy equipment outside of working hours | DoF | Contractor | No cost incurrence |
| | | (2) Do not carry out night construction | DoF | Contractor | No cost incurrence |
| Land use and local resource utilization | Temporary closure of the port entrance during construction | (1) Installation of a temporary quay during the construction period | DoF | Contractor | Included in construction cost |
| Existing social infrastructure and services | | | | | |
| Gender | Wage gap between male and female construction workers | (1) Gender equality wages are specified in the bid document to the contractor | DoF | DoF | No cost incurrence |
| Infectious disease such as HIV/AIDS | COVID-19 infection for workers | (1) Thorough implementation of epidemic prevention measures such as wearing masks and disinfecting. | DoF | Contractor | Included in construction cost |
| Working environment | Accidents occurring on construction workers | (1) Awareness raising through safety education | DoF | Contractor | No cost incurrence |
| | | (2) Installation of a warning sign | DoF | Contractor | No cost incurrence |
| Accident | Traffic accident around the site | (1) Appointment of traffic control staff | DoF | Contractor | Included in construction cost |
| | Accident with the submerged breakwater | (1) Beacon light installation on the submerged breakwater and the second groyne | DoF | Contractor | Included in construction cost |
| | | (2) Reparation of existing beacon lights | DoF | Contractor | Included in construction cost |
| After construction | | | | | |
| Water pollution | Water pollution due to dumping of fish waste into the fishing port | (1) Prevent dumping waste in the fishing port by fisherfolks and residents (waste disposal has been banned, trash boxes are installed, and trash is collected twice a week. These conditions are promoted and continued) | DoF | DoF | No cost incurrence |

3. Environmental Monitoring Plan (draft)

Based on the surveyed data and standards, and considering the scale and type of work expected in this Project, necessity of environmental monitoring has been determined. Water quality is subject to environmental monitoring as shown in the following table.

| Environmental Item | Monitoring item | Survey point | Frequency | Responsible agency | Executing agency | Note |
|--|--|--|---|--------------------|------------------|---|
| During main construction and minor improvement work (during monitoring period) | | | | | | |
| Air quality | Implementation status of mitigation measures | Inside the fishing port | As required | DoF | Contractor | Mitigation measures: (1) Regular watering (2) Stop engine of heavy machinery outside of working hours |
| Water quality | COD | Two locations inside the fishing port | Twice during the main construction (one time during the minor improvement work) | DoF | Contractor | Cost is included in construction cost |
| | Understanding turbidity (transparency, SS) | Two locations inside and outside the fishing ports | Twice during the main construction (one time during the minor improvement work) | DoF | Contractor | |
| Noise | - | Two locations around the site | Twice a day | DoF | Contractor | Survey points: entrance and exit of fishing port, rear main roads Frequency: twice a day (one in the morning and one in the afternoon during the construction) |
| After construction (after Project completion) | | | | | | |
| Water quality | COD | Two locations inside the fishing port | Once/ 3 years | DoF | DoF | Cost: Approximately USD500/time |
| | Escherichia coli bacterium | Two locations inside the fishing port | Once/ 3 years | DoF | DoF | |

Handwritten signatures and initials, including a large stylized signature on the right and several smaller initials or marks on the left.

Environmental monitoring form

(1) During the Construction

<Air quality (monitoring of implementation of mitigation measures)>

| Item | Implementation situation | Remark |
|--|--------------------------|--|
| Watering (asperion) | | Implementation is confirmed accordingly. |
| Turning off engines outside of operation hours | | |

<Water quality>

| Item | Unit | Measured Value | Baseline value (at the time of the preparatory survey) | Standard value | Remark (measurement point, frequency...) |
|-----------|----------------------|----------------|--|---|--|
| COD | mg/L | | 1,000 - 1,200 | N/A (*1) | Measurement point: Two (2) locations inside and outside the fishing port. Frequency: Twice during the construction period, once during each minor improvement work. |
| | Transparency | NTU | 3.2 - 21 | N/A (*2) | |
| Turbidity | Suspended Solid (SS) | mg/L | 32 - 132 | The amount of SS artificially added is 2mg/L or less (*3) | |

- (*1) There is no specific standard for Saint Lucia nor stipulation in WHO guideline, and it is impossible to refer to Japanese standard due to difference of measurement method.
- (*2) There is no specific standard for Saint Lucia nor stipulation in WHO guideline.
- (*3) Refer to the Japanese standard (Fisheries water standard (Japan Fisheries Resource Conservation Association)), since there is no specific standard for Saint Lucia nor stipulation in WHO guideline.

<Noise>

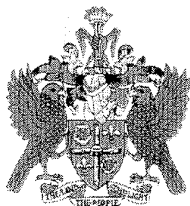
| Item | Unit | Measured Value | Baseline value (at the time of the preparatory survey) | Standard value | Remark (measurement point, frequency...) |
|-------|----------|----------------|--|----------------|---|
| Noise | Leq(A)dB | | 79.5 (during dredging) | 70 | Measurement point: Two (2) points (entrance of port, main road besides fishing port) Frequency: 2 times/day (in the morning and afternoon) |

(2) During Monitoring period and Operation

【Water quality】

| Item | Unit | Measured Value | Baseline value (at the time of the preparatory survey) | Standard value | Remark (measurement point, frequency...) |
|------------------|-----------|----------------|--|----------------|---|
| COD | mg/L | | < 200 | N/A (*1) | Measurement point: Two (2) locations inside and outside the fishing port. Frequency: Once/ 3 years |
| Coliform bacilli | CFL/100mL | | 2,300 - 6,000 | 1,000 (*2) | |

- (*1) There is no specific standard for Saint Lucia nor stipulation in WHO guideline, and it is impossible to refer to Japanese standard due to difference of measurement method.
- (*2) Refer to the WHO guideline, since there is no specific standard for Saint Lucia.



Development Control Authority

Graham Louisy Administrative Building, P.O. Box 709,
Castries, Saint Lucia, West Indies

Tel: 1.758. 468.4439/4438/4461

Email: Physicalplanningstlucia@gosl.gov.lc

Please reply to the Executive Secretary

October 21, 2021

Permanent Secretary
Ministry of Agriculture, Fisheries, Food Security
and Rural Development
c/o 5th Floor, Sir Stanislaus James Building
Waterfront
Castries

Dear Sir,

**Re: Proposed Infrastructural Development (coastal dredging)
located on Seabed, Choiseul Fishing Port, Choiseul
Application Registration Number: 1003/21**

The Development Control Authority (DCA) considered your application to conduct coastal dredging on the seabed, Choiseul Fishing Port, Choiseul.

Kindly be informed that the Board at its meeting on October 21, 2021 granted **Approval** to your application subject to the following conditions:

1. The Department of Fisheries to collaborate with SLASPA to install appropriate signage during the operation and inform all fishers and cooperatives using the facility;
2. The developer to inform SLASPA of the development and SLASPA to inform all other mariners of the activity.

Your attention is drawn to the provisions of the Physical Planning and Development Act, Chapter 5.12 as follows:

Section 28 (1)

“If permission is granted for the development of land and the development is not commenced within a period of twelve (12) months from the date on which it was granted, it shall lapse.”

Section 28 (2)

“A person who intends to carry out a development for which permission has been granted shall give notice to the Head of the Physical Planning and Development Division (DCA) of the date on which that development will commence.”

.../2

October 21, 2021
Application Registration Number: 1003/21

Section 29 (1)

“Whenever any plans have been submitted to the Head of the Physical Planning and Development Division (DCA) on an application for permission to develop any land and such permission has been granted, the development in question shall be carried out in accordance with the approved plans and any conditions subject to which permission was granted.”

Should you require further information or clarification on the above, please contact us at the above address or at telephone numbers 468-4456/4455.

Please be guided accordingly.

Yours faithfully,



.....
Executive Secretary
Development Control Authority

Copy: Chairman, Development Control Authority
Deputy Chief Physical Planning Officer
Physical Planning Officer - Mr. W. Houson
District Building Officer – A. Trim
Permanent Secretary - Department of Physical Development and Urban Renewal

Appendix-6 Sand Permit
(1) 1st Dredging



GOVERNMENT OF SAINT LUCIA
MINISTRY OF INFRASTRUCTURE, PORTS, TRANSPORT, PHYSICAL DEVELOPMENT
AND URBAN RENEWAL
Department of Infrastructure, Ports and Transport

Communication on this subject
Should be addressed to:

Chief Engineer

Union Office Complex
Union, Castries
Saint Lucia, West Indies
Telephone Number: 1-758-468-4300
Fax Number: 1-758-453-2769
Email: ajnbaptise@gosl.gov.lc

November 8th, 2021

The Permanent Secretary
Ministry of Agriculture, Fisheries,
Food Security and Rural Development
Waterfront
Castries

Dear Sir

Sand Permit

Your letter dated November 3rd, 2021 is acknowledged.

Please be informed that a Permit has been issued to Skelly Construction Services Ltd to extract 3000 cubic yards of sand from the Choiseul Fishing Port.

