Directorate General of Fisheries Product Processing and Marketing
Directorate General of Capture Fisheries
Ministry of Marine Affairs and Fisheries
Republic of Indonesia

THE STUDY ON DISTRIBUTION MECHANISM REFORM THROUGH DEVELOPMENT OF WHOLESALE MARKET (IMPROVING OF POST HARVEST HANDLING AND MARKETING FACILITIES) IN INDONESIA

FINAL REPORT

DECEMBER 2011

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

OAFIC CO., LTD.
ORIENTAL CONSULTANTS CO., LTD.

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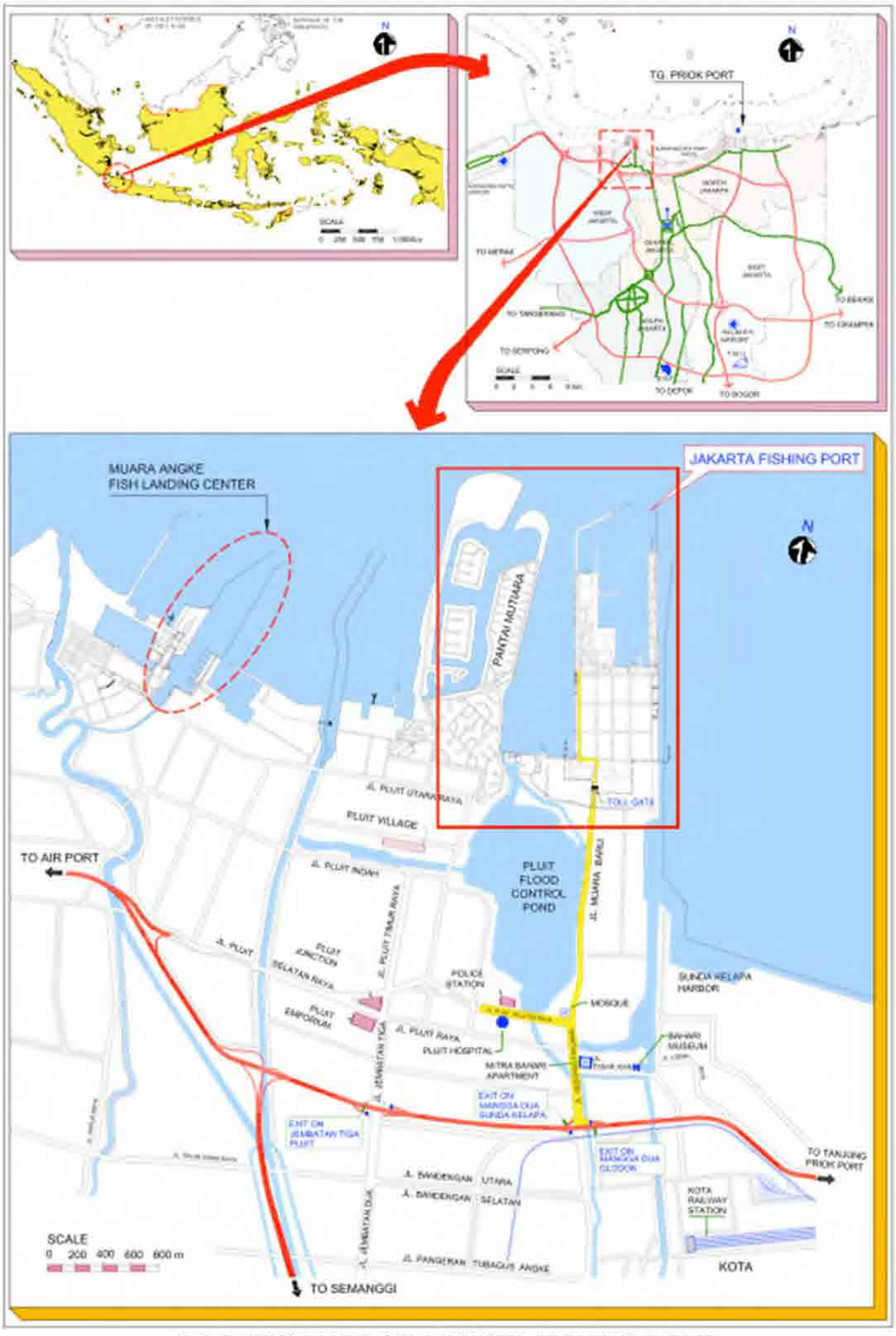

LOCATION MAP OF JAKARTA FISHING PORT

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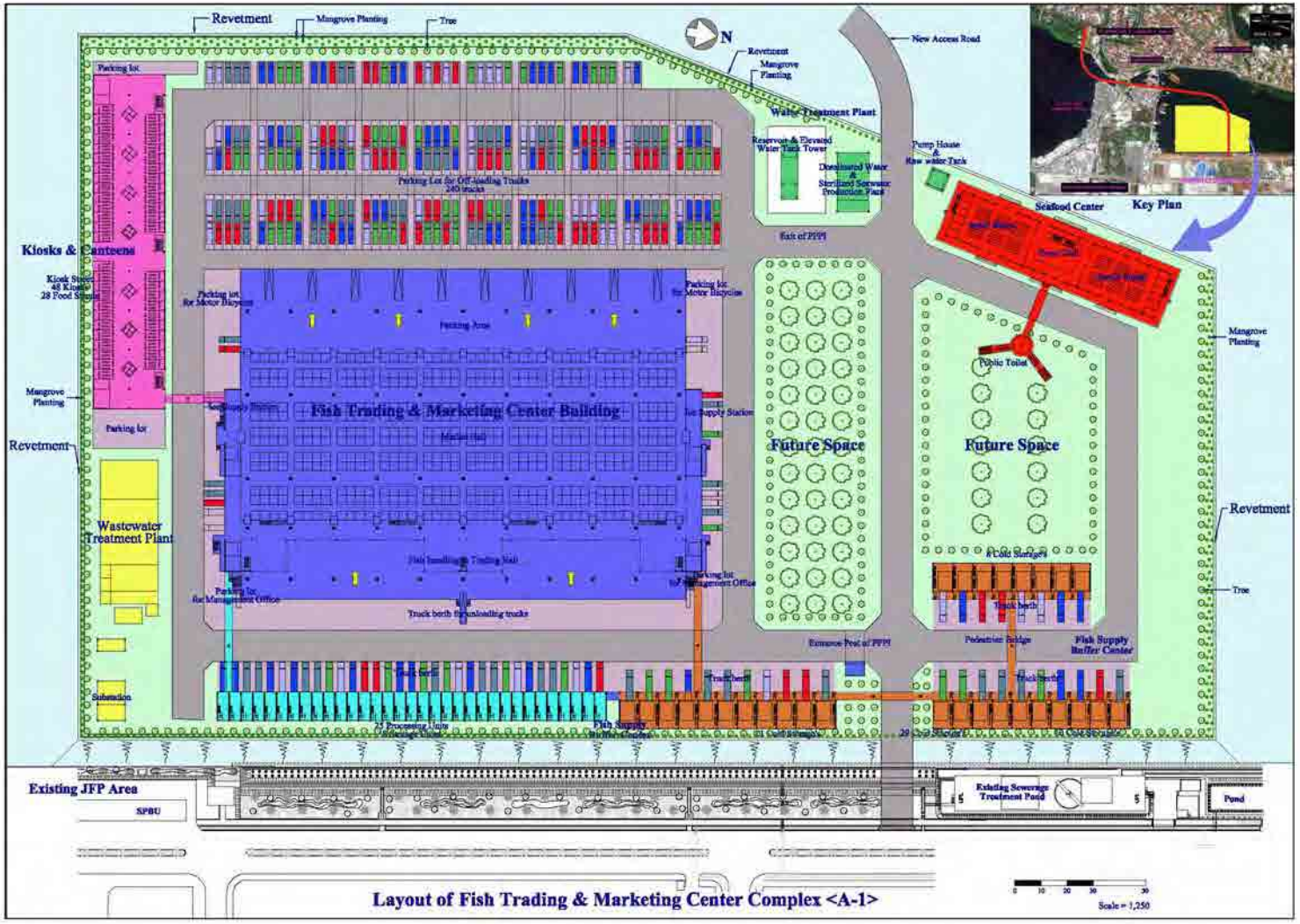


PROJECT LAYOUT PLAN (RECOMMENDED OPTION)

JFP Fish Wholesale Market Complex

Fish Trading and Marketing Center (PPPI) - Overview

Market Hall in PPPI

Fish Handling & Trading Hall in PPPI

EXECUTIVE SUMMARY

1. Introduction

The total marine fish harvest in Indonesia reached 4,862,800 tons (t) in 2008, indicating that current fishing effort has already reached the maximum harvestable level, especially for reef and demersal fish, shrimp, and squid in most fishing areas. However, a recent survey showed that there are still abundant fish resources, especially small and medium pelagic, in the Seram, Sulawesi, and Arafura Seas and in the Pacific Ocean. However, there is a lack of physical infrastructure for fish landing, processing, and transport and marketing close to these rich fishing grounds.

Indonesia is now the world's third largest fish producing country after China and Peru. The country's total fish production reached 10.06 million t in 2010, more than double its production of 4 million t in 2000. This remarkable increase in fish production is attributed to the increase in capture fisheries production by 28% and in aquaculture production by 397.4% in the last 10 years. The country's exports of fish and fishery products have decreased slightly in volume (by 1.42%) but increased in value (by 41.1%) since 2005.

Indonesia's primary industries account for 13.7% of gross domestic product (GDP) (2007), about 40% of the total working population, and about 70% of poor people in the rural areas. Fishery products contribute about 2/3 of the animal protein intake of the Indonesian people. The distribution of agro-fishery products produced by small-scale farmers/fishers, who are assumed to belong to the poverty group, are mostly sold directly to middlemen without passing through public markets due to the lack of marketing and distribution infrastructure and their limited access to markets and market information. Farmers/fishers are therefore in a very weak position in terms of price determination and the sale of their products. In addition, the wholesale markets, as distribution centers of agro-fishery products, have generally become older, do not have enough space, and are unhygienic. Also, the products, whose handling take a longer time, lose freshness and/or are of poorer quality. As a result, a large portion of post-harvest loss occurs at the distribution stage.

Fish supply to the Indonesian capital, Jakarta (with a population of approximately 9.14 million) comes from various areas of Java and the southern part of Sumatra, including Surabaya as the farthest point, and is landed at the wholesale market of the Jakarta Fishing Port (JFP). **This wholesale market is the largest in Indonesia, handling approximately 71,000 tons (t) annually through several thousands of fish brokers and buyers. With the increasing demand for fish and the observed reduction in volume of fish landings from fishing vessels at JFP, this wholesale market has become an important fish distribution point to ensure a stable fish supply for the population of Jakarta and nearby areas.** However, this wholesale market is facing several problems, including the (i) inferior sanitary condition and inadequate working environment because of damage caused by ground sinking and insufficient water supply and drainage facilities, (ii) heavy traffic at access roads caused by flood during high tide, and (iii) insufficient supply of ice needed to preserve the freshness of landed fish.

It is against this background that the Government of Indonesia (GOI), through the Ministry of Agriculture and the Ministry of Marine Affairs and Fisheries (MMAF), requested the Japanese Government for technical assistance for the conduct of a development study (feasibility study) on distribution mechanism reform through the development of a wholesale market (improvement of postharvest handling and marketing facilities) in 2007.

In response to this request, JICA dispatched a two survey missions to Indonesia in May and November 2009 to hold discussions with GOI on the proposed Study. The Minutes of Meeting (M/M), including Scope of Work for the Study (Fishery), was signed between MMAF and JICA on 17 December 2010.

This Final Report contains the findings and recommendations of the JICA Study Team based on their field works in Indonesia from March 9 to May 7, 2011 and from July 10 to16, 2011 and comments from both the Indonesian and the Japanese officials concerned. The report presents the results of the Study Team's analysis of the current situation of fish handling, distribution, and marketing at the JFP wholesale market (JFPWM) and their recommendations with respect to the improvement of fish wholesale and related facilities and services, including the proposed fish distribution mechanism.

2. JFP Wholesale Market and Related Facilities: The Current Situation

Current Situation and Future Prospects of Fisheries around JFP. The JFP has been constructed in phases since 1980 and has been playing an important role as an integrated fish landing, marketing, and processing center. The JFP auction hall (TPI) and fish wholesale market (PPI) were constructed in 1984 and 1992, respectively. Since then, the PPI has been operational, providing some 71,000 t of fish (2009) to the population not only in DKI Jakarta but also to most parts of Java. In 2009, the total volume of fish landings amounted to 44,300 t, of which 10,889 t (equivalent to 24.6%) in 2009 was marketed through PPI/ JFP, and the balance was either exported or processed in plants located mostly within the JFP industrial complex. Due to the stagnant marine fish catches especially around Java, fish landings have been decreasing from year to year, except in 2009. On the other hand, the volume of fish transported over land to the JFP has been increasing on an annual basis. It has also been observed that the proportion of frozen fish has increased compared to those landed fresh.

Current Condition of the Existing JFP Wholesale Market. The existing wholesale market and related facilities are located at the south end of the JFP. It is operated and managed by PERUM-PPS, a public corporation. The wholesale market building has deteriorated, and about half of building needs to be reconstructed to improve its structural strength. At The WM has 992 booths for wholesale marketing, but only 942 booths are occupied by 390 registered users. However, in fact, some booths are sub-leased, non-registered booths are used, and about 15% of area is not used for wholesaling. In addition, the horizontal passages are only 1m wide, and 50% of the passages are occupied by fish containers, and although the vertical passages are wide enough (2.5m), these passages are also used for the display of fish. As a result, the existing JFPWM is always congested, and the flow of fish and people very difficult. Furthermore, there is no restriction on the usage of the booths, and no control or guidance is given to the lessees by the operator (PERUM).

Jl. Muara Baru is the only existing access road to JFP. The road is 8m wide and is a concrete (ridged) paved road. Some areas suffer from flooding throughout the year during high tide. Recent records show that this road was heavily inundated during the high tide experienced on 28-29 January 2006. The road is usually heavily congested due to (i) mixed traffic caused by public transport, motorbikes, Bajaj, trucks, and cars; (ii) illegal parking; (iii) occupancy of illegal houses, vendors, and shops; and (iv) lack of a road shoulder or pedestrian space. A study currently being conducted with Netherlands Government assistance showed an annual settlement rate of 16.2 cm, on average, from 2006-2010.

Around the existing wholesale market site are the JFP fish processing industry estate to the north and east, MMAF's Marine Fisheries Research Institute (BRPL) to the south, privately owned land to the west, and the corner of the water basin to the northwest. An analysis of the possibility of landward expansion of the existing site showed that it will be difficult to obtain the surrounding land for the following reasons: (i) the vacant lots of the JFP fish processing industry estate have already been leased out; (ii) it will take a long time and complicated procedures for the BRPL to be relocated; and (iii) the current market price of land around the JFP is approximately Rp10 million per sq m, which is too high and unaffordable. Therefore, any site expansion for proposed facilities will have to be done through reclamation of the water basin.

Present Situation of Fish Distribution and Marketing in JFPWM. Some 71,043 t of fish were landed and handled in the PPI/JFP in 2009, equivalent to about 195 t/day, of which 85% were transported by land and 15% by direct landing at JFP. More than 46% of the total volume of fish brought to PPI/JFP comes from West Java, followed by DKI Jakarta with 15% of total, including 924 t of imported frozen fish. By species, 50% of the total volume is composed of small pelagic; 33%, freshwater fish; and 10%, medium and large pelagics. About 90% of all fish (except fresh tuna) are frozen and immediately brought to the cold storage for sorting. The remaining 10% is fresh and displayed in the auction hall for sale after weighing. However, auction has not been practiced in Indonesia since 2000, and instead, fish are marketed through negotiated transactions with wholesalers.

The fishes are transported in barrels to the wholesale booths after ocular inspection and then transferred to the wholesalers' own containers. They are sorted by size in the wholesale booths and

sold to 750-1,000 fish buyers after weighing. The payment is made in cash after price negotiations. Fish buyers comprise 90% of those engaged in buying fish in the PPI/JFP, and the rest are fish retailers (8%) and fishing boat owners and fish farmers (2%). Most of fish are transported by pick-up trucks to their destinations by groups of fish buyers. The fish buyers start to distribute fish to their clients (fish retailers, caterers, and restaurants) from 0100-0600 hrs. Payment from retailers to brokers is made in cash either on the spot or with a one-day deferment. The average mark-up from the wholesaler to the retailer is 30.6%, and are 70.9% and 92.6% for a hypermart and a department store, respectively.

The quality control function rests with DKI Jakarta, specifically the North Jakarta Sub-district Office, in the case of the PPI/JFP. Under DKI Jakarta is a provincial quality control laboratory, the Center for Development and Control of Fishery Products (CDCFP), located in Pluit. For fish markets, fish inspectors are dispatched once every three months to conduct random checks on the quality of fish.

Current Status of Operation and Maintenance (O&M) of JFPWM. The existing JFPWM is operated and managed by (i) UPT-PPSJ or the JFP Technical Implementation Unit under MMAF, and (ii) PERUM (Prasarana Perikanan Samudera) or Ocean Fisheries Infrastructure Public Corporation.

UPT-PPSJ is responsible for the O&M of non-income generating facilities, control of illegal fishing, and fishery-related statistics in the JFP. The main roles of UPT-PPSJ in the wholesale market are cleaning and repair of buildings/facilities, crowd control, and inspection of the market. UPT-PPSJ has 84 government staff, 30 security personnel, and 100 cleaning workers. The annual O&M cost of UPT-PPSJ in 2008-2010 varied from Rp7.5-9.3 billion.

PERUM PPS has 84 staffmembers responsible for O&M of the income-generating facilities of eight national fishing ports and the JFP Branch. Its roles in the wholesale market are: (i) leasing of market space and other related spaces and land; (ii) supply, control, and sale of electricity; (iii) sale of ice; and (iv) sale of water. The annual revenue of PERUM-PPS ranged from Rp39.2-51.4 billion, while its annual expenditure amounted to Rp37.2-47.2 billion, with profits increasing on a yearly basis. The operation of the wholesale market also brought a certain profit. However, it is difficult to make a conclusion on the soundness of PERUM's financial status in terms of operating ratio, breakeven point, benefits:cost ration (BCR), and return on sales.

Demarcation of Wholesale Markets between JFP and Muara Angke. The existing wholesale markets of both JFP Muara Baru and Muara Angke are located inside different fishing ports within a range of only 3 km. The former has been operated and managed by UPT-PPSJ (central government) and PERUM-PPS (public corporation) since 1983, while the latter has been operated and managed by the local government (DKI Jakarta) and by the local fishers and wholesalers' cooperative (Koperasi Mina Jaya) since 1977.

Both markets have the same wholesale functions and the same level of fish handling volume (approx. 200 t/day). There are no distinct differences in the origin and destination of fish, including composition of fishery products. The only differences can be found in the scale of fishing boats, fish market-related stakeholders, and direct contribution to consumers. At present, there is a very limited linkage between these two wholesale markets, and there is no cross distribution of fish between them. About 97% of the wholesalers and 89% of the fish buyers in Muara Angke would not move to the JFP wholesale market even if the facilities and access road of JFP were improved, citing the wide variety of good-quality fish and longstanding relationships between sellers and buyers.

Problems and Issues to be Addressed by the Proposed Project. The existing JFPWM does not serve as a central fish trading and marketing center in Indonesia, and instead, functions only as a wholesale market similar to Muara Angke. Considering its present condition vis-à-vis the estimated future demand for fishery products in DKI Jakarta and surrounding regions, a number of problems and issues have been identified, namely: (i) traditional transaction system; (ii) limited space in the wholesale market without demarcation of activities; (iii) limited access to the JFP; (iv) limited capacity of cold storage and fish processing facilities for domestic use; (v) no facilities attractive for consumers; and (vi) poor quality of fish handled in the market.

3. Findings and Recommendations of the Feasibility Study

3.1 Overall Project Concept and Components

The area surrounding the JFP, including Muara Baru and Muara Angke, is being planned for integrated development under the *Jakarta Fisheries Waterfront Development Project*, which will include not only fish handling, marketing, and distribution facilities but also those related to fish producers and consumers. Considering this higher level development plan, **it is proposed that the JFPWM be developed as (i) a fish trading and marketing center (PPPI), an upgrade from the existing PPI); (ii) a fish supply buffer center; and (iii) an seafood plaza.**

The JFPWM will be improved/upgraded, and a reform of the wholesale market mechanism will be introduced in the following two stages:

Stage 1: Demarcation of Work Space Based on the Existing Mechanism

- Demarcation of the area by type of operation, into (i) fish handling/trading area, (ii) transit area, and (iii) market hall;
- Strengthening of fish inspection system (allocation of full-time inspectors and conduct of daily organoleptic inspection);
- Identification of market-related stakeholders (introduction of caps, badges, etc.) and improvement of sanitary conditions (use of boots, sterilized water bath, etc.);
- Extension of the operating hours of the JFPWM;
- Formulation of new rules and regulations governing the operations of the JFPWM; and
- Standardization of fish containers at the levels of transport and wholesale marketing by providing incentives for the use of insulated fish containers (e.g., sale of standard fish containers at promotional prices; provision of priority rights to use the market hall) (to be continued in the Stage 2).

Stage 2: Reform of Wholesale Market Mechanism

- Weighing and verification of fish before the market transaction through dissemination to fish wholesalers;
- Introduction of a more open and fair transaction system (e.g., auction system) by inviting experienced fish traders and relevant cooperatives to serve as fish auctioneers; and
- Conversion of some areas of the wholesale market through the installation of partitions and/or walls.

The Project will consist of the following components:

- Fish trading and marketing center (including handling/trading/market halls, packing area, kiosk/ canteen, fish organoleptic laboratory, office, ice retail store, freshwater retail store);
- Fish supply buffer center (cold storages, fish processing units);
- Seafood plaza (model fish shops/restaurants, event square);
- Auxiliary facilities (desalination plant, public toilets, sewage treatment facility);
- Access road; and
- Reclamation/seawall.

3.2 Demand Projections and Scale Determination

The JFPWM supplies fish to six provinces, with a large portion supplied to DKI Jakarta, West Java, and Banten, and a small portion to Central Java, East Java, and Lampung. Based on the population forecast, per capita fish consumption by province, and the proportion of the estimated distribution volume to the total demand in the provinces, it is projected that the fish volume to be distributed from the JFP wholesale market will reach 135,845 t by 2025. With the increase in fish supply at the national level, it is estimated that the fish handling volume in PPI/JFP will reach 115,490 t in 2025 from the current level of 71,043 t.

The traffic in the roads surrounding JFP between 2011 and 2025 will increase in all roads. The traffic volume in Jl. Muara Baru is anticipated to increase about 1.5 times from 14,704 PCU/day to 21,354 PCU/day, of which about 1/3 will be absorbed by the new access road (6,957 PCU/day) to be constructed under the proposed Project. Although the traffic volume in Jl. Muara Baru in 2025 is projected to be maintained at current levels, it is expected that most of traffic going in and out of the JFP (13,560 PCU/day in 2025) will be through the new access road, with appropriate traffic controls, as most of the vehicles going to and from the JFP will pass through the road at night when the roads around JFP are not congested.

3.3 Design Criteria

Roads. The *Standard Specifications for Geometric Design of Urban Roads,* published by the Directorate General of Highways of the Ministry of Public Works (MPW) in March 1992, were used as guidelines for the design of the access roads in this Study. The design speed of Type II/Class III is 40 km/h. Road clearance will be provided 5.5 m from the crown level of the pavement.

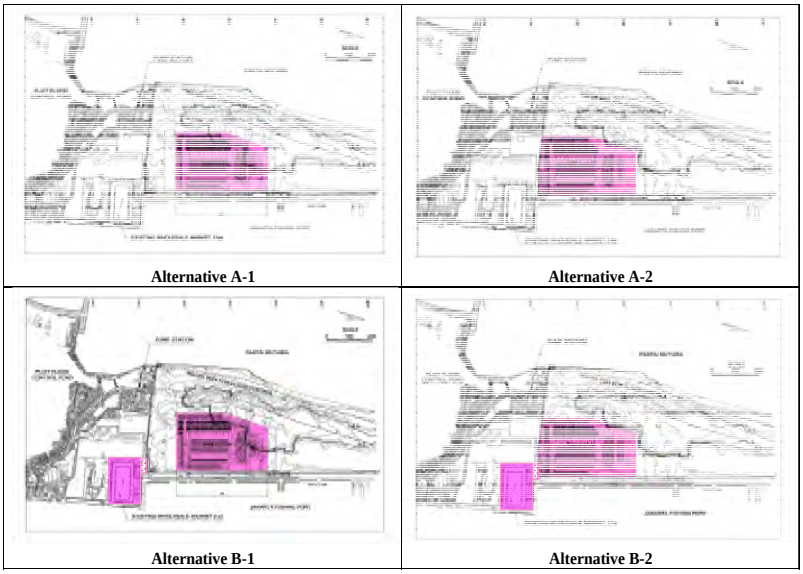
Land Reclamation and Seawall. The basic design of civil works in the proposed Project was based on the *Standard Design Criteria for Ports in Indonesia* (SI) issued by the Maritime Sector Development Program, Directorate General of Sea Communications in January 1984.

Building and On-land Facilities. The construction and management of buildings and supporting equipment will conform with relevant regulations, codes, standards, and guidelines.

Natural Conditions. Subsoil improvement up to an elevation of -11.0 m will be necessary in case of reclamation, and the piles for structures and access roads will be supported by the layer below -20 m.

3.4 Basic Design and Comparison of Design Options

Alternatives for Site Plan. Four alternative site plans were considered in the Study. In Alternatives A-1 and A-2, all the wholesale market facilities will be located in the reclamation area, while in Alternatives B-1 and B-2, only some wholesale market facilities will be sited in the reclamation area, and the remaining facilities will remain in the existing area. Alternative B-1 is not believed to be efficient and effective because of the separation of the areas. Alternatives A-1, A-2, and B-2 are proposed for consideration for the site plan of the wholesale market area.



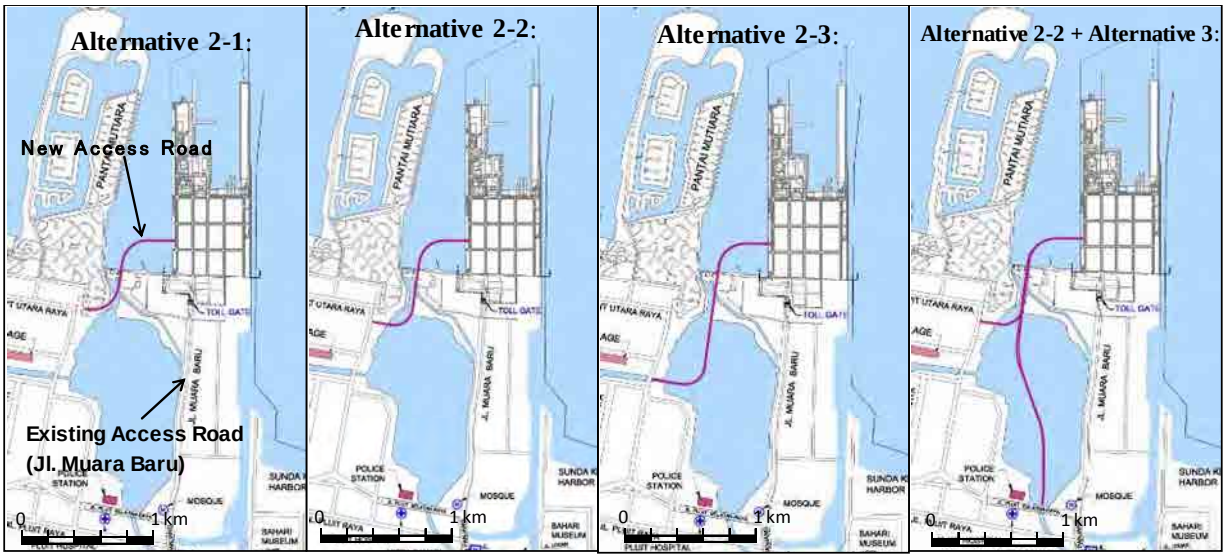
Alternative A-1 | Alternative A-2

Alternative B-1 | Alternative B-2

It is recommended that reclamation, foundation of piling and concrete slab for buildings, and soil improvement be used as the construction method considering the short construction period, minimum maintenance, and the lowest construction cost compared with the other two alternatives. A PC sheet pile structure with the armour rock type above a rubble mound will be adopted as the countermeasure against the waves. Between the outer revetment and the reclamation area, mangroves will be planted as wind and wave breakers and as a means of ecosystem conservation. Very limited impact of land reclamation will be given to the flood control by discharging water from the Pluid Pond, since it is planned to be done by securing waterway of more than 200 m in width and 600 m^2 to 1,400 m^2 in cross section, without causing any water level fluctuation, as certified by the results of computer calculation of HEC-RAS developed by US Army Corps of Engineers.

Access Road Plan. Out of four alternative plans for access roads, **Alternative 2-2 is recommended** by the JICA Study Team because it will involve the acquisition of only a small piece of land and will not require any resettlement work – which will be advantageous to the Project. Also, it will cause only a minor disturbance to Pluit Pond, which is actually considered good for its maintenance.

Item	Alternatives			
	2-1	2-2	2-3	2+3
Route length	1,020 m	1,230 m	1,730 m	2,700 m
Land acquisition	Approx. 7,000 m^2	Approx. 5,100 m^2	Approx. 1,000 m^2	Approx. 6,000 m^2
Number to be resettled	Approx. 30 houses	Nil	Nil	Nil
Duration of construction	18 months	24 months	26 months	36 months
Construction cost ratio	1.0	1.2	1.8	5.0
Recommendation	Land acquisition and resettlement of houses are indispensable. This is the most cost-effective alternative.	Most highly recommended alternative.	Area of land acquisition is the smallest.	Two accesses to JFP are ensured. The cost is too high to expect cost-effective benefits.



Architectural Plan. The wholesale market building will consist of three main areas: (i) fish handling and trading hall; (ii) market hall; and (iii) packing area. The fish handling and trading hall is designed for possible partitioning or enclosure in the future. The wholesalers' booths will be expanded to almost double the present size. The packing area for buyers will be expanded to accommodate various handling activities, such as collecting fish from the market, sorting, supplying ice and water, and packing. As a result, the following architectural plan was selected:

Type	:	Rectangular plan with no truck berth for offloading
Truck berth for unloading trucks	:	170 m, 40 trucks/rotation, 3.2 rotations, approx. 2.5 hrs
Required building area	:	Approx. 51,000 m^2 including parking lot for 238 trucks

Structural System of the Wholesale Market Building. Some structural systems were examined and evaluated according to the design concept, including the following aspects: (i) dimensions of columns; (ii) functional use; (iii) flexibility; (iv) rainwater protection; (v) construction methods; (vi) construction periods; and (vii) cost. Based on the results of the evaluation, the composite structural system (Alternative E) is selected at this stage (see below), but all the details should be re-examined during the implementation stage.

Type	Shape	Possible length of span	No. of columns
Mountain-shaped, single directional truss frame of steel composite with tensile force		Normally up to 50~60m	10 x 5

Wholesale Market and Related Facilities. The proposed features of the improved JFPWM are shown below in comparison with those of the existing market.

Item	Existing Wholesale Market	Projected Wholesale Market (Alternative Layout Plan A-1)	Increase Ratio
Volume of fish handled	71,043 t/yr 195 t/day	115,490 t/yr 316 t/day	162%
Unloading truck berth	All activities done in the peripheral area of the market hall and surrounding truck berth 7,000 m^2 (including offloading truck berth)	2,040 m^2	182%
Fish handling area		1,785 m^2	
Fish trading area (hall)		2,040 m^2	
Transit area		1,275 m^2	
Packing area		5,610 m^2	
Market hall	7,000 m^2	10,710 m^2	153%
Stalls for wholesalers	2.5 x 2 m	3.5 x 3.5 m	245%
Passages	Width 2.5 m and 1 m	Width 2.5m and 2.5m	250%
Hands washing basin	None	8 places	--
Boots washing basin	None	12 places	--
Solid waste depots	None	10 places x 2	--
Ice supply depots	8 places	2+10 places	150%
Seawater reservoirs and supply piping	Reservoir, 4 places (with charge)	Supply piping for every stall (free of charge)	---
Water supply for the market	140 m^3 daily, raw well water (non-sterilized, brackish)	900 m^3 seawater (filtered and sterilized)	643%
Water supply for the auxiliary facilities	Max. 70 m^3 daily (filtered and sterilized)	600 m^3 (filtered, sterilized, and inspected)	857%
Treated wastewater (discharge water volume)	210 m^3 (not functioning)	1,900 m^3 (including water from outside)	905%
Public toilets	5 places in the site	4 places in the market building and 5 places in the site	180%
Cold storages	1,700 t; 10 units	2,900 t; 29 units	171%
Fish processing units	2 units + 10 places (in the market building); 710 m^2	25 units 1,181 m^2	166%
Fish shops and restaurants	None	12 shops and 2 restaurants	--
Kiosks	21	48	229%
Canteens	14	48	343%
Food stands	30 (in and around the market building)	60	200%
Inner roads	4,574 m^2 (excluding the surrounding truck berth in the market building)	17,686 m^2	387%
Parking lot	None	9,802 m^2	---
Total Area	3.0 ha	10.7 ha (including reserve area)	357%

Equipment Plan. The criteria for the selection of equipment are (i) ease of maintenance, (ii) low O&M cost, and (iii) presence of a representative/agent in Indonesia. All these plants/systems are planned to operate as independent units within the JFP.

Item	Capacity	Remarks
Desalination plant	600 t/day (300 t/day x 2 sets)	Reverse osmosis
Sterilized seawater plant	1,000 t/day (500 t/day x 2 sets)	Chemical treatment
Drain water treatment plant	1,900 t/day (including fish box seawater)	300 t/fish box
Cold storage equipment	100 t type cold storage x 29 sets	Temperature maintained at -20^oC
Electric supply plant	Max. 3,500 KVA	Transformer by PLN

Other equipment for PPPI	Insulated fish boxes (2,000), Boots/caps/badges (3,700), Hand carts (320), Weighing scales (40), Public announcement system (1), CCV camera security system (1), Laboratory equipment (1), Office equipment (1)	Insulated fish box, boots/caps/badges, and hand carts are for sales to stakeholders.

3.5 Environmental and Social Considerations

The potential environmental impacts of the three alternative plans being considered for the development of the new wholesale fish market and access road are summarized in the table below. For the wholesale market, Alternatives A-2 and B-2 will cause significant social impacts due to the need for the involuntary relocation of 80 houses built on stilts over the water. Alternative 2-1 for the access road will cause the same problem, but will involve fewer (30) houses.

Items	Reclamation Alternatives			Access Road Alternatives			
	A-1	A-2	B-2	2-1	2-2	2-3	2-2 + 3
Social Environment (No. of houses to be resettled)	B (0)	A (80)	A (80)	B+ (30)	B (0)	B (0)	B (0)
Natural Environment	B	B	B	C	C	C	C
Pollution	B	B	B	B	B	B	B

Rating: A= serious impact is expected; B = some negative impact is expected; B+ = relatively large impact; B- = relatively small impact; C = extent of impact is unknown; P = positive impact is expected; No Mark = no impact is expected.

3.6 Project Cost

The total Project cost for the recommended alternative (A-1 and 2-2) is estimated at Rp1,764 billion.

3.7 Implementation Schedule

It is estimated that Project development will take approximately 6.5 years – from the selection of the consultant to the completion of construction work, of which 3.5 years will be for construction work, provided that MMAF will be able to obtain AMDAL approval in 2011.

3.8 Implementation Arrangements

The agency responsible for project implementation will be the Directorate General of Capture Fisheries (DGCF) of MMAF. Under DGCF, **the Directorate of Fishing Ports** will directly take charge of various activities during Project implementation, including detailed design, tendering, procurement, and construction. **For O&M, there are two options being considered:** (i) to establish a new UPT under Directorate General of Fishery Products Processing and Marketing (DGFP2M) (Option-1); or (ii) to operate and manage Project facilities based on the existing organizations (UPT-PPSJ and PERUM), but with some modifications (Option 2). Considering that the Project will be introducing new approaches for the modernization of the wholesale market mechanism and that the proposed JFP wholesale market will be serving as a center for receiving, marketing, and distribution of fish – but with limited links with the JFP, **it is proposed and recommended by the Study Team that a new UPT be established under the Directorate General of Fishery Products Processing and Marketing (DGFP2M),** which will be responsible for the overall operation and management of the proposed JFP wholesale market based on the MMAF's new policy. In both Options 1 and 2, it is recommended that the following modifications should be implemented to ensure more efficient O&M:

- All land and facilities should belong to the National Government (no change).
- MMAF will entrust the O&M of a part of facilities to either other UPT, PERUM or private companies, but subject to approval by the Minister of Marine Affairs and Fisheries.
- The lessees of the income-generating facilities will be selected by UPT, considering the purpose of

use and the lessee's capabilities (both technical and financial).

- The utilities (electricity, water supply, etc.) and civil engineering facilities (access road, inner roads, and seawall) will be maintained in collaboration with the existing organizations (UPT-PPS and PERUM), considering their experience of PPSJ in O&M.
- Vacant lots will be under the direct control of UPT for lease to the private sector, but subject to approval of the development plan by MMAF.

In addition, regardless of the option that is selected, it is recommended that the seafood plaza be implemented, operated, and managed through the BOT (build-operate-transfer) scheme to introduce the business knowhow of the private sector in the O&M of such commercial facilities.

The recommended organizational set-up for the O&M of Project facilities will consist of three divisions (Management Division, Maintenance Division, and Operations Division) with 160 personnel including Director and Assistant Director of the new JFPWM. All existing staff for the JFP wholesale market (PPI) will be transferred to, and serve as staff of, the new JFPWM, including the existing cooperatives (TKBMI), security personnel, and cleaning workers. In addition, about 12 individuals from private companies and/or cooperatives will be recruited to serve as auctioneers in the PPPI.

To support the O&M of the new Project facilities, it is recommended that the following consultants be engaged in the two stages of Project development:

Stage 1: Market O&M/Marketing Promotion Advisor (9 months)
Fish Hygienic and Sanitary Control Specialist (3 months)
Stage 2: Market O&M/Marketing Promotion Advisor (6 months)

3.9 Project Evaluation

Indicators for Measuring Operational Effects. Based on the results of the feasibility study, the Project is expected to achieve the targets shown in the matrix below within two and five years after commencement of operation of the Project facilities:

A. Operational Result

Monitoring Indicator	Present	2 years after commencement of operation (2020)	5 years after commencement of operation (2023)
Fish handling volume (t/yr)	71,034	101,600	109,934
Booth occupation rate (%)	85%	88%	95%
No. of booth used	-	10	11
Booth occupation rate (%)	-	88%	95%
No. of vehicles (units/day)	173	230	249
Fish holding volume per month per storage (t / month) (average / max.)	46 / 75	72 / 100	82 / 100
Volume of fish processed products per unit (t / year)	59	76	81
No. of shops operated	-	12	12
No. of restaurants operated	-	2	2
Trip generation to JFP (PCU/day)	4,394	5,933	6,446

B. Operational Effects

Monitoring Indicator	Present	2 years after commencement of operation (2020)	5 years after commencement of operation (2023)
No. of fish suppliers / day	94	125	135
Average wholesale volume per unit space (kg/m^2/day)	30 (4960m^2)	48 (5880m^2)	51 (5880m^2)
Icing ratio to fish at entry and shipment from PPPI	16%	→	15% (with insulated box)
No. of vehicles parking outside of PPPI (units/day)	27	0	0
Max./Min. ratio of monthly storage volume (*1)	2.03	1.75	1.50
Value added ratio (processed products price / raw materials price) (*2)	Marlin: 1.44 Moonfish: 2.54	Marlin: 1.60 Moonfish: 2.75	Marlin: 1.75 Moonfish: 3.00
No. of guests per shop (person/week)	-	300	300

No. of guests per restaurant (person/week)	-	480	480
Travel time (from start to end point of road)	15 min.(old road)	2 min. (new road)	2 min. (new road)

Note: (*1) Except aquaculture fish (milkfish and freshwater fish).
(*2) Frozen marlin and moonfish are mainly processed into block at present.

In summary, the proposed Project will result in the following outcomes within two and five years after the start of operation of the JFP facilities:

- increase in fish handling volume due to the expansion of the wholesale market and the demarcation of the area by type of operation;
- increase in number of vehicles using the new access road to JFP;
- improvement in wholesale efficiency (average wholesale volume per unit space) as a result of the (i) widening of passages inside the market hall, (ii) enlargement of wholesale stalls, and (iii) demarcation of work space by type of operation;
- increase in fish holding volume in cold storages and increase in volume of processed fish products at the UPIs resulting in improved stability of fish supply and distribution to consumers; and
- increase in number of customers visiting the JFP wholesale market with the opening of the seafood center with 12 shops and two restaurants.

Non-Quantitative Benefits of the Project. It is expected that the following non-quantitative benefits will be generated through the Project: (i) more organized and systematic process for doing business; (ii) improved operational efficiency; (iii) stable fish prices and value-added fish products; (iv) increased employment opportunities and reduced poverty; and (v) improved welfare of population along the fishing port area.

Financial and Economic Evaluation. To ensure the sustained financial viability of the operations of the JFP wholesale market, some necessary changes have to be implemented in order to generate sufficient revenues to cover the O&M cost of the newly constructed facilities and, consequently, ensure its financial viability. Among these reforms are: (i) setting tariff rates per square meter at adequate levels to cover more than the sum of annual depreciation and O&M costs per square meter of the new facility and ensure sufficiency of funds for O&M operations; and (ii) implementing a percentage charge on the value of fish landed at the JFPWM, i.e., starting at 2% in 2019, increased to 5% by 2025, and maintained at that level thereafter.

For the financial evaluation, six alternative investment scenarios were chosen for analysis by selecting the investment alternative with the lowest investment cost under each reclamation design and corresponding access road option. Following this selection criterion, the six proposed scenarios for site plan design were subjected to financial and economic evaluation. **The resulting financial and economic internal rates of return are shown in the table below.**

Scenario	Option	FIRR	EIRR
1	A-1 and 2-2	6.01%	26.8%
2	A-1 and 2-3	6.17%	27.0%
3	A-2 and 2-2	5.54%	27.7%
4	A-2 and 2-3	6.53%	28.8%
5	B-2 and 2-2	5.61%	26.9%
6	B-2 and 2-2	6.55%	27.9%

The above results indicate that all of the six investment scenarios evaluated are financially viable as their calculated FIRR values are greater than 2.2%, the weighted average cost of capital (WACC) assumed in the analysis. The six scenarios are also all economically viable as their respective calculated EIRRs are greater than 10%, the economic opportunity cost of capital (EOCC) assumed in the analysis.

The contribution of each investment scenario, in terms of economic benefits, are substantial in terms of: (i)

increase in value and volume of fish handled; (ii) reduced economic losses due to fish supply fluctuations; (iii) increase in the number of customers patronizing seafood restaurants and kiosks in the JFPWM; (iv) reduced losses in business within the JFPWM due to flooding of the existing access road; (v) benefits from savings in vehicle operating cost; and (vi) benefits from reduced passenger travel time costs.

However, based on the analysis, it is recommended that investment scenario A-1 and 2-2 be considered among the six alternative investment scenarios, which have been due to its high EIRR and FIRR values. Moreover, as this investment scenario does not require resettlement, it is a less costly option for the Government.

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ABBREVIATIONS

ACI	American Concrete Institute
AASHTO	American Association of State Highway and Transportation
ADB	Asian Development Bank
AFTA	ASEAN Free Trade Area
AISC	American Institute of Steel Construction
AMDAL	Analisis Mengenai Dampak Lingkungan (Environmental Impact Assessment)
ANDAL	Analisis Dampak Lingkungan (Environmental Impact Analysis)
APEC	Asia-Pacific Economic Cooperation
ASEAN	The Association of Southeast Asian Nations
ASTM	American Society for Testing and Materials
BAKOSURTANAL	Badan Koordinasi Survei dan Pemetaan Nasional; a governmental agency of Indonesia for land survey and mapping
BAPEDAL	Badan Pengendalian Dampak Lingkungan (Environmental Control Agency)
BAPPENAS	Badan Perencanaan Pembangunan Nasional (National Development Planning Agency)
BCR	Benefit Cost Ratio
BMKG	Badan Meteorologi Klimatologi dan Geofisika (Meteorological, Climatological and Geophysical Agency)
BPOM	Badan Pengawasan Obat dan Makanan (Food and Drag Control Agency)
BPS	Badan Pusat Statistik (Indonesian Statistic Agency)
BRPL	Balai Riset Perikanan Laut (Sea Fisheries Research Institute)
CCTV	Closed Circuit Television
CDCFP	Center for Development and Control of Fishery Product
CDL	Chart Datum Level
CGI	Consultative Group on Indonesia
CMEA	Coordinating Ministry of Economic Affairs
DG	Directorate General
DGH	Directorate General of HIghway
DGPS	Differential Global Positioning System
DKI	Daerah Khusus Ibukota (Special Capital City District)
DL	Datum Level
DLT	Design Low Tide Level
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EPA	Economic Partnership Agreement
EU	European Unions
FAO	Food and Agriculture Organization
FIRR	Financial Internal Rate of Return
FOB	Free On Board
FTT	Fishermen/Fish Farmer Terms of Trade
GDP	Gross Domestic Product
GEIP	GHG (Greenhouse Gas)
GIFHE	Grimsby Institute of Further and Higher Education
GOI	Government of Indonesia

GOJ	Government of Japan
GPS	Global Positioning System
GRDP	Gross Regional Domestic Product
HEC-RAS	Hydrologic Engineering Centers River Analysis System
HWL	High Water Level
ICB	Interlocking Concrete Block
IEE	Initial Environmental Examination
IMF	International Monetary Fund
IRR	Internal Rate of Return
ITB	Institut Teknologi Bandung (Bandung Institute of Technology)
IUU	Illegal Unreported and Unregulated
JCDS	Jakarta Coastal Defense Strategy
JBIC	Japan Bank for International Cooperation
JFP	Jakarta Fishing Port
JICA	Japan International Cooperation Agency
JIS	Japan Industrial Standard
JKABODETABEK	Greater Jakarta covering Jakarta, Bogor, Depok, Tangerang and Bekasi
JKABODETABEKPUNJUR	Greater Jakarta covering Jakarta, Bogor, Depok, Tangerang, Bekasi, Puncak and Cianjur
KA-ANDAL	Kerangka Acuan Analisis Dampak Lingkungan (Term of Referrence for Environmental Impact Analysis
KKP	Kementrian Kelautan dan Perikanan (Ministry of Marine Affairs and Fisheries)
KKPPI	Komite Kebijakan Percepatan Penyediaan Infrastruktur (National Committee on Acceleration of Infrastructure Provision)
KN	Kilo Newton
LA	Loan Agreement
LLWL	Lowest Low Water Level
LWL	Low Water Level
MCS	Monitoring, Control and Surveillance
MENR	Ministry of Environment and Natural Resources
MMAF	Ministry of Marine Affairs and Fisheries
MP3 EI	Master Plan on Acceleration and Expansion of Indonesia Economic Development
MPW	Ministry of Public Works (= KPU, Kementrian Pekerjaan Umum)
MOA	Ministry of Agriculture
M/M	Minutes of Meeting
MSL	Mean Sea Level
MSY	Maximum Sustainable Yield
MT	Metric Ton
MW	Megawatt
MWL	Mean Water Level
NCQC	National Center for Quality Control
O&M	Operation and Maintenance
OD	Origin and Destination
OECF	Overseas Economic Cooperation Fund
ODA	official Development Assistance
PBI	Indonesian Standard

PC	Prestressed Concrete
PCU	Passenger Car Unit
PDAM	Perusahaan Daerah Air Minum
Pelindo	Indonesian Port Corporation
PERUM	Perusahaan Umum (Public Company)
PIANC	The World Association for Water bone Transport Infrastructure
PLN	Perusahaan Listrik Negara (National Electric Corporation)
PPI	Pusat Pemasaran Ikan (Fish Wholesale Market)
PPDI	Pusat Pemasaran dan Distribusi Ikan (Fish Marketing and Distribution Center)
PPP	Public Private Partnership
PPPI	Pusat Pemasaran dan Perdagangan Ikan (Fish Trading and Marketing Center)
PVD	Plastic Vertical Drain
RC	Reinforced Concrete
RKL	Rencana Pengelolaan Lingkungan (Environmental Management Plan)
RMCIP	Risk Management Committee on Infrastructure Provision
RMU	Risk Management Unit
ROI	Return on Investment
ROS	Return on sales
ROW	Right of Way
Rp.	Rupiah
RPJMN	Rencana Pembangunan Jangka Menengah Nasional (National Medium-term Development Plan)
RPJPN	Rencana Pembangunan Jangka Panjang Nasional (National Long-term Development Plan)
RPL	Rencana Pemantauan Lingkungan (Environmental Monitoring Plan)
RTRW	National, Provincial and Regional/Municipal Spatial Plan
SCF	Standard Conversion Factor
SE	South-East
SEA	Strategic Environmental Assessment
SEAFDEC	Southeast Asian Fishery Development Center
SEZ	Special Economic Zone
SOE	State Owned Enterprises
SPM	Suspended Particulate Matter
SPP	Steel Pipe Pile
SPT	Standard Penetration Test
SSP	Steel Sheet Pile
S/W	Scope of Work
STEP	Special Terms for Economic Partnership
STP	Sewerage Treatment Plan
TKBMT	Koperasi Tenaga Kerja Bongkar Muat Ikan (Cooperative Fish Unloading Labor)
TGFP	Technical Guideline of Fishing Port
TMA	Tri-Metil Amin
TPI	Tempat Pelelangan Ikan (Fish Auction Hall)
TSP	Total Suspended Solids
TSPH	Technical Standard for Port and Harbor

TSS	Traffic Surveillance System
TVB	Total Volatil Base
UK	United Kingdom
UKL-UPL	Upaya Pengelolaan Lingkungan - Upaya Pemantauan Lingkungan (Environmental Management Efforts - Environmental Monitoring Efforts)
UNDP	United Nations Development Program
UNPF	United Nations Population Fund
UPI	Unit Pengolahan Ikan
UPT	Unit Pelaksana Teknis (Technical Implementation Unit)
USA	United State of America
VAT	Value Added Tax
W.E.T	Water, Electricity and Telecommunication

CHAPTER 1

Background, Necessity and Appropriateness of the Project

1. Background, Necessity and Appropriateness of the Project

1.1 Background of the Study

The Ministry of Agriculture (MOA), as well as the Ministry of Marine Affairs and Fisheries (MMAF or KKP), of the Government of Indonesia (GOI) requested the Japanese Government for technical assistance for the conduct of a development study (feasibility study) on distribution mechanism reform through the development of a wholesale market (improvement of postharvest handling and marketing facilities) (hereinafter called "the Study") in 2007.

