

10.4 Environmental Management Plan (EMP)

10.4.1 Introduction

For long time, ports have tried to minimize expenditure to manage the environmental issues, because it was seen as only increasing their operation costs while giving little improvement in efficiency. However, it is globally recognized today that execution of environmental management can have a number of benefits to the ports and their related industries.

For example, the implementation of an environmental management will demonstrate a commitment to minimize negative environmental impacts and thus provide a clean and efficient working area in both construction and operation phase of the ports. This is good for public relations and it may help to give the ports a competitive edge in the global shipping market.

In this project, considering the said global trend and following an official requirement concerning an EIA procedure in Indonesia, Port and Dredging Directorate General of Sea Communication (DGSC) prepared a set of EIA documents consisting of 1) Environmental Analysis (ANDAL), 2) Environmental Management Plan (RKL) and 3) Environmental Monitoring Plan (RPL). These documents were evaluated by a committee and then approved by State Minister of Environment on 26 March 2004.

Since there is no major difference in the project component between the EIA documents and JICA D/D Study, the EMP presented in this section was prepared reviewing the above RKL and RPL in consideration of the final output from JICA D/D Study, such as the results of detailed facility design, numerical modelling, construction schedule and supplemental environmental survey.

Style of EMP varies from country to country and port to port, depending on the national environmental policies, aspect of the environmental concerns in ports, etc.

In general, however, the EMP is a routine program to be implemented throughout the project phases, construction and operation phases, in order to minimize negative impacts and maximize positive impacts originated from the project implementation.

The program is made up of following three (3) components.

1) Mitigation

Compensation for land acquisition, introduction of environmentally friendly construction methods, reuse of waste materials, etc.

2) Monitoring

Interview with Project Affected People (PAP), periodical air, water and seabed material quality measurements, etc.

3) Feedback

Review of construction methods and schedule, implementation of additional mitigation measures, public consultation, etc.

This EMP includes following contents.

- Project Description
- Summary of Current Environmental Conditions

- Aspect of Primary Impacts
- Environmental Mitigation Measures
- Environmental Monitoring Plan
- Responsibilities and Authorities for Implementation of Mitigation Measures and Monitoring Plan
- Environmental Awareness Promotion, Education and Training for Construction Workers
- Environmental Monitoring Work Plan
- Cost for Environmental Monitoring
- Mechanisms for Feedback and Adjustment
- Consideration for Preparing Detailed Design and Tender Documents

10.4.2 Project Description

Tanjung Priok Port was built more than hundred years ago, and it has been playing significant role for the national economic activity, especially in and around the metropolitan, DKI Jakarta.

Current handling volume of container cargo in Tanjung Priok Port reaches to 55% of total volume in the country. This situation makes port operations busy but inefficient, since basic layout and structure of some port facilities still have been kept original.

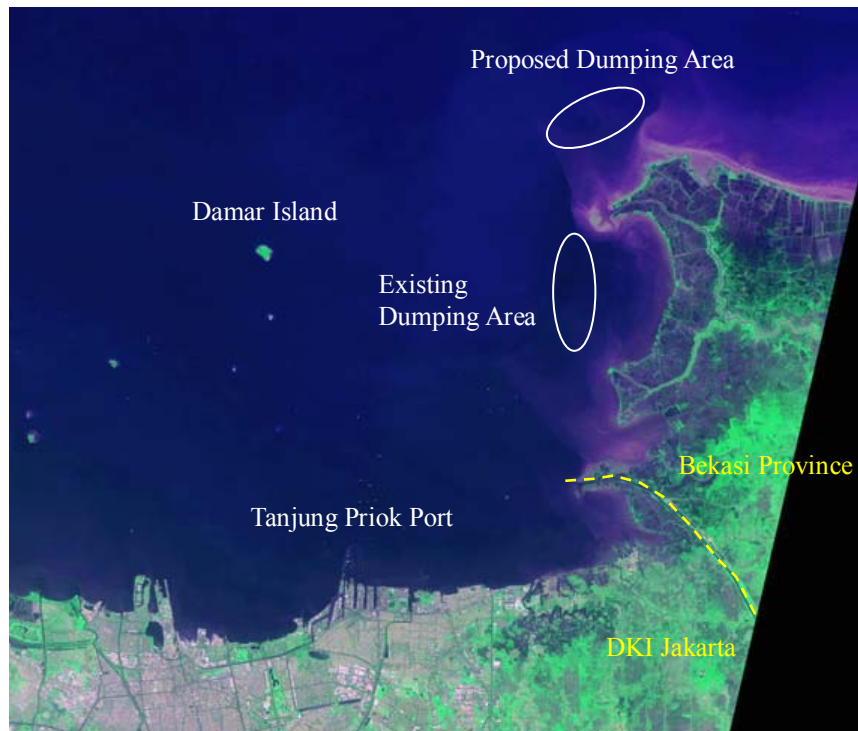
As a result, heavy land and water traffic congestion in and around the port area became an obstacle to the smooth and efficient port operation, and a cause of the environmental degradation, such as air and water pollution.

As a consequence, in order to ameliorate the above critical situations, “The Rehabilitation Project of Tanjung Priok Port” has been formulated.

The project area is located in DKI Jakarta and Bekasi province. Tanjung Priok Port, main site of this project, is located in the northern part of DKI Jakarta, which is the most densely populated area in the country.

Two (2) dumping areas for dredged seabed materials, existing and newly proposed, are located off shore in Bekasi province as shown in Figure 10.4.1 and 2.

Scope of the project covered by this EMP consists of two (2) components are shown in Figure 10.4.3 and 4.



Note: Location and dimension of dumping areas are not precise.

Figure 10.4.1 Satellite Image of Project Area



Note: Location and dimension of dumping areas are not precise.

Figure 10.4.2 Navigation Chart of Project Area

- **Contract Package - 1:** Channel and Basin Improvement including Breakwater Demolition (1,830 m), Breakwater Construction (1,661 m with 411,000 m³ foundation dredging) and Access Channel & Basin Dredging (8,078,000 m³)

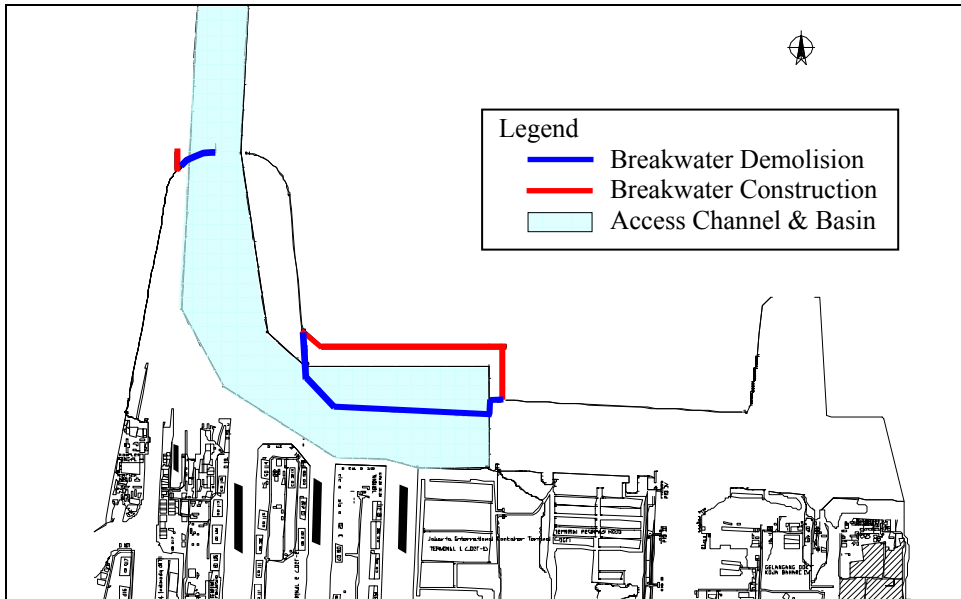


Figure 10.4.3 General plan of Contract Package - 1

- **Contract Package - 2:** Port Inner Road Improvement including Rehabilitation of Inner Road (4,560 m) and Construction of Flyover (650 m)

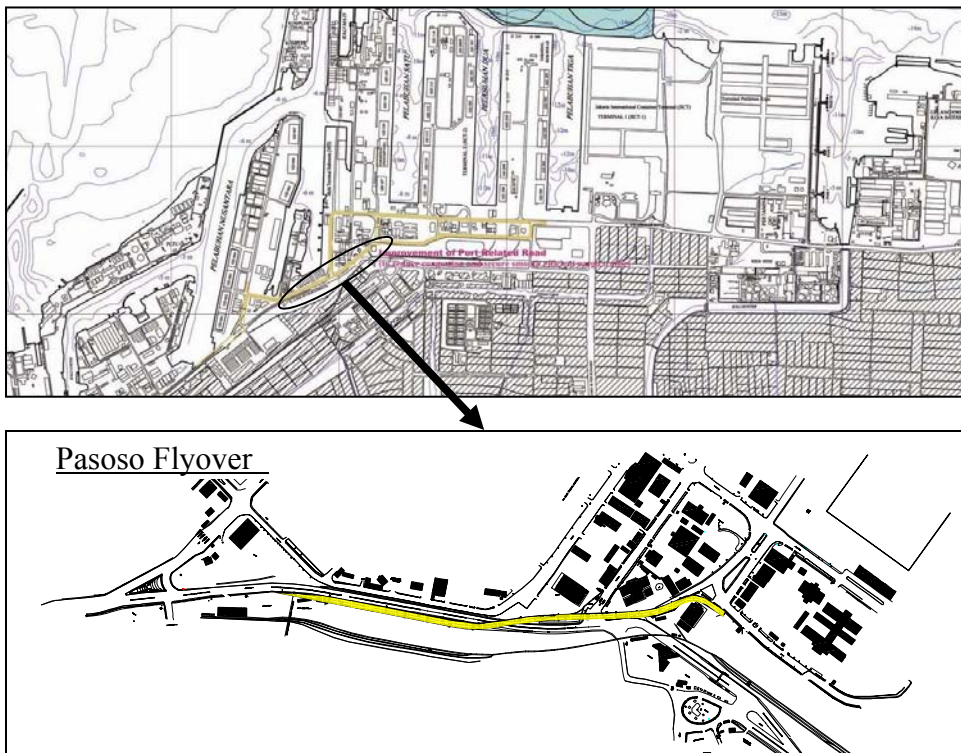


Figure 10.4.4 General plan of Contract Package - 2

10.4.3 Summary of Current Environmental Conditions

Activities in ports affect the environment in several ways through its entire span of life, construction and operation. Behind ports, there are production activities such as factories, improvement of transportation functions, etc. which are closely related to the activities in ports.

Further out in the surrounding areas, the population tends to increase due to expansion of local community, which brings about various pollution problems and impacts on the natural environment. Tanjung Priok Port is located in the core of the said activities.

Based on the information derived from the previous environmental surveys, including the EIA, Monitoring Survey done by IPC-II, JICA F/S Study and JICA D/D Study, current environmental conditions in and around the project area were summarized in **Table 10.4.1** and can be briefly described as follows.

In-depth data and descriptions are available in Section 10.2 and 3 of JICA D/D Study Report.

(1) Physical Environment

1) Land Area

Chronic traffic congestion and high level of dust (TSP) concentration and noise are primary environmental degradation in and around the port area.

The levels of dust and noise likely increase and exceed national standard values depending on the weather (increase in dry and windy conditions) and following the increase of traffic volume respectively. In general, these levels measured outside the port were higher than those inside the port.

Concentration levels of emission gases such as NO₂, SO₂, CO met the national standard values.

According to the results of port related traffic survey, which was carried out inside the port area by JICA D/D Study Team, the highest traffic volume was recorded on Friday while the lowest was recorded on Sunday.

2) Water Area

High concentration of nutrient salts (T-P, T-N) and organic substances (COD), and low Oxygen (DO), especially inside the port area, are primary cause of the aggravation of water quality. The above nutrient salts and organic substances have mainly been discharging into the port area from several residential areas and factories through the rivers, Ancol and Sunter.

Suspended Solid (SS) concentration met the national standard value for port area (80 mg/l) except for a point at the Sunter River mouse. Based on the survey results in JICA D/D Study, the present values of SS concentration in surface layer can be averaged at 11 mg/l and 22 mg/l in the dumping area and outside port area respectively.