SAND PERMIT – VALID FOR TWELVE (12) WORKING DAYS WEDNESDAY NOVEMBER 10th TO FRIDAY NOVEMBER 12th 2021, MONDAY NOVEMBER 15th, 2021 TO FRIDAY NOVEMBER 19th, 2021, MONDAY NOVEMBER 22nd, TO THURSDAY NOVEMBER 25th, 2021.

| NO | TRUCK REG. NO. | VEHICLE/EQUIPMENT | DRIVER |
|----|-------------------|-------------------|-------------------------|
| 1 | Kmtwa028C79H51314 | KOMATSU WA320-5 | Candius Lambert |
| 2 | TN650 | Dump Truck | Celesta L Thomas |
| 3 | 31584 | Excavator | Edland Nivel Dantzie |
| 4 | 20007 | Excavator | Jevain Miguel Hippolyte |
| 5 | HHKHU601CL000115 | Back Hoe | Marlan Denver William |
| 6 | Wa320h21300 | Wheel Loader | Skelly Construction Ltd |
| 7 | A88069 | Excavator | Thomas Asson |
| 8 | CAT0321CHKCR00242 | Excavator | Skelly Construction Ltd |

(SEE ATTACHED INSURANCE DETAILS).

...../2

OUR VISION:

“To be a flagship Ministry critical to the achievement of infrastructural and national development.”

Desilting Works shall be executed between the Hours of 8:00 a.m. and 4:00 p.m. on the Sand Permit valid date/s.

Any damages sustained to the access road shall be repaired at the cost of Skelly Construction Services Ltd. Also, the river front shall be left in a pristine condition on completion of the exercise.

Skelly Construction Services Ltd shall inform Engineer Eddie Parsade 518-7504) and the police of the date and time of commencement of the mining exercise. Ministry can only start when the Police and Engineer have been informed.

Yours faithfully



Albert Jh. Baptiste
CHIEF ENGINEER

cc : Permanent Secretary – Ministry of Infrastructure, Ports, and Transport
Deputy Chief Engineer – Ministry of Infrastructure, Ports and Transport
Commissioner of Police – Attn: Officer i/c Choiseul Police Station
Zonal Engineer – Ministry of Infrastructure, Ports and Transport

OUR VISION:

“To be a flagship Ministry critical to the achievement of infrastructural and national development.”

(2) 2nd Dredging



GOVERNMENT OF SAINT LUCIA
MINISTRY OF INFRASTRUCTURE, PORTS, TRANSPORT, PHYSICAL DEVELOPMENT
AND URBAN RENEWAL
Department of Infrastructure, Ports and Transport

Communication on this subject
Should be addressed to:

Chief Engineer

Union Office Complex
Union, Castries
Saint Lucia, West Indies
Telephone Number: 1-758-468-4300
Fax Number: 1-758-453-2769
Email: ajnbaptise@gosl.gov.lc

April 25th, 2022

The Permanent Secretary
Ministry of Agriculture, Fisheries,
Food Security and Rural Development
Waterfront
Castries

Dear Sir

Sand Permit

Your letter dated April 20th, 2022 is acknowledged.

As per Chapter 6.04 of the Beach Protection Act (Revised Edition, 31 December 2017) permission is hereby granted to Skelly Construction Services Ltd to extract 2000 cubic yards of sand from the Choiseul Fishing Port.

SAND PERMIT – VALID FOR TWELVE (12) WORKING DAYS WEDNESDAY APRIL 27th TO FRIDAY APRIL 29th 2022, TUESDAY MAY 3rd, TO FRIDAY MAY 6th, 2022, AND MONDAY MAY 9th, TO FRIDAY MAY 13th, 2022.

| NO | TRUCK REG. NO. | VEHICLE/EQUIPMENT | DRIVER |
|----|-------------------|-------------------|-------------------------|
| 1 | JHEFY1EUK00010599 | Truck | Candius Lambert |
| 2 | JHEFS1EMK00010052 | Dump Truck | Celesta Thomas |
| 3 | Wa320h21300 | Wheel Loader | Ediand Nivel Dantzie |
| 4 | KMTWA028C79H51314 | Wheel Loader | Jevain Miguel Hippolyte |
| 5 | HHKHU601CL000115 | Back Hoe | Skelly Construction Ltd |
| 6 | 31584 | Excavator | Marian Denver William |
| 7 | 20007 | Excavator | Thomas Asson |
| 8 | A88069 | Excavator | Skelly Construction |
| 9 | KMTPC199A04020579 | | Mgiuel Edison Horne |

(SEE ATTACHED INSURANCE DETAILS).

...../2

OUR VISION:

“To be a flagship Ministry critical to the achievement of infrastructural and national development.”

Desilting Works shall be executed between the Hours of 8:00 a.m. and 4:00 p.m. on the Sand Permit valid date/s.

Any damages sustained to the access road shall be repaired at the cost of Skelly Construction Services Ltd. Also, the river front shall be left in a pristine condition on completion of the exercise.

Skelly Construction Services Ltd shall inform Engineer Eddie Parsade (518-7504) and the police of the date and time of commencement of the mining exercise. Ministry can only start when the Police and Engineer have been informed.

Yours faithfully



Albert Jr. Baptiste
CHIEF ENGINEER

cc : Permanent Secretary – Department of Infrastructure, Ports, and Transport
Deputy Chief Engineer – Department of Infrastructure, Ports and Transport
Commissioner of Police – Attn: Officer i/c Choiseul Police Station
Zonal Engineer – Department of Infrastructure, Ports and Transport

OUR VISION:

“To be a flagship Ministry critical to the achievement of infrastructural and national development.”



SAINT LUCIA AIR AND SEA PORTS AUTHORITY

Connecting People, Partners and the World.

Manoel Street, P.O. Box 651, Castries, Tel: (758) 457 6100, Fax: (758) 457 6190. E-mail: info@slaspa.com www.slaspa.com

November 16, 2021

Mrs. Sarita Williams-Peter
Chief Fisheries Officer
Department of Fisheries
Ministry of Agriculture, Fisheries,
Food Security and Rural Development
Pointe Seraphine
CASTRIES

Dear Mrs. Williams-Peter:

Re: Proposed Infrastructural Development (coastal dredging) Located on Seabed, Choiseul Fishing Port, Choiseul Application Registration Number: 1003/21

Reference is made to the correspondence from the Development Control Authority dated October 21, 2021 regarding the above subject.

In an effort to increase the safety of navigation in Saint Lucia's coastal waters, the Saint Lucia Air and Sea Ports Authority (SLASPA) recommends that the Project Managers and Coordinators take into consideration the safety of navigation to and from the Port facility.

On October 21, 2021, the Division of Maritime Affairs met with the Consulting Engineer, Mr. Kenji Kuroki to discuss the dredging of Choiseul Fishing Port Project. During this discussion, technical specifications for the repositioning of lateral (entrance) lights were provided to the Choiseul Fishing Port.

Consequently, SLASPA anticipates that the Department of Fisheries through its Contractors, reposition the lateral lights to the entrance of the Port. On completion of the project, the Authority expects an increase in safe navigation of seagoing vessels to and from the fishing Port.

Additionally, the Division of Maritime Affairs shall seek to address the following:

- Inform all maritime-related agencies utilizing the facility of the ongoing project including the Marinas;
- Inform the International Hydrographic Office (IHO) of said project and the installation of the lights;

- Maintain communication with the Department of Fisheries on the progression of the project and the safety of navigation.

Should you require further information and/or clarification, please contact the Director of Maritime Affairs, Mr. Christopher Alexander at telephone number (758) 457-6151 or via email christopher.alexander@slaspa.com.

Sincerely,



Daren Cenac
GENERAL MANAGER

Cc: Mr. Barrymore Felicien, Permanent Secretary - Ministry of Agriculture, Fisheries, Food Security and Rural Development
Mr. Christopher Alexander, Director of Maritime Affairs - SLASPA



ECOH CORPORATION

Address: Ueno-Takeuchi Bldg., 2-6-4, Kita-Ueno, Taito-ku, Tokyo 110-0014, Japan
Tel. +81-3-5828-8412 **Fax.** +81-3-5828-2175

November 30, 2021

Attn: Mr. Cristopher Alexander
Director of Maritime Affairs,
Saint Lucia Air and Sea Ports Authority (SLASPA)

Project Title: The Project for Improvement of Choiseul Fishing Port in Saint Lucia
Re: Beacon Lights in Choiseul Fishing Port

Dear Cristopher Alexander:

Your name has been forwarded from Mr. Daren Cenac, General Manager of SLASPA, via letter (Registration Number: 1003/21) issued on November 16, 2021 to Sarita Williams-Peter, Chief Fisheries Officer in the Department of Fisheries.

We have been committed to the subject project, and I am Kenji KUROKI in charge of facility planning and design. As mentioned in the above letter, I had an opportunity to talk to Mr. Wilbur Etienne and Kerwin John, SLASPA in terms of installation of light beacons in the project. They advised me that existing light beacons should be demolished, and new light beacons should be installed on the submerged breakwater and second sand groyne which are constructed in this project.

In the letter, "reposition" of the light beacons are mentioned. We have been wondering which is the correct interpretation of your intention:

- 1) existing light beacons are not demolished but just relocated onto the new port facilities,
- 2) existing light beacons are demolished, and new products are procured and installed onto the new port facilities.

Just for your reminder, existing light beacons are heavily damaged and missing its solar panels, so none of them are working. Therefore, it seems difficult to fix and relocate them.

As shown in Figure-1, the navigation channel of Choiseul fishing port is bent between the existing light beacons colored in green and red.

Therefore, from the technical point of view, the lighting parts of existing light beacons are fixed so that the lights reach approximately 2 miles away. The new light beacons having the stronger lights reaching 5 miles away are newly procured and installed onto the submerged breakwater and second sand groyne. This leads to the safer navigation and operation for fisherfolk.