In response to the request, the Japan International Cooperation Agency (JICA) dispatched a first preparatory survey mission to Indonesia in May 2009 to confirm the basic framework for execution of the development study. A second survey mission in November 2009 discussed with GOI the Study objectives, scope, items, and schedule and collected information necessary for the Study. The Minutes of Meeting (M/M), including Scope of Work (S/W) for the Study (Fishery), was signed between MMAF and JICA on 17 December 2010.

The proposed project is related to the "agricultural and fishery products wholesale markets" described in the Annex of the Joint Statement made at the signing of the Economic Partnership Agreement (EPA) between Japan and Indonesia. The Study (Fishery) will focus on the improvement of fish wholesale and related facilities and services, including access roads to the fish wholesale market, in the Nizam Zachman Oceanic Fishing Port, commonly known as the Jakarta Fishing Port (JFP).

1.2 Overview of Fisheries-Related Policies

1.2.1 National Medium-term Development Plan (RPJMN), 2010-2014

The *National Medium-Term Development Plan (RPJMN), 2010-2014* aims to consolidate the restructuring of Indonesia in all fields, with an emphasis on improving the quality of human resources, including science and technology capacity building and strengthening economic competitiveness. The latter is to be pursued through the (i) integrated development of marine and other natural resources in accordance with the potential of the region and (ii) accelerated development of science and technology. The development of marine and fisheries resources covers the various areas under the marine sector, including marine transportation, maritime industries, fisheries, marine tourism, and energy and mineral resources, which should be developed in synergy and in an optimal and sustainable manner.

The national development priorities set forth in the RPJMN are: (i) bureaucratic reform and good governance; (ii) education; (iii) health; (iv) poverty reduction (from an absolute poverty rate of 14.1% in 2009 to 8-10% in 2014); (v) food security (agricultural GDP growth of 3.7% per annum, FTT indices of 115-120 in 2014); (vi) infrastructure; (vii) investment climate and business climate; (viii) energy; (ix) environment and disaster management; (x) underdeveloped regions, foremost, outermost and post-conflict; and (xi) culture, creativity, and innovative technology. Within these national priorities, the development of the marine and fisheries sector in 2010-2014 is related to five national priorities, namely: items (i), (iv), (v), (ix), and (x).

1.2.2 Strategic Plan, 2010-2014

The development of the marine and fisheries sector is needed to achieve the four pillars of development, namely: *pro-poor* (poverty alleviation); *pro-jobs* (employment); *pro-growth* (growth); and *pro-sustainability*. **As a result, over the period 2005-2008, the MMAF has succeeded in producing the following three outcomes:** (i) achievement of the *pro-poor* pillar of development by increasing the income of coastal communities through marine and fishery community empowerment programs, mainly in small islands, which have reached more than 200 districts/cities; (ii) achievement of the *pro-jobs* development pillar by increasing cumulative employment that has reached up to 7.69

million people; and (iii) achievement of the *pro-growth* pillar through the 5.7% growth in the marine and fisheries sector.

Based on the review of the progress attained from 2004-2008, **the *Strategic Plan, 2010-2014* was formulated by MMAF with the following vision, mission, and strategic objectives:**

Vision: Indonesia as the largest producer of marine and fishery products by 2015

Mission: Welfare of the marine and fisheries society

Strategic objectives:

- Strengthening of institutional and human resources in integrated manner;
- Management of marine and fisheries resources in a sustainable manner;
- Increased productivity and competitiveness through the use of knowledge-based systems; and
- Expansion of domestic and international market access.

The key performance indicators for marine and fisheries development from 2010-2014 are:

(i) Economic Indicators

- GDP contribution to national economy : From 3.0% to 6.5%
- Fishery production
  - Capture (million tons/yr) : From 5.38 to 5.50
  - Aquaculture (million tons/yr) : From 5.38 to 16.89
- Export value ($billion/yr) : From 2.9 to 5.0
- Per capita fish consumption (kg/yr) : From 30.47 to 38.67
- Number of fish processing units (UPI) : From 444 to 468
- Fishers/fish farmers terms of trade : From 105 to 115

(ii) Environmental Indicators

- Area of marine conservation region and water : Increase by 0.9 million ha/yr
- Number of small islands under management : Increase to 205 islands
- Water areas free from IUU fishing boats : Increase from 62% to 100%

To achieve the above targets, the following nine programs were formulated:

- Program for Development and Management of Capture Fisheries;
- Program for Improvement of Aquaculture Production;
- Program for Improvement of Fisheries Product Competiveness;
- Program for Management of Marine Resources, Coasts, and Small Islands;
- Program for Monitoring of Marine and Fisheries Resources;
- Program for Research and Development of Marine and Fishery Science and Technology;
- Program for Development of Marine and Fisheries Human Resources;
- Program for Monitoring and Improvement of the Accountability of the KKP Apparatus; and
- Program for Improvement of Management Support and Other KKP Technical Implementation Tasks.

The proposed project is directly related to the Program for Improvement of Fisheries Product Competiveness.

1.2.3 Focus Area for Food Security

As the degradation of fish resources in Indonesian waters, mainly in inland and coastal waters, has been observed in the last decade, aquaculture development is expected to become dominant in the future in line with the global trend in fisheries development. The challenge for Indonesia is, therefore, how to sustain its aquaculture activities, while at the same time conserving its marine and aquatic environment and rehabilitating its marine and public waters in an effort to increase their capacity and geographical coverage. **To ensure food security through aquaculture and sustainable marine fisheries development, the MMAF emphasizes the development strategy of *"minapolitan"* (integrated fisheries/aquaculture management based on fishing ports and districts).** In 2011, the plan is to implement 24 *minapolitan* for aquaculture and 9 *minapolitan* for capture fisheries in collaboration with seven ministries including MMAF. In addition, the MMAF allocated approximately Rp200 billion for rural aquaculture development in 300 districts in 2011.

In terms of the development of domestic fish marketing, **one of the most important issues in Indonesia is the need to adjust the mismatch of, and/or the gap between, fish supply and demand**. To address this need, the MMAF initiated a number of measures. *Firstly*, it has been trying, since 2010, to develop a new concept of fish marketing, which is intended to increase the opportunity for fish suppliers and buyers to meet. This involves the establishment of a **Fish Marketing and Distribution Center (*PPDI*) in Brondong, East Java**, which is different from the existing fish auction center (*TPI*) and fish marketing center (*PPI*). *Secondly*, the MMAF has set up special economic areas for development of cold chains so as to reduce postharvest losses, mostly in remote areas, and to effectively utilize the resources for stabilization of fish supply. *Thirdly*, to improve the logistic system for reducing market margins, including transportation cost, the MMAF has been disseminating market price information on its website and monthly magazine, and has also introduced the use of insulated trucks to fish traders. *Fourthly*, the MMAF has launched a campaign to promote fish consumption through mobile stations (vehicles) and fish tasting events in Java, where per capita fish consumption is the lowest in Indonesia.

The proposed Project will be formulated taking the above issues and the accomplishments of MMAF into account, with the objective of reforming the fish distribution mechanism through the development of the JFP wholesale market.

1.3 Overview of the Indonesian Fisheries Sector

1.3.1 Fisheries Resources

The fisheries resources in Indonesia can be classified into four groups: (i) large pelagic like tuna, skipjack, marlin, shark, etc.; (ii) small pelagic such as like sardines, anchovies, mackerels, etc.; (iii) demersal and reef fish like grouper, snapper, etc; and (iv) crustaceans such as shrimps and lobsters. The current level of exploitation of these resources is shown in Appendix 2.

The Indonesian fishery resource map is released every five years, with the latest one due for publication in mid-2011. In the 2006 survey, the maximum sustainable yield (MSY) has been estimated by MMAF at 6,258,600 t, of which 5 million t would be the total allowable catch (TAC). Against this estimate, **the total marine fish harvest reached 4,862,800 t in 2008, indicating that current fishing effort has already reached the maximum harvestable level,** especially for reef and demersal fish, shrimp, and squid in most fishing areas. However, **a recent survey showed that there are still abundant fish resources, especially the small and medium pelagics (e.g., trevally, skipjack, Eastern little tuna, Indian scad) in the Seram, Sulawesi, and Arafura Seas and in the Pacific Ocean.** The problem, though, is the lack of physical infrastructure for fish landing, processing, and transport and marketing close to these rich fishing grounds.

Production from marine capture fisheries consists mainly of (i) small pelagic fish (such as Trevally, Indian mackerel, Indian Scad, and Bali sardine) caught by purse seines and liftnets; and (ii) **medium and large pelagics,** including skipjack, long-tailed tuna, eastern little tuna, yellowfin tuna, and marlin, mainly caught by purse seines, driftnets, and tuna longlines. Altogether, these fish species accounted for 37.2% and 27.7% of total production in 2009, respectively (MMAF statistics). The inland capture fishery contributed a small 9.4% to the total capture fisheries production in 2009, with the main harvests consisting of freshwater shrimp and frog.

In mariculture, it is the culture of seaweed, mainly *Eucheuma*, that made a huge con tribution to total production, with **seaweed culture accounting for over 95% of total marine aquaculture production.** In inland and brackishwater aquaculture, shrimps, milkfish, carp, and catfish are the dominant groups. In the future, production of *Pangasius* (channel catfish) and tilapia is expected to increase with the increased export demand for these species.

1.3.2 Current Situation and Future Prospects of Fish Demand, Supply, and Consumption

1.3.2.1 Fish Production

Over the last six decades, fish production in Indonesia has increased significantly (by about 40 times) from 200,000 t in 1950 to 8 million t in 2010. **Indonesia is now the world's third largest fish producing country after China and Peru,** while production in other major fish producing countries in the world has either decreased or stagnated. **The country's total fish production reached 10.06 million tons in 2010, more than double the production of 4 million t in 2000** (Table 1.3.1)**. This remarkable increase in fish production is attributed to the increase in capture fisheries production by 28% and in aquaculture production by 397.4% in the last 10 years,** with the total volume of fishery production growing at 10.02% per year and its value increasing by 15.6% per year, on average, over the 2005-2009 period (see Fig. 1.3.1).

Table 1.3.1: Fish Production (in '000 t) in Indonesia, 2000-2009

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2,009
Marine capture	3,807	3,966	4,074	4,383	4,320	4,408	4,512	4,734	4,702	4,789
Inland capture	318	310	305	305	331	297	294	310	494	496
Capture total	4,125	4,276	4,379	4,688	4,651	4,705	4,806	5,044	5,196	5,285
Aquaculture	997	1,077	1,137	1,152	1,469	2,164	2,683	3,194	3,855	4,780
T. Production	5,122	5,353	5,516	5,840	6,120	6,869	7,489	8,238	9,051	10,065

Source: MMAF, Marine and Fisheries Statistics, 2010.

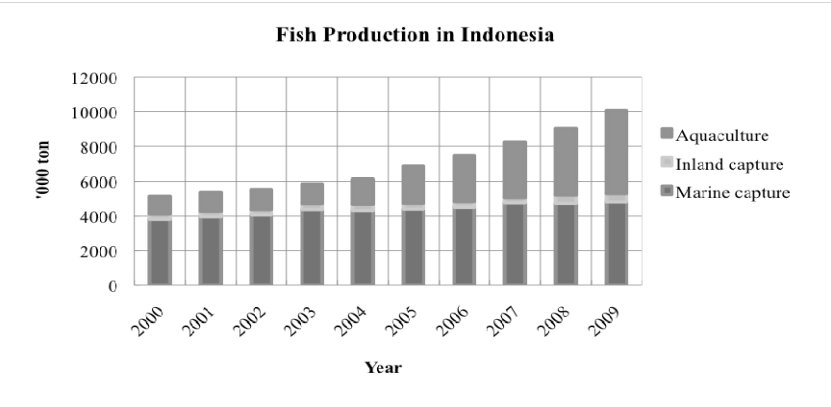


Figure 1.3.1: Fish Production in Indonesia, 2000-2009

Capture Fisheries. Of the total fish production, **marine capture fisheries contributed 4.79 million t, accounting for 47.6% of total production,** with a steady increase of 2.9% per year, on average, since 2000. This trend could continue in the future, provided that investments in infrastructure construction and fish transport are made in remote areas. **Production from inland capture fisheries was relatively small at 0.5 million t and accounts for only 4.9% of total**, and as most of the catch is disposed in live or fresh form in nearby vicinities, these fish are hardly seen in fish wholesale markets (PPI) such as in JFP.

One factor that is believed to have contributed to the observed growth in capture fisheries production is the success of the country's monitoring, control, and surveillance (MCS) operations, which are jointly undertaken by the Navy, Police, Marine Security Coordination Agency (BAKORKAMLA), and MMAF. The Government's intensified MCS efforts have led to the confiscation or sinking of foreign fishing vessels caught illegally fishing in Indonesian waters. It is a well-known fact many of these foreign fishing vessels, especially trawlers, used to be rampant in Indonesian waters, causing the degradation of demersal fish habitats and resources.

Aquaculture. The huge increase in aquaculture production could be attributed to the large **production from mariculture, mostly coming from seaweeds (mainly *Eucheuma*), which reached 2.4 million t in 2009 and growing by an average of 126.3% per year since 2000.** Seaweed production is expected to continue to grow in the future, stimulated by the increasing global demand for seaweed products and facilitated by the vast aquaculture potential of seaweeds in the Indonesian archipelago.

In contrast, the culture of marine fish, like grouper and sea bass, has been limited, while brackishwater and freshwater fish culture has been dominated by milkfish and shrimp. Milkfish production reached 291,000 t in 2009, representing a steady increase since 2000, while production from shrimp culture has fluctuated from 330,000-410,000 t/yr since 2005. This trend is likely to continue in the future as a result of shrimp disease problems and the current stagnation in international trade in shrimp.

The major species from inland fish culture are catfish, tilapia, and common carp, with production volumes of *Pangasius, Clarias,* and tilapia reaching 132,600 t, 200,000 t, and 378,300 t, respectively, in 2009 and growing by 155-307% since 2005. This trend is expected to continue as a result of the steady demand for fish fillet in foreign markets like the USA.

1.3.2.2 Fish Exports and Imports

Exports. Shrimp and tuna are the country's main exports, accounting for 33.0% of total exports in 2008. **The country's exports of fish and fishery products have decreased slightly in volume (by 1.42%) but increased in value (by 41.1%) since 2005.** This trend has been attributed to the diversification of the export market to more lucrative markets (like China, Malaysia, and the Middle East) from the traditional ones (Japan, USA, and the European Union [EU]), which naturally entailed efforts in product development and marketing research. In the future, the country's fish exports are not likely to increase drastically given the problems in shrimp aquaculture and the Government's move to promote an increase in domestic consumption of fish per capita.

Imports. **The major fishery commodities that are imported into Indonesia are fish meal, fish feed, and fresh or frozen fish.** The levels of fish import in 2008 were as follows:

Item	Volume (t)
Fish meal and fish feeds (non-directly consumed items)	139,434
Fresh, frozen, and canned fish (directly consumed items)	140,744
Total	**280,178**

The import volume has stayed in the range of 110,000-180,000 t since 2000, except for the much higher volume of about 280,000 in 2008. Imports of fish meal and fish feeds accounted for 49.8% of

total imports, while fresh and frozen fish imports (83,984 t) comprised 30% of total in 2008. However, this trend is not expected to increase significantly, considering the (i) fish prices prevailing in the international market, (ii) availability of harvestable fish resources, and (iii) current government policy to discourage fish imports through the imposition of a high import tax on fish commodities. Government believes that Indonesia has achieved self-sufficiency in fish, at 101.6% in 2003, and that the country can supply the demand for fish with its own resources, provided that optimum utilization of fish is pursued in the whole country in line with the balanced fishery development strategy.

1.3.2.3 Fish Utilization

Of the total fish catch, about 60.9% of fish is consumed fresh, and the balance is processed and consumed as salted and dried (15.2%), boiled (3.5%), smoked (2.2%), and fermented (<1%). About 1.3% of the catch, mostly sardines and skipjack, is canned in oil. Fishmeal production is negligible at 1.1% of total. About 15.2% of the total harvest is frozen, mostly for export (e.g., shrimps and tuna). A greater proportion of the harvest could be frozen for domestic consumption, but this has been constrained by serious limitations in the supply of ice and availability of refrigerated storage and transport facilities in areas close to the remote fishing grounds.

1.3.2.4 Fish Consumption

The global average per capita fish consumption has improved from 13 kg/yr in 1961 to 16 kg/yr in 2003 (FAO estimate). **In Indonesia, the fish consumption level has been gone up from 22.8 kg/person in 2002 to 29.98 kg/person in 2008** (MMAF, 2010), **representing a 32.8% increase within four years.** MMAF's *Strategic Plan for 2010-2014* targets **a further increase in per capita fish consumption to reach 38.67 kg/yr by the end of 2014, or a 29% increase from 2008 level**. One of the models used in calculating per capita fish consumption is shown in Table 1.3.2 below.

Table 1.3.2: Basis of Calculation of Per Capita Fish Consumption (2009)

1. Total fish production	10,065,120	ton
2. Total seaweed production	(2,574,000)	ton
3. Total consumable fish	7,491,120	ton
4. Total fish import	218,622	ton
5. Total non directly consumable (Fish meal, fish feeds, fish oil, etc.)	(155,221)	ton
6. Total export (consumable items only)	(796,700)	ton
7. Total domestic consumption	6,757,821	ton
8. Population in the country	230,306,000	person
9. Per capita fish consumption	29.3	kg/year

By comparison, weekly protein consumption volumes for meat, fish, and egg were 2.77 g, 7.57 g, and 1.27 g in 2002 and slightly higher at 3.05 g, 8.17 g, and 1.42 g in 2007, respectively. This clearly demonstrates the fact that fish is the most important animal protein source for most Indonesians.

Per capita fish consumption differs by province in the country. For example, in DKI Jakarta, it was 17.56 kg/yr in 2008, while it was 21.02 kg/yr in Bali, 37.62 kg/yr in Papua, 39.40 kg/yr in Gorontalo, and 20.56 kg/yr in Banten. In general, fish consumption in Java is lower compared with other areas in Indonesia.

MMAF has stressed, on many occasions, that efforts would be exerted to promote fish consumption through the development of marketing tools for fish products, institutional strengthening and marketing networks, strengthening of domestic marketing information and promotions, and joint marketing in the country so as to absorb future increases in fish production resulting from greater production inputs and a highly motivated fisheries industry.

1.3.3 Future Prospects

In order to assess future prospects in fish supply, demand, and consumption up to 2025, it was agreed, during discussions of the Consultant with the responsible officer in MMAF on 25 March 2011, that the target figures used in the *MMAF Strategic Plan 2010-2014* will be used as the indicators. On that basis, future projections of fish supply, demand, and consumption were made and are given in Appendix 2. The yearly projections on fish production are shown in Figure 1.3.2, and the projected fish supply and consumption levels by 2025 are in Table 1.3.3. The per capita fish consumption in that year is projected at 47.6 kg. While the figure seems to be on the high side, it is considered attainable, compared with other countries in Asia, e.g., 60.78 kg/yr in Japan and 50.8 kg/yr in Malaysia (FAO, 2007).

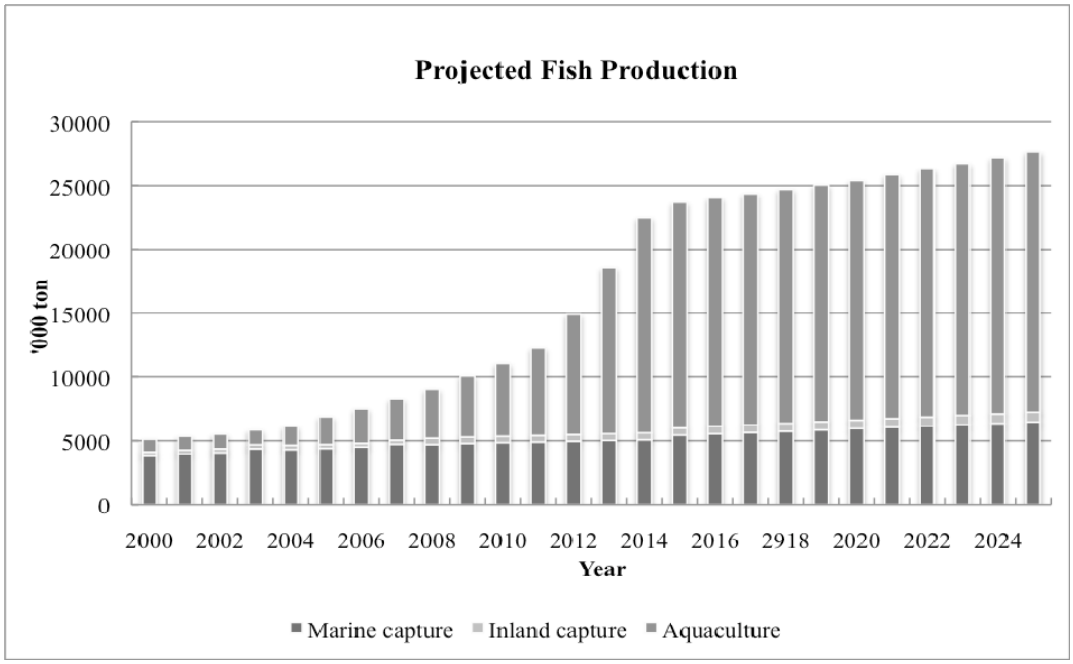


Figure 1.3.2: Projected Fish Production up to 2025

Table 1.3.3: Projected Fish Supply and Consumption in 2025

Item	2009 (ton)	2025(ton)	Increase(%)
1. Marine capture fisheries	4,789,410	6,462,110	34.9
2. Inland capture fisheries	495,610	760,214	53.4
3. Capture fisheries total	5,285,020	7,222,324	36.7
4. Aquaculture	4,780,100	20,426,700	327.3
5. Total production	10,065,120	27,649,024	174.7
6. Seaweed production	(2,574,000)	(12,000,000)	366.2
7. Fisn Import	218,622	597,276	173.2
8. Fishmeal / fish feed import	(155,221)	(246,383)	58.7
9. Fish export	(796,700)	(3,000,000)	276.6
10.Domestic consumption	6,757,821	12,999,917	92.4
11.Population (person)	230,306,000	273,219,000	18.6
12.Per Capita consumption (Kg/year	29.3	47.6	62.2

Sources of data: Statistics MMAF up to 2014,
Population: Projecsi Penduduk 2000- 20005 (www.datastatistiks-indonesia.com)

1.4 Review of Jakarta Fishing Port Master Plan and Development Policy

MMAF has drafted a *Master Plan for a Fisheries Waterfront City for Jakarta Fishing Port and Muara Angke Fishing Port*, which includes a new wholesale market, access road development, quaywall expansion, and fisheries industrial area expansion (see Fig. 1.4.1 below). The detailed study of the Fisheries Waterfront City for JFP and Muara Angke will be conducted by MMAF and the selected consultant within 2011.

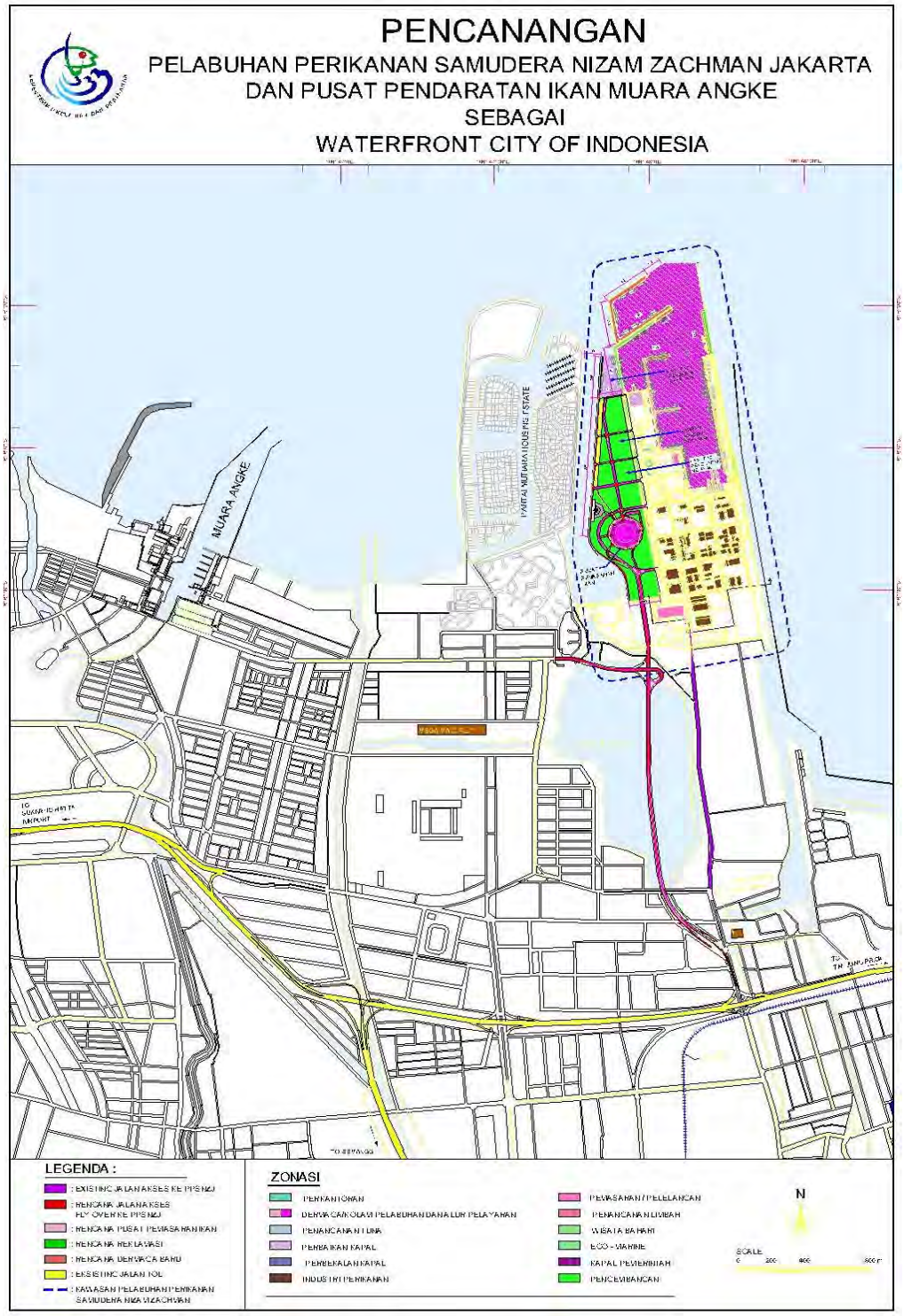


Fig. 1.4.1: Master Plan of Fisheries Waterfront City (Draft)

1.5 Current Situation and Outlook of Fishing Port-Related Projects of Other Donors

GOI has entered into a number of agreements with bilateral and multilateral organizations for aid and cooperation programs in fisheries. Bilateral programs involve the governments of Australia, China, France, Japan, Korea, Norway, Spain, UK, and USA, while multilateral assistance is provided by the Asian Development Bank (ADB), the Food and Agriculture Organization of the United Nations (UN/FAO), the United Nations Development Programme (UNDP), and the Southeast Asian Fisheries Development Center (SEAFDEC). Assistance is primarily focused on capacity building in fisheries resources management and aquaculture development, followed by marine science research. None of the donors has currently extended assistance to GOI in the field of fish marketing and distribution reform except the current JICA-supported Rehabilitation and Improvement Project of Jakarta Fishing Port (Package III).

The JFP in Muara Baru has a long history of loan assistance from the Government of Japan, through the former Overseas Economic Cooperation Fund of Japan (OECF) and the Japan Bank for International Cooperation (JBIC), for its construction and development (see Table 1.5.1).

Table 1.5.1: Government of Japan Assistance for the Construction and Development of JFP

Phase of Development/ Years	Scope of Work	Loan Amount (Million Yen)
Phase I: March 1980 – December 1982	Reclamation of land and harbor construction, including breakwater and quay wall	4,430 (OECF)
Phase II: July 1982 – June 1984	Construction of essential facilities including fish port, fish auction hall, fish wholesale market, ice plant and cold storage facilities	3,622 (OECF)
Phase III: completed in December 1988	Preparation of Master Plan for the Jakarta Fishing Port/Marketing Development Project	372 (OECF)
Phase IV: 1993-2002	Construction of Jakarta Fishing Port/Market Development Project: rehabilitation and renovation of some facilities and construction of additional facilities in three packages: • Package 1: Sand filling and stock piling work, March 1997 – April 1998 • Package II: Construction of port facilities, August 1998 – February 2001 • Package III: Land development, civil works, buildings, and utilities work, August 1998 – December 2001	4,009 (JBIC)
2004-2012	Rehabilitation and Improvement of JFP • Package I: Construction and expansion of JFP facilities comprising a quay wall, breakwater, harbor control tower, and some other related facilities, March 2004 – March 2011 • Package II: Improvement of roads, drainage, and revetments, March 2004 – November 2009 • Package III: New construction and renovation work on various harbor facilities, including reconstruction of fish auction and trading hall, June 2011 – January 2012	3,437 (JICA)

Other than the above major fish harbor and market construction projects, a cooperation program entitled, "Development of an Indonesia-United Kingdom Fishery Products Trade Corridor," commenced in September 2009 and was completed in October 2009 under the auspices of the Grimsby Institute of Further and Higher Education (GIFHE), United Kingdom. The main objective of the program was to establish a fishery products trade corridor between Indonesia and the UK, with the main inputs the diversification of exported fishery products and technical assistance on safety, quality, certification, and labeling of fishery products. The total donor contribution by GIFHE was USD 400,000. During this project tenure, promotion of Indonesian export of seafood by facilitation of business meetings in Jakarta, Surabaya, Denpasar and Padan with Lincoln Shire Business Operators was achieved, resulted in direct shipment of 20 containers per month of seafood products from

Indonesia to Humberside Harbor, United Kingdom. In addition, 4 Indonesian scientists were awarded the master degrees on fish processing technology under this scheme in the GIFHE.

1.6 Relevant Laws and Procedures for Social and Environmental Considerations

1.6.1 Environmental Impact Assessment (EIA)

In Indonesia, environmental impact assessment (EIA) is called AMDAL (*Analisis Mengenai Dampak Lingkungan*). The criteria for projects which require AMDAL are stipulated in *Regulation of the Ministry of Environment No.11/2006* for the national level and in the *Decree of the Governor of DKI Jakarta No. 2863/2001* for the provincial level. The criteria applicable to this current Project are summarized in Table 1.6.1; the proposed Project will require AMDAL (see Table 1.6.2 for the outline of AMDAL procedures).

Table 1.6.1: AMDAL Requirements

Project	Proposed Scale of this Project	Criteria for AMDAL Requirement	Requirement for AMDAL
Wholesale Market with Reclamation	Market Land area: 10.7-13.8ha Reclamation Area: 10.7-10.8ha	Market Land area: >= 5ha [1/ 2/] Reclamation Area: >=5ha [2/]	Required
Access Road	New road Length: 1.02-2.70 km	New road Length >=1km [2/)]	Required

[1/] Decree of the Ministry of Environment No.11/2006 on Type of Business Plan and/or Activity Requiring EIA (AMDAL)
[1/] Decree of the Governor 2863/2001 on Type of Industry and/or Activity Requiring EIA (AMDAL) in DKI Province

Table 1.6.2: Outline of AMDAL Procedure

Items	Outline
Documents to be prepared	• KA-ANDAL (*Kerangka Acuan Analisis Dampak Lingkungan*): Terms of Reference for ANDAL • ANDAL (*Analisis Dampak Lingkungan*): Environmental Impact Assessment Report • RKL (*Rencana Pengelolaan Lingkungan*): Environmental Management Plan • RPL (*Rencana Pemantauan Linkungan)*: Environmental Monitoring Plan
Relevant agencies for this Project	Responsible agency: DKI Jakarta Agency which will review the documents: AMDAL Commission under DKI Jakarta Decision on environmental feasibility: Governor of DKI Jakarta
Means of public consultations	• Anyone who is interested in the project can submit questions, opinions, and/or requests to the responsible agency within 30 working days from the public announcement of AMDAL initiation. • During the process of the preparation of KA-ANDAL, the proponent consults with the people about possible environmental impacts. • The public has a right to submit their opinions for each of the AMDAL documents. • Representatives of the affected people can become members of the AMDAL Committee.

Note: Relevant regulations: Law No.32/2009, Government Regulation No.27/1999; Decree of Head of BAPEDAL No. 8/2000; Regulation of the Ministry of Environment No.8/2006; and Regulation of the Ministry of Environment No. 5/2008.

1.6.2 Land Acquisition

Presidential Decrees No. 36/2005 and No. 65/2006, as well as the Regulation of the Head of the National Land Agency No. 3/2007, stipulate the procedure for acquiring land, buildings, plants, and related objects, with the land owned by the central/local government for development of public interest. As shown in Table 1.6.3, the procedure is relatively simple if the area for acquisition is not more than one hectare. The area to be acquired for the proposed Project is less than one ha; therefore, the land is

acquired based on direct consensus between the project proponent and the land owner. The means and amount of the compensation are also decided through the direct negotiation.

Table 1.6.3: Outline of Land Acquisition Procedure

Land Area to be Acquired	Outline	Procedure for this Project
=< 1 ha	Direct negotiation with landowners.	X
> 1ha	Land Provision Committee is formed under the Governor. The Committee conducts inventory survey for the land to be acquired and proposes amount of the compensation.	

Relevant regulations: Presidential Decree No.36/2005; No. 65/2006; and Regulation of the Head of National Land Agency No. 3/2007.

1.6.3 Resettlement of Inhabitants

The proposed project may require the resettlement of informal inhabitants in the Project area. The outline of the compensation policy of DKI Jakarta is shown in Table 1.6.4; there are gaps with the World Bank's policy, which JICA Guidelines follow.

Table 1.6.4: Comparison between the Regulation of DKI Jakarta and the JICA Guidelines on the Policy of Involuntary Resettlement of Informal Inhabitants

Items	Regulation of DKI Jakarta[1/]	JICA Guidelines (The World Bank's Policy)
Eligibility for compensation	Continuous tax payment of at least for 5 years	All inhabitants
Compensation for buildings	25% of Tax Object Sales Value (NJOP) for the year	100% of the market price and the transaction cost
Other compensation	None	Expenses for moving to new area; Loss of income during /after relocation; and Cost to re-establishing livelihood and/or residence
Other assistance	None	Preparing relocation sites; Providing infrastructure and social services; Arrangement with the host community; Preparing grievance mechanism.
Monitoring	Payment of compensation	Progress of resettlement activities, including payment of compensation: Condition of relocated people.

[1/] Regulation of the Governor No. 193/2010.

1.7 Relevant Laws and Procedures for Development of Fishing Ports and Wholesale Markets

1.7.1 Reclamation and Road Construction Permit

In this Project, the wholesale market facilities are planned to be located in a reclamation area, and the access road is planned to pass over the Pluit flood control pond. Total reclamation area planned is approximately 10 ha, and the distance of the access road is more than 1 km. Reclamation construction permit and road construction permit are issued by Department of Public Works, State Government of DKI Jakarta after approval of the AMDAL (EIA).

1.7.2 Construction Permit for Newly Developed Wholesale Market-Related Facilities

In order to obtain the construction permit for the on land facilities, the application form has to be submitted to the DKI office for Planning and Supervision of Buildings. The application form has to

include, as attachments, the appropriate scales of architectural drawings, structural drawings and calculations, electrical drawings, and drawings of machinery and plumbing.

An applicant for a construction permit has to send his/her engineers to the above-noted approving authority to provide detailed explanations on the facility for construction to the engineers in charge of approval. In addition, facility construction-related requirements, such as safety against fire and management of hygiene and sanitary levels of the market hall, are also examined and judged by the approving authority.

The period for obtaining approval of the application for a construction permit is not stipulated in the Indonesian Building Code and local government regulations, but is estimated to take 3-4 months, based on previous experience.

CHAPTER 2

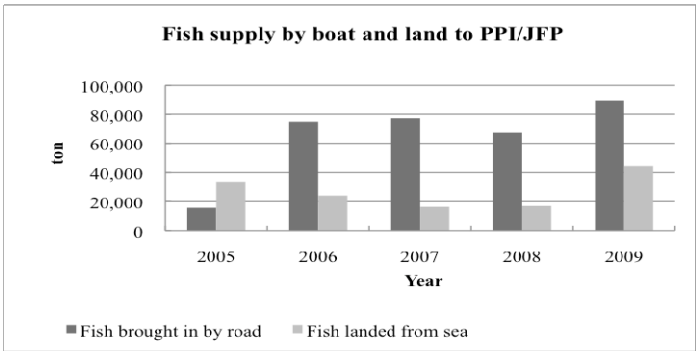
Problems and Issues to be Addressed with Respect to the Wholesale Market and Other Related Facilities at Jakarta Fishing Port

2. Problems and Issues to be addressed with respect to the Wholesale Market and other Related Facilities at the Jakarta Fishing Port

2.1 Current Situation and Future Prospects of Fisheries around JFP

Background. The JFP was constructed on reclaimed land in the northern part of Jakarta under the auspices of a JICA ODA loan. Since the reclamation work commenced in 1980, the structures have been constructed in phases. The auction hall and fish wholesale market were constructed in 1984 and 1992, respectively, and public fish trading activities started in 1984. Fish auction was practiced at one stage, but discontinued as explained later, while the fish wholesale market (PPI) has been operational, providing some 70,000 t of fish (2009) to the population not only in DKI Jakarta but also to most parts of Java. As such, the PPI/JFP has been playing an important role as a fish marketing and distribution hub/center in Java and the southern part of Sumatra. With the continuing expansion and facility renovations at the JFP, it has evolved into a fish landing, processing, and marketing complex.

Fish Landings at JFP. Fish landed in the East Pier are mostly fresh tuna for export and in the West Pier are other common fish species, frozen tuna, and other large pelagic caught by longlining. In 2009, the total volume of fish landings in both piers amounted to 44,300 t, of which 10,889 t (equivalent to 24.6%) in 2009 was marketed through PPI/ JFP, and the balance was either exported or processed in plants located mostly within the JFP industrial complex. Due to the stagnant marine fish catches especially around Java, **fish landings have been decreasing from year to year, except in 2009,** as shown in Table 2.1.1 and Figure 2.1.1.



Source: JFP Statistics, 2009

Figure 2.1.1: Fish Supplied from Land and Sea at JFP

Table 2.1.1: Number of Fish Boats Unloading in JFP in 2009

Fishing gear	2005	2006	2007	2008	2009
1. Liftnet	103	0	41	75	320
2. Driftnet	1,077	1,088	933	694	610
3. Purse-sein	109	13	270	239	722
4. Tuna longline	1,820	937	400	282	737
5. Muroami	10	5	0	0	49
6. Boukeami	99	28	0	0	0
7. Others	1	8	0	203	216
8. Carrier	459	-	-	203	216
Total	3,678	2,079	1,644	1,696	2,870

Source: Statistical Report 2009, UPT, JFP, MMAF

On the other hand, the volume of fish transported over land to the JFP has been increasing by the year and compensating for the decrease in marine fish landings (see Fig 2.1.1). Fish are collected from all over in Java and Lampung, Sumatra (see Table 2.3.2). **It has also been observed that the proportion of frozen fish has increased compared to those landed fresh.** This trend is expected to accelerate in the coming years as fishing effort extends to the more remote fishing grounds. **A drop in the number of tuna longline vessels has also been observed in JFP** – the result of the conversion of many tuna fishing vessels to purse seiners for capture of medium-sized pelagic like skipjack, longtail tuna, and eastern little tuna. This trend partly explains the reduction in fish landings, especially of tuna, at the JPF.

Issues. As the JFP was constructed on reclaimed land, **the area has been plagued with land subsidence problems,** which have caused great inconvenience and physical damage to some structures, such as the auction hall and wholesale market. **There is also a serious flooding problem,**

which causes heavy traffic in the area during high tide and which has made some fish traders decide to relocate and has prevented others from coming to the PPI/PFG for trading. This was expressed by some fish retailers interviewed at the Jatinegara and Bendungan Hilir fish retail markets.
In the past, substantial renovation and repair works were carried out under the auspices of the JICA ODA loan to improve the situation. There are also plans to renovate the auction hall in the Western Pier in 2011 using the unspent balance of funds from JICA ODA Loan No. IP-519. The JICA Study Team currently in the field is evaluating possible options for the improvement (or replacement) of the fish wholesale market, which is facing problems of (i) extensive physical damage brought about by land subsidence and (ii) heavy congestion in the market flood due to 'cross trades."

In addition to physical infrastructure problems, the fish marketing and distribution system itself needs to be addressed in PPI/JFP, which is the largest fish market in Indonesia and as such, should be a model for other similar facilities. MMAF has acknowledged the need to streamline the fish marketing and distribution system in its *Five-Year Strategic Plan, 2010-2014* and has already launched a project to construct a model fish market and fish distribution center in Brondong, which will be completed in early 2012. At this center, an auction system will be introduced, which is envisaged to lead to the streamlining of fish marketing and distribution and protect the benefits of fishermen and consumers in the long run. The auction system of fish trading has been shown in most developed countries to attract more fish traders because it is believed to be a fair and transparent mode of fish trading. According to the DKI Jakarta Regional Regulation (Article 17 of Chapter VIII Fish Auction, Regional Gazette of Jakarta Province No.12 2000), it is stipulated that i) all fish and their associated commodities landed by fisherman at their fish landing bases or fishing ports and fish from outsides the areas coming into the DKI Jakarta should be auctioned at the auction centers that shall be determined by the Provincial Governor, and ii) terms of organizing the fish auction referred to in paragraph (1) of this article shall be determined by the Provincial Governor.

There are also social issues involved as the Muara Baru is recognized as the area where the lowest income households are aggregated (DKI Jakarta, 2011). Hence, DKI Jakarta has focused on localized development in this area with the view towards increasing job opportunities and improving the security there. In addition, MMAF has drafted a Waterfront Plan for North Jakarta, with JFP at the center. While the completed blueprint has not been released, it will be necessary to link the development plan for the fish wholesale market to the Waterfront Plan so that high-quality fish and fish products could be served in the fish restaurants to be installed in the new PPI/JFP premises.

2.2 Current Condition of the Existing JFP Wholesale Market

2.2.1 Physical Condition

2.2.1.1 Wholesale Market Complex

The JFP wholesale market complex is located at the south end of the JFP. The market is at the center of the complex, and related facilities around it.

Table 2.2.1: Facilities at the Wholesale Market Complex

Facilities	Number of Units	Building Area (m^2)	Average Building Area (m^2)	Site Area (m^2)	Remarks
Wholesale market	1	9,856	-	-	
Cold storages	10	1,907	-	-	Most have offices on the second floor.
Offices, rest rooms, storages	15	709	47.3	-	
Kiosks	21	851	40.5	-	
Canteens	44	874	19.9	-	
Food stands	36	-	4	-	Assumed average area.

Public toilets	4	216	54	-	
Management offices PERUM DKI	 1 1	 179 91	 - -	 - -	
Police station	1	212	212	819	For the whole JFP
Mosque	1	217	-	447	
Water supply station	1	-	-	692	Including desalination plant for the whole JFP
Electric substation	1	24	-	37	

Note: Data obtained from the registration and field survey.

2.2.1.2 Wholesale Market Building

The JFP wholesale market is a windswept facility composed of corrugated cement board and lifted reinforced concrete floor. The central part of the building is surrounded by the columns and is used as a market hall for wholesalers. The hall is divided into 70 wholesale divisions separated by horizontal and vertical passages. Each wholesale division is horizontally subdivided into two rows by steel bars, from which the wholesalers' hanging weighing scales are suspended. The borders of each wholesale division are marked by the location of reinforced concrete posts of the aforementioned steel bars. Each unit is subdivided into 14-16 booths. There are 992 booths for wholesalers in total, each measuring 5 m^2 (2.5m wide and 2m long) and 8 booths are used as water reservoirs for washing fish and equipment and also for cleaning the market.

Based on the registration forms, there are currently 390 users occupying 942 booths. Currently the rest of the booths are not registered but actually are used for various purposes such as fish sales booth, storage for unused insulated boxes, fish processing space, etc. (see Appendix 3 for the drawing of the existing building).

The widths of the market passages are 2.5m (vertical) and 1m (horizontal). Drainage channels are installed in the vertical passage, but drainage of horizontal passage is fully by gravity (depending only on the floor slope).

The peripheral area outside the columns is used for fish handling and for the supply of ice – there are six supply stations. The depth of this area is approximately 7m^2.. There are 20 sets of slopes and stairs used as approaches to the wholesale market floor from the ground level. The entire area has no drainage facility (water drainage is purely by gravity – only by floor slope).
The grounds surrounding the market hall are used as berths for trucks loading and unloading fish. Drainage channels are installed beside the sidewall of the market building.

Lights are fitted under the truss roof to provide illumination to the market floor and peripheral area. There are no other fixtures in the building, not even water supply piping. Brackish water from the four water reservoirs is supplied using plastic drums. Water from a well within the complex site is distributed through two lines of pipes directly to the reservoirs.

The following physical problems in the market building have been identified (see Appendix 3 for map showing the damages in the building):

- Fragmentation of rusted steel;
- Partial loss of concrete in some columns and exposed reinforcement of concrete posts supporting the hanging weighing scales;
- Parts of the market floor are floated and cracked due to differential settlement of the floor. As the results, poor drainage and water puddles are seen in most parts of the drainage channels and in some parts of the passages and the peripheral floor area;
- Absence of good quality of water for use in the market – no filtration and disinfecting equipment in the water supply line and no water quality test conducted.

2.2.1.3 Ice Storages and Offices

Tenement-type facilities are leased to tenants. Most of the facilities were renovated by the tenants and used for various purposes as shown in Table 2.2.1, and some are left in a state of disrepair.

2.2.1.4 Kiosks and Canteens

These facilities, also of tenement type, are leased to tenants for renovation and use as kiosks and canteens.

2.2.1.5 Food Stands

These are movable stall-type facilities located both inside and outside of the market building.

2.2.1.6 Public Toilets

These facilities are also leased to the private sector to operate and manage.

2.2.1.7 Management Offices

PERUM uses some parts of the wooden office building as its office, while DKI Jakarta has its office at the end of the tenement house for shops, located very near the entrance to the complex. The booster pump and reservoir of PDAM, which supplies city water to whole JFP, are also installed in this area. These two management offices are mostly being used as originally designed. The facilities have deteriorated, but their condition is not so bad.

2.2.1.8 Police Station, Mosque, Water Supply Station, and Electric Sub-station

These facilities were constructed on the reclaimed land for lease to the organizations that built the necessary facilities themselves.

2.2.1.9 Inner Road

The entire market complex is traversed by inner roads that are more than 15m wide and provided with drainage canals and street lights along the outer edges of the road and underground water and electricity supply lines. The condition of the road is not so bad in spite of the lack of maintenance.

2.2.1.10 Utilities

Water Supply. The wholesale market site is supplied with brackishwater originating from a well within the existing complex. There are two supply lines. One is operated by PERUM for market users and supplies an estimated 100 m^3/day. The other is operated by UPT and is used for cleaning the market site, including market floor, drainage gutters, and inner roads, and supplies approximately 30-50 m^3/day. As this water is not subjected to water quality tests, and no disinfection measures are carried out, it is possible that this water is not suitable for fish market use and contamination of fresh fish with bacteria and other infectious organisms is possible.
The site also has a supply of sterilized desalinated water used as drinking water only in the auxiliary facilities (not to the wholesale market building). Consumption volume is 60 m^3/day max.

Electricity. PERUM ensures electricity supply to the all facilities in the JFP site including the wholesale market. Their supply condition is not so bad since the fluctuation and power failure is mainly due to PLN. Regular maintenance of the electric facilities of PLN is conducted once every two months. Electricity to the complex is provided from the main supply station of JFP through an LT2-1 panel and middle voltage transformer (6.6KV/380, 200V). (The existing capacity of this transformer

will not be enough to supply to power requirement of a new wholesale market.)

2.2.1.11 Refrigeration Facilities

The existing refrigeration facilities of JFP are fully operated by PERUM, which has been managing the facilities and maintaining them in rather good condition for more than 25 years already (see Appendix 3 for the original plan). Ammonia was initially used as the refrigerant, but the system was subsequently changed and modified for the use of freon (R-22).

Ice-making capacity is approximately 200 t/day of 50-kg and 60-kg blocks of ice. All 50-kg ice blocks are supplied to the wholesale market. Consumption volume is 67 t/day, on average, less than half the production capacity of 150 t/day.

There are four cold storages currently operating in the complex, two of which are leased to the private sector. Their inside temperature is maintained up to -20^{o}C.

2.2.1.12 Sewage Treatment Plant (STP)

The JFP STP has a treatment capacity of 1,000 m^3/day. There are three sewage lines connected to the STP. One line is from the existing wholesale market site, including some parts of the fish industrial area. The others are from the fish industrial area and pier area of JFP. This plant has not been operated since last October 2010 because land subsidence and seawater flooding had damaged the plant and sewage piping lines. Their rehabilitation is expected to start soon, however, and the pipelines and related equipment are projected to be repaired within the year (2011). So far, discharge water quality from the STP is not good, although water quality analysis data showed that water quality meets the effluent standards of DKI.

2.2.2 Operation and Maintenance Condition

2.2.2.1 Facilities

All the facilities in the existing wholesale market site are leased out by PERUM to the private sector. PERUM does not operate the wholesale market facilities, and only collects rental fees from the lessees through four staff members are sent to the market daily. PERUM is responsible for the maintenance of water and electricity supply to the complex, and has maintenance personnel stationed at their main in the JFP. It also makes announcements in case of traffic congestion and other incidents.

The maintenance of market facilities and sanitation of the market site is the responsibility of UPT. For the cleaning work, UPT has established a specialized division, the Administrative Affairs Division, which has 24 personnel. These personnel are divided into four teams, each responsible for (i) spraying of brackish water, (ii) cleaning of the floor, (iii) gathering of solid waste, and (iv) bringing the solid waste to the garbage collection site in the west pier. Their work starts from at 0300 hrs and normally ends within the morning.

Security in the market site is maintained by the local police through security staff hired through a private company. The police are also responsible for managing and operating the parking lot in the PERUM office site.

2.2.2.2 Equipment

Most of the equipment in the wholesale fish market complex are operated and maintained by PERUM, except for the brackish water supply line and sewage treatment plant, which are operated by UPT.

PERUM has an Technical/Engineering Division responsible for operation and maintenance of these pieces of equipment. The division consists of four sections; (i) Dock Section (1 leader and 13 mechanics); (ii) Water Supply System/Electric/Telecom (WET) Section (1 leader and 3, 2, and 3 mechanics responsible for water supply, electricity, and telecom, respectively); (iii) Ice-making and Cold Storage Section (1 leader and 26 mechanics); and (iv) Building Section (1 leader and 2 staff). The section leaders and some staff work only during the day, but other technical staff work at night.

UPT's Operation and Maintenance (O&M) Division consists of two sections: (i) Administrative Affairs Section responsible for the O&M of the wholesale market; and (ii) Infrastructure Section responsible for operating and maintaining the well pump and STP. The latter section has 14 staff members. The shift schedule of these UPT sections is similar to that of the other sections of UPT.