Table 10.4.1 Present Condition (Min. - Max.) and Applicable Standards

Item	Parameter	Unit	Present Condition										Applicable Standards
			EIA			IPC-II Monitoring			JICA D/D Study				
			Land Area	Outside Port	Inside Port	Land Area	Outside Port	Inside Port	Land Area	Dumping Area	Outside Port	Inside Port	
Air Quality	TSP	σg/m ³	15 - 1,532 ^{24hr}	-	-	93 - 1,803 ^{24hr}	-	-	45 - 96 ^{1hr}	-	-	-	230 ^{24hr} (I) ¹
	NO ₂	σg/m ³	8.7 - 128.7 ^{24hr}	-	-	8.5 - 30.5 ^{24hr}	-	-	<50 ^{1hr}	-	-	-	150 ^{24hr} (I) ¹
	SO ₂	σg/m ³	4.4 - 58.1 ^{24hr}	-	-	6.3 - 22.4 ^{24hr}	-	-	<5 ^{1hr}	-	-	-	365 ^{24hr} (I) ¹
	CO	σg/m ³	100 - 5,600 ^{24hr}	-	-	914 - 3,200 ^{24hr}	-	-	<5,000 ^{1hr}	-	-	-	10,000 ^{24hr} (I) ¹
Noise Level	-	dBa	44.5 - 85.4	-	-	-	-	-	65.3 - 97.0	-	-	-	70 (I) ²
Vibration Level	-	mm/sec	0.3 - 8.1	-	-	-	-	-	0.1 - 0.8	-	-	-	20 (I) ²
Water Quality (Surface Layer)	pH	-	-	7.84 - 8.19	8.84 - 8.15	-	8.16	7.46 - 8.27	-	7.33 - 8.23	7.25 - 8.28	7.22 - 8.20	6.5 - 8.5 (I) ³
	SS	mg/l	-	1 - 20	3 - 7	-	11	2 - 81	-	4 - 16	8 - 52	8 - 89	80 (I) ³
	DO	mg/l	-	4.9 - 6.5	2.0 - 5.5	-	6.2	0 - 6.6	-	4.8 - 6.8	0.64 - 6.80	0.00 - 5.20	5 (I) ³
	BOD	mg/l	-	-	-	-	5.4	5.6 - 34.2	-	1.10 - 4.80	1.95 - 13.10	2.83 - 20.5	20 (I) ³
	COD	mg/l	-	16.5 - 20.6	16.5 - 57.8	-	23.5	23.5 - 109.8	-	20.38 - 77.43	32.60 - 432.00	13.00 - 142.63	80 (I) ⁴
	T-N	mg/l	-	0.33 - 2.55	0.40 - 6.35	-	-	-	-	0.01 - 4.34	0.17 - 0.95	0.29 - 2.18	1 (J)
	T-P	mg/l	-	0.02 - 0.46	0.04 - 0.1	-	-	-	-	<0.001 - 0.078	0.014 - 1.689	<0.001 - 1.360	0.09 (J)
	Oil & Grease	mg/l	-	1	1 - 2	-	-	-	-	<0.001 - 0.16	<0.001 - 0.18	<0.001 - 0.19	5 (I) ³
	Coliform	MPN/100mg	-	0 - 17	21 - 27	-	0	0 - 15	-	30 - >1,600	23 - >1,600	500 - >1,600	1,000 (I) ³
	Hg	mg/l	-	-	-	-	<0.0005	<0.0005	-	<0.0005	<0.0005	<0.0005	0.003 (I) ³
	As	mg/l	-	-	-	-	<0.002	<0.002	-	<0.0005 - 0.029	<0.0005 - 0.031	<0.0005 - 0.020	0.012 (I) ³
	Pb	mg/l	-	<0.005	<0.005	-	<0.005	<0.005	-	<0.001	<0.001	<0.001	0.05 (I) ³
	Cr ⁶⁺	mg/l	-	<0.005	<0.005	-	<0.005	<0.005	-	<0.001 - 0.040	<0.001 - 0.040	<0.001 - 0.010	0.005 (I) ³
	Cd	mg/l	-	<0.0005	<0.0005	-	<0.0005	<0.0005	-	<0.0001	<0.0001	<0.0001	0.01 (I) ³
PCB	mg/l	-	-	-	-	-	-	-	-	-	-	0.01 (I) ³	
PAH	mg/l	-	-	-	-	-	-	-	-	-	-	0.003 (I) ³	
Sediment Quality	T-Hg	mg/kg ^{dry}	-	0.01 - 0.46	0.68 - 0.73	-	-	<0.01 - 0.28	-	0.03 - 1.92	0.07 - 1.75	0.01 - 2.34	0.3 (W) ¹ / 1.6 (W) ²
	As	mg/kg ^{dry}	-	<0.5	<0.5	-	-	<0.5	-	0.02 - 3.72	0.08 - 2.44	0.08 - 3.50	29 (W) ¹ / 85 (W) ²
	Pb	mg/kg ^{dry}	-	16 - 22	47 - 69	-	-	<5 - 166	-	14.69 - 89.27	16.38 - 119.40	14.69 - 124.18	85 (W) ¹ / 530 (W) ²
	Cr ⁶⁺	mg/kg ^{dry}	-	6 - 17	13	-	-	7 - 25	-	0.09 - 1.74	0.03 - 1.47	0.27 - 2.19	100 (W) ¹ / 480 (W) ²
	Cd	mg/kg ^{dry}	-	<0.5	<0.5	-	-	<0.5 - 175	-	0.06 - 0.79	0.06 - 0.99	0.05 - 1.20	0.8 (W) ¹ / 7.5 (W) ²

Source: EIA: Air Quality and Noise and Vibration Level (July 2002), Water and Sediment Quality (June 2002)
 IPC-II Monitoring: April to June 2004
 JICA D/D: June and October 2005

Note: Applicable Standard:

- (I)¹ Indonesian Government Degree No. 41, 1999
- (I)² :DKI Jakarta Province Governor Degree No. 551, 2001
- (I)³ :Indonesian Government Degree No. 51, 2004
- (I)⁴ :Indonesian Government Degree No. Kep-02/MeNLH/1/1988
- (J): Japanese Water Quality Standard
- (w)¹: World Bank Technical Paper No. 126, Reference Value
- (w)²: World Bank Technical Paper No. 126, Testing Value

 : Present conditions exceeding applicable standards

Concentration of heavy metal substances in water column exceeded the national standard levels of Arsenic (As) and Chromium (Cr⁶⁺) during the JICA D/D Study in rainy season. These levels were rapidly increased in a few months mainly in dumping areas and outside of the port. This implies that these contaminants likely discharged from the land area in the event of heavy rain.

Another environmental issue in the water area is seabed material contamination by mercury (Hg) compounds. A previous survey said that it was revealed around 1980 and caused by open dumping from some factories along the rivers.

The results in JICA D/D Study implies that the mercury compounds have been likely discharged from the rivers and accumulated on the bottom of eastern side of basin area, which has been enclosed by the breakwaters and maintained deeper (approximately from CDL-14m to -15m.) than that in the adjacent area.

The environmental agency of DKI Jakarta said that in the past, there were some factories discharging mercury compounds directory into the rivers. However, after strict control done by the agency, these factories moved out from DKI Jakarta.

Today, there is no supply source of mercury compounds along the rivers in DKI Jakarta, and no monitoring data of water quality in the rivers exceeded the national standard level of mercury concentration.

Based on the above information obtained from the agency, it can be anticipated that the present high concentration level of mercury in the seabed material (2.34 mg/kg at a point in the center of eastern side of harbor basin area, sampling No. 16 in JICA D/D Study) may gradually decrease in a next few decades, if concerned parties keep, even make further, effort to control potential sources of the contaminants.

Besides mercury, considerably high levels of cadmium concentration in seabed material were reported in the result of monitoring survey in 2004 carried out by IPC-II. These samples were taken from the deepest points of the port basins (Port Basin II, III and Oil Basin), and west entrance of the port. Concentration levels in the samples ranged from <0.5 mg/kg to 175 mg/kg which are higher than the World Bank's standard level (Testing Value, Technical Paper No. 126).

Although the high concentration values of mercury and cadmium were detected in the project area as mentioned above, no value which exceeds the World Bank's standard levels were detected in JICA D/D Study from the area to be dredged in the construction stage of this project as shown in Figure 10.4.5.

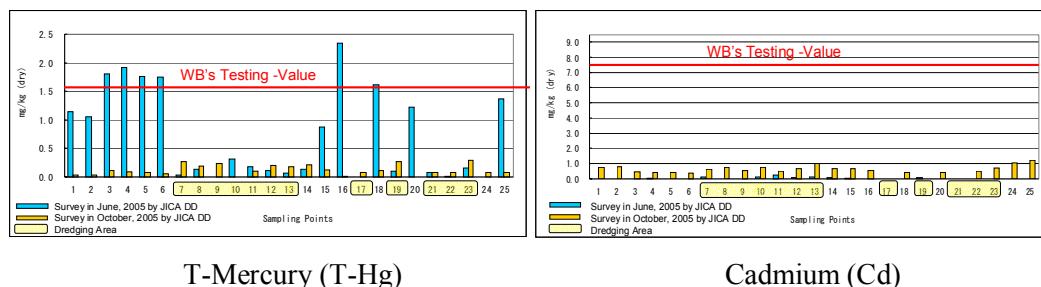


Figure 10.4.5 Detected Values of T-Hg and Cd in JICA D/D Study

Other heavy metals than mercury and cadmium, such as Cyanide, Lead, Chromium and Arsenic, met the World Bank's standard levels in the previous surveys.

(2) Biological Environment

1) Terrestrial biology

According to the EIA documents, 7 and 13 species of animal and plant were identified respectively. Since the project area on land side is entirely included in the existing port area, no species is, therefore, special and protected by national and international legislations.

In and vicinity of the project area, there is no area where subject to the national and international environmental treaties, such as RAMSAR.

2) Aquatic biology

The EIA documents describes that higher values in diversity of phytoplankton and zooplankton were observed inside and outside of the port area, respectively. This implies that water quality inside the port is more degraded than outside due to the inflow of domestic discharge.

As for inhabitation of fishes in the project area, 18 names are listed up in the EIA documents as common fishes in Jakarta Bay. They are murret, mackerel, pony fish, snapper, etc.

In the seabed outside the port, some species of benthos were identified in JICA D/D Study. In the seabed samples contained more sandy materials, the quantity of benthos increased. In contrast, inside the port, no benthos was identified due to excessive organic substances in the seabed material and low oxygen in the water column.

In the dumping areas, some species of benthos were identified in the existing dumping area but no benthos was identified in the proposed dumping area.

(3) Socioeconomic Environment

1) Land Area

The project area on land side is situated in the kelurahans (administrative district) of Tanjung Priok and Koja.

At present, approximately 75% of Tanjung Priok and 35 % of Koja is occupied by several port facilities, such as container terminal, warehouse, etc. Due to this, livelihood of population in the both kelurahans (Tanjung Priok: 26,731 persons and Kojya: 32,645 persons, in 2002) is largely dependent on the port related industries.

As of 2004, approximately 24,000 persons, consisting of 8,000 males and 16,000 females, were employed by various companies in and around Tanjung Priok Port.

According to an interview survey conducted in 2002, 80% of respondents in Tanjung Priok and 100% of respondents in Koja expected that implementation of the project will increase their job opportunity and income.

In contrast, all respondents perceive the present conditions of traffic jam, noise disturbance and air pollution as serious problems. 32.5% and 80% of respondent expect that implementation of this project will accelerate existing noise disturbance and air pollution, and traffic jam, respectively.

2) Water Area

In the west side of Jakarta Bay, including Tanjung Priok Port and the dumping areas, there are commercial aquaculture and fishing activities, such as 1) fish cultivation in brackish pond, 2) mussel cultivation with bamboo pile, 3) fish capture with cast and fixed net, 4) crab capture with wire cage, 5) shrimp capture with small-scale trawl net.

The fishing activities enter the regular season which extends from May to November. During this period, numbers of fishing boats spread over the area between Damar Island and the proposed dumping area.

Besides the fishing boats, large number of cargo vessels also sail in this area to call Tanjung Priok Port.

In 2004, an average number of the calling vessels reached to 45 ships per day and it tends to increase today. However, due to the limited capacity of the port, many vessels, waiting for an entering clearance, are required to drop their anchors outside the port.

Under the above circumstances, according to the information from ADPEL and local fishermen, average numbers of water traffic accidents in a past few years were about 0.5 cases/year between large vessels and 2.5 cases/year between fishing boats and large vessels.

10.4.4 Aspect of Primary Impacts

Considering the aforementioned current environmental conditions in and around the project area, aspects of the primary impacts which may arise from the project implementation are summarized as follow.

These aspects will be taken into account in the process of the EMP, including mitigation and monitoring of the impacts.

(1) Impact of Dredging and Disposal of Existing Seabed Material

In the construction phase, large amount of fine material will be dredged from the seabed and disposed into the planned dumping area. Total amount of the material to be disposed was estimated at 8,489,000 m³, which consists of 411,000 m³ and 8,078,000 m³ in the sites of breakwaters construction and channel and basin improvement respectively.

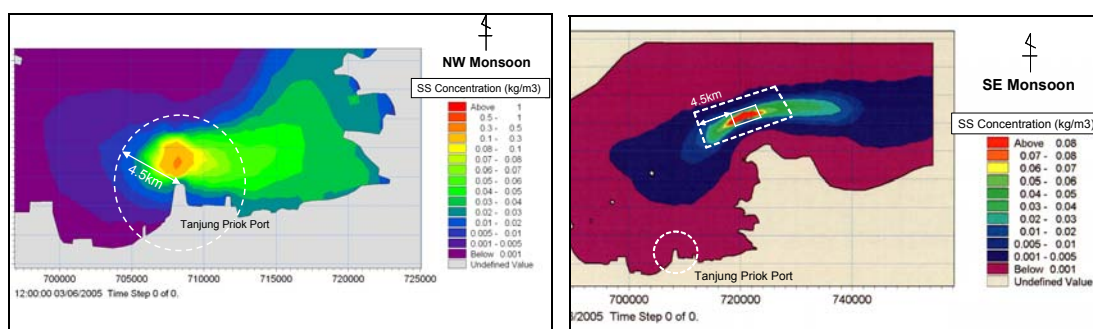
In addition, after completion of the construction phase, the material reaching approximately 100,000 m³, which have been dredged and disposed annually for maintenance dredging of the existing channel and basin, will also be disposed into the planned dumping area. This volume may be increased by their widening in this project.

In general, character and significance of environmental impacts, which may arise from dredging and disposal activities, are depend on toxicity of material to be dredged, and concentration and extent of dispersion of turbid water column in and around the dredging and dumping sites.

In case of this project, former impact has been confirmed to be minor because the seabed material which will be dredged during the construction stage meets the World Bank's standard levels as described in the previous Section 10.4.3 (1) 2).

As for the latter impact, it has been also confirmed to be minor by means of a numerical plume modeling. Some critical examples of modeling outputs are shown in Figure 10.4.6. Full results of the modelling are presented in APPENDIX 10-A.

These figures shows additional SS concentration which will be produced from the dredging and dumping activities. Taking account of the background concentrations (22 mg/l in dredging area and 11 mg/l in dumping area) into the concentrations in the figures, total concentration levels hardly exceed the standard level (80 mg/l) on the white dash lines which were allocated in the EIA documents as project boundaries with 4.5km distance from the both dredging and dumping areas.



Output in Dredging Area

Output in Dumping Area

Figure 10.4.6 Examples of Modeling Output

Although the impacts have confirmed to be minor, high concentration level of heavy metal compounds, especially mercury and cadmium, may appear in the area to be dredged during the construction stage. Therefore, careful and continuous monitoring of seabed material and water qualities will be conducted before, during and after dredging and dumping activities, so that proactive mitigation measures can be taken.

Considering the significance of the impact on local environment and project implementation in the case that unacceptable concentration of heavy metal is found in the area to be dredged, a possible and realistic additional mitigation measure is presented in Section 10.4.12(1).

(2) Impact of Construction Related Traffic

Transportation of large amount of construction materials by dump trucks through the existing roads likely causes further traffic congestion and dust pollution along the roads.

In order to avoid these consequences, the construction materials, especially sand and stone, will be transported to the construction sites from sea-side as much as possible.

In the water area, large size working vessels will stay and sail in and around the port for construction and transportation purposes. Additional traffic to the existing local pattern likely increases the number of traffic accidents.