We appreciate it if you give us your frank comments or opinions about above idea.

Just in case, our proposal is summarized in the following page.

ECOH CORPORATION

<Reference>

B system in IALA (International Association of Lighthouse Authorities)

Existing Light Beacons: to be fixed in the same locations

- 1) Red light beacon: Seen from the sea, light beacon in red is placed on the right side, and its light reaches more than 2 miles away. In the night time, the light colored in red is flashing.
- 2) Green light beacon: Seen from the sea, the light beacon in green is placed on the left side, and its light reaches more than 2 miles away. In the night time, the light colored in green is flashing.

New Beacon Lights: to be installed on the submerged breakwater and second groyne

- 3) Red light beacon: This is installed on the submerged breakwater, and its light is stronger reaching more than 5 miles away. In the night time, the light colored in red is flashing. The flashing may take place simultaneously with the existing light beacon in red.
- 4) Green light beacon: This is installed on the second groyne, and its light is stronger reaching more than 5 miles away. In the night time, the light colored in green is flashing. The flashing may take place simultaneously with the existing light beacon in green.

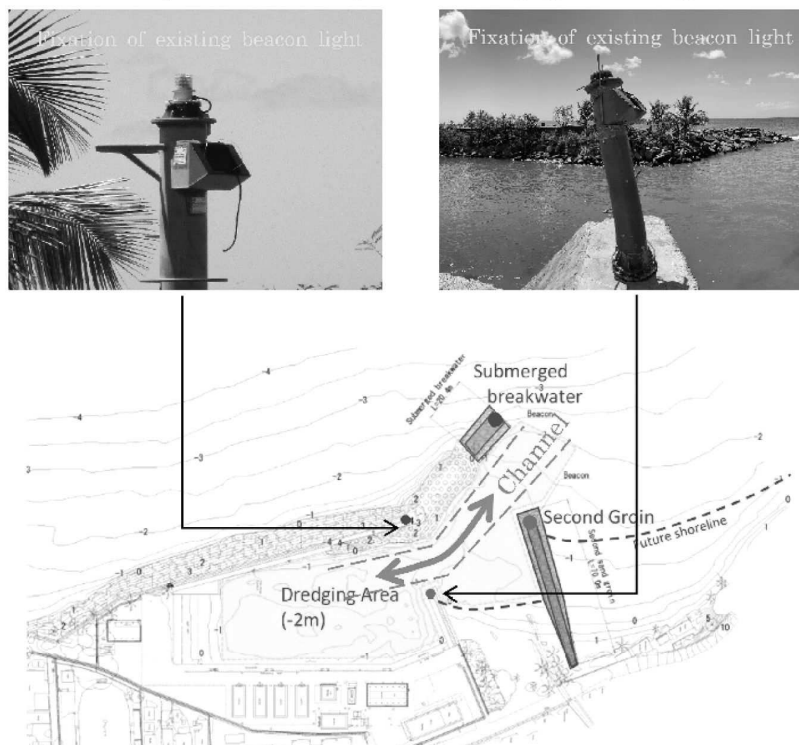


Figure-1 Fixation of existing light beacon and installation of new ones

Sincerely yours,

Kenji KUROKI
Senior Civil Engineer
International Division
ECOH CORPORATION

Cc : Mrs. Sarita (CFO) and Mr. Thomas (Deputy CFO), Department of Fisheries

ECOH CORPORATION

November 30, 2021

Mr. Kenji Kuroki
Senior Civil Engineer
International Division
ECOH Corporation

Dear Mr. Kuroki,

RE: Beacon Light in Choiseul Fishing Port

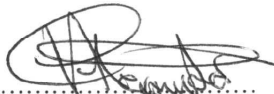
Reference is made to your correspondence dated November 12, 2021, titled **The Project for improvement of Choiseul Fishing Port in Saint Lucia.**

As articulated in your letter which states that **‘the existing lights are heavily damaged, missing their solar panels and need repairing; thus the relocation would prove to be difficult.’**

The Saint Lucia Air and Sea Ports Authority (SLASPA) concurs with this assessment and supports safe navigation that your second proposal, of installing new beacon lights on the submerged breakwater and utilizing the second groyne. As indicated, the proposed jetty lights would be stronger and be seen at a greater distance than the previous lights.

Should you require further clarification, please feel free to contact the undersigned.

Sincerely,



Christopher Alexander
Director of Maritime Affairs

Appendix-8 Environmental Monitoring Form

(1) During the Construction

<Air quality (monitoring of implementation of mitigation measures)>

| Item | Implementation situation | Remark |
|--|--------------------------|--|
| Watering (aspersion) | | Implementation is confirmed accordingly. |
| Turning off engines outside of operation hours | | |

<Water quality>

| Item | Unit | Measured Value | Baseline value (at the time of the preparatory survey) | Standard value | Remark (measurement point, frequency...) |
|-----------|----------------------|----------------|--|---|--|
| COD | mg/L | | 1,000 – 1,200 | N/A (*1) | Measurement point: Two (2) locations inside and outside the fishing port. Frequency: Twice during the construction period, once during each minor improvement work. |
| Turbidity | Transparency | NTU | 3.2 - 21 | N/A (*2) | |
| | Suspended Solid (SS) | mg/L | 32 - 132 | The amount of SS artificially added is 2mg/L or less (*3) | |

(*1) There is no specific standard for Saint Lucia nor stipulation in WHO guideline, and it is impossible to refer to Japanese standard due to difference of measurement method.

(*2) There is no specific standard for Saint Lucia nor stipulation in WHO guideline.

(*3) Refer to the Japanese standard (Fisheries water standard (Japan Fisheries Resource Conservation Association)), since there is no specific standard for Saint Lucia nor stipulation in WHO guideline.

<Noise>

| Item | Unit | Measured Value | Baseline value (at the time of the preparatory survey) | Standard value | Remark (measurement point, frequency...) |
|-------|----------|----------------|--|----------------|---|
| Noise | Leq(A)dB | | 79.5 (during dredging) | 70 | Measurement point: Two (2) points (entrance of port, main road besides fishing port) Frequency: 2 times/day (in the morning and afternoon) |

(2) During Monitoring period and Operation

【Water quality】

| Item | Unit | Measured Value | Baseline value (at the time of the preparatory survey) | Standard value | Remark (measurement point, frequency...) |
|------------------|-----------|----------------|--|----------------|---|
| COD | mg/L | | < 200 | N/A (*1) | Measurement point: Two (2) locations inside and outside the fishing port. Frequency: Once/ 3 years |
| Coliform bacilli | CFL/100mL | | 2,300 – 6,000 | 1,000 (*2) | |

(*1) There is no specific standard for Saint Lucia nor stipulation in WHO guideline, and it is impossible to refer to Japanese standard due to difference of measurement method.

(*2) Refer to the WHO guideline, since there is no specific standard for Saint Lucia.

Appendix -9 Environmental Checklist

| | Environmental Item | Main Check Item | Yes: Y No: N Not applicable: N/A | Confirmation of Environmental Considerations (Reasons, Mitigation Measures) |
|---------------------------|---|---|---|---|
| 1 Permits and Explanation | (1) EIA and Environmental Permit | <p>a) Have EIA reports been already prepared in official process?</p> <p>b) Have EIA reports been approved by authorities of the host country's government?</p> <p>c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied?</p> <p>d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?</p> | <p>a) N/A</p> <p>b) N/A</p> <p>c) N/A</p> <p>d) N</p> | <p>a) EIA is not required.</p> <p>b) EIA is not required.</p> <p>c) EIA is not required.</p> <p>d) Infrastructure Development Permit and Sand Permit are required prior construction.</p> |
| | (2) Explanation to the Local Stakeholders | <p>a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders?</p> <p>b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?</p> | <p>a) Y</p> <p>b) Y</p> | <p>a) Stakeholder meeting were held during both first and second site survey, understanding of parties involved was obtained.</p> <p>b) Opinions from hearing and stakeholder meeting are reflected in the project.</p> |
| | 3) Examination of Alternatives | <p>a) Have alternative plans of the project been examined with social and environmental considerations?</p> | <p>a) Y</p> | <p>a) In the comparison of alternatives, environmental related items were also compared and optimal plan was selected.</p> |
| 2 Pollution Control | (1) Air Quality | <p>a) Do air pollutants, such as sulfur oxides (SO_x), nitrogen oxides (NO_x), and soot and dust emitted from ships, vehicles and project equipment comply with the country's emission standards? Are any mitigating measures taken?</p> | <p>a) N</p> | <p>a) Both NO₂ and SO₂ exceeded WHO standard values. Nevertheless, it is presumed that possible causes are not directly related to this project. PM_{2.5} and PM₁₀ are basically within the standard values. Generation of dust is suppressed by regular watering and turning off heavy equipment engine outside of the working hours.</p> |