Water Supply System. There are two sterilized desalinated water production plants in the entire JFP site. Field O&M starts with the original inlet port of desalination plant and extends up to the inlet port of the customer. The water supply pipelines are embedded underground and connected to each customer's flow-meter or junction point. There are some leakages in these supply lines and approximately 20% of water produced by the plants is lost to the ground. Although the staff inspect leakage points, it is very difficult to determine the points of leakage. Since land subsidence is a problem at the JFP site, it is likely for parts of these water supply lines to suffer breakdowns in the near future.

Each plant is operated and maintained by staff of each commercial company jointly with PERUM staff. Routine work, such as reading and recording of flow-meter and data input into computers is done well. Each staff member, except their leader, works in shifts, as shown in Table 2.2.2. Working time is 24 hours, and one shift consists of one working day and two days off.

Table 2.2.2: Work Shifts, Water Supply Section

Shift	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
A	A	-	-	A	-	-	A
B	-	B	-	-	B	-	-
C	-	-	C	-	-	C	-

Power Supply System. Maintenance of this system is shared by two groups. The maintenance of equipment outside the mechanical house is the responsibility of PERUM's WET Section, which has two electricians (day duty) in charge of O&M of the low voltage lines. O&M of the ice-making and cold storage equipment inside the mechanical house, including the transformer and diesel generators, is the responsibility of several mechanics/electricians who work in shifts (see Table 2.2.3). The O&M condition of the power supply equipment is good.

Refrigeration Facilities. The O&M of refrigeration facilities is handled by the O&M Section of PERUM in three groups: (i) operation (12 staff); (ii) maintenance (5 staff); and (iii) ice production (9 staff). Staff responsible for mechanical maintenance work only during the day, while those in charge of ice production work in shifts similar to that shown in Table 2.2.2. Those in charge of the operation of machinery have the most difficult job and work under a different shift schedule; the 12 operations staff are divided into four teams: A, B, C, and D (Table 2.2.3).

Table 2.2.3: Work Shift for Staff Assigned to the Operation of Refrigeration Facilities

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
0800-1630	A	B	C	D	A	B	C
1630-2400	B	C	D	A	B	C	D
0000-0830	C	D	A	B	C	D	A
Day off	D	A	B	C	D	A	B

The O&M condition of the refrigeration facilities is excellent, considering the (i) age of the equipment and (ii) small budget for regular maintenance and routine work.

Sewage Treatment Plant. As mentioned earlier, the STP has not been in operation since October 2010. Therefore, the six personnel of the UPT Infrastructure Section have nothing to do. Four staff of the same section are engaged in the O&M of the brackish water supply line in the existing wholesale market site. The condition is rather good, but the quality of supplied water is not good and is not advisable to use in the newly developed wholesale market facilities.

2.2.3 Public Services

2.2.3.1 Water Supply

One of the water supply line to the JFP is managed by PDAM, which is also responsible for the water supply in Jakarta. The water supply line is connected to the reservoir and booster pump system located at the entrance area to the JFP. This connecting point is allocated in the DKI's control office of the wholesale market. However, this water receiving line has been shut down since August 2010 because of poor water quality.

There are two sterilized desalination plants in JFP, as mentioned earlier, which supply the required volume of clean water is supplied to the consumers in JFP. One of the companies has recently installed additional plant of capacity of 1,500 t/day. The installation of a water supply pipeline and related equipment, such as sand filter and chemical charging system, are being awaited. However, the current supply volume is considered inadequate for future consumption, particularly if the requirements of the newly developed wholesale market are included in the estimates of water consumption. This is because a number of fish industry companies will resume or start their business in JFP when the rehabilitation project is completed.

2.2.3.2 Power Supply System

Electric power is supplied to the JFP by PLN. Power supply is more than adequate, and power failures have been seldom, and mostly for routine maintenance of PLN. PERUM has two sets of generators, each 1000 KVA, for use during blackouts. However, as the operation of the gen-sets cannot be synchronized, it is necessary to reduce electric power consumption during periods of power failure.

2.2.3.3 Sewage Treatment

The STP is not in operation but is expected to be repaired soon. However, even if it is repaired, its treatment capacity will be too small to process the volume of drainage water from the new wholesale market, which is estimated at approximately 1,900 m^3/day.

2.2.3.4 Solid Waste Management

Although large amounts of solid waste are discharged in DKI Jakarta, there is no solid waste treatment plant in or near DKI. Solid wastes from JFP are transferred to a dumpsite in Tangerang by UPT. A primary depot of solid waste produced in JFP is found at the edge of the west pier area. UPT cleaning staff collect the solid waste from JFP daily and transfer those to the dumpsite. Solid wastes produced in the existing wholesale market site are not toxic and harmful, since they usually consist of worn-out or damaged insulated fish boxes, fish handling related items, and refuse of market workers.

2.2.4 Possibility for Site Expansion

Around the existing wholesale market site (marked as "O" in Figure 2.2.1) are the JFP fish processing industry estate to the north and east, MMAF's Marine Fisheries Research Institute (BRPL) to the south

(marked as "B"), privately owned land ("C" and "D") to the west, and the corner of the water basin ("E") to the northwest. An analysis of the possibility of landward or seaward expansion of the existing site is presented below.

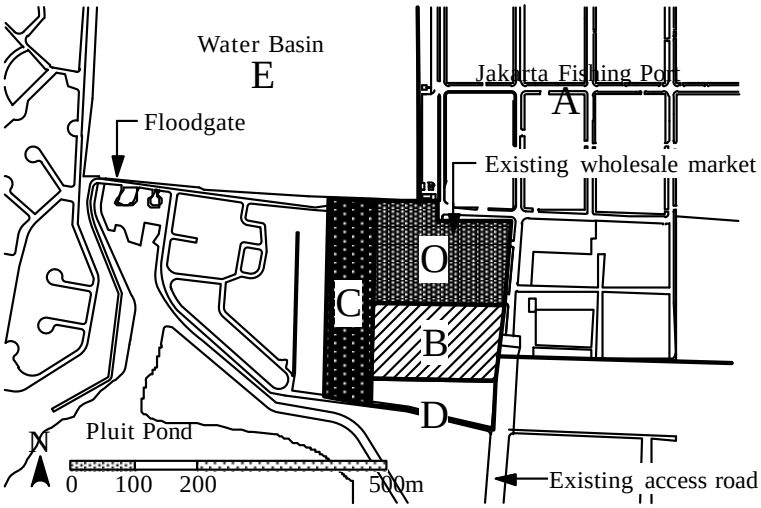


Figure 2.2.1: Surrounding Area of the JFP Wholesale Market

2.2.4.1 Possibility of Landward Expansion

If the current site is extended landward, land has to be acquired from any of the adjacent areas, as discussed below.

Option 1: Expansion inside the JFP area (see area marked "A" in Fig. 2.2.1)

JFP is a complex consisting of fishing port, fish processing and storage industries, and some public open spaces. Although land for the fishing port facilities and open spaces have already been developed and used for specific purposes, some parts of fish industry area have not been used and are vacant lots. However, those unused pieces of land have been subdivided and leased out to private companies. Therefore, acquisition of those lots for the new wholesale market seems difficult. Even assuming that it would be possible to acquire these lots for JFP expansion, the process of negotiation and land acquisition is expected to be long and arduous. Furthermore, several lots are needed for the development of the new market.

Option 2: Expansion into the BRPL area (see area marked "B" in Fig. 2.2.1)

As this lot is owned by MMAF and is used by the Marine Fisheries Research Institute, and its total area is smaller than that required for the proposed expansion, it has been excluded as a possible expansion area. Use of this piece of land would require additional area on the west and/or further south in order to meet the area requirement of the proposed new development.

Option 3: Expansion into the adjacent private land to the west of the existing site (see area marked "C" in Fig. 2.2.1)

This piece of land is privately owned and, although it is not currently in use, acquisition of land in this area will be more difficult than in Option 1.

Option 4: Expansion into the land to the south of the existing site (see area marked "D" in Fig. 2.2.1)

This piece of land is owned and managed by the local government corporation, PT. Jakarta Propertindo. Although it is not currently in use, it will be excluded from the study since it will only be useful if combined with Option 2.

2.2.4.2 Possibility of Seaward Expansion

Option 1: Expansion inside the water basin (see area marked "D" in Fig. 2.2.1)
This water basin is under the control of DKI Jakarta, but its planned development is not indicated in the current city spatial plan. Thus, it seems highly unlikely to obtain DKI approval for its use for the project. It is necessary to propose the use of this water basin to the DKI city planning or related division. If DKI has no objection to the proposal, it has to be subjected to AMDAL (EIA).

Option 2: Expansion into the area used for boat/barge anchorage (see area marked "E" in Fig. 2.2.1)

There are two areas currently used as anchorages along the southern edge of the water basin. One is for leisure boats, and the other is for barges of private construction companies. It will be necessary to reserve about 100-120 m from the water edge for securing their steering and mooring area. In case this reserve area is acquired, appropriate measures have to be taken to prevent water stagnation and putrefaction in this area caused by land reclamation in the water basin. This is possible with the use of island-type reclamation method or entirely piled slab type reclamation method. If the anchorages could be relocated to other suitable areas, reclamation work could be extended to the water edge to prevent the aforementioned natural impact.

Option 3: Present land use along the water edge (see area marked "E" in Fig. 2.2.1)

There are seawalls and embankments on the border between the water basin and the existing land. The land along the southern and eastern seawalls is used for roads and open spaces, except the existing wholesale market site and the fuel supply station and sewage treatment facility of JFP. Even if reclamation work is extended to the existing seawall, no problems are anticipated under the proposed land use. However, there are about 80 houses built on stilts above the water between the anchorage for the leisure boats and the existing wholesale market, which have an estimated population of about 300. This means that relocation or resettlement of these informal settlers will have to be undertaken, and appropriate compensation measures implemented, which will require a long period of time before it is completed.

2.2.5 Access Road

2.2.5.1 Existing Condition of Jl. Muara Baru

Jl. Muara Baru is the only existing access road to JFP. The road is 8.0m wide and is a concrete (ridged) paved road. The pavement is in relatively good condition, with the area near the JFP gate having been paved recently as part of the JFP improvement project. The remaining sections in the improvement area should be overlain with concrete to avoid flooding.

Some areas suffer from flooding throughout the year during high tide. Recent records show that this road was heavily inundated during the high tide experienced on 28-29 January 2006.
The road is usually heavily congested due to (i) mixed traffic caused by public transport, motorbikes, Bajaj, trucks, and cars; (ii) illegal parking; (iii) occupancy of illegal houses, vendors, and shops; and (iv) lacking of a road shoulder or pedestrian space.

Figures 2.2.2-2.2.6 show the results of the field reconnaissance survey conducted in Jl. Muara Baru.

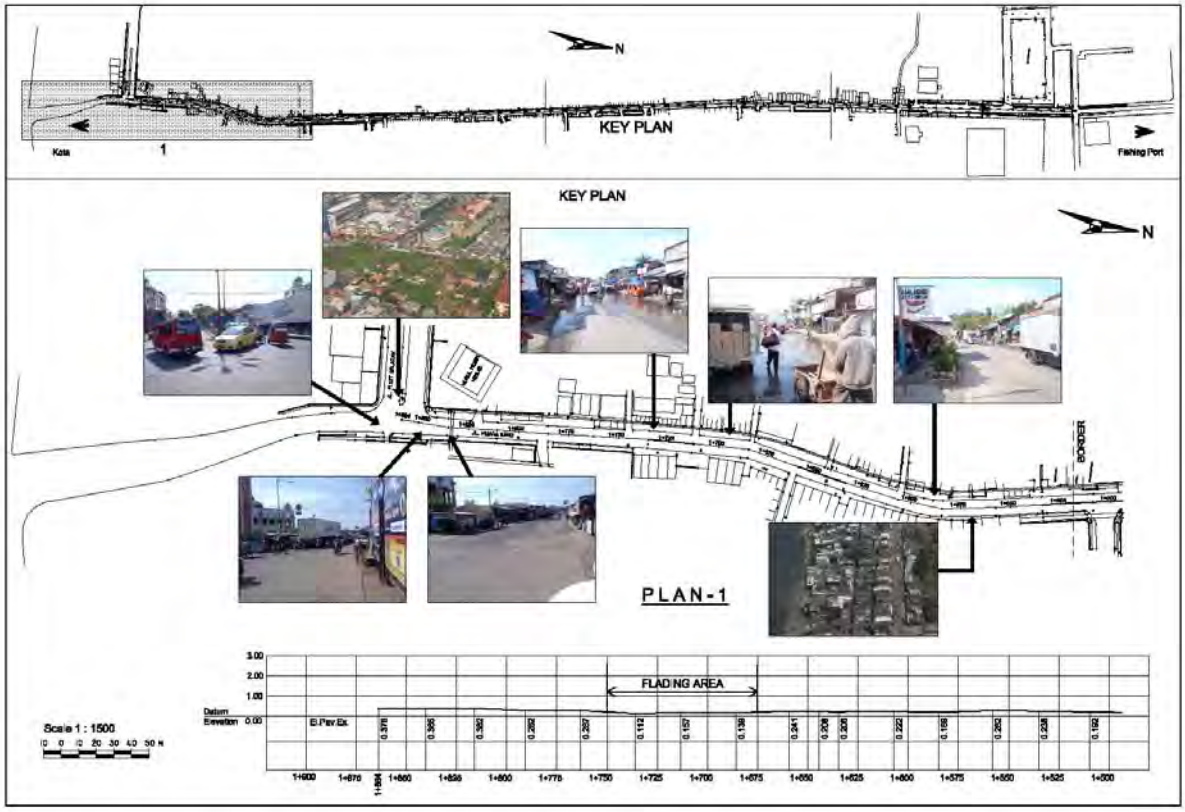


Figure 2.2.2 Existing Condition of Access Road (Jl. Muara Baru) (1)

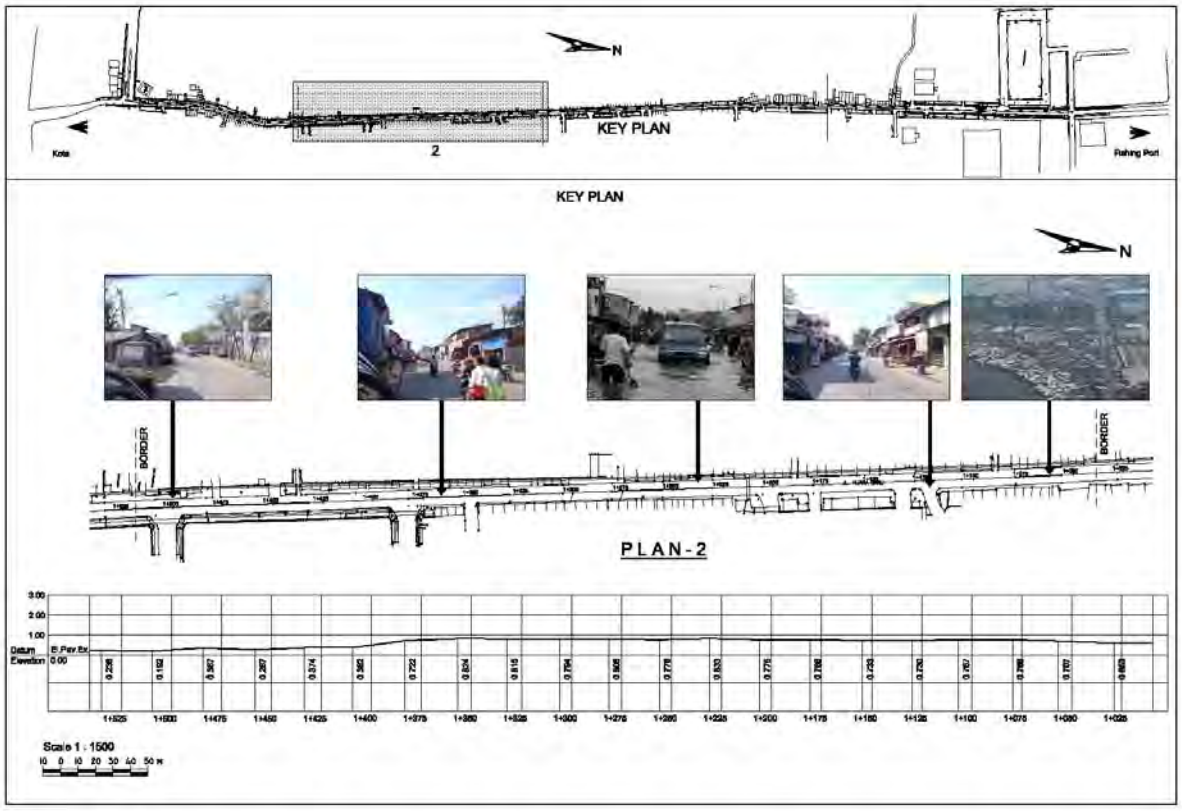


Figure 2.2.3 Existing Condition of Access Road (Jl. Muara Baru) (2)

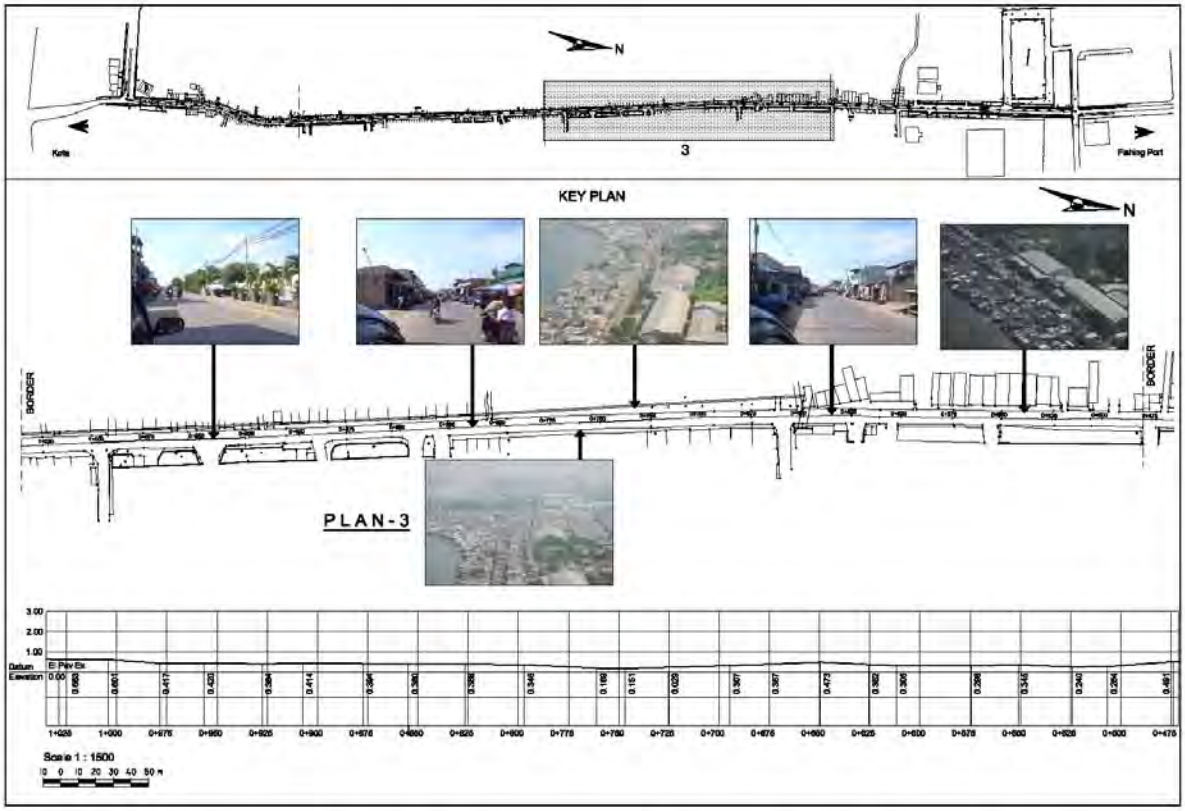


Figure 2.2.4 Existing Condition of Access Road (Jl. Muara Baru) (3)

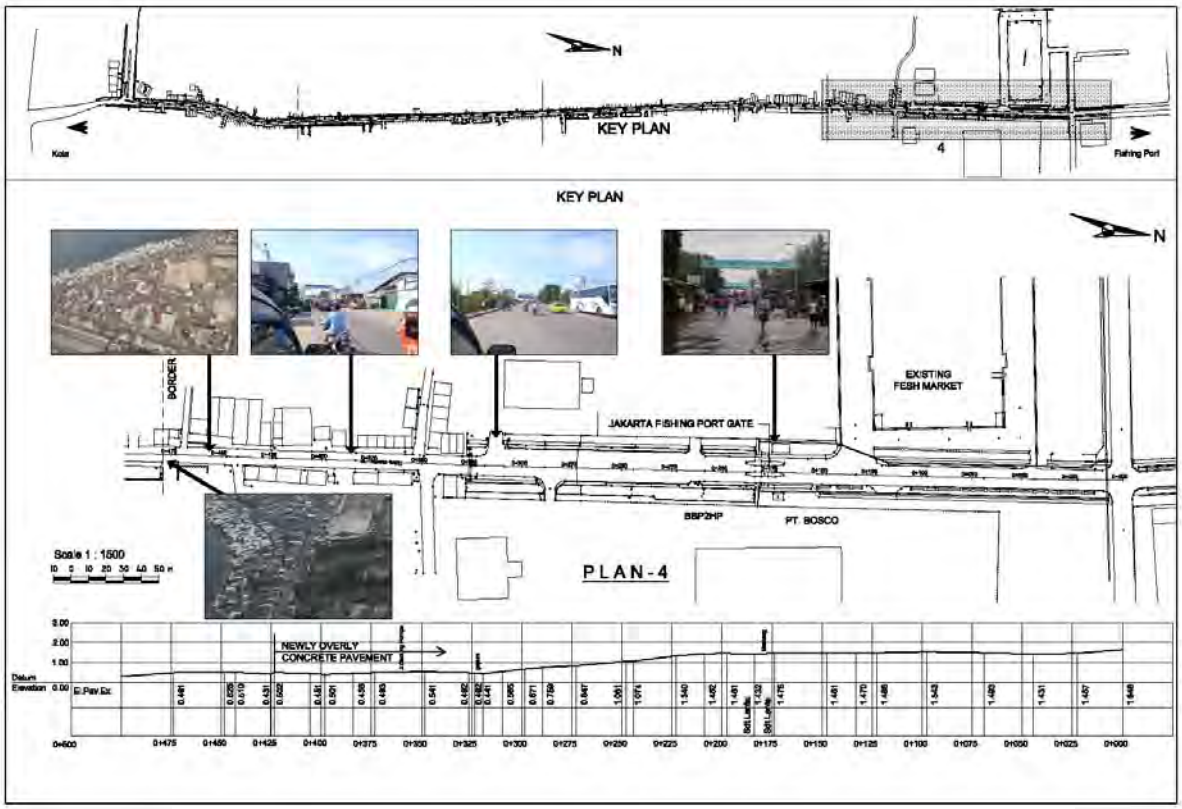


Figure 2.2.5 Existing Condition of Access Road (Jl. Muara Baru) (4)

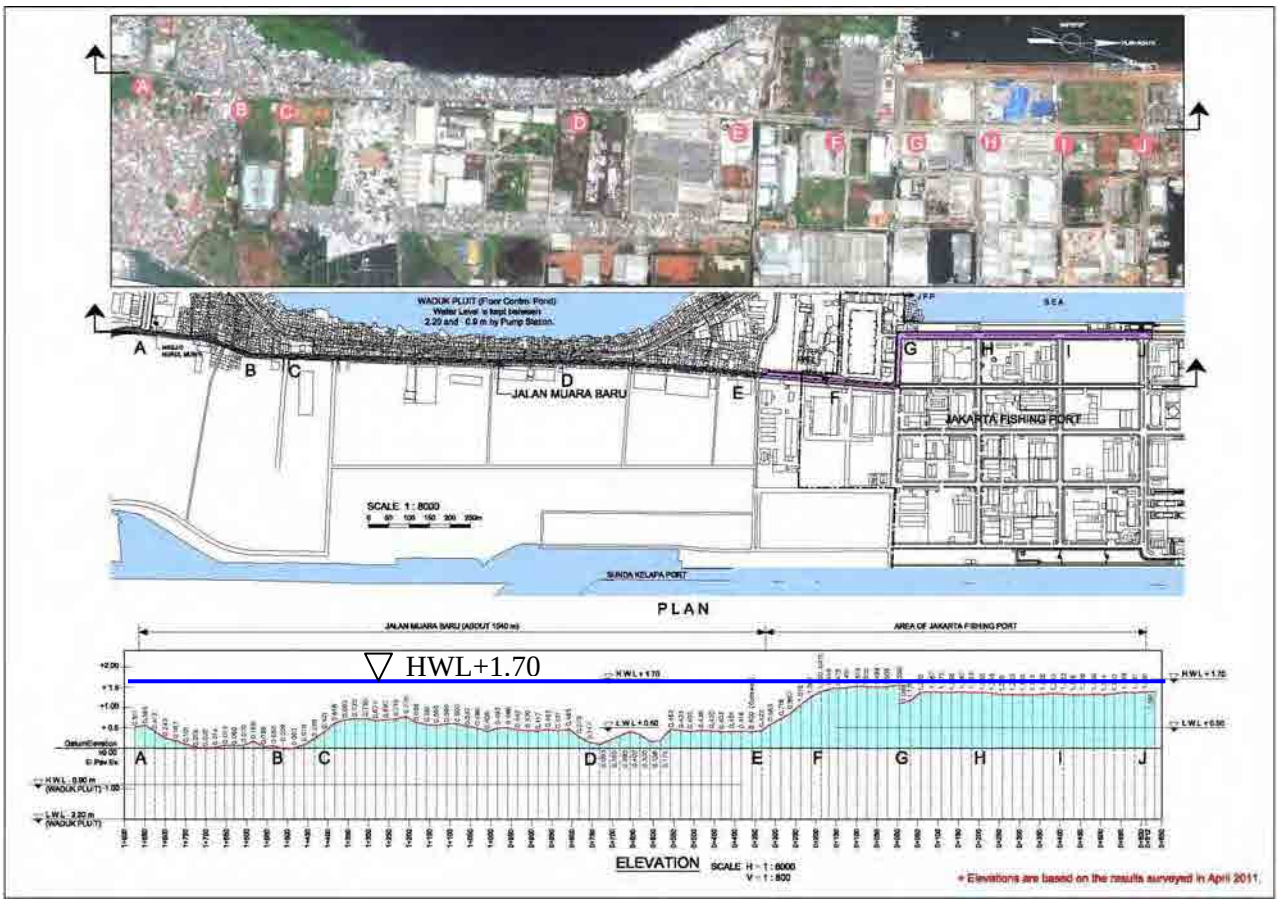


Figure 2.2.6: Existing Condition of Access Road (Jl. Muara Baru)

2.2.5.2 Settlement Condition of Surrounding Area

It is generally understood that the main cause of land settlement is the consolidation of deeper clay layers caused by the widespread extraction of groundwater in the deep aquifers. Various studies have indicated that land settlement is a widespread phenomenon in Jakarta, especially in the northern coastal area where there are numerous factories, shops, and houses. The area surrounding the Kota Railway Station has been found to be in a serious situation, with a settlement rate greater than 5 cm per year in 1999.

Jl. Muara Baru is located approximately 1 km from the Kota railway station, its elevation is close to sea level, and the magnitude of projected land settlement in the future are all causes for serious concern. Based on an analysis of data from a 200-m depth of boring log, conducted as part of the Jl. Sediyatmo Toll Road Study, it is anticipated that a total of 50 cm of land settlement (2.5 cm/yr) could occur along Jl. Muara Baru in the next 20 years, provided that the extraction of deep groundwater is reasonably controlled by government authorities in the future and the settlement rate gradually decreases with a yearly decline of water pressure in the aquifers.

For structures, such as piled slab or bridge planned for the access road, the profile of these road facilities should be determined so as to allow the predicted land settlement for clearance of the structures (net clearance + land settlement). For the embankment system, settlement due to soil consolidation should also be considered.

Figure 2.2.7 shows the land settlement situation in JFP based on the topographic survey that was carried out to check the actual settlement condition in the Project area. The area with the greatest land settlement shows more than 13 cm of settlement.

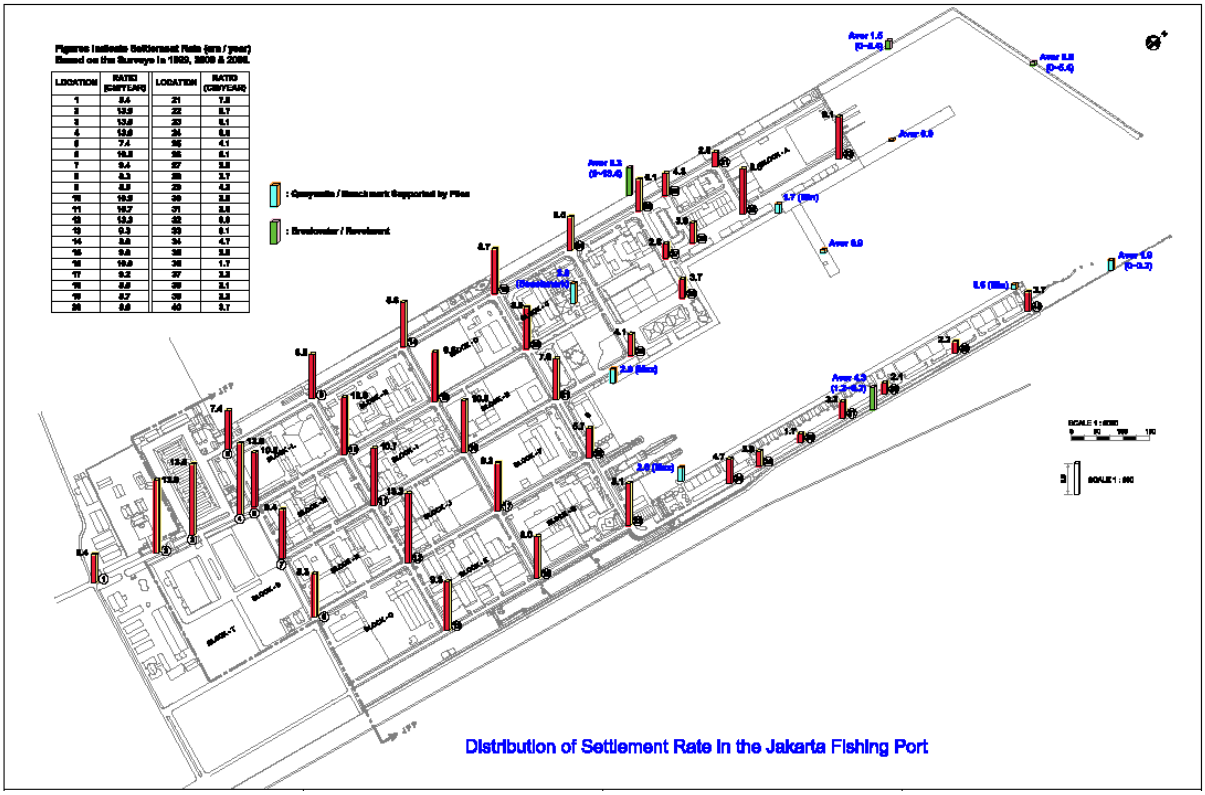
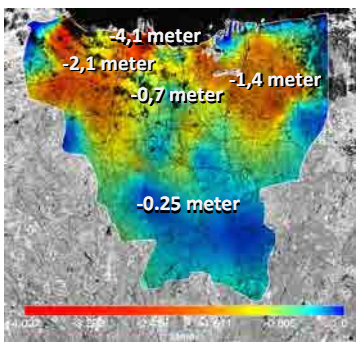


Figure 2.2.7: Land Settlement Situation in JFP

In addition to the above information, the *Jakarta Coastal Defense Strategy (JCDS) Study* being conducted with Netherlands Government assistance has been monitoring the settlement situation in Jakarta since 2006. Data from this study has shown an annual settlement rate of 14.9 cm, on average, from 2006-2011. Land settlement is caused by drawing of groundwater in Jakarta Fishing Port. Therefore, MMAF have to manage for surveillance and restraint of drawing of groundwater. If MMAF can control to avoid drawing groundwater in Jakarta Fishing Port, land settlement will be expected to decrease from 15 cm of yearly settlement to 5 cm.

Land Subsidence Map



SUBSIDENCE AT MUARA BARU (in meter)

Muara Baru monitoring point	latitude	6° 06' 15.84303" S	
	longitude	106° 48' 00.70473" E	
			
Ellipsoid height (m)	2006	23.999	
	2007	23.837	**-0.162**
	2008	23.605	**-0.232**
	2009	23.477	**-0.128**
	2010	23.350	**-0.127**
	2011	23.254	**-0.096**
Yearly average			**-0.149**

Source: Jakarta Coastal Defense Strategy (JCDS) Study（2011）

Figure 2.2.8: Land Settlement Situation in Jakarta and Muara Baru

2.3 Present Situation of Fish Distribution and Marketing in and around JFP Wholesale Market

2.3.1. Fish Distribution Volume

Volume of Fish Landed and Handled in JFP. Based on data contained in the *JFP Statistics Report*, some 71,043 t of fish were landed and handled in the PPI/JFP in 2009, equivalent to about 195 t/ day (Table 2.3.1).

Table 2.3.1: Fish Landed and Transported by Road

Item	2009	Volume per day in 2009(ton)
Fish transported by road to JFP	89,102	244.1
- Estimated volume broght to PPI	60,153	164.8
- Estimated volume broght to factories	28,949	79.3
Fish laned in JFP	44,300	121.4
- Estimated volume brought to PPI	10,889	29.8
- Estimated volume directly exported or sent to factories	33,411	91.5
Total fish landed and brought in JFP	133,402	365.5
- Total estimated volume brought to PPI	71,042	194.6
- Total estimated volume sent to factories directly	62,360	170.8
Source of data: Statistic Report in 2009, PPS Nizam Zachman Jakarta, estimated by UPT/JFP		

Details on fish landing volume, by fish species, month, and mode of delivery (by land or boat) are shown in Appendix 2.

In an effort to verify the accuracy of the figures, and origin and destination (O/D) survey was conducted from 4-18 April 2011, with focus on quantifying the fish supply volume by origin and fish distribution volume by destination. Preliminary analysis of the survey data gave an estimated 51,129 t/yr as the total volume of fish handled in the PPI/JFP, which is lower than the figures given in the JFP statistics report.

Sources and Species of Fish Landed in JFP. There are two supply sources of fish for the PPI/JFP: (i) fish landed at the piers in JFP and supplied to the PPI/JFP; and (ii) fish to PPI/JFP by land from almost all provinces in Java Island and the southern part of Sumatra (Table 2.3.2). More than 46% of the total volume of fish brought to PPI/JFP comes from West Java, followed by DKI Jakarta with 15% of total, including 924 t of imported frozen fish.

Table 2.3.2: Volume of Fish Supplied from Different Provinces

Province	Lampung	DKI Jakarta	West Java	Central Java	D.I.Yogyakarta	East Java	Banten	Others	Total
Distributed amount(ton)	3,068	9,203	27,791	12,993	0	6,136	722	241	60,153
Ratio (%)	5.1	15.3	46.2	21.6	0.0	10.2	1.2	0.4	100.0
Source of data: Statistic report of UPT/JFP MMAF 2009, Preliminary result of the OD survey 2011									

The main species of fish brought to the JFP wholesale market are small pelagic like Indian mackerel, scad, and sardine, which altogether account for 50% of the total fish brought in, followed by freshwater fish, mostly from aquaculture (33%), medium/large pelagics such as skipjack and eastern little tuna (10%) and others.

Volume of Fish Distributed from PPI/JFP. Fish unloaded in the PPI/JFP are traded through negotiated transactions or through pre-agreements with fish buyers, who then distribute the fish to various destinations. The preliminary results of the O/D survey conducted as part of this study showed that most of the fish landed in JFP are sold in Jakarta (29,696 t or 41.8%), West Java (28,640 t or 40.3% of total), and Banten (8,383 t or 11.8%) (Table 2.3.3).

Table 2.3.3: Destinations of Fish Landed at JFP

Province	Lampung	DKI Jakarta	West Java	Central Java	EastJava	Banten	Total
Amount (ton)	426	29,696	28,630	1,918	1,989	8,383	71,043
Ratio (%)	0.6	41.8	40.3	2.7	2.8	11.8	100.0
Source of data: Ratiofrom the result of OD Survey, Total amount: Statistic Result of UTP/JFP 2009							

2.3.2. Distribution Flow (Fish, People, Information, Money)

The flow of fish distribution and marketing centered in the JFP fish wholesale market is shown in the flowchart in Figure 2.3.1. The flowcharts for the movement of fish and people are in Appendix 4.

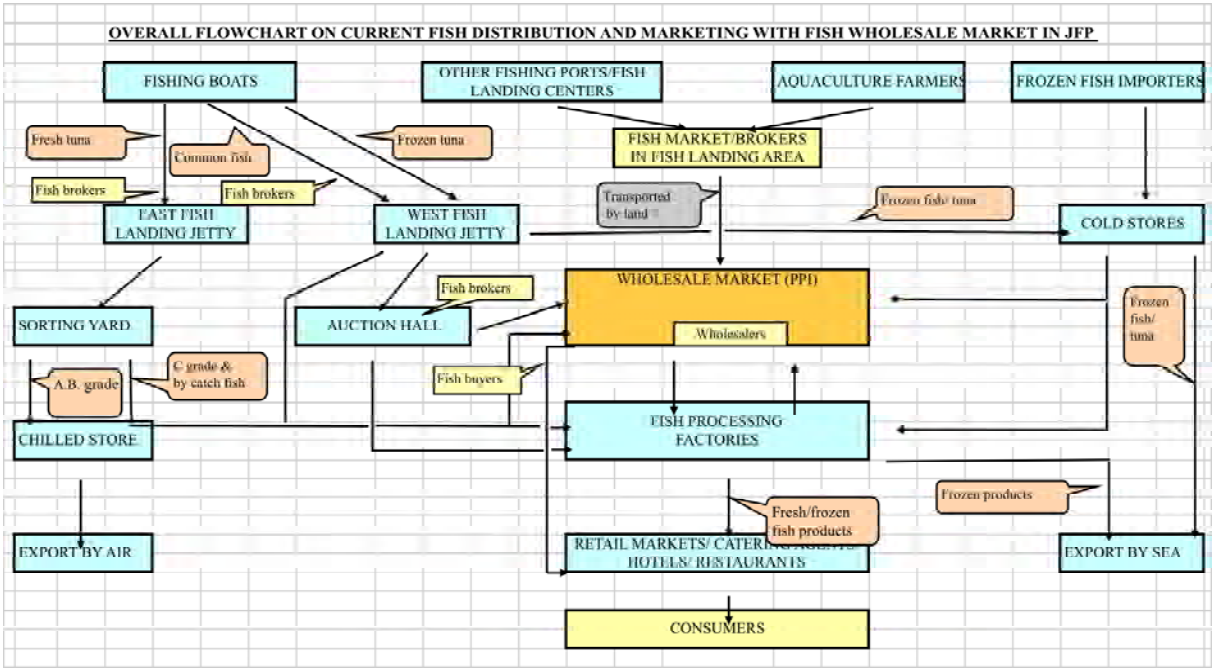


Figure 2.3.1: Overall Flowchart for Fish Distribution and Marketing

2.3.3. Fish Marketing System

2.3.3.1 Fish Supply

In the JFP Fish Wholesale Market, there are three supply flows for fish and fish products, namely: (i) fish transported by road through the gate; (ii) fresh tuna and related species harvested as by-catch and landed in the east pier of JFP; and (iii) frozen and fresh fish landed in the west pier.

Fish Transported by Road. Fish landed in remote fishing ports and landing sites are mostly purchased by fish brokers (almost 90%) in the fish landing markets through negotiated transactions or purchased directly from boat owners in a pre-agreed manner or consignment basis. In the former case, payment is made at the site in cash or disbursed within a week in cash or check. Fish brokers transport

fish to the PPI/JFP by trucks, pick-ups, or insulated vans, while communicating with wholesalers in Jakarta, with whom they have established relationships, to report the quantities and varieties of fish and other relevant pieces of information. Through these conversations, fish prices are settled prior to arrival at the PPI.

Once the trucks arrive at the PPI/JFP, fish in plastic barrels are distributed to respective marketing booths for wholesale marketing. No weighing is generally done, as that has been accomplished at the fish landing sites, although some wholesalers conduct random checks for quality. In this case, wholesalers normally make some deposit payments to their fish brokers, and a reconciliation payment is made by cash or check within one week. Some fish brokers who have no close connections with particular wholesalers sell their fish to any wholesaler through a negotiated transaction or directly to fish buyers in their own booths. (Some fish brokers rent selling booths in the PPI/JFP.) In other cases, a few wholesalers receive fish jointly from fish brokers on consignment and sell them at respective fish selling booths, and the price is paid in cash on the same day. Some fish boat owners and fish farmers also bring their fish produce directly to PPI/JFP and sell them to wholesalers through negotiated transactions, although their numbers are limited.

Fresh Tuna and Other Related Species Landed at the East Pier. Fresh tuna, mostly yellow fin and big eye tuna, as well as related species (e.g., marlin, sailfish, swordfish, and shark) harvested as by-catches of tuna long line fishing, are landed at the East Pier. These are brought to the sorting yards, which are arrayed along the pier, examined for quality and appearance, and separated into three grades. The high-grade fish are well-chilled and packed in polystyrene boxes for transport by air. Some 17 such factories are currently in operation. This business is handled by brokers who market fish in Japan on consignment basis. Lower-grade fish are sent to factories in the JFP for further processing into fillets, loins, and steaks for the export and local markets. The lowest grade fish are sometimes sent to the PPI/JFP and filleted on the floor and sold to fish buyers or restaurant owners, etc. The list of fish factories in operation in the JFP complex is in Appendix 2.

Frozen and Fresh Fish Landed in the West Pier. All fish, except fresh tuna, are landed at the west pier. Frozen tuna and other related fish species are immediately brought to the cold storage for sorting. Some are exported, while others are either sent to processing factories or to the PPI/JFP. Other common fish in fresh or frozen form directly dispatched to factories or cold stores for further processing or storage before marketing, or otherwise displayed in the auction hall for sale after weighing. However, auction has not been practiced in Indonesia since 2000, and instead, fish are marketed through negotiated transaction with wholesalers. Persons interviewed as part of this study said that the practice of auction was discontinued in 2000 due to the decrease in the volume of fresh fish landings.

There are two cooperatives in the auction hall –Tuna Wholesalers' Cooperative and Fishermen and Common Fish Wholesalers' Cooperative (*Koperasi Mina Muara Makmur*), with the latter dealing with weighing. DKI imposes a commission on all fish landings, the amount being 5% of the value of the fish. Of this amount, 3% is paid by the fish owner and the balance of 2% is borne by the wholesaler. Of the fee collected by DKI, 40% is shared with the cooperative. Wholesalers who purchase fish in this auction hall sell them to small processing factories, which produce various products for the local markets, or send them to the PPI/JFP. All payments to boat owners are made either in cash or check within one week.

2.3.3.2 Wholesale Selling

In the wholesale market of JFP, the fish are displayed in plastic tubs with a 60-cm diameter for fish buyers or their agents to examine their quality and sizes in the fish selling booths. The fish are preserved with ice, and frozen fish are thawed in sea water. There are 992 selling booths in the PPI/JFP, 942 of which are registered with PERUM, the agency managing the JFP facilities.

For all fish brought into PPI/JFP, DKI charges the fish brokers an entrance fee of Rp500 per plastic barrel (about 75 kg net). (DKI is the government body responsible for management of the wholesale market.) In the PPI/JFP, no auction is undertaken for wholesale transactions, and instead negotiations are made between the wholesalers and the fish brokers.
The fish are checked one by one by the fish buyers and their agents, and subsequently weighed. The payment is made in cash after price negotiations. The PPI/JFP starts operations at around 1800 hrs and closes at 2400 hrs. Fish prices gradually decrease with time, and so, fish buyers usually sit around and wait for the prices to go down later in the evening.
It is reported that about 750-1,000 fish buyers engage in fish trading in the JFP wholesale market. There are also some fishing boat owners and fish farmers who bring their produce directly from the fish landing sites and buy fish on their way back for sale through their channels. A number of fish retailers in Jakarta also purchase fish in this wholesale market. Preliminary O/D survey results showed that fish buyers comprise 90% of those engaged in buying fish in the PPI/JFP, and the rest are fish retailers (8%) and fishing boat owners and fish farmers (2%).

2.3.3.3 Fish Distribution and Marketing

Fish bought in the PPI/JFP are mostly transported by pick-up trucks to their destinations by groups of fish buyers. Some are transported in trucks and insulated vans, to a lesser extent. The fish buyers normally leave the PPI/JFP before midnight so as to arrive at their destinations by early morning, depending on the distance from JFP. The fish buyers start to distribute fish to their clients (fish retailers, caterers, and restaurants) from 0100-0600 hrs. As fish retailers open their shops as early as 0100-0300 hrs, fish buyers have to adjust the timing of their departure from JFP to reach their destination before that time. The payment from retailers to brokers is made in cash on the spot or with a one-day deferment.

With the modernization of lifestyle, especially in Jakarta, supermarkets and hypermarts have emerged as a new outlet for fish. It is said that there are about 1,000 super markets and 100 hypermarts in Jakarta, which have fish stalls in their premises to attract customers who prefer not to shop in local retail markets with their low hygienic standard, filthy surroundings, and early morning operation. These supermarkets and hypermarts have also been able to bring down the prices of fish with their increasing volume of fish sale. Many of them have already begun their keeping stocks of fish purchased directly from fish processing factories and fish wholesale markets. The payment for fish suppliers is normally made by such stores at the end of each month.

The price changes during fish distribution are shown in Table 2.3.4. As demonstrated in this figures, the average mark-up from the wholesaler to the retailer is 30.6% and those for a hyper-market and department store are 70.9% and 92.6% respectively.

Table 2.3.4: Fish Price Changes during Distribution

No.	Species of fish	Market price (Rp)				Ratio of price mark-up (%)		
		Wholesale (PPI/JFP)	Retail market (Jakarta)	Super market (Jakarta)	Depart. Store (Jakrta)	Retail market	Hyperr-market	Department store
1	Longtail tuna(large)	17,000	25,000			47.1		
2	Longtail tuna (small)	15,000	19,000		27,900	26.7		86.0
3	Fresh Water Bawal (large)	12,000						
4	Fresh Water Bawal (small)	10,000	15,500			55.0		
5	Milk fish (large)	17,000	22,500	30,000	32,000	32.4	76.5	88.2
6	Milk fish (small)	15,000	18,000			20.0		
7	Tilapia	12,000	15,000		19,900	25.0		65.8
8	Pangasius	12,000	16,000	19,000	21,900	33.3	58.3	82.5
9	Indian mackerel	15,000	19,000	23,000	28,900	26.7	53.3	92.7
10	Squid (large)	32,000	38,000		44,500	18.8		39.1
11	Squid (small)	20,000	25,000	40,000		25.0	100.0	
12	Cuttle fish (large)	24,000						
13	Cuttle fish (small)	15,000	22,500			50.0		
14	Shrimp (large)	47,000	52,000		187,700	10.6		299.4
15	Shrimp (small)	18,000	25,000	35,000	44,500	38.9	94.4	147.2
16	Scad	14,000	19,000	20,000		35.7	42.9	
17	Black pomfret	30,000	38,000		38,900	26.7		29.7
18	Spanish mackerel	30,000	40,000			33.3		
19	Snapper	35,000	40,000		49,900	14.3		42.6
20	Grouper (small)	20,000			29,000			45.0
	Average mark-up ratio(%)					30.6	70.9	92.6
	Source of data: Base on survey in April 2011							

2.3.4. Fish Hygiene and Quality Control System

When envisaging construction any fisheries related facilities including fish processing factories, fish cold storage and fish market, it should seek conformity to the national health guideline. In fact, the basic mainstay of governing the food commodity safety in the country is Indonesian Food Law No.7/1996 and Government Regulation No.28/2004 pertaining to Food Safety and in case of fisheries sectors certain provisions of Fisheries Law No.31/2004 will be referred. To implement such provisions, the concerning Ministerial Regulation has to be formulated. To serve the purpose specifically for quality assurance and food safety system in the fisheries sector, the Regulation and Decree of Ministry of Marine Affairs and Fisheries was promulgated in 2007 with No: KEP.01/2007. This regulation clearly define important requirements needed to guarantee quality and safety of fishery products derived from fishing, collecting vessels, landing places, auction centers, processing units and distribution facilities. In case of the fish market, the provisions stipulated in the Chapter IV: Fish Auction Center will be applicable. The main provisions are exerted as seen in Appendix 2 which defines the requirements as fish auction centers and central markets as well as other markets which frequently display fishery products. This is only the guideline to abide and therefore the newly constructed fish wholesale market should comply with the provisions stipulated herein. In addition, an effort should be exerted so as to follow this guideline in implementation of practices as close as possible, even in a step-by-step approach.

As to the quality control function, it is rest with the jurisdiction of DKI Jakarta in case of the PPI/JFP, more specifically with the North Jakarta Sub-District Office. In fact, all fishery factories in DKI Jakarta have to register with DKI and they are subject to their periodical quality inspection under the regulation. There is the Regional Gazette of Jakarta Province promulgated in 1997 defining in the Chapetr VI that;

1) Any person or entity conducting business in fish handling and processing in DKI Jakarta area must have a Business Registration Certificate for Fish Handling and Processing of Fish from the Provincial Governor.
2) Any fish that enter the DKI Jakarta to be traded or released from the DKI Jakarta area must go through quality inspection by the designated quality control officers.

In the DKI Jakarta office, there is a provincial quality control laboratory called Center for Development and Control of Fishery Products (CDCFP) in Pluit. Actually their main functions are:

- Carrying out the laboratory analytical work for export oriented fish and fishery products responding to requests from processors and issues relevant health certificates if samples are proved in meeting the requirements (this laboratory is accredited by EU),
- Analyzing any product requested by the local producers, suppliers and supermarket to issue health certificates in compliance with the regulation,
- For fish markets, they dispatch fish inspectors once every 3 months and check the quality of fish with the following items;
    1) Temperature (at the spot)
    2) Formalin (mobile laboratory)
    3) Boric acid (mobile laboratory)
    4) Histamine (sample analysis at the laboratory)
    5) TVB/TMA (sample analysis at the laboratory)
    6) Microbiological test (TPC, E.Coli, Salmonela, Vibrio etc at the laboratory)
    7) Organoleptic test for selected fish species (at the spot)

    (Note: no water quality check has been conducted in the list.)

When any defect is detected in the inspection result, they will instruct the relevant sub-district inspector for remedial measures to be taken. In the North Jakarta office, there are 5 fishery inspectors stationed and they will be in charge of providing technical guidance and supervision to the fish markets. In fact, there was a document remained from the inspection carried out in the fish markets in Muara Angke and Muara Baru on 18 June 2009, which results showed relatively satisfactory outcomes in organoleptic, chemical and microbiological analysis.