In order to avoid traffic accidents between construction related traffic and existing local traffic, information on the construction activities will be opened on regular bases to the parties concerned, including local fishermen.

Besides, effective management of reusable materials will reduce required volume of materials to be transported from outside of the construction site. As a result, air pollution and traffic accidents can be minimized. Therefore, reusable materials, such as excavated materials in the

breakwater relocation, will be recycled as much as economically and environmentally practicable.

(3) Impact of Construction of Flyover Structure in Congested Area

As indicated by a dotted line in Figure 10.4.7, construction of flyover structure is located in an area where extremely crowded with many people, consisting of passengers using a bus terminal, a railway station and a ferry terminal for their commute and trip, residents in vicinity, customers of many small stalls, visitors of a mosque for pray.

Design less and uncontrolled construction works will expose the people to inconvenient and finally dangerous situations during the flyover construction period.

In order to ensure safety of the people, comprehensive and detailed construction planning, including preparation of alternative routes with trained traffic controllers, mitigation measures of noise, dust, vibration and solid waste management, is required.

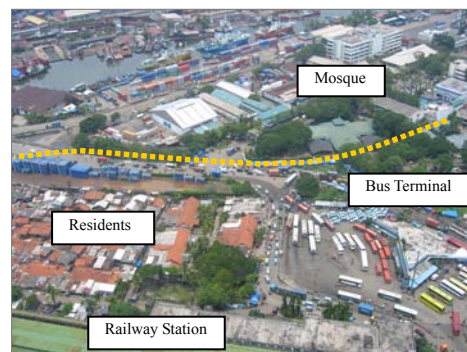


Figure 10.4.7 Flyover Construction Site

(4) Impact of Land Acquisition

According to the result of topographic survey in JICA D/D Study, no resettlement is required and necessary land acquisition area for road improvement is relatively small (7,704 m²). However, this area is spreading out in the territory of several land owners and users, including Army, Motor Shop, Bank, Mosque, Local Government, Railway Agency, and Small Stalls. In order to make project implementation smooth with supportive attitudes from them, prompt coordination of land acquisition procedures is necessary.

10.4.5 Environmental Mitigation Measures

The mitigation process of potential impacts has several components, which are evaluated in the following hierarchical sequences.

- Avoid the adverse impacts altogether by not taking a certain action or a part of a certain action which causes the adverse impact.
- Minimize the adverse impacts by limiting the degree of the action.
- Ameliorate or rectify the impact by repairing, rehabilitating or restoring the affected environment.
- Reduce or eliminate adverse impacts by preservation and maintenance operations.
- Compensate for unavoidable adverse impacts that remain after all appropriate and practical measures of avoidance and minimization have been taken, by replacing or providing substitute resources or environment.

In addition, taking the social conditions and sustainability of the Indonesian society into account, several but realistic mitigation measures against the potential impacts, which were identified in the EIA documents and JICA D/D Study, are summarized in Table 10.4.2.

In principal, as shown in the Tables, responsible bodies for execution of the mitigation measures in the construction phase are the Sub-directorate of Port Development (SDPD) and Contractors (C-P1 and C-P2). Technical Division of IPC-II (TD-IPC-II) is responsible in operation phase. This is because they are primary performers of daily activities, which may produce negative impacts on the existing local environment. Overall image of institution for execution of the mitigation measures is presented in Figure 10.4.11.

The planned mitigation measures will be periodically evaluated on its necessity of continuance and improvement, effects, efficiency, etc., depending on the results of the monitoring described in the subsequent section.

10.4.6 Environmental Monitoring Plan

An environmental monitoring plan was devised to examine if there were actually estimated environmental impacts, if the level of impacts met the prediction, if there were any impacts that had been not predicted and to obtain materials to judge if additional environmental mitigation measures should be needed.

Therefore, it is required to propose a monitoring plan, indicating appropriate timings and methods of the monitoring, and to establish the monitoring criteria, so that prompt additional mitigation measures can be taken if necessary.

Responsible bodies for execution of the monitoring plan are basically same with those of mitigation measures described above.

Table 10.4.3 presents the monitoring plan includes possible feedback actions (additional mitigation measures), if monitoring results failed to meet monitoring criteria.

Table 10.4.2 (1) Potential Impacts and Mitigation Measures

No	Item of Impact	Source of Impact	Impact Indicator	Objective of Mitigation	Mitigation Measure	Mitigation Site	Mitigation Period	Institution for Mitigation		
								Executor	Supervisor	Report
1 Construction Phase										
A Spatial Aspect										
1	Maritime Traffic Activity	i. Mobilization and demobilization of construction material and equipment ii. Offshore work <ul style="list-style-type: none"> Widening of channel & basin Breakwater relocation Dumping of dredged material 	<ul style="list-style-type: none"> Increase of maritime traffic volume and accident Complaint from local fishermen 	To minimize disturbance on existing maritime traffic	i. CP-1 clearly indicates construction areas, dumping area and access routes by placing temporarily buoys. ii. CP-1 cooperates with ADPEL to make sure temporarily operation rules among relevant port users. iii. CP-1 informs their daily construction activities to ADPEL and fishing parties on regular basis. iv. CP-1 cooperates with ADPEL to plan operation route of dredgers and barges between dredging sites and dumping area. v. CP-1 establishes Safety Manual and Prevention Manual against accidents likely occur in water area.	<ul style="list-style-type: none"> Offshore construction area Existing navigation route Access route to / from dumping area Dumping area 	During offshore construction period	SDPD C-P1	SD-IPC-II ADPEL EAs DGSC	SD-IPC-II ADPEL EAs DGSC
2	On Land Traffic Activity	i. Mobilization and demobilization of construction material and equipment ii. On land work <ul style="list-style-type: none"> Inner road improvement Construction of flyover Material stock and fabrication 	<ul style="list-style-type: none"> Increase of on land traffic volume and congestion Increase of on land traffic accident Complaint from local community 	To minimize disturbance on existing on land traffic	i. CP-2 select appropriate access routes to construction areas and material stock and fabrication yards considering existing road's capacity. ii. CP-2 use well-maintained vehicles for transportation purpose to ensure smooth traffic condition. iii. CP-2 indicate distinctive signs on construction related vehicles in accordance with Decree of Communication Minister No. KM69, 1993 to distinguish them from others. iv. CP-2 cooperate with Port Police Unit of Tanjung Priok (KP3) and Local Policemen (POLSEK) to place sign boards, traffic signs, traffic lights and to set up detours. v. CP-2 prepare dedicated parking areas and loading / unloading facilities to minimize waiting vehicles on loads and traffic congestion. vi. CP-2 schedule material and equipment transportation in nighttime, not in peak hour to avoid traffic congestion. vii. CP-2 instruct sub-contractors and vehicle drivers to follow traffic regulations and drive safely. viii. CP-2 compensate (repair and maintenance) road damage caused by their construction related works to ensure safe and smooth traffic. ix. CP-2 selects sea route transportation of bulky construction material in stead of land route by tracks as much as possible to avoid traffic congestion.	<ul style="list-style-type: none"> On land construction area Material stock and fabrication yard Access road to / from TP port: Jl. Jampea Jl. Enggano Jl. RE Martadinata Jl. Sulawesi 	During construction phase	SDPD C-P2 in collabo. with KP-3 and POLSEK	SD-IPC-II EAs DGSC	SD-IPC-II EAs DGSC

Note: CP-1: Contractor of Package-1 (Breakwater, Channel and Basin Dredging), CP-2: Contractor of Package-2 (Road and Flyover), SDPD: Sub-Directorate of Port Development, ADPEL: Tanjung Priok Port Administration
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Table 10.4.2 (2) Potential Impacts and Mitigation Measures

No	Item of Impact	Source of Impact	Impact Indicator	Objective of Mitigation	Mitigation Measure	Mitigation Site	Mitigation Period	Institution for Mitigation		
								Executor	Supervisor	Report
B Physico-chemical Aspect										
1	Air Quality	i. Mobilization and demobilization of construction material and equipment ii. On land work <ul style="list-style-type: none"> Inner road improvement Construction of flyover Material stock and fabrication 	<ul style="list-style-type: none"> Degradation of air quality Complaint from local community 	To minimize air pollution	i. CP-2 uses low environmental impact type construction equipment to minimize air pollution. ii. CP-2 maintains engine-drive construction equipment in good condition to minimize gas emission. iii. CP-2 uses covering sheet on bulky construction material (sand and gravel) during transportation to avoid dust dispersion. iv. CP-2 places construction materials in stock yard far from residential area and sprinkle water on dry days. v. CP-2 selects sea route transportation of bulky construction material in stead of land route by tracks as much as possible to avoid dust pollution.	<ul style="list-style-type: none"> On land construction area Access road to / from TP port Jl. Jampea Jl. Enggano Jl. RE Martadinata Jl. Sulawesi Material stock and fabrication yard 	During construction phase	SDPD C-P2	SD-IPC-II EAs DGSC	SD-IPC-II EAs DGSC
2	Noise and Vibration	i. Mobilization and demobilization of construction material and equipment ii. On land work <ul style="list-style-type: none"> Inner road improvement Construction of flyover 	<ul style="list-style-type: none"> Increase of noise and vibration level Complaint from local community 	To minimize noise and vibration pollution	i. CP-2 uses low environmental impact type construction equipment to minimize noise and vibration pollution. ii. CP-2 places noisy construction equipment at least 63m far away from housing and residential area. iii. CP-2 refrain intensive construction works, such as pile driving, beam placing for flyover) during busy time of local activities. iv. CP-2 selects sea route transportation of bulky construction material in stead of land route by tracks as much as possible to avoid noise and vibration pollution.	<ul style="list-style-type: none"> On land construction area 	During construction phase	SDPD C-P2	SD-IPC-II EAs DGSC	SD-IPC-II EAs DGSC
3	Sea Water Quality	i. Offshore work <ul style="list-style-type: none"> Widening of channel & basin Breakwater relocation Disposal of dredged material 	<ul style="list-style-type: none"> Degradation of sea water quality Complaint from local fishermen 	To minimize degradation of sea water quality.	i. CP-1 selects less environmental impact dredging and dumping method. ii. CP-1 considers oceanographic condition especially current, tide during offshore work to localize turbid water dispersion. iii. CP-1 maintains maritime construction equipment in good condition to avoid oil leakage to sea.	<ul style="list-style-type: none"> Offshore construction area Existing navigation route Access route to / from dumping area Dumping area 	During offshore construction period	SDPD C-P1	SD-IPC-II EAs DGSC	SD-IPC-II EAs DGSC
4	Solid Waste (Dredged soil, gravel and removed concrete)	i. Offshore work <ul style="list-style-type: none"> Widening of channel & basin Breakwater relocation Disposal of dredged material 	<ul style="list-style-type: none"> Deposition of solid waste in and around TP port Degradation of seabed sediment quality Complaint from local fishermen 	<ul style="list-style-type: none"> To minimize solid waste in and around TP port To minimize degradation of seabed sediment quality 	i. CP-1 covers dredged material in transporting barge to avoid drop and leaking out to sea during transportation to dumping area. ii. CP-1 arranges transportation schedule of dredged material properly, considering dredger's and barge's maximum loading capacity. iii. CP-1 tries to reuse construction waste material as much as possible with environmentally friendly technology. iv. Location of dumping area must be approved by ADPEL and local government.	<ul style="list-style-type: none"> Offshore construction area Existing navigation route Access route to / from dumping area Dumping area 	During offshore construction period	SDPD C-P1 in colabo. with TD-IPC-II-T PB	SD-IPC-II EAs DGSC	SD-IPC-II EAs DGSC

Note: CP-1: Contractor of Package-1 (Breakwater, Channel and Basin Dredging), CP-2: Contractor of Package-2 (Road and Flyover), SDPD: Sub-Directorate of Port Development, ADPEL: Tanjung Priok Port Administration
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Table 10.4.2 (3) Potential Impacts and Mitigation Measures

No	Item of Impact	Source of Impact	Impact Indicator	Objective of Mitigation	Mitigation Measure	Mitigation Site	Mitigation Period	Institution for Mitigation		
								Executor	Supervisor	Report
C Biological Aspect										
1	Aquatic Biota	i. Offshore work <ul style="list-style-type: none"> Widening of channel & basin Breakwater relocation Disposal of dredged material 	Change in quantity, diversity of plankton, benthos and nekton due to alteration of water and sediment quality	To minimize impact factor on habitat condition of plankton, benthos and nekton	i. CP-1 minimizes degradation of seawater and sea bed sediment quality as explained in 1B3 and 4 .	<ul style="list-style-type: none"> Offshore construction area Access route to / from dumping area Dumping area 	During offshore construction period	SDPD C-P1	SD-IPC-II EAs DGSC	SD-IPC-II EAs DGSC
D Socio-economic and Cultural Aspect										
1	Public Health	i. Mobilization and demobilization of construction material and equipment ii. On land work <ul style="list-style-type: none"> Inner road improvement Construction of flyover Material stock and fabrication iii. Offshore work <ul style="list-style-type: none"> Widening of channel & basin Breakwater relocation Disposal of dredged material 	<ul style="list-style-type: none"> Complaint from construction workers and local community Record of disease in local community 	To minimize health hazard to construction workers and local residents in vicinity	i. CP-1 and CP-2 prepare safety measures for construction workers (insurance, first aid kit and medicine). ii. CP-1 and CP-2 train construction workers to promote understanding on health care and public sanitation. iii. CP-1 and CP-2 train construction workers to maintain and improve working environment. iv. CP-1 and CP-2 provide construction workers working in extreme condition with masks and ear protectors to minimize health hazard. v. CP-1 and CP-2 minimize degradation of air quality, sea water quality, sea bed sediment quality and noise and vibration level as explained in 1B1, 2, 3 and 4 .	<ul style="list-style-type: none"> On land construction area Offshore construction area Local community (Kerulahan Tanjung Priok and Koja) 	During construction phase	SDPD C-P1 C-P2	SD-IPC-II EAs DGSC	SD-IPC-II EAs DGSC

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SD-IPC-II: Sub-directorate Facility, Marketing & Business Development Directorate, IPC-II, TD-IPC-II-TPB: Technical Division of IPC-II, Tanjung Priok Branch, EAs: Environmental Agency, BPLHD-DKI Jakarta and North Jakarta