| | Environmental Item | Main Check Item | Yes: Y No: N Not applicable: N/A | Confirmation of Environmental Considerations (Reasons, Mitigation Measures) |
|--|-------------------------|--|--|---|
| | (2) Water Quality | (a) Do effluents from the project facilities comply with the country's effluent and environmental standards? (b) Do effluents from the ships and other project equipment comply with the country's effluent and environmental standards? (c) Does the project prepare any measures to prevent leakages of oils and toxicants? (d) Does the project cause any alterations in coastal lines and disappearance/appearance of surface water to change water temperature or quality by decrease of water exchange or changes in flow regimes? (e) Does the project prepare any measures to prevent polluting surface, sea or underground water by the penetration from reclaimed lands? | a) N/A b) N/A c) Y d) N e) N/A | a) No effluent is generated from the facility. b) No effluent is generated from the ships or project equipment. c) Silt-fence is installed during the dredging to limit the occurrence of turbidity. d) In the future, it is expected that the shoreline (waterfront line) will advance at the beach on the north side of the fishing port, but this will not cause any changes in water temperature or quality. e) No landfill is generated. |
| | (3) Wastes | (a) Are wastes generated from the ships and other project facilities properly treated and disposed of in accordance with the country's regulations? (b) Is offshore dumping of dredged soil properly disposed in accordance with the country's regulations? (c) Does the project prepare any measures to avoid dumping or discharge toxicants? | a) N/A b) Y c) N/A | a) Waste is not generated from ships and project facilities. b) Dredged sediment generated by this project will be placed on the north side of the fishing port. Since this is a sand bypassing system, it does not affect the surrounding water area. In the sand bypassing system, dredged sediment is not recognized as waste. c) Dredged sediment does not contain harmful substances. |
| | (4) Noise and Vibration | a) Do noise and vibrations comply with the country's standards? | a) N | a) Slight exceedance of noise level during dredging was confirmed. As to the vibration, Saint Lucia uses ISO standards. Results were significantly low both before and during the dredging conducted in this survey. |

| | Environmental Item | Main Check Item | Yes: Y No: N Not applicable: N/A | Confirmation of Environmental Considerations (Reasons, Mitigation Measures) |
|-----------------------------|------------------------------|---|--|---|
| | (5) Land subsidence | a) In the case of extraction of a large volume of groundwater, is there a possibility that the extraction of groundwater will cause land subsidence? | a) N/A | a) Extraction of a large volume of groundwater is not generated. |
| | (6) Odor | a) Are there any odor sources? Are adequate odor control measures taken? | a) N | a) Since there is no source of bad odor, no countermeasures will be taken. |
| | (7) Sediment | (a) Are adequate measures taken to prevent contamination of sediments by discharges or dumping of hazardous materials from the ships and related facilities? | a) N | a) In this project, dredging work will occur at existing fishing port and navigation channel. However, in this survey, no harmful substances were contained in the sediment, and no emissions from related facilities were confirmed. |
| 3 Environment Natural | (1) Reserve/ Protected areas | (a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas? | a) N | a) The project site is not located in a reserve. Since the construction scale is small and the Piton Management Area, a World Heritage Site, is located about 3.5km north of the project site, no impact is expected. |

| | Environmental Item | Main Check Item | Yes: Y No: N Not applicable: N/A | Confirmation of Environmental Considerations (Reasons, Mitigation Measures) |
|--|----------------------------|---|---|---|
| | (2) Ecosystem | <p>(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g.: coral reefs, mangroves, or tidal flats)?</p> <p>(b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions?</p> <p>(c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem?</p> <p>(d) Is there a possibility that the project will adversely affect aquatic organisms? Are adequate measures taken to reduce negative impacts on aquatic organisms?</p> <p>(e) Is there a possibility that the project will adversely affect vegetation or wildlife of coastal zones? If any negative impacts are anticipated, are adequate measures taken to reduce the impacts on vegetation and wildlife?</p> | <p>a) N b) N c) N/A d) N e) N</p> | <p>a) The project site does not include primeval forests, tropical rain forests or ecologically valuable habitats.</p> <p>b) As a result of the ecosystem survey (visual survey) in this survey, no rare species inhabit the site.</p> <p>c) There are no concerns about significant impacts on the ecosystem.</p> <p>d) No adverse effects on aquatic life are expected.</p> <p>e) No adverse effects on coastal vegetation and wildlife are expected.</p> |
| | (3) Hydrology | <p>a) Do the project facilities affect adversely flow regimes, waves, tides, currents of rivers and etc if the project facilities are constructed on/by the seas?</p> | <p>a) Y</p> | <p>a) After the construction of the existing fishing port and the additional breakwater, the flow conditions are such that sand is likely to accumulate in the port. This project will return the sediment transport system to its original state. Thus, there are no adverse impacts, and the project is effective against deposition.</p> |
| | (4) Topography and Geology | <p>a) Does the project require any large-scale changes of topographic/geographic features or cause disappearance of the natural seashore?</p> | <p>a) Y</p> | <p>a) Dredging ensures the water depth inside the port at the port entrance. In addition, the shoreline on the northern side of the second groyne will advance, creating a new beach. Topographical changes will have a positive effect on fishermen and local residents.</p> |

| | Environmental Item | Main Check Item | Yes: Y No: N Not applicable: N/A | Confirmation of Environmental Considerations (Reasons, Mitigation Measures) |
|----------------------|--------------------|---|--|--|
| 4 Social Environment | 1) Resettlement | <ul style="list-style-type: none"> a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement? c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? d) Are the compensations going to be paid prior to the resettlement? e) Are the compensation policies prepared in document? f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? g) Are agreements with the affected people obtained prior to resettlement? h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? i) Are any plans developed to monitor the impacts of resettlement? j) Is the grievance redress mechanism established? | <ul style="list-style-type: none"> a) N/A b) N/A c) N/A d) N/A e) N/A f) N/A g) N/A h) N/A i) N/A J) N/A | <ul style="list-style-type: none"> a) Involuntary resettlement is not generated. b) Involuntary resettlement is not generated. c) Involuntary resettlement is not generated. d) Involuntary resettlement is not generated. e) Involuntary resettlement is not generated. f) Involuntary resettlement is not generated. g) Involuntary resettlement is not generated. h) Involuntary resettlement is not generated. i) Involuntary resettlement is not generated. J) Involuntary resettlement is not generated. |

| | Environmental Item | Main Check Item | Yes: Y No: N Not applicable: N/A | Confirmation of Environmental Considerations (Reasons, Mitigation Measures) |
|--|--------------------------|---|--|--|
| | 2) Living and Livelihood | <p>a) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary?</p> <p>b) Is there a possibility that changes in water uses (including fisheries and recreational uses) in the surrounding areas due to project will adversely affect the livelihoods of inhabitants?</p> <p>c) Is there a possibility that port and harbor facilities will adversely affect the existing water traffic and road traffic in the surrounding areas?</p> <p>d) Is there a possibility that diseases, including infectious diseases, such as HIV will be brought due to immigration of workers associated with the project? Are considerations given to public health, if necessary?</p> | <p>a) N b) N c) N d) N</p> | <p>a) No negative impact on the living conditions of inhabitants is expected. If the deposition at the port entrance is improved, it will contribute to the promotion of fisheries.</p> <p>b) No adverse effect on the livelihood of the inhabitants is expected. If the port entrance is closed during the construction period, fishing activities can be continued by using a temporary pier.</p> <p>c) No adverse effects on existing water traffic and road traffic are expected. Although the navigation channel will be curved due to the installation of the submerged breakwater and the second groyne, installation of beacon light will ensure safe operation.</p> <p>d) Disease outbreak due to immigration of workers is not expected. Since the construction is on a small scale and a short-period, a large-scale of workers immigration from other areas will not occur during the construction period.</p> |
| | 3) Heritage | <p>a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?</p> | <p>a) N</p> | <p>a) There is no risk of damaging archeological, historical, cultural or religious valuable heritage or sites.</p> |
| | 4) Landscape | <p>a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?</p> | <p>a) N/A</p> | <p>a) There is no consideration for landscape on the project site.</p> |

| | Environmental Item | Main Check Item | Yes: Y No: N Not applicable: N/A | Confirmation of Environmental Considerations (Reasons, Mitigation Measures) |
|--|---|--|--|---|
| | 5) Ethnic Minorities and Indigenous Peoples | a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected? | a) N/A b) N/A | a) No adverse effects on ethnic minority or indigenous people are expected. b) No adverse effects on land and resources of ethnic minorities and indigenous people are expected. |
| | 6) Working Conditions | a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.? (d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents? | a) Y b) Y c) Y d) Y | a) The project will be in compliance with Saint Lucia legislation on working environment. The contractors of this project are required to comply with legislation on working environment. b) Installation of safety equipment, management of hazardous materials, and safety considerations in terms of hardware will be taken, which are also required to the contractors of this project. c) Software measures such as formulation of safety and health programs and implementation of safety education for workers are planned and implemented, which are also required to the contractors of this project. d) Measures are taken in bidding materials for security personnel not to infringe on safety of related parties and local residents. |

| | Environmental Item | Main Check Item | Yes: Y No: N Not applicable: N/A | Confirmation of Environmental Considerations (Reasons, Mitigation Measures) |
|----------|--------------------------------|---|--|---|
| 5 Others | 1) Impacts during Construction | <p>a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)?</p> <p>b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts?</p> <p>c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?</p> | <p>a) Y b) N c) Y</p> | <p>a) Silt-fence will be used to control turbidity expected to occur generated by the dredging. In addition, regular watering will be conducted at the project site to control dust generation during construction. Impacts of noise and vibration is not expected, but as a consideration for local residents, engine of heavy equipment will be turned off outside of working hours and night work will not be carried out.</p> <p>b) No adverse effect on the ecosystem is expected.</p> <p>c) Construction vehicles pass through residential areas and narrow roads. A traffic control staff will be assigned to prevent accidents.</p> |