In the central level of fish quality control laboratory, called NCQC (National Center for Quality Control) or officially entitled as the Institute for Development and Control for Fisheries Products (B2P2HP) is upheld by 39 provincial laboratories existed in each province (in some provinces like East and Central Java multi-numbers of laboratory are existed), and the CDCFP - DKI Jakarta is one of them. All technical matters are guided from this central laboratory to the provincial ones. However, the administration in the food safety and quality control in the fishery sub-sector is currently under transitional stage and a bit confusing in conjunction with the latest structural reformation of MMAF. In fact, one of main functions assigned to the NCQC in controlling the hygienic level of the fisheries industry was transferred to the newly reorganized Quarantine Agency for Fisheries Control and Standard (Badan Karantina Ikan dan Pengendaliar Nube). In association with this structural reform, the office for Director of Standardization and Accreditation of DG of Fisheries Product Processing and Marketing in the MMAF was also transferred to this Agency. However, this Agency was new and no required facilities and manpower in conducting the physical analytical work were sufficiently prepared the NCQC will continue such a leading function for the time being, except issuing the certificate for live fish exportation which will be continued by Quarantine Agency.

As to the national standard, the National Standard Bureau promulgates it after being formulated in consultation with the National Committee composed of the members from various authorities like Baden Pengawasan Obat dan Malaran (BPOM - Food and Drag Control Agency) and the University professors.

2.4 Current Status of Operation and Maintenance of JFP Wholesale Market

2.4.1 Organizational Structure

The existing JFP wholesale market is operated and managed by (i) **UPT-PPSJ** or the JFP Technical Implementation Unit under KKP and (ii) **PERUM** (Prasarana Perikanan Samudera) or Ocean Fisheries Infrastructure Public Corporation.

2.4.1.1 UPT-PPSJ

UPT-PPSJ is responsible for the operation and maintenance (O&M) of non-income generating facilities, control of illegal fishing, and fishery-related statistics in the JFP. The main roles of UPT-PPSJ in the wholesale market are cleaning and repair of buildings/facilities, crowd control, and inspection of the market. UPT-PPSJ has 84 government staff, 30 security personnel, and 100 cleaning workers, all under the overall direction and supervision of the UPT-PPSJ Head. **Under the Head are three divisions, each under a Division Head:** (i) Administration Division; (ii) Development Division; and (iii) Operational Procedures Division. In addition to these three divisions, there is a **Functional Group** responsible for public relations (2 personnel), security (30 personnel), and cleaning services (100 personnel). The UPT-PPSJ organizational chart is shown in Appendix 5.

The **Administration Division** has two subdivisions: (i) Finance Subdivision consisting of seven personnel, including the Head; and (ii) General Subdivision with 13 personnel including its Head.
The **Development Division** also has two subdivisions: (i) Support Subdivision consisting of 12 personnel including the Head of the subdivision; and (ii) Services System and Business Development Subdivision with 15 personnel including its Head.

The **Operational Procedures Division** likewise has two subdivisions: (i) Marketing and Information Subdivision consisting of 14 personnel including its Head; and (ii) Fishing Port Subdivision with 17 personnel including its Head.

2.4.1.2 PERUM PPS

PERUM PPS is responsible for O&M of the income-generating facilities of eight national fishing ports and the JFP Branch. Its roles in the wholesale market are: (i) leasing of market space and other related spaces and land; (ii) supply control and sale of electricity; (iii) sale of ice; and (iv) sale of water to the porters' cooperative, *Koperasi Tenaga Kerja Boncar Muat Ikan (TKBMT)*, which consists of more than 300 members (mostly porters and some wholesalers).

The operation and management of PERUM PPS falls under the direction and responsibility of the Head of PERUM PPS. **Under the Head are four divisions, each under a Division Head:** (i) Finance and Administration; (ii) Technical Services; (iii) Marketing and General Business Development; and (iv) Trading. The organizational diagram for PERUM PPS and the corresponding number of staff for each division and subdivision is presented in Appendix 2.

The **Finance and Administration Division** has four subdivisions: (i) Treasury, Budgeting, and Taxation, which has six personnel including the Head of the subdivision; (ii) Accounting and Statistics, with four personnel including its Head; (iii) Administration, Human Resources, Law, and Public Relations with four personnel; and (iv) Internal Affairs and Security consisting of 24 personnel.

The **Technical Services Division** also has four subdivisions: (i) Ice Production and Storage consisting of 26 personnel including the Head of the subdivision; (ii) Electrical Installation, Water, and Telephone with 10 personnel including its Head; (iii) Dock and Workshop Facilities with 10 personnel; and (iv)
Building and Spatial Maintenance with three personnel.

The Marketing and General Business Development Division likewise has four subdivisions: (i) Mooring, Anchoring, Docking, Workshop, and Supply Facilities Subdivision consisting of 11 personnel including the Head of the subdivision; (ii) Ice and Cold Storage Subdivision with 12 personnel including its Head; (iii) Room, Building, and Partnership Subdivision with six personnel; and (iv) Wholesale Market and Auction Hall Subdivision comprising of eight personnel.
The **Trading Division** has five personnel including the Division Head.

2.4.2 Operational and Financial Performance of the JFP Wholesale Market

2.4.2.1 UPT-PPSJ

The O&M of all non-revenue generating facilities of the JFP wholesale market is the responsibility of UPT-PPSJ. Total O&M costs are allocated among two major groups of costs: (i) allowances, salaries, overtime, honoraria, etc.; and (ii) office O&M, with about 65% and 35% allocated to items (i) and (ii), respectively, despite variations in total budget appropriated to UPT-PPSJ for O&M. During the period 2008-2009, total UPT-PPSJ O&M costs exhibited an increase of about 19%, from Rp7,525.908 million in 2008 to about Rp9,313.522 million in 2009. However, these costs decreased to Rp8,415.838 million in 2010, for a decrease of about 10%. A summary of the O&M costs is presented in Table 2.4.1.

Table 2.4.1: Summary of O&M Costs, UPT-PPSJ, 2008-2010

		2008		2009					2010				
CODE		Rph million	%	Rph million	%	%	Rph million +/(-)	% +/-	Rph million	%	%	Rph million +/(-)	% +/-
01.01.09	**PROGRAM PENERAPAN KEPEMERINTAHAN YAN BAIK** (GOOD GOVERNANCE PROGRAM)	7,525.908	100	9,313.522	100		1,787.614	19	8,415.838	100		(897.684)	-11
00001	**PEMBAYARAN GAJI, LEMBUR, HONORARIUM DAN VAKASI** (ALL ALLOWANCES PAID, SALARY, OVERTIME, HONORARIA, AND VACATION PAYMENT)	2,501.816	33	3,253.214	35		751.398	23	2,944.939	35		(308.275)	-10
00002	**PENYELENGGARAAN OPERASIONAL DAN PEMELIHARAAN** (OFFICE OPERATION AND MAINTENANCE PROGRAM)	5,024.092	67	6,060.308	65		1,036.216	17	5,470.899	65		(589.409)	-11
00024	Supplement food and beverage			157.968	1.7				85.680	1.0		(72.288)	-46
00026	Clinic/Medicines (Doctors and Nurses)			8.000	0.1				8.000	0.1		-	0
00032	Clothes			44.150	0.5				39.100	0.5		(5.050)	-11
00034	Uniforms (Drivers, nurses, doctors, security, etc.)			46.400	0.5				48.550	0.6		2.150	5
00087	Meals for visitors/representation			28.000	0.3				28.000	0.3		-	0
00205	Office building maintenance			139.597	1.5				93.065	1.1		(46.532)	-33
00250	Heavy equipment/supporting facilities maintenance			1,292.921	13.9				772.909	9.2		(520.012)	-40
00256	Office equipment repair			131.650	1.4				36.500	0.4		(95.150)	-72
01138	4/6/10 wheel vehicles			640.452	6.9	62			419.000	5.0	62	(221.452)	-35
02005	Motorcycle maintenance			44.800	0.5				48.000	0.6		3.200	7
02006	Building maintenance			771.326	8.3				159.511	1.9		(611.815)	-79
02007	Utilities			774.000	8.3				888.000	10.6		114.000	15
04863	Office operational expense			1,976.844	21.2				2,832.584	33.7		855.740	43
02178	Mails, checques, certificates			4.200	0.0				12.000	0.1		7.800	186

2.4.2.2 PERUM PPS

The O&M of the revenue-earning facilities of the JFP wholesale market is the responsibility of PERUM PPS. In order to determine the current performance of PERUM PPS, an analysis of its revenues and costs was carried out to determine its profitability and operational efficiency during the last three years, i.e., 2008, 2009, and 2010. The summary of revenues and O&M costs is presented in Table 2.4.2.

Table 2.4.2: Summary of Revenues and O&M Costs, JFP Wholesale Market, 2008-2010

Item	2008		2009		2010		2008 - 2009	2009 - 2010	2008 - 2010
	Actual Rph million	Actual as % of planned	Actual Rph million	Actual as % of planned	Actual Rph million	Actual as % of planned	% +/-	% +/-	% +/-
Revenues from operations	39,214.05	100%	45,811.616	99%	51,382.994	94%	17%	12%	31%
Operation and maintenance costs									
Division for Marketing and General Business Development	19,533.953	101%	23,763.916	98%	26,446.762	87%			
Dirvision for Technical Services	13,713.540	119%	13,441.399	95%	13,582.246	88%			
Division for Finance and Administration	3,989.979	106%	4,002.867	88%	4,657.205	109%			
Total operation and maintenance costs	37,237.472	108%	41,208.182	96%	44,686.213	89%	11%	8%	17%
NET Revenue from operations	1,976.575	44%	4,603.434	141%	6,696.780	146%	133%	45%	239%
NET Revenue from operations and other sources	2,376.233	62%	4,812.183	147%	6,791.582	148%	103%	41%	186%

Revenues from Operations. PERUM PPS generates revenues from the following sources: (i) cold storage services; (ii) rent/lease of buildings and land; (iii) supply of electricity to clients; (iv) water services; (v) telephone services; (vi) other revenue sources; (vii) ice services; (viii) berthing services; (ix) logistics services; (x) workshop and dockyard services; and (xi) fish selling services. Actual revenues for 2008 and 2009 were observed to be within the planned revenues for those years, while the total revenue actually generated in 2010 was about 6% below the target revenue for that year. However, in general, the revenues generated by the JFP wholesale market exhibited an increasing trend from 2008 to 2010. Total revenues increased from about Rp39,214.047 million in 2008 to about Rp45,811.616 million in 2009, or an increase of about 17%. Revenues in 2010 were estimated at about Rp51,382.994, or an increase of about 12% from that in 2009. Details of actual revenues from the major sources are presented in Appendix 5, while details of tariff rates, which serve as basis for the revenues generated by PERUM PPS, are in Appendix 5.

O&M Costs. Estimated O&M costs are mainly incurred to cover the operations of the Directorate for Development, Directorate for Engineering, and Directorate for Finance and Administration. These O&M costs cover: (i) salaries, honoraria, wages, and employees' benefits; (ii) office operations; (iii) building rental; (iv) electricity; (v) water; (vi) telephone; and (vii) maintenance cost of buildings, machinery, and equipment, etc. Details of actual O&M costs are presented in Appendix 5.

Over the period 2008-2010, the total O&M cost of the three directorates exhibited a slightly increase. Total O&M cost (i.e., covering all three directorates) increased from about Rp37,237.472 million in 2008 to about Rp41,208.182 million in 2009, for an increase of about 11%. O&M costs in 2010 were estimated at about Rp44,686.213, or an increase of about 8% from that of 2009. On the average, the Directorate for Development accounts for about 60% of the total O&M costs, the Directorate for Engineering accounts for about 30%, and the Directorate for Administration and Finance, about 10%.

It should also be mentioned that despite the annual increase in the value of the overall O&M cost, there has been an observed decrease in the annual total O&M cost actually incurred by the three directorates relative to their respective planned O&M costs for each year. For example, in 2008, the actual O&M cost of the three directorates was estimated at 108% of planned O&M cost, which decreased to about 96% in 2009 and to 89% in 2010.

Net Revenue from Operations. The actual or realized net revenue for 2008 was estimated at about Rp1,976.575 million, which is about 44% of the planned net revenue for that year. This was observed to increase significantly to about Rp4,603.434 million in 2009, which was about 141% of planned net revenue from operations in 2009. There was a 133% increase in net revenue realized from operations for the period 2008-2009, which increased further to about Rp6,696.780 million in 2010, or an increase of about 45% from that of 2009. The actual 2010 net revenue from operations was about 146% of the planned net revenue for the same year.

Net Revenue from Operations and Other Sources. The net revenue realized from operations and other sources in 2008 was estimated at about Rp2,376.233 million, which is about 62% of what was

planned for that year. This figure increased to about Rp4,812.183 million in 2009, up by 103% from 2008 and about 147% of the planned net revenue from operations and other sources for 2009. In 2010, the figure rose further to Rp6,791.582 million, for an increase of about 41% from that in 2009 and was about 148% of what was planned in the same year.

Financial Ratios to Determine Operational Efficiency. An analysis of the financial condition of the JFP wholesale market was conducted to determine its financial viability with the use of some important financial indicators, namely:

- **Operating ratio,** which measures the coverage of operating expenses by operating revenues;
- **Breakeven point (in Rph and %),** which indicates the level of operating revenues that must be realized to be able to recover all fixed and variable expenses;
- **Benefit-cost ratio (BCR),** which measures the extent to which total revenues are able to cover all expenses; and
- **Return on sales (ROS),** which measures how large an operating margin each fish port has on its total sales (or revenues). The lower the return on sales (or revenues), the lower the operating margin, which implies that larger sales (or revenues) must be made to make an adequate return on investment (ROI).

A summary of the financial ratios and corresponding calculated estimates for 2008, 2009, and 2010 is presented in Table 2.4.3 below.

Table 2.4.3: Summary of Financial Ratios, JFP Wholesale Market

Item	Ideal Value	2008	2009	2010
Efficiency Ratios:				
1) Operating ratio[a]	0.30 - 0.60	0.95	0.90	0.87
2) Break-even point in Rph million[b]		34,632.227	38,850.963	42,242.158
3) Break-even as % of total revenue from operations	60 - 70%	88%	85%	82%
Benefit:Cost Ratio:				
1) BCR (excluding other revenues and O&M costs)[c]	1.5 - 2	1.05	1.11	1.15
2) BCR (including other revenues and O&M costs)[d]	1.5 - 2	1.06	1.12	1.15
Income Ratio:				
1) Return on sales[d]	30 - 50%	6%	12%	15%

[a] Operating ratio = Cost of operation ÷ Total revenue

[b] Breakeven point (PhP) = Total fixed expenses + (Total revenue x (Total variable expenses ÷ Total revenue))

[c] Benefit:Cost ratio (excluding other revenues and O&M costs) = Total revenue from operations ÷ Total operation & maintenance cost

[d] Return on sales = Net profit after tax and debt service ÷ Total revenue

The financial ratios presented in Table 2.3 provide indicative levels of operational efficiency currently attained by the JFP wholesale market per year over the period 2008-2010. The estimated **operating ratio** for the JFP wholesale market decreased from 0.95 in 2008 to 0.87 in 2010, which indicates an improvement in the generation of revenues despite slightly increasing O&M costs. Total revenues increased by about 31% from 2008 to 2010, while O&M costs increased by only 17% over the same period. **However, the calculated operating ratio is significantly higher than the ideal range of 0.30-0.60.**

The **breakeven point** also increased from Rp34,632.227 million in 2008 to about Rp42,242.158 million in 2010, mainly due to an increase in the overall O&M costs. However, as a result of higher revenues generated over the same period, the breakeven point as a percentage of total revenue from operations is observed to have decreased from 88% in 2008 to 82% in 2010. **The calculated breakeven point is significantly higher than the ideal range of 60-70%.**

The **BCR** calculated for the JFP wholesale market was estimated at being **greater than one, but**

barely greater than one. **The ideal BCR range is 1.5-2.0.**

The **calculated return on sales** in 2008 was estimated at about 6%. Due to a significant increase in revenues from 2008-2010, the return on sales in 2010 was estimated at about 15%. **These calculated values are significantly lower than the ideal range of 30-50%.**

It should be noted, however, that the ideal values of financial ratios used to evaluate financial performance depends on the type of industry or enterprise being evaluated and what the management of that industry/enterprise deems applicable to its operations.

Future Financial Performance of the JFP Wholesale Market. With the proposed improvements in its facilities and infrastructure and the resulting increase in its operational efficiency, the financial performance of the JFP wholesale market is expected to improve significantly with corresponding positive consequential effects on the financial indicators. The financial indicators presented above are just a few of the indicators that need to be monitored and maintained by PERUM PPS at their corresponding ideal levels throughout the operational life of the fish wholesale market in order to be able to sustain financial viability. Anytime the values of these indicators are observed to be lower than the ideal values, PERUM PPS management must immediately critically review its operational performance and carry out remedial measures in order to improve operational efficiency and financial performance to the required level.

2.5 Demarcation of Wholesale Markets between JFP and Muara Angke

The existing wholesale markets of both JFP Muara Baru and Muara Angke are located inside different fishing ports within a range of only 3 km. The former has been operated and managed by UPT-PPSJ (central government) and PERUM-PPS (public corporation) since 1983, while the latter has been operated and managed by the local government (DKI Jakarta) and by the local fishers and wholesalers' cooperative (*Koperasi Mina Jaya*) since 1977.

Both markets have the same wholesale functions and the same level of fish handling volume (approx. 200 t/day). Neither origin nor destination of fish, including composition of fishery products, shows distinct differences, as shown in the results of the fish origin/destination (O/D) survey conducted as part of this Study in April 2011. The only differences can be found in the scale of fishing boats, fish market-related stakeholders, and direct contribution to consumers, as shown in Table 2.5.1 below.

Table 2.5.1: Comparison of Fish Wholesale Markets of JFP Muara Baru and Muara Angke

Item	Point	JFP Muara Baru	Muara Angke
Fishing boats	Scale of fishing boats	Large and medium-scale (Frozen fish, 90%)	Medium and small-scale (Frozen fish, 90%)
Fish supplied	Origin of fish	West Java, 46%; Central Java, 22%; Jakarta, 15%; East Java, 10%; Lampung, 4%; Banten, 1%	West Java, 31%; Central Java, 20%; Jakarta, 21%; East Java, 15%; Lampung, 10%: Banten, 4%
	Type of products	Fresh, 78%; frozen, 22%	Live, 6%; fresh, 69%; frozen, 25%
Fish distributed	Destination of fish	Jakarta, 42%; West Java, 40%; Banten, 12%	Jakarta, 39%; Banten, 33%; West Java, 22%
	Type of products	Live, 1%; fresh, 68%; frozen, 31%	Live, 4%; fresh, 55%; frozen, 41%
Fish composition	Source of fish	Capture, 72.5%, Culture, 27.5%	Capture, 62.4%, Culture, 37.6%
	Dominant fish species	Indian mackerel, Eastern little tuna, Pacu (*Colosoma*)	Eastern little tuna, Indian mackerel, Milkfish
Types of stakeholders	No. of wholesalers	390 (List of lessees of PERUM) Approx. 200 (estimate)	192 (Survey in Apr. 2011)
	Scale of fish suppliers and buyers	Medium-scale: - Suppliers: 2,232 kg/vehicle - Buyers: 1,212 kg/vehicle	Small-scale: - Suppliers: 1,560 kg/vehicle - Buyers: 623 kg/vehicle
	Type of fish processors	Industrial (Frozen products)	Traditional (Salted-dried fish)

Contribution to consumers	Restaurant	No	Yes (traditional BBQ fish)
	Retail shop	No	Yes (retailer of fresh fish)

Source: Fish O/D Distribution Survey, April 2011

At present, there is very limited linkage between these two wholesale markets, and there is no cross distribution of fish between them. Although most of fish suppliers hold prior telephone negotiations with the wholesalers, they decide to which wholesale market they will bring and sell their fish depending on the required quantity and price. As well, fish buyers decide which wholesale market they will patronize, depending on the variety and price of fish, and they do not have strong preferences on which market is better. However, interviews conducted with some fish buyers as part of this Study revealed that one of the most important factors considered by fish buyers is the physical accessibility and security on the way to and from the fish market.

It is, thus, difficult to clearly demarcate between these two wholesale fish markets based on their current roles and functions. **However, once the JFP wholesale market is improved, both physically and functionally, including access road (bypass road other than Jl. Muara Baru), the JFP wholesale fish market is expected to become the Fish Marketing Center (PPI) as originally envisioned.** Both markets should be improved so that they could offer better services, and stakeholders and general consumers could choose which of the two markets to patronize based on their personal preferences.

The results of the survey conducted in Muara Angke in April 2011 showed that about 97% of wholesalers and 89% of fish buyers would not move to the JFP wholesale market because of the display of varieties of abundant fish with good quality and old relationships with seller/buyer – even if the facilities and access road to JFP were improved. Although this is similar to the results for the JFP wholesale market, Muara Angke fish landing center including wholesale market has longer history and thus more closed to local residents than JFP wholesale market.

It should be further studied and examined in the Jakarta Fisheries Waterfront City Plan whether both markets are to be integrated, but the opinions of administrative sides have not been coordinated and finalized since both markets are operated and managed under different administration (JFP wholesale market by MMAF and Muara Angke wholesale market by DKI Jakarta). Furthermore, even if it is decided to integrate both markets, due to the limited space, the reclamation of large area including improvement of access roads are indispensable in JFP, while it is necessary to remove all existing facilities in Muara Angke.

It, therefore, appears that it will be difficult to integrate two wholesale markets in one place, and each wholesale market will be functioned independently in the capital area. However, it will be desirable that JFP wholesale market will be modernized as the integrated place for fish trading, marketing and consumption, while Muara Angke wholesale market will be continuously functioned as fish market closed to local communities.

2.6 Problems and Issues to be Addressed by the Proposed Project

The existing JFP wholesale market does not serve as a central fish trading and marketing center in Indonesia; it functions only a wholesale market similar to Muara Angke. Considering its present condition vis-à-vis the estimated future demand for fishery products in DKI Jakarta and surrounding regions, a number of problems and issues have been identified and are summarized below

Closed Fish Transaction System. Most of the fish brought into the wholesale market are directly sold to wholesalers under contract or prior negotiation by phone. This system is not attractive to new fish producers and traders, who have to sell their products through fish brokers who have established relationships with existing wholesalers.

The fish auction is conducted for fish unloaded from fishing boats at the fish auction place (TPI) in some fishing ports, but not in the wholesale markets in Indonesia. Although every container unloaded to the market is labeled, showing species and weight of fish inside the container, limited verification (manual checking of fish size and quality) is conducted before the transaction due to the close relationship between fish suppliers and fish wholesalers. **A place to conduct more open and fair transaction system, so as to attract more traders (suppliers and buyers), in the JFP wholesale market, should be provided,** and it is necessary to introduce the transaction system (either auction, bargaining or consignment) gradually by reflecting opinions of stakeholders. Since the auction itself has been conducting at the fish auction place (TPI) of Muara Angke up to now and also used to be done in the TPI – JFP before, it will not be unreasonable practice in Indonesia. However, the auction system is not deemed as the best transaction system in general, any transaction method be chosen should be accepted but not forcing to do auction.

Limited Space in the Wholesale Market without Demarcation of Activities. There are 992 stalls in the JFP wholesale market, which are used not only for fish wholesale but also for other purposes such as primary fish processing, box storage, and kiosk/canteen. Even in the stalls used for fish wholesale, about half of the space is occupied by insulated fish containers, and some containers have to be placed along the corridors due to space limits (low fish selling efficiency: 39 kg/m^2/day). The peripheral area of the market floor is used for fish unloading and loading and as ice and water supply depot. However, some parts are occupied by containers and by the kiosk/canteen, so that fish unloading and loading activities cannot be conducted smoothly, especially because of the lack of a packing area for fish buyers. **It is necessary to demarcate the work space in the wholesale by process/operation and to expand it,** based on future projections of fish handling volumes, so as to ensure smooth operations in a hygienic environment.

Low Sanitary Condition. The water volume used in the market is very limited since the existing drain system (by gravity) in the wholesale market is not well functioned, and both seawater and freshwater are not free of charge. Even under such a unhygienic condition, primary fish processing is conducted.

Low Recognition to the fish handled in the JFP Wholesale Market. The fish inspections conducted by DKI Jakarta every three months have shown that no low-quality fish has been sold in the market as of today. However, the ice to fish ratio during transport is not deemed appropriate. Although the fish do not show signs of deterioration, there is a risk that their quality could deteriorate during distribution from the wholesale market, which may result in the poor reputation of the JFP wholesale market. Daily inspection of fish quality and handling method should be done, and adequate guidance should be provided to concerned actors, as required. In addition, the insulated fish boxes should be standardized, and promoted for use during the transport and selling stages so as to reduce the cost of ice.

Congestion around the Wholesale Market (No Parking Area). Vehicles for unloading fish are directly attached to the peripheral area of the market building, but some trucks have to wait for berth during peak time. Although vehicles for offloading fish are usually park in front of shops around the market and offload fish, they cause congestion in the market area and have to park outside the market area during peak time. This brings the unhygienic condition for fish handling and the loss of time caused by congestion.

Low Fish Value during Peak Fishing Season (Limited Capacity of Cold Storage and Fish Processing Facilities for Domestic Use). In JFP, there are PERUM-operated and private-owned cold storages (10 companies) built around the existing market. Currently, about 22% of fish brought in (or 33% of fish shipped out) consists of frozen fish, the volume of which increased significantly in the last two years. Most of the fish processing factories in the JFP are export-oriented, and there is not much space for processing of fish for domestic use, so that fish is processed on the market floor without the use of water. Considering the increasing domestic demand for frozen and processed fish, it is necessary to install cold storage and fish processing units in the JFP to ensure a stable supply of fish for the domestic market.

Unused Waterfront Resources (Lack of Facilities to Attract High-class Consumers). Although tuna and skipjack comprise about 10% of the fish handled in the JFP wholesale market, these are processed without the use of water on the unhygienic market floor, and no tuna is available for retail sale in the market. On the other hand, there are high-class residential areas around JFP, such as Pantai Mutiara, and there are about 7,000 Japanese long-term residents in Jakarta, but there are few places where these people could buy high-quality tuna products (although there is high demand). It is expected that the fish shops and restaurants proposed for establishment in the improved JFP will attract these rich people to patronize the JFP.

Limited Access to the JFP. Jl. Muara Baru is the only public access road to the JFP. This road is generally used for daily living activities of people living in the area. Due to the traffic of heavy trucks on this road, the lives and safety of the local people are constantly at risk. Furthermore, part of the road gets flooded during high tide, causing heavy traffic jams, which make many JFP stakeholders reluctant to expand their businesses. Some fish retailers also hesitate to go to the JFP wholesale market and instead go to Muara Angke to purchase fish. **A bypass road for the JFP is needed to reduce the traffic and related risks in Jl. Muara Baru for market stakeholders and local residents.**

The above-mentioned issues are summarized into causes and countermeasures as shown in the Table 2.6.1.

Table 2.6.1: Causes (Problems) and Countermeasures to be addressed to Each Issue in JFP Wholesale Market

Issues	Causes (Problems)	Countermeasures	
		Hard	Soft
1. Closed transaction of fisheries product	1-1. Wholesalers to but fish are decided before entry of fish into market. 1-2. There is limited space for transaction. 1-3. New fish suppliers cannot identify the wholesalers.	1. Provide the place where everybody can participate to transaction.	1. Create the real wholesalers (auctioneers/consignees) 2. Identify stakeholders by caps, badges, and boots.
2. Congestion and low work efficiency	2-1. Absolute space of market is limited. 2-2. Passages are not functioned due to blockage by fish boxes. 2-3. Some of wholesale booths are used for fish processing, storage and food stand without order.	2. Ensure necessary space of market to meet the fish demand. 3. Demarcate spaces by type of operations.	3. Guide and manage each work space so as to be utilized as planned.
3. Unhygienic environment	3-1. Water supply and drainage systems are not well functioned. 3-2. Market related people do not use water much as waters are not free of charge.	4. Equip water supply/drainage system (desalination and seawater sterilization).	4. Provide sterilized seawater at free of charge.
4. Low recognition to fish handled	4-1. Appropriate system for inspection of fish quality and hygienic is not established. 4-2. The icing ratio is low for fishes before and after the market (No insulted boxes are used).	5. Facilitate a fish sensory testing room. 6. Procure and sell insulated fish boxes to stakeholders.	5. Establish the fish inspection system with allocation of the full-time based inspectors.

5. Congestion around the market	5-1. There is no parking lot in the market area. 5-2. Land area for market is small.	7. Allocate the parking area.	6. Conduct vehicle control in the market.
6. Low value of fisheries product during peak season	6-1. Cold storage/processing units for domestic use are limited in capacity and number. 6-2. Small-scale enterprises do not afford to invest for facilities.	8. Facilitate small-scale cold storages and processing units based on the demand.	7. Invite tenants.
7. Unused waterfront resources	7-1. There is no facility attractive for consumers (restaurants, fish shops). 7-2. Private knowhow on customers satisfaction is lack.	9. Establish a Seafood Plaza by using the private knowhow.	8. Conduct PR activity in collaboration with Muara Angke.
8. Limited access to JFP	8-1. Only one access road cannot pass through during flood. 8-2. Bad influence to neighbors is given (noise, accident, etc.)	10. Construct a new access road.	9. Conduct traffic control so as not to be a threat for inhabitants.

CHAPTER 3

Project Formulation (Feasibility Study)

3. Project Formulation (Feasibility Study)

3.1 Overall Project Concept and Components

3.1.1 Overall Concept

Fish supplies about 2/3 of the animal protein requirement of Indonesians. The total demand for fish in the country is projected to increase about 1.8 times from 7.05 million t in 2010 to 12.9 million t in 2025, and per capita fish consumption is forecast to rise from 30.2 kg/person in 2010 to 47.2 kg/person in 2025. Most of the increase in domestic demand for fish will have to be met through supply from aquaculture, the distribution of frozen marine fish from the eastern part of Indonesia, and imports. Because of the stagnant supply of fresh marine fish and the development of cold storage chains, the fish consumption pattern of Indonesians has been shifting from fresh fish to more frozen/processed fish and fish produced through aquaculture.

On the other hand, MMAF is currently formulating the *Jakarta Fisheries Waterfront City Plan*, which will be part of the *Jakarta Waterfront City Spatial Plan*, in collaboration with the Ministry of Public Works (MPW or KPU) and DKI Jakarta. The surrounding area of Jakarta Fishing Port (JFP) including Muara Baru and Muara Angke will be integrally develop under "Jakarta Fisheries Waterfront City Plan", which covers not only fish handling, marketing and distribution facilities but also those related to fish producers and consumers.

Furthermore, the strengthening of "Connectivity" is emphasized as one of three pillars for strategies to accelerate economic growth in the "Master Plan on Acceleration and Expansion of Indonesia Economic Development (MP3 EI)" prepared and publicized in May 2011 under the President Initiative. The Connectivity is a concept to accelerate regional economy through ensuring smooth flow of people, goods and information. It is expected that the economy of production areas will be activated and food industry will be further developed in the vicinity of Jakarta, through the distribution and transaction of aquaculture fish produced in Java / Sumatra as well as marine fish caught in various places of Indonesia. By expanding and improving market mechanism under the Project, the JFP Wholesale Market will be strengthened as a hub market of fish trading and distribution, so as to contribute not only to development of fishery industry around Jakarta but also to diversification and activation of economy in the fish producing areas.

Taking into account the upper level development plans and against that background, it is proposed that the JFP Wholesale market be developed as (i) a fish trading and marketing center (PPPI, after upgraded from the existing PPI), (ii) a fish supply buffer center, and (iii) a Seafood Plaza, and a new access road as a supporting but indispensable facility.

JFP Wholesale Market as Fish Trading and Marketing Center (PPPI). The current JFP wholesale market is the largest wholesale market in Indonesia, handling 71,043 t of fish in 2009. However, it is considered as only one of several wholesale fish markets in terms of function and mechanism, with no other features distinguishing it from other wholesale fish markets**. It is, therefore, essential not only to improve and expand its facilities, but also to develop its trading function,** such as through the introduction of an auction system that will (i) create more opportunities for both fish suppliers and fish buyers and (ii) ensure more open and fair transactions. Since it will take time to reform the existing wholesale mechanism, the improvement of the wholesale market will be done in a stepwise manner, as described in Section 3.1.2 below.

JFP Wholesale Market as Fish Supply Buffer Center (PBPI). The existing cold storages and processing plants in JFP are mostly used for the export of fish. Although some cold storages (with a total holding capacity of approximately 1,700 t) were recently constructed around the existing wholesale market, the future demand for frozen fish is expected to increase every year, thereby exceeding the present capacity of these cold storages. To stabilize fish supply to the most populated consumption areas (DKI Jakarta and surrounding areas) at stable prices, **the JFP wholesale market**

will also provide storage facilities for domestic fish and ensure the availability of fish on a year-round basis despite daily and seasonal fluctuations in fish supply.

JFP Wholesale Market as Seafood Plaza. JFP is the largest fishing port complex in Indonesia, with a fish processing estate mainly serving as an export and fish marketing center (PPI) supplying fish to the capital, Jakarta. However, there are no facilities that target fish consumers, while the neighboring Muara Angke fishing port has many local restaurants serving traditional grilled fish ("*ikan bakar*") as well as fish retail shops. This situation is due to the limited land for development, the traditional style of wholesale market, and heavy traffic jams on the way to JFP. **Both the JFP and Muara Angke wholesale markets will be developed as integrated Seafood Plazas, not duplicating but, instead, specializing in specific types of consumer facilities.** Since the JFP is a major tuna landing area, fish shops/restaurants specializing in tuna may be appropriate for the JFP Wholesale market and attractive for foreigners, Indonesian and tourists who have tuna eating habit. On the other hand, facilities for food fairs selling special fishery products of each province in Indonesia, as well as fish cooking and taste tests, could also be set up in the JFP wholesale market, to promote fish eating for Java people.

New Access Road as a Supporting but Indispensable Facility. The existing access road (Jl. Muara Baru) has i) a risk not to be able to pass through during flood since the road level is lower than sea level and ii) a threat to cause noise and traffic accidents to inhabitants since many houses have been illegally built along the road. It is indispensable to construct a new access road (bypass road) so as to be able to access to JFP safely at any time. The new access road will be most economical in terms of construction cost and connected with the road towards Muara Angke, so as to contribute to integrated development with Muara Angke wholesale market under the Jakarta Fisheries Waterfront City Plan.

Linkages in Fish Distribution between Muara Baru and Muara Angke. As explained above, the JFP wholesale market (Muara Baru) will be developed as a center for fish trading and marketing and as a fish supply buffer storage, receiving and distributing fish all over Indonesia, while the Muara Angke wholesale market will continue to be a local wholesale market, mainly receiving fish caught by local small and medium-scale fishing boats and some fish transported by land (Fig. 3.1.1). With the introduction of an open and fair transaction system at the JFP wholesale market, with it serving as a PPPI, fish will be marketed wholesale mainly at PPPI, and a certain portion will be distributed to the Muara Angke wholesale market. The wholesale markets of Muara Baru and Muara Angke will be connected through a new access road to enable the establishment of an integrated Seafood Plaza and the supply of fish from Muara Baru to Muara Angke.

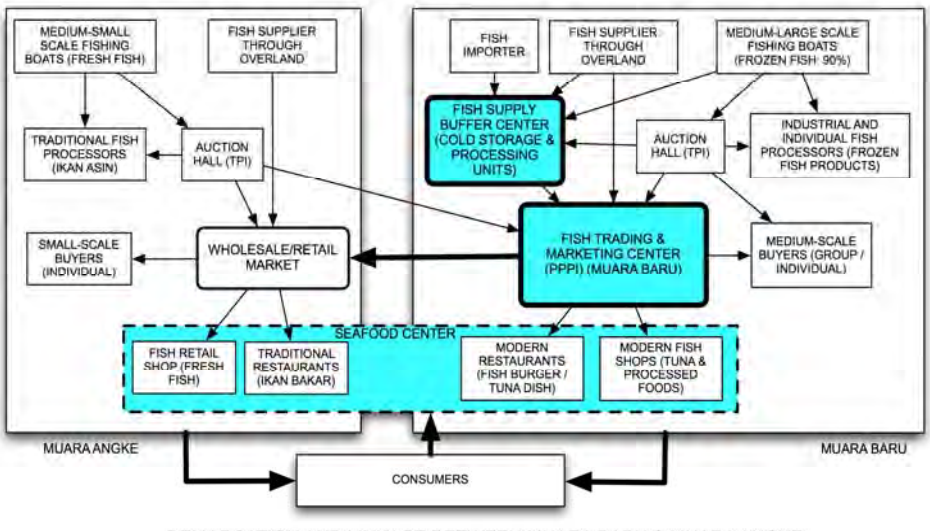


Figure 3.1.1: Demarcation and Linkages between the Muara Baru and Muara Angke Wholesale Markets

A Seafood Plaza featuring modern fish restaurants and retail shops in Muara Baru and traditional style restaurants and shops in Muara Angke will be established to provide consumers with a wide range of choices. The integrated Seafood Plaza will be promoted among the general public through mutual cooperation between Muara Baru and Muara Angke. For this purpose, the seafood retailers/restaurants cooperatives will be organized in both places, and an association will be organized to conduct various activities for sales promotion, e.g., preparation and distribution of pamphlets and planning and execution of sales events such as seafood fairs, etc.

In addition, it is necessary for the existing fishers/traders cooperatives in Muara Baru and Muara Angke to form a cooperative to stabilize fish supply and prices in both wholesale markets. The association of cooperatives in coordination with its members (fishers and wholesalers) will control the daily fish supply volume at each market in collaboration with other relevant actors, such as cold storages/fish processing units (UPI).

To implement the integration of the above described activities between Muara Baru and Muara Angke, it is proposed that the organizational linkages shown in Figure 3.1.2 be adopted.

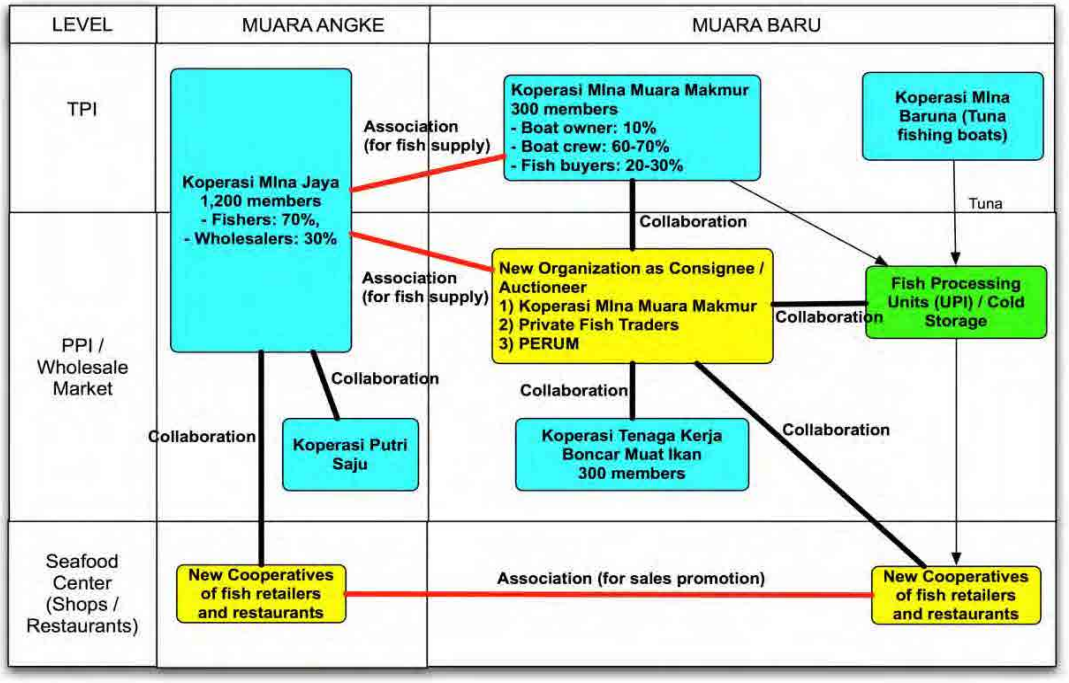


Figure 3.1.2: Organizational Linkages between the Muara Baru and Muara Angke Wholesale Markets

3.1.2 Stages in the Development of the JFP Wholesale Market

As mentioned earlier, the JFP wholesale market will be improved/upgraded and a reform of the wholesale market mechanism will be introduced in a series of stages, as described below.

Stage 1: Demarcation of Work Space Based on the Existing Mechanism (during Construction, 2016-2018)

This stage will involve the physical development of the wholesale market facilities and the demarcation of the area by type of operation, into (i) trading area, (ii) transit area, and (iii) market hall. The disinfection foot basin will be placed at each entrance to the wholesale market. These improvements will ensure smooth flow of fish/ice and people and will the improve sanitation in

the wholesale market. The total area of the wholesale market will also be expanded so as to reduce congestion and cross-flow of fish entry and exit. However, the existing wholesale mechanism will continue to be applied, considering the time necessary for socialization and dissemination of information to conservative stakeholders.

The existing fish inspection system will also be strengthened during the initial stage of operation of the JFP Wholesale Market. At present, only the inspection of illegally caught fish is conducted at JFP, and fish organoleptic inspection is conducted by DKI Jakarta only once every three months. After the upgrading of the wholesale market, fish organoleptic inspection will be conducted daily at the point of fish unloading and wholesale by DKI staff in collaboration with UPT-PPSJ. For this purpose, one small laboratory will be installed in the wholesale market.

Furthermore, the operating hours of the JFP wholesale market will be extended beyond the present six hours (1800-2400 hrs) to provide more trading opportunities to both fish suppliers and buyers. The Muara Angke Wholesale Market operates from 1600-0400 hrs, and receives and distributes fish after the closing of the Muara Baru market.

New rules and regulations governing the operations of the JFP Wholesale market will be prepared, reflecting the opinions of stakeholders, and an operations manual for fish marketing and fish inspection procedures will be developed before the operation of the new wholesale market.

Stage 2: Reform of Wholesale Market Mechanism (from the Operational Stage, 2019-2025)

After the completion of construction, **the reform of the wholesale market mechanism will be addressed.** The following measures will be tested, and appropriate incentives will be provided to stakeholders to promote the wholesale market reform:

- Standardization of fish containers at the levels of transportation and wholesale marketing by providing incentives for the use of insulated fish containers (e.g., sale of standard fish containers at promotional prices; provision of priority rights to use the market hall);
- Weighing and verification of fish before the market transaction through dissemination to fish wholesalers;
- Introduction of a more open and fair transaction system (e.g., auction system) by inviting and evaluating the experience and management capacity of interested fish traders and relevant cooperatives to serve as auctioneers;
- Conversion of some areas of the wholesale market through the installation of partitions and/or walls, e.g.:
    - Division of trading area (see Stage 1) into fish handling area and trading hall (Stage 2); and
    - Continuous use of the transit area and market hall (see Stage 1).

Table 3.1.1 shows the schedule for modernization of wholesale market mechanism.

Table 3.1.1: Schedule for Modernization of Wholesale Market Mechanism

Activities for Modernization of Market Mechanism	Construct Stage	Operation & Management Stage				
		1st year	2nd year	3rd year	4th year	5th year
Stage 1. Demarcation of Work Space based on the Existing Mechanism						
1) Demarcation of work space in wholesale market	**********					
2) Preparation and execution of rules and regulations governing wholesale market operation	**********					
3) Improvement of fish quality and hygienic inspetion system	*******					
4) Identification of market related stakeholders (procurement snad sales of caps, badges and boots)	**********					
5) Extension of market operating hours (from 18h - 24h to 16h - 4h)	*******					
Stage 2. Reform of Wholesale Market Mechanism						
1) Standardization of fish containers (procurement of insulated fish box and sales to the relevant stakeholders)	**********	**********	**********			
2) Intoroduction of weighing and verification system before transaction (enlightenment to stakeholders)		*******				
3) Introduction of auction system (invitation of private companies, evaluation of experiences, and capacity building)		*******	**********	**********	**********	**********
4) Physical reform of market building (installation of walls and partitions)					**********	**********

Figures 3.1.3 and 3.1.4 show the proposed improvements in the fish handling process in the JFP wholesale market.

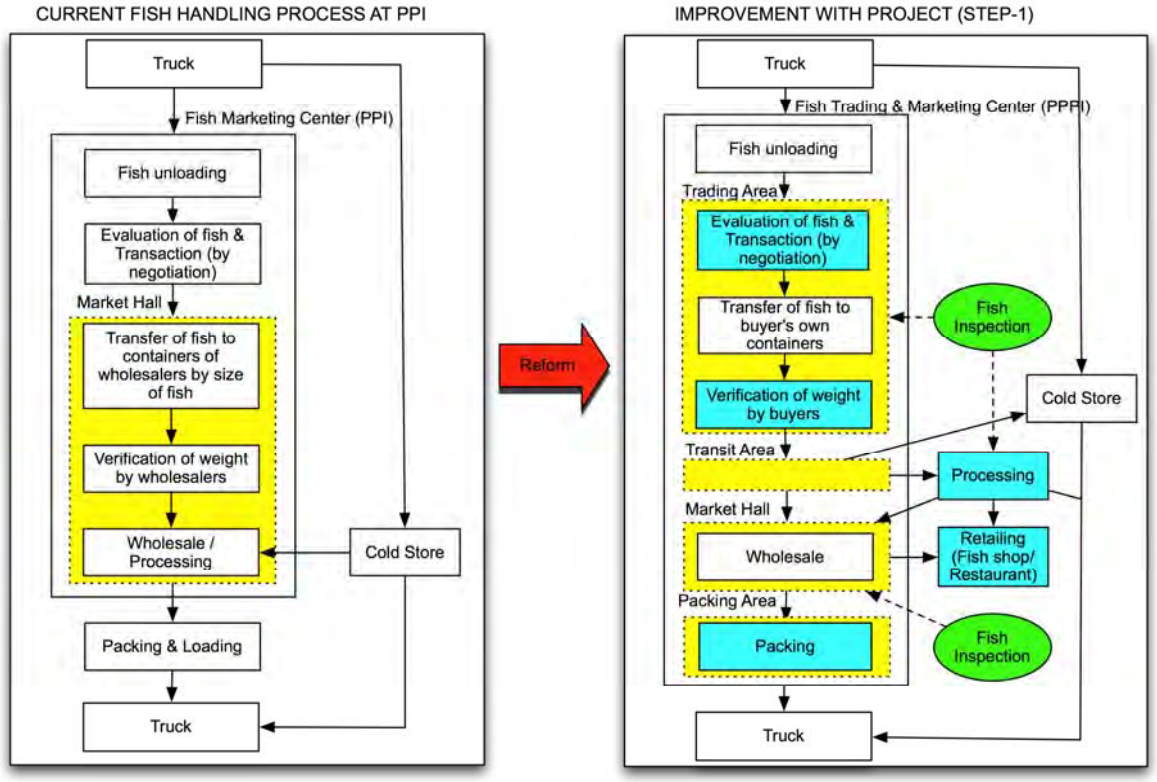


Figure 3.1.3: Demarcation of Work Space Based on the Existing Mechanism (Stage 1)

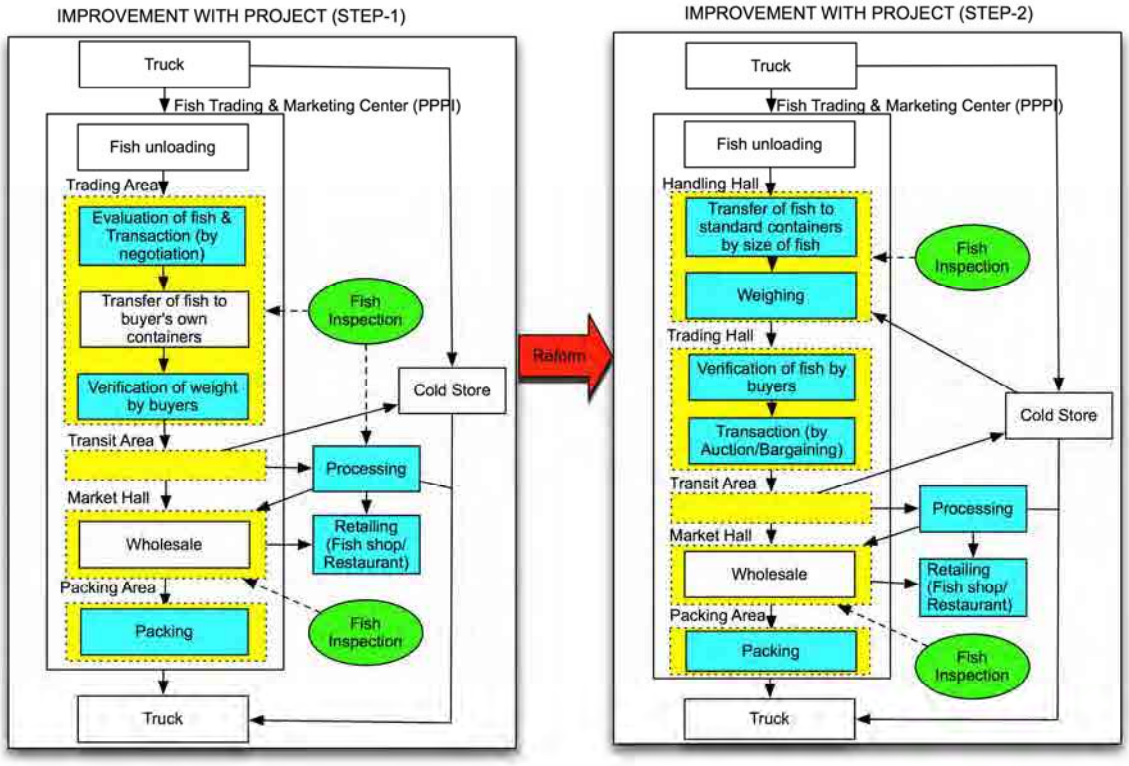


Figure 3.1.4: Reform of Wholesale Marketing Mechanism (Stage 2)

3.1.3 Project Components

Given the problems and issues that need to be addressed (Section 2.6) and based on the above development concept for the JFP Wholesale market (Section 3.1.1), **the Project will consist of the following components:**

- Fish trading and marketing center (handling/trading/market halls, packing area, kiosk/ canteen, fish organoleptic laboratory, office, ice retail store, freshwater retail store);
- Fish supply buffer center (cold storages, fish processing units);
- Seafood Plaza (model fish shops/restaurants, event square);
- Auxiliary facilities (desalination plant, public toilets, sewage treatment facility); and
- Access road.

The entire complex including the above-listed all facilities will be called as "JFP Wholesale Market Complex" (tentative name) and its popular name will be decided in July 2011 in discussion with the MMAF.

