CHAPTER 2 ENVIRONMENTAL MANAGEMENT PLAN

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2. 1 Approach

2.1.1 Development of Environmental Management Plan

The work to develop the Environmental Management Plan for the project involved several interrelated activities, as follows:

1) The Mitigation Measures and Conditions contained in the Environmental Permit were reviewed. This showed that 10 of the 18 Permit Conditions involve action that will be carried out when particular Mitigation Measures are implemented, so no separate action is required;

2) The main aspects of each of the remaining measures were then summarized in a table. This showed the reasons given in the EIA report and/or the Environmental Permit for recommending each measure, and what each would involve. It also proposed action in the design, construction and operational stages that would ensure that the measures were implemented;

3) It was then discussed with CEPA to agree on the feasibility of including each measure in the design, and the justification for applying the degree of environmental protection provided. 9 of the 14 Mitigation Measures and 7 of the 8 additional Permit conditions were considered feasible and appropriate, and action was agreed on how each would be implemented;

4) Alternative approaches were discussed for the remaining 6 (5 mitigation + 1 permit) measures, based on the view that a lower degree of environmental protection was justified;

5) Meetings were then held with the Technical Committee and with MARN, to explain how the mitigation would be carried out, and to discuss alternative approaches for the 6 measures. Formal approval of the proposed changes was subsequently confirmed by MARN;

6) The approach to each measure was then discussed in more detail within the JICA Study Team, and agreement was reached on what the engineering would involve in each case, and how the mitigation would be included in the project designs;

7) Lists of "Environmental Design Parameters" were then prepared and provided to the relevant members of the JICA Study Team, these being the elements they must include in their designs to provide the specified mitigation. This is the mechanism that ensured that the mitigation was achieved.

Tables 2.1.1 and 2.1.2 shows the Mitigation Measures and Permit Conditions as originally described in the Environmental Permit and the EIA Report, and Table 2.1.3 shows the changes suggested following the initial review, and subsequently approved by MARN.

The laws and regulations of El Salvador mainly applied for the study are listed below:

1) Environmental Law Decree No. 233, May 1998, MARN

   (Ley del Medio Ambiente)

2) General Regulations of the Environmental Law, March 2000, MARN

   (Reglamento General de la Ley del Medio Ambiente)

3) Special Regulation for Sewage (discharge) Waters, May 2000, MARN

   (Reglamento Especial de Aguas Residuales)

4) Special Regulation for Dangerous Materials Substances and Residues, May 2000, MARN

   (Reglamento Especial en Materia de Sustancias, Residuos y Desechos Peligrosos)

5) Integral Management of Solid Waste, May 2000, MARN

   (Reglamento Especial sobre el Manejo Integral de los Desechos Sólidos)

6) Technical Norms for Environmental Quality, May 2000, MARN

   (Reglamento Especial de Normas Técnicas de Calidad Ambiental)

2.1.2 Impact of Changes in the Project

There were also changes in the approach to aspects of the engineering during the design stage (reclamation, dredging and disposal), as a result of additional data collected. These were:

1) The borrow area was reduced from 28 to 20 ha because it was uneconomic to extract material from the south-east of the site where there was a high proportion of rock near the surface;

2) Some of the dredged material from the inner channel was found to be suitable for reclamation, so it was proposed to use material for this purpose to reduce the amount to be dumped offshore;

3) It was also proposed to use material from the inner channel to reclaim an additional 62.8 ha of land on either side of the port, to provide land for future expansion and further reduce offshore dumping.

4) The environmental impacts of these changes were assessed, using data on existing conditions collected by the environmental surveys, assisted by numerical modeling of the production of plumes of suspended sediment by the dredging, reclamation and dumping operations. The environmental assessment is described in the Main Report.

5) Less extensive plumes in the inner channel from the use of dredged material for reclamation, within which there would be lower increases in suspended sediment than if the dredger was extracting material for offshore dumping;

6) A significant gain in terrestrial habitat at the borrow site (16 ha);

7) A significant loss of intertidal/subtidal habitat at the reclamation area.

Mitigation was proposed to address these impacts, and again this was discussed with MARN and the Technical Committee before MARN approval was granted.

In relation with the dumping operation to the onshore dumping zones adjacent to the port reclamation area, an additional Mitigation Measure No. 16 "Disposal of Dredged Material to Onshore Dumping Areas" was established.

The following account covers each Mitigation Measure and Environmental Permit Condition in turn, dealing first with those that relate to the construction phase, then those relating to the operational phase. It summarizes each measure and explains how it will be engineered, then lists the actions taken to include each measure in the project design. Where any action is still required this is also shown, together with the responsibility for each action.

All measures represent the final situation, that is after the approved amendments. The rationale for the changes is explained in the text, to record how the Plan developed, should this be required for reference in the future.

Table 2.1.1 Original Environmental Mitigation Measures (1/3)

MEASURE	OBJECTIVE	RATIONALE	ELEMENTS
1. Re-vegetation and Wildlife Rescue	Plant trees to compensate for losses during the borrow operation. Rescue fauna from the area in which habitat will be lost.	Clearing the borrow site will destroy trees and vegetation, and to compensate, double the area lost should be planted with trees. Planting should be close to the port and on the Conchagua hills. A plan should be developed to rescue the wild fauna from the area and relocate to an area in which they will be able to survive.	Re-vegetate 50 ha with 2,240 trees of species that grow in the area at present; Implement a plan to rescue wild fauna from the area; Monitor establishment of vegetation and fauna.
2. Conservation of Rocky Areas and Biota	Conserve rocky habitat that is relatively rare in the area.	Move rocks in front of Cutuco port and the pillars supporting the existing dock, which are encrusted with marine animals, to an area nearby where the habitat and fauna will survive.	Move rocks and pillars to another area that will not be affected by future port activities.
3. Environmental Management during the Borrow Operation	Control dust and vehicle emissions, and prevent turbid water entering the bay.	Clearing the borrow area could generate dust so the area should be watered, and drainage and runoff should be collected. A protective fence should be built around the site, and vehicles and construction equipment must be properly maintained.	Water soil 3 times a day in the dry season; Construct 2,400 m canal with sediment boxes, 2 headers for discharge, and turbidity screens; Develop program of equipment maintenance; Construct 1,600 m perimeter fence.
4. Management of Waste from Borrow Operation	Dispose of waste from the borrow operation with minimal impacts.	To minimize environmental impacts, vegetation, topsoil and any other waste material from the borrow area should be taken to a disposal site without transporting through La Unión City.	Recondition the disposal site by compacting an estimated 500,000 m^3 of material; Re-vegetate the site with 1600 trees.
5. Management of Dismantling and Disposal of Existing Infrastructure	Avoid accidents and prevent soil, air and water pollution.	Appropriate precautions must be taken when dismantling existing structures at the port, including the jetty, warehouses, tanks and pipelines. Special measures will be needed for asbestos, which is present in the ceiling panels of Warehouse No. 5.	Manage asbestos waste, demolish rest of site; Check and clean existing pipes; Put signs on pipes from the CORSAIN site which are to be retained intact.
6. Solid Waste Management	Maintain cleanliness of operating port and avoid soil and water pollution.	Garbage and domestic-type waste will be produced by the operations of the port and by visiting ships, and this will need to be collected and burnt in an incinerator.	Provide an incinerator to process solid waste from the port and ships; Provide refuse containers and a garbage truck.