| | Environmental Item | Main Check Item | Yes: Y No: N Not applicable: N/A | Confirmation of Environmental Considerations (Reasons, Mitigation Measures) |
|--|--------------------|---|--|---|
| | 2) Monitoring | <p>a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts?</p> <p>b) What are the items, methods and frequencies of the monitoring program?</p> <p>c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)?</p> <p>d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?</p> | <p>a) Y b) Y c) Y d) Y</p> | <p>a) Monitoring on air quality, water quality, and noise will be conducted. For the monitoring on air quality, implementation of mitigation measures is monitored.</p> <p>b) Monitoring is performed twice during the construction period (once during the amendment work period). There will be a total of two survey location inside and outside the fishing port.</p> <p>c) Monitoring system of the Department of Fisheries will be established. Research company entrusted with the survey by the Department of Fisheries shall carry out the survey and report to JICA. During the construction period, consultant will assist in conducting survey.</p> <p>d) Each survey stage will be reported.</p> |

| | Environmental Item | Main Check Item | Yes: Y No: N Not applicable: N/A | Confirmation of Environmental Considerations (Reasons, Mitigation Measures) |
|--------|---------------------------------------|--|--|---|
| 6 Note | Note on Using Environmental Checklist | <p>a) Where necessary, impacts on groundwater hydrology (groundwater level drawdown and salinization) that may be caused by alteration of topography, such as land reclamation and canal excavation should be considered, and impacts, such as land subsidence that may be caused by groundwater uses should be considered. If significant impacts are anticipated, adequate mitigation measures should be taken.</p> <p>b) If necessary, the impacts to transboundary or global issues should be confirmed, if necessary (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).</p> | <p>a) N/A b) N/A</p> | <p>a) No impact on land reclamation, groundwater hydrology or land subsidence due to the alteration of topography is expected.</p> <p>b) The construction is on a small scale. No impact on transboundary or global environment issues is expected.</p> |

Appendix-10 Natural Environment Survey Result

(1) Sediment

1) Outline of survey

Sampling points are shown in Figure Appendix-10(1). Sampling was conducted at 3 points: inside the port (S1), port entrance (S2), and outside the port (S3), on November 12, 2021 in the timeframe of low tide. Items of survey include specific gravity, sieve analysis and unit weight in addition to 33 items stipulated in “Guideline for fisheries area environmental impact assessment related to dumping of dredged sand” in Japan. However, alkyl mercury, thiram, and thiobencarb were excluded due to impossibility of laboratory test in Saint Lucia.



Figure Appendix-10(1) Sampling points for sediment survey

2) Result

Table Appendix-10(1) shows comparisons between results of sediment survey and standard values. It is noted that sieve analysis and items which are possible to refer and compare to standard values in Saint Lucia are extracted. Result of all items are shown in Appendix-11. In the sediment survey, neither trace metals nor organic pollutants were detected.

In Saint Lucia, there are no national standard and WHO standard for evaluating sediment quality, multiple standard used in other countries are referred for evaluation.

Table Appendix-10(1) Comparison between result of sediment survey and standard values

| | | Unit | Result | | | Standard (µg/g) | | | | | Standard (µg/g) | |
|---|--------|--|---|-------|-------|-----------------|-------------|--------|---------------------|-------------------------|-----------------|-----------------------|
| | | | 1st (low tide, Nov-12) Before dredging | | | Trace metals | | | | Organic pollutants | | |
| | | | W1 | W2 | W3 | NOAA (*1) | ANZECC (*2) | EC(*3) | Hong Kong ISQV (*4) | Hong Kong ISQV & ANZECC | | Japan (*5) |
| 3 | 1 | Specific Gravity | | 1.8 | 1.9 | 1.7 | | | | | | |
| 3 | 2 | Sieve Analysis (*6) | µm | 147 | 204 | 176 | | | | | | |
| 3 | 3 | Unit Weight | kN / m ³ | 12.7 | 13.2 | 11.7 | | | | | | |
| 3 | 5 | Mercury or its compound | µg / g | <0.05 | <0.05 | <0.05 | 0.15 | 0.15 | 0.13 | 0.28 | | 0.025 |
| 3 | 6 | Cadmium or its compound | µg / g | <0.05 | <0.05 | <0.05 | 1.2 | 1.2 | 0.68 | 1.5 | | 0.1 |
| 3 | 7 | Lead or its compound | µg / g | 3.4 | 4.6 | 3.9 | 46.7 | 47 | 30.2 | 75 | | 1 |
| 3 | 10 | Arsenic or its compound | µg / g | 6.3 | 7.6 | 7.5 | 8.2 | 20 | 7.24 | 8.2 | | 0.15 |
| 3 | 12 | Polychlorinated biphenyl (PCB) | µg / g | <0.3 | <0.3 | <0.3 | | | | | 34.1 | 0.003 |
| 3 | 8 & 15 | Organophosphorus compound / Organochlorine compounds / organic chlorine compound | | | | | | | | | | 3-8/±1.0 3-15/±4.0 |
| | | chlordan (total) | µg / g | <0.05 | <0.05 | <0.05 | | | | | 4.5 | |
| | | DDD (total) | µg / g | <0.05 | <0.05 | <0.05 | | | | | 3.54 | |
| | | DDE (total) | µg / g | <0.05 | <0.05 | <0.05 | | | | | 1.42 | |
| | | DDT (total) | µg / g | <0.05 | <0.05 | <0.05 | | | | | 7 | |
| | | dieldrin | µg / g | <0.05 | <0.05 | <0.05 | | | | | 2.85 | |
| | | endrin | µg / g | <0.04 | <0.04 | <0.04 | | | | | 2.67 | |
| | | heptachlor | µg / g | <0.01 | <0.01 | <0.01 | | | | | 0.6 | |
| 3 | 30 | Copper or its compound | µg / g | 8.2 | 8.4 | 7.9 | 34 | 34 | 18.7 | 65 | | 10 |
| 3 | 31 | Zinc or its compound | µg / g | 31 | 31 | 29 | 200 | 200 | 124 | 200 | | 20 |
| 3 | 34 | Chromium or its compound | µg / g | 12 | 11 | 9.9 | 81 | 81 | 52.3 | 80 | | 2 |
| 3 | 35 | Nickel or its compound | µg / g | 3.2 | 3.3 | 3.2 | 21 | 21 | 15.9 | 40 | | 1.2 |

*1 NOAA ERL: National Oceanic and Atmospheric Administration

*2 ANZECC: Australia and New Zealand Environmental Conservation Council

*3 EC: Environment Canada

*4 Hong Kong ISQV: Hong Kong Interim Sediment Quality Value

*5 Waste Disposal and Public Cleaning Law

*6 Value of D50

*7 ND: Not Detected

3) Observation

<Sieve analysis>

Median diameter (D50) is 147µm in W1, 204µm in W2, and 176µm in W3. The sediment is mainly sand with just a slight inclusion of gravel or silt.

<Trace metals and organic pollutants>

Neither trace metals nor organic pollutants were detected.

Only arsenic or its compound just slightly exceeded the standard in comparison with Environment Canada, but the detected value was less than other standards. However, according to “Probable Effects Level” by Environment Canada which is considered to be appropriate to see harmful level, the limit is set to 17µg/g, so it is evaluated that serious pollution has not occurred.

4) Suggestions in implementing the Project

According to sediment survey, serious contamination by trace metals or organic pollutants were not confirmed. Since works which possibly cause sediment contamination are not expected in this Project, neither mitigation measures nor environmental monitoring are required.

(2) Water Quality

1) Outline of survey

Figure Appendix-10(2) shows sampling points. Sampling was conducted twice in 4 points: inside the port (W1), outlet of drain ditch (W2), front ocean of north beach (W3), and offshore side of existing breakwater (W4). First sampling was carried out before dredging on November 21, 2021 in the timeframe of low tide, and second sampling was conducted during dredging on December 10, 2021 in the timeframe of high tide. Items of survey includes pH, COD, SS, DO, total phosphorous, and coliform in addition to 27 items stipulated in “Environmental standard in relation to human health protection” in Japan. However, alkyl mercury, thiram, and thiobencarb were excluded due to impossibility of laboratory test in Saint Lucia.

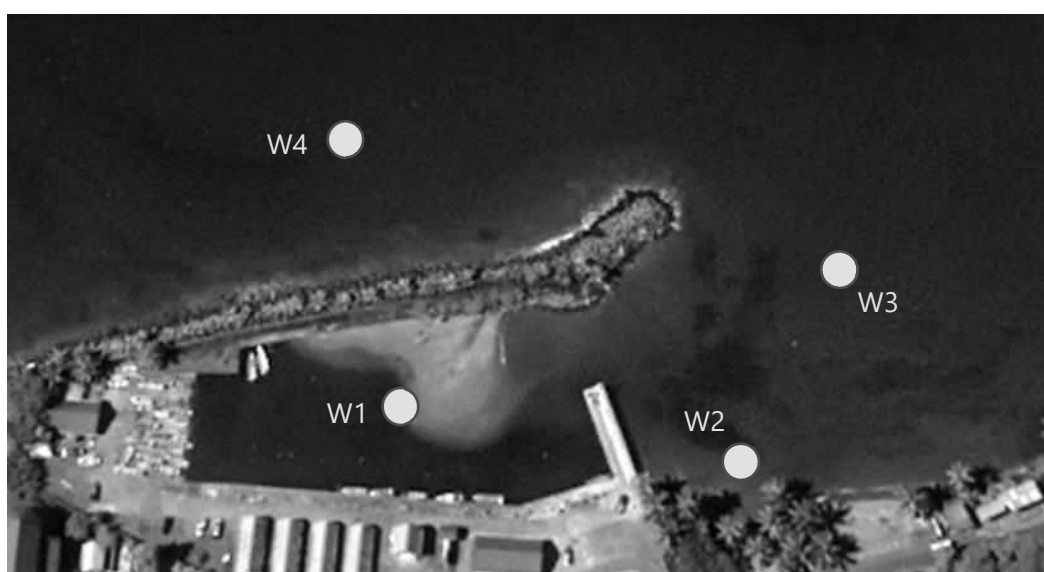


Figure Appendix-10(2) Sampling points for water quality survey

2) Results

Table Appendix-10(2) shows comparison between results of water quality survey and standard values. Items which were increased during dredging are extracted. Results of all items are shown in the Appendix-11. Through water quality survey, contamination by chemical pollutants was not confirmed.

