

ASIAN DEVELOPMENT BANK

SUMMARY ENVIRONMENTAL IMPACT ASSESSMENT

AND

SUMMARY INITIAL ENVIRONMENTAL EXAMINATIONS

FOR THE

BELAWAN, BANJARMASIN, AND BALIKPAPAN PORTS PROJECT

IN

INDONESIA

May 1997

CURRENCY EQUIVALENTS

(as of 9 April 1997)

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\$1.00	=	Rp2,405

ABBREVIATIONS

AMDAL	-	Environmental Impact Assessment Report
BOD	-	Biochemical Oxygen Demand
CO	-	Carbon Monoxide
COD	-	Chemical Oxygen Demand
DGSC	-	Directorate General of Sea Communications
EIA	-	Environmental Impact Assessment
H ₂ S	-	Hydrogen Sulfide
IEE	-	Initial Environmental Examination
MOC	-	Ministry of Communications
MSL	-	Mean Sea Level
NO _x	-	Nitrogen Oxides
PTPI	-	State Owned Limited Liability Port Company
SO ₂	-	Sulfur Dioxide
SEIA	-	Summary Environmental Impact Assessment
SEL	-	Environmental Evaluation Study Report
SIEE	-	Summary Initial Environmental Examination
SS	-	Suspended Solids

WEIGHTS AND MEASURES

°C	-	degree Celsius
dBA	-	decibel A (audible decibel)
ha	-	hectare
km	-	kilometer
km ²	-	square kilometer
L	-	liter
m	-	meter
m ²	-	square meter
m ³	-	cubic meter
mm	-	millimeter
TEU	-	twenty-foot equivalent unit
µg/m ³	-	microgram per cubic meter

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I. INTRODUCTION

1. The Government of Indonesia has requested the Asian Development Bank for a loan to improve and expand port facilities at Belawan in Sumatra and at Banjarmasin and Balikpapan in Kalimantan. The main thrust of the proposed Project is to remove capacity constraints and improve operational efficiency and productivity in the ports of Belawan and Banjarmasin, and to create a new port facility in Kariangau near Balikpapan Port to meet the rapidly growing demands of cargo and passenger traffic. These three ports are owned and operated by PTPI (PT Pelabuhan Indonesia - State-owned Limited Liability Port Company) I, III, and IV, respectively, which are State-owned private companies under the jurisdiction of the Directorate General of Sea Communications in the Ministry of Communications (MOC). The total cost of the Project is estimated at \$215 million, with a foreign currency cost component of \$143 million.

2. While the Belawan and Banjarmasin Port components consist of the improvement and extension of existing port facilities, the Balikpapan Port component includes the development of a new facility. The Bank classified the first two components as environmental category B, requiring an initial environmental examination and the last one as environmental category A, requiring an environmental impact assessment (EIA). This Report consists of one summary environmental impact assessment (SEIA) for the Balikpapan Port component and two summary initial environmental examinations (SIEEs) for the Belawan and Banjarmasin Port components.

3. The ANDAL (Analisis Dampak Lingkungan or Environmental Impact Assessment Report) for the Balikpapan Port component was prepared by PTPI IV and was approved by MOC in April 1996. The SELs (Studi Evaluasi Lingkungan or Environmental Evaluation Study Report) for the Belawan and Banjarmasin Port components were prepared by the respective PTPIs in 1992 and 1995, respectively. The SEIA and SIEE are based on the ANDAL and SEL, which were reviewed by the Bank-financed technical assistance consultants.¹

II. SEIA OF THE BALIKPAPAN PORT COMPONENT

A. Description of the Component

4. Balikpapan is the largest city in East Kalimantan, while the second largest city is Samarinda, the capital of the province. Balikpapan Port is one of the main ports within the jurisdiction of PTPI IV. The existing port consists of Semayang terminal and Kampung Baru terminal. Semayang terminal has been used for handling general cargo and container traffic from oceangoing and interisland vessels as well as interisland passenger traffic. Kampung Baru terminal is used for rakyat (wooden vessels that carry small cargo on short routes). The existing port area is small and very congested because of limited area and the recent increase in cargo and passenger traffic; hence expansion is required. The local government intends to develop an industrial estate of more than 4,500 hectares (ha) near Kariangau.

¹ Engaged under Bank-financed project preparatory TA No. 2386: *Belawan Port Development Project* for \$595,000, approved on 31 August 1995 and project preparatory TA No.2402: *Banjarmasin, Balikpapan, and Gresik Port Development Project* for \$900,000 approved on 22 September 1995.