Table 2.1.1 Original Environmental Mitigation Measures (2/3)

MEASURE	OBJECTIVE	RATIONALE	ELEMENTS
7. Liquid Waste Management	Prevent accidents that could release hazardous liquids, polluting land and sea.	The terminal in which liquids will be handled in bulk will require infrastructure and equipment to manage the liquids according to international standards and prevent spillage and pollution.	Construct oil slop tank or mud tank; API oil-water separator to treat drainage; Bunds around oil loading and unloading areas; Vapor collecting tank in truck loading area; Concrete boxes under jetty to collect spills at pipe connecting points; Booms, skimmers and absorbent to isolate, collect and dispose of oil spilled into water; All drainage to feed into oil-water separator; Oil and grease collector tank of 150 m^3 capacity.
8. Environmental Protection during Dredging	Limit the production and spread of turbidity produced by the dredging and disposal works.	Dredging will produce around 6.5 million m^3 of material, which must be collected and disposed of using procedures that minimize impacts on the marine ecosystem.	Environmental study of disposal area; Anti-turbidity curtains in dredging and disposal areas to prevent spread of sediment; Make workers aware of impacts of dredging; Place warning signs in disposal area; Surround disposal area with silt curtains; Booms and skimmers to deal with oil spills.
9. Sanitary Infrastructure for Construction Workers	Avoid water pollution from the inadequate disposal of sewage waste.	Adequate sanitary facilities should be provided for workers on the construction site to prevent sewage entering the surrounding channel water.	Provide portable latrines for 400 workers; Treat estimated 36,000 liter per day of sewage via treatment plant, septic tank or irrigation field.
10. Service Infrastructure for Port Workers	Provide recreational areas for workers to comply with occupational safety and hygiene regulations.	This measure proposed by the EIA report was omitted when the Environmental Permit was issued.	
11. Occupational Health and Safety	Prevent accidents harming port workers.	Occupational Health and Safety measures are needed to avoid accidents and protect workers at all times.	Equip personnel with gloves, masks, ear protection, safety shoes and showers.

Table 2.1.1 Original Environmental Mitigation Measures (3/3)

MEASURE	OBJECTIVE	RATIONALE	ELEMENTS
12. Project Promotion	Reduce socio-economic impacts and disordered growth from increased demand on public service.	The population of La Unión could triple because of workers from ships and container lorries. The impacts of this increase should be studied and a publicity campaign implemented to inform the public and reduce the effects.	Hold eight (8) meetings with the local community to promote the project; Conduct an opinion poll to verify acceptance of the project.
13. Port Environmental Unit	Reduce and prevent impacts of the port on the environment	Form a committee of highly qualified persons to be responsible for environmental matters in the operating port, and for enforcing environmental guidelines and regulations.	Form a committee of qualified environmental experts.
14. Environmental Measures in Port Operations Manual	Raise awareness of environmental protection in the port.	All ports have a Bulletin or Manual containing instructions regarding procedures that must be followed in the port. It must be given to ships and other visitors. Environmental measures should be included to prevent visiting ships polluting the bay.	Add environmental measures to the Port Manual in collaboration with the navy.
15. Management of Bulk Solids	Minimize pollution from the handling of solid bulk material, mainly particles.	Equipment installed at the solid bulk terminal should manage the material according to international standards to reduce the emission of dust.	Handle solids using covered conveyor belts; Provide towers with dust prevention systems at all direction changes in the conveyors; Use silos with dust retention mechanisms, including rotating valves; Use low speed conveyors with collecting trays.

Note : No further action was taken with respect to Mitigation Measure No. 10 as this was omitted from the Environmental Permit.

Table 2.1.2 Original Environmental Permit Conditions (1/2)

CONDITION	RATIONALE	ELEMENTS
1. Environmental Management Plan	Execute the Environmental Management Plan according to the program proposed in the EIA report.	This will be fulfilled when Mitigation Measures are included in the port design as stated in the Environmental Management Plan.
2. Solid Waste Management	Prepare and implement an integrated plan to manage solid waste produced during the construction and operation of the port.	Solid Waste will be managed according to Mitigation Measures Nos. 3, 4 and 6.
3. Borrow site Watering/Vehicle Maintenance	Verify that the watering and vehicle maintenance programs are executed properly during the borrow operation.	Watering and vehicle maintenance will be verified by monitoring associated with Mitigation Measure No. 3.
4. Effluent Analysis by Port Environment Unit	Port Environmental Unit should carry out physical, chemical and microbiological analysis of effluent from the wastewater treatment system, and compare results with national standards.	Port Environmental Unit will monitor effluents, as specified when the Unit is established, so this is included in Mitigation Measure No. 13.
5. Monitor Turbidity during Dredging	Turbidity should be analyzed periodically during the dredging.	Turbidity monitoring will be included in the implementation of Mitigation Measure No. 8.
6. Service infrastructure for port workers	The functioning port should include service infrastructure for workers to comply with Occupational Health and Safety legislation, including green and recreational areas.	Trees will be planted in and around the port as required by Mitigation Measure No. 1.
7. Environmental Measures in Port Manual	Environmental Measures must be incorporated into the Port Operations Manual to avoid pollution from ships visiting the port	This is the same as Mitigation Measure No. 14.
8. Air Quality Monitoring	Dust concentrations must be tested and controlled periodically.	Port Environmental Unit will monitor dust, so this is included in Mitigation Measure No. 13.
9. Operation Liquid Treatment Plants	A technician should be hired to operate the liquid treatment system of the port and monitor the liquid effluent	
10. Maintenance of Treatment Plants	The water treatment systems of the port must be maintained by: - Removing sludge from the treatment plant; - Maintaining incinerator, water plant, oil slop tank, separator; - Controlling exploitation of the water well; - Monitoring the quality of industrial and drinking water.	

Table 2.1.2 Original Environmental Permit Conditions (2/2)

CONDITION	RATIONALE	ELEMENTS
11. Cleaning Drainage Channel	Mud should be removed periodically from the channel collecting drainage water from the borrow site.	Drainage channel will be cleaned as part of Mitigation Measure No. 3.
12. Re-settlement of Settlers	Settlers living in the borrow area should be re-settled to housing with at least minimum conditions.	
13. Completion of La Unión Bypass	The new La Unión bypass should be completed before construction of the new port begins.	
14. Prevent Rodents Entering the Port	The new port should have a mechanism to prevent rodents migrating ashore from visiting ships.	
15. Control Improvised Canteens	In coordination with the competent authorities, CEPA should control the development of improvised canteens outside the site to prevent the generation of solid and liquid waste	
16. Training in Wildlife and Avoiding Snakebites	Venomous snakes are found near the port, so workers should be trained in treatment of snakebites and provided with antiserum. Training should also be provided in wildlife laws and nature conservation (by the Services of Parks and Wildlife Authority). Any apretador crabs (*Menippe frontalis*) found must be given to the local CENDEPESCA office, and MARN should be notified.	
17. Physical and Biological Survey of Disposal Site	Physical and biological characteristics of proposed disposal site should be determined. MARN suggest that this should be south of latitude 13° 0' N, at 43 m depth, on soft sediment, not rocky bottom. Material must not affect the boundary with the Republic of Nicaragua. The study should be submitted to MARN.	The environmental survey of the disposal site will be carried out and submitted to MARN during the implementation of Mitigation Measure No. 8.
18. Comply with Laws	All laws relevant to this type of project must be complied with.	