Table Appendix-10(2) Comparison of water quality results and standard values

| | | | Unit | Results | | | | | | | | Standard (mg/L) | |
|---|----|-------------------|-----------|---|-------|------|-------|--|------|------|------|-----------------|-------------------------|
| | | | | 1st (low tide, Nov-12) Before dredging | | | | 2nd (high tide, Dec-10) During dredging | | | | WHO | Japan (*2) |
| | | | | W1 | W2 | W3 | W4 | W1 | W2 | W3 | W4 | | |
| 3 | 3 | SS | mg/L | 35 | 59 | 144 | 39 | 32 | 85 | 132 | 26 | | 2 (artificial increase) |
| 3 | 4 | COD | mg/L | <200 | <200 | <200 | <200 | 1200 | 1120 | 1000 | 1050 | | 8 or less |
| 3 | 6 | Coliform bacilli | CFU/100mL | 6000 | 3400 | 2300 | 96 | 7400 | 2800 | 1300 | 86 | 1000 (*1) | |
| 3 | 8 | Transparency | NTU | 2.36 | 7.72 | 19.3 | 0.28 | 3.2 | 14 | 21 | 0.35 | | |
| 3 | 10 | Total Phosphorous | mg/L | 0.08 | <0.03 | 0.04 | <0.03 | 3.3 | 3.3 | 3.9 | 3.1 | 20 | 0.09 |

*1 USEPA: United States Environmental Protection Agency

*2 "Environmental standard for water quality pollution" and "Water quality standard for fisheries purposes"

3) Observations

<Suspended Solids (SS)>

In W2, detected value was increased during dredging. On the other hands, in W1, W3, and W4, detected values were decreased during dredging. The increase seems to result from turbidity caused by dredging. Since there were decrease in other points, the impact by dredging is expected to be limited.

<Chemical Oxygen Demand (COD)>

In Japan, COD(Mn) using potassium permanganate as oxidant is applied, but COD(Cr) using potassium dichromate as oxidant is used. COD(Cr) is generally used in foreign countries such as the United States. It is impossible to make conversion between COD(Mn) and COD(Cr), thus the surveyed result is not evaluated with the Japanese standard directly.

It was confirmed that detected value was less than 200 mg/L before dredging in all sampling points, but the value was increased during dredging.

According to rapid COD test conducted by the consultant team on September 26, 2021, all detected values were under the Japanese standard. Figure Appendix-10(3) shows sampling points of rapid COD test, and Table Appendix-10(3) shows the result.



Figure Appendix-10(3) Points of rapid COD test

Table Appendix-10(3) Result of rapid COD test

| No. | Point (coordinates) | COD |
|-----|---------------------|-----|
| 1 | N13° 46'23.0" | 1 |
| | W61° 03'06.4" | |
| 2 | N13° 46'32.9" | 1 |
| | W61° 03'06.6" | |
| 3 | N13° 46'30.0" | 5 |
| | W61° 03'03.5" | |
| 4 | N13° 46'28.1" | 4 |
| | W61° 03'02.9" | |
| 5 | N13° 46'28.6" | 2 |
| | W61° 03'02.0" | |
| 6 | N13° 46'26.5" | 3 |
| | W61° 03'02.0" | |
| 7 | N13° 46'31.3" | 0 |
| | W61° 03'02.7" | |
| 8 | N13° 46'30.0" | 3 |
| | W61° 03'03.5" | |

<Coliform bacilli>

The detected values in W1 to W3 exceeded the standard value, 1,000CFU/100mL in WHO standard. Exceedance inside the port and port entrance is notable. It seems that causes are waste, living sewage, garbage dumping, etc.

In comparison between low and high tides, the detected value is higher in the condition of high tide. This implies that coliform bacilli are dispersed from inside to outside the port during low tide, and concentrated in the port from outside during high tide.

<Transparency>

In comparison of results before and during dredging, values in all points were increased during dredging, especially in W2 and W3 which were closer to dredging area. Therefore, dredging work had an impact on turbidity.

<Total phosphorous>

In comparison of results before and during dredging, values in all points were increased during dredging. It is assumed that total phosphorous lying in sediment was dispersed by dredging. However, the detected values were all within WHO standard, 20mg/L.

4) Suggestions in implementing Project

Neither serious contamination of water quality nor significant damage by dredging were not confirmed.

However, since there were increase in COD, SS and transparency during dredging, so it is

suggested that appropriate measures are taken in construction phase and during minor improvement works to prevent expansion of turbidity, and environmental monitoring is also implemented. After completion of the Project, generation of turbidity is not expected, thus environmental monitoring on COD and coliform bacilli is recommended for maintaining clean use of fishing port.

(3) Air quality

1) Outline of survey

Figure Appendix-10(4) shows measurement points. In 3 points: in front of a church on south side of the port (Site-1), entrance of the port (Site-2) and traffic road on north side of the port (Site-3), measurement for 24 hours per point was conducted. Surveyed items were NO₂, SO₂, PM_{2.5} and PM₁₀. Measurement took place between October 23 to 24, 2021 in Site-3, October 24 to 25, 2021 in Site-2, and October 25 to 26, 2021 in Site-1.



Figure Appendix-10(4) Measurement point of air quality survey

2) Results

Table Appendix-10(4) shows comparison between survey results and standard values. SO₂ and NO₂ exceeded with Japanese and WHO standards significantly. PM_{2.5} and PM₁₀ were within Japanese standard.

Table Appendix-10(4) Comparison between results or air quality survey and standard

(unit: converted into $\mu\text{g}/\text{m}^3$)

| Point | Measurement Date (*) | measurement item | | | |
|--------------------------------------|----------------------|--|--|---|-----------------------------------|
| | | SO ₂ | NO ₂ | PM _{2.5} | PM ₁₀ |
| Site-1 | Oct. 25-26, 2021 | 229.63 | 218.84 | 16.28 | 30.43 |
| Site-2 | Oct. 24-25, 2021 | 331.02 | 226.62 | 10.61 | 19.23 |
| Site-3 | Oct. 23-24 2021 | 344.31 | 219.68 | 17.79 | 31.35 |
| Standard in Japan (24 hours average) | | 104.80 | 112.80 | 35.00 | 100.00 |
| WHO standard (24 hours average) | | 40.00 | 25.00 | 15.00 | 45.00 |
| Evaluation | | Significant exceedance of Japanese and WHO standards | Significant exceedance of Japanese and WHO standards | Exceedance of WHO standard in Site-1 and Site-3, but still within Japanese standard | Within Japanese and WHO standards |

* Measurement took place before first dredging

3) Observation

<SO₂>

SO₂ is omitted when fossil fuel is burned, however, such activities were not confirmed at the time of measurement. Choiseul fishing port is approximately 3.5km away from Pitons which are volcanic. Also, large eruption in Soufriere volcano in Saint Vincent and Grenadines which is approximately 50km away from Choiseul occurred on April 2021, and volcanic ash reached Saint Lucia. It is assumed that high value of SO₂ is resulted from those volcanic causes.

<NO₂>

NO₂ is generated by burning fuels such as operations in plants, thermal power plants, and vehicles. Measurement was conducted in a main road in Choiseul district, and it is the only road aside the fishing port. According to hearing survey to residents, comments in relation to congestion of the road were confirmed. Since there are no plants or thermal power plants, possible source of omission is expectedly vehicles.

<PM_{2.5} and PM₁₀>

In Site-1 and Site-3, the measured values slightly exceeded WHO standard but were within Japanese standards. At the time of measurement in Site-1, wood lumbering was implemented nearby, and it might have affected to the measurement.

4) Suggestions in implementing Project

The main component of this Project is construction of second groyne and submerged breakwater, and dredging inside the port and port entrance. Both scale of the work and impacts on environment are expected to be small, however, it is suggested to take any measures to minimize the impacts on air quality during construction.

Slight exceedance of PM_{2.5} and PM₁₀ is not considered to be a serious problem since those measured values were within Japanese standard. However, generation of dust is assumed during construction, so it is suggested that measures for minimization of impacts, and monitoring for confirming proper implementation of such measures are conducted.

(4) Noise and vibration

1) Outline of survey

Figure Appendix-10(5) shows measurement points. In 3 points: in front of a church on south side of the port (Point-1), entrance of the port (Point -2) and traffic road on north side of the port (Point -3), measurement for 2 hours in each point before and during dredging was conducted.