5. The proposed port site at Kariangau is about 12 kilometers (km) northwest of the city and faces Balikpapan Bay. The new Kariangau terminal will occupy an area of about 30 ha and comprise the following significant works: (i) construction of a wharf 390 meters (m) long and 30 m wide; (ii) dredging of about 900,000 cubic meters (m³); (iii) land reclamation for the port area of 180,000 square meters (m²) and pavement of open storage area and roads; (iv) construction of transit sheds and a container freight station; and (v) procurement of cargo-handling equipment. Project implementation will commence in 1998 and be completed by 2002. The estimated total cost of the Balikpapan component, excluding contingencies, taxes, and IDC, is \$53.3 million equivalent comprising \$33.8 million in foreign exchange and \$19.5 million equivalent in local currency.

6. Three hundred hectares will be provided for Kariangau Port development by the East Kalimantan provincial government. Construction of an access road from the existing Samarinda-Balikpapan highway to the Trans-Kalimantan highway through the Kariangau Port site commenced in 1996 and is scheduled to be completed by 1999.

7. It is estimated that 500,000 tons of general cargo (170,000 tons for oceangoing ships and 330,000 tons for interisland shipment) and 82,000 twenty-foot equivalent units (TEUs) of containers (10,000 TEUs for oceangoing and 72,000 TEUs for interisland) will be handled in 2005.

B. Description of the Environment

1. Physical Environment

a. Geology and Topography

8. The municipality of Balikpapan has a total area of 750 square kilometers (km²). The Balikpapan area is 85 percent mountainous and 15 percent flat. The municipality is located on the valley ridge and along the coastal line. Kariangau is a 17,532-ha subdistrict located in West Balikpapan district.

9. Balikpapan Bay, in which the port of Balikpapan is located, extends north from the mouth of the Makassar Strait. It has a width of 5.6 km at the entrance, and some 20 km lies between the mouth of the bay and Balang Island. From its topography, the bay may be classified as semiclosed, which may be a retentive polluting zone. High tide is 1.40 m above mean sea level (MSL), and the low tide is 1.40 m below MSL.

10. The rivers that flow into Balikpapan Bay are relatively small in comparison to other principal rivers in East Kalimantan. They include (i) Wain River (including Wain Kiri, Wain Tengah, and Wain Besar), with a length of 18 km; (ii) Sumber River, 15 km; (iii) Makasaar River, 4 km; (iv) Berenga River, 9 km; and (v) Lempasuang River, 10 km.

b. Climate

11. The climate of Balikpapan is tropical. It consists of a dry season from June to September and a rainy season from October to May. The annual atmospheric temperature of the Balikpapan area is 27.0 degrees Celsius (°C), and the average monthly temperature ranges from 26.7°C to 27.3°C. The average relative humidity is 84 percent,

and the mean precipitation is 2,500 millimeters (mm). Northerly winds prevail during the rainy season and southerly winds during the dry season.

c. Water Quality

12. The population of Kariangau is small, and there are no major industrial sources for water pollution. Appendix 1 presents water quality conditions monitored in the coastal sea in front of the proposed Project site. The data show that water quality is in relatively good condition. Also, heavy metals including mercury, chromium, arsenic, selenium, cadmium, copper, lead, and zinc are far below the water quality standards for marine biota set by the provincial government.

d. Air Quality and Noise

13. Air quality including sulfur dioxide (SO₂); nitrogen oxides (NO_x); carbon monoxide (CO); hydrogen sulfide (H₂S); and particulate matter was monitored at Kariangau. While SO₂ and CO were undetected, the levels of NO_x, H₂S, and particulate matter were 0.24 microgram per cubic meter (µg/m³), 1.64 µg/m³, and 39.6 µg/m³, respectively. All items were far below the ambient air quality standards set by the provincial government. The noise level in the coastal area was 48 - 55 audible decibel (dBA), while that in a settlement was 40-45 dBA, is a quiet level for residential areas.

2. Ecological Resources

a. Coastal Environment

14. In Balikpapan municipality, the shoreline facing the Makassar Strait is a good capture area for marine products such as shrimps and crabs. Also, fisheries rely on environments such as the mangrove forests around the estuary of the Wain River, which also supports flourishing fish aquaculture activities. The farmers produce lobster and milkfish. Also, deepsea fishing out of Balikpapan Bay is being increasingly undertaken. However, the proposed site for the Kariangau terminal is located in the northern part of Balikpapan Bay, outside of the major fishing zones.