Note : No separate action was taken with respect to Permit Conditions Nos. 1-8, 11 and 17 as these all involve actions that will be carried out when Mitigation Measures are implemented.

Table 2.1.3 Changes Suggested to Mitigation Measures and Environmental Permit Conditions (subsequently accepted by MARN)

MEASURE/ CONDITION	REQUESTED AMENDMENT	SUGGESTED ALTERNATIVE
MITIGATION MEASURES		
2. Relocation and Conservation of Rocky Areas and Inhabiting Biota currently present in the Area to be Reclaimed	Remove the requirement to relocate all rocks from the reclamation area and the pillars supporting the existing wharf. This is not necessary to preserve the inhabiting animals as these all have planktonic larvae, which will colonize the numerous hard surfaces underwater in the new port, and which will be inhabited by the same species in 2 years.	Not action required.
3. Control of Dust and Pollution from vehicles during Excavating and Grading of the Borrow Area	Change the action that requires enclosure of the two streams on site in a concrete canal, which is used to carry the drainage water into the reclamation lagoon. Enclosure within concrete and ingress of highly turbid water would damage and destroy the flora and fauna of the streams, which should be retained, if possible.	Retain the two streams on site in their natural condition and dig temporary channels across the borrow area to direct drainage water into the reclamation lagoon. Prevent any ingress of drainage water or pollutants into the streams during construction and port operation.
6. Solid Waste Management during Port Operation	Omit the requirement to provide and run an incinerator to burn solid waste from the port. Waste from ships is dealt with by Shipping Agents and is not the responsibility of the port. Waste from the port itself will be produced in only small quantities which do not justify the expense of providing and running an incinerator.	Include in the Port Operations Manual a procedure requiring all operators to implement their own waste management system that includes deposition of waste in bins provided. Arrange for La Unión City to collect waste from the port regularly and dispose of at a municipal landfill.
7. Liquid Waste Management	Omit elements relating to the handling and storage of hydrocarbons, because oil is likely to continue to be handled at Acajutla Port where there is existing infrastructure. It is unlikely that any bulk liquids will be handled at La Unión. Slop out facilities for the washing of fuel tanks will also not be provided, so mitigation associated with the handling of hydrocarbons will not be required.	Omit the requirement to provide the following: Slop tank and oil collecting bunds at oil truck loading and unloading points; Vapor collecting tanks at fuel truck loading areas; Oil and grease collector for lubricants.

8. Environmental Protection during Dredging	Omit the use of silt curtains around the dredger and at the dumpsite to limit the spread of suspended sediment. These measures are normally only used in clear waters where there are very sensitive organisms such as corals. La Unión Bay is naturally high in turbidity so animals are adapted to such conditions, and there are no corals. A lower degree of environmental protection is appropriate.	Set and agree levels of suspended sediment which should not be exceeded in the vicinity of the dredger and at the dumpsite. Monitor turbidity at agreed locations around both operations and suspend work, if levels rise above agreed limits.
PERMIT CONDITIONS		
13. Complete Construction of La Unión Bypass	Amend the condition that prohibits commencement of port construction before La Unión Bypass is completed to keep heavy traffic out of the city. The road project is well behind the port and this could significantly delay port construction	Allow consideration of alternative means and routes of transport of materials to the port site. Encourage MOP to accelerate land acquisition so that the bypass route could be used before the road is completed.

2.2 Environmental Protection during the Construction Period

2.2.1 Re-vegetation and Wildlife Rescue

(1) Description of Measure

Table 2.2.1 Mitigation Measure No. 1: Re-vegetation and Wildlife Rescue

DESCRIPTION OF MEASURE				
1. Plant trees within the port site and in other areas in La Unión Province. 2. Collect wildlife from the borrow area and release in suitable habitats nearby.				
OBJECTIVE: 1 Plant trees to compensate for those lost during the borrow operation, and to provide natural dust filters and a visual screen around the port. 2. Conserve wildlife living in the borrow area by collecting and re-locating to an undisturbed area nearby.				
RATIONALE: 1. Re-vegetation: The borrow operation will clear 20 ha of land in and around the present port site, of which 12 ha supports vegetation. To compensate for the loss, new trees will be planted at the port site and elsewhere in La Unión Province, covering an area double the size of that which will be lost (12 x 2 = 24 ha). Trees will be planted at a density of 625 per hectare, following normal practice in El Salvador. 1 ha of natural vegetation will be retained inside the perimeter fence to screen the port from view, provide a natural barrier to dust, and improve the appearance of the area. A further 0.5 ha has been designated for planting elsewhere on site to provide areas where workers can relax during meal breaks, and to shade buildings. Planting outside the site will be coordinated with La Unión Municipality. Indigenous trees will be planted at all locations, and 6 ha of mangroves will be included, to compensate for 3 ha lost at the borrow site. 2. Wildlife rescue: Wildlife at the borrow site includes certain animals that are rare and protected by law, so a rescue operation will be carried out to collect as many as possible alive, and relocate them to the adjacent undamaged area. This will include mammals, reptiles and amphibians.				
MAIN ELEMENTS				
Re-vegetation	D	C	O	Responsibility
1. Contract Drawings allow vegetation retained at site perimeter (Fig. 2.2.1)	■			Completed
2. 0.5 ha of further planting shown on site layout drawings (Fig. 2.2.1)	■			Completed
3. Identify 22.5 ha for planting outside port	■			CEPA
4. Prepare planting specification, appoint contractor	■			CEPA
5. Plant trees, maintain planted areas		■		Contractor
Wildlife Rescue				
1. Prepare specification for animal rescue	■			CEPA/MARN
2. Appoint contractor, carry out rescue and release	■			CEPA
MONITORING				
1. Monitor onsite and offsite planting as specified		■		ECW/CEPA
2. Tree survival, watering, clearing of competing vegetation		■		ECW*/CEPA
3. Supervise wildlife capture and release	■			CEPA/MARN

Note: * ECW: Environmental Clerk of Works

(2) Approach

1) Change in the Mitigation Measure

The description of this measure in the Environmental Permit required the re-vegetation of 56 ha, but this was based on an estimated loss of 28 ha of natural habitat at the borrow site. Ground investigations during the Basic Design Phase showed that material could not be extracted economically from 8 ha in the south-east of the site, so the borrow area was reduced to 20 ha. It was also found that 40 % of this area supports no natural vegetation because of the presence of the CEPA buildings and yards, so in fact only 12 ha of natural habitat will be lost (Figure 2.2.2). The surveys showed that the flora of the area includes nationally rare trees, shrubs and herbaceous plants, and the fauna includes endangered mammals, reptiles and birds. The environmental assessment therefore considered the 16 ha gain in habitat to be a significantly positive impact. This mitigation measure was amended in line with the reduction in vegetation to be lost, so that CEPA is required to re-vegetate 24 ha only (double the 12 ha), at a density of 625 trees per hectare, the rate commonly applied in El Salvador.

2) Re-vegetation

Contract Documents require the Contractor to retain a 5 m strip of natural vegetation intact inside the perimeter fence (Figure 2.2.1), which will provide approximately 1 ha of trees. The port site also allocate a further 0.5 ha for on-site planting, and the documents specify the use of trees with a wide canopy to provide shade, including Tigüilote, Almendro de playa, Cenicero, Caoba, Cortes blanco and Flor amarilla. Additional trees may be planted around certain roads and adjacent to the administration buildings, and palms and ornamental species will be planted around the main entrance and along the driveway, to provide a pleasing view for visitors.