It turned out that Point-3 was far enough from Choiseul fishing port and trucks transporting material for dredging did not come through, resultantly impacts of noise and vibration were extremely small. Thus, measurement in Point-3 during dredging was not conducted. Instead, for more accurate comprehension of impacts of noise and vibration, measurement was conducted twice in Point-2, closest to the site, during dredging.



Figure Appendix-10(5) Measurement points for noise and vibration

2) Results

Table Appendix-10(5) shows result of noise measurement, and Table Appendix-10(6) shows result of vibration measurement.

Table Appendix-10(5) Result of noise measurement

| Point | Before / during dredging | Date | Time | Measured value (Leq(A)dB) | WHO standard | Comparison | Note |
|-------|--------------------------|--------------|---------------|---------------------------|--------------|------------|--|
| 1 | Before | Oct-21, 2021 | 11:20 - 13:20 | 61.2 | < 70 | OK | |
| | | Nov-16, 2021 | 10:15 - 12:15 | 66.4 | | OK | |
| | During | Nov-23, 2021 | 13:30 - 15:30 | 74.2 | | Exceeding | work conducted: transportation of rubble stone for temporary access road |
| 2 | Before | Oct-21, 2021 | 13:33 - 15:33 | 56.2 | | OK | |
| | | Nov-16, 2021 | 13:00 - 15:00 | 58.6 | | OK | |
| | During | Nov-23, 2021 | 15:30 - 17:30 | 79.5 | | Exceeding | work conducted: transportation of rubble stone for temporary access road |
| | | Nov-30, 2021 | 14:00 - 16:00 | 68.2 | OK | | |
| 3 | Before | Oct-21, 2021 | 15:45 - 17:45 | 62 | OK | | |
| | | Nov-16, 2021 | 15:02 - 17:02 | 61.6 | OK | | |
| | During * | - | - | - | - | | |

* Point-3 is away from the port and there were no traffic of trucks transporting materials. Instead, measurement was conducted twice in Point-2, closest to the site.

Table Appendix-10(6) Result of vibration measurement

| Point | Before / during dredging | Date | Time | Measured value (mm/sec) | ISO standard | comparison | Note |
|-------|--------------------------|--------------|-------|-------------------------|---------------|------------|--|
| 1 | before | Oct-21, 2021 | 11:20 | <0.15 | < 5.41 mm/sec | OK | |
| | before | Nov-16, 2021 | 10:15 | <0.15 | | | |
| | during | Nov-23, 2021 | 13:30 | <0.15 | | | work conducted: transportation of rubble stone for temporary access road |
| 2 | before | Oct-21, 2021 | 13:33 | <0.15 | | | |
| | | Nov-16, 2021 | 13:00 | <0.15 | | | |
| | during | Nov-23, 2021 | 15:30 | <0.15 | | | work conducted: transportation of rubble stone for temporary access road |
| | | Nov-30, 2021 | 14:00 | <0.15 | | | work conducted: dredging at port entrance |
| 3 | before | Oct-21, 2021 | 15:45 | <0.15 | | | |
| | | Nov-16, 2021 | 15:02 | <0.15 | | | |
| | during * | - | - | - | | | |

* Point-3 is away from the port and there were no traffic of trucks transporting materials. Instead, measurement was conducted twice in Point-2, closest to the site.

3) Observation

<Noise>

Source of continuous noise in Choiseul fishing port does not exist. It is expected that noise is generated by traffic, so type of noise is intermittent in accordance with the vehicle.

In comparison between measured value before dredging and WHO standard, the noise level is lower than the standard. It is subject to the traffic volume, but basically it is assumed that serious problem of noise does not occur.

During dredging, slight exceedance of WHO standard was confirmed in Point-1 and Point-2. During the measurement, mainly transportation of rubble stones for establishing temporary access road was conducted by trucks, so probably it is the cause of increase of noise level.

<Vibration>

Results of measurement before and during dredging were less than 0.15mm/sec, which were extremely small. Even in Point-1 and Point-2 where trucks were passing through, the measured value did not exceed 0.15mm/sec. According to ISO (2631-1), standard value of vibration is 5.41mm/sec. Compared to the standard, the detected level is rather smaller, so no impacts of vibration are expected.

As a reason why, measured vibration level was extremely small even during dredging, it is assumed that the works which usually cause vibration such as pile driving were not implemented, and trucks decreased speed due to limited width of road near the fishing port.

4) Suggestions in implementing Project

As to the noise, according to WHO standard, noise less than 70 Leq(A)dB is not harmful for lives regardless its continuity, and noise which is continuous and over 85 Leq(A)dB possibly causes problems to human health. In this Project, construction during night time is not expected, type of noise is intermittent by traffic, and the noise level is less than 85 Leq(A)dB, thus occurrence of serious problem is not expected. However, as a consideration for residents nearby, it is suggested that measures for minimization of impacts are taken, and monitoring on noise is conducted during construction to confirm no occurrence of problems.

As to the vibration, any problems are not expected, based on this survey.

(5) Biological survey

1) Outline of survey

On September 26, 2021, biological survey by visual inspection and taking underwater photos in Choiseul fishing port were conducted. Figure Appendix-10(6) shows the survey area and shooting points. The area where construction of facilities or dredging is expected in this Project was subject to biological survey, and shooting was conducted in 16 points in total.



Figure Appendix-10(6) Survey area and shooting points for biological survey

2) Results

Table Appendix-10(7) to Table Appendix-10(12) shows photos taken in each area.

Table Appendix-10(7) Underwater photos in Area-A





| Area-A (near navigation channel, behind additional breakwater) | |
|--|---|
| ①  | ②  |
| Fine sand, neither animal nor plant are confirmed. | Fine sand, neither animal nor plant are confirmed. |
| ③  | ④  |
| On sand, rocks of approx. 10cm are found. Neither animal nor plant are confirmed. | On sand, rocks of approx. 15cm are found. Neither animal nor plant are confirmed. |

Table Appendix-10(8) Underwater photos in Area-B

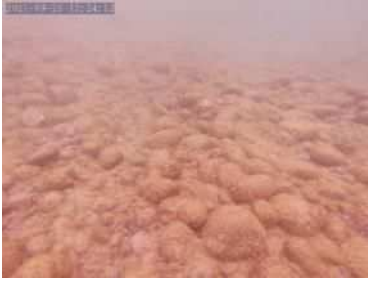

| Area-B (tip of additional breakwater) | |
|---|--|
| ⑤  | ⑥  |
| Rocks of approx. 15cm are scattered, but neither animal nor plant are found. | Small fish are inhabited. |

Table Appendix-10(9) Underwater photos in Area-C




| Area-C (tip of additional breakwater to offshore to south) | |
|--|--|
| ⑦  | ⑧  |
| Rocks are scattered as farther from additional breakwater. Neither animal nor plant are found. | Sand with rocks are confirmed at -2m or deeper. Neither animal nor plant are found. |
| ⑨  | |
| Small amount of rocks is found. Striped patterns are on the sediment sand. Neither animal nor plant are confirmed. | |

Table Appendix-10(10) Underwater photos in Area-D




| Area-D (North offshore to port entrance) | |
|---|--|
| ⑩  | ⑪  |
| Striped patterns are on sediment sand. Neither animal nor plant are confirmed. | Striped patterns are on sediment sand. Neither animal nor plant are confirmed. |
| ⑫  | |
| Rocks with moss is found. Neither animal nor plant are confirmed. | |

Table Appendix-10(11) Underwater photos in Area-E

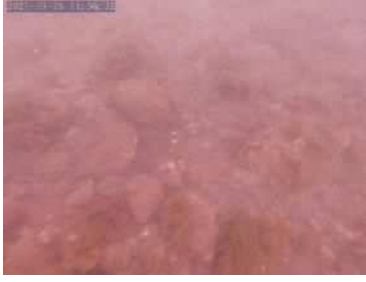



| Area-E (Central area of north offshore) | |
|---|--|
| ⑬ | ⑭ |
|  |  |
| Sediment is sand with rocks. Most of the rocks have moss on surface. | Sediment is sand with rocks. Most of the rocks have moss on surface. |

Table Appendix-10(12) Underwater photos in Area-F

| Area-F (North offshore to port entrance) | |
|--|---|
| ⑮ | ⑯ |
|  |  |
| Rocks with moss are scattered. Animals including fish are not found. | Rocks with moss are scattered. Moss is found in the sediment of sand and rocks. |

3) Observation

In the Choiseul fishing port, existence of rare species was not confirmed. Fish was found in Area-B, at the tip of additional breakwater, but animals were not found in other areas. Moss was found in Area-D, Area-E, and Area-F on north side of Choiseul fishing port, but plants were not found in other areas.

4) Suggestions in implementing Project

Based on the biological survey, rare species were not found in the Project site, and existence of animals and plants are quite limited. Considering an aspect that the expected scale of construction is small, impacts on biology are not expected.