Table 10.4.2 (4) Potential Impacts and Mitigation Measures

No	Item of Impact	Source of Impact	Impact Indicator	Objective of Mitigation	Mitigation Measure	Mitigation Site	Mitigation Period	Institution for Mitigation		
								Executor	Supervisor	Report
2 Operation Phase										
A Spatial Aspect										
1	Maritime Traffic Activity	i. Maritime port operation <ul style="list-style-type: none"> Channel operation Basin operation ii. Maintenance dredging	<ul style="list-style-type: none"> Increase of maritime traffic volume and accident Complaint from local fishermen 	To avoid maritime traffic accident	i. TD-IPC-II-TPB cooperates with ADPEL to optimize navigation information system with VTIS (Vessel Transportation information System), improve human resources quality and announce their regulation to related parties. ii. TD-IPC-II-TPB cooperates with ADPEL to decide shipping routes and regulations. iii. TD-IPC-II-TPB cooperates with ADPEL to arrange navigation system, sea traffic signs and coordination with other related parties. iv. TD-IPC-II-TPB commits environmental management during maintenance dredging such as: <ul style="list-style-type: none"> To inform their dredging activity schedule to ADPEL for announcement to other port user and related parties. To select less environmental impact dredging and dumping method. To cooperates with ADPEL to decide dumping area, transportation route and navigation sign around activity. To establish Safety Manual and Prevention Manual against accidents likely occur in water area. 	<ul style="list-style-type: none"> TP port Existing navigation route Access route to / from dumping area 	During operation phase	TD-IPC-II-T PB in collabo. with ADPEL	SD-IPC-II ADPEL EAs DGSC	SD-IPC-II ADPEL EAs DGSC
2	On Land Traffic Activity	i. On land port operation <ul style="list-style-type: none"> Cargo handling Cargo transportation Related business 	<ul style="list-style-type: none"> Increase of on land traffic volume and congestion Increase of on land traffic accident Complaint from local community 	To minimize on land traffic congestion and accident	i. TD-IPC-II-TPB provides sufficient parking and waiting area inside port. ii. TD-IPC-II-TPB improves traffic management in and around port in collaboration with related institutions outside port. iii. TD-IPC-II-TPB repair port inner load periodically to ensure smooth flow of traffic.	<ul style="list-style-type: none"> TP port Access road to / from TP port: Jl. Jampea Jl. Enggano Jl. RE Martadinata Jl. Sulawesi 	During operation phase	TD-IPC-II-T PB in collabo. with Traffic and Transportati on Agency (DLLAJ)	SD-IPC-II EAs DGSC	SD-IPC-II EAs DGSC
B Physico-chemical Aspect										
1	Air Quality	i. On land port operation <ul style="list-style-type: none"> Cargo handling Cargo transportation Related business 	<ul style="list-style-type: none"> Degradation of air quality Complaint from local community 	To minimize air pollution	i. TD-IPC-II-TPB layouts plantation around port as barrier to minimize spreading air pollution. ii. TD-IPC-II-TPB maintains port operation equipment in good condition to minimize gas emission. iii. TD-IPC-II-TPB instruct port users and ship operators to avoid dispersion of mealy cargo into air during loading and unloading.	<ul style="list-style-type: none"> TP port Around entrance gate 	During operation phase	TD-IPC-II-T PB	SD-IPC-II EAs DGSC	SD-IPC-II EAs DGSC

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 SD-IPC-II: Sub-directorate Facility, Marketing & Business Development Directorate, IPC-II, TD-IPC-II-TPB: Technical Division of IPC-II, Tanjung Priok Branch, EAs: Environmental Agency, BPLHD-DKI Jakarta and North Jakarta

Table 10.4.2 (5) Potential Impacts and Mitigation Measures

No	Item of Impact	Source of Impact	Impact Indicator	Objective of Mitigation	Mitigation Measure	Mitigation Site	Mitigation Period	Institution for Mitigation		
								Executor	Supervisor	Report
2	Noise and Vibration	i. On land port operation <ul style="list-style-type: none"> • Cargo handling • Cargo transportation • Related business 	<ul style="list-style-type: none"> • Increase of noise and vibration level • Complaint from local community 	To minimize noise and vibration pollution	i. TD-IPC-II-TPB layouts plantation around port as barrier to minimize spreading out noise pollution. ii. TD-IPC-II-TPB repairs port inner load periodically to minimize noise pollution. iii. TD-IPC-II-TPB maintains port operation equipment in good condition to minimize noise and vibration pollution.	<ul style="list-style-type: none"> • TP port • Around entrance gate 	During operation phase	TD-IPC-II-TPB	SD-IPC-II EAs DGSC	SD-IPC-II EAs DGSC
3	Sea Water Quality	i. Maritime port operation <ul style="list-style-type: none"> • Channel operation • Basin operation ii. Maintenance dredging iii. On land port operation <ul style="list-style-type: none"> • Cargo handling • Cargo transportation • Related business 	<ul style="list-style-type: none"> • Degradation of sea water quality • Complaint from local fishermen 	<ul style="list-style-type: none"> • To minimize degradation of sea water quality • To minimize degradation of public sanitation and health condition in TP port 	i. TD-IPC-II-TPB strengthens and revises existing environmental regulation and rule to adopt new operation system. ii. TD-IPC-II-TPB monitors pollution caused by ship following MARPOL 73/78. iii. TD-IPC-II-TPB maintains emergency procedure against oil leakage effective, such as oil boom. iv. TD-IPC-II-TPB receives oily and toxic waste from ship and transfer it to legal treatment facility to avoid sea water pollution. v. TD-IPC-II-TPB instructs workers not to dump construction waste into sea but into disposal area on land. vi. TD-IPC-II-TPB prepares sufficient toilets for workers and calling ship. vii. TD-IPC-II-TPB improves wastewater treatment facility (septic tank or communal sewage treatment plant). viii. During maintenance dredging, TD-IPC-II-TPB takes measures same as those in construction phase (see 1B3 and 4).	<ul style="list-style-type: none"> • TP port • Existing navigation route • Access route to / from dumping area • Dumping area 	During operation phase	TD-IPC-II-TPB	SD-IPC-II EAs DGSC	SD-IPC-II EAs DGSC
4	Water Supply	i. On land port operation <ul style="list-style-type: none"> • Cargo handling • Cargo transportation • Related business 	<ul style="list-style-type: none"> • Consumption level and quality of water supply for port activity • Complaint from local community 	To fulfill water demand in TP port without hindrance to existing water supply system	i. TD-IPC-II-TPB control worker's water demand to avoid excessive consumption. ii. TD-IPC-II-TPB evaluates source of water supply in terms of capacity and quality to satisfy demand from workers and port users. iii. TD-IPC-II-TPB cooperates with Jakarta Water Enterprise (PDAM) to supply water by pipelines and trucks. iv. TD-IPC-II-TPB considers introduction of efficient water recirculation system to minimize additional water consumption. v. TD-IPC-II-TPB avoids using ground water as source of water supply in TP port.	TP port	During operation phase	TD-IPC-II-TPB	SD-IPC-II EAs DGSC	SD-IPC-II EAs DGSC

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Table 10.4.2 (6) Potential Impacts and Mitigation Measures

No	Item of Impact	Source of Impact	Impact Indicator	Objective of Mitigation	Mitigation Measure	Mitigation Site	Mitigation Period	Institution for Mitigation		
								Executor	Supervisor	Report
5	Solid Waste	i. On land port operation <ul style="list-style-type: none"> • Cargo handling • Cargo transportation • Related business 	<ul style="list-style-type: none"> • Volume of garbage collected in TP port • Degradation of sea water quality • Degradation of seabed sediment quality • Complaint from local community • Complaint from local fishermen 	To minimize degradation of sanitation and aesthetics conditions caused by inappropriate solid waste management	i. TD-IPC-II-TPB informs solid waste disposal regulation to related parties in TP port, especially to new comers. ii. TD-IPC-II-TPB prepares waste bag and domestic refuse bins with appropriate cover. iii. TD-IPC-II-TPB cooperates with DKI's cleaning agency (Dinas Kebersihan) to manage solid waste and install incinerator if necessary. iv. TD-IPC-II-TPB manages domestic waste collection within every 24 hours to avoid bad smell and leachate. v. Rubbish (bottle, plastic, can, etc.) is recycled as much as possible in collaboration with local collector. vi. TD-IPC-II-TPB avoids further degradation of aesthetics in and around TP port.	TP port	During operation phase	TD-IPC-II-T PB in collabo. with DKI's cleaning office (Dinas Kebersihan)	SD-IPC-II EAs DGSC	SD-IPC-II EAs DGSC
C Biological Aspect										
1	Aquatic Biota	i. Maritime port operation <ul style="list-style-type: none"> • Channel operation • Basin operation ii. Maintenance dredging	Change in quantity, diversity of plankton, benthos and nekton due to alteration of water and sediment quality	To minimize impact factor on habitat condition of plankton, benthos and nekton	i. TD-IPC-II-TPB and related institution integrate policy of Integrated Coastal Management (ICM) into EMP of TP port ii. TD-IPC-II-TPB minimizes degradation of seawater and sea bed sediment quality as explained in 2B3 .	<ul style="list-style-type: none"> • TP port • Existing navigation route • Access route to / from dumping area • Dumping area 	During operation phase	TD-IPC-II-T PB	SD-IPC-II EAs DGSC	SD-IPC-II EAs DGSC
D Socio-economic and Cultural Aspect										
1	Regional Economy	i. On land port operation <ul style="list-style-type: none"> • Cargo handling • Cargo transportation • Related business 	<ul style="list-style-type: none"> • Job opportunity and business chance • Livelihood structure • Income level 	To provide surrounding community with job opportunity and business chance	i. TD-IPC-II-TPB announces business opportunity to local government. ii. TD-IPC-II-TPB recruits qualified workers from local community. iii. TD-IPC-II-TPB provides open space to local companies and people to run food stand, transportation service, etc. iv. Local government optimizes community development fund to prepare vocational skill training center, young generation education center, etc.	TP port and surrounding Kelurahan, especially Tanjung Priok and koja	During operation phase	TD-IPC-II-T PB in collabo. with local government	SD-IPC-II EAs DGSC	SD-IPC-II EAs DGSC
2	Public Health	i. On land port operation <ul style="list-style-type: none"> • Cargo handling • Cargo transportation • Related business 	<ul style="list-style-type: none"> • Complaint from construction workers and local community • Record of disease in local community 	To minimize health hazard to workers and local residents in vicinity	i. TD-IPC-II-TPB prepares safety and health care facility for workers (insurance, medical facility, medical staff). ii. TD-IPC-II-TPB trains workers to promote understanding on health care and public sanitation. iii. TD-IPC-II-TPB trains workers to maintain and improve working environment. iv. TD-IPC-II-TPB provides workers working in extreme condition with masks and ear protectors to minimize health hazard. v. TD-IPC-II-TPB minimize degradation of air quality, sea water quality, sea bed sediment quality and noise and vibration level as explained in 2B1,2 and 3 .	TP port	During operation phase	TD-IPC-II-T PB	SD-IPC-II EAs DGSC	SD-IPC-II EAs DGSC

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Table 10.4.3 (1) Monitoring Plan

No	Item of Impact	Source of Impact	Monitoring Plan						Institution for Monitoring			Possible Feedback Auction (if monitoring results failed to meet monitoring criteria)
			Objective of Monitoring	Monitoring Method	Monitoring Site	Monitoring Period	Monitoring Frequency	Analysis Method	Executor	Supervisor	Report	
I Construction Phase												
A Spatial Aspect												
1	Maritime Traffic Activity	i. Mobilization and demobilization of construction material and equipment ii. Offshore work <ul style="list-style-type: none"> Widening of channel & basin Breakwater relocation Dumping of dredged material 	To monitor increase of maritime traffic volume and accident in and around TP Port caused by construction activities	i. Item Traffic volume and number of accident ii. Method <ul style="list-style-type: none"> Collection of information on traffic volume and accident through ADPEL Interview with local fishermen iii. Criteria Increased / Maintained / Decreased	<ul style="list-style-type: none"> Offshore construction area Existing navigation route Access route to / from dumping area Dumping area 	During offshore construction period	Every week	Interview and statistical analysis method	SDPD C-P1 in collaboration with ADPEL	SD-IPC-II EAs DGSC	SD-IPC-I I ADPEL EAs DGSC	In case monitoring results were classified into "Increased", SDPD instructs C-P1 to review construction and transportation method and schedule. SDPD, C-P1, ADPEL and other parties concerned (fishermen, etc.) have meeting to develop additional mitigation measures, such as strengthening information network among parties concerned.
2	On Land Traffic Activity	i. Mobilization and demobilization of construction material and equipment ii. On land work <ul style="list-style-type: none"> Inner road improvement Construction of flyover Material stock and fabrication 	To monitor: <ul style="list-style-type: none"> Increase of on land traffic volume and congestion Increase of on land traffic accident In and around TP Port caused by construction activities	i. Item Traffic volume and number of accident ii. Method <ul style="list-style-type: none"> Collection of information on traffic volume and accident through Port Police Unit of Tanjung Priok (KP3) and Local Policemen (POLSEK). Interview with local residents iii. Criteria Increased / Maintained / Decreased	<ul style="list-style-type: none"> On land construction area, especially flyover Material stock and fabrication yard Access road to / from TP port: JI. Jampea JI. Enggano JI. RE Martadinata JI. Sulawesi 	During construction phase	Every week	Interview and statistical analysis method	SDPD C-P2 in collaboration with KP-3 and POLSEK	SD-IPC-II EAs DGSC	SD-IPC-I I EAs DGSC	In case monitoring results were classified into "Increased", SDPD instructs C-P2 to review construction and transportation method and schedule. SDPD, C-P2, KP-3, POLSEK and other parties concerned (local residents, etc.) have meeting to develop additional mitigation measures, such as setting alternative detour.
B Physico-chemical Aspect												
1	Air Quality	i. Mobilization and demobilization of construction material and equipment ii. On land work <ul style="list-style-type: none"> Inner road improvement Construction of flyover Material stock and fabrication 	To monitor: degradation of air quality caused by construction activities	i. Item Air quality ii. Method Field sampling (8 times / 24 hours) and laboratory analysis: SO ₂ , CO, NO ₂ and TSP iii. Criteria Indonesian Government Degree No. 41, 1999	<ul style="list-style-type: none"> On land construction area Access road to / from TP port JI. Jampea JI. Enggano JI. RE Martadinata JI. Sulawesi Material stock and fabrication yard 	During construction phase	Every 6 months (rainy / dry seasons)	NDIR, Spectrophotometric and Gravimetric method	SDPD C-P2	SD-IPC-II EAs DGSC	SD-IPC-I I EAs DGSC	In case monitoring results failed to meet criteria, and it is confirmed that pollutants have been originated from construction activities, SDPD instructs C-P2 to take additional mitigation measures, such as sprinkling water over earthwork site and access roads.