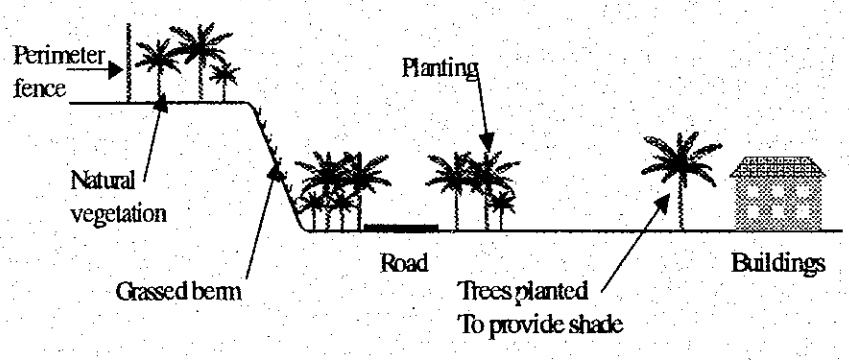
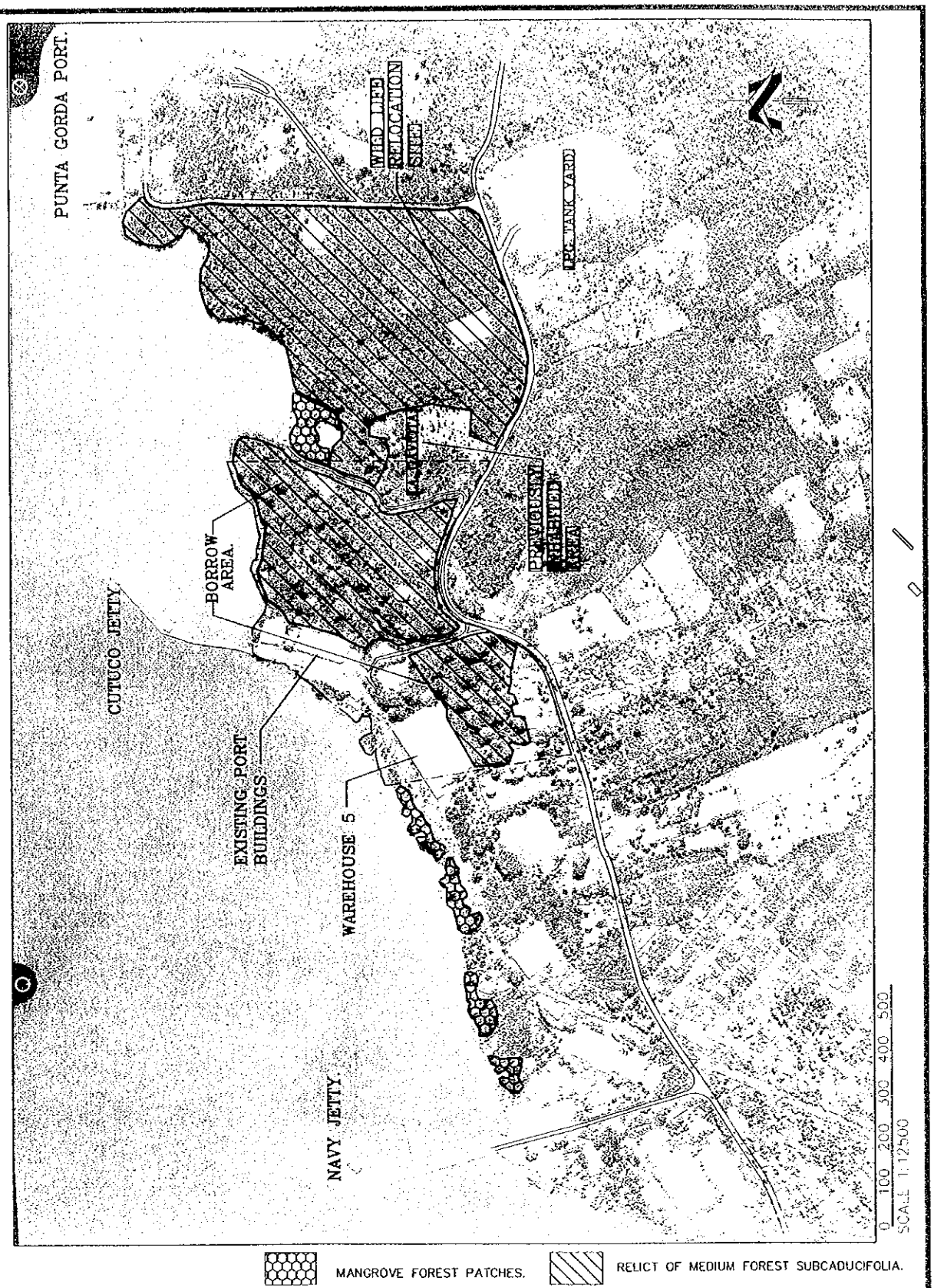


Figure 2.2.1 Likely Cross Section of Perimeter of Completed Port Site



Japan International Cooperation Agency (JICA)	Figure	Title
Detailed Design on Port Reactivation Project in La Union Province of the Republic of El Salvador	2.2.2	AERIAL PHOTOGRAPH OF THE EXISTING PORT SHOWING THE TERRESTRIAL HABITATS

Contract Documents require the Contractor to employ a recognized landscape and vegetation contractor to implement the planting on site during the construction phase, following a Technical Specification prepared by CEPA. The contractor will be required to maintain the planted areas for one year.

CEPA will fulfill the remainder of this Mitigation Measure by planting trees in 24 ha outside the port, including 6 ha of mangrove to compensate for 3 ha lost at the borrow site (Figure 2.2.2). CEPA will liaise with La Unión Municipality to identify suitable areas, including parks, derelict land and intertidal mudflats (for mangroves); a total of 14,000 trees will be planted.

CEPA will request assistance from MARN in developing the Technical Specification for the planting, which will need to specify the species, the number of each to be planted, planting patterns, fertilizer and water applications, and the maintenance program. Table 2.2.2 lists the species recommended for planting in the EIA report, so these should be used as far as is possible.

(3) Wildlife Rescue

Table 2.2.3 shows the category of the animals classified based on the official listing of the Ministry of Agriculture and Cattle of El Salvador (MAG Official Listing 1998), and listed in the Appendices to the Agreement on International Trade in Threatened Species of Wild Fauna and Flora (CITES 1998) both are normally used for classification of the status of endanger by MARN.

MAG official listing was prepared following the IUCN 1996 and 1997 classification, and issued in 1998 in accordance with Wild Life Conservation Law. MAG classification has only two categories 1) Threaten of Extinct (T) and 2) Endanger of Extinct (DE).

A total of 14 species were under the category of "Threaten of Extinct" and 6 species were "Endanger of Extinct". Thus, these species are considered to be nationally rare in accordance with the judgement of MARN. None of these species are listed in the Red Book of IUCN 2000.

The habitat currently occupied by these animals (the trees, vegetation and soil of the borrow area) will be removed before construction, a good proportion of the fauna should survive if they are properly collected, transported and released in a similar habitat nearby.

MARN have agreed to the proposal of releasing captured animals into the adjacent undamaged area (Figure 2.2.2), which has a sufficient carrying capacity to support the relocated individuals. CEPA will consult MARN to obtain their assistance in specifying the species and capture methods. The operation of capture will start by the

identification of the location of nests and borrows ,and carrying capacity of animal s at the proposed releasing ground. It will be carried out avoiding the period of breeding.