15. Phytoplankton existing in the Kariangau coastal area is of only one class, the Bacillariophyceae, consisting of 17 species, among which *Chaetoceros* sp. is the most dominant. The individual density of phytoplankton is between 32,850 plankton/liter (L) and 54,813 plankton/L. Zooplankton consists of three classes: Mastogophora consisting of four species, Ciliphora including two species and Crustacea containing five species. The individual density of zooplankton is 38-109 plankton/L. A field survey on benthos showed that there are three classes including seven species in total. The individual density ranges from 128 to 168 per m². These data show a relatively rich biota in the coastal environment. The detailed data on coastal ecology are given in Appendix 2.

b. Terrestrial Environment

16. The proposed project area at Kariangau is infertile hilly land covered by low trees and bushes. There is no dense mangrove or other primary lowland forest in the project area. Secondary vegetation is very dominant in the inland hilly areas. The main

flora in the project area are noted in Appendix 3. There are no protected forests or wildlife zones, and no rare or endangered species have been reported.

3. Socioeconomic Environment

17. The whole municipality of Balikpapan covers about 750 km² with a population of about 390,000 in 1994. The real economic growth rate in 1994 of East Kalimantan Province, to which Balikpapan belongs, was 9.6 percent excluding the oil and gas sector. This compared favorably with the national average of 7.5 percent. Agriculture including plantation crops and timber afforestation is significant, but rice cultivation is more important. Dominant cash crops include rubber, coconut, coffee, pepper, clove, and cocoa. Oil refining by the Indonesian State Oil and Gas Mining Company (PERTAMINA) is the major industrial activity. There are no remarkable tourist attractions, known historical sites, or archeological assets in Balikpapan.

18. The population of Kariangau Subdistrict was 1,159 in 426 families in 1994, which was 0.3 percent of the population of Balikpapan Municipality. The population density of the subdistrict was 6.6/km² compared with the average population density of the whole Balikpapan Municipality of 520/km². The main industry is fishery, and most income is generated by fishing activities. The surrounding area is planned for new industrial development, and three new factories have been established south of the proposed port site along the coast.

C. Anticipated Environmental Impacts and Mitigation Measures

1. Project Location

19. Land acquisition is identified as the only significant preconstruction activity. Only 30 ha of land is needed for the proposed initial development at Kariangau. All of the land allocated for the new port at Kariangau is Government land, and there are no private owners in the area. There are only seven private land users leasing land from the Government in the area. The local government has already compensated these land users in compliance with Indonesian laws and regulations and their leases have been terminated.

2. Construction Stage

a. Terrestrial Ecology

20. The Project component includes land clearing and preparation entailing the loss of vegetation. However, since this area is not a significant habitat of valuable flora or fauna, adverse impacts on the ecological environment are considered to be minor.

b. Marine Environment

21. Without appropriate measures, rain runoff and soil erosion during the construction stage might increase, resulting in the temporary deterioration of water quality in the coastal sea and the marine environment. Rain runoff and soil erosion will be

mitigated by the construction of embankments/slopes prior to land consolidation works. In any case, construction activities will be avoided during heavy rains.

22. The Project component also includes dredging (900,000 m³) and reclamation work (180,000 m²). The work methods during dredging will be of such a nature that will cause minimal disturbance to the marine environment. Dredging material will be piled up at the dump site that has already been set up by the port authority. Also, installation of a silt trap at the outlet of surplus seawater at the site of reclamation will be considered.

c. Air and Noise

23. Some construction work like piling and demolition may generate dust, noise, and vibration. However, since these temporary works will be confined to the port area and there are few residences near it, disturbance to local people will be minimal. Also, the temporary traffic generated by the Project is expected to be 250 vehicles/day, which is relatively low, and environmental impacts by traffic will be insignificant.

d. Social Impacts

24. It is estimated that about 400 persons on average will be employed during the construction period. Also, the construction activities will provide some business opportunities for suppliers of materials and transportation, and for traders to cater to the employees' requirements such as food, daily needs, and medical care.

3. Project Operations

a. Water Pollution

25. Ships calling at the port might generate oily wastewater such as bilge water. Other solid and liquid wastes will also be generated by the port community including ships' crews. A waste reception facility will be established to deal with such liquid and solid wastes. Oily liquid wastes are expected to be handled by third parties. Solid wastes generated at the port area will be collected and disposed of by the municipal government of Balikpapan. Sewage generated at the port area will be treated in septic tanks.

b. Air and Noise

26. Potential sources of air pollution are ships and vehicles for the transportation of cargo and other port operations. However, such impacts will be limited to the hours of port operation, and the intensity will be relatively low; hence no significant impacts are anticipated. Also, no dusty or hazardous cargo will be handled in the port. Since there are few local residents near the project area, noise generated at the port area will not have significant impacts on local people.

c. Social Impacts

27. About 500 persons are expected to be involved in port operations. The population to be benefited will include that of West Balikpapan and East Balikpapan, bringing about job opportunities for local people. The port activities will also create other

business opportunities, particularly in the service sector, contributing to the development of the local economy. Such positive impacts are considered to be significant.