Figure 3.1.5 shows the Project target areas within the overall development of the JFP wholesale market. Two alternative development options are presented. In **Alternative A**, land will be reclaimed, allowing a larger Project area and the development of all facilities included in the target area. In **Alternative B,** the existing market site will be upgraded and an additional area will be developed, and all existing facilities, except for the existing cold storages, will be improved. Details are provided in Section 3.5.1, Site Plan.

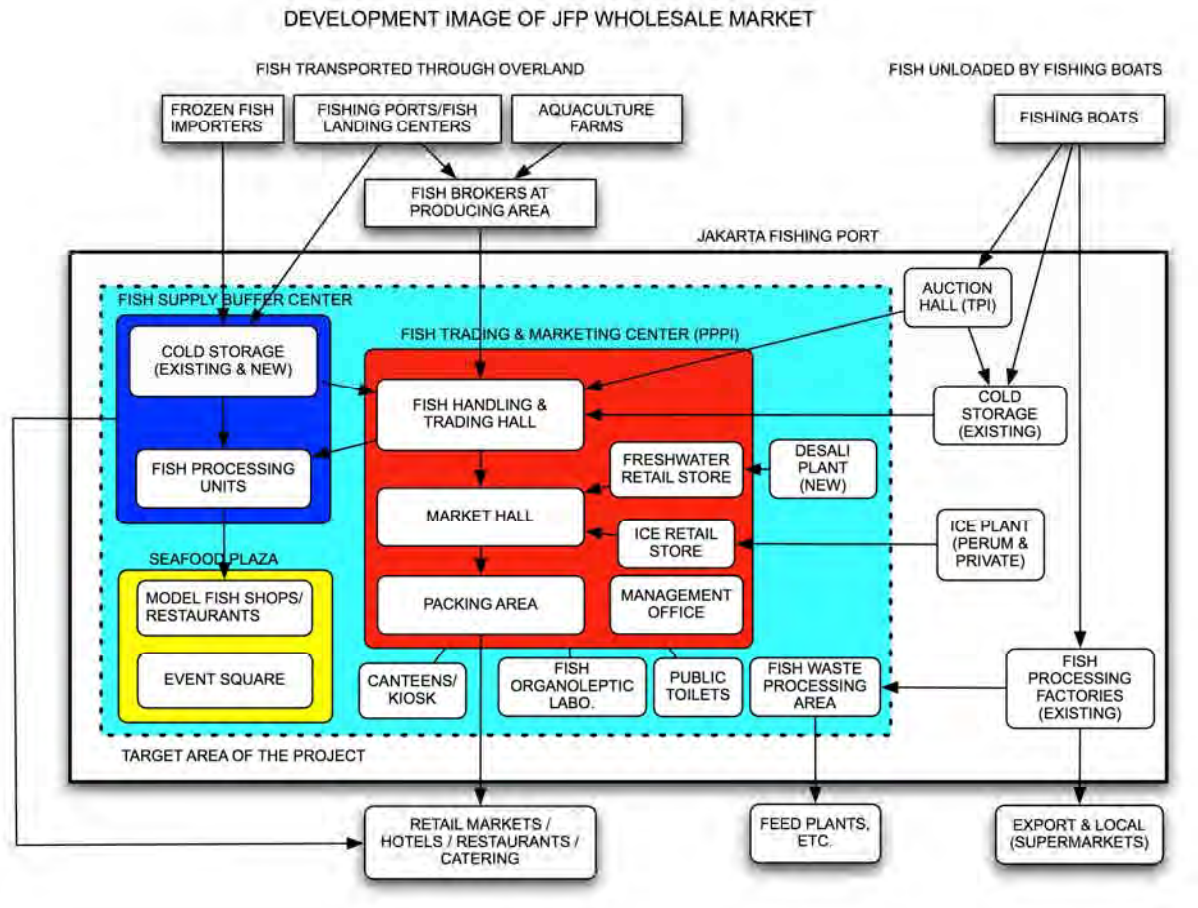


Figure 3.1.5: Proposed Development of JFP Wholesale Market and its Components

3.2 Demand Projections and Scale Determination

3.2.1 Projections of Demand

The JFP wholesale market supplies fish to six provinces, with a large portion supplied to DKI Jakarta, West Java, and Banten, and a small portion to Central Java, East Java, and Lampung. Based on the population forecast made by the Statistics Bureau *(BPS)* and the projection of per capita fish consumption by province, as contained in the *KKP Strategic Plan, 2010-2014*, the total demand for fish in these provinces has been estimated as shown in Table 3.2.1 below.

Table 3.2.1: Fish Demand Projection in Selected Provinces of Indonesia

Province	Estimated Population ('000 persons)			Estimated PC Fish consumption (kg)			Total Demand for Fish (MT)		
	2015	2020	2025	2015	2020	2025	2015	2020	2025
Lampung	8,377.40	8,881.00	9,330.00	25.9	32.3	38.7	217,228	286,807	360,685
DKI Jakarta	9,168.50	9,262.60	9,259.90	21.1	24.3	27.6	193,393	225,416	255,380
Jawa Barat	46,073.80	49,512.10	52,740.80	20.2	23.5	26.8	931,674	1,165,186	1,415,846
Jawa Tengah	32,882.70	33,138.90	33,152.80	17.9	24.5	31.2	588,466	813,118	1,033,618
Jawa Timur	36,840.40	37,183.00	37,194.50	20.2	23.8	27.4	743,081	883,814	1,017,951
Banten	12,140.00	13,717.60	15,343.50	24.7	28.5	32.3	299,822	390,873	495,466
Source: Estimated by the Study Team based on population forecast (BPS) and the Strategic Plan 2010-2014 (KKP)									

Based on the proportion of the estimated distribution volume to the total demand in the provinces, **it is projected that the fish volume to be distributed from the JFP wholesale market will reach 113,951 t and 135,845 t, respectively, by 2020 and 2025** (Table 3.2.2).

Table 3.2.2: Estimated Fish Volume Distributed from PPI/JFP

Province	Proportion of distribution (%)	Distributed Volume in 2009 (MT)	Total Fish Demand in 2009 (MT)	Proportion to demand (%)	Fish Volume distributed from PPI-JFP (MT)		
					2015	2020	2025
Lampung	0.6%	426	150,233	0.3%	616	814	1,023
DKI Jakarta	41.8%	29,692	156,797	18.9%	36,622	42,687	48,361
Jawa Barat	40.3%	28,627	696,693	4.1%	38,282	47,877	58,176
Jawa Tengah	2.7%	1,918	367,722	0.5%	3,069	4,241	5,391
Jawa Timur	2.8%	1,989	590,332	0.3%	2,504	2,978	3,430
Banten	11.8%	8,382	213,366	3.9%	11,778	15,355	19,464
Total	100.0%	71,034	2,175,141	3.3%	92,872	113,951	135,845
Source: Estimated by the Study Team based on the results of Fish O/D Distribution Survey (Apr. 2011)							

3.2.2 Projected Fish Handling Volume

As mentioned in Section 2.3.1, it is predicted that the fish consumption in the country will rise from 6,757,821 t in 2009 to 12,999,917 t in 2025. **With this increase in fish consumption level, it is estimated that the fish handling volume in PPI/JFP will reach 115,490 t in 2025 from the current level of 71,043 t** (Table 3.2.3). The basic assumptions used in this projection exercise are shown in Table 3.2.4.

Table 3.2.3: Projected Fish Handling Volume in PPI/JFP

Fish Supply	2009	Increase (%)	2025
1. Fish transported overland	60,153		100,799
1.1 Imported fish (frozen form)*	924	151.3	1,398
1.2 Marine fish	39,476	134.9	53,253
1.2.1 Marine fresh fish	39,476	110.0	43,424
1.2.2 Marine frozen fish**	0	-	9,830
1.3 Aquaculture fish	19,753	233.6	46,148
2. Fish landed at JFP	10,890	134.9	14,691
2.1 Marine fresh fish	3,630		1,469

2.2 Marine frozen fish	7,260		13,222
Total	71,043		115,490

* Calculation of the volume of imported (frozen) fish

1. Domestic fish consumption in 2009	6,757,821 t
2. Fish supply through PPI/JFP in 2009	71,043 t
3. Ratio of fish supply through PPI/JFP compared with the whole country	1.1%
4. Fresh and frozen fish imports in 2009 (MMAF Statistics, 2009)	83,984 t
5. Fresh and frozen fish imported and supplied through PPI/JFP in 2009	924 t

** The projected increase in the volume of frozen marine fish is based on the fact that fish resources around Java waters have been almost fully exploited, and further increases in fish harvest are not likely. Thus, the future supply of fish to Jakarta would inevitably come from catches in remote areas which would be brought to JFP over land in frozen form.

Table 3.2.4: Basic Assumptions Used for Calculating Fish Supply Volume to PPI/JFP

Source of fish supply	2009	Projected figure in 2025	Increase (%)	Remarks
Marine capture fish	4,789,410	6,462,100	134.9	
Inland capture fish	495,610	760,214	153.4	This figure should be ignored as captured fish in inland tend to be consumed in the markets nearby.
Cultured fish without seaweed	2,206,100	8,426,700	382.0	Including marine culture.
Import of frozen fish	83,984	127,029	151.3	In consistent with the government policy to curve the fish import, this figure would be reasonable.
Total	7,575,104	15,776,043		

Source: Statistics of MMAF 2009 and computerized projection by the Study Team.

3.2.3 Scale Determination for the Main Facilities

Based on the projected fish handling volumes above, the respective scales of the Fish Trading and Marketing Center (PPPI), Fish Supply Buffer Center, and Seafood Plaza have been calculated as follows (see Appendix 6 for details).

3.2.3.1 Fish Trading and Marketing Center (PPPI)

Taking into account the current congested situation and the projected increase of fish handling volume from 71,034 t in 2009 to 115,490 t in 2025, **the existing total floor area of the JFP wholesale market will be expanded about 2.5 times from 9,856 m^2 to 24,986 m^2.** The basic assumptions used in calculating the areas of the JFP wholesale market areas are given in Table 3.2.5.

Table 3.2.5: Basic Assumptions for Calculating the JFP Wholesale Market Areas

Area		2009	2025
Fish Handling Volume		71,043 t	115,490 t + alpha
Truck berth		Approx. 7,000 m^2 (no space demarcation: All activities done in the peripheral area of market hall (7m wide) and truck berths of 7m wide).	For 40 units (Vehicle In) 2,040 m^2 [170 m (W) x 12 m (W)]
Fish Handling Area			1,785 m^2 [170 m(W) x 10.5 m (W)]
Transaction Area (Trading Hall)			2,040 m^2 [170 m (W) x 12 m (W)]
Transit Area			1,275 m^2[170m (W) x 7.5 m (W)]
Packing Area			5,610 m^2[170 m (L) x 33m (W)]
Handling volume		71,043 t/yr	113,016 t (except 2,474 t for processing)
Market Hall	Stalls for wholesale marketing	4,960 m^2 (39 kg/m^2) (2 x 2.5m/unit x 992 units, used by 390 wholesalers)	5,880 m^2 (53 kg/m^2) (3.5 x 3.5m/unit x 480 units, to be used by 480 wholesalers)

	Passage	2.5m /1m wide	2.5m /2.5m wide (to allow two-way passage)
Parking lot		-	9,802 m^2 (including 1,000 m^2 for passage for transport of fish)

The kiosk and canteen will be located beside the Fish Trading and Marketing Center (PPPI), including the existing ones and the new ones estimated based on the increase of fish handling volume.

3.2.3.2 Fish Supply Buffer Center

Ice Requirement. The current ice application to fresh fish during transport and wholesale marketing is not enough to keep the freshness of the fish. **It is recommended that the ice application rate be increased, unless appropriate insulated fish containers are used** (see Table 3.2.6).

Table 3.2.6: Ice Requirement (t) under Different Ice Applications

Item	2009	2025	Ice to Fish Ratio
Ice required ice under current practice	24,119	34,315	10-25% in PPI premises; 16% for transportation
Ice required under suggested application	48,273	75,880	15-25% in PPI premises; 50% for transportation
Ice required for use in insulated box		28,671	10-15% in PPI premises; 15% for transportation

Since the current supply of ice to the wholesale market (by PERUM) is 20,000-24,000 t/yr at approximately 70% operation, the volume of ice required in 2025 will be supplied through the improvement of the operational efficiency of the existing PERUM ice plant, augmented by the future expansion of private sector capacity, provided that the use of insulated boxes will be adopted by stakeholders, and the consumption of frozen fish increases.

Cold Storages. The maximum fish holding capacities of the existing cold storages owned by PERUM and the private sector in the JFP wholesale market are shown in Table 3.2.7 below.

Table 3.2.7: Maximum Fish Holding Capacity of Existing Cold Storages

Ownership of Existing Cold Storages in JFP Wholesale Market	Storage Capacity (t)	Occupancy at Peak Month (2009)	Actual Fish Holding Volume at Peak Month (2009)	Maximum Occupancy	Maximum Fish Holding Volume at Peak Month (t)
Private storages (around the market)	1,700	N/D	N/D	75%	1,275
PERUM	1,800	60%	800	75%	1,350
Total	2,900				2,625

Assuming that the surplus fish over the monthly average volume would be stored and distributed in the month, causing a fish deficit, the fish volume to be stored in cold storages is estimated at 3,845 t on the peak month or 2,395 t, on average. **The required capacity of new cold storages in 2025 is estimated at 1,200 t** (see Table 3.2.8).

Table 3.2.8: Required Capacity of New Cold Storages

Item	2009	2025
Fish brought to PPI per month (range and average)	3,099 – 6,298 (4,127)	4,184 – 8,502 (5,571)
Fish to be stored each month (range and average)	0 – 2,848 (1,774)	0 – 3,845 (2,395)
Holding volume of existing cold storage	2,625	2,625
Shortage of cold storage (on peak months)	-	1,220

Note: Estimates do not include milkfish and freshwater fish, which are non-target species for frozen fish processing.

Fish Processing Units (UPI). Assuming that frozen large pelagic fishes are used as raw materials for processing, the processing volume and area required for fish processing units in 2025 has been estimated as shown in Table 3.2.9 below.

Table 3.2.9: Estimated Processing Volume and Area Required for Fish Processing Units

Item	2009	2025
Raw materials (frozen large fish) for processing (t)	1,752	2,474
Volume of processed products (fillet) (t)	1,489	2,103
Volume of fish waste (t)	263	371
Area for fish processing (m^2)	710 m^2	1,181 m^2
No. of fish processing units (UPI)	17 units	27 units

3.2.3.3 Seafood Plaza

A Seafood Plaza will be built as a model for private investment in the future, with 12 fish shops and two restaurants. Of the 12 fish shops, two will be selling special tuna products and ten will serve as outlets for provincial seafood shops (for the provinces facing Java Sea, namely, Lampung, DKI Jakarta, West Java, Banten, Central Java, East Java, West Kalimantan, South Kalimantan, East Kalimantan, and Bali). Seafood restaurants will be operated by private sector and will serve mainly tuna-based dishes cooked in a variety of ways. It is difficult to estimate reliable number of customers (consumers) who are expected to visit to Seafood Plaza for time being. However, the following figures in Table 3.2.10 are given as the target in 2025 provided that the special foods which cannot be taken except JFP are supplied.

Table 3.2.10: Target Number of Customers to Seafood Plaza in 2025

	Seafood Restaurant	Tuna Shops	Antenna shops for special foods
No. of Shops	2	2	10
Average No. of Customers (persons/shop/day)	80	50	50
Annual Operating days	300	300	300
Total No. of customers per year	48,000	30,000	150,000
Target Customers Group	Foreigners, Rich group of Indonesian, and tourists in Jakarta		Rich and medium income groups of people in Jakarta

3.2.4 Traffic Projections

3.2.4.1 Current Traffic on Existing Access Road

Jl. Muara Baru is connected directly to JFP through a high-density area consisting of illegally constructed houses and shops on the eastern open space between the road and the factories and on the east bank of the flood control pond (Waduk Pluit) located along the west side of the road. The existing road has an 8-m carriageway and is a two-way, two-lane, undivided, concrete road without shoulders, and is occupied on both sides by informal settlers. These illegally constructed structures (houses and shops) plus stockpiles of goods and parked vehicles on the sides of the road make it difficult for vehicles, especially the large container vans, to access JFP. Moreover, the road gets flooded during high tide, causing the suspension of fish transport to and from JFP for several days, resulting in significant losses to both wholesalers, traders, buyers, and JFP itself.

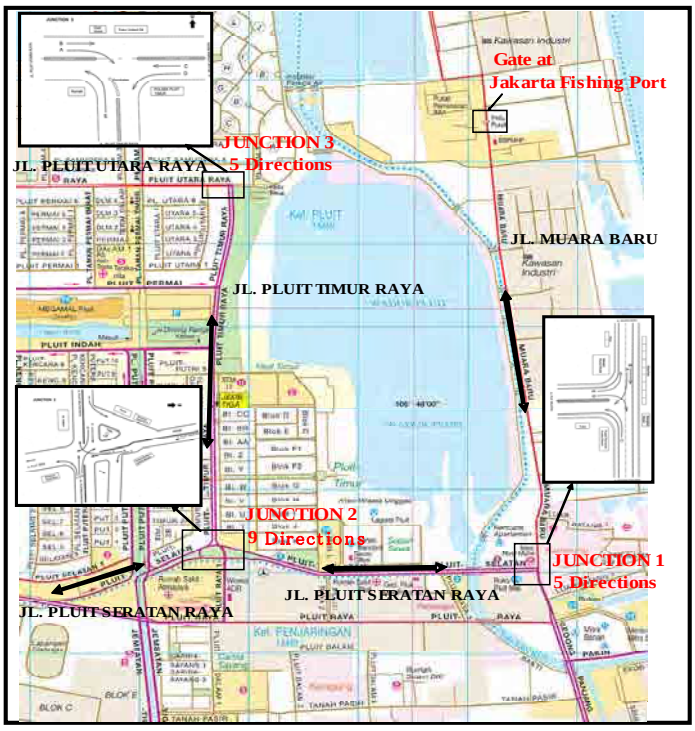
Jl. Muara Baru has a T-junction with Jl. Pluit Selatan, which is a two-way, four-lane divided road, at the south end of the road. This junction is usually heavily congested, mainly by vehicles coming from the west (Jl. Pluit Selatan) and mostly turning right from west to south. Traffic at the junction is not controlled by traffic lights, and instead, a special traffic regulation has been introduced at the junction, i.e., vehicles from the south going to JFP are prohibited from passing directly through the junction;

they must turn left at the junction and enter Jl. Muara Baru via a U-turn facility located at the west of Jl. Pluit Selatan.

3.2.4.2 Traffic Projections

(i) Current Traffic Conditions

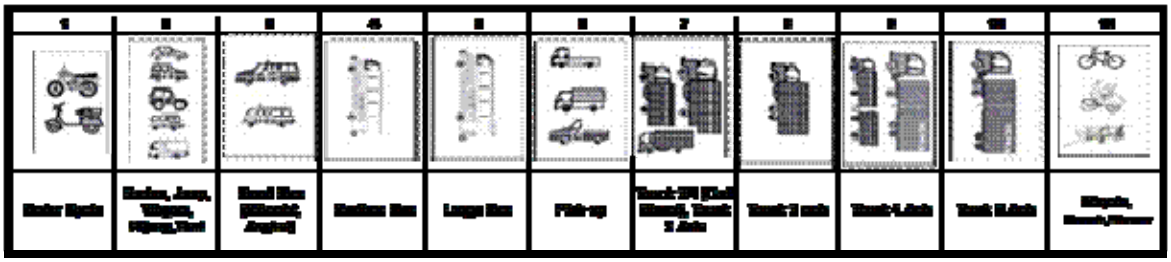
Traffic Survey. A traffic count survey was conducted by the JICA Study Team in order to (i) obtain the latest information/data on traffic condition, (ii) determine existing traffic characteristics, and (iii) provide baseline data for a traffic demand forecast. The survey was conducted 24 hrs a day for one week (6-12 April 2011) at four points, including the JFP gate (Fig 3.2.1). Eleven vehicle categories (heavy and small trucks, sedans, motorbikes, and others) used by the Directorate General of Highways (Bina Marga), Ministry of Public Works (Table 3.2.11) were covered by the survey. Hourly traffic volume by vehicle type and direction at the four survey points was measured (see Appendix 7). The data generated will be used as baseline data for future planning of access road development.



Source: JICA Study Team

Figure 3.2.1: Traffic Survey Points

Table 3.2.11: Vehicle Category Type



Source: JICA Study Team

(ii) Current Traffic Pattern

Traffic Volume and Composition by Vehicle Type. Current traffic volumes based on traffic counts conducted at three intersections and at the JFP gate are shown in Tables 3.2.12 and 3.2.13. **The volume of traffic for almost vehicle types on weekdays is slightly bigger than those on holidays.**

Table 3.2.12: Current Traffic Volume at Survey Points (Average on Weekdays, Vehicle/Day, PCU/day)

	1	2	3	4	5a	5b	6	7a	7b	7c	8	PCU/day
JFP gate	15,671	1,397	233	90	30	1,469	652	72	20	27	1,614	8,779
JNT 1	75,843	28,112	1,183	1,031	99	6,076	2,571	368	366	191	1,514	61,758
JNT 2	75,807	43,205	1,281	972	62	6,061	2,342	531	308	144	970	76,346
JNT 3	22,621	24,478	221	36	33	2,099	1,307	197	17	20	679	35,078

Source: JICA Study Team

Table 3.2.13: Current Traffic Volume at Survey Points (Average on Holidays, Vehicle/Day, PCU/day)

	1	2	3	4	5a	5b	6	7a	7b	7c	8	PCU/day
JFP gate	14,090	1,026	140	20	18	1,251	536	43	10	23	1,538	7,322
JNT 1	57,571	26,452	1,224	1,082	97	3,650	1,680	519	140	87	1,317	51,346
JNT 2	55,782	41,619	1,266	1,032	77	3,759	1,332	765	145	77	860	65,867
JNT 3	20,294	20,735	137	20	26	1,617	753	599	6	12	665	29,921

Source: JICA Study Team

Tables 3.2.14 and 3.2.15 show the vehicle composition at the survey points. **On an average weekday, motorcycles (1) dominate the traffic with a 59.0% share of the vehicle composition at the survey points,** followed by sedans/jeeps/station wagons (2) at 30.2%, buses (5a and 5b), pick-ups (6). Trucks (7a, 7b, and 7c) account for only 5.0%, 2.1%, and 0.8%, of the vehicles, respectively.

Table 3.2.14: Current Traffic Volume at Survey Points (Average on Weekdays, %)

	1	2	3	4	5a	5b	6	7a	7b	7c	8	Total
JFP gate	73.7%	6.6%	1.1%	0.4%	0.1%	6.9%	3.1%	0.3%	0.1%	0.1%	7.6%	100.0%
JNT 1	64.6%	24.0%	1.0%	0.9%	0.1%	5.2%	2.2%	0.3%	0.3%	0.2%	1.3%	100.0%
JNT 2	57.6%	32.8%	1.0%	0.7%	0.0%	4.6%	1.8%	0.4%	0.2%	0.1%	0.7%	100.0%
JNT 3	43.7%	47.3%	0.4%	0.1%	0.1%	4.1%	2.5%	0.4%	0.0%	0.0%	1.3%	100.0%
Total	59.0%	30.2%	0.9%	0.7%	0.1%	4.9%	2.1%	0.4%	0.2%	0.1%	1.5%	100.0%

Source: JICA Study Team

Table 3.2.15: Current Traffic Volume at Survey Points (Average on holidays, %)

	1	2	3	4	5a	5b	6	7a	7b	7c	8	Total
JFP gate	75.4%	5.5%	0.7%	0.1%	0.1%	6.7%	2.9%	0.2%	0.1%	0.1%	8.2%	100.0%
JNT 1	61.4%	28.2%	1.3%	1.2%	0.1%	3.9%	1.8%	0.6%	0.1%	0.1%	1.4%	100.0%
JNT 2	52.3%	39.0%	1.2%	1.0%	0.1%	3.5%	1.2%	0.7%	0.1%	0.1%	0.8%	100.0%
JNT 3	45.2%	46.2%	0.3%	0.0%	0.1%	3.6%	1.7%	1.3%	0.0%	0.0%	1.5%	100.0%
Total	55.9%	34.0%	1.0%	0.8%	0.1%	3.9%	1.6%	0.7%	0.1%	0.1%	1.7%	100.0%

Source: JICA Study Team

PCU Conversion Factor. The passenger car unit (PCU) conversion factor can significantly influence road facility planning. There are differences in PCU conversion factors of inter-urban and urban roads. For this study, the JICA Team applied the PCU conversion factors shown in Table 3.2.16, considering the condition of the roads in the area surrounding JFP.

Table 3.2.16: PCU Conversion Factor

	Vehicle Categories	Vehicle Type	PCU factor
1	1	Motorcycle, *bajaj*, *becak* motor	0.25
2	2	Private car (sedan, jeep, Kijang, etc)	1.0
3	3	Small bus (demo, *mikrolet*, *angkutan*, *kota*)	1.0
4	4	Medium bus (metro mini, *kopaja*)	1.2
5	5a	Large bus (including city bus, school bus, tourist bus)	1.6
6	5b	Pick-up, small truck (2 axis)	1.0
7	6	Truck, 2axis 3/4 ton (Colt diesel), large truck (2 axis)	1.5
8	7a	Truck, 3axis	1.6
9	7b	Truck, 4axis	2.0
10	7c	Truck, 5axis or more	2.5
11	8	Non-motorized	0.25

Source: JICA Study Team

Hourly Variations. Figures 3.2.2-3.2.6 show the hourly traffic variations (PCU basis) at the survey points over a 24-hour period during weekdays. The traffic variation pattern at the JFP gate is different from that in the other survey points in the area surrounding JFP (Junctions 3 and 4) and in Jl. Muara Baru (Junction 2). The highest traffic volume at the JFP gate was observed during the evening peak hour of 1600-1700 hrs, and the motorcycle was the dominant type of vehicle observed. At the other survey points (Junctions 1, 2, and 3), the highest traffic volume was recorded at 0800-0900, 0800-0900, and 1800-1900 hrs, respectively, with private cars dominating the road traffic.

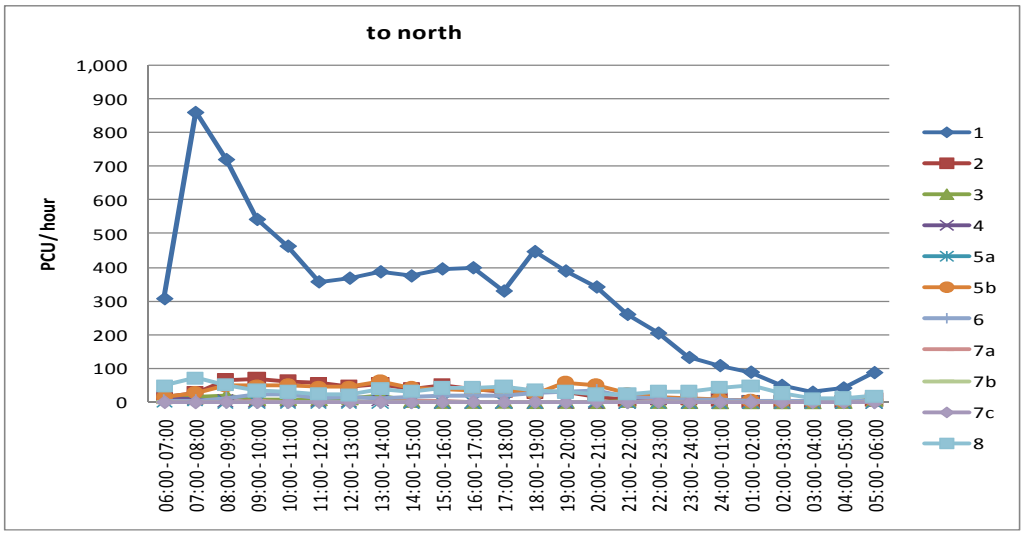


Figure 3.2.2: Hourly Fluctuations (PCU), by Vehicle Type, at JFP Gate (to north)

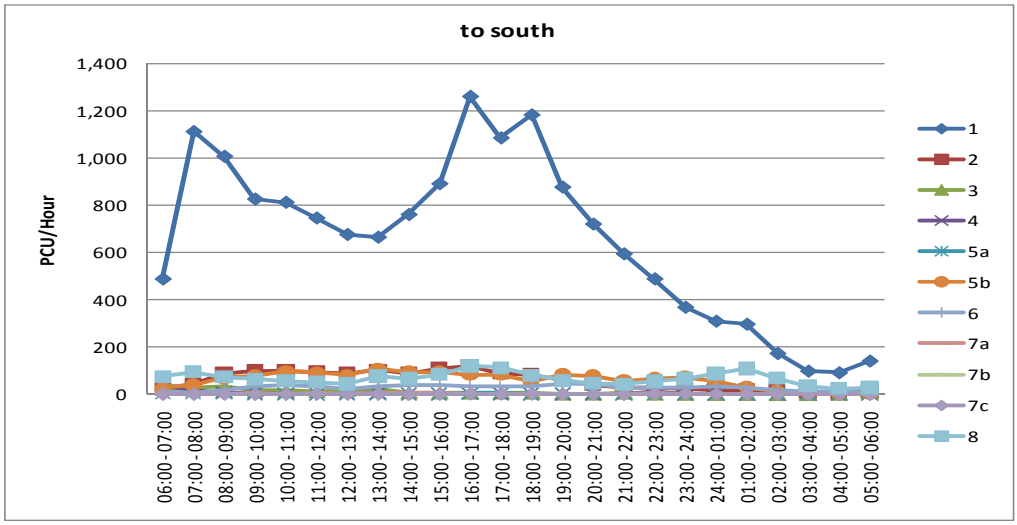


Figure 3.2.3: Hourly Fluctuations (PCU), by Vehicle Type, at JFP Gate (to south)

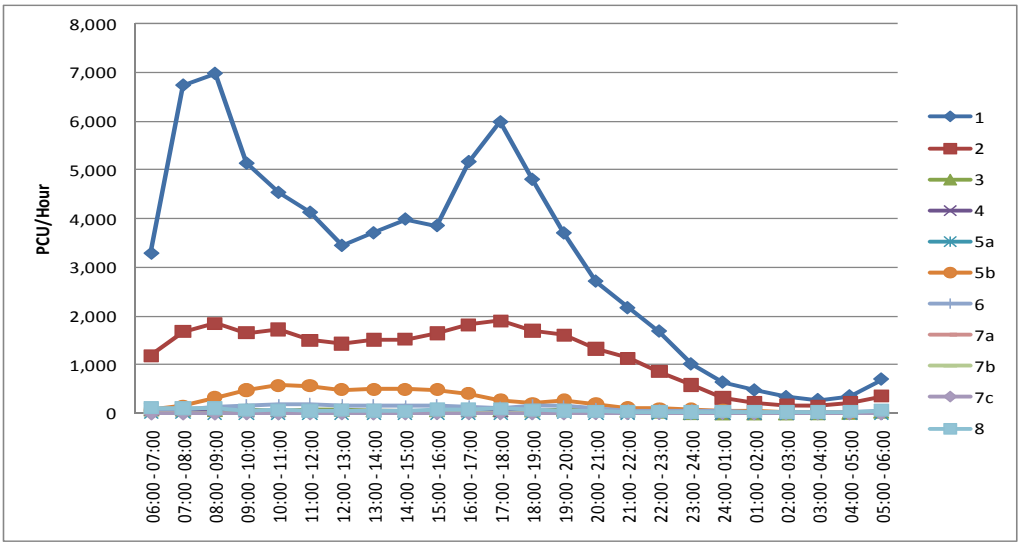


Figure.3.2.4: Hourly Fluctuations (PCU), by Vehicle Type, at Junction 1

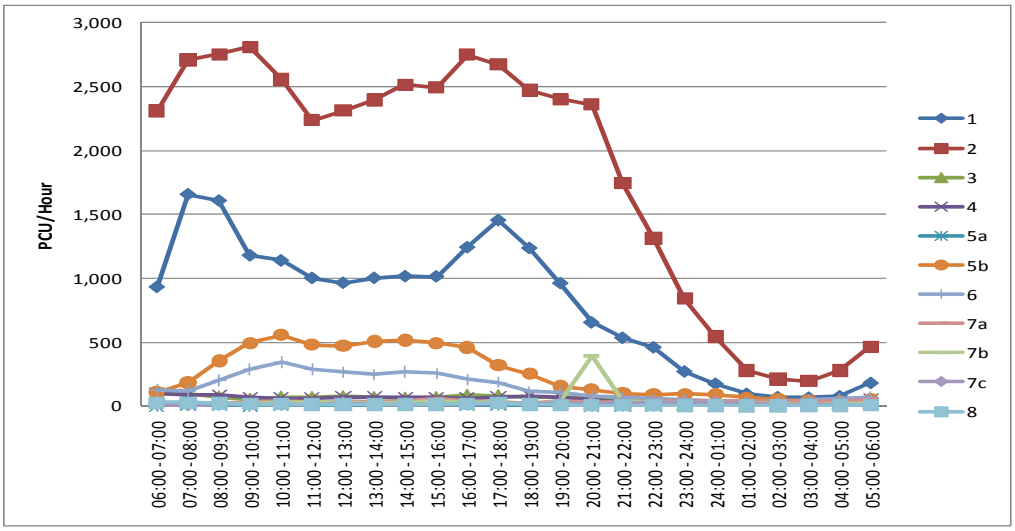


Figure 3.2.5: Hourly Fluctuations (PCU), by Vehicle Type, at Junction 2

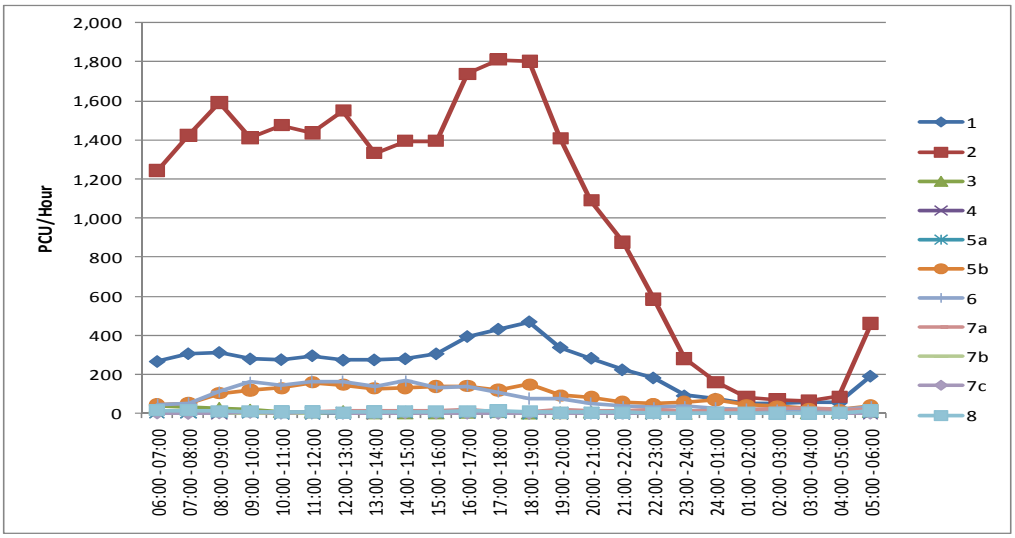


Figure 3.2.6: Hourly Fluctuations (PCU), by Vehicle Type, at Junction 3

(iii) Traffic Volume Projection

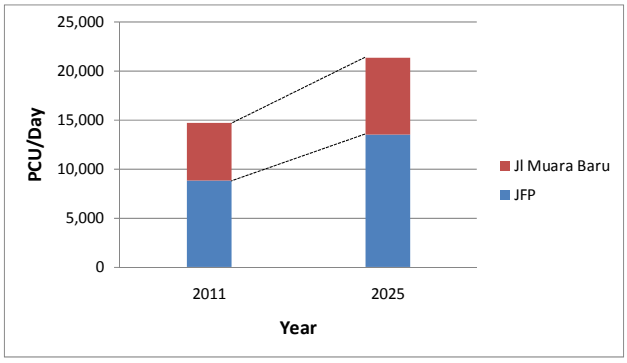
The Study Team estimated the future traffic volume in the JFP area by means of a simple projection method based on the results of the traffic count survey, using the average traffic volume on weekdays as baseline data. Table 3.2.17 provides a summary of the basic parameters used in the forecast of future traffic volume. The baseline data doesn't include the derivative traffic stemmed from the private development like as a Seafood Plaza including a fish shop, seafood restaurant, etc.

Table 3.2.17: Summary of Traffic Volume Projections

	Explanatory Variables	Projection Method
JFP	Fish throughput volume in JFP	Proportionate growth rate of fish throughput volume in JFP
Residents in Jl. Muara Baru	Population growth	By the Elasticity (Traffic/Population [2011])/ (Traffic/Population [2006])
Through traffic in and around JFP	Population growth	By the Elasticity (Traffic/Population [2011])/ (Traffic/Population [2006])

Source: JICA Study Team

Trip Generation Projection. Projections were made of the total trips to JFP and the resident population in Jl. Muara Baru in 2025 compared to that in 2011 based on the traffic count survey. Considering the anticipated throughput volume in JFP and population growth in Jl. Muara Baru, the total number of trips to JFP and the number of residents in Jl. Muara Baru is projected to increase by about 54% and 31%, respectively, in 2025 compared to 2011 (Fig. 3.2.7). Current and future traffic volume to and from JFP and in the area along Jl. Muara Baru in the years 2011 and 2025 are shown in Table 3.2.18.



Source: JICA Study Team

Figure 3.2.7: Trip Generation Projections in JFP and Jl. Muara Baru

Table 3.2.18: Projected Trip Generation in JFP and Jl Muara Baru (Unit:PCU/day)

		2011	2025
JFP	From	4,385	6,773
	To	4,394	6,787
	Sub-total	8,779	13,560
Jl. Muara Baru Area	From	3,136	4,135
	To	2,789	3,659
	Sub-total	5,925	7,794
Total	From	7,521	10,908
	To	7,183	10,446
	Total	14,704	21,354

Note: The PCU figure in the table is the average weekday traffic volume by direction.
Source: JICA Study Team

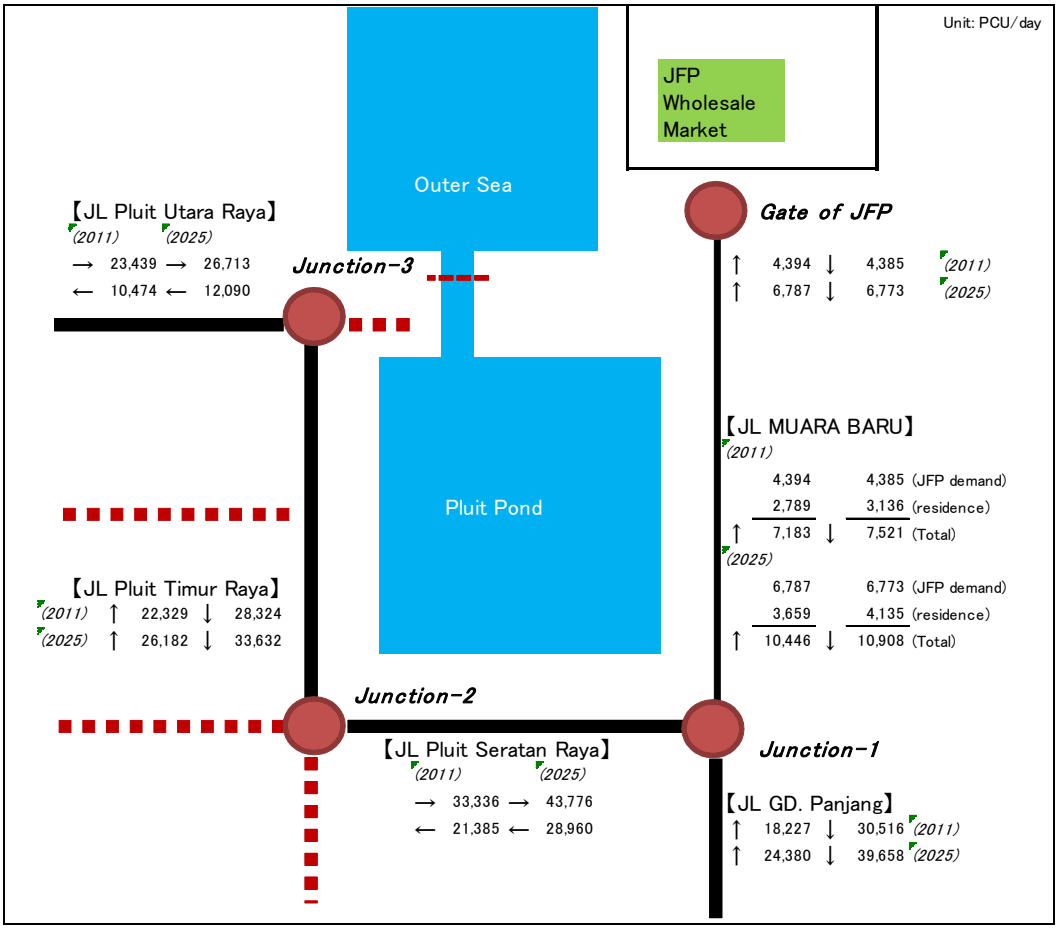
Current and future through traffic in the roads surrounding JFP in 2011 and 2025 (including "with" and "without" development of access road to JFP) are shown in Table 3.2.19.

Table 3.2.19: Projected Traffic Volume in Roads around JFP (Unit: PCU/day)

		2011	2025 (W/O)	2025 (W)	No. of Lanes
Jl. Muara Baru	to north	7,183	10,446	6,333	1
	to south	7,521	10,908	8,064	1
	Total	14,704	21,354	14,397	2
Access Road	to east	-	-	4,113	1
	to west	-	-	2,844	1
	Total	-	-	6,957	2
Jl. Gd. Panjang	to north	18,227	24,380	20,267	2
	to south	30,516	39,658	37,362	2
	Total	48,743	64,038	57,629	4
Jl. Pluit Selatan Raya	to east	21,385	43,776	39,663	2
	to west	33,336	28,960	28,412	2
	Total	54,721	72,736	68,075	4
Jl. Pluit Timur Raya	to north	22,329	26,182	30,295	2
	to south	28,324	33,632	36,476	2
	Total	50,653	59,814	66,771	4
Jl. Pluit Utara Raya	to east	23,439	26,713	26,713	2
	to west	10,474	12,090	12,090	2
	Total	33,913	38,803	38,803	4

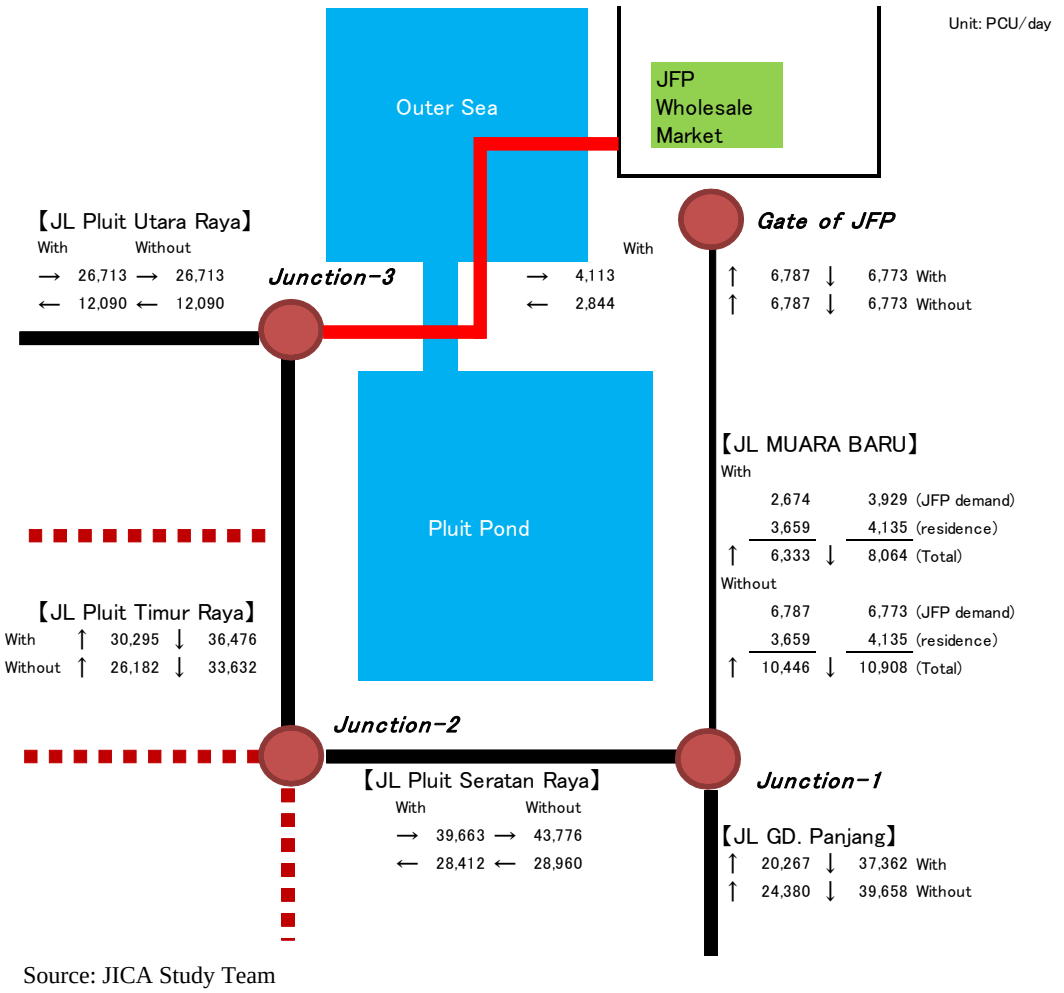
Note: The PCU figure in the table is the average weekday traffic volume by direction.
Legend: W/O – "without access road development; W - "with access road development"
Source: JICA Study Team

Projected Traffic Flow on Road around JFP. Current and future traffic flow to JFP and the surrounding areas in 2011 and 2025, including "with" and "without" development of access road to JFP, are shown in Figures 3.2.8 and 3.2.9, respectively.



Source: JICA Study Team

Figure 3.2.8: Future Demand Estimation without Access Road Development

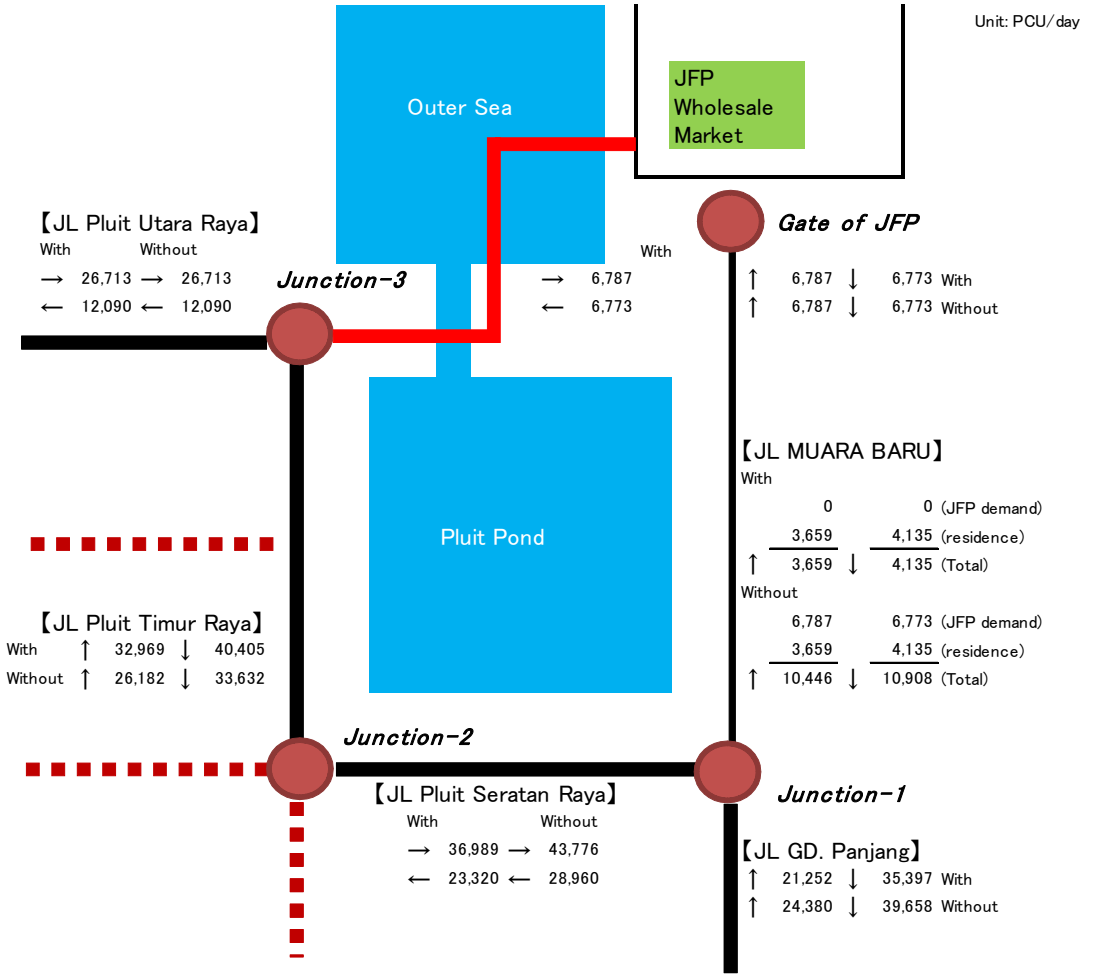


Source: JICA Study Team

Figure 3.2.9: Projected Future (2025) Demand with Access Road Development

With the development of an access road (Alternative 2), the traffic movement pattern in the region will be drastically changed, e.g., part of the traffic to/from JFP on the existing roads in Pluit Permai will shift from Jl. Pluit Selatan to this new access road.
As a long-term requirement, it is suggested that an additional lane be provided for the southbound traffic in Jl. Muara Baru in the future. It is desirable that Jl. Muara Baru has two lanes per direction, considering the possibility that the estimated traffic volume is exceeded and that it could take a long time to relocate the illegal residents presently occupying the road right of way (ROW). The traffic situation on the roads around JFP is expected to become even more heavily congested in the future as shown by the demand projections discussed above.

In addition, Figure 3.2.10 shows the comparison of future traffic demand “with” and “without” new access road development in case of flood damage in Jl. Muara Baru. The “with” case means that all future traffic to/from JFP would be diverted from Jl. Muara Baru to the new access road.



Source: JICA Study Team

Figure 3.2.10: Projected Future (2025) Demand Comparison between "with" and "without" Access Road Development (as a reference)

The business traffic inflow and outflow relevant closely to the wholesale market in JFP concentrates in the business hours from evening and midnight. Giving consideration to the living climate of the residences along Jl. Muara Baru, it will work for the residence along the Jl. Muara Baru that the business traffic relevant to the wholesale market would be made to divert from Jl. Muara Baru to the new access road by means of an traffic restriction under the condition of decreasing traffic volume during the nighttime in the surrounding roads of JFP.