Table 2.2.2 Tree Species to be Used in the Re-vegetation Program

LOCAL NAME	SPECIES NAME
Pintadillo	Piptadenia constricta
Aceituno	Simarouba glauca
Laurel	Cordia alliodora
Flor de fuego	Delonix regia
Conacaste	Enterolobium cyclocarpum
Tambor	Omphalea oleifera
Madrecacao	Gliricidia sepium
Caoba	Switennia humilis
Mango	Mangifera indica
Cola de pava	Trichilia martiana
Mangollano de carbón	Pithecellobium oblongum
Amate	Ficus glabrata
Caulote	Guazuma ulmifolia
Tecomasuche	Cochlospermum vitifolium
Quebracho	Lysiloma divaricatum
Casco de venado	Bauhinia ungulata
Iril	Coccoloba floribunda
Morro	Crescentia alata
Jocote	Spondias purpurea
Maquilishuat	Tabebuia rosea
Maranon	Anacardium occidentale
Carao	Cassia grandis
Nance	Mascagnia ovatifolia
Guarumo	Cecropia peltata
Conacaste blanco	Albizia caribeae
Iscanal	Acacia cornigera
Cincho	Lonchocarpus minimiflorus
Carreto	Pithecellobium saman
Almendro de río	Andira inermis
Cachimbo	Crataeva tapia
Huligüiste	Karwinskia calderon
Almendro	Terminalia cattapa
Salamo	Calcycophyllum candidisimum
Cedro	Cedrela odorata
Ceiba	Ceiba pentrandra
Flor de mayo	Plumeria acutifolia
Flor de la cruz	Plumeria rubra
Palo jiote	Bursera simaruba
Tigüilote	Cordia dentata
Almendro de playa	-
Cenicero	-
Cortes blanco	-
Flor amarilla	-
Mangle rojo	Rhizophora mangle
Madresal	Avicennia bicolor
Histaten	Avicennia germinans
Sincaguite	Laguncularia racemosa

Table 2.2.3 Rare and Endangered Animals Reported from Borrow Area

SCIENTIFIC LATIN NAME	LOCAL COMMON NAME	ENGLISH COMMON NAME	MAG* 1998	CITES (Appendix)
Reptiles				
Lampropeltis triangulum	False coral	Milk snake	DE	
Micrurus nigrocinctus zunilensis	Coral	Central American Coral Snake	T	III
Crotalus durissus	Cascabel	Rattlesnake	DE	III
Kinosternum scorpioides	Tortuga candado	Scorpion mud turtle	T	
Iguana iguana	Iguana verde	Green iguana	DE	II
Boa constrictor	Masacuata	Boa constrictor	T	II
Oxybelis aeneus	Bejuquilla cafe	Mexican vine snake	T	
Birds				
Pelecanus erythrorhynchus	Pelicano blanco	American white pelican	T	
Falco sparverius	Lilisque	Sparrow kestrel	T	II
Caracara plancus	Querque	Southern caracara	T	II
Ortalis leucogastra	Chachalaca	White bellied chachalaca	T	
Aratinga strenua	Pericón	Pacific Parakeet	T	II
Aratinga canicularis	Chocoyo	Orange fronted parakeet	T	II
Amazon auropaliata	Lora de nuca amarilla	Yellow headed parrot	DE	II
Contopus cinereus	Copetón	Tropical pewee	T	
Dendroica petechia erythacorides	Reinita del Manglar	Yellow warbler	T	
Mammals				
Dasypus novemcinctus fanestratus	Cuzuco	Nine banded armadillo	T	
Canis latrans dickeyi	Coyote	Coyote	T	
Agouti paca	Tepezcuintle	Paca Agouti	DE	III
Herpailurus yagouaroundi fossata	Gato zonto	Otter cat	DE	

Note (*): (T = Threatened, DE = in Danger of Extinction) classified according to the guidelines established by the IUCN, 1996 and IUCN, 1997)

(4) Action Taken – Design Stage

1) Re-vegetation: Inside Port

Contract Documents (Drawings) require:

- 0.5 ha of planting of wide canopied indigenous trees at locations shown on the port plans;
- Retention of 5 m wide strip of natural vegetation around the landward perimeter of the port site, inside the perimeter fence;

- The Port Contractor to engage a recognized landscape and vegetation contractor to implement the planting on site, and to maintain the areas for one year.

(4) Action Required – Design Stage

1) Re-vegetation: Outside Port

CEPA will:

- Prepare a Technical Specification prescribing the approach to be adopted by the vegetation contractor. This will include the following requirements (subject to MARN approval):
  - Utilize only indigenous species, as listed in Table 2.2.2;
  - Plant at a density of 400 trees per hectare, using proven planting patterns;
  - Utilize species with a broad, dense canopy in any areas near the port to provide a high degree of shade, including Tigüilote, Almendro de playa, Cenicero, Caoba, Cortes blanco, and Flor amarilla;
  - Water all planted trees during the dry season (1 November to 30 April);
  - Clear the areas between trees and keep clean to prevent competition from weeds whilst the trees are becoming established;
  - Continue maintenance of the planted areas for one year, replacing all dead or poorly growing trees with new specimens of the same type.
- Liaise with La Unión Municipality to identify areas suitable for planting trees outside the port, including parks, derelict land, and intertidal mudflats and to obtain permission to plant trees and maintain the areas for three years. These areas will total at least 22.5 ha, including 6 ha of intertidal mudflat (for mangroves);
- Seek assistance from MARN in developing the Technical Specification for the planting;
- Appoint recognized vegetation contractor and monitor performance to ensure that the planting is implemented as required, and that healthy trees become established.

2) Wildlife rescue

CEPA will:

- Consult MARN to identify species to be captured and methods to be used;
- Prepare a Technical Specification for the capture and release operation. This will

specify precise methods to be used, and will include the requirement to:

- Carry out the operation three times in the two months before construction commences at the borrow site;
- Ensure that all persons handling captured animals are approved by MARN as sufficiently qualified and experienced.

• Coordinate the capture and relocation with MARN, who will be asked to supervise the operation.

(5) Action Required – Operational Phase

1) Re-vegetation: Inside Port

After the one-year maintenance period of the construction contract, CEPA will:

• Continue maintenance of planted areas within the port over the long term.

2.2.2 Conservation of Rocky Areas and Biota

(1) Description of Measure

Table 2.2.4 Mitigation Measure No. 2: Conservation of Rocky Areas and Biota

DESCRIPTION OF MEASURE				
Remove 1,000 rocks and inhabiting epifauna from the foreshore in the reclamation area and relocate onto revetments surrounding the new port.				
OBJECTIVE: Conservation of the rocky habitat and the organisms that live on it				
RATIONALE: There are few areas of hard substrate in La Unión Bay, and the project will destroy some of these by burying rocks that are present along the shoreline, which are heavily encrusted with barnacles, oysters and other epifauna. This will not cause a long-term loss of habitat or fauna because the many underwater hard surfaces of the new port (steel, concrete and rock revetments) will be colonized by planktonic larvae of the species currently present, so that adults will cover these surfaces within 2-3 years.				
MAIN ELEMENTS				
	D	C	O	Responsibility
1. Contract Docs require relocation of 1,000 rocks by hand				Completed
2. Relocate rocks and inhabiting animals				Contractor
MONITORING				
1. Rocks relocated as specified				ECW
2. Colonization of port by epifauna, ambient water quality				CEPA (PEU)

(2) Approach

1) Change in the Mitigation Measure

The Environmental Permit originally required the removal of all rocks and inhabiting organisms from the foreshore in front of Cutuco Port, plus the concrete pillars supporting the existing dock (which are heavily encrusted with barnacles, oysters and other organisms). These were to be relocated to a nearby site to preserve the epifauna. However this was shown to be unnecessary

because all of these organisms produce larvae that drift in the plankton before settling on suitable hard surfaces and developing into adults. This means that even if the adults are destroyed locally, there will still be very large numbers of larvae in the plankton, produced by animals living in other parts of Fonseca Gulf and elsewhere along the coast. These will settle on the many new hard surfaces underwater in the new port, which will thus become covered by adults within 2-3 years. It is likely that these will be present in much larger populations than at the current site, because of the larger amount of hard material available when the port is built. Thus, no action is required for relocation of rocks.