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Table 10.4.3 (2) Monitoring Plan

No	Item of Impact	Source of Impact	Monitoring Plan						Institution for Monitoring			Possible Feedback Auction (if monitoring results failed to meet monitoring criteria)
			Objective of Monitoring	Monitoring Method	Monitoring Site	Monitoring Period	Monitoring Frequency	Analysis Method	Executor	Supervisor	Report	
2	Noise and Vibration	i. Mobilization and demobilization of construction material and equipment ii. On land work <ul style="list-style-type: none"> Inner road improvement Construction of flyover 	To monitor increase of noise and vibration level caused by construction activities	i. Item Noise and vibration ii. Method Field measurement (8 times / 24 hours) iii. Criteria DKI Jakarta Province Governor Decree No. 551, 2001	<ul style="list-style-type: none"> On land construction area, especially flyover near mosque Access road to / from TP port JI. Jampea JI. Enggano JI. RE Martadinata JI. Sulawesi 	During construction phase	Every 6 months (rainy / dry seasons)	Direct measurement	SDPD C-P2	SD-IPC-II EAs DGSC	SD-IPC-I EAs DGSC	In case monitoring results failed to meet criteria, and it is confirmed that pollutants have been originated from construction activities, SDPD instructs C-P2 to take additional mitigation measures, such as installation of noise prevention cover on construction equipment (pile driver, generator, concrete breaker, etc.).
3	Sea Water Quality	i. Offshore work <ul style="list-style-type: none"> Widening of channel & basin Breakwater relocation Disposal of dredged material 	To monitor degradation of sea water quality caused by construction activities	i. Item Sea water quality ii. Method Field sampling from 2 layers, field measurement and laboratory analysis: <ul style="list-style-type: none"> Every week Temperature, pH, Salinity, Turbidity (equivalent SS), DO Every month COD, SS Every 6 months (dry/rainy seasons) BOD, Coliform, T-N, T-P, Hg, As, Pb, Cr, Cd, Oil, PCB, PAH iii. Criteria <ul style="list-style-type: none"> Indonesian Government Degree No. 51, 2004 and No. Kep-02 /MenKLH/I/1988 Japanese Water Quality Standard 	<ul style="list-style-type: none"> Offshore construction area Existing navigation route Access route to / from dumping area Dumping area 	During offshore construction period	<ul style="list-style-type: none"> Every 6 months (rainy / dry seasons) Every month Every week during maintenance dredging 	Electrometric, Gravimetric, Titrimetric, and Atomic Absorption Spectrophotometer (AAS) method	SDPD C-P1	SD-IPC-II EAs DGSC	SD-IPC-I EAs DGSC	i. Every week items: In case turbidity (equivalent SS) failed to meet criteria, and it is confirmed that pollutants have been originated from construction activities, watch results in subsequent 2 times. If failed in consecutive 3 times, SDPD instructs C-P1 to take additional mitigation measures, such as: <ul style="list-style-type: none"> reducing daily dredging and dumping volume. installation of silt screen. ii. Every month and 6 months items: In case monitoring results failed to meet criteria, and it is confirmed that pollutants have been originated from construction activities, SDPD instructs C-P1 to take additional mitigation measures considering nature of pollutants.

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Table 10.4.3 (3) Monitoring Plan

No	Item of Impact	Source of Impact	Monitoring Plan						Institution for Monitoring			Possible Feedback Auction (if monitoring results failed to meet monitoring criteria)
			Objective of Monitoring	Monitoring Method	Monitoring Site	Monitoring Period	Monitoring Frequency	Analysis Method	Executor	Supervisor	Report	
4	Solid Waste (Dredged soil, gravel and removed concrete)	i. Offshore work <ul style="list-style-type: none"> Widening of channel & basin Breakwater relocation Disposal of dredged material 	To monitor: <ul style="list-style-type: none"> Deposition of dumping materials in and around TP port Degradation of seabed sediment quality caused by construction activities 	i. Item Sediment quality ii. Method Field sampling and laboratory analysis: Hg, As, Pb, Cr, Cd, Ignition loss, G-size iii. Criteria <ul style="list-style-type: none"> Every 6 months Degrade / Maintained / Improved Once before start dredging World Bank Technical Paper No. 126, Reference Value / Testing Value 	<ul style="list-style-type: none"> Offshore construction area Existing navigation route Access route to / from dumping area Dumping area 	During offshore construction period	<ul style="list-style-type: none"> Every 6 months (rainy / dry seasons) in dumping route and dumping area Once before start dredging at areas to be dredged 	Gravimetric and Atomic Absorption Spectrophotometer (AAS) method	SDPD C-P1	SD-IPC-II EAs DGSC	SD-IPC-I EAs DGSC	i. Every 6 months items: In case results classified into "Degraded", and it is confirmed that degradation has been caused by project activities, SDPD instructs C-P1 to take additional mitigation measures, such as: <ul style="list-style-type: none"> reducing daily dredging and dumping volume. ii. Once before start dredging items: In case monitoring results failed to meet criteria (Reference or Testing Values) conduct second survey within 1 month from 1 st sampling. If 2 nd results still failed to meet Testing values, SDPD instructs C-P1 to abandon disposal of dredged materials into proposed dumping area. Instead, contaminated dredged materials must be dumped into designated controlled containment dumping location. (see Fig. 10.4.14) If 2 nd results still failed to meet Reference values but lower than Testing Values, SDPD instructs C-P1 to take additional mitigation measures, such as <ul style="list-style-type: none"> smaller volume dumping into wider area within planned offshore dumping area.

Note: CP-1: Contractor of Package-1 (Breakwater, Channel and Basin Dredging), CP-2: Contractor of Package-2 (Road and Flyover), SDPD: Sub-Directorate of Port Development, ADPEL: Tanjung Priok Port Administration
 SD-IPC-II: Sub-directorate Facility, Marketing & Business Development Directorate, IPC-II, TD-IPC-II-TPB: Technical Division of IPC-II, Tanjung Priok Branch, EAs: Environmental Agency, BPLHD-DKI Jakarta and North Jakarta

Table 10.4.3 (4) Monitoring Plan

No	Item of Impact	Source of Impact	Monitoring Plan						Institution for Monitoring			Possible Feedback Auction (if monitoring results failed to meet monitoring criteria)
			Objective of Monitoring	Monitoring Method	Monitoring Site	Monitoring Period	Monitoring Frequency	Analysis Method	Executor	Supervisor	Report	
C Biological Aspect												
1	Aquatic Biota	i. Offshore work <ul style="list-style-type: none"> Widening of channel & basin Breakwater relocation Disposal of dredged material 	<ul style="list-style-type: none"> To monitor change in quantity, diversity of plankton, benthos and nekton due to alteration of water and sediment quality caused by construction activities Hg bio-accumulation in aquatic biota 	i. Item <ul style="list-style-type: none"> Aquatic biology Fishery conditions ii. Method <ul style="list-style-type: none"> Field sampling and laboratory analysis Interview with local fishermen iii. Criteria Changed (Degraded) / Maintained	<ul style="list-style-type: none"> Offshore construction area Access route to / from dumping area Dumping area 	During offshore construction period	Every 6 months (rainy / dry seasons)	Inventory and AAS method	SDPD Consultant	SD-IPC-II EAs DGSC	SD-IPC-I EAs DGSC	In case monitoring results classified into "Changed (Degraded)", and it is confirmed that change or degradation have been caused by project activities, SDPD instructs C-P1 to take additional mitigation measures, such as: <ul style="list-style-type: none"> reducing daily dredging and dumping volume. smaller volume dumping into wider area within planned offshore dumping area.
D Socio-economic and Cultural Aspect												
1	Public Health	i. Mobilization and demobilization of construction material and equipment ii. On land work <ul style="list-style-type: none"> Inner road improvement Construction of flyover Material stock and fabrication iii. Offshore work <ul style="list-style-type: none"> Widening of channel & basin Breakwater relocation Disposal of dredged material 	To monitor health hazard on construction workers and residents in vicinity caused by construction activities	i. Item Public health ii. Method <ul style="list-style-type: none"> Collection of information on regional health condition at medical facilities in vicinity Interview with construction workers and local residents iii. Criteria Degraded / Maintained / Improved	<ul style="list-style-type: none"> On land construction area Offshore construction area Local community (Kerulahan Tanjung Priok and Koja) 	During construction phase	Every year	Interview and statistics analysis method	SDPD Consultant	SD-IPC-II EAs DGSC	SD-IPC-I EAs DGSC	In case monitoring results classified into "Degraded", and it is confirmed that degradation has been caused by project activities, SDPD instructs C-P1 to take additional mitigation measures, such as assistance for having sufficient medication.

Note: CP-1: Contractor of Package-1 (Breakwater, Channel and Basin Dredging), CP-2: Contractor of Package-2 (Road and Flyover), SDPD: Sub-Directorate of Port Development, ADPEL: Tanjung Priok Port Administration
SD-IPC-II: Sub-directorate Facility, Marketing & Business Development Directorate, IPC-II, TD-IPC-II-TPB: Technical Division of IPC-II, Tanjung Priok Branch, EAs: Environmental Agency, BPLHD-DKI Jakarta and North Jakarta

Table 10.4.3 (5) Monitoring Plan

No	Item of Impact	Source of Impact	Monitoring Plan						Institution for Monitoring			Possible Feedback Auction (if monitoring results failed to meet monitoring criteria)
			Objective of Monitoring	Monitoring Method	Monitoring Site	Monitoring Period	Monitoring Frequency	Analysis Method	Executor	Supervisor	Report	
2 Operation Phase												
A Spatial Aspect												
1	Maritime Traffic Activity	i. Maritime port operation <ul style="list-style-type: none"> Channel operation Basin operation ii. Maintenance dredging	To monitor increase of maritime traffic volume and accident caused by port operation	i. Item Traffic volume and number of accident ii. Method <ul style="list-style-type: none"> Collection of information on traffic volume and accident through ADPEL Interview with local fishermen iii. Criteria Increased / Maintained / Decreased	<ul style="list-style-type: none"> TP port Existing navigation route Access route to / from dumping area 	During operation phase	Every week	Interview and statistics analysis method	TD-IPC-II-TPB in collabo. with ADPEL	SD-IPC-II EAs DGSC	SD-IPC-I I ADPEL EAs DGSC	In case local fishermen made complaint or port related maritime traffic was involved in accident, TD-IPC-II-TPB, ADPEL and other parties concerned (ship operator, fishermen, etc.) have meeting to develop additional mitigation measures, such as up grade of present ship navigation system in TP port.
2	On Land Traffic Activity	i. On land port operation <ul style="list-style-type: none"> Cargo handling Cargo transportation Related business 	To monitor: <ul style="list-style-type: none"> Increase of on land traffic volume and congestion Increase of on land traffic accident caused by port operation 	i. Item Traffic volume and number of accident ii. Method <ul style="list-style-type: none"> Collection of information on traffic volume and accident through Port Police Unit of Tanjung Priok (KP3) and Local Policemen (POLSEK). Interview with local residents iii. Criteria Increased / Maintained / Decreased	<ul style="list-style-type: none"> TP port Access road to / from TP port: JI. Jampea JI. Enggano JI. RE Martadinata JI. Sulawesi 	During operation phase	Every 3 months	Interview and statistics analysis method	TD-IPC-II-TPB in collabo. with Traffic and Transportation Agency (DLLAJ)	SD-IPC-II EAs DGSC	SD-IPC-I I EAs DGSC	In case local residents made complaint or on land port related traffic caused traffic congestion or accident, TD-IPC-II-TPB, DLLAJ, KP-3, POLSEK and other parties concerned (local residents, tenants in port, etc.) have meeting to develop additional mitigation measures, such as improvement of present traffic pattern in and around TP port.
B Physico-chemical Aspect												
1	Air Quality	i. On land port operation <ul style="list-style-type: none"> Cargo handling Cargo transportation Related business 	To monitor: degradation of air quality caused by port operation	i. Item Air quality ii. Method Field sampling (8 times / 24 hours) and laboratory analysis: SO ₂ , CO, NO ₂ and TSP iii. Criteria Indonesian Government Degree No. 41, 1999	<ul style="list-style-type: none"> TP port Around entrance gate 	During operation phase	Every 6 months (rainy / dry seasons)	NDIR, Spectrophotometric and Gravimetric method	TD-IPC-II-TPB	SD-IPC-II EAs DGSC	SD-IPC-I I EAs DGSC	In case monitoring results failed to meet criteria, TD-IPC-II-TPB takes additional mitigation measures, and it is confirmed that pollutants have been originated from port related activities, such as improvement of road drainage system to reduce dust accumulation on roadside.