D. Alternatives

28. The proposed Kariangau terminal is a new development outside the main urban area of Balikpapan. Alternatives to this Project would be (i) continued and expanded use of the existing Semayang terminal, and (ii) diversion of cargo to Samarinda Port, 120 km from Balikpapan, or to Banjarmasin Port, 500 km away. The first alternative would incur environmental degradation in Balikpapan and economic loss, since Semayang Port is congested, is physically constrained from further extension, and has already caused some congestion problems within the city. The second alternative would be costly for cargo transport and hinder economic development in Balikpapan due to the lack of efficient port facilities. Therefore, the Project is considered the most appropriate option for port development in South Kalimantan.

E. Cost-Benefit Analysis

29. The financial internal rate of return and economic internal rate of return, assuming an economic life of 20 years, are 10.7 percent and 16 percent, respectively. The cost for environmental mitigation measures will amount to \$520,000, and its ratio to total project cost is 1 percent.

F. Institutional Arrangements and Environmental Monitoring Program

30. An environmental management and monitoring plan was prepared along with the ANDAL report. The Government administration office at Balikpapan Port will be responsible for environmental monitoring and management. To ensure effective environmental management, an organization consisting of (i) physical, chemical, and biological specialists; (ii) a socioeconomic and cultural specialist; and (iii) administration and reporting personnel will be established.

31. The environmental monitoring plan includes activities for the (i) preconstruction phase, (ii) construction phase, and (iii) operation phase. In the preconstruction phase, social impacts including that of land acquisition will be monitored. In the construction and operation phases, both environmental and social impacts will be monitored.

32. During construction, air quality and noise will be monitored at two locations at three stages namely the beginning, middle, and end of construction works. The items for air quality monitoring will be SO₂, NO_x, H₂S and CO. Seawater quality including turbidity, suspended solids (SS), biochemical oxygen demand (BOD), chemical oxygen demand (COD), and other chemical parameters will be monitored at two locations in the port area and one at the dump site. Also, it is planned to monitor the status of erosion and sedimentation as well as impacts on marine ecology such as plankton and benthos. Social impacts such as employment, business opportunities, and traffic disturbance are included in the monitoring plan.

33. During the operation phase, seawater quality will be monitored every six months at four stations in the port area and navigation channel. Parameters to be

monitored include turbidity, SS, BOD, COD, oil, and microbiology. Social issues will be covered by the monitoring plan, i.e., employment opportunities, health and work safety, environmental sanitation, and social security.

34. Once a year, PTPI IV will submit to the Bank (i) a compilation of all the monitoring data, and (ii) highlights of the activities related to environmental management in the port area.

G. Public Involvement

35. The proposed port site is located in an undeveloped area, with only a few people living nearby. Therefore, adverse environmental impacts on local people will be minor during the construction and operation of the Project. Moreover, there are no environmental action committees or community groups active in the project area. The Project has received local publicity, including newspaper coverage, and local people have been fully informed of it. A public meeting was held in October 1996 with participation of concerned stakeholders including local governments and representatives of port users, to explain the proposed project scope and to exchange views and opinions on it.

36. A sample public opinion survey was conducted among 30 local residents, which is 2.6 percent of the total population in Kariangau Subdistrict, during the EIA study. The results show that 25 residents support the Project and 4 have no opinion, while 1 resident does not fully agree with it because he is worried that it will benefit only a certain segment of society and also that he will lose the utilization right of his land.

H. Conclusions

37. The existing Balikpapan Port is located near the city center, and further development at the existing site is not environmentally preferable. The proposed Project at Kariangau is a new development in the undeveloped area far from the city center. The site is infertile hilly land covered with low trees and bushes, and there are no valuable flora, fauna, or historical, or cultural monuments. Although the Project entails civil works including land preparation and reclamation as well as dredging, appropriate measures will be taken to minimize adverse environmental impacts. Only a small number of families will be affected by land acquisition of the Project, and they will be adequately compensated in compliance with relevant Indonesian laws and regulations. The Project is justified in terms of environmental and social matters and is expected to contribute to the development of the local and the national economy as well as to the improvement of the quality of life in the local area.