2.2.3 Environmental Management During the Borrow Operation

(1) Description of Measure

Table 2.2.5 Mitigation Measure No. 3: Environmental Management During the Borrow Operation

DESCRIPTION OF MEASURE				
1. Water exposed soil at the borrow area during the dry season and retain drainage in a lagoon to reduce suspended solids. 2. Reduce vehicular emissions by adequate maintenance of construction site vehicles and machinery.				
OBJECTIVE: Avoid air pollution from dust and vehicular emissions, and water pollution from runoff high in suspended solids.				
RATIONALE: 1. Reduce dust and water pollution The borrow operation will remove vegetation and infrastructure from 20 ha, after which soil and rocks will be dug and dumped into the reclamation area. This could produce dust in dry weather, which could affect plants, animals and people in the vicinity, including site workers. The borrow area will therefore be watered three times a day throughout the dry season. Drainage will be directed into the reclamation area via channels dug in the soil, and solids will be allowed to settle in lagoons before the water discharges to the sea. 2. Vehicle maintenance The use of old and poorly maintained vehicles and machinery would add to the air pollution, so all such equipment will be kept in a good state of repair and maintained regularly.				
MAIN ELEMENTS				
	D	C	O	Responsability
1. Contract Docs require watering, drainage				Completed
2. Contract Docs require vehicle maintenance				Completed
3. Construct fence around port site				Completed
4. Implement watering program				Contractor
5. Implement vehicle and equipment maintenance				Contractor
MONITORING				
1. Correct watering and vehicle maintenance				ECW
2. Turbidity in water outside reclamation area				Contractor

(2) Approach

1) The Borrow Operation

The borrow operation will commence with the cutting of all trees and vegetation, using chain saws and other hand-held equipment. Roots will then be removed using mechanical diggers, and all of the vegetation will be collected into piles at one side of the area using bulldozers. The vegetation will be disposed of at a landfill operated by La Unión Municipality, described in Section 2.2.4 below.

In ahead of site clearance work of borrow area the rock bunds enclosing the reclamation area will be constructed, using rock from a rock quarry outside of the port area, and brought to site by road or by sea. Any suitable rocks from the borrow area will also be used. Two side bunds will be built from the beach out into the channel, and they will be joined by a third bund or silt curtain parallel to the shoreline, enclosing the area to be reclaimed (Figure 2.2.3). The materials forming the core of the bunds will be placed by crane or tipped from lorries, and those on the outer surface will be placed individually by grab crane. A geotextile membrane will then be laid against the inner surface of the bunds to retain fine material.

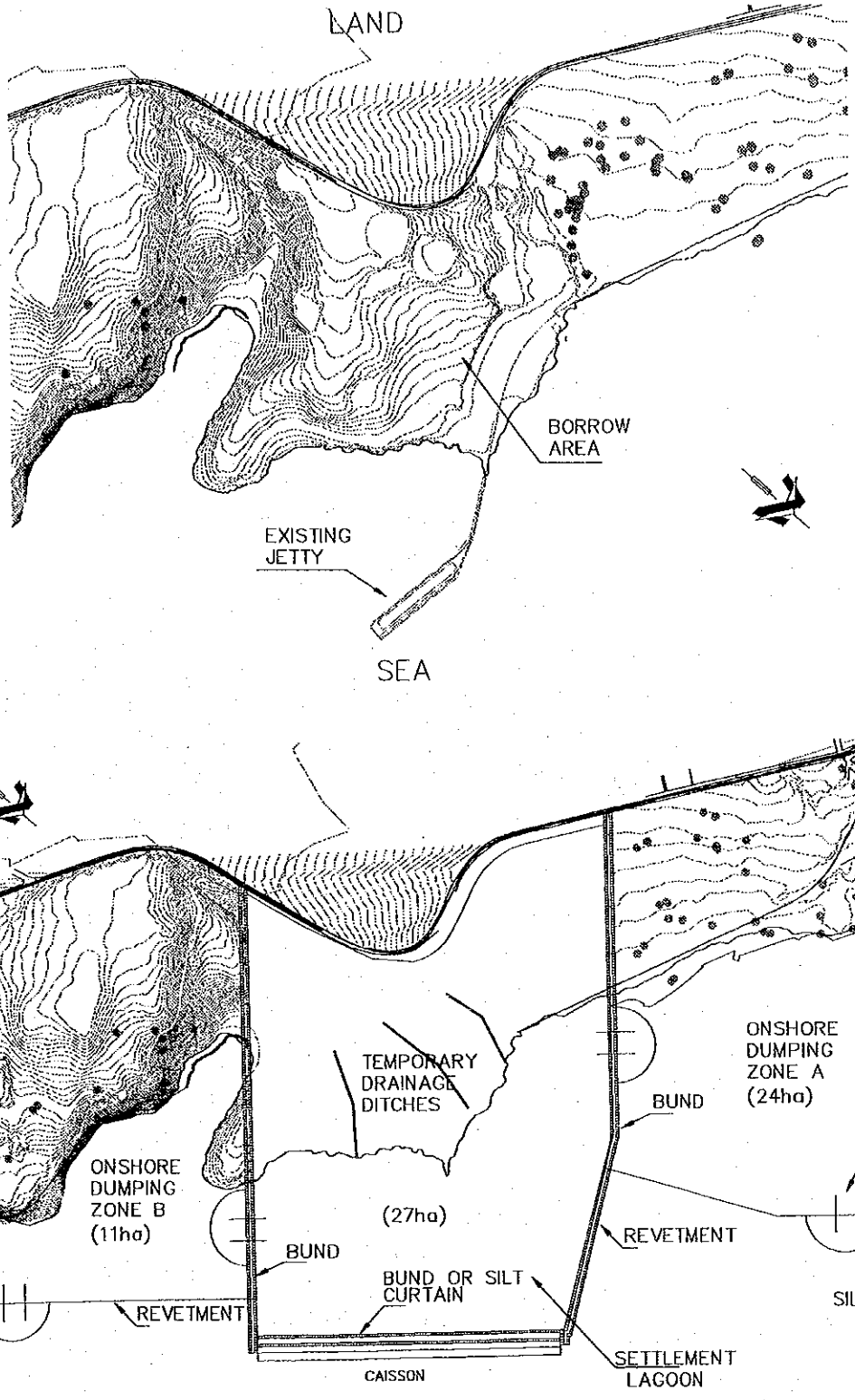
Once the reclamation area is enclosed, soil and other loose material from the borrow site will be bulldozed towards the seashore and pushed into the bunded area or tipped from lorries. Diggers and bulldozers will then work progressively across the borrow site, cutting gradually into the higher ground on the landward side and reducing the level of the area in the process.