Note: CP-1: Contractor of Package-1 (Breakwater, Channel and Basin Dredging), CP-2: Contractor of Package-2 (Road and Flyover), SDPD: Sub-Directorate of Port Development, ADPEL: Tanjung Priok Port Administration
SD-IPC-II: Sub-directorate Facility, Marketing & Business Development Directorate, IPC-II, TD-IPC-II-TPB: Technical Division of IPC-II, Tanjung Priok Branch, EAs: Environmental Agency, BPLHD-DKI Jakarta and North Jakarta

Table 10.4.3 (6) Monitoring Plan

No	Item of Impact	Source of Impact	Monitoring Plan						Institution for Monitoring			Possible Feedback Auction (if monitoring results failed to meet monitoring criteria)
			Objective of Monitoring	Monitoring Method	Monitoring Site	Monitoring Period	Monitoring Frequency	Analysis Method	Executor	Supervisor	Report	
2	Noise and Vibration	i. On land port operation <ul style="list-style-type: none"> • Cargo handling • Cargo transportation • Related business 	To monitor increase of noise and vibration level caused by port operation	i. Item Noise and vibration ii. Method Field measurement (8 times / 24 hours) iii. Criteria DKI Jakarta Province Governor Decree No. 551, 2001	<ul style="list-style-type: none"> • TP port • Around entrance gate 	During operation phase	Every 6 months (rainy / dry seasons)	Direct measurement	TD-IPC-II-TPB	SD-IPC-II EAs DGSC	SD-IPC-I I EAs DGSC	In case monitoring results failed to meet criteria, and it is confirmed that pollutants have been originated from port related activities, TD-IPC-II-TPB takes additional mitigation measures, such as maintenance of port inner roads.
3	Sea Water Quality	i. Maritime port operation <ul style="list-style-type: none"> • Channel operation • Basin operation ii. Maintenance dredging iii. On land port operation <ul style="list-style-type: none"> • Cargo handling • Cargo transportation • Related business 	To monitor degradation of sea water quality caused by port operation	i. Item Sea water quality ii. Method Field sampling from 2 layers, field measurement and laboratory analysis: <ul style="list-style-type: none"> • Every week Temperature, pH, Salinity, Turbidity (equivalent SS), DO • Every 6 months (dry/rainy seasons) SS, COD, BOD, Ccoliform, T-N, T-P, Hg, As, Pb, Cr, Cd, Oil, PCB, PAH iii. Criteria <ul style="list-style-type: none"> • Indonesian Government Degree No. 51, 2004 and No. Kep-02 /MenKLH/I/1988 • Japanese Water Quality Standard 	<ul style="list-style-type: none"> • TP port • Existing navigation route • Access route to / from dumping area • Dumping area 	During operation phase	<ul style="list-style-type: none"> • Every 6 months (rainy / dry seasons) • Every week during maintenance dredging 	Electrometric, Gravimetric, Titrimetric, and Atomic Absorption Spectrophotometer (AAS) method	TD-IPC-II-TPB	SD-IPC-II EAs DGSC	SD-IPC-I I EAs DGSC	i. Every week items: In case turbidity (equivalent SS) failed to meet criteria, and it is confirmed that pollutants have been originated from port related activities, watch results in subsequent 2 times. If failed in consecutive 3 times, TD-IPC-II-TPB instructs contractor of maintenance dredging to take additional mitigation measures, such as: <ul style="list-style-type: none"> • reducing daily dredging and dumping volume. • installation of silt screen. ii. Every 6 months items: In case monitoring results failed to meet criteria, and it is confirmed that pollutants have been originated from port related activities, TD-IPC-II-TPB takes additional mitigation measures depending on nature of pollutants.

Note: CP-1: Contractor of Package-1 (Breakwater, Channel and Basin Dredging), CP-2: Contractor of Package-2 (Road and Flyover), SDPD: Sub-Directorate of Port Development, ADPEL: Tanjung Priok Port Administration
SD-IPC-II: Sub-directorate Facility, Marketing & Business Development Directorate, IPC-II, TD-IPC-II-TPB: Technical Division of IPC-II, Tanjung Priok Branch, EAs: Environmental Agency, BPLHD-DKI Jakarta and North Jakarta

Table 10.4.3 (7) Monitoring Plan

No	Item of Impact	Source of Impact	Monitoring Plan						Institution for Monitoring			Possible Feedback Auction (if monitoring results failed to meet monitoring criteria)
			Objective of Monitoring	Monitoring Method	Monitoring Site	Monitoring Period	Monitoring Frequency	Analysis Method	Executor	Supervisor	Report	
4	Sea Bed Sediment Quality	i. Maritime port operation <ul style="list-style-type: none"> • Channel operation • Basin operation ii. Maintenance dredging iii. On land port operation <ul style="list-style-type: none"> • Cargo handling • Cargo transportation • Related business 	To monitor degradation of sea bed sediment quality caused by port operation	i. Item Sediment quality ii. Method Field sampling and laboratory analysis: Hg, As, Pb, Cr, Cd, Ignition loss, G-size iii. Criteria <ul style="list-style-type: none"> • Every 6 months Degrade / Maintained / Improved • Once before start dredging World Bank Technical Paper No. 126, Reference Value / Testing Value 	<ul style="list-style-type: none"> • TP port • Existing navigation route • Access route to / from dumping area • Dumping area 	During operation phase	<ul style="list-style-type: none"> • Every 6 months (rainy / dry seasons) in dumping route and dumping area • Once before start dredging at areas to be dredged 	Gravimetric and Atomic Absorption Spectrophotometer (AAS) method	TD-IPC-II-TPB	SD-IPC-II EAs DGSC	SD-IPC-I 1 EAs DGSC	i. Every 6 months items: In case results classified into “Degraded”, and it is confirmed that degradation has been caused by project activities, TD-IPC-II-TPB takes additional mitigation measures depending on nature of pollutants. Even degradation has been caused by others, for example waste discharge from the rivers, TD-IPC-II-TPB makes effort to ameliorate such degradation in corroboration with concerned parties. ii. Once before start dredging items: In case monitoring results failed to meet criteria (Reference or Testing Values) conduct second survey within 1 month from 1 st sampling. If 2 nd results still failed to meet Testing values, TD-IPC-II-TPB instructs contractor of maintenance dredging to abandon disposal of dredged materials into proposed dumping area. Instead, contaminated dredged materials must be dumped into designated controlled containment dumping location. (see Fig. 10.4.14) If 2 nd results still failed to meet Reference values but lower than Testing Values, TD-IPC-II-TPB instructs contractor of maintenance dredging to take additional mitigation measures, such as <ul style="list-style-type: none"> • smaller volume dumping into wider area within planned offshore dumping area.

Note: CP-1: Contractor of Package-1 (Breakwater, Channel and Basin Dredging), CP-2: Contractor of Package-2 (Road and Flyover), SDPD: Sub-Directorate of Port Development, ADPEL: Tanjung Priok Port Administration
SD-IPC-II: Sub-directorate Facility, Marketing & Business Development Directorate, IPC-II, TD-IPC-II-TPB: Technical Division of IPC-II, Tanjung Priok Branch, EAs: Environmental Agency, BPLHD-DKI Jakarta and North Jakarta

Table 10.4.3 (8) Monitoring Plan

No	Item of Impact	Source of Impact	Monitoring Plan					Institution for Monitoring			Possible Feedback Auction (if monitoring results failed to meet monitoring criteria)	
			Objective of Monitoring	Monitoring Method	Monitoring Site	Monitoring Period	Monitoring Frequency	Analysis Method	Executor	Supervisor		Report
5	Water Supply	i. On land port operation <ul style="list-style-type: none"> • Cargo handling • Cargo transportation • Related business 	To monitor water source, quality and consumption for port activity	i. Item Water supply ii. Method <ul style="list-style-type: none"> • Quantity (Every month): Interview with workers and local residents • Quality (Every 6 months): Sampling and laboratory analysis: iii. Criteria <ul style="list-style-type: none"> • Quantity: Sufficient / Insufficient • Quality: Indonesian Government Degree No. 416/Permenkes/x/1990 	TP port	During operation phase	<ul style="list-style-type: none"> • Every 6 months • Every month 	Interview and statistical analysis method	TD-IPC-II-TPB	SD-IPC-II EAs DGSC	SD-IPC-I I EAs DGSC	In case monitoring results classified into "Insufficient" or failed to meet regulation, and it is confirmed that pollutants have been originated from port related activities, TD-IPC-II-TPB reviews existing water supply system and develop alternatives, including waste water recycle system, installation of permanent and/or temporally treatment equipment.
6	Solid Waste	i. On land port operation <ul style="list-style-type: none"> • Cargo handling • Cargo transportation • Related business 	To monitor origin and volume of garbage collected in TP port	i. Item Solid waste ii. Method Interview with DKI's cleaning agency (Dinas Kebersihan) and workers iii. Criteria Increased / Maintained / Decreased	TP port	During operation phase	Every 3 months	Interview and statistical analysis method	TD-IPC-II-TPB in collabo. with DKT's Dinas Kebersihan	SD-IPC-II EAs DGSC	SD-IPC-I I EAs DGSC	In case monitoring results classified into "Increased" and it is confirmed that pollutants have been originated from port related activities, TD-IPC-II-TPB reviews existing garbage collection system and develop alternatives, including installation of incineration equipment in TP port.
C Biological Aspect												
1	Aquatic Biota	i. Maritime port operation <ul style="list-style-type: none"> • Channel operation • Basin operation ii. Maintenance dredging	<ul style="list-style-type: none"> • To monitor change in quantity, diversity of plankton, benthos and nekton due to alteration of water and sediment quality caused by construction activities • Hg bio-accumulation in nekton 	i. Item <ul style="list-style-type: none"> • Aquatic biology • Fishery conditions ii. Method <ul style="list-style-type: none"> • Field sampling and laboratory analysis • Interview with local fishermen iii. Criteria Changed (Degraded) / Maintained	<ul style="list-style-type: none"> • TP port • Existing navigation route • Access route to / from dumping area • Dumping area 	During operation phase	Every 6 months (rainy / dry seasons)	Inventory and AAS method	TD-IPC-II-TPB	SD-IPC-II EAs DGSC	SD-IPC-I I EAs DGSC	In case monitoring results classified into "Changed (Degraded)", and it is confirmed that change or degradation have been caused by port operational activities, TD-IPC-II-TPB take additional mitigation measures depending on nature of impacts.

Note: CP-1: Contractor of Package-1 (Breakwater, Channel and Basin Dredging), CP-2: Contractor of Package-2 (Road and Flyover), SDPD: Sub-Directorate of Port Development, ADPEL: Tanjung Priok Port Administration
SD-IPC-II: Sub-directorate Facility, Marketing & Business Development Directorate, IPC-II, TD-IPC-II-TPB: Technical Division of IPC-II, Tanjung Priok Branch, EAs: Environmental Agency, BPLHD-DKI Jakarta and North Jakarta

Table 10.4.3 (9) Monitoring Plan

No	Item of Impact	Source of Impact	Monitoring Plan						Institution for Monitoring			Possible Feedback Auction (if monitoring results failed to meet monitoring criteria)
			Objective of Monitoring	Monitoring Method	Monitoring Site	Monitoring Period	Monitoring Frequency	Analysis Method	Executor	Supervisor	Report	
D Socio-economic and Cultural Aspect												
1	Regional Economy	i. On land port operation <ul style="list-style-type: none"> • Cargo handling • Cargo transportation • Related business 	To monitor change in <ul style="list-style-type: none"> • Job opportunity and business chance • Livelihood structure • Income level caused by port operation 	i. Item Regional economic ii. Method <ul style="list-style-type: none"> • Collection of information on change in local economic conditions at public office in Tanjung Priok and Koja • Interview with local residents iii. Criteria Degraded / Maintained / Improved		During operation phase	Every year	Interview and statistics analysis method	TD-IPC-II-TPB in collabo. with local government	SD-IPC-II EAs DGSC	SD-IPC-I I EAs DGSC	In case monitoring results classified into "Degraded", and it is confirmed that degradation have been caused by port related activities, TD-IPC-II-TPB take additional mitigation measures, such as: <ul style="list-style-type: none"> • further employment from regional communities. • assistance to regional development programs.
2	Public Health	i. On land port operation <ul style="list-style-type: none"> • Cargo handling • Cargo transportation • Related business 	To monitor health hazard on workers and residents in vicinity caused by port operation	i. Item Public health ii. Method <ul style="list-style-type: none"> • Collection of information on regional health condition at medical facilities in vicinity • Interview with workers and local residents iii. Criteria Degraded / Maintained / Improved	TP port and surrounding Kelurahans, especially Tanjung Priok and koja	During operation phase	Every year	Interview and statistics analysis method	TD-IPC-II-TPB	SD-IPC-II EAs DGSC	SD-IPC-I I EAs DGSC	In case monitoring results classified into "Degraded", and it is confirmed that degradation has been caused by port related activities, TD-IPC-II-TPB take additional mitigation measures, such as assistance for having sufficient medication.

Note: CP-1: Contractor of Package-1 (Breakwater, Channel and Basin Dredging), CP-2: Contractor of Package-2 (Road and Flyover), SDPD: Sub-Directorate of Port Development, ADPEL: Tanjung Priok Port Administration
SD-IPC-II: Sub-directorate Facility, Marketing & Business Development Directorate, IPC-II, TD-IPC-II-TPB: Technical Division of IPC-II, Tanjung Priok Branch, EAs: Environmental Agency, BPLHD-DKI Jakarta and North Jakarta

(1) Monitoring Schedule

Figure 10.4.9 shows a possible time schedule, including duration, timing and frequency of monitoring surveys and measurements, throughout the project phases. In this figure, in order to present appropriate timing of the surveys and measurements, related key construction activities are also indicated.

It is noted, however, that due to some uncertain factors with regard to the construction methods to be actually employed, this monitoring schedule should be reviewed and, if necessary, modified at the time of commencement of the construction and port operations.

(2) Monitoring Criteria

Monitoring criteria have been established with due consideration of relevant national legislations, standards and present environmental conditions in and around the project area.

In this EMP, there are two types of monitoring activities as follows:

- Monitoring Survey: Monitoring of impacts on socio-economic and biological conditions by means of interviews and/or visual inspections.
- Monitoring Measurement: Monitoring of physical impacts on air, water, seabed material qualities by means of field measurements and/or laboratory analyses.

1) Criteria for monitoring surveys

The answers of interviews and visual inspections for socio-economic and biological impacts are classified or chosen from the following alternatives, depending on the feature of the impacts.

Satisfied / Dissatisfied

Serious / Moderate / Minor

Increased / Maintained / Decreased

Improved / Maintained / Degraded

2) Criteria for monitoring measurements

The criteria in the field measurements and laboratory analyses for physical impacts are permissible level of measured values and allowable exceeding frequency of the permissible level which is a criterion of final judgment whether feedback action should be taken or not.

The former criteria are shown in Table 10.4.1 as Applicable Standards. It is understood that some parameters in the table presently failed to meet its standard values.

In this case, the results of monitoring will be evaluated carefully whether realized impacts have been caused by the project or not, and these criteria may be reviewed, reflecting the results of continuous monitoring in the course of the project implementation.

The latter criteria are defined as follows, considering the accuracy of the measurements and variation of metrological and hydraulic conditions in the field of the monitoring measurements.

Weekly measurement for Water Quality:

Consecutive 3 times

Once before start dredging for Sediment Quality: Consecutive 2 times

In case of sediment quality measurements, 2nd measurement should be conducted not later than one (1) month from the day of 1st field sampling.

Figure 10.4.10 shows locations of the monitoring measurements in construction phase. The primary measurement points outside the port area are located on the dotted lines which were designated in the EIA documents as project boundaries. In the operation phase, these locations may be appropriately modified reflecting the results obtained in the construction phase.