Appendix-11 Water and Sediment Quality

(1) Water Quality survey results

| | | | Unit | Result | | | | | | | | Standard (mg/L) | |
|---|----|-------------------------------------|-----------|---|----------|----------|----------|--|----------|----------|----------|-------------------|---------------|
| | | | | 1st (low tide, Nov-12) Before dredging works | | | | 2nd (high tide, Dec-10) During dredging works | | | | WHO | Japan (*2) |
| | | | | W1 | W2 | W3 | W4 | W1 | W2 | W3 | W4 | | |
| 3 | 1 | temperature | °C | 28.8 | 28.9 | 28.5 | 28.7 | 28.7 | 28.8 | 28.5 | 28.5 | | |
| 3 | 1 | salinity | mg/L | 34 | 34 | 34 | 35 | 33 | 35 | 35 | 35 | | |
| 3 | 2 | pH | units | 8.23 | 8.12 | 8.1 | 8.09 | 8.16 | 8.09 | 8.06 | 8.08 | | 7.8 - 8.4 |
| 3 | 3 | SS | mg/L | 35 | 59 | 144 | 39 | 32 | 85 | 132 | 26 | | 2(artificial) |
| 3 | 4 | COD | mg/L | <200 | <200 | <200 | <200 | 1200 | 1120 | 1000 | 1050 | | 8 or less |
| | | Biochemical Oxygen Demand | mg/L | | | 1.7 | | | | 5.2 | | | 5 or less |
| 3 | 5 | DO | mg/L | 8 | 8.2 | 7.9 | 8 | 8 | 8.2 | 7.9 | 8 | | 6 or more |
| 3 | 6 | Coliform bacilli | CFU/100mL | 6000 | 3400 | 2300 | 96 | 7400 | 2800 | 1300 | 86 | 1000 (*1) | |
| 3 | 7 | n-Hexane Extraction Substance | mg/L | <15 | <15 | <15 | <15 | <15 | <15 | <15 | <15 | | |
| 3 | 8 | Transparency | NTU | 2.36 | 7.72 | 19.3 | 0.28 | 3.2 | 14 | 21 | 0.35 | | |
| 3 | 9 | Total Nitrogen | as N mg/L | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | 1000 | 1 |
| 3 | 10 | Total Phosphorous | mg/L | 0.08 | <0.03 | 0.04 | <0.03 | 3.3 | 3.3 | 3.9 | 3.1 | 20 | 0.09 |
| 3 | 11 | Total Cadmium | mg/L | <0.00003 | <0.00003 | 0.00003 | <0.00003 | 0.0001 | <0.00003 | 0.0002 | 0.0001 | 0.06 | 0.03 |
| 3 | 12 | Total cyanide | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | 10 | ND |
| 3 | 13 | Total Lead | mg/L | <0.0009 | <0.0009 | <0.0009 | <0.0009 | 0.0028 | 0.0004 | 0.0004 | 0.0005 | 0.2 | 0.01 |
| 3 | 14 | Hexavalent chromium | mg/L | <0.006 | <0.006 | <0.006 | <0.006 | <0.01 | <0.01 | <0.01 | <0.01 | 1 | 0.05 |
| 3 | 15 | Total Arsenic | mg/L | 0.004 | 0.003 | 0.004 | <0.002 | 0.0022 | 0.002 | 0.002 | 0.0021 | 0.2 | 0.01 |
| 3 | 16 | Total mercury | mg/L | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.01 | 0.01 | <0.01 | 0.01 | 0.12 | 0.0005 |
| 3 | 17 | Alkyl mercury | | | | | | | | | | | ND |
| 3 | 18 | PCBs | mg/L | <0.00002 | <0.00002 | <0.00002 | <0.00002 | <0.00004 | <0.00004 | <0.00004 | <0.00004 | 0.01 (*1) | ND |
| 3 | 19 | Dichloromethane | mg/L | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.4 | 0.02 |
| 3 | 20 | Carbon tetrachloride | mg/L | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.08 | 0.002 |
| 3 | 21 | 1,2-Dichloroethane | mg/L | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0002 | <0.0002 | <0.0002 | <0.0002 | 0.6 | 0.004 |
| 3 | 22 | 1,1-Dichloroethylene | mg/L | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | | 0.1 |
| 3 | 23 | Cis 1,2-Dichloroethylene | mg/L | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | | 0.04 |
| 3 | 24 | 1,1,1-Trichloroethane | mg/L | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | | 1 |
| 3 | 25 | 1,1,2-Trichloroethane | mg/L | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | | 0.006 |
| 3 | 26 | Trichloroethylene | mg/L | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | | 0.01 |
| 3 | 27 | Tetrachloroethylene | mg/L | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | | 0.01 |
| 3 | 28 | 1,3-Dichloropropene | mg/L | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.001 | <0.001 | <0.001 | <0.001 | 0.4 | 0.002 |
| 3 | 29 | Thiram | mg/L | | | | | | | | | | 0.006 |
| 3 | 30 | Simazine | mg/L | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | <0.00001 | 0.04 | 0.003 |
| 3 | 31 | Thiobencarb | mg/L | | | | | | | | | | 0.02 |
| 3 | 32 | Benzene | mg/L | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.2 | 0.01 |
| 3 | 33 | Selenium | mg/L | 0.0005 | <0.0004 | 0.0007 | <0.0004 | <0.00004 | 0.0002 | <0.00004 | 0.0005 | 0.2 | 0.01 |
| 3 | 34 | Nitrate nitrogen & nitrite nitrogen | mg/L | <6 | <6 | <6 | <6 | <6 | <6 | <6 | <6 | Nitrate (as N) 20 | 10 |
| 3 | 35 | Fluoride | mg/L | 0.9 | 0.91 | 0.9 | 0.89 | 0.9 | 0.88 | 0.89 | 0.91 | 30 | 0.8 |
| 3 | 36 | Boron | mg/L | 4.09 | 4.46 | 4.7 | 4.4 | 4.29 | 4.62 | 4.37 | 4.69 | 48 | 1 |
| 3 | 37 | 1,4-Dioxane | mg/L | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | 1 | 0.05 |

*1 Refer to USEPA standard (United States Environmental Protection Agency)

*2 Japanese Standard: refer to the Environmental Quality Standards for Water Pollution (Japan) and Fisheries Water Standards (Japan Fisheries Resource Conservation Association)

(2) Sediment Quality survey results

| | | | Unit | Result | | | Standard (µg/g) | | | | Standard (µg/g) |
|---|--------|--|---------------------|---|-------|-------|-----------------|-------------|--------|---------------------|-------------------------|
| | | | | 1st (low tide, Nov-12) Before dredging | | | Trace metals | | | Organic pollutants | |
| | | | | W1 | W2 | W3 | NOAA (*1) | ANZECC (*2) | EC(*3) | Hong Kong ISQV (*4) | Hong Kong ISQV & ANZECC |
| 3 | 1 | Specific Gravity | | 1.8 | 1.9 | 1.7 | | | | | |
| 3 | 2 | Sieve Analysis (*6) | µm | 147 | 204 | 176 | | | | | |
| 3 | 3 | Unit Weight | kN / m ³ | 12.7 | 13.2 | 11.7 | | | | | |
| 3 | 5 | Mercury or its compound | µg / g | <0.05 | <0.05 | <0.05 | 0.15 | 0.15 | 0.13 | 0.28 | 0.025 |
| 3 | 6 | Cadmium or its compound | µg / g | <0.05 | <0.05 | <0.05 | 1.2 | 1.2 | 0.68 | 1.5 | 0.1 |
| 3 | 7 | Lead or its compound | µg / g | 3.4 | 4.6 | 3.9 | 46.7 | 47 | 30.2 | 75 | 1 |
| 3 | 10 | Arsenic or its compound | µg / g | 6.3 | 7.6 | 7.5 | 8.2 | 20 | 7.24 | 8.2 | 0.15 |
| 3 | 12 | Polychlorinated biphenyl (PCB) | µg / g | <0.3 | <0.3 | <0.3 | | | | | 34.1 |
| 3 | 8 & 15 | Organophosphorus compound / Organochlorine compounds / organic chlorine compound | | | | | | | | | 3-8は1.0 3-15は4.0 |
| | | chlordane (total) | µg / g | <0.05 | <0.05 | <0.05 | | | | | 4.5 |
| | | DDD (total) | µg / g | <0.05 | <0.05 | <0.05 | | | | | 3.54 |
| | | DDE (total) | µg / g | <0.05 | <0.05 | <0.05 | | | | | 1.42 |
| | | DDT (total) | µg / g | <0.05 | <0.05 | <0.05 | | | | | 7 |
| | | dieldrin | µg / g | <0.05 | <0.05 | <0.05 | | | | | 2.85 |
| | | endrin | µg / g | <0.04 | <0.04 | <0.04 | | | | | 2.67 |
| | | heptachlor | µg / g | <0.01 | <0.01 | <0.01 | | | | | 0.6 |
| 3 | 30 | Copper or its compound | µg / g | 8.2 | 8.4 | 7.9 | 34 | 34 | 18.7 | 65 | 10 |
| 3 | 31 | Zinc or its compound | µg / g | 31 | 31 | 29 | 200 | 200 | 124 | 200 | 20 |
| 3 | 34 | Chromium or its compound | µg / g | 12 | 11 | 9.9 | 81 | 81 | 52.3 | 80 | 2 |
| 3 | 35 | Nickel or its compound | µg / g | 3.2 | 3.3 | 3.2 | 21 | 21 | 15.9 | 40 | 1.2 |

*1 NOAA ERL: National Oceanic and Atmospheric Administration

*2 ANZECC: Australia and New Zealand Environmental Conservation Council

*3 EC: Environment Canada

*4 Hong Kong ISQV: Hong Kong Interim Sediment Quality Value

*5 Waste Disposal and Public Cleaning Law

*6 Value of D50

*7 ND: Not Detected