Because of the reduction in size of the borrow area it is likely that additional material will need to be imported to complete the reclamation. As explained in Sections 2.2.6 and 2.2.9 below, some of this will be dredged from the seabed near the port. It is likely however that some soil and rock may need to be brought by road from on-land sources identified by the Contractor, of which there are several within a few kilometers of the site.

The material in the reclamation site will be compacted by the action of the bulldozers and lorries, and further compaction will be carried out by heavy rollers once the level rises close to the final ground height. At this stage material will be placed in layers, each of which will be compacted before the next level is applied. A pavement structure will be placed as the finished surface on the outer half of the reclamation area, covering the stockpile and container areas. The surface of the inland half will be covered with a single layer and left for development in the future as the port expands.

2) Reduction of Dust

As required by this Mitigation Measure, the Contract Documents state that all bare soil at the borrow site is to be watered during the dry season (1 November – 30 April) to prevent dust. This will probably be done using water tankers and/or piped water in the areas of flat terrain, with areas of undulating topography being watered by hand using hoses.



Japan International Cooperation Agency (JICA)	Figure	Title
Detailed Design on Port Reactivation Project in La Union Province of the Republic of El Salvador	2.2.3	Likely Layout of Reclamation Area

3) Change in the Mitigation Measure

The Mitigation Measure also required construction of 2,400 m of concrete-lined canal, plus settlement boxes and other structures to collect drainage from the watered area and reduce suspended solids before the water is returned to the channel. However following discussion with MARN this was amended as follows:

- The concrete canal was omitted, as temporary drains dug into the soil would be as effective in directing runoff into the reclamation area, and would allow greater flexibility as temporary channels can easily be re-dug as the topography of the borrow site changes;
- The settlement boxes and turbidity screens were also omitted as the reclamation area can be used as a lagoon within which solids can settle before water is released back into the channel;
- As a control mechanism it was proposed to monitor turbidity in the channel 500 m from the discharge point and to set the level above which suspended solids must not rise (see Section 2.2.9 below). If this trigger level was reached the Contractor would be required to take further measures to reduce turbidity, which could include the use of silt curtains as shown in Figure 2.2.3.

4) Reduction of Water Pollution

The construction of temporary drains in the soil of the borrow area to direct runoff into the reclamation area has been included in the Contract Documents. The design of the reclamation area includes construction of internal bunds to allow greater retention of water and settlement of solids, and a weir to permit overflow of water to the channel. A Technical Specification has been prepared describing turbidity monitoring (see Sections 2.2.6 and 2.2.9 below), which includes a station 500 m from the weir at the reclamation site.

Although the EIA report mentioned the presence of two streams on site, these were investigated in the design stage and found to be temporary creeks, carrying water from the hills inland of the port in the rainy season only. They therefore have little ecological value and will be removed during the borrow operation. Water from these areas will be collected by the temporary drains during the land clearance, and by the drainage system of the port once it has been constructed.

5) Vehicle Maintenance

The Mitigation Measure also requires development of a program for the maintenance of machinery and equipment, to prevent air pollution from exhaust gases. The Contract Documents state therefore that all vehicles and equipment must be maintained according to manufacturers' specifications.

6) Construction of a Perimeter Fence

The Mitigation Measure also requires construction of a perimeter fence around the landward boundary of the site to prevent entry by people, vehicles or animals, and this is being undertaken by CEPA.

(3) Action Taken – Design Stage

A Technical Specification has been prepared for the borrow and reclamation operation, which requires the Contractor to:

- Ensure that the bunds are fully constructed before any material is deposited in the reclamation area;
- Water all exposed soil in the borrow area as necessary to reduce dust in the dry season (1 November – 30 April) during the earthworks;
- Construct temporary drains across the borrow area to effectively direct water applied to the surface and falling as rain, into the reclamation area;
- Construct new drains in each new working area as the operation progresses;
- Ensure that the contour of the borrow area effectively directs runoff into the drains throughout the operation;
- Utilize the reclamation area (between the edge of the in-filled area and the rock bunds, (Figure 2.2.3) as a settlement lagoon throughout the operation to reduce the suspended solids entering the sea outside the reclamation area;
- Construct additional bunds inside the reclamation area to form at least three settlement lagoons through which drainage water must pass before reaching the outside;
- Prevent any drainage water from the borrow area entering the sea directly without entering the settlement lagoon;
- Ensure that all vehicles and machinery are maintained throughout the construction operation and promptly repaired if necessary, following the manufacturers' guidelines.

2.2.4 Management of Waste from the Borrow Operation

(1) Description of Measure

Table 2.2.6 Mitigation Measure No. 4: Management of Waste from the Borrow Operation

DESCRIPTION OF MEASURE				
Dispose of excess material from the borrow operation at an appropriate location, and compact and re-vegetate the site afterwards.				
OBJECTIVE: Minimize the impact of disposing of waste material				
RATIONALE: The borrow operation will generate excess vegetation and topsoil which is biodegradable and thus unsuitable for use for reclamation. Topsoil will be provided for other projects if uses can be identified, and remaining material will be buried at a municipal landfill.				
MAIN ELEMENTS				
	D	C	O	Responsibility
1. Contract Docs specify reuse of topsoil if possible	■			Completed
2. Contract Docs specify landfilling of waste	■			Completed
3. Transport and dispose of waste as appropriate		■		Contractor
4. Compact, seal and re-vegetate landfill		■		Contractor
MONITORING				
1. Transport and disposal of waste as specified		■		ECW
2. Tree survival, maintenance in re-vegetated area		■		CEPA

(2) Approach

The borrow operation will begin with the clearance of vegetation as described in Section 2.2.3 above, and the Contract Documents require that all such material is transported in lorries to a landfill approved by La Unión Municipality, either an existing or a new site.

Topsoil is also unsuitable for use in reclamation because it contains biodegradable organic matter, so the approximately 100,000 m^3 produced at the borrow area must be taken offsite. Topsoil is the natural medium for plant growth, so as much of it as possible should be used elsewhere. The Contract Documents require the Contractor to consult La Unión Municipality to determine whether there are other projects in the area which have a requirement for topsoil (eg for agriculture, parks or landscaping), and if so, to transport the required quantities to the appropriate locations.

Any remaining topsoil will be landfilled, probably at the same site as the vegetation.

(3) Action Taken – Design Stage

The Technical Specification prescribing the borrow and reclamation operation requires the Contractor to:

- Transport all waste vegetation at the beginning of the borrow operation to an approved landfill site identified by CEPA;

- Consult La Unión Municipality to determine whether there are any projects in the area requiring topsoil, and if so, transport the required quantities to the appropriate sites;
- Dispose of any remaining topsoil and any other waste material from the borrow site at the landfill used for vegetation;
- Transport all material to the landfill;
- Treat landfill as agreed by Authorities concern.

(4) Action Required – Design Stage

CEPA will:

- Liaise with La Unión City to identify an existing landfill suitable for deposition of the waste vegetation and soil material, or to identify a suitable site for construction of a purpose built landfill.