3) Implication of World Bank's Standard Levels for seabed material quality

Since there is no seabed material quality standard in Indonesia, the results of monitoring measurement will be evaluated comparing with the permissible levels on heavy metal concentration in dredged material, which was presented in the World Bank's Technical Paper No. 126. Definition of the values are explained in the paper as shown in Figure 10.4.8.

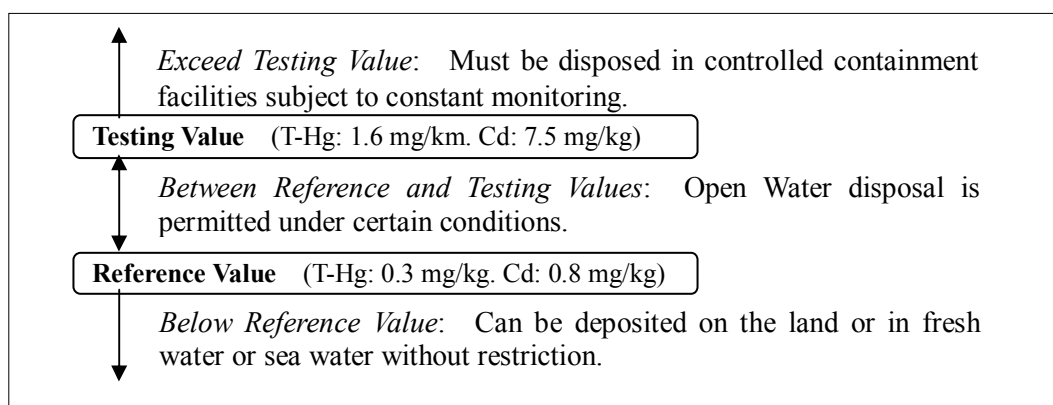
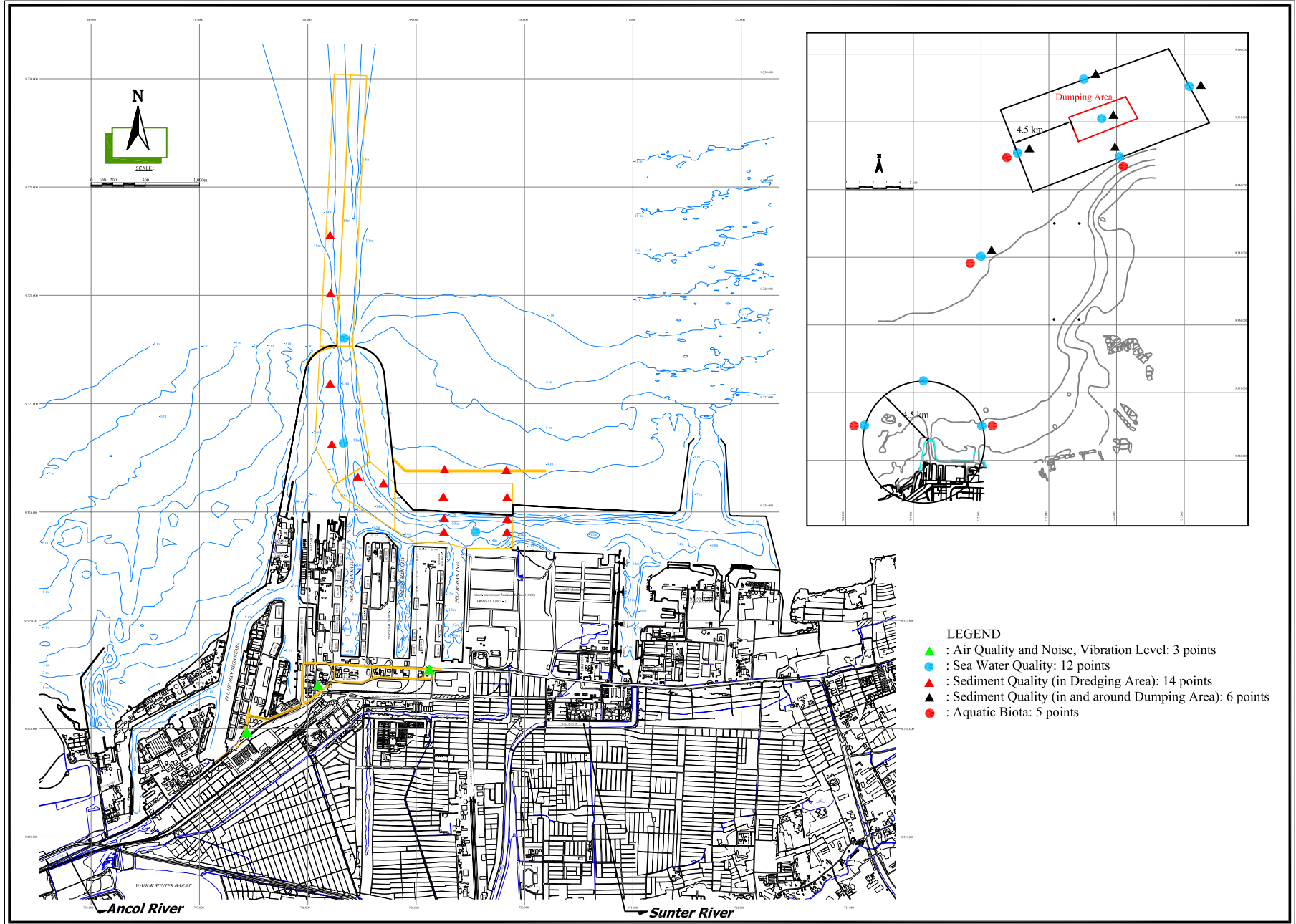


Figure 10.4.8 Definition of World Bank's Standard Levels

As shown in Figure 10.4.5, T-Hg and Cd concentration levels in the seabed materials to be dredged in the construction stage met the Testing Values and even lower than the Reference.

Considering the above site conditions, the Testing Values and Reference Values were selected as the monitoring criteria for dredging and dumping operations in this project as described in Table 10.4.(3).

Figure 10.4.10 Monitoring Location
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10.4.7 Responsibilities and Authorities for Implementation of Mitigation Measure and Monitoring Plan

Relationship among the responsible bodies specified in Table 10.4.2 and 3 is illustrated in Figure 10.4.11. Arrows in the figure showing the relationship are:

- Supervise: includes evaluation of mitigation records and results of monitoring activities, instruction of additional mitigation measures, and suspension of construction works, etc.
- Join with: includes consultation on traffic control, social security, maritime safety, regional waste discharge control, environmental conservation promotion, etc.

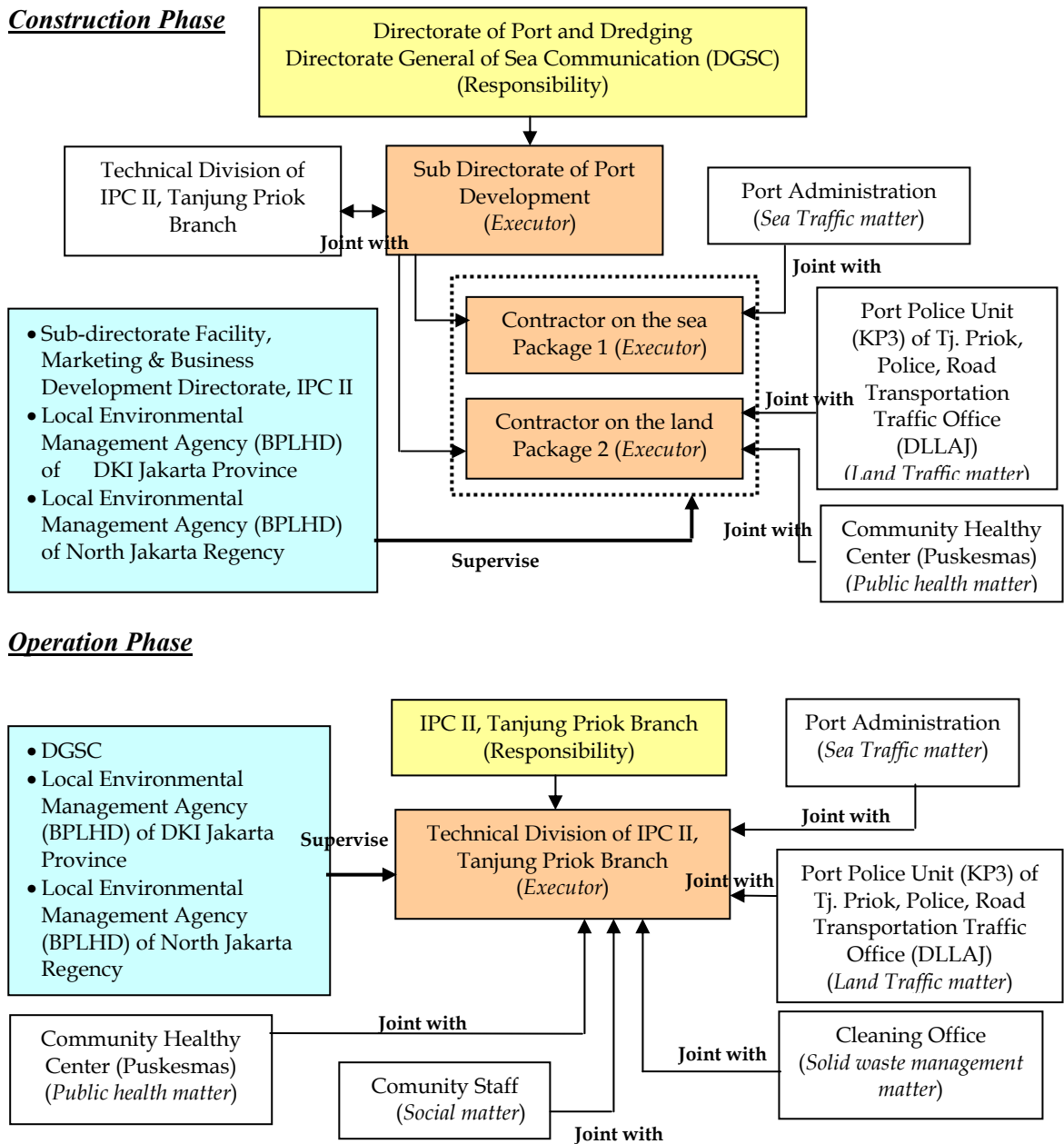


Figure 10.4.11 Relationship Among Responsible Bodies

10.4.8 Environmental Awareness Promotion, Education and Training for Construction Workers

A number of skilled and unskilled workers will be employed by the contractors and sub-contractors during the construction phase.

Each contractor and sub-contractor should ensure that new employees and those who changed job assignment are properly oriented to the new job and introduced to new associates, and are given adequate information related to this EMP in order to be safety-conscious, knowledgeable, effective and productive workers.

The programs to be provided by the contractors and sub-contractors to the workers will include the following items.

- General health and safety policy and pertinent provisions of Indonesian regulations.
- Employee's responsibilities to protect property, health and safety of others.
- Employee's responsibilities to report all accidents.
- Medical facilities and required treatment.
- Procedures for reporting or correcting unsafe conditions or practices.
- Safe clearance procedures.
- Fire fighting and other emergency procedures.
- Job hazard and activity hazard analysis and accident prevention.
- Segregation of vehicular and pedestrian traffic.
- Alcohol/drug abuse policy.
- Prevention of HIV/AIDS and other sexual infection.

10.4.9 Environmental Monitoring Work Plan

In Tanjung Priok Port, a series of environmental monitoring have started 10 years ago and the results have been reported to the concerned environmental agencies in a present reporting form since 5 year ago. IPC-II Tanjung Priok Branch is responsible for this environmental monitoring.

Scope of the monitoring covers socio-economic, biological, physico-chemical conditions in and around the port.

Therefore, several environmental monitoring activities for this project will be planned and implemented in coordination with the above monitoring program, so that results of both monitoring programs can be utilised effectively and economically.

Organization structures of Technical Division of IPC-II, Tanjung Priok Branch, which has been directory involved in the monitoring activities, and possible contractors are as follows.

(1) Technical Division of IPC-II, Tanjung Priok Branch

As shown in Figure 10.4.12, there are seven (7) divisions and Sub-division of Planning (indicated with red colour) is in charge of the environmental monitoring.

In the sub-division, there are four (4) staff who are responsible for technical survey works, planning, technical management and environmental management.

Apart from the preparation of annual environmental monitoring report, the last staff supervises following environmental management activities.

- Periodical clean up along the port inner roads in collaboration with a local agency.
- Periodical garbage clean up over water surface in the port area by eight (8) collection and two (2) transportation ships.
- Periodical collection and disposal of general garbage received from calling ships and port related facilities at an incineration facility in Marunda Village.
- Collection of contaminated / toxic garbage received from calling ships.
- Maintenance of green area in the port including water sprinkling using waste water collected from buildings in the port.

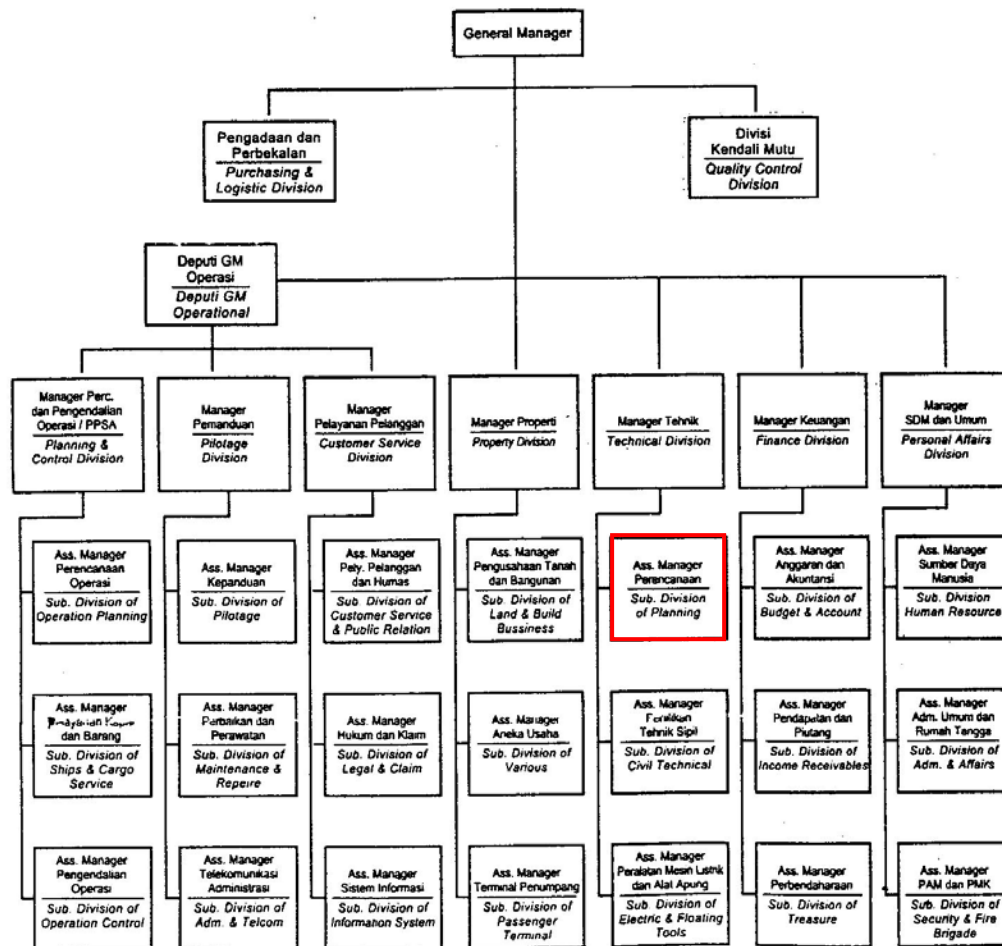


Figure 10.4.12 Organization Chart of IPC-II Tanjung Priok Branch

(2) Contractors

In case of contractors, they should provide EMP staff in accordance with the staffing levels. The items described below are recommended, as examples, for the EMP of this project.