3.3 Design Criteria

3.3.1 Roads

3.3.1.1 Applicable Design Standards

The *"Standard Specifications for Geometric Design of Urban Roads"* published by the Directorate General of Highways of the Ministry of Public Works (MPW) in March 1992 were used as guidelines for the design of the access roads in this Study.

3.3.1.2 Road Classification

Roads in urban areas are classified into two types according to the kind of access control:

- Type I : full access control
- Type II: partial or no access control

The access roads for the proposed Project are classified under Type II.

Type II roads are further classified into four according to their functional classification and design traffic volume. The design classes of Type II roads are shown in Table 3.3.1.

Table 3.3.1: Design Classes, Type II Roads

Function		Design Traffic Volume (PCU/day)	Class
Primary	Arterial		I
	Collector	10,000 or more	I
		Less than 10,000	II
Secondary	Arterial	20,000 or more	I
		Less than 20,000	II
	Collector	6,000 or more	II
		Less than 6,000	III
	Local	500 or more	III
		Less than 500	IV

Source: Standard specifications for geometric design of urban roads, DGH

The four classes of Type II roads and their distinguishing features are:

- Class I: Highest standard streets of four or more lanes to serve inter-city or intra-city, high speed, through traffic with partial access control;
- Class II: High standard streets of two or more lanes to serve inter-city or intra-city, high speed, through traffic with/without partial access control;
- Class III: Intermediate standard streets of two or more lanes to serve inter-district, moderate speed, through or access traffic without access control; and
- Class IV: Low standard streets of 1 travel way to serve access to the road side land lots

Based on the projected traffic volume is less than 6,000 PCU/day in the new access road to/from JFP (see Section 3.2.4.2[iii]), **the road classification of Type II, Class III is applicable to the new JFP access road.**

3.3.1.3 Design Speed

The design speed of Type II roads is based on the road classification as follows.

- Class I : 60 km/h
- Class II : 60 or 50 km/h
- Class III : 40 or 30 km/h
- Class IV : 30 or 20 km/h

3.3.1.4 Geometric Design Criteria

Table 3.3.2 shows the geometric design criteria for each design speed.

Table 3.3.2: Geometric Design Criteria (Main Road)

Item	Unit	Design Standard			
Design speed	km/h	60	50	40	30
Road class		I, II	II	III	III, IV
1. Cross Section					
Lane width	m	3.5	3.25	3.25 (3.0)	3.25 (3.0)
Median width	m	2.0 (1.0)	1.5 (1.0)	1.5 (1.0)	1.5 (1.0)
Marginal strip of median width	m	0.5	0.25	0.25	0.25
Left shoulder width	m	2.0 (1.5)	2.0 (1.5)	2.0 (1.5)	0.5
Right shoulder width	m	0.5	0.5	0.5	0.5
Planted strip	m	1.5	1.5	1.5	1.5
Frontage road	m	4.0	4.0	4.0	4.0
Sidewalk	m	3.0 (1.5)	3.0 (1.5)	1.5 (1.0)	1.5 (1.0)
Cross fall	%	2		2	
2. Horizontal Alignment					
Minimum curve radius	m	400 (150)	150 (100)	100 (60)	65 (30)
Minimum radius at normal crossfall	m	2,000 (220)	1,300 (150)	800 (100)	500 (55)
Minimum curve length	m	700/θ (100)	600/θ (80)	500/θ (70)	350/θ (50)
Minimum transition curve length	m	50	40	35	25
Minimum radius without transition curve	m	600	400	250	150
Minimum stopping sight distance	m	75	55	40	30
3. Vertical Alignment					
Maximum grade	%	5	6	7	8
Critical vertical curve length	m	300 (8%)	300 (9%)	200 (10%)	-
Minimum crest radius	m	2,000 (1,400)	1,200 (800)	700 (450)	400 (250)
Minimum sag radius	m	1,500 (1,000)	1,000 (700)	700 (450)	400 (250)
Minimum curve length	m	50	40	35	25

Source: Standard Specifications for Geometric Design of Urban Roads, DGH.

Table 3.3.3: Geometric Design Criteria for at-grade Intersection

Item	Unit	Design Standard			
Design speed	km/h	60	50	40	30
Road class		I, II	II	III	III, IV
Minimum grade	%	2	2	2	2
Minimum length of low grade	m	40, 35	35	15	15, 6
Lane width of tangent section	m	3.5, 3.25	3.25	3.25, 3.0	3.25, 3.0
Lane width of through traffic lane	m	3.25, 3.0	3.0, 2.75	3.0, 2.75	3.0, 2.75
Lane width of auxiliary lane	m	3.25, 3.0, 2.75	3.25, 3.0, 2.75		
Taper of lane shift		1/30 (40)	1/25 (35)	1/20 (30)	1/15 (25)
Minimum length by deceleration	m	30	20	15	10
Minimum length by shift	m	30	25	20	15

Source: Standard Specifications for Geometric Design of Urban Roads, DGH

Table 3.3.4: Geometric Design Criteria for Interchange

Item	Unit	Design Standard			
Design speed	km/h	60	50	40	30
Road class		I, II	II	III	III, IV
1. Cross Section					
Lane width	m	3.5	3.5	3.5	3.5
Median width	m	2.0	2.0	2.0	2.0
Marginal strip of median width	m	0.5	0.5	0.5	0.5
Left shoulder width	m	2.5 (0.75)	2.5 (0.75)	2.5 (0.75)	2.5 (0.75)
Right shoulder width	m	1.0 (0.75)	1.0 (0.75)	1.0 (0.75)	1.0 (0.75)
2. Horizontal Alignment					
Minimum curve radius	m	140 (110)	90 (70)	50 (40)	40 (30)
Minimum parameter of transition curve	m	70	50	35	20
Minimum transition curve radius	m	350	220	140	140
Minimum stopping sight distance	m	75	55	40	35
3. Vertical Alignment					
Maximum grade	%	5 (up to10)	5 (up to10)	5 (up to10)	5 (up to10)
Minimum crest radius	m	1,400	800	450	250
Minimum sag radius	m	1,000	700	450	250
Minimum curve length	m	50	40	35	30
4. Deceleration Lane					
Standard length of deceleration lane	m	70	50	30	-
Standard taper length in parallel type	m	45	40	40	-
5. Acceleration Lane					
Standard length of acceleration lane	m	120	90	50	-
Standard taper length in parallel type	m	45	40	40	-

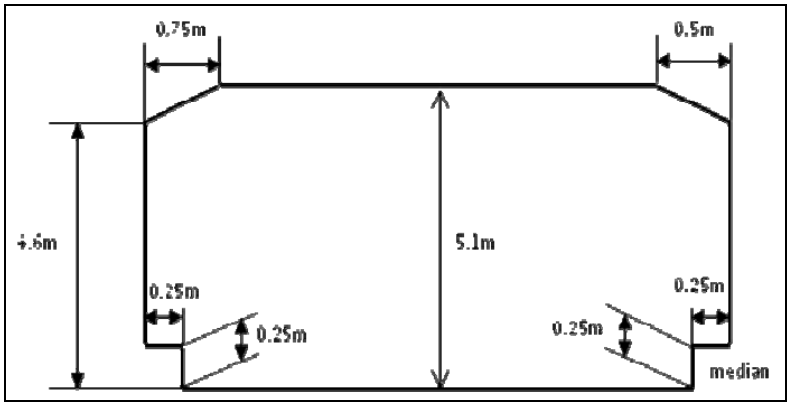
Source: Standard Specifications for Geometric Design of Urban Roads, DGH

3.3.1.5 Clearance

The road clearance will be provided according to the design of the cross section. Any structure, facilities, trees, or other unmovable objects cannot be placed within the clearance. The vertical and horizontal clearance is shown in Fig. 3.3.1.

3.3.1.6 Typical Cross-section

Based on the selected design criteria and future traffic projections, the typical cross-section for the JFP access road was designed as shown in Figure 3.3.2 below:



Source: Standard Specifications for Geometric Design of Urban Roads, DGH

Figure 3.3.1: Vertical and Horizontal Clearances for Roads

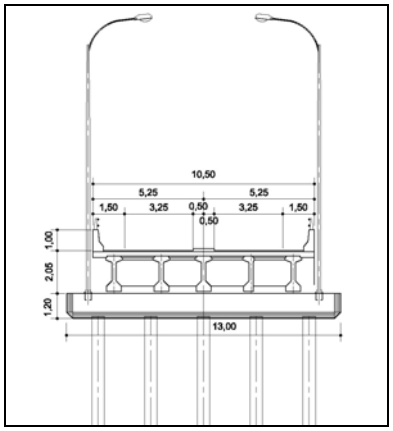


Figure 3.3.2: Typical Cross Section for JFP Access Road

In the new access road planning, final land settlement amount by soil filling on the existing soft soil layer is estimated approximately 3 m. Therefore, bridge structure by soil filling is not adopted for this access road planning. Due to serious settlement of land, also in the consideration with minimum impact for waterway in Pluit flood control pond, the foundation structure of access road has to plan as pile structure on bearing soil layer. This pile structure can be completely avoided from approx. 3m of consolidation settlement.

3.3.2 Land Reclamation and Seawall

3.3.2.1 Design Standards and Guidelines

The basic design of civil works in the proposed Project was based on the *Standard Design Criteria for Ports in Indonesia* (SI) issued by the Maritime Sector Development Program, Directorate General of Sea Communications in January 1984. In cases where there are no applicable SI guidelines or criteria, the *Technical Guidelines for Fishing Ports (TGFP)*, and *Technical Standards for Port and Harbor Facilities in Japan (TSPH)*, were used as a reference. Other relevant industrial standards were also used in the basic design of civil works, including the following;

- Relevant Indonesian industrial standards;
- Relevant North American standards and regulations by ASTM, ACI, AISC, AASHTO, and others;
- Japanese industrial standards; and
- Relevant publications by PIANC.

3.3.2.2 Natural Conditions

Tide. The relevant tide levels for this project are summarized in the following table.

High water level (HWL)	+1.70 m
Mean water level (MWL)	+1.10 m
Low water level (LWL)	+0.50 m
Datum level (DL)	±0.00 m

Waves. Wave conditions were also analyzed in the Phase 1 Preliminary Design Report of the Jakarta Fishing Port Project. The said study predicted the extreme waves at the Project area for the return period not identified by SMB method (Table 3.3.5).

Table 3.3.5: Wave Conditions

Item	Direction		
	NW	N	NE
Equivalent Deepwater Wave Height (H_0')	1.3 m	1.0 m	1.1 m
Significant Wave Height at Breakwater (h=-3 to -5)	1.2 m	0.9 m	1.0 m
Period ($T_{1/3}$)	7.3 sec	4.4 sec	5.5 sec

Seismic Coefficient. The design seismic coefficients for the structures were obtained using the following formula:

$K_h = C \times I \times K$

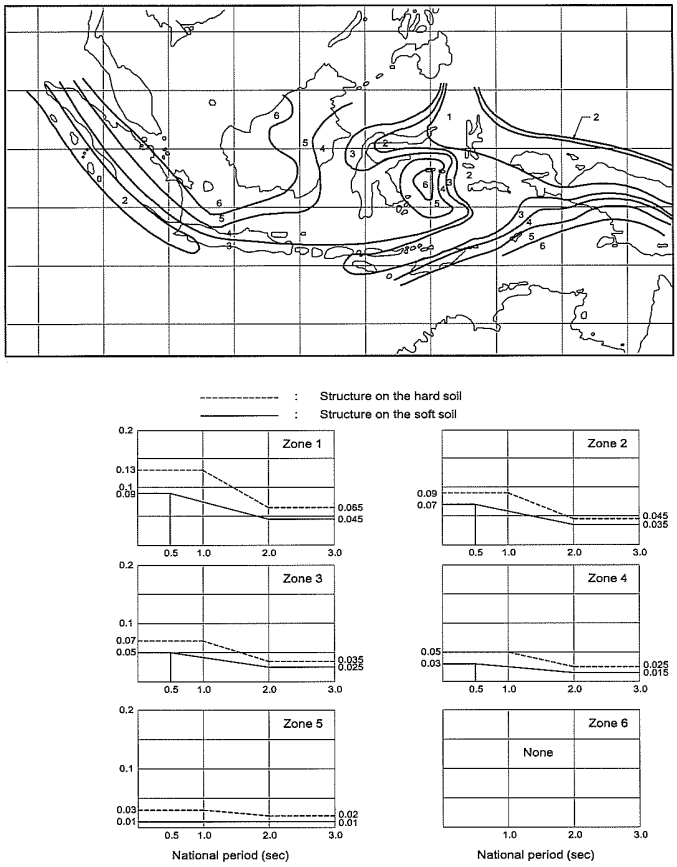
Where:

K_h: Design seismic coefficient

C : Regional seismic coefficient (see Fig. 3.3.3)

I : Importance coefficient (Refer to Table 3.3.6)

K : Structural type coefficient (Refer to Table 3.3.7)



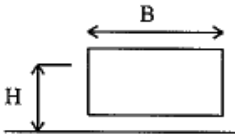
Source : Standard Design Criteria for Ports in Indonesia, January, 1994

Figure 3.3.3: Classification of the Seismic Zone

Table3.3.6: Importance Coefficient (T)

	Buildings	Main Factor I
(a)	Monumental buildings	1.5
(b)	Important facility that have to keep function after the earthquake : The example facilities as follows : Hospital, School building, Storing food building, Health center in emergency, Power station, Reservoir building, Radio and TV facilities, Playground	1.5
(c)	Distribution facilities for gases and petroleum in down town	2.0
(d)	The building that keep the dangerous materials (such as acid, poisons, etc)	2.0
(e)	The other buildings	1.0

Table.3.3.7: Structural Type Coefficient (K)

Type of Structure	Material of Building	Structural Type Factor (K)
- Frame designed in ductiled area	- Reinforced concrete	1.0
	- Pre-stressed concrete	1.4
	- Steel	1.0
	- Wood	1.7
- Ditto, but with shear wall	- Reinforced concrete	1.0
- Cantilever structure with shear wall (B/H>2.0 and Bmin>1.5m)	- Reinforced concrete	1.2
	- Hollowed R.C. wall	2.5
	- Wood	2.0
		
- Cantilever structure with shear wall but exceeding above limitation. Or other structures	- Reinforced concrete	1.5
	- Hollowed R.C wall	3.0
	- Wood	2.5
- Frame with diagonal members	- Reinforced concrete	2.5
	- Steel	2.5
	- Wood	3.0
- One storied cantilever structure	- Reinforced concrete	2.5
	- Steel	2.5
	- Wood	3.0
- One storied cantilever structure	- Reinforced concrete	2.5
	- Steel	2.5
- Chimney, small tank	- Reinforced concrete	3.0
	- Steel	3.0

Source : "Pedoman Perencanaan Ketahanan Gempa untuk Rumah dan Gedung"

The design seismic coefficient is summarized in Table 3.3.8.

Table3.3.8 : Design Seismic Coefficient

Structure	C	I	K	Kh
Civil Structures	0.05	1.0	1.0	0.05

3.3.3 Building and On-land Facilities

3.3.3.1 Laws, Regulations, Codes, Standards and Guidelines

Building Law. Up to the end of 2002, the Government of Indonesia did not have a national building law. Instead, for public buildings, the Ministry of Public Works had government ordinances on Technical Guidelines for Technical Management of the State Buildings and Technical Requirements for Building Structure and maintained those safety levels against fire, earthquake, etc. On the other hand, about 70% of local governments had their own building regulations and maintained safety levels of general buildings.

After 2002, the *Building Law of Indonesia* has been in force and governs building use, its requirements, process, role of the community, role of the government, and application, and superseded all previous regulations and standards related to the building construction process. The *Building Law* is supported by relevant provisions of various regulations, codes, and standards that were used before the passage of the *Building Law*. In addition, relevant international regulations, codes, standards, and guidelines are often adopted.

Building Regulations, Codes, Standards, and Guidelines. The construction and management of buildings and supporting equipment have to conform to the following regulations, codes, standards, and guidelines:

- Building Law of Indonesia;
- Technical Guidelines for Technical Management of State Buildings;
- Technical Requirements for Building Structures;
- National Standards of Indonesia for Building Structures
- Seismic Resistance Design Standard for Buildings of Indonesia
- National Standards of Indonesia for Building Machinery
- National Standards of Indonesia for Sanitation
- National Discharge Regulations of Indonesia;
- Discharge Regulations of DKI;
- Quality Standards of Discharge Water of DKI;
- General Installation Regulations of Indonesia (Electric Installation Regulations);
- Indonesian Government Regulations of Prohibition of Producing Ozone Depleting Substance and Goods, and the Use of Ozone Substance and Goods
- Building Construction and Safety Code (NFPA 5000: National Fire Protection Association of USA);
- International Plumbing and Sanitation Code (IPC, IBC);
- International Standards of Electrical Wiring (IEE Wiring Regulations, BS 7671, NFPA Code); and
- International Electorotechnical Commission Standard (IEC/IEEE).

Japanese regulations, codes, standards and guidelines are normally treated among the international standards considered in building process, including in the application stage.

3.3.3.2 Design Conditions

Design conditions of the buildings and supporting equipment will be as follows, based on above mentioned regulations, standards etc. and the results of field surveys:

Items	Design conditions	Notes or Remarks
Air temperature	Maximum temperature : 33ºC apply to Air-conditioning & Refrigeration plan	Average per month of past 5 years : 32.4ºC
Humidity	Maximum humidity : 85% same as above	Average per month of past 5 years : 84.4%
Precipitation	Intensity of rainfall : 50mm/hour apply to pitch & drain of roof plan	Frequency of precipitation more than 50mm/day (of past 5 years) : average once per year
Sea water temperature	Maximum temperature : 30ºC apply to Water supply plan	Average temperature at the site survey: 29.1ºC
Allowable bearing capacity & Consolidation settlement amount of subgrade	3 tons/m^2 Total amount of Consolidation settlement : approx.3m	Base on the information of civil work. In the case of Subgrade that is applied soil improvement of Plastic vertical drain method : 1.2m Pitch of PVD, Pre-load : 6 month
Type and material of piles	Driven Pile ; Pre-stressed Concrete Pile (: Spun Pipe Pile), Cylindrical hollow pile, Closed end	Base on the information of civil work.
Length of piles, Allowable Axial load of Pile	25m Length ; Drive into sand stone bed or silty sand bed of N-value more than 50. Allowable Axial load of Pile : 125tons	Base on the information of civil work. In the case of 500mm diameter
Bearing capacity of piles	End bearing capacity : approx.30tons End bearing capacity : approx.38tons	Base on the information of civil work. In the case of 500mm diameter
Allowable unit stress of subsoil at the tip of piles	Allowable unit stress : 62tons	Base on the information of civil work.
Consolidation settlement amount at the tip of piles	2~5 tons/year	Base on the information of civil work. In the case of foundation piles of sea wall
Strength of concrete and specifications of cements	Pile : 50N/mm^2, Foundation :24N/mm^2, Upper structure : 24N/mm^2, Blind concrete : 15N/mm^2,	High Sulfate Portland cement for piles (ASTM C1157), Normal Portland Cement for the others (ASTM C150),
Specifications of rebar Covering depth of rebar	SD390 or SD345 (JIS G3112), by means of JASS 5	
Specifications of steel materials which is used for roof truss, Anti-corrosive measures for steel material	SMA400 : Hot-rolled atmospheric corrosion resisting steels for welded structure (JIS G3114), SM400A : Rolled steels for welded structure (JIS G3106)	No anti-corrosive measure is needed for SMA400. Hot dip galvanizing or the other heavy duty coatings (JIS Z0103) for SM400A.
Live load	1,800 N/m^2 : Pedestrian deck 2,900 N/m^2 : Market hall, Office, etc. 3,500 N/m^2 : Corridor, Stairs, Meeting rooms, etc. 3,900 N/m^2 : Cold storage, Storage, etc.	

Earthquake load	Standard shear coefficient : 0.2 and 1.0 Lateral seismic coefficient : 0.2	By means of Allowable stress calculation , Horizontal retention load-bearing capacity calculation and Time history dynamic response analysis (SNI 03-1726-2002)
Wind pressure	Reference wind speed : 35m/sec	Max wind speed of past 5 years : 21.6m/sec
Effluent water quality to the water basin	BOD Value : less than 20ppm	Based on the Ardinance of Governor DKI No.582 year 1995 regarding "Waste Water Quality Standards for Business and Domestic Events"

3.4 Natural Conditions

3.4.1 Meteorological Conditions

The study area is located in the northern part of Java Island facing Java Sea. The area is categorized as belonging to the tropical monsoon climate zone.

Air Temperature. Tables 3.4.1 and 3.4.2 show the mean daily minimum and maximum temperatures and humidity in Jakarta. Seasonal variations of temperature are small, and the mean daily temperature varies between 23-33ºC.

Table 3.4.1: Air Temperature in Jakarta (^{o}C)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean Daily Maximum	29	30	31	32	32	32	32	32	33	33	33	32
Mean Daily Minimum	23	23	24	24	24	24	23	23	23	24	24	24

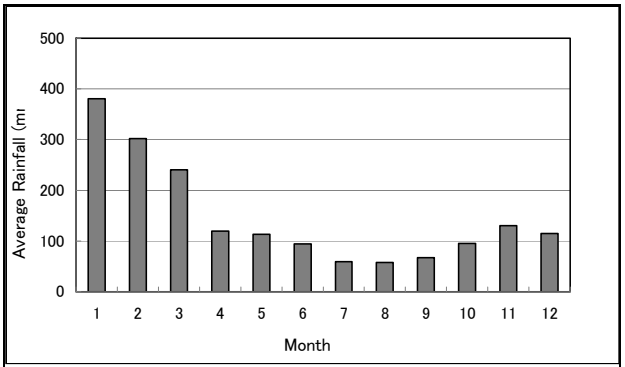
Source: Indonesian Pilot, Volume I, Second Edition, 1996. The Hydrographer of the Navy, UK.

Table 3.4.2: Humidity in Jakarta

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
At 0700 hrs	92	93	93	92	91	89	88	88	87	86	91	91
At 1300 hrs	73	72	69	66	66	63	58	57	57	60	64	68

Source: Indonesian Pilot, Volume I, Second Edition, 1996. The Hydrographer of the Navy, UK.

Precipitation. The annual total rainfall in the Jakarta area is 1,800 mm. The rainy season in the West Java region is from November to March, and the dry season is from June to September. Figure 3.4.1 shows the monthly precipitation in Jakarta. The monthly rainfall during the wet season is more than five times that in the dry season. The highest monthly rainfall (381 mm) is recorded in January.



(mm)

	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Average Rain Fall	381	302	240	119	113	94	59	58	67	95	130	115

Source: Indonesian Pilot, Volume I, Second Edition, 1996. The Hydrographer of the Navy, UK.

Figure 3.4.1: Average Precipitation (mm) in Jakarta

Wind. The Southeast (SE) monsoon is experienced from May to September, and the Northwest (NW) monsoon if from November to March. Wind observation records taken at 0700 and 1300 hrs are available at the observation stations; wind directions in Jakarta are shown in Table 3.4.3. At 0700 hrs, the wind is about 50% calm and blowing in the SE and S directions throughout the year. At 2200 hrs, N, NE, and NW direction winds are dominant throughout the year, and are rarely calm.

Table 3.4.3: Wind Distribution in Jakarta

%)

Jakarta at 0700 hrs													
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Mean**
N	6	5	4	2	2	3	4	3	3	4	4	5	4
NE	4	2	2	2	4	6	5	5	4	3	3	3	4
E	4	3	4	6	10	8	7	9	1	6	6	5	6
SE	5	7	6	9	12	10	13	15	12	13	9	7	10
S	8	10	6	8	7	7	10	12	18	14	13	10	10
SW	11	11	10	5	2	2	3	3	2	5	8	12	6
W	14	10	9	4	1	1	2	2	2	3	5	14	6
NW	6	5	3	1	1	1	1	1	2	2	1	3	2
CALM	42	47	56	63	61	62	55	50	47	50	51	41	52
SUM	100	100	100	100	100	100	100	100	100	100	100	100	100
Jakarta at 1300 hrs													
N	18	18	19	28	22	21	20	33	45	42	33	22	27
NE	3	4	12	29	39	34	32	27	17	17	15	6	20
E	2	2	3	10	18	23	19	13	8	6	7	3	9
SE	1	1	2	2	3	3	4	5	7	5	4	1	3
S	2	2	1	1	1	1	4	2	1	2	1	2	2
SW	7	5	6	5	3	3	6	3	3	4	6	7	5
W	24	28	26	10	5	4	5	4	3	6	13	25	13
NW	42	39	29	14	8	9	8	12	15	17	19	32	20
CALM	1	1	2	1	1	2	2	1	1	1	2	2	1
SUM	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: Indonesian Pilot, Volume I, Second Edition, 1996. The Hydrographer of the Navy, UK.

3.4.2 Oceanographic Conditions

Tides. The authorized benchmark in the JFP is in front of the UPT office (+3.370 m). Based on this benchmark, tidal conditions are as follows:

HWL: +1.70 m
MSL: +1.10 m
LWL: +0.50 m
DL: +0.00 m

Storm Surge. Strom surge is the rise in tidal level due to the passage of a low atmospheric pressure system such as typhoon, cyclone or monsoon. Generally speaking, if the atmospheric pressure at the sea surface is lowered 1 hPa for a sufficiently long time, the sea surface is higher by about 1 cm than normal level. According to the record of Bureau of Meteorology and Climatology in Jakarta, minimum atmospheric pressure is 1005.9 hPa on May 15, 2009 through the year, therefore, storm surge will be estimated 7 cm higher than normal sea level. There is also a rise of sea surface due to wave breaking and it depends on factors such as the slope of the sea bottom and steepness of the incident waves. The maximum sea surface rise by wave breaking may be 20 cm considering the rise is about 10% of the 2.0 m significant wave height at offshore.

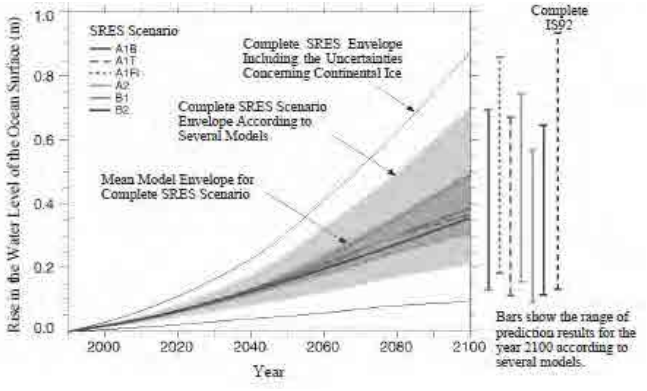


Figure 3.4.2: Prediction of Global Sea Level

Long-term Variation of sea water level due to global warming. According to the evaluation report of the Intergovernmental Panel on Climate Change (IPCC) Climate Change 2001, Scientific Basis, Cambridge University Press, the global sea water level is predicted to rise between 0.09 and 0.88 meters from 1990 to 2100 as shown in Figure 3.4.2. Based on the prediction, the most provable rise may be about 5 cm between 2010 and 2025 of the target year.

Wave Climate. Waves are generated locally by the wind in Java Sea, and wave heights are frequently less than 1 m. Tables 3.4.4 and 3.4.5 show the relationship between wave height and direction and wave between wave height and period based on the wave hindcast data (JICA, 2002-2003). The most dominant wave direction is West, and the frequency of its occurrence is 10.5%. The other wave directions are small, and their occurrence varies from 1.6-4.1%. The area is relatively calm since the occurrence percentage of calm waves is 68.5%, and the cumulative percentages of wave height are less than 0.5 m and 1.0 m, with occurrences of 86.6% and 96.9%, respectively.

Table 3.4.4: Occurrence of Wave Height and Direction (Deepwater Wave off Jakarta)

Dir $H_{1/3}$	W	WNW	NW	NNW	N	NNE	NE	ENE	E	Calm	total	Cumu-lative
0.00≦ H< 0.25	1,011	153	146	182	252	256	218	133	173	32,259	34,783	73.9%
0.25≦ H< 0.50	1,785	415	432	540	614	699	786	401	303		5,975	86.6%
0.50≦ H< 0.75	976	223	211	241	200	336	523	379	157		3,246	93.5%
0.75≦ H< 1.00	620	187	73	62	44	115	238	205	70		1,614	96.9%
1.00≦ H< 1.25	316	96	41	21	11	45	113	95	38		776	98.6%
1.25≦ H< 1.50	136	74	11	7	7	16	38	56	13		358	99.3%
1.50≦ H< 1.75	61	39	6	8	2	5	18	23	6		168	99.7%
1.75≦ H< 2.00	29	9	3	4	1	4	14	18	2		84	99.9%
2.0≦ H< 2.5	17	23	3				1	9	2		55	100.0%
2.5≦ H< 3.0		4						1			5	100.0%
3.0≦ H< 3.5											0	100.0%
3.5≦ H< 4.0											0	100.0%
4.0≦ H											0	100.0%
total	4,951	1,223	926	1,065	1,131	1,476	1,949	1,320	764	32,259	47,064	100%
	10.5%	2.6%	2.0%	2.3%	2.4%	3.1%	4.1%	2.8%	1.6%	68.5%	100%	100%

Source: JICA Study Team

Table 3.4.5: Occurrence of Wave Height and Period (Deepwater Wave off Jakarta)

$H_{1/3}$ (m) \ $T_{1/3}$ (sec)	1	2	3	4	5	6	7	8	9	Calm	Total	Rate		weighted average
												Individual	Comulative	
0.00 ≦H< 0.25	2,524									32,259	34,783	73.91%	73.91%	1.00
0.25 ≦H< 0.50	2,382	3,593									5,975	12.70%	86.60%	1.60
0.50 ≦H< 0.75		2,442	804								3,246	6.90%	93.50%	2.25
0.75 ≦H< 1.00		62	1,528	24							1,614	3.43%	96.93%	2.98
1.00 ≦H< 1.25			480	296							776	1.65%	98.58%	3.38
1.25 ≦H< 1.50			38	308	12						358	0.76%	99.34%	3.93
1.50 ≦H< 1.75				134	34						168	0.36%	99.69%	4.20
1.75 ≦H< 2.00				45	39						84	0.18%	99.87%	4.46
2.00 ≦H< 2.50				22	33						55	0.12%	99.99%	4.60
2.50 ≦H< 3.00				4	1						5	0.01%	100.00%	4.20
3.00 ≦H< 3.50											0	0.00%	100.00%	
3.50 ≦H< 4.00											0	0.00%	100.00%	
4.00 ≦H											0	0.00%	100.00%	
Total	4,906	6,097	2,850	833	119	0	0	0	0	32,259	47,064	100.00%	100.00%	
Rate	10.42%	12.95%	6.06%	1.77%	0.25%	0.00%	0.00%	0.00%	0.00%	68.54%	100.00%			
Coumlative Rate	10.42%	23.38%	29.43%	31.20%	31.46%	31.46%	31.46%	31.46%	31.46%	100.00%				

Source: JICA Study Team

3.4.3 Natural Condition Surveys

Topographic and Hydrographic Surveys. Topographic and hydrographic surveys were carried out in order to confirm the existing data and obtain the latest information around the proposed wholesale market and access road. The survey area is shown in Figure 3.4.3 below, and the survey results are given in Appendix 8.

Subsoil Investigations. Subsoil investigations were conducted to determine the actual onshore and offshore subsoil conditions in the area of the proposed wholesale market and access road. The borehole locations were identified to collect data on the subsurface condition around the assumed proposed area considering the existing borehole locations. Eight bore holes were conducted onshore and five bore holes were conducted offshore, as indicated in Figure 3.4.3. Soil profiles, drilling logs for 13 bore holes (BH-1 to 13) and the laboratory test results for BH-4 and 5 are given in Appendix 9.

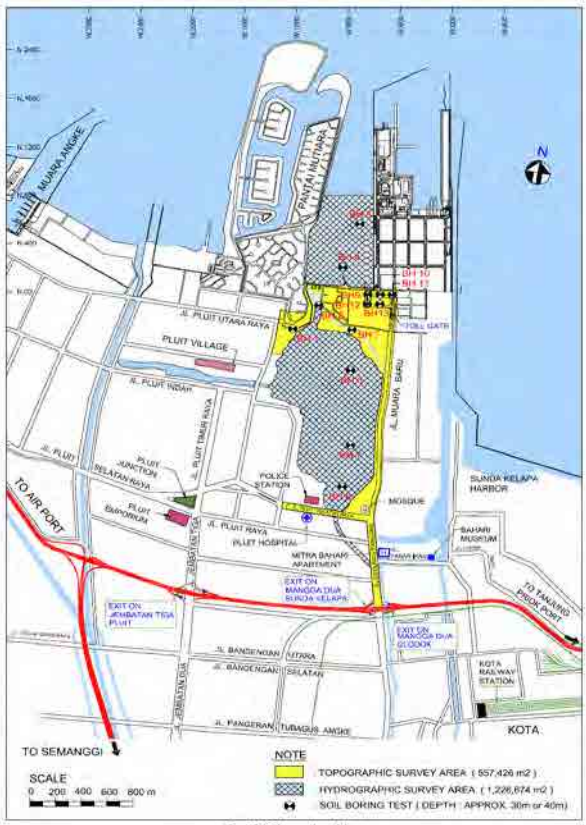


Fig. 3-2 Location Map

Figure 3.4.3: Location Map Showing Topographic and Hydrographic Survey Coverage

3.4.4 Examination of Water Quality

Water Quality. In order to decide the design criteria for the proposed fishing port facilities, three samples of waste water in the existing wholesale market hall were taken on April 6, 2011 at 7:00, 9:00 and 11:00 PM and tested in the laboratory as shown in Appendix 10. Several water quality tests were conducted by the portable test equipment at sea water, Puluit pond and inside the existing JFP for the facility design and environmental purposes on April 11 and 12, 2011 as shown in Appendix 10.

3.5 Basic Design and Comparison of Design Options

3.5.1 Site Plan

3.5.1.1 Alternatives of Site Plan

Project Site Selection. It is estimated that the wholesale market will require an area of 11 ha, including auxiliary facilities such as cold storages, kiosks, parking spaces, water supply facility, sewage treatment plant, amenities area, and future expansion, etc. As the existing wholesale market area is only 3 ha, the reclamation of the bay between Jakarta Fishing Port and Pantai Mutiara is recommended as an expansion area for the development of the new wholesale market and its facilities.

In view of the need to situate the new wholesale market facility to the existing cold storages, the reclamation is planned near the existing wholesale market and outside the existing seawall. **The configuration of the reclaimed land was designed based on the following considerations:**

- There is a flood control gate at the mouth of Waduk Pluit. The width, depth, and alignment of the waterway from the gate to the sea should be maintained to discharge rainwater.
- Based on the hydrographic survey conducted by the JICA Study Team, the elevation of almost all the areas close to the seawall is only about -2.0m to -3.0m, but there is a deep area with an elevation of -9.0m around the center of the bay. Therefore, reclamation should be planned in the shallow water area, both for cost and construction considerations.
- Two subsoil borings carried out by the Study Team revealed that from the soil from the

seabed to elevations of -2.0m to -11.0m is very soft clay (N=0), -11.0 m to -20m is medium clay (N=10), and below -20m is very dense and hard silty clay (N>50). Therefore, subsoil improvement up to an elevation of -11.0 m is necessary in case of reclamation.

- In order to reduce the length of revetment, the reclamation area should be connected to the existing seawall.

Based on the above, Alternatives A-1, A-2, B-1, and B-2 were considered for the site plan, as indicated in Figure 3.5.1. In Alternatives A-1 and A-2, all the wholesale market facilities will be located in the reclamation area, while in Alternatives B-1 and B-2, only some wholesale market facilities will be sited in the reclamation area and the remaining facilities will remain in the existing area.

Since the site survey conducted by the JICA Study Team revealed that there are more than 80 illegal houses, berthing facilities of fishing boats and barges, and a repair area for construction equipment along the existing seawall, Alternatives A-1 and B-1 were considering to avoid the relocation of these houses, berthing facilities, and repair area, which is a long and difficult process. However, as Alternative B-1 is not believed to be efficient and effective because of the separation of the areas, **Alternatives A-1, A-2, and B-2 are proposed for consideration for the site plan of the wholesale market area.**

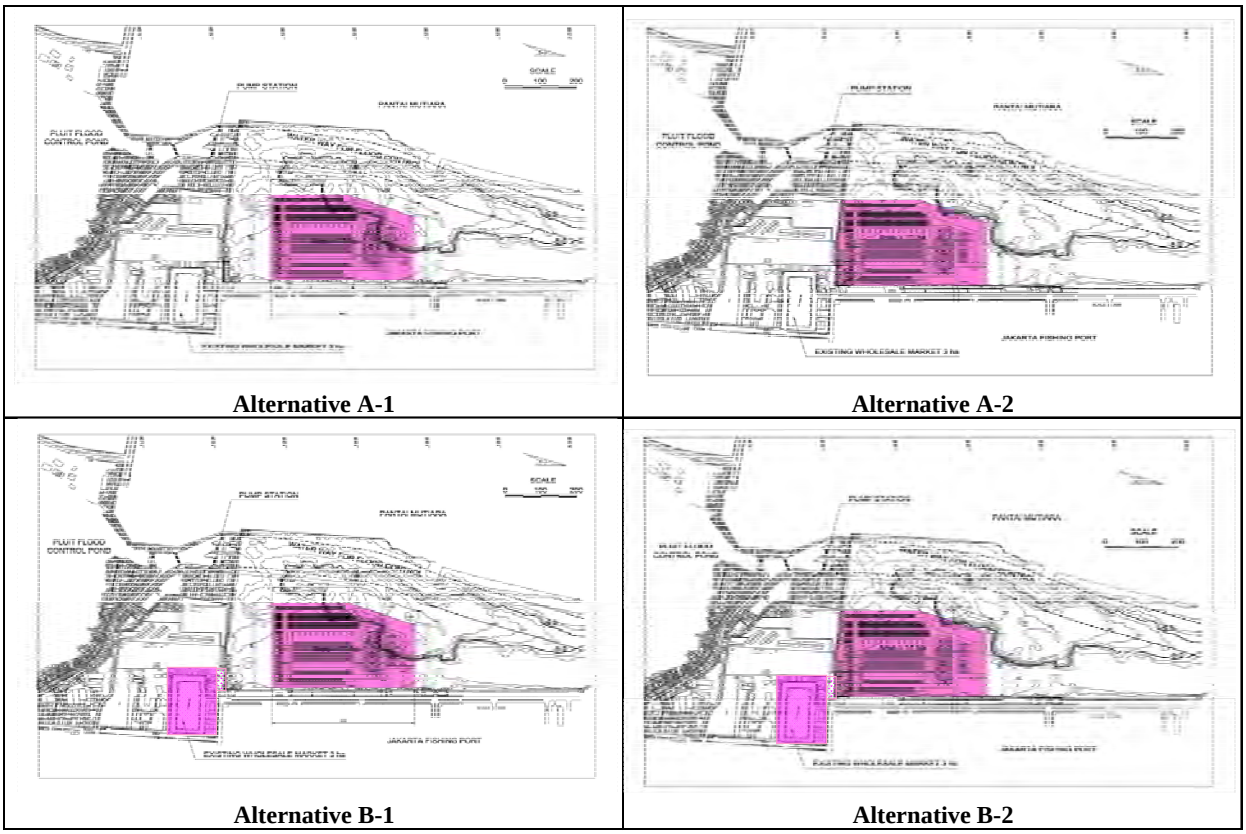


Figure 3.5.1 Alternatives of Site Plan

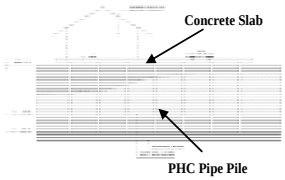
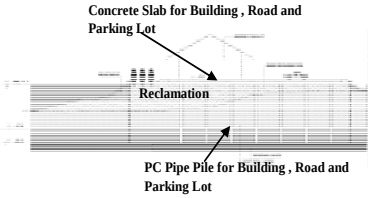
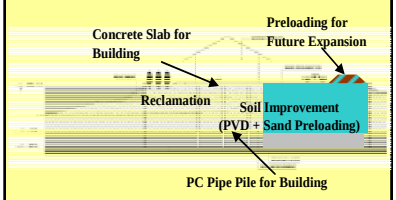
3.5.1.2 Comparison of Market Area Foundation Alternatives

Soil investigations conducted in the seaside area of the wholesale market showed a soft soil layer (less than 10 N-value) above -18m elevation and it is estimated 3m of consolidation settlement. Therefore, countermeasures during construction are necessary to prevent soil settlement in the market facilities area.

Table 3.5.1 shows three alternatives for the foundation of the wholesale market area, viz.: (i) alternative 1 (ALT 1): foundation of piling and concrete slab; (ii) alternative 2 (ALT 2): reclamation

and foundation of piling and concrete slab without future expansion area; and (iii) alternative 3 (ALT 3): reclamation, foundation of piling and concrete slab for building, and soil improvement without future expansion area.

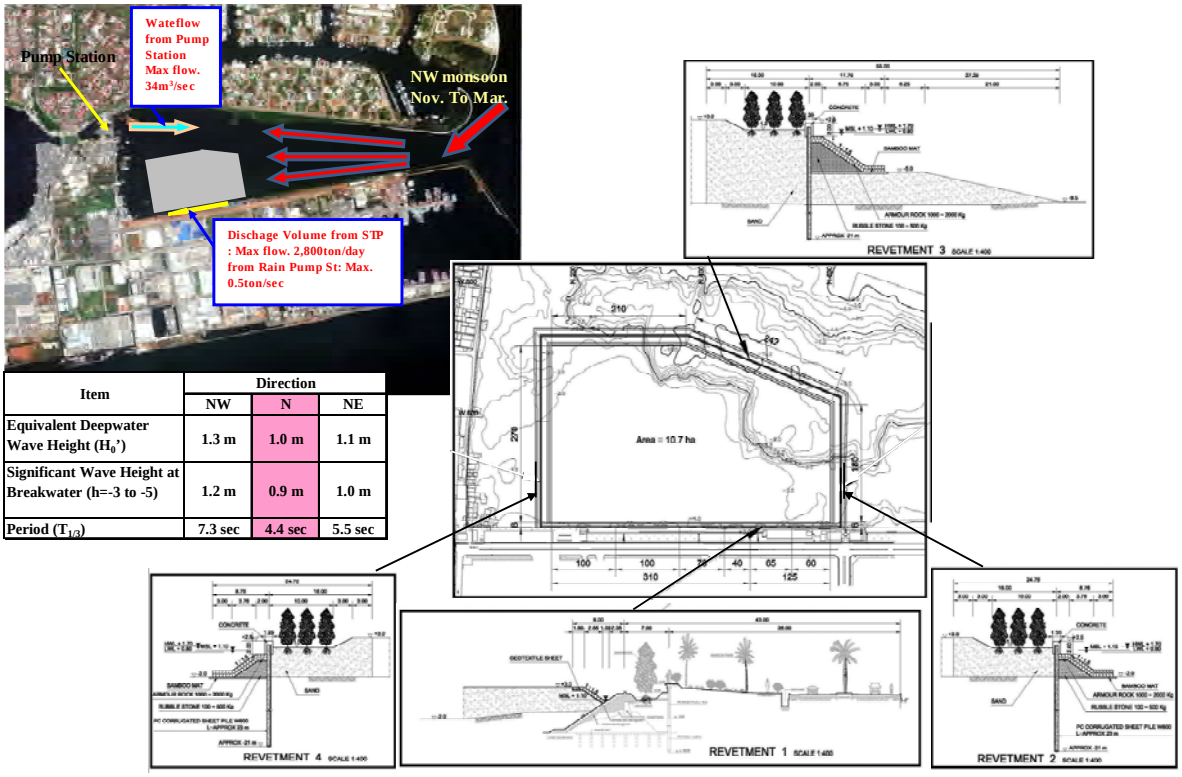
Table 3.5.1: Market Area Foundation Alternatives Comparison

Item	ALT-1	ALT-2	ALT-3
Method			
	Foundation of Piling and Concrete Slab	Reclamation, Foundation of Piling and Concrete Slab without Future Expansion Area	**Reclamation, Foundation of Piling and Concrete Slab for Building, Soil Improvement without Future Expansion Area**
Construction Term	3.0 years <No Good>	2.2 years <Rather Good>	**2.0 years** **<Good>**
Maintenance	Concrete surface for re-bar corrosion maintenance, especially splash zone after 10 years <No Good>	Future expansion area and empty land area have huge land settlement in 2025. <No Good>	**Future expansion area will be considerably improved by sand preloading in 2025.** **<Good>**
Construction Cost Ratio	100% <Expensive>	79% <Rather Expensive>	**74%** **<Cheapest>**
Evaluation	Not recommendable	Secondary recommendable	**Most recommendable**

All alternatives can avoid 3m of consolidation settlement, however, **ALT 3 is the recommended method because of the short construction period, minimum maintenance, and the lowest construction cost compared with the other two alternatives.**
The PVD and preloading of soil improvement method is considered for settlement of reclamation area without future expansion area. After soil improvement, preloading material can be stacked in the future expansion area for long-term preloading improvement. The elevation of reclamation is set at +3.0m (1.3m higher than HWL).

3.5.1.3 Revetment around the Reclamation Area

The mouth width of the sea wave entrance is only approximately 145m, while the sea width in front of the reclamation area 415m. Therefore, most waves are refracted and spread before reaching the reclamation area. It is only the north direction wave that will reach the reclamation area directly to reach (see Fig. 3.5.2). However, the waves generated by the northwest, north, and northeast monsoons always hit the JFP from November and March. Hence, the structure of the outer revetment will be of the armour rock (1-2 t) type above a rubble mound (100-500 kg) similar to the existing JFP breakwater. The crown height of the outer revetment is set at +2.5m from datum level, considering a design wave height of 0.9m and a design wave period of 4.4 sec in the north direction. An inner revetment is planned and will be an armour rock-type of structure above a geotextile sheet on reclamation sand. The drainage canal between the existing revetment and the planned inner revetment will be used for the discharge from the existing and newly repaired sewerage treatment plant and rainwater pump station.



Item	Direction		
	NW	N	NE
Equivalent Deepwater Wave Height (H_0')	1.3 m	1.0 m	1.1 m
Significant Wave Height at Breakwater (h=-3 to -5)	1.2 m	0.9 m	1.0 m
Period ($T_{1/3}$)	7.3 sec	4.4 sec	5.5 sec

Figure 3.5.2: Condition of Wind, Wave, Water Flow, and Revetment

A PC sheet pile structure will be adopted as the countermeasure for soil erosion and settlement that could result from the soft soil layer (less than 10 N-value) above -18m of elevation. Between the outer revetment and the reclamation area, mangroves will be planted as a wind- and wave breaker and as a means of ecosystem conservation.

3.5.1.4 Impact to Discharge Rainwater by Site Construction of Reclamation

Rainwater is discharged to pump out from Pluit Pond to sea through the flood control gate, with the discharging volume of approx. 11 m^3/sec in case of the ordinary rain and of approx. 34 m^3/sec in case of the extraordinary rain. The existing width between the east seawall along Pantai Mutiara and the west seawall/breakwater of JFP is around 130 m to 500 m. The cross section of the narrowest waterway is about 520 m^2 in the northernmost part of the seawall. The proposed site reclamation will be done by securing waterway of more than 200 m in width and 600 m^2 to 1,400 m^2 in cross section. In this situation, water level fluctuation based on the influence of reclamation was confirmed by the calculation of non-uniform flow. The water level was calculated by computer program of HEC-RAS, which was developed by US Army Corps of Engineers. As the results of computation, no level fluctuation was recorded, so that the proposed site reclamation will not affect to the water level in waterway (See the Appendix 11-16).

3.5.2 Access Road Plan

3.5.2.1 Initial Identification of Alternatives to Access Road Development

Following the selected design standards described in Section 3.3.1, **four alternatives to access road development were identified, namely:**

Alternative 1 : Improvement of existing road (1.7 km) by widening and signalization/ re-channelization of T junction;

Alternative 2 : Construction of new access road (1.0 km) with an east-west direction running through the pond and connecting JFP with Jl. Pluit Utara Raya, including bridge construction work in the new west entrance of JFP;

Alternative 3 : Construction of a new access road (2.8 km) with a north-south direction running through the pond and connecting JFP with Jl.Gedong Panjang, including reclamation and bridge work in the new west entrance of JFP; and

Alternative 4 : Construction of a new access road (2.8 km) with north-south direction running through the side of Sunda Kelapa Wharf and connecting JFP with Jl. Pasar Ikan.

Several meetings with concerned agencies, such as DKI and KKP, were held to discuss the four possible alternatives, and their opinions were reflected in the analysis of alternatives. Since resettlement is foreseen to be one of most important issues that need to be addressed to ensure smooth Project implementation, Alternatives 1 and 4 were eliminated from the four options due to the large numbers to be relocated in case either alternative was chosen. Alternative 3, which will connect the access road to the existing toll road, was also omitted because of the need to relocate large numbers of illegal settlers close to the Jl. Gedung Panjagan toll road. However, a combination of Alternatives 2 and 3 will be studied (Figure 3.5.3).

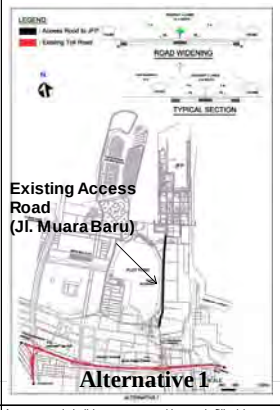
Selected Alternatives				
Applicable Structure	Access road shall be constructed by earth fill with overlay concrete pavement. At the end point of T-junction needs improvement with signalized control system.	Viaduct such as bridge or piled slab is needed. Fill section will may be constructed at pond area.	Viaduct such as bridge or piled slab is needed.	Viaduct such as bridge or piled slab is needed.
Construction Difficulty	If a ROW acquired completely, construction work it's self is no difficulty. However, detour plan or temporally road plan should deeply considered for main road and T-junction.	To overpass two existing road, temporary plan should be considered. Pilling works on pond has some difficulty. At the end point of T-junction, signalized system should be applied.	Pilling works on sea and pond has some difficulty. Also,	Pilling works on sea and pond has some difficulty. Also,
Construction Cost	Construction cost is lowest because of existing road improvement without bridge or viaduct.	Construction cost is second lowest.	Construction cost is highest.	Construction cost is second highest.
Maintenance	Regular maintenance works such as pavement cleaning, drainage maintenance and overlay are recommended.	As same as Alternative 1plus joint maintenance for bridge section.	As same as Alternative 1plus joint maintenance for bridge section.	As same as Alternative 1plus joint maintenance for bridge section.
Land Acquisition	Huge number of land acquisition and house relocation is needed.	Land acquisition area is smallest.	Connecting point with Jl. Pluit Raya area and Pluit Pond needs resettlement.	Huge number of land acquisition and house relocation is needed.
Benefit	Beautification of Jl. Muara Baru and surrounding area. To secure through traffic by upgrading of the road. To secure smooth traffic. Exclusion of illegal houses.	Limited number of resettlement work. Traffic diversion could make smooth traffic for Jl. Muara Baru. To secure bypass route while flooding season of Jl. Muara Baru.	Bypass route make smooth traffic for Jl. Muara Baru. To secure bypass while flooding effect.	Beautification of Sunda Kelapa Harbor area. Exclusion of illegal housing. To secure bypass route while flooding season of Jl. Muara Baru.
Comments	DKI has a plan for expansion of Jl. Muara Baru for long time. However, the program is not yet implemented. Through the discussion with KKP and DKI, construction implementation of this route is impossible. Thus, this route is omitted for alternative study.	Most shortest access route and cheapest route. A route is most preferable for JFP.	Considering to the access to toll road, huge number of resettlement is needed. However, the number of resettlement could be reduced by the alter of access road to shorten to Jl. Pluit Raya.	The land behind of Sunda Kelapa Harbor was secured for the access road for JFP but all area acquired by illegal resident and impossible to resettlement. Thus, this access route is omitted for alternative study.

Figure 3.5.3: Initial Alternative Study for New JFP Access Road

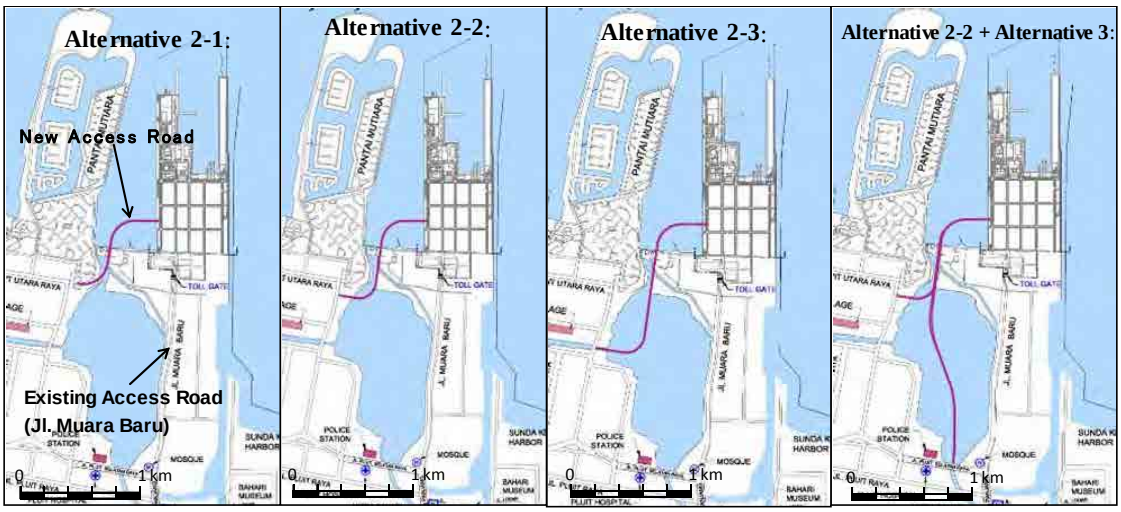


Figure 3.5.4: Selective Alternative Study for New JFP Access Road

Preliminary Selection of Alternative Access Roads. Alternative 2 was initially selected for study, and three possible options were developed (Fig. 3.5.4):

- **Alternative 2-1** is recommended by the DKI Spatial Planning Department because of its accord with the DKI road network master plan. This alternative will minimize the length of road for construction and will not create any disturbance to Pluit Pond. This alternative, however, was finally rejected by DKI due to the difficulty to get consensus from the owners of the rich neighboring (Pantai Mutiara).
- **Alternative 2-2** is the most recommended option by the JICA Study Team because it will involve the acquisition of only a small piece of land and will not require any resettlement work – which will be advantageous to the Project. Also, it will cause only a minor disturbance to Pluit Pond, which is actually considered good for its maintenance.
- **Alternative 2-3** is also recommended by the Study Team as second option, because of the small land acquisition and absence of resettlement. However, it could cause a major disturbance to Pluit Pond.
- **Alternative 2-2 + 3** is recommended by KKP for the further development of JFP. This alternative can maintain a bypass route for the existing Jl. Muara Baru. Transport cargo to/from JFP can pass through the new access road, thereby minimizing congestion with public transport on the existing Jl. Muara Baru. Also, these two access roads can accommodate two-directional traffic, such as eastbound and westbound, on separate lanes. The two routes will contribute to the smooth flow of cargo traffic and save time for commercial activities.

3.5.2.2 Selection of Alternatives

The merits and demerits of the four Alternative 2 options are summarized in Table 3.5.2.

Table 3.5.2: Detailed Analysis of Alternatives for JFP Access Road Development

Item	Alternatives			
	2-1	2-2	2-3	2-2 + 3
Route length	1,020 m	1,230 m	1,730 m	2,700 m
Type of structure				
Super Structure	Piled slab, PC girder bridge, steel box girder bridge	Piled slab, PC girder bridge, steel box girder bridge	Piled slab, PC girder bridge, steel box girder bridge	Piled slab, PC girder bridge, steel box girder bridge

Item	Alternatives			
Sub-structure	Concrete pier and abutment	Concrete pier and abutment	Concrete pier and abutment	Concrete pier and abutment
Foundation	Combination of steel and concrete pile	Combination of steel and concrete pile	Combination of steel and concrete pile	Combination of steel and concrete pile
Land acquisition	Approx, 7,000 m2	Approx, 5,100 m2	Approx, 1,000 m2	Approx, 6,000 m2
Number to be Resettled	Approx. 30 houses	Nil	Nil	Nil
Disturbance to public area	Canal and pump station will be disturbed; gate to Pantai Mutiara will be demolished; public road beside canal will be disturbed.	Canal and pump station will be disturbed.	Canal and pump station will be disturbed.	Canal and pump station will be disturbed.
Disturbance to Pluit pond	Least impact on the pond.	Second smallest impact to the pond.	West part of pond will be affected.	Access road will divide the pond into west and east sides. This will take effect after the dredging work.
Duration of construction	18 months	24 months	26 months	36 months
Construction cost ratio	1.0	1.2	1.8	5.0
Recommendation	Land acquisition and resettlement of houses are indispensable. This is the most cost-effective alternative.	Most highly recommended alternative.	Area of land acquisition is the smallest.	Two accesses to JFP are ensured. The cost is too high to expect cost-effective benefits.

Notes:
1. Land to be acquired might have been pre-registered with the DKI Board of Governors, but has not been officially registered with the National Land Office. Land acquisition is indispensable in all the alternatives under consideration.
2. Alternative 2-1 is linked to the coastal road shown in the *DKI City Development Plan, 2010* that was prepared in 1999.

Longitudinal cross section of JICA team's proposed access road (alternative 2-2) is shown in the following Figure 3.5.5.

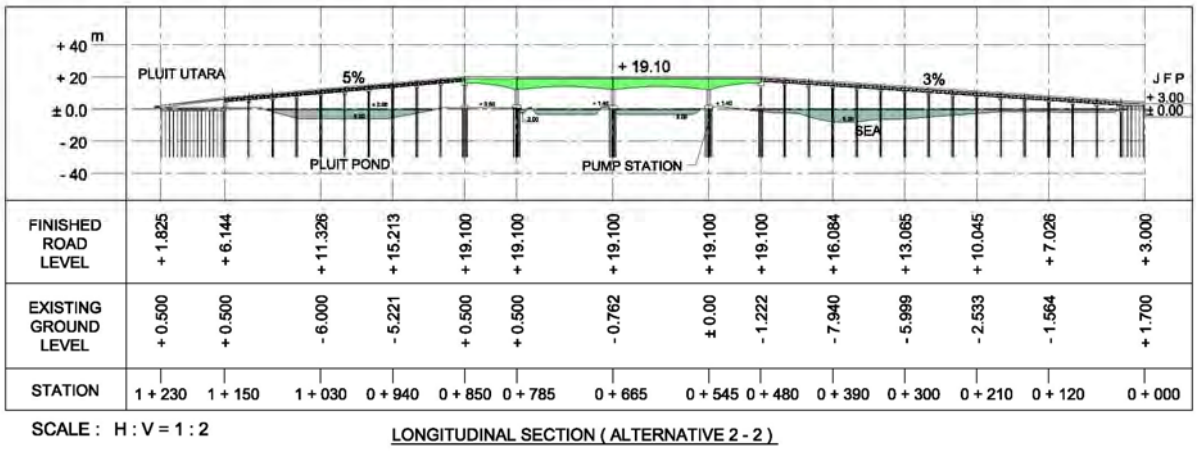


Figure 3.5.5: Longitudinal Cross Section of Alternative 2-2 (Image)

3.5.3 Architectural Plan

3.5.3.1 Design Concept

The basic architectural design concept is summarized in Table 3.5.3.

Table 3.5.3: Basic Concept of Architectural Design

Basic Concept	Necessary Measures
Functional	• Application of functional materials and equipment • Security of required area and good mutual relationships among the parts • Gradual improvement, not drastic or extreme change
Flexible	• Receptive to appropriate changes, improvements, reforms • With possibility for future extension
Durable	• Stable structure • Countermeasures for weathering, corrosion, and deterioration • Countermeasures for vibration and shaking by vehicles, wind, and earthquake
Environment-friendly	• Clean discharge and emission of garbage, wastewater, exhaust, and odor • Power-saving materials, equipment, and operations
Reasonable	• Construction and installation cost • Operation and maintenance cost

3.5.3.2 Architectural Plan of the Wholesale Market Building

The wholesale market building will consist of three main areas: (i) fish handling and trading hall; (ii) market hall; and (iii) packing area. In addition to these three main areas, an ice supply station and packing area, management offices, wholesalers' offices and rest rooms, as well as public toilets have to be accommodated in the building.

As auction is foreseen to take place in the trading hall in the future, all fish will have to pass through the auction area in a one-way flow. As an MMAF decree stipulates that the auction hall should be enclosed by walls, **the fish handling and trading hall is designed for possible partitioning or enclosure in the future.**

The wholesaler's booth will be expanded to almost double the size of the existing one. The existing booths are too narrow for each wholesaler, so approximately 80% of wholesalers use more than two booths each. The width of the horizontal passage will be expanded to 2.5m from the existing 1m to prevent congestion and help contribute to the improved sales efficiency of wholesalers. The proposed layout and dimensions of the wholesaler's booth is shown in Figure 3.5.6.

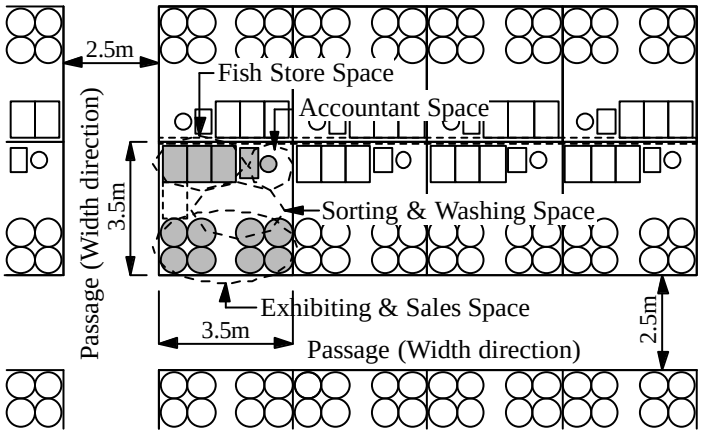


Figure 3.5.6: Wholesaler's Booth Unit

The packing area for buyers, which is currently the most congested and complicated part of the existing market, will be expanded to accommodate various handling activities, such as collecting fish from the market, sorting, supplying ice and water, and packing.

At present, fish loading and unloading are carried out directly from vehicles, which park at the edge of the handling space of the market. The required length of the truck berth for unloading is estimated at

approximately 170m, corresponding to 40 trucks unloading at the same time. Each truck completes unloading within 40 minutes. On the other hand, the fish buyers' trucks stay in the offloading berths for more than three hours. If the number of rotations in each truck berth would be ~1.2-1.5, the required berth length for offloading of trucks is estimated at about 700m. Thus, the fish buyer's offloading system has to be considered carefully.

Assuming that other sides of the building cannot be used for offloading, alternative plans were evaluated based mainly on offloading methods (Table 3.5.4), and the rectangular plan with no offloading system was selected (see Appendix 11 for alternative layout plans).

Table 3.5.4: Alternative Plans for the Wholesale Market Building

No.	Investigations Character	Truck Berth for Unloading Trucks	Truck Berth for Offloading Trucks	Required Building Area including Parking Lot	Evaluation
1	Rectangular plan With truck berths for offloading	170m 40 trucks/rotation 3.2 rotations approx. 2.5 hours	170m 40 trucks/rotation 5.8 rotations approx.18 hours	Approx. 52,000m^2 Including parking lot for 198 trucks	Imbalance of offloading work in truck berths and parking lot
2	Rectangular plan No truck berth for offloading	170m 40 trucks/rotation 3.2 rotations approx. 2.5 hours	Nothing	Approx. 51,000m^2 Including parking lot for 238 trucks	**Selected**
3	Separate building With truck berth for offloading	340m 80 trucks/rotation 1.6 rotations approx. 1.2 hours	340m 80 trucks/rotation 2.9 rotations approx.9 hours	Approx.66,500m^2 Including parking lot for 175 trucks	Too large an area requiring tighter management
4	Circular or curved With truck berth for offloading	170m 40trucks/rotation 3.2 rotations approx. 2.5 hours	298m 70 trucks/rotation 3.3 rotations more than 9 hours	Approx.67,000m^2 Including parking lot for 175 trucks	Same as above; moreover, future extension is difficult

3.5.3.3 Other Auxiliary Facilities

Cold Storage Facilities. New cold storages to accommodate approximately 1,200 t of fish will be installed in the Fish Supply Buffer Center. Twelve blocks of buildings, each about 80m^2 in area, will be provided, and cold storages of 100-t capacity each will be installed in each block. In case all existing cold storages will have to shift to the new complex site, additional 17 blocks, each 100 t, of cold storages will be provided, of which 11 blocks will be inside the complex site, and the others in the area across the new access road.

Management offices and auxiliary spaces, such as rest rooms and storages, will be placed on the roof floor of each block, with an exterior walkway connected directly to the wholesale market building through the pedestrian deck. The structure will be a ramen frame system of reinforced concrete with pile foundation.

Fish Processing and Storage Units. Twenty-five blocks of building, each approximately 45 m^2, will be provided for use in fish processing, and eight blocks of the same size will be provided as fish storage units. Each management office and auxiliary space will be on the second floor of each block. As in the cold storage blocks, the second floor spaces will be connected to the wholesale market building through the pedestrian deck. The structure will be the as same as that of the cold storage block.

Kiosks, Canteens, and Food Stands. The kiosks, canteens, and food stands in the existing wholesale market site will be shifted to the new complex, except if the existing market site will be used for the new complex. To accommodate these facilities, a one- or two-storey, mixed use building will be provided. The broad corridors will be arranged at the center of each floor, and 15 sets of 60 food

stands will be provided along these corridors. A total of 42-48 blocks of kiosks or canteens will also be provided along these corridors. There will be three entrances and stairs on the ground floor and one connecting pedestrian bridge to the market building on the second floor. The structure of the system will be ramen frame of reinforced concrete with pile foundation.

The comparison between the existing and project wholesale markets are as shown in Table 3.5.5.

Table 3.5.5: Comparison of Spaces between the Existing and Project Wholesale Markets

Item	Existing Wholesale Market	Projected Wholesale Market (In the case of Alternative Layout Plan A-1)	Increase Ratio
Volume of Fish handled	71,043 tons annually 195 tons daily	115.490 tons annually 316 tons daily	162 %
Unloading Truck Berth	All activities is done in the peripheral area of the Market hall & Surrounding truck Berth Approx. 7,000 m^2 (including off-loading truck berth)	2,040 m^2	182 %
Fish Handling Area		1,785 m^2	
Fish Trading Area (Trading Hall)		2.040 m^2	
Transit Area		1,275 m^2	
Packing Area		5,610 m^2	
Market Hall	7,000 m^2	10,710 m^2	153 %
Stalls for wholesaler	2.5 x 2 m	3.5 x 3.5 m	245%
Passage	2.5 m, 1 m	2.5m, 2.5m to allow 2 ways transit of carriers	100 % 250 %
Hands Washing Basin	None	8 places	---
Boots Washing Basin	None	12 places	---
Solid Waste Depots	None	10 places x 2	---
Ice Supply Depots	8 places	2 + 10 places	150 %
Seawater Reservoirs & supply Piping	Reservoir 4 places (Charged)	Supply Piping for Every Stalls, (Free of Charge)	---
Water Supply for the Market (to maintain hygienic and sanitary conditions)	140 m^3 daily Raw Well Water (Non-sterilized, Brackish)	900 m^3 Seawater (Filtered & Sterilized)	643%
Water Supply for the Auxiliary Facilities (including Kiosks and Canteens)	Max. 70 m^3 daily (Filtered & Sterilized)	600 m^3 (Filtered, Sterilized & inspected)	857 %
Treated Wastewater (Discharge water Volume)	210 m^3 (Not functioned)	1,900 m^3 (Including transferred water from fish production area)	905 %
Public Toilets	5 places in the Site	4 places in the market building & 5 places in the Site	180 %
Cold Storages	1,700 tons / 10 units	2,900 tons / 29 units	171 %
Fish Processing Units	2 units + 10 places (in the market building) 710 m^2	25 units 1,181 m^2	166 %
Fish Shops &Restaurants	None	12 Shops & 2 Restaurants	---
Kiosks	21	48	229 %
Canteens	14	48	343 %
Food Stands	30 (in and around the market building)	60	200 %
Inner Roads	4,574 m^2 (excluding surrounding truck berth of the market building)	17,686 m^2 (excluding access road area)	387 %

Parking Lot	None	9,802 m^2 (including 1,000 m^2 for passage for transport of fish)	---
Total Site Area	3.0 ha	10.7 ha (including reserve area)	357 %

(Remarks) A part of inner road outside the market is also used for parking of vehicles during the peak time of wholesale market. The current inner road area is estimated 10,300 m2 including the parking area outside market.

3.5.4 Structural Plan

3.5.4.1 Design Concept

Consideration to differential settlement. Based on the results of soil investigations and the comparison of foundation plans for market area, the piling method on the first intermediate bearing layer is selected as building foundation. Although the building weight is loaded to the first intermediate bearing layer, it is anticipated that the consolidation settlement in the deep clay soil layer existing under the first bearing layer will be brought in the future, even without groundwater draft. Therefore, the building structure should be one that weight is equally loaded to the first intermediate bearing layer, so as not to cause the differential settlement (so as to be equally loaded to the bearing layer through piles).

Flexible structure to meet the change of marketing system. To meet flexibly the change of fish wholesale marketing system in the future, the structures which make possible to reduce number and size of pillars are selected, taking into account the rational cost, appropriateness of construction methods and periods, etc.

Possibility of the multiplex use of space. Fish Trading and Marketing Center (PPPI) has the largest floor area among the project facilities, and it is necessary to locate other functional facilities on upper or lower story so as to make it as the multi-layer building. Canteen/kiosks and Seafood Plaza are functionally possible to locate on the upper story of PPPI. However, the total floor area of these facilities are smaller than that of he PPPI, the building would be partly single- and two-stories so as to be affected physically and functionally by differential settlement.

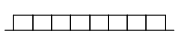
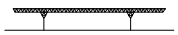
Other possibility for multiplex use of PPPI building is to locate parking lot on upper or lower story. In this case, however, the ramen frame structure may have to be selected due to heavy weight of building, resulting in the high cost of structure with increase of numbers of piles to the intermediate bearing layer. In addition, since the weight of building per unit area is very heavy comparing with other facilities, the tendency of settlement of the intermediate bearing layer itself may not be same depending on parts (the relative settlement volume will be largely differed by places).

In these contexts, **the multiplex use of space is not technically feasible in this Project.**

3.5.4.2 Structural System of the Wholesale Market Building

Some structural systems were examined and evaluated according to the design concept in Table 3.5.6.

Table 3.5.6: Alternative Structural Systems for the PPPI Building

Structural System / Evaluation	Alt A	Alt B	Alt C	Alt D	Alt E
	Ramen frame of reinforced concrete	Flat, dual directional, three-dimensional truss frame made of steel	Mountain-shaped, single directional truss frame made of steel	Mountain-shaped, single directional truss frame made of steel with tensile force	Mountain-shaped, single directional truss frame of steel composite with tensile force
Shape					

Structural System **Evaluation**	**Alt A**	**Alt B**	**Alt C**	**Alt D**	**Alt E**
	Ramen frame of reinforced concrete	Flat, dual directional, three-dimensional truss frame made of steel	Mountain-shaped, single directional truss frame made of steel	Mountain-shaped, single directional truss frame made of steel with tensile force	Mountain-shaped, single directional truss frame of steel composite with tensile force
Possible length of span	Normally up to 15m	Normally more than 50m	Normally Up to 40~50m	Normally Up to 50~60m	Normally Up to 50~60m
No. of columns	10 x 9	3 x 2	10 x 3	10 x 3	10 x 5
Dimensions of columns	***** Not so slim	* Too big	** Smaller than B	*** Smaller than C	**** Smaller than D
Functional use	* Obstructive	* (Column) Obstructive	**** Better selection	**** Better selection	**** Better selection
Flexibility†	* No flexibility	**** The best	*** Better selection	*** Better selection	*** Better selection
Rainwater††	** Manageable	* Difficult	*** Better selection	*** Better selection	*** Better selection
Construction Method†††	**** Easy	* by lift-up method	*** Not so easy	** More difficult than C	** Same as D
Schedule††††	*** Normal	**** Rater short	**** Rater short	**** Rater short	**** Rater short
Cost	**** The best	* Expensive	** Rather expensive	** Rather expensive	** Rather expensive
Overall Evaluation	Cannot select based on functionality of use and flexibility	Same as A; Moreover for Rainwater	Considerable	Considerable	Better selection at this study stage

† Flexibility for future changes, improvements and reforms
†† Ease of countermeasures against the volume & intensity of rainfall
††† Ease of construction
†††† Length of construction period

Based on the above table, **the composite structural system (Alternative E) is selected at this stage,** but all the details should be re-examined during the implementation stage.

3.5.5 Equipment Plan

The criteria for the selection of equipment are (i) ease of maintenance; (ii) low O&M cost; and presence of a representative/agent in Indonesia. This section describes the criteria for the design of the desalination plant, filtered and sterilized seawater plant, wastewater treatment plant, cold storage facilities, and electric power supply system (Table 3.5.7). All these plants/systems are planned to operate as independent units within the JFP.

Table 3.5.7: Required Equipment Capacity

Item	Capacity	Remarks
Desalination plant	600 t/day (300 t/day x 2 sets)	Reverse osmosis
Sterilized seawater plant	1,000 t/day (500 t/day x 2 sets)	Electrolyzed treatment
Wastewater treatment plant	1,900 t/day (including fish box seawater)	300 t/fish box
Cold storage equipment	100 t type cold storage x 29 sets	Maintenance temp. = -20^{o}C
Electric supply plant	Max. 3,500 KVA(20 KV/6.6 KV or 20 KV/6.6 KV)	Transformer by PLN

Desalination Plant. Freshwater has not been supplied to the existing market since a long time ago. Although it was originally equipped to supply freshwater to the market, PERUM closed the line for unknown reasons. Currently, PERUM has two desalination lines operated by private companies and one public water service line from PDAM. The required capacity of the desalination plant is shown in Table 3.5.8 below, and a comparison of two systems is given in Table 3.5.9.

Table 3.5.8: Required Desalination Plant Capacity

	Number (approx.)	Required water (t)/person	Total (t)	Remarks
Full-time workers	5,000	100	500	
Temporary workers	5,000	50	25	
Officers	100	100	10	
Public use	1		65	Toilet, etc.
Total			600	

Table 3.5.9: Comparison of Vacuum Vapor Compression and Reverse Osmosis

Item	Vacuum Vapor Compression (VVC)	Reverse Osmosis (RO)
Operating system	Vaporization by vacuum and compression	Filtration through RO film
Quality of water	Excellent	Good
Operation	Easy	Special technique required
Maintenance	Easy	Difficult
Electric consumption	More than RO	Less than VVC

The VVC desalination system is much better than that using reverse osmosis, but its price is double that of the RO system. Since the RO system has been used in JFP with good maintenance in recent years, it is recommended for the projected desalination system.

Filtered and Sterilized Seawater Supply System. Brackish water has been supplied to the market by two lines, one by PERUM and the other by UPT. The PERUM line leads to the reservoirs of the cooperative in the market for sale to retailers and other customers. The UPT line supplies water for cleaning the floor and related equipment during and after market hours. Water from the two lines is not filtered and sterilized and is supplied directly from deep wells.

The total water requirement of the Project has been estimated at 900 t, as shown in Table 3.5.10. Of several systems available for water sterilization, the ozone irradiation system and the chemical addition system were considered for the Project.

Table 3.5.10: Required Volume of Sterilized Seawater

Item	Number	Required seawater	Total (t)	Remarks
Barrel to store fish	2,000 barrel	50 li/ barrel	100	
Floor to be cleaned	25,000 m^2	30 li/1min/m^2	750	
Other public uses	1		50	Toilets, etc.
Total			900	

There is not much difference between three systems for producing sterilized seawater as shown in Table 3.5.11. However, electrolyzed system has more advantage than the others on all comparison items. Furthermore, necessary space for installation is the smallest since this sterilized unit will be installed along sea water pipe line as the part. Therefore, this system is recommended as the most appropriate sterilized seawater production system in the Project.

Table 3.5.11: Comparison of Sterilized Seawater Production System

Item	Electrolyzed system	Ultra-violet irradiation system	Ultra-violet + Ozone generated system
Area for installation	Very small	Small	Small
Quality of sea water	Good	Good	Excellent
Operation / maintenance	Easy	Not-so difficult	Not-so difficult
Electric consumption	Less than UV	Middle	More than UV only

Wastewater Treatment Plant. The effluent water quality is governed by regulations of the Ministry of Environment (MOE) and the regulations of DKI (Table 3.5.12), depending on where the treated water is to be discharged. If the treated water will drain into the sea, MOE standards will apply; if the treated water will flow into the river, DKI standards will apply. Although the treated water will be discharged to the sea, the latter regulations will apply for this project since the water basin where the treated water is discharged is one of the inland waters with narrow mouth to the sea.

Table 3.5.12: Required Biological Oxygen Demand (BOD) Values of Effluent Water Applied to the Fisheries Industry

Office	Category I	Category II	Required BOD
MOE	Fisheries (May 2007)	Canning plant	75
		Fish meal plant	100
		Processing plant	100
DKI	Office (Regulation No.122/2005)		75
	Industrial (Regulation No. 582/1995)		20

The existing plant has a standard activated sludge system and a treatment capacity of 1,000 t/day. Water quality of the effluent after treatment by the system has been certified by a public laboratory in Jakarta.

To determine the BOD to be considered for the new plant, drain water from the market was sampled three times a day at 1700, 2100, and 2300 hrs, and the resulting analysis gave the following results: 1,588.6 mg/l, 1,594.0 mg/l, and 1067.0 mg/l, respectively. The highest BOD value of 1,594 mg/l was adopted as basis for planning the treatment system of the new plant.

In order to satisfy the water effluent regulations of DKI, three treatment systems were examined. (Table 3.5.13). As a result, highly efficient aeration system was selected for the project at this study stage, but all the details should be re-examined during the implementation stage.

Table 3.5.13: Comparison of Wastewater Treatment Systems

	Standard Activated Sludge	Rotating Biological	Highly Efficient Aeration*
Area for installation	Middle	Middle	Small
Wastewater concentration	100 -1,000 ppm	100 - 2,000 ppm	100 - 500 ppm
Response to load variation	Unstable	Stable	Stable
Oxygen supply method	Air blowing	Rotation of plate	Air blowing
Operational performance	Difficult	Easy	Easy
Sludge condition	Large	Small	Small
Sludge disposal cost	High	Low	Low
Operation cost	High	Low	Low

* Highly efficient aeration system is combined system of both activated sludge system and rotating biological system.

Cold Storage Facilities. The technical specifications of the existing cold storages in JFP are shown in Table 3.5.14 below.

Table 3.5.14: Characteristics of Existing Cold Storages

	Storage Capacity	Inner Height	Handling Method	Temperature	Refrigerant
PERUM	600-800 t	6m	Pallet and forklift	-15 to -20^{o}C	Ammonia
Private	200-400 t	4-6m/2-stage	Manpower	-20^{o}C	Freon (R-22)

Currently, CFC (Freon) or HCFC refrigerant (such as R-22) has been used in private cold storages and the other refrigeration facilities in Indonesia. Since new type of refrigerant such as HFC is not yet used widely in Indonesia, it is recommended that HFC refrigerant will be used for the Project's refrigeration

facilities, considering ozone depletion and global warming issues. And R-404A is one of the most useful HFC refrigerants.

Electric Power Supply System. Since the voltage normally used in Jakarta is 380/220v, the Project facilities will be supplied with electric power of the same voltage. The power requirement of the Project is summarized in Table 3.5.15.

Table 3.5.15: Power Requirement of the Project Facilities

Area/Facilities	Single Phase, kw (approx)	Three Phases, kw (approx.)
Fish trading and marketing center (PPPI)	500	0
Fish supply buffer center (Cold storage and fish processing units)	400	610
Canteen/kiosks	150	0
Seafood Plaza (Fish shops/restaurants)	80	50
Utility area		
• Clean water supply station	15	400
• Sewage treatment facilities	15	80
• Power station	15	20
Grand total	**1,175**	**1,160**

There will be a total of seven distribution panels, one each for the fish trading and marketing center (PPPI), fish supply buffer center, canteen/kiosks, Seafood Plaza, and utility areas (clean water supply station, sewage treatment facilities, and electric power and related stations). The capacity of the transformer is estimated at 3,500 KVA maximum for the time being.

Other Equipment. Other equipment for control and promotion of fish marketing activities at the PPPI will be also procured and installed under the Project as listed in Table 3.5.16.

Table 3.5.16: List of Other Equipment

Name of Equipment	Specifications	Q'ty	Purpose of use
Insulated fish box	Capacity 200L, FRP	2,000	For sales to fish brokers/wholesalers/retailers
Boots, Caps, Badges		3,700	Ditto (For sanitary control and identification of stakeholders)
Hand cart	2-wheel	320	For transport of fish/ice/water at PPPI (for sales to the porters)
Weighing scale	Platform type	40	For weighing of fish at Fish Handling/Trading Area of PPPI
Public announcement system		1	For control of activities in PPPI
CCV camera security system		1	For control of activities in PPPI
Laboratory equipment	Lab. Table/chairs, thermometer, pH meter, incubator, etc.	1	For fish organoleptic inspection
Office equipment	PC, printer/copy/fax/scan machine and furniture	1	For accounting, O&M, and promotion to consumers.

3.6 Environmental and Social Considerations

The potential environmental impacts of the three alternative plans being considered for the development of the new wholesale fish market and access road are summarized in Tables 3.6.1 and 3.6.2, respectively. For the wholesale market, Alternatives A-2 and B-2 will cause significant social impacts due to the need for the involuntary relocation of 80 houses built on stilts over the water. Alternative 2-1 for the access road will cause the same problem, but will involve fewer (30) houses. In the case that the Government of Japan undertakes the assistance of the project implementation, "JICA Guidelines for Environmental and Social Considerations (April 2010)" will be applied.

Table 3.6.1: Comparison of Potential Environmental Impacts of Alternatives for New Wholesale Market Development Involving Land Reclamation

Items	Alternatives			Mitigation Measures
	A-1	A-2	B-2	
Social Environment				
Involuntary resettlement	**D**	**A-:** About 80 houses need to be relocated.		**Preparation phase:** To obtain agreement of the inhabitants and give proper compensation.
Poor indigenous and ethnic people	**D**	**A-:** The inhabitants to be relocated are poor people.		
Local economy	**B+:** New market will bring positive impacts to the local economy thorough improvement of fish distribution.			-
Water area use	**B-^{S}:** Fishing boats (*bagan*) anchored in the Project area need to be moved.	**B-^{L}:** Boats anchored in the existing seawall as well as fishing boats (*bagan*) around the project area need to be relocated.		**Preparation phase**: To obtain consensus with users of the water area.
Local conflict	**B-:** Conflict between construction workers is likely to be occurred on employment.			**Construction phase:** To develop communication between workers and contractors.
Sanitation	**B-:** During the construction phase, sanitary condition may deteriorate due to inflow of construction laborers. **P:** After the construction, the sanitary condition will be improved by the operation of the new facilities.			**Construction phase:** To provide enough portable toilets and ensure the proper waste management.
Hazards (Risk)	**C-:** Reclamation may affect the flood control function of the reservoir area.			**Preparation phase**: To assess impacts on flood control.
Natural Environment				
Hydrological situation	**C-:** Water current may change due to reclamation.			**Preparation phase:** To assess changes in water current.
Flora, fauna, and biodiversity	**B-:** Composition of aquatic fauna around the reclamation area could change due to the change in habitat condition resulting from land reclamation. **B+:** Planted mangrove around the reclamation area will contribute to enhancing biodiversity.			**Preparation phase:** To assess the condition of the aquatic fauna and their habitat.
Global Warming	**B+:** New refrigerant which does not deplete Ozone will be installed. Mangrove which absorbs CO2 gas will be planted. Height of the reclaimed land is designed considering sea level rising.			-
Pollution				
Air pollution	**B-:** Emission of construction vehicles and equipments will increase air pollution.			To develop an environmental management

Items	Alternatives			Mitigation Measures
	A-1	**A-2**	**B-2**	
Water pollution	**C-:** Reclamation work may generate turbidity. In case the reclaimed land causes water stagnation, it could lead to a deterioration of water quality. Wastewater from the new market facilities will be treated in the new treatment facility.			
Waste	**B-:** Construction waste will be generated in case the existing market is demolished. During operation, fish residues and other waste materials will be generated but will be collected for treatment.			
Noise	**B-:** Construction will create noise pollution.			
Accidents	**B-:** There are risks of accidents during construction.			
Overall Evaluation				
Social Environment	**B-**	**A-**	**A-**	
Natural Environment	**B-**	**B-**	**B-**	
Pollution	**B-**	**B-**	**B-**	

Rating: A= serious impact is expected; B = some impact is expected; B^L = relatively large impact; B^S = relatively small impact; C = extent of impact is unknown; + = positive impact is expected; -=negative impact is expected; D= no impact is expected.

Table 3.6.2: Comparison of Environmental Impacts of Access Road Alternatives

Items	Alternatives				Mitigation Measures
	Alt 2-1	**Alt 2-2**	**Alt 2-3**	**Alt 2-2 +Alt 3**	
Social Environment					
Involuntary resettlement	**B-:** About 30 houses need to be relocated.	-			**Preparation phase**: To obtain agreement with with the inhabitants regarding their resettlement and proper compensation.
Poor, indigenous, and ethnic people	**B-:**Inhabitants to be relocated are poor people.	-			
Land use	**B-:** About 0.5ha of land needs to be acquired.	**B-:** About 0.3ha of land needs to be acquired.	**B-:** About 0.1ha of land needs to be acquired.	**B-:** About 0.4ha of land needs to be acquired.	**Preparation phase**: To obtain consensus with the water area users.
Local conflict	**B-:** Conflict between construction workers is likely to be occurred on employment.				**Construction phase:** To develop communication between workers and contractors.
Sanitation	**B-:** During construction phase, sanitary condition may be deteriorated due to inflow of construction labors.				**Construction phase:** To provide enough portable toilets and ensure the proper management of waste.
Hazards (Risk)	**B+:** Smooth access to JFP will be realized without flood influences at the existing access road (Jl.Muara Baru).				-
Natural Environment					
Flora, fauna, and biodiversity	**C-:** Aquatic fauna may be affected by the construction work.				**Preparation phase:** To assess the condition of aquatic fauna and their habitat.
Pollution					
Air pollution	**B-:** Emission of construction vehicles and equipment will increase air pollutants and traffic on the access road. **B+:** Increase of air pollutants around the existing access road will be alleviated.				To develop an environmental management and monitoring plan.

Items	Alternatives				Mitigation Measures
	Alt 2-1	**Alt 2-2**	**Alt 2-3**	**Alt 2-2 +Alt 3**	
Water pollution	**C-:** Construction work may generate water turbidity.				
Noise	**B-:** Construction and traffic noise pollution is generated. **B+:** Traffic noise around the existing access road will be reduced.				
Accidents	**B-:** There are risks of construction and traffic accidents. **B+:** Risk of traffic accidents at the existing access road will be decreased.				
Overall Evaluation					
Social Environment	**B-^{L}**	**B-**	**B-**	**B-**	
Natural Environment	**C-**	**C-**	**C-**	**C-**	
Pollution	**B-**	**B-**	**B-**	**B-**	

Rating: A= serious impact is expected; B = some impact is expected; B^{L} = relatively large impact; C = extent of impact is unknown; + = positive impact is expected; -=negative impact is expected; D= no impact is expected.

3.7 Construction and Procurement Plan

The Construction and Procurement Plans were prepared based on a number of considerations, including the following:

(1) Natural and environmental conditions in the JFP area, situation of procurement in Indonesia, and local construction capacity of contractors;
(2) Construction methods that will cause the least disturbance to JFP operations, traffic, and activities;
(3) Land reclamation that will be undertaken in compliance with DKI requirements and other pertinent domestic regulations – the construction method will include silt dispersal protection techniques considering tidal current and effluent water current from the flood control pump station;
(4) Construction schedule of marine and civil works vis-à-vis the impacts of meteorological conditions, particularly the rainy season and occurrence of monsoons from November to March, which will require the use of floating barges and equipment for marine construction work, as well as highly skilled operators and laborers, thereby increasing construction cost compared to land-based construction work; therefore, from the quality and cost control viewpoint, construction work should involve minimal marine works; and
(5) Use of locally available construction materials to the extent possible.

3.8 Project Cost

Project cost was estimated based on following assumptions:

(1) Prices are as of May 2011.
(2) Exchange rate: US$1.00=¥81.96=8,582
(3) 10% VAT was included in the cost estimates.
(4) Price escalation of -0.98% per annum was considered for the foreign currency portion and 5.28% per annum for the local currency portion.
(5) A physical contingency of 5% was applied to the total of construction cost and price escalation.
(6) The cost of consulting services was calculated based on the schedule of manpower required during construction. Price escalation and physical contingency were applied to the cost of consulting services.

Table 3.8.1 below shows the cost estimates for 12 alternatives. **The JICA Study Team's recommended option, Alternative A-1 and 2-2, was estimated to cost Rp1,764 billion.** The breakdown of the preliminary Project cost estimate (Market A-1 and Access Road 2-2) is shown in Table 3.8.2.

Table 3.8.1: Summary of Project Cost for 12 Alternatives

Alternatives		Construction Cost	Price Escalation	Physical Contingency	Consulting Service	Land Acquisition	Resettlement Cost	Administration Cost	VAT	**Total Project Cost**
Market	Access Road									
A-1	2-1	1,161,616	182,797	69,359	86,475	70,000	4,708	63,608	119,745	**1,758,309**
	2-2	**1,187,240**	**184,805**	**70,741**	**86,475**	**50,000**	**0**	**63,498**	**121,525**	**1,764,284**
	2-3	1,260,343	192,380	74,839	87,758	10,000	0	64,194	126,917	**1,816,431**
	2+3	1,426,698	225,670	84,916	89,652	60,000	0	73,779	141,087	**2,101,802**
A-2	2-1	1,061,293	169,693	63,618	85,078	70,000	15,191	58,545	109,619	**1,633,038**
	2-2	1,086,916	171,665	65,056	86,242	50,000	10,483	58,494	111,518	**1,640,374**
	2-3	1,160,019	179,250	69,185	88,135	10,000	10,483	59,231	116,991	**1,693,295**
	2+3	1,326,375	213,025	79,715	98,596	60,000	10,483	69,251	132,030	**1,989,474**
B-2	2-1	994,226	166,757	60,455	85,078	70,000	15,191	55,326	103,182	**1,550,217**
	2-2	1,029,076	170,323	62,462	86,242	50,000	10,483	55,659	105,848	**1,570,092**
	2-3	1,108,295	179,771	66,962	88,135	10,000	10,483	56,817	112,163	**1,632,626**
	2+3	1,265,293	211,270	76,910	98,596	60,000	10,483	66,309	126,147	**1,915,007**

Table 3.8.2: Preliminary Project Cost Estimates, Market A-1 and Access Road 2-2

Description	Unit	Quantity	Cost Estimation (Unit: Rp. 1,000)				Total
			Local Portion		Foreign Portion		
			Unit Price	Amount	Unit Price	Amount	
I. Construction Expense							
1. General Expense	L.S.	1	10,036,306	**10,036,306**	7,509,109	**7,509,109**	**17,545,415**
2. Fish Trading & Market Center				**155,355,000**		**54,783,000**	**210,138,000**
1) Wholesale Market Bldg.	m^2	24,315	5,200	126,438,000	1,800	43,767,000	170,205,000
2) Kiosk/Canteen Bldg. (each 48 units)	m^2	6,885	4,200	28,917,000	1,600	11,016,000	39,933,000
3. Fish Supply Buffer Center				**36,352,600**		**77,436,550**	**113,789,150**
1) Cold Storage (29 units)	m^2	3,915	5,000	19,575,000	18,600	72,819,000	92,394,000
2) Fish Processing Unit (25 units)	m^2	2,363	4,000	9,450,000	1,100	2,598,750	12,048,750
3) Storage Bldg. (8 units)	m^2	756	4,000	3,024,000	1,100	831,600	3,855,600
4) Pedestrian Walk	m^2	1,484	2,900	4,303,600	800	1,187,200	5,490,800
4. Seafood Plaza	m^2	2,976	9,400	**27,974,400**	2,700	**8,035,200**	**36,009,600**
5. Utilities				**28,035,400**		**64,192,900**	**92,228,300**
1) Desalinated Water Production Plant	LS	1	9,833,400	9,833,400	26,181,400	26,181,400	36,014,800
2) Sterilized Seawater Production Plant	LS	1	995,500	995,500	3,590,000	3,590,000	4,585,500
3) Wastewater Treatment Plant	LS	1	8,504,100	8,504,100	28,616,100	28,616,100	37,120,200
4) Electric Power Supply Plant	LS	1	8,702,400	8,702,400	5,805,400	5,805,400	14,507,800
6. Pavement				**18,247,800**		**4,744,428**	**22,992,228**
1) Inner Road	m^2	17,687	500	8,843,250	130	2,299,245	11,142,495
2) Parking Lot and Truck Berth	m^2	18,809	500	9,404,550	130	2,445,183	11,849,733
7. Access Road				**143,220,510**		**75,621,690**	**218,842,200**
1) Access Road	m	1,430	96,525	138,030,750	51,975	74,324,250	212,355,000
2) Gate	LS	1	5,189,760	5,189,760	1,297,440	1,297,440	6,487,200
8. Reclamation and Revetment				**259,901,386**		**215,793,477**	**475,694,863**
1) Reclamation	m3	715,211	210	150,194,258	90	64,368,968	214,563,226
2) Soil Improvement	m2	107,000	574	61,434,600	861	92,151,900	153,586,500
3) Outer Revetment	m	902	53,224	48,008,048	64,922	58,559,644	106,567,692
4) Inner Revetment	m	435	608	264,480	1,639	712,965	977,445
Total Expense				**679,123,402**		**508,116,354**	**1,187,239,756**
II. Price Escalation				**213,385,793**		**-28,581,006**	**184,804,787**
III. Physical Contingency				**44,103,060**		**26,637,960**	**70,741,020**
IV. Consulting Service				**18,469,000**		**68,006,004**	**86,475,004**
V. Land Acquisition				**50,000,000**		**0**	**50,000,000**
VI. Resettlement Cost						**0**	**0**
VII. Administration Cost				**35,528,193**		**27,969,858**	**63,498,051**
VIII VAT				**65,585,552**		**55,939,717**	**121,525,269**
Total Project Cost				**1,106,195,000**		**658,088,887**	**1,764,283,887**

3.9 Implementation Schedule

The sequence of steps to be undertaken from AMDAL approval (in 2011) to the termination of the defect liability period of completed works (in 2018) is shown in the implementation schedule in Table 3.9.1, while the construction schedule for Alternative A-2 and 2-2 is shown in Table 3.9.2.

Table 3.9.1: Implementation Schedule

Description \ Year / Period		2013				2014				2015				2016				2017				2018				2019			
		1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Selection of Consultant	**6 months**																												
Land Acquisition	**12 months**																												
Reclamation Permit	**12 months**																												
Engineering Stage	**12 months**																												
Tender Stage (Contractor)	**12 months**																												
Construction Stage	**42 months**																												
Reclamation	**18 months**																												
Wholesale Market	**21 months**																												
Access Road	**24 months**																												
Maintenance Stage	**12 months**																												

Table 3.9.2: Construction Schedule for Market A-1 and Access Road 2-2

	Unit	Quantity	2015												2016												2017												2018					
			1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
1. Preparation/Mobilization	L.S.	1																																									
2. Reclamation and Revetment																																												
1) Outer Revetment	m	902																																									
2) Inner Revetment	m	435																																									
3) Reclamation	m3	715,211																																									
4) Soil Improvement	m2	107,000																																									
3. Fish Trading & Market Center																																											
1) Wholesale Market Bldg.	m^2	24,315																																									
2) Kiosk/Canteen Bldg. (each 48 units)	m^2	6,885																																									
4. Fish Supply Buffer Center																																											
1) Cold Storage (29 units)	m^2	3,915																																									
2) Fish Processing Unit (25 units)	m^2	2,363																																									
3) Storage Bldg. (8 units)	m^2	756																																									
4) Pedestrian Walk	m^2	1,484																																									
5. Seafood Plaza	m^2	2,976																																									
6. Utilities																																											
1) Desalinated Water Production Plant	LS	1																																									
2) Sterilized Seawater Production Plant	LS	1																																									
3) Wastewater Treatment Plant	LS	1																																									
4) Electric Power Supply Plant	LS	1																																									
7. Pavement																																											
1) Inner Road	m^2	17,687																																									
2) Parking Lot and Truck Berth	m^2	18,809																																									
8. Access Road																																											
1) Access Road	m	1,430																																									
2) Gate	LS	1																																									
9. Demobilization/Final Clean Up	LS	1																																									

Note: ▪▪▪▪▪▪▪ Critical Path

Based on the critical path of construction, the construction period for Alternative A-1 is 42 months and 39 months for Alternatives A-2 and B-2 because of the smaller reclamation volume compared to that in Alternative A-1.

Alternative for Wholesale Market	Preparation/ Mobilization (months)	Reclamation/ Revetment (months)	Market Facilities (months)	Construction Period (months)
Alternative A-1	3	18	21	**42**
Alternative A-2	3	15	21	**39**
Alternative B-2	3	15	21	**39**

The estimated road construction period for each alternative, based mainly on the length of the road and bridge, is shown below.

Access Road Alternatives	Period (months)
Alternative 2-1	18
Alternative 2-2	24
Alternative 2-3	26
Alternative 2+3	36

3.10 Implementation Arrangements

3.10.1 Project Implementation Structure

The Directorate General of Capture Fisheries (DGCF) of MMAF will be responsible for Project implementation. DGCF has a total of 1,623 personnel working in 1 secretariat, 5 directorates and 22 UPTs. The Directorate of Fishing Ports, one of five directorates of DGCF, will be directly responsible for the various activities during Project implementation, including detailed design, tendering, procurement, and construction. The organization charts of MMAF and DGCF are in Appendix 15.

The Directorate of Fishing Ports has 61 personnel in five sub-directorates, namely: (i) Fishing Port Preparation and Identification; (ii) Fishing Port Operational Management; (iii) Fishing Port Development Control; (iv) Fishing Port Master Harbor; and (v) Fishing Port Monitoring and Evaluation. The Directorate has experience in project implementation, having implemented the Jakarta Fishing Port Project (Package III) and the ongoing fishing port rehabilitation. Since the proposed site for the wholesale market is close to the JFP, the Directorate of Fishing Ports is deemed the most appropriate directorate to handle the implementation of the proposed Project.

Project Management Office (PMO). The PMO will be set up in the Directorate of Fishing Ports of DGCF and will have a staff of six, headed by the Director of Fishing Ports. The PMO will be responsible for the timely implementation of Project activities and coordination with concerned agencies. Its specific tasks will include the following:

a) Procurement of consulting and engineering services;
b) Evaluation and approval of relevant project documents prepared by the Consultant, which include tender documents including engineering drawings and specifications and the results of the evaluation of bids received;
c) Examination and approval of technical documents related to construction and procurement work, including shop drawings, specifications, and materials;
d) Acquisition of necessary permits and approvals from relevant government agencies in the course of Project implementation; and
e) Coordination of various project activities with other relevant directorates of MMAF, DKI Jakarta, and Ministry of Public Works (KPU).

3.10.2 Operation and Maintenance (O&M) Structure

As explained earlier, the MMAF is now seeking several new approaches to reform the wholesale marketing mechanism. The establishment of the Fish Marketing and Distribution Center (PPDI) in Brondong is one of the new approaches, which is different from either the existing fish auction place (TPI), the Fish Marketing Center (PPI) in JFP or the wholesale market (*pasar grosir*) in various places. The operation and management of PPDI-Brondong has not been decided yet, but planned to operate by any new organizations separate from the existing Brondong Fishing Port, whether central or local government (e.g., UPT), public corporation, or private company – is being considered for O&M. The privately operated wholesale market in Cibitung could be used as a model for introducing changes to an existing fish marketing system.

Considering that the Project will be introducing new approaches for the modernization of the wholesale market mechanism and that the proposed JFP wholesale market will be serving as a center for receiving, marketing, and distribution of fish – but with limited links with the JFP, **it is proposed and recommended by the Study Team that a new UPT be established under the Directorate General of Fishery Products Processing and Marketing (DGFP2M),** which will be responsible for the overall operation and management of the proposed JFP wholesale market based on the MMAF's new policy (Option 1).

The DGFP2M has a total of 408 personnel working in one secretariat, five directorates, and one UPT. In case of Option 1, the Directorate of Domestic Marketing will be directly responsible for the organization, coordination, and control of activities of a new UPT for the JFP wholesale market. The Directorate of Domestic Marketing has 47 personnel in five sub-directorates, namely: (i) Infrastructure and Facilities; (ii) Institutions; (iii) Analysis and Information; (iv) Distribution Network and Partnership; and (v) Promotion and Cooperation. DGFP2M was organized in 2005 from directorates that were formerly under DGCF, which is why there is only one UPT at present under the DGFP2M. The organization chart of DGFP2M is shown in Appendix 15.

Another option is to operate and manage Project facilities based on the existing organizations (UPT-PPS), but with some modifications (Option 2). The O&M system proposed for the Project facilities are shown in Table 3.10.1 below.