III. SIEE OF THE BELAWAN PORT COMPONENT

A. Description of the Component

38. Belawan Port is located on the northeast coast of Sumatra, approximately 27 km from Medan, the provincial capital of North Sumatra. It is the largest port in Sumatra and the third largest port in Indonesia. The port is owned and operated by PTPI I.

39. The Belawan Port component comprises the following components aimed at increasing capacity and operational efficiency: (i) construction of a new passenger

terminal including a sewage treatment plant; (ii) provision of a high-capacity loading system for palm oil consisting of pumps, pipeline, and loading points with an oily waste reception facility; (iii) provision of a system for animal feed loading comprising shed stockpile and mobile loading conveyors; (iv) rehabilitation of the quay structure and apron of the Ujung Baru Quay; and (v) provision of one additional quayside gantry crane at the container terminal. Construction is programmed to commence at the end of 1999, with completion at the beginning of 2002. The total cost of the Belawan Port component, excluding contingencies, taxes, and IDC is estimated to be \$31.2 million equivalent, of which \$20.0 million is foreign exchange and \$11.2 million equivalent is local currency.

B. Description of the Environment

1. Physical Environment

40. Belawan Port is situated on a low-lying peninsula bounded by the Belawan and Deli rivers. The surrounding area is flat and typical of the eastern coastal region of Sumatra. Belawan presently consists of the port together with mainly residential areas and some industrial developments on the south bank of the Belawan River. The surrounding area comprises mostly tidal creeks and mangrove swamps, but there are some small farms and fish ponds.

41. North Sumatra has a typical tropical climate. The seasonal variation in climate is small, whereas daily changes are most pronounced. In particular, there is a predominant regime of daily thunder and squalls that develop over the coastal area during the afternoon. Temperature exhibits little seasonable and diurnal variation, with an average daily temperature of between 22°C and 33°C. The relative humidity is high and fairly constant throughout the year, with an average of about 82 percent. The predominant winds are monsoon and trade winds. The northeast monsoon occurs from November to March, and the weather is normally cloudy and rainy. The southwest monsoon prevails from June to September, and this is the least wet season. The average monthly rainfall varies between 100 and 260 mm.

42. The source of the Belawan and Deli rivers is the Sibayak Mountains, and both rivers discharge into the Malacca Strait. The hydrology is influenced by local rainfall, water runoff, and tidal flows. At Belawan, permanent stagnant and swampy areas exist on both sides of the Belawan and Deli rivers. These areas are tidal, and the water is therefore brackish.

43. The water quality in the Belawan River and the access channel is greatly influenced by inflows from industrial and human activities along the two rivers and the activities in Belawan Port itself. The Belawan River contains high concentrations of fine sediments, which are deposited in the lower reaches of the river and the adjacent coastal waters. The port access channel is subject to an extremely high level of siltation caused by littoral drift and riverborne sediments.

2. Ecological Environment

44. Almost all fish production for the Medan area consists of sea fish from the Belawan fishing port. Total fish production rose from 40,310 tons in 1991 to 47,060 tons in 1994. Conditions in the access channel are favorable for the growth of phytoplankton, and

concentration over 8,000 plankton/L were measured. In the port basin and rivers, the measured concentration of phytoplankton was high at around 2,000-3,000 plankton/L. Sampling of the benthos indicated a relatively poor biota. The waters around the port area are rich in nekton, which are caught using various methods such as traps and nets.

45. The vegetation in the area surrounding Belawan Port comprises mainly stands of mangrove, with 17 species having been identified. The mangrove forests provide not only a natural habitat for the wildlife of the area but also fish spawning grounds, protection of the coastal areas from erosion, and a natural barrier between the saline and freshwater environments.

46. Wildlife, mainly birds and monkeys, is found in the mangrove surrounding Belawan. Rare or endangered species are not reported in the project area.

3. Socioeconomic Environment

47. The Belawan Subdistrict of Medan covers some 3,000 ha and includes six villages with a total population of 86,235 in 1992. Employment in Belawan is varied: Fisherman represent the largest employment group (29.6 percent), followed by civil servants (15.3 percent); labor (12.7 percent); merchants (11.9 percent); private employers (9.9 percent); armed forces (4.3 percent); and farmers (4.2 percent) and the rest without specific jobs.

48. The industries dominating the Belawan Port area are associated with plantations (palm oil and rubber); storage; and cement. There is no particular agricultural or mining activity in the port area, although there are some small-scale farmers in the Belawan region who cultivate mainly vegetables.

49