2.2.5 Management of Dismantling and Disposal of Existing Infrastructure

(1) Description of Measure

Table 2.2.7 Mitigation Measure No.5: Management Dismantling and Disposal of Existing Infrastructure

DESCRIPTION OF MEASURE				
1. Safely remove the existing dock and other buildings and infrastructure, including Warehouse 5, the ceiling of which contains asbestos-cement. 2. Identify the contents of all pipes on site and dispose of any hazardous material safely.				
OBJECTIVE: Prevent harm to human health and pollution of land and sea				
RATIONALE: 1. Infrastructure including asbestos Infrastructure will be demolished using cranes and bulldozers and the material will be disposed of at a landfill approved by La Unión Municipality. The ceiling of Warehouse . No.5 contains asbestos-cement, which is very hazardous to human health, and precautions will be taken to prevent workers inhaling dust during removal and appropriate disposal. 2. Pipes There are a number of pipes on the port site, the locations and contents of which will be determined prior to any groundbreaking. The contents wil be treated or disposed of accordingly.				
MAIN ELEMENTS				
	D	C	O	Responsibility
1. Contract Docs specify asbestos handling method				Completed
2. Contract Docs require removal of pipe contents				Completed
3. Contract Docs: dump rubble in municipal landfill				Completed
4. Remove, dispose of structure containing asbestos				Contractor
5. Remove, dispose of pipe contents in hazwaste site				Contractor
6. Dispose of rubble and other demolition waste				Contractor
MONITORING				
1. Removal and disposal of asbestos as specified				ECW
2. Removal and disposal of pipe contents				ECW
3. Disposal of building rubble waste as specified				ECW

(2) Approach

1) Demolition

The approach to the demolition of infrastructure at an existing site is normally left to the Contractor, as he may wish to use buildings and hard standing during the operation and to thus retain these structures until the end of site clearance. In the case of the present project however, certain things will be specified, such as the method by which the dock pillars will be removed. There will thus be the opportunity to specify the measures required by this mitigation item.

2) Infrastructure Including Asbestos

The bulk of the on-land infrastructure of the existing port consists of buildings and hard standing, which will be removed using standard demolition methods. The rubble will be largely inert concrete material, which will be disposed of at a municipal landfill.

The one area where special measures are required is in the demolition of Warehouse No. 5 (Photo 2.2.3), where asbestos-cement is present in the laminates used to cover the ceiling. Asbestos is an extremely hazardous material known to be a direct cause of lung cancer and respiratory diseases if fibers are inhaled, so strict precautions to protect human health have been included in the Contract Documents, to fulfill the requirements of this Mitigation Measure.

A Technical Specification has been prepared for the operation to dismantle the ceiling of Warehouse No. 5. This requires all ceiling panels to be removed with the minimum of disturbance, avoiding any breakages, cutting and other activities likely to cause dust. CEPA will determine whether there are contractors in El Salvador with experience of handling asbestos, who could be employed to carry out the operation.

3) Pipes

There are likely to be pipes on site that could contain hazardous liquids including oil, which could cause pollution if the pipes were ruptured during ground excavations. The Contract Documents therefore requires the Contractor to identify the location and contents of all existing pipes prior to any ground disturbance.

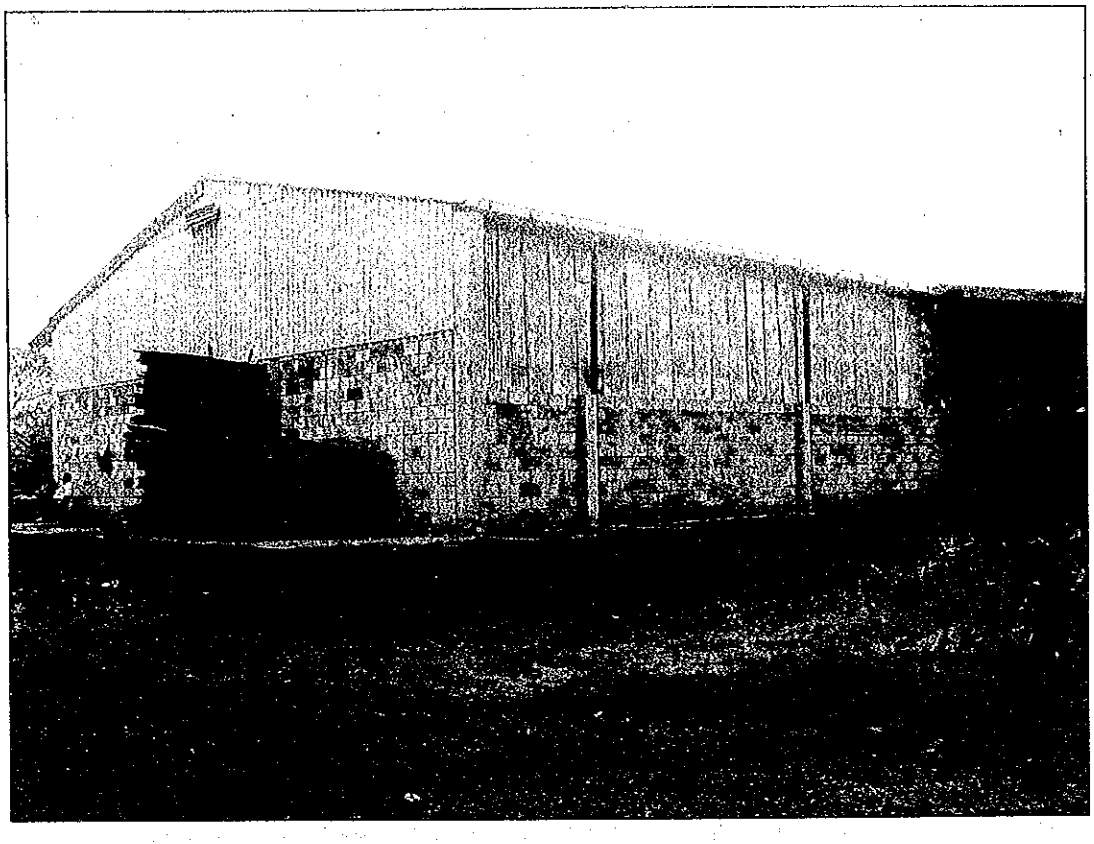


Photo 2.2.3 View of Warehouse No.5

(3) Action Taken - Design Stage

1) Infrastructure Including Asbestos

The Specification for the dismantling and disposal of the infrastructure of the existing port requires the Contractor to:

- Ensure that all persons involved in handling materials from the ceiling of Warehouse No. 5 wear require protection in accordance with relevant law;
- Special Regulation for Dangerous Materials Substances and Residues, May 2002, MARN (Reglamento Especial en Materia de Sustancias, Residuos y desechos peligrosos).
- Ensure that workers remove protective equipment carefully at the end of each shift, avoiding generating or inhaling any dust;
- Provide showers to allow workers to bathe after working with asbestos;
- Provide training to all workers in the health risks associated with handling asbestos, and the precautions which must be taken;
- Remove all ceiling panels without cutting and without incurring any breakages.

2) Pipes

The Specification also requires the Contractor to:

- Determine the location of all pipes prior to any ground disturbance;
- Determine the likely contents of each pipe by consulting CEPA;
- Transfer the contents of all pipes into seal-able drums;
- Transfer all drums into a separate compartment in the landfill without damaging or rupturing any drums, or damaging any contents already in the landfill;

(4) Action Required - Design Stage

1) Pipes

CEPA will:

- Determine whether the locations of pipes at the port site are shown on plans and if available, provide these to the Contractor;
- Also provide information to the Contractor on the likely contents of all pipes.