Table 3.10.1: Operation and Management Structure, by Type of Facilities

No.	Category		Facilities	O & M Method
1	Fish Trading & Marketing Center	Wholesale Market Bldg.	Fish handling/trading area	Charged as fish handling charge (5% of fish value), DKI for fish quality inspection / transaction control.
			Fish transit area	
			Market hall (480 stalls)	Market stalls leased to wholesalers.
			Packing area	No charge as deemed to includ in fish handling charge.
			Ice depots for retail (12 units)	Leased to private sector per unit.
			Offices	Space leased to relevant organizations
			Public toilets (4)	Public service (not charged)
		Kiosk / Canteen Bldg.	Kiosk/Canteen (96 units)	Leased to private sector per unit.
			Food stands (60 units)	Leased to private sector per unit.
			Public toilets (4)	Public service (not charged)
		Parking lot		Parking fee collected.
2	Fish Supply Buffer Center		Cold storages (17 units)	Compensation of the existing facilities.
			Cold storages (12 units)	Leased to private sector per unit (incl. machinery)
			Fish Processing Units (2 units)	Compensation of the existing facilities.
			Fish Processing Units (23 units)	Leased to private sector per unit.
3	Seafood Plaza		Fish Shops (12 units)	To be operated under BOT scheme.
			Restaurants (2 units)	To be operated under BOT scheme.
			Public toiltes (3)	To be operated under BOT scheme.
4	Utilities		Electricity supply	Public service (charged).
			Desalinaed water supply	Public service (charged). Entrusted to private sector.
			Seawater supply	Public service (not charged)
			Waste water treatment	Public service (not charged)
			Solid waste disposal	Public service (not charged)
5	Civil engineering facilities		Access Road / Inner Road	Entrance fee collected.
			Seawall	Public service (not charged)
6	Vacant lot			Used as parking lot and public space for the time being.

In both Options 1 and 2, a number of modifications of the current status of O&M are recommended ensure better operation and management. These are summarized in the matrix below.

Current Status	Recommended Modifications
All land and facilities belong to the National Government.	No change.
MMAF entrusts to PERUM the O&M of the income-generating facilities.	MMAF will entrust the O&M of a part of facilities to either other UPT, PERUM or private companies, but subject to approval by the Minister of Marine Affairs and Fisheries.
PERUM-PPSJ can lease facilities and spaces without permission from PERUM HQ (leasing period is 1 year maximum).	The lessees of the income-generating facilities will be selected by UPT, considering the purpose of use and the lessee's capabilities (both technical and financial).
UPT-PPS is responsible for providing public services including O&M of non-income generating facilities.	Utilities (electricity, water supply, etc.) and civil engineering facilities (access road, inner roads, and seawall) will be maintained in collaboration with the existing organizations (UPT-PPS and PERUM), considering their experience of PPSJ in O&M.
PERUM HQ can lease land without the prior approval of MMAF, in accordance with KKP Ordinance (No. KEP. 41/MEN/2007 dated 6/Nov/07).	Vacant lots will be under the direct control of UPT for lease to the private sector, but subject to approval of the development plan by MMAF.

Regardless of which option is selected, it is recommended that the Seafood Plaza be implemented, operated, and managed through a build-operate-transfer (BOT) scheme in order to introduce the business knowhow of the private sector in O&M for such commercial facilities.

The recommended organization chart for the O&M of Project facilities are shown in Figure 3.10.1, regardless of the option selected and applied.

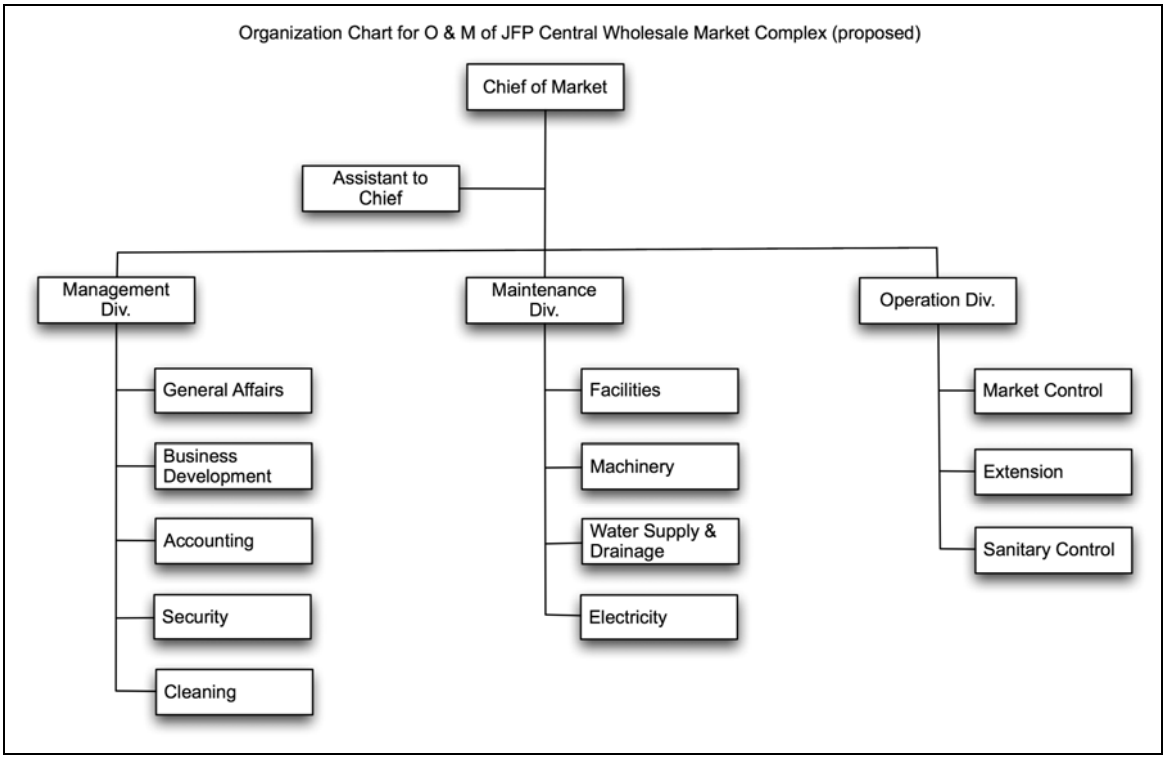


Figure 3.10.1: Proposed Organization Chart for O&M of JFP Central Wholesale Market

All existing staff of the JFP wholesale market (PPI) will be transferred and serve as staff of the new JFP wholesale market, including the existing cooperatives (TKBMI), security personnel, and cleaning workers. The number of staff required for each section of the new wholesale market is shown in Table 3.10.2.

Table 3.10.2: Number of Staffs Required for Each Section

Division	Section	Position	Chief	Staff	Remarks
Management Division	General Affairs	Entrance Fee Collector	1	3	
		Lease Fee Collector		4	
		Ice Supply		8	
		Seawater Supply		20	
		Toilet keeper		9	
	Business Development		1	2	
	Accounting		1	11	
	Security		1	18	Not necessary if outsourced.
	Cleaning		1	24	Not necessary if outsourced.
Maintenance Division	Building and Facilities		1	2	
	Machinery (Desalination)		1	4	
	Water supply and drainage		1	3	
	Electricity		1	4	
Operation Division	Market Control	Weighing Officer	1	20	
		Transaction Recorder		6	
	Extension		1	2	
	Sanitary Control / Fish Inspection		1	6	
Total			**12**	**146**	

In addition to the number of staff indicated in the above table, the Project will scout for about 160 workers of TKBMI as porters and about 12 persons from private companies and/or cooperatives as auctioneers in the PPPI.

3.10.3 Proposed Technical Assistance

As mentioned earlier, the Project will improve or upgrade the JFP wholesale market through the demarcation of the area by type of operation: (i) trading area; (ii) transit area; and (iii) market hall. From the final stage of construction throughout the initial operational stage, the following activities will have to be carried out in order to achieve the reform of the wholesale market mechanism:

Stage 1: Demarcation of work space based on the existing mechanism (from construction to initial operation, 2014-2018)

- Preparation of new rules and regulations governing the operations of the JFP wholesale market (through stakeholder meetings);
- Identification of fish market-related stakeholders (introduction of caps and badges);
- Extension of the operating hours of the JFP wholesale market;
- Preparation of operations manual and its execution for strengthening of fish inspection and sanitary control; and
- Standardization of fish containers at the levels of transport and wholesale marketing by providing incentives for the use of insulated fish containers (e.g., sale of standard fish containers at promotional prices; granting of priority rights for use of the market hall);

Stage 2: Reform of wholesale market mechanism (from the initial operational stage, 2018-2025)

- Standardization of fish containers (continuous activity from Stage 1);
- Conversion of some areas of the wholesale market through the installation of partitions and/or walls;
- Weighing and verification of fish before the market transaction through dissemination to fish wholesalers; and

- Introduction of a more open and fair transaction system (e.g., auction system) by inviting and evaluating the experience and management capacity of interested fish traders and relevant cooperatives to serve as auctioneers.

To implement these activities, it is recommended that the following consultants be engaged by the Project:

Stage	Consultant	Duration of Engagement (No. of person-months)
1	Market O&M/Marketing Promotion Advisor	9
	Fish Hygiene and Sanitary Control Specialist	3
2	Market O&M/Marketing Promotion Advisor	6

The terms of reference for these consultants are provided in Appendix 16.

3.11 Project Evaluation

3.11.1 Proposed Indicators for Measuring Operational Result and Effects

Based on the results of the feasibility study, the Project is expected to achieve the targets shown in the matrix below within two and five years after commencement of operation of the Project facilities:

Table 3.11.1: Proposed Indicators for Measuring Operational Result

Target Facility	Components	Monitoring Indicator	Present	2 years after commencement of operation (2020)	5 years after commencement of operation (2023)	Monitoring methods
Fish Trading & Marketing Center (PPPI)	Wholesale Market					
	- Handling/Trading /Transit Area	Fish handling volume (t/yr)	71,034	101,600	109,934	UPT statistics
	- Market Hall (480)	Booth occupation rate (%)	85%	88%	95%	UPT statistics
	- Ice retail shops (12)	No. of booth used	-	10	11	UPT statistics
	Kiosk/Canteens	Booth occupation rate (%)	-	88%	95%	UPT statistics
	Parking area	No. of vehicles (units/day)	173	230	249	UPT statistics
Fish Supply Buffer Center (PBPI)	Cold storage (100 ton x 29 units)	Fish holding volume per month per storage (t / month) (average / max.)	46 / 75	72 / 100	82 / 100	Hearing survey & Site observations
	Fish Processing Units (25 units)	Volume of fish processed products per unit (t / year)	59	76	81	Hearing survey to each processing unit
Seafood Plaza	Fish shops (12)	No. of shops operated	-	12	12	Site observation
	Restaurants (2)	No. of restaurants operated	-	2	2	Site observation
Access Road		Trip generation to JFP (PCU/day)	4,394	5,933	6,446	UPT statistics and PCU factor (see Table 3.2.15)

Table 3.11.2: Proposed Indicators for Measuring Operational Effects

Target Facility	Components	Monitoring Indicator	Present	2 years after commencement of operation (2020)	5 years after commencement of operation (2023)	Monitoring methods
Fish Trading & Marketing Center (PPPI)	Wholesale Market					
	- Handling/Trading /Transit Area	No. of fish suppliers / day	94	125	135	Record of fish handling charge
	- Market Hall (480)	Average wholesale volume per unit space (kg/m^2/day)	30 (4960m^2)	48 (5880m^2)	51 (5880m^2)	UPT statistics & sampling survey
	- Ice retail shops (12)	Icing ratio to fish at entry and shipment from PPPI	16%	→	15% (with insulated box)	Sampling survey
	Kiosk/Canteens	(No indicator due to public welfare facility)				
	Parking area	No. of vehicles parking outside of PPPI (units/day)	27	0	0	Site observation
Fish Supply Buffer Center (PBPI)	Cold storage (100 ton x 29 units)	Max./Min. ratio of monthly storage volume (*1)	2.03	1.75	1.50	Data from each cold storage
	Fish Processing Units (25 units)	Value added ratio (processed products price / raw materials price) (*2)	Marlin: 1.44 Moonfish: 2.54	Marlin: 1.60 Moonfish: 2.75	Marlin: 1.75 Moonfish: 3.00	Hearing survey to each unit
Seafood Plaza	Fish shops (12)	No. of guests per shop (person/week)	-	300	300	Sales slip of each shop
	Restaurants (2)	No. of guests per restaurant (person/week)	-	480	480	Sales slip of each restaurant
Access Road		Travel time (from start to end point of road)	15 min. (old road)	2 min. (new road)	2 min. (new road)	Site observation (every 1 hour)

Note: (*1) Except aquaculture fish (milkfish and freshwater fish).
(*2) Frozen marlin and moonfish are mainly processed into block at present.

In summary, the proposed Project will result in the following outputs within two and five years after the start of operation of the JFP facilities:

- increase in fish handling volume due to the expansion of the wholesale market and the demarcation of the area by type of operation;
- increase in number of vehicles using the new access road to JFP;
- improvement in wholesale efficiency (average wholesale volume per unit space) as a result of the (i) widening of passages inside the market hall, (ii) enlargement of wholesale stalls, and (iii) demarcation of work space by type of operation;
- increase in fish holding volume in cold storages and increase in volume of processed fish products at the UPIs resulting in improved stability of fish supply and distribution to consumers; and
- increase in number of customers visiting the JFP wholesale market with the opening of the Seafood Plaza with 12 shops and two restaurants.

3.11.2 Non-Quantitative Benefits of the Project

The Project is envisioned to implement various interrelated, complementing, and supporting interventions which are, in turn, expected to contribute to the attainment of the Project's outcome, i.e., *reform of the fish distribution mechanism through the development of a wholesale fish market in Indonesia.* This will be attained by improving post-harvest handling and marketing facilities in the JFP wholesale market and by introducing separate but complementary operational centers such as the center for fish trading and marketing (PPPI), center for fish supply buffer storage, and Seafood Plaza. These non-quantitative benefits are briefly discussed below.

More Organized and Systematic Process of Doing Business. The implementation of reforms in the fish distribution mechanism within the JFP wholesale market, such as the introduction of separate but complementary operational centers, will result in a more organized and systematic process of doing business in the wholesale market. This is expected to result in a significant increase in business opportunities and improved operational efficiency (time savings in fish handling and marketing) and number of clients (e.g., fish traders, processors, seafood restaurant operators, buyers/sellers, etc.) doing business within the JFP wholesale market.

Improved Operational Efficiency. The improved fish wholesale market facilities and sanitary practices are envisaged to result in improved operations and conditions within the PPPI. More open and fair fish transactions will be introduced which will, in turn, encourage larger numbers of fish producers/traders to do business in the PPPI. Innovations, such as the demarcation of work space by type of operation and increase in market hours, will ensure a smoother flow of fishery products. The provision of a full-time fish organoleptic inspector will contribute to the reduction of low-quality, deteriorated fish sold in the market, which will improve the reputation of the JFP wholesale market among fish buyers. The formulation of new rules and regulations to govern market operations will lead stakeholders to improve their fish handling, marketing, and distribution practices and ensure sound management. The standardization of fish containers is expected to save ice consumption, resulting in energy savings. More efficient operations of the JFP wholesale market will mean that clients are served in a more timely manner and at lower cost (i.e., time, effort, and transaction costs) with a resulting positive impact on strengthening the relationship between JFP management and its clients.

Stable Fish Prices and Value-added Fish Products. The increased capacity of the JFP wholesale market, particularly the Fish Supply Buffer Center, will allow the absorption of larger volumes of fish for storage. The fish cold storage facilities in the Center will ensure that fish quality is retained and fish prices are stabilized, particularly during peak and low seasons. The fish processing units will provide opportunities for various types of value-adding processes which will improve the revenue-generating capacity of fish processors and offer buyers a wider variety of high-quality processed fish products.

Increased Employment Opportunities and Reduced Poverty. The increased operational capacity of the JFP wholesale market, together with the establishment of value-adding facilities (such as fish processing, seafood restaurants, and canteens, kiosks, and food stands) and the improved trading and marketing facilities/operations, will increase the demand for labor. It is estimated that about 10,000 person-years of manpower will be required to satisfy the labor requirements for efficiently operating these new facilities. The additional manpower will be sourced from within the vicinity of the JFP and is expected to improve the income-generating capacity of people residing in the area. With the increase in employment generation during construction and operation, the Project will contribute to the reduction of poverty among the population residing near or within the area of the JFP. However, the extent to which poverty incidence will be reduced is difficult to estimate, as a substantial portion of the required manpower will consist of semi-skilled workers, and the total number of workers expected to be employed is basically a small percentage of the population in the Project area.

Improved Welfare of Population in the JFP Area. The relocation of the JFP wholesale market to a new site and the construction of a new access road will significantly reduce the congestion along the present access road to the JFP complex. The new access road planned for construction under the Project will reduce the traffic and the cost of travel and transport of fish commodities to and from the JFP. The reduction of traffic along the present access road will consequently reduce air pollution and noise, with positive impacts on the health and general well-being of the population residing along or near the road.

3.11.3 Financial Evaluation

To ensure the sustained financial viability of the operations of the JFP wholesale market, some necessary changes have to be implemented in order to generate sufficient revenues to cover the O&M

cost of the newly constructed facilities and, consequently, ensure its financial viability.

Adjustment in Tariff Rates. As the Project will involve the construction of new facilities, future tariff rates must be based on estimates of annual depreciation and O&M costs of these facilities. Specifically, tariff rates per square meter must be higher than the sum of annual depreciation and O&M costs per square meter of the new facility.

Implementation of a 5% Charge on the Value of Fish Landed. A percentage charge on the value of fish landed at the JFP wholesale market must be implemented starting in 2019, the first year of operation after completion of construction. Starting in 2019, a 2% charge should be applied and gradually increased to 5% by 2025 and maintained at that level thereafter. Although a fish handling charge has not been charged in any wholesale market in Indonesia, it is deemed possible to collect 5% of fish value at the JFP with the introduction of the fish trading system supported by an efficient auction system. Also, since a 5% charge is currently being collected at fish auction places (TPI) in Muara Angke and used to be collected at the JFP in compliance with an ordinance issued by DKI Jakarta, these precedents justify the collection of such a fee.

(i) Major Assumptions Applied in the Financial Evaluation

The financial evaluation was based mainly on incremental revenues and expenses that are expected to result from the construction of a new JFP wholesale market complex. The financial evaluation was, therefore, conducted by viewing the Project as the establishment of an entirely new JFP wholesale market. Thus, all costs incurred and revenues generated by the Project were treated as incremental. For this purpose, financial statements of incremental revenues and expenses pertaining to each alternative investment scenario were developed as basis for assessing each scenario's income-earning capacity. The profit and loss statement of a specific investment scenario was projected over a period of 30 years which, in turn, served as basis for creating its corresponding projected cash flow statement for determining the financial internal rate of return (FIRR). Based on an interest rate on soft loans from multilateral lending agencies of about 1.4-1.5% per year on a loan comprising about 85% of total investment and government counterpart of about 15% and with an estimated interest yield of about 6.75% per year,[1] a weighted average cost of capital (WACC) of about 2.2% was applied as the cutoff rate for evaluating the financial viability of each investment scenario. In other words, its calculated FIRR value must be at least equal to or greater than 2.2%.

Investment Costs. For each of the scenarios evaluated, the total investment cost estimates were calculated based on (i) the requirements for the services of design and construction consultants and (ii) cost of construction and installation of various types of facilities that have been identified, during Project design, as necessary for improving JFP operations and conditions. Examples of these facilities include those required for the fish trading and marketing center, fish supply buffer center, canteens and kiosk area, Seafood Plaza, utility stations, and truck berth and parking lot. All investment costs pertaining to access roads and reclamation/revetment were excluded in the financial evaluation (i.e., FIRR calculation). In the financial evaluation, the fielding of design and construction consultants and conduct of civil works and equipment installation were all assumed to be carried out during the period 2013-2018, or from Years 1-6. All construction works were assumed to commence in 2015 and completed by 2018 (Year 6), and market operations were assumed to commence by 2019 (Year 7).

Three reclamation design alternatives, each with four access road options, were considered and their corresponding investment costs estimated. These are presented in Table 3.11.3.

[1] "*Interest Rates Must Rise Soon: Analysts.*" Business, *Jakarta Globe*, Wednesday, 13 April 2011, page B-1.

Table 3.11.3: Total Investment Cost of Each Scenario

Access Road Option	Reclamation Design		
	A - 1	A - 2	B - 2
	(Rp million)	(Rp million)	(Rp million)
Option 2 -1	1,758.308	1,633.038	1,550.217
Option 2 -2	1,764.284	1,640.374	1,570.092
Option 2 -3	1,816.431	1,693.295	1,632.626
Option 2 +3	2,101.802	1,989.474	1,915.007

Among the scenarios, Reclamation Design Option A-2 and 2-1 and B-2 and 2-1 will require the resettlement of persons residing in the area where the proposed access road will be constructed, as earlier mentioned. This will require the resettlement of about 80 houses and substantial compensation of affected families by the Government. **With priority given to expediting the implementation of the Project at lower cost, investment scenario A-1 and 2-2 was selected as the best recommended option since it requires a relatively low investment cost, compared to the other scenarios, and it does not require resettlement.**

However, discussions with officials of MMAF and DKI Jakarta revealed that there is currently a government effort to resettle the illegal inhabitants along the coast as part of the implementation of the Jakarta Fisheries Waterfront Plan. In the event that this Plan is actually implemented, other investment scenarios with investment costs lower than A-1 & 2-2, such as A-2 and 2-2 and B-2 and 2-2, may instead be selected for implementation under this Project. **That being the case, the following six scenarios were analyzed and compared:**

Condition of Resettlement	Scenarios Analyzed
Recommended investment plan for implementation	A-1 and 2-2
If the resettlement related to reclamation design A-2 and B-2 is achieved	A-2 and 2-2; B-2 and 2-2
If the land acquisition related to access road option 2-2 is not achieved	A-1 and 2-3
If the resettlement related to both reclamation designs are achieved	A-2 and 2-3; B-2 and 2-3

For the financial evaluation, six alternative investment scenarios were chosen for analysis by selecting the investment alternative with the lowest investment cost under each reclamation design and corresponding access road option. **Following this selection criterion, the financial evaluation was carried out for each of the proposed site plan design scenarios:**

(i) **Scenario 1 (Option A-1 and 2-2)** pertains to the site plan involving the (a) construction of new facilities in the newly reclaimed area, with the reclaimed area designed as an island separated from the existing wall; and (b) construction of an access road of about 1.23 km;

(ii) **Scenario 2 (Option A-1 and 2-3)** pertains to the site plan involving the (a) construction of new facilities in the newly reclaimed area, with the reclaimed area designed as an island separated from the existing wall; and (b) construction of an access road of about 1.73 km;

(iii) **Scenario 3 (Option A-2 and 2-2)** pertains to the site plan involving the (a) reclamation of the bay, with the reclaimed area attached to the existing seawall; and (b) construction of a new access road of about 1.23 km;

(iv) **Scenario 4 (Option A-2 and 2-3)** pertains to the site plan involving the (a) reclamation of the bay, with the reclaimed area attached to the existing seawall; and (b) construction of a new access road of about 1.73 km;

(v) **Scenario 5 (Option B-2 and 2-2)** pertains to the site plan involving the (a)

reclamation of the bay, with the reclaimed area attached to the existing seawall; (b) construction of a new access road of 1.23 km; and (c) construction of new facilities in the reclaimed area except for the proposed fish buffer supply center which will be established in the existing site of the fish wholesale market; and

(vi) **Scenario 6 (Option B-2 and 2-3)** pertains to the site plan involving the (a) reclamation of the bay, with the reclaimed area attached to the existing seawall; (b) construction of a new access road of 1.73 km; (c) construction of new facilities constructed in the reclaimed area except for the proposed fish buffer supply center, which will be established in the existing site of the fish wholesale market.

Depreciation. Each investment item was depreciated over the assumed number of years that it may be in useful operation. Depreciation cost was based mainly on a straight-line estimate (i.e., total value of investment divided by the total number of useful years of the investment). The depreciation cost for buildings and revetment was based on an economic life of about 40 years, while for equipment, an economic life of 15 years was applied.

Incremental O&M Costs. The assumed O&M cost of all new investments in JFP facilities was based on a percentage of the total value of each type of investment. For buildings, the annual O&M cost was estimated at about 0.5% of the total investment cost of buildings, while the annual O&M cost of the revetment was estimated at about 1% of its investment cost. Projected estimates of annual O&M cost of equipment/mechanical works were derived from the engineering design specifications. The estimated incremental O&M costs include additional expenditures on electricity and water as well as on personnel and miscellaneous costs required in the O&M of the new facilities. All O&M costs pertaining to access roads and reclamation/revetment were included in the financial evaluation, i.e., FIRR calculation, as well as the portion of the general expenses, physical contingencies, and administrative expenses that accrue to the fish trading and market facilities, fish supply buffer center, canteens/kiosks, fish shops and restaurants, pavement/parking facilities, and utilities.

Tariff Rates for Estimation of Incremental Revenue. Projected revenues were derived from the specific services/facilities that are envisioned to be provided by the newly constructed JFP facilities at their corresponding current and proposed tariff rates[2] (see Table 3.11.4).

[2] The tariff rates for specific services currently being charged (as of 7 May 2010) are presented in Appendix 5.

Table 3.11.4: Current and Proposed Tariff Rates

Item	Rp/unit	Current Tariff	Proposed Tariff			
			2019 - 2025	2026 - 2028	2029 - 2038	2039 - 2048
A. Fish Trading and Marketing Center						
1. Fish Unloading Charge	% of value of landed fish		2% - 5%	5%	5%	5%
2. Market Hall	Rp/sqm/month	15,500	43,000	43,000	43,000	43,000
3. Offices and Resting Places for Wholesalers	Rp/sqm/month	10,000	43,000	43,000	43,000	43,000
4. Ice Supply Stations	Rp/sqm/month	25,000	43,000	43,000	43,000	43,000
B. Fish Supply Buffer Center						
1. Cold Storage Building	Rp/sqm/month	15,000	240,000	240,000	240,000	240,000
2. Fish processing Units	Rp/sqm/month	15,000	42,000	42,000	42,000	42,000
3. Storage Building	Rp/sqm/month	15,000	42,000	42,000	42,000	42,000
C. Kiosks, Canteens, and Food Stands						
1. Kiosks and Canteens	Rp/unit/month	15,000	60,018	60,018	60,018	60,018
2. Food Stands	Rp/unit/month	10,000	60,091	60,091	60,091	60,091
D. Seafood Center						
1. Fish Shops	Rp/sqm/month	10,000	85,000	85,000	85,000	85,000
2. Seafood Restaurants	Rp/sqm/month	10,000	85,000	85,000	85,000	85,000
E. Utilities - Water and Electricity						
1. Water Surcharge						
(i) For washing and cleaning	Rp/cum	18,000	18,000	18,000	18,000	18,000
2. Electricity Surcharge	surcharge on kwh used	20%	20%	20%	20%	20%
F. Parking						
1. Truck	Rp/Truck	3,000	3,000	3,000	3,000	3,000
2. Pick-up	Rp/Pick-up	2,000	2,000	2,000	2,000	2,000
G. Entrance						
1. PCU	Rp/PCU		2,000	2,000	2,000	2,000

(iii) Results of the Financial Evaluation

FIRR and Benefit:Cost Ratio Calculation. The results of the financial evaluation indicate that **each of the investment scenarios is financially viable as the calculated FIRR values are greater than 2.2%,** the WACC assumed in the analysis. A summary of the FIRR values and benefit-cost ratios calculated for each alternative scenario is presented in Table 3.11.5, while the details of the FIRR calculations for each scenario are presented in Appendix 17.

Table 3.11.5: Summary of FIRR and BCR Values for the Different Investment Scenarios

Financial Indicator	Reclamation Design					
	A-1 & 2-2	A-1 & 2-3	A-2 & 2-2	A-2 & 2-3	B-2 & 2-2	B-2 & 2-3
FIRR	6.01%	6.17%	5.54%	6.53%	5.61%	6.55%
BCR	1.94	1.95	1.91	2.02	1.91	2.01

Important Financial Indicators for Monitoring Financial Performance. In order to ensure that the JFP wholesale market remains financially viable, management should strictly monitor some important financial indicators at the end of each year. These indicators pertain to the following:

(a) **Operating ratio,** which measures the coverage of operating expenses by operating revenues;
(b) **Breakeven point (in Rupiah [Rp]),** which indicates the level of operating revenues that must be realized to be able to recover all fixed and variable expenses;
(c) **Benefit:cost ratio (BCR),** which determines whether total revenues will be able to cover total operating costs; this ratio should at least be equal to or greater than 1;
(d) **Return on sales,** which measures how large an operating margin the Project will have on its total sales (or revenues); the lower the return on sales (or revenues), the lower the

operating margin, which implies that larger sales (or revenues) must be made to make an adequate return on investment (ROI);

(e) **Return on equity (ROE),** which measures the rate of ROI of the Project; the ROE should be at least equal to or greater than the market interest rate that the investment would have earned in a bank or it may be compared to the rate of ROE of a similar business investment;

(f) **Debt service ratio,** which provides a measure of how the Project's annual revenues are able to cover the annual debt (i.e., loan amortization plus loan interest payment); its value should be at least equal to or greater than 1.

The financial indicators presented in Table 3.11.6 provide indicative levels that need to be maintained by the JFP wholesale market throughout its operational life in order to be able to sustain financial viability. Anytime the values of these indicators are observed to be below the values presented in the table, Management must immediately critically review its operational performance and carry out remedial measures in order to improve operational efficiency and financial performance to the level required.

Table 3.11.6: Financial Indicators for Monitoring the Financial Performance of the JFP Wholesale Market

Financial Indicator	A-1 & 2-2		A-1 & 2-3	
	2020	2025	2020	2025
Efficiency Ratio:				
1) Operating ratio[b]	0.35	0.34	0.36	0.34
2) Break-even point in Rp million[c]	16,279.42	15,525.32	17,088.15	15,464.39
Benefit:Cost Ratio:	2.84	2.90	2.78	2.91
Income Ratios:				
1) Return on sales[d]	0.58	0.59	0.58	0.59
2) Return on equity[e]	0.80	0.81	0.81	0.83
Debt Service Ratios:				
1) Debt Service Coverage Ratio[f]	1.21	1.30	1.26	1.32
Financial Indicator	**A-2 & 2-2**		**A-2 & 2-3**	
	2020	**2025**	**2020**	**2025**
Efficiency Ratio:				
1) Operating ratio[b]	0.34	0.34	0.35	0.33
2) Break-even point in Rp million[c]	15,548.75	14,732.68	16,064.13	14,455.58
Benefit:Cost Ratio:	2.91	2.98	2.87	3.00
Income Ratios:				
1) Return on sales[d]	0.59	0.60	0.59	0.60
2) Return on equity[e]	0.78	0.79	0.84	0.85
Debt Service Ratios:				
1) Debt Service Coverage Ratio[f]	1.12	1.20	1.24	1.29
Financial Indicator	**B-2 & 2-2**		**B-2 & 2-3**	
	2020	**2025**	**2020**	**2025**
Efficiency Ratio:				
1) Operating ratio[b]	0.33	0.32	0.34	0.32
2) Break-even point in Rp million[c]	15,040.64	14,344.93	15,553.87	14,066.25
Benefit:Cost Ratio:	3.03	3.10	2.98	3.12
Income Ratios:				
1) Return on sales[d]	0.60	0.61	0.60	0.61
2) Return on equity[e]	0.80	0.81	0.87	0.89
Debt Service Ratios:				
1) Debt Service Coverage Ratio[f]	1.06	1.15	1.18	1.23

[a] Income tax assumed at 10% percent of net profit after cost of operation.

[b] Operating ratio = Cost of operation ÷ Total revenue

[c] Breakeven point (PhP) = (Total fixed costs ÷ (Total variable expesnes ÷ Total revenue)

[d] Return on sales = Net profit after tax and debt service ÷ Total revenue

[e] Return on equity = Net profit after tax and debt service ÷ Investment

[f] Debt Service Ratio = Net profit ÷ Annual debt service (Note: Net revenue equals revenues less expenses; excluding non-cash and interest charges)

FIRR Sensitivity and Switching Value Analysis. FIRR sensitivity analysis covers the six alternative investment scenarios and focuses on the potential risks that are perceived to possibly confront the Project during implementation and over its economic life. These include: (a) the possible occurrence of an increase in Project investment costs by 10%; (b) a possible decrease in Project benefits or revenues by 10%; (c) simultaneous increase in Project investment costs and decrease in benefits or revenues; (d) an increase in Project O&M costs by 10%; (e) a simultaneous increase in Project O&M costs and a decrease in expected benefits/revenues by 10%; and (f) a simultaneous increase in Project investment costs, O&M costs, and a decrease in benefits/revenues by 10%.

The sensitivity analysis of the FIRR values under each of the six alternative investment scenarios indicate that these are very sensitive to: (i) a decrease in the project's expected benefits or revenues by 10%; (ii) a simultaneous increase in project investment costs and a decrease in benefits or revenues by 10%; (iii) a simultaneous increase in the project's O&M costs and a decrease in benefits or revenues by 10%; and (iv) a simultaneous increase in project investment costs, O&M costs, and a decrease in benefits/revenues by 10%. These are implied by the calculated sensitivity indicators for the change variables, which exhibit values significantly greater than 2. These results are confirmed by the **switching value analysis, which indicates that small percentage changes in these change variables will result in a significant drop in the FIRR values, down to the acceptable level of 2.2%.**

Table 3.11.7 presents the results of the FIRR sensitivity and switching value analysis for each investment scenario.

Table 3.11.7: Results of the FIRR Sensitivity and Switching Value Analysis

	Scenario A-1 & 2-2			**Scenario A-1 & 2-3**		
	Financial			**Financial**		
Base Value IRR =	6.01%			6.17%		
Benefit:Cost Ratio =	1.94			1.95		
	Sensitivity Analysis			**Sensitivity Analysis**		
Change Variable	Recalculated FIRR	Sensitivity Indicator	Switching Value	Recalculated FIRR	Sensitivity Indicator	Switching Value
(i) Investment costs increase by 10%	4.8%	2.07	34%	4.9%	2.02	36.0%
(ii) Benefits decrease by 10%	4.3%	2.88	21%	4.4%	2.82	21.0%
(iii) Increase in investment cost and decrease in benefits by 10%	3.0%	4.93	13%	3.2%	4.83	12.7%
(iv) Operation and maintenance (O&M) costs increase by 10%	5.8%	0.31	>100%	6.0%	0.31	>100%
(v) Benefits decrease and O&M costs increase by 10%	4.1%	3.23	18%	4.2%	3.18	18.5%
(vi) Investment costs and O&M costs increase; benefits decrease by 10%	2.8%	5.29	12%	3.0%	5.18	12.0%
	Scenario A-2 & 2-2			**Scenario A-2 & 2-3**		
	Financial			**Financial**		
Base Value IRR =	5.54%			6.53%		
Benefit:Cost Ratio =	1.91			2.02		
	Sensitivity Analysis			**Sensitivity Analysis**		
Change Variable	Recalculated FIRR	Sensitivity Indicator	Switching Value	Recalculated FIRR	Sensitivity Indicator	Switching Value
(i) Investment costs increase by 10%	4.3%	2.21	30%	5.3%	1.92	39.0%
(ii) Benefits decrease by 10%	3.9%	3.04	19%	4.8%	2.64	23.0%
(iii) Increase in investment cost and decrease in benefits by 10%	2.6%	5.25	12%	3.6%	4.54	14.5%
(iv) Operation and maintenance (O&M) costs increase by 10%	5.4%	0.30	>100%	6.4%	0.27	>100%
(v) Benefits decrease and O&M costs increase by 10%	3.7%	3.39	17%	4.6%	2.94	20.5%
(vi) Investment costs and O&M costs increase; benefits decrease by 10%	2.4%	5.60	11%	3.4%	4.84	13.5%
	Scenario B-2 & 2-2			**Scenario B-2 & 2-3**		
	Financial			**Financial**		
Base Value IRR =	5.61%			6.55%		
Benefit:Cost Ratio =	1.91			2.01		
	Sensitivity Analysis			**Sensitivity Analysis**		
Change Variable	Recalculated FIRR	Sensitivity Indicator	Switching Value	Recalculated FIRR	Sensitivity Indicator	Switching Value
(i) Investment costs increase by 10%	4.4%	2.16	31%	5.3%	1.88	40.0%
(ii) Benefits decrease by 10%	4.0%	2.95	19%	4.9%	2.57	23.0%
(iii) Increase in investment cost and decrease in benefits by 10%	2.7%	5.10	12%	3.6%	4.43	14.0%
(iv) Operation and maintenance (O&M) costs increase by 10%	5.4%	0.31	>100%	6.4%	0.28	>100%
(v) Benefits decrease and O&M costs increase by 10%	3.8%	3.30	18%	4.7%	2.88	21.0%
(vi) Investment costs and O&M costs increase; benefits decrease by 10%	2.5%	5.46	11%	3.4%	4.75	14.0%

3.11.4 Economic Evaluation

Economic evaluation was conducted to quantify the incremental economic benefits and costs generated in the course of Project implementation, which will, in turn, serve as basis for assessing the economic viability of the Project and for justifying the Project from a national economic viewpoint.

Incremental economic benefits and costs were mainly derived by calculating the incremental economic benefits and costs accruing to the Project. For this purpose, all benefits and costs, which are in financial values, were converted to economic values by adjusting these by the relevant standard conversion factor (SCF).

General Assumptions Used in the Economic Evaluation. The following assumptions were applied in the conduct of the economic evaluation:

- Economic values are based on April 2011 prices.
- Project life is 30 years, including project construction period of four years (2015- 2044).
- Discount rate is at 10%.
- Inflation is not taken into account; it is not considered in benefits or in costs estimated during the evaluation period.
- The foreign exchange rate is fixed at the following rates (as of April 2011): 1 US$ = Rp 8,575; ¥1 = Rp103.175; and a shadow exchange rate is not considered.
- Financial costs are converted to economic costs using conversion factors as presented in Appendix 17.

Economic Costs. Economic costs of the Project were estimated based on the financial investment costs i.e., costs of all construction work (including reclamation/revetment costs and cost of construction of access road), costs of consulting services, physical contingencies, general expenses, administrative expenses, and O&M cost of the Project, as described in the earlier discussion. These were estimated in constant April 2011 prices, identified by each category of foreign/local costs for economic evaluation and then converted into economic prices.

Economic Benefits. There are a variety of direct and indirect benefits (quantitative and qualitative) derived from the proposed Project. For the economic evaluation, only directly quantifiable economic benefits were considered, namely: (i) increase in value and volume of fish handled; (ii) reduced fish losses due to seasonality in fish supply; (iii) increase in the number of customers patronizing seafood restaurants and kiosks in the JFP wholesale market; (iv) reduced business revenue losses at the JFP wholesale market due to flooding along the existing access road; (v) benefits from savings in vehicle operating cost (VOC)**;** and (vi) benefits from reduced passenger travel time costs (TTC). The detailed calculations of these economic benefits are presented in Appendix 17.

(ii) Results of the Economic Evaluation

EIRR and BCR Calculation. The economic evaluation likewise covered the six investment scenarios. Each scenario was assessed by estimating its economic internal rate of return (EIRR) and BCR over a projected period of 30 years. **The results of the economic analysis indicate that the Project, under each scenario, is economically viable as the respective calculated EIRRs are greater than 10%,** the economic opportunity cost of capital (EOCC) assumed in the analysis. A summary of the EIRR values and BCRs calculated for each scenario is presented in Table 3.11.8, while the details of the EIRR calculations are presented in Appendix 17.

Table 3.11.8: Summary of EIRR and BCR Values for Different Investment Scenarios

Economic Indicator	Reclamation Design					
	A-1 & 2-2	**A-1 & 2-3**	**A-2 & 2-2**	**A-2 & 2-3**	**B-2 & 2-2**	**B-2 & 2-3**
EIRR	26.8%	27.0%	27.7%	28.8%	26.9%	27.9%
BCR	3.47	3.43	3.65	3.73	3.49	3.58

EIRR Sensitivity and Switching Value Analysis. The EIRR sensitivity analysis focused on the potential risks perceived to likely confront the Project during implementation and over its economic life. These include: (i) the possible occurrence of an increase in Project investment costs by 10%; (ii) a possible decrease in economic benefits by 10%; (iii) simultaneous increase in investment costs and a decrease in economic benefits; (iv) an increase in project O&M costs by 10%; (v) a simultaneous increase in Project O&M costs and a decrease in economic benefits by 10%; and (vi) a simultaneous increase in Project investment costs, O&M costs, and a decrease in economic benefits by 10%. Table 3.11.9 presents the results of the EIRR sensitivity and switching value analysis for each alternative investment scenario.

The sensitivity analysis for each investment scenario indicates that the EIRR is relatively sensitive to: (i) a simultaneous increase in Project investment costs and a decrease in expected economic benefits; and (ii) a simultaneous increase in Project investment costs, O&M costs, and a decrease in economic benefits by 10%. The sensitivity indicators calculated for these scenarios exhibited a value greater than 1. **These results were confirmed by the switching value analysis, which indicates that a relatively small percentage change in these change variables will result in a significant drop in the EIRR value, down to the acceptable level of 10%.**

However, it should be noted that the EIRR value is not very sensitive as the switching value analysis indicated that the percentage changes require at least 50%, in all cases, to have an effect on the EIRR values.

Table 3.11.9: Results of the EIRR Sensitivity and Switching Value Analysis

	Scenario A-1 & 2-2			**Scenario A-1 & 2-3**		
	Economic			**Economic**		
Base Value IRR =	26.8%			27.0%		
Benefit:Cost Ratio =	3.47			3.43		
	Sensitivity Analysis			**Sensitivity Analysis**		
Change Variable	Recalculated EIRR	Sensitivity Indicator	Switching Value	Recalculated EIRR	Sensitivity Indicator	Switching Value
(i) Investment costs increase by 10%	25.2%	0.59	>100%	25.4%	0.61	>100%
(ii) Benefits decrease by 10%	25.0%	0.67	71%	25.2%	0.68	71.0%
(iii) Increase in investment cost and decrease in benefits by 10%	23.5%	1.23	56%	23.6%	1.26	55.0%
(iv) Operation and maintenance (O&M) costs increase by 10%	26.8%	0.01	>100%	27.0%	0.01	>100%
(v) Benefits decrease and O&M costs increase by 10%	25.0%	0.68	70%	25.1%	0.69	70.0%
(vi) Investment costs and O&M costs increase; benefits decrease by 10%	23.5%	1.24	55%	23.6%	1.27	55.0%
	Scenario A-2 & 2-2			**Scenario A-2 & 2-3**		
	Economic			**Economic**		
Base Value IRR =	27.7%			28.8%		
Benefit:Cost Ratio =	3.65			3.73		
	Sensitivity Analysis			**Sensitivity Analysis**		
Change Variable	Recalculated EIRR	Sensitivity Indicator	Switching Value	Recalculated EIRR	Sensitivity Indicator	Switching Value
(i) Investment costs increase by 10%	26.1%	0.59	>100%	27.0%	0.60	>100%
(ii) Benefits decrease by 10%	25.9%	0.66	73%	26.8%	0.67	72.5%
(iii) Increase in investment cost and decrease in benefits by 10%	24.3%	1.22	58%	25.2%	1.25	57.6%
(iv) Operation and maintenance (O&M) costs increase by 10%	27.7%	0.01	>100%	28.7%	0.01	>100%
(v) Benefits decrease and O&M costs increase by 10%	25.9%	0.67	72%	26.8%	0.68	71.7%
(vi) Investment costs and O&M costs increase; benefits decrease by 10%	24.3%	1.23	57%	25.1%	1.26	56.6%
	Scenario B-2 & 2-2			**Scenario B-2 & 2-3**		
	Economic			**Economic**		
Base Value IRR =	26.9%			27.9%		
Benefit:Cost Ratio =	3.49			3.58		
	Sensitivity Analysis			**Sensitivity Analysis**		
Change Variable	Recalculated EIRR	Sensitivity Indicator	Switching Value	Recalculated EIRR	Sensitivity Indicator	Switching Value
(i) Investment costs increase by 10%	25.3%	0.60	>100%	26.2%	0.61	>100%
(ii) Benefits decrease by 10%	25.1%	0.67	71%	26.0%	0.68	72.0%
(iii) Increase in investment cost and decrease in benefits by 10%	23.6%	1.24	56%	24.4%	1.26	57.0%
(iv) Operation and maintenance (O&M) costs increase by 10%	26.9%	0.01	>100%	27.9%	0.01	>100%
(v) Benefits decrease and O&M costs increase by 10%	25.1%	0.68	70%	26.0%	0.69	71.0%
(vi) Investment costs and O&M costs increase; benefits decrease by 10%	23.6%	1.24	55%	24.4%	1.27	56.0%

CHAPTER 4

Conclusions and Recommendations

4. Conclusions and Recommendations

4.1 Conclusions

Jakarta Fishing Port is one of the largest fishing ports in Southeast Asia, where about 40,000 workers are employed, more than 300 tons of fishery products are processed and distributed per day, and over US$1 million is earned through exports daily. Due to the degradation of fishery resources in the coastal waters and a jump in the price of fuel, fish supply to the JFP wholesale market has been shifting from direct fish unloading to transport over land from the fishing grounds. Fish produced outside Jakarta have become the main sources of raw materials for the fish processing industry and for human consumption around Jakarta. That being the case, more importance has to be given to the JFP's function as a fish marketing and distribution center rather as its traditional role as catering to fishing boats. The proposed Project is designed to address this emerging trend.

In addition, there is a plan to develop the northern part of Jakarta, particularly the coastal zone between JFP Muara Baru and Muara Angke, under the *Jakarta Fisheries Waterfront Plan* for joint implementation by three agencies: MMAF, MPW, and DKI Jakarta. Within that context, **the proposed Project is considered as a key component of the *Jakarta Fisheries Waterfront Plan,*** with its development as an integrated fish handling, distribution, and marketing center not only for fish producers and marketing-related stakeholders but also for the general public.

Due to the limited availability of land in and around the JFP, the Project will have to reclaim land on which most of the Project facilities will be developed. Although reclamation accounts for about 40% of the basic Project cost, the reclamation area will be kept clean and completely secure and separate from the existing JFP area, a new access road will ensure a better approach to JFP, and it is expected that the JFP will be developed further as an integrated fisheries center in Jakarta.

The results of the financial and economic analysis showed that all the six scenarios are financially and economically viable. Moreover, each investment scenario has been projected to result in significant economic benefits, including the following: (i) increase in value and volume of fish handled; (ii) reduced economic losses due to fish supply fluctuations; (iii) increase in the number of customers patronizing seafood restaurants and kiosks in the JFP wholesale market; (iv) reduced losses in business within the JFP wholesale market due to flooding of the existing access road; (v) benefits from savings in vehicle operating cost; and (vi) benefits from reduced passenger travel time costs.

4.2 Recommendations

From among several investment scenarios evaluated by the JICA Study Team, **Alternative A-1 and 2-2 is recommended for adoption by MMAF. This alternative has the lowest investment cost, will not require resettlement of residents, and exhibited high EIRR and FIRR values.** Other recommendations based on the findings of the Study Team are presented below.

Clarification of the Proposed Project in the Relevant Master Plan. It is recommended that the proposed project should be included and properly indicated in the relevant master plans, namely, the Jakarta Metropolitan Area Development Plan (MPA: under preparation by JICA grant), the Jakarta Spatial Plan 2030 (approved by the assembly of DKI Jakarta in August 2011), and Jakarta Fisheries Waterfront City Plan (under preparation by MMAF/MPW/DKI), so as to make sure the status of the proposed project within the framework of the overall urban development.

Introduction of Appropriate Fish Transaction System in the Fish Trading and Marketing Center (PPPI). **It is recommended that a fish transaction system (either auction, bargaining or consigning) be set up in the PPPI** in order to increase business opportunities for fish suppliers and

buyers, resulting in the increase of fish quality and value, and eligible fish market stakeholders should be invited to serve as fish auctioneers. The fish wholesalers in the JFP wholesale market, who have more than 20 years of experience in the wholesale marketing of fish and handle more than 10 tons of fish per day, should make good candidates for the position.

Promotion of Private Investment for Seafood Business. The development of the new JFP wholesale market is expected to result in an increase in business opportunities in the fields of fish processing and storage, food service (restaurants and shops), and the leisure industry (related attractions and events). **However, it will be necessary to organize marketing and promotional activities** (such as the holding of seafood events, campaigns, and sales) to encourage or attract people to come to the JFP and patronize the facilities that will be open to the general public.

Traffic Control for Maximum Utilization of the New Access Road. With the Project, there will be two ways to access the JFP wholesale market: one, through the existing Jl. Muara Baru, and the other, through a new access road from Pluit. However, since it is anticipated that about 2/3 of the vehicular traffic will remain in the existing Jl. Muara Baru even after the development of the new access road, **it is recommended that access to JFP should be shifted to the new access road, as much as possible through appropriate traffic control.** This can be done by providing some incentives for not using Jl. Muara Baru. For example, a fee can be collected from vehicles passing through Jl. Muara Baru at night.

Sustainability of Financial and Economic Viability. For the Project to sustain its financial and economic viability, it is critical that the following conditions are met:

(i) Management of the JFP wholesale market should seriously consider charging a 5% charge on the value of fish unloaded at the market. This charge should be gradually increased from 2% in 2019, the first year of operation after construction, to 5% in 2025, and maintained at that level thereafter. Imposing a percentage charge on the value of fish unloading is justifiable in view of the substantial improvements in the market facilities and their operation that will be introduced under the Project.

(ii) It is recommended that these rates should be mutually acceptable to both market management and fish suppliers /buyers and agreed upon on a formal basis.

(iii) DKI must seriously rethink the adequacy of the current tariff rates charged for services rendered at the JFP wholesale market. As the Project will be constructing new facilities, future tariff rates must be based on estimates of annual depreciation and O&M costs of these facilities. Specifically, tariff rates per square meter must be more than the sum of annual depreciation and O&M costs per square meter of the new facility.

(iv) As the investments on the value-adding facilities to be established under the Project (i.e., Fish Trading and Marketing Center and Fish Supply Buffer Center) are considerably high, and since these facilities are expected to generate substantial revenues for the JFP wholesale market, Management should make sure that O&M (and repair, whenever necessary) is carried out on a regular basis. Serious breakdowns due to inadequate O&M budget and action will be costly since the loss in revenues as a consequence of the non-operation of these facilities will adversely affect the market's financial performance.

Ban of Groundwater Draft in JFP Administrative Zone. Jakarta Fishing Port has the most serious land settlement (approx.15 cm settlement/year from 2006 to 2011) in Jakarta, cased by groundwater overdraft. The serious land settlement is wasted huge maintenance and operation cost by damage of facilities/road. Therefore, UPT should manage and completely prohibit groundwater draft in JFP administrative zone. Moreover, UPT should entrust leveling survey company for monthly monitoring land settlement in JFP area, and check the condition of land settlement. UPT through PERUM who controls water supply in JFP should be monitoring and strengthen the regulation for ban of

groundwater to all private companies including processing companies, ice making companies, etc. If there is serious settlement spot in the results of leveling survey, UPT should be strict monitoring.