- Project Manager will have overall and particularly legal responsibilities in the EMP.

- Contract Manager will have day-to-day responsibility in the EMP.
- Construction Manager will be directly accountable in all matters concerned to the EMP. He will have responsibility to Contract Manager; approval of staffing, technical resources and finance; according to Environmental Officer's request to implement the EMP during the construction period.

Specifically, the Construction Manager will:

- ✓ Provide resources and support to implement this EMP,
- ✓ Ensure that employees are recognized, and be accountable for their EMP performance,
- ✓ Ensure that constructor's meetings are held and documented, and that appropriate topics are covered,
- ✓ Ensure that training is attended by employees, including introduction of this EMP to all the new comers at worksites,
- ✓ Communicate information on environmental-friendly practices to affected employees,
- ✓ Ensure that inspections are conducted, corrective actions are taken and records are maintained,
- ✓ Investigate and follow-up on environmental incidents/accidents,
- ✓ Provide a good example to employees, by integrating EMP issues into staff meetings and daily work activities as appropriate, and
- ✓ Provide information to the Contract Manager and the Project Manager on EMP performance.
- Chief Engineer will be responsible for determining construction activities that minimize environmental pollution, or reviewing construction technology, equipment, etc. so as to have feedback actions for environmental protection.
- Environmental Officer will supervise and monitor compliance with the EMP, organize and provide environmental orientation to the staff of the contractors, and audit the operation of the EMP in accordance with a rolling program to be submitted, from time to time, to the consultant for his consent.

The Environmental Officer should be vested with powers which would enable him to:

- ✓ Take urgent, appropriate and direct actions in order to 1) ensure environmental protection, 2) prevent polluting working practices, and 3) correct improper or inadequate environmental mitigation measures or other infringements of the detailed EMP or environmental regulations, and
- ✓ Instruct employees of each contractor or of its subcontractors to 1) cease operation; or 2) take urgent and appropriate actions for environmental mitigation at the working area; and 3) prevent polluting practices or other infringements of the EMP or the environmental regulations.
- Safety Officer will provide inputs in safety matters related also to environmental protection.

10.4.10 Cost for Environmental Monitoring

Necessary costs for the the environmental monitoring in the construction phase, consisting of costs for monitoring measurements to be conducted by the contractors (Package 1 and 2) and employment of consultants for periodical execution of monitoring surveys are estimated as shown in Table 10.4.4.

Table 10.4.4 Required Costs for Environmental Monitoring

Package-1

Code	Item	Frequency	Parameter	Unit	Unit Cost (JPY)	Quantity		Cost (JPY)	Remarks
						Point	Time		
1B3	Sea Water Quality (1)	Every Week	Temp., pH, Salinity, Turbidity	time · point	2,712	12	140	4,556,160	Sampling from 2 layers
	Sea Water Quality (2)	Every Month	SS, COD	time · point	3,118	12	37	1,384,392	Sampling from 2 layers
	Sea Water Quality (3)	Every 6 Months	BOD, Col. T-N, T-P, Hg, As, Pb, Cr, Cd, Oil, PCB, PAH	time · point	31,964	12	6	2,301,408	Sampling from 2 layers
	Sub-total							8,241,960	
1B4	Sediment Quality (1)	Every 6 Months	Hg, As, Pb, Cr, Cd, I-Loss, G-size	time · point	18,980	6	6	683,280	1 sample from seabed
	Sediment Quality (2)	Before Dredging	Hg, As, Pb, Cr, Cd, I-Loss, G-size	time · point	18,980	1	14	265,720	1 sample from seabed
	Sub-total							949,000	
	Total							9,190,960	
	Tax (10% of Total)							919,096	
	Grand Total							10,110,056	

Package-2

Code	Item	Frequency	Parameter	Unit	Unit Cost (JPY)	Quantity		Cost (JPY)	Remarks
						Point	Time		
1B1	Air Quality	Every 6 Months	SOx, CO, NOx, SPM	time · point	76,948	3	6	1,385,064	8 samples in 24 hours
1B2	Noise and Vibration	Every 6 Months		time · point	54,825	3	6	986,850	8 samples in 24 hours
	Total							2,371,914	
	Tax (10% of Total)							237,191	
	Grand Total							2,609,105	

Consultant (1)

Code	Item	Frequency	Parameter	Unit	Unit Cost (JPY)	Quantity		Cost (JPY)	Remarks
						Point	Time		
1C1	Aquatic Biology	Every 6 Months	Planktons, Benthos, Nekton, Hg bio-accumulation	time · point	121,839	5	6	3,655,170	
	Tax (10% of Total)							365,517	
	Grand Total							4,020,687	

Consultant (2)

Code	Item	Frequency	Parameter	Unit	Unit Cost (JPY)	Quantity		Cost (JPY)	Remarks
						Month			
	Foreign Env. Expert		Remuneration	month	2,000,000	6		12,000,000	1 month x 6 times
			Allowance	month	150,000	6		900,000	
			Accommodation	month	180,000	6		1,080,000	
			Airfare	r-trip	350,000	6		2,100,000	
	Total							16,080,000	
	Tax (10% of Total)							1,608,000	
	Grand Total							17,688,000	

10.4.11 Mechanism for Feedback

Effectiveness of the mitigation measures is to be continually monitored, following the monitoring schedule presented in Figure 10.4.9.

In case that the monitoring results failed to meet the monitoring criteria and judged that current mitigation measures are inadequate, the measures will be revised/adjusted so that future monitoring results can achieve the monitoring criteria as shown in Figure 10.4.13.

By making the above process open for public to see, as presented in the figure, good public relations can be established and kept throughout the project phases.

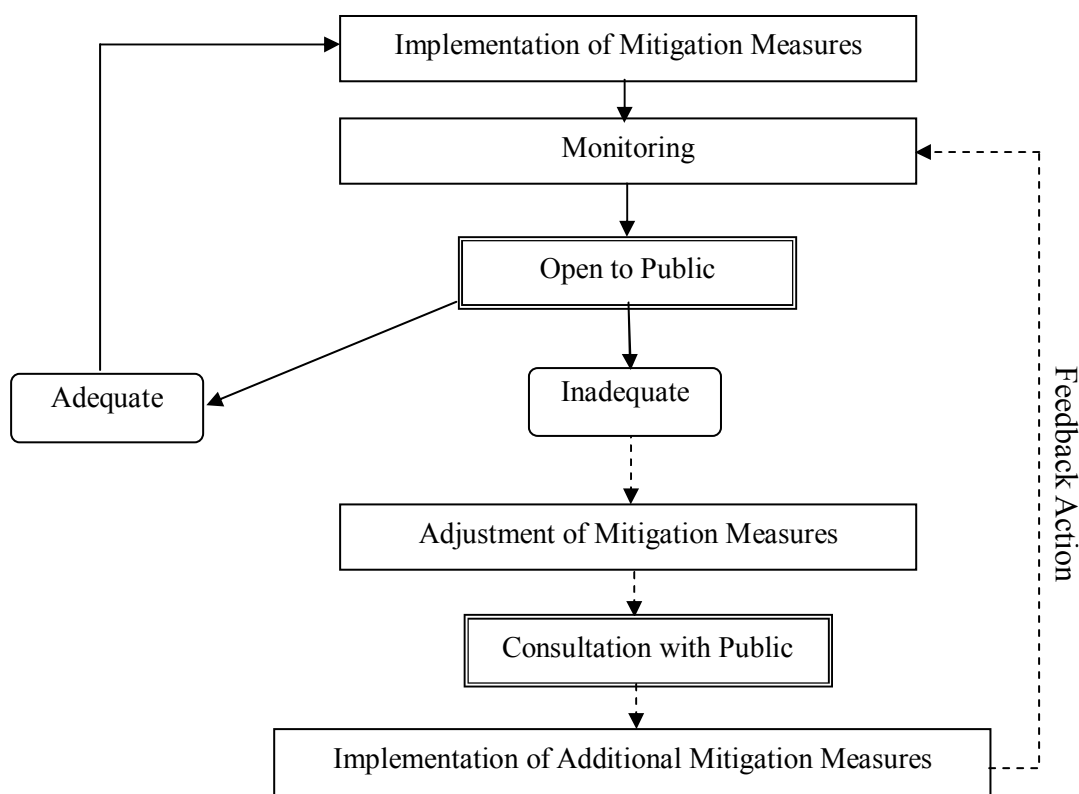


Figure 10.4.13 Flow of Feedback Action

10.4.12 Consideration for Preparing Detailed Design and Tender Documents

(1) Considerations for Preparing Detailed Design

1) Utilization of reusable construction waste

In some cases, construction waste becomes usable materials in other cases. It will ameliorate both negative potential impacts simultaneously, disposal and transportation of materials.

In this project, certain amount of foundation material of the existing breakwaters to be relocated has been confirmed that its quality satisfies as replacement materials of weak soil for the planned new breakwaters.

Hence, the new breakwaters were designed to use the above reusable material as much as possible.

2) Minimization of land acquisition area

Improvement of existing inner road and construction of new flyover structure require land acquisition.

Since the areas along the construction sites have occupied by several land owners and users, acquisition of their territory and construction works may have significant impact on their daily activities.

Hence, the arraignment of inner road improvement and flyover structure was planned to minimize not only the total area to be acquired but also the number of parties to be involved.

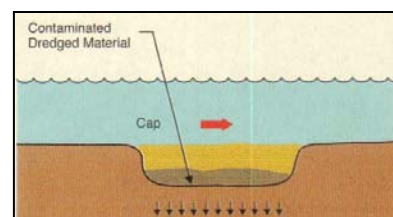
3) Dumping of highly contaminated seabed material

As mentioned in Section 10.4.4.(1), there is a possibility to encounter highly contaminated seabed materials which exceed monitoring criteria (World Bank's Testing Values) in the area to be dredged. In this case, these materials must be dredged and disposed in the controlled containment as shown in Figure 10.4.14.

Considering the bathymetric (30m in depth) and hydraulic (80-100 cm/sec in current velocity) conditions in the planned dumping area, it may difficult to control the contaminated material as shown in the Figure.

Therefore, it is recommended to allocate possible location of the controlled containment in the area which is closer, shallower and calmer than the proposed dumping area.

Scale and detailed dimensions of the containment can not be decided at the moment. However, considering the results of seabed quality survey in JICA D/D Study, it is preferable that the possible containment has a capacity to receive the dredged materials in one (1) m thickness from the one-fourth of the total planned dredging area.



Source: Environmental Guidelines for Aquatic, Nearshore and Upland Confined Disposal Facilities for Contaminated Dredged Material, PIANC, 2002

Figure 10.4.14 Example of Containment Disposal

(2) Considerations for Preparing Tender Documents

1) Environmental management plan prepared by contractors

The contractors are responsible for implementation of individual environmental management plan of each contract.

In the tender documents, showing the environmental characteristics in and around the project area and several required environmental mitigation measures, the environmental management plans proposed by the possible contractors will be evaluated carefully in the process of contractors selection.

The environmental characteristics to be considered are:

- Construction works within crowded areas with local maritime and on-land traffics,
- Required large amount of dredging and dumping within limited time schedule,
- Possibility of encounter with contaminated seabed material to be dredged, and
- Existence of coastal fishery activities in and around the proposed dumping area.

2) Monitoring measurements to be carried out by contractors

The contractors are responsible for carrying out monitoring measurements. Required specifications of the monitoring, including criteria, methods, locations, periods and frequency, should be clearly mentioned in the tender documents for bidder's reference.

In order to secure reliable monitoring measurements, adequate budget should be allocated in the bidding prices.

3) Human resource for environmental management

Sufficient human resource for implementation of environmental management should be assigned by the contractors. An example of staffing is presented in Section 10.4.9(2). Beside the staff at the sites, the contractors should be possible to obtain supportive consultation from their headquarters with regard to the possible environmental issues they may confront in the sites.

**CHAPTER 11 CONCLUSIONS AND
RECOMMENDATIONS**

11 CONCLUSIONS AND RECOMMENDATIONS

Since the Project has been justified in view of engineering, economic and environmental soundness, it is strongly recommended that the Project should be urgently implemented in order to ease the traffic congestion in the port and secure efficient and safe port operation.

To this end, DGSC and IPC-II should organize a Project Management Unit and proceed to the selection of the supervision consultant and contractor (s).

DGSC and IPC-II, in the course of the Project implementation, should strictly observe the Environmental Management Plan (EMP) that has been prepared by the JICA D/D Team, and make strenuous efforts to curtail the environmental deterioration that could be caused by the Project in and around the Project area. Furthermore, DGSC and IPC-II should organize the security control unit through which well-woven safety measures should be taken to prevent any traffic accidents or mishaps during the period of the construction.

The construction of the Pasoso flyover should be preceded by land acquisition for the construction site, particularly for the area outside the port-control zones. DGSC and IPC-II should urgently commence the negotiation procedures with the land owners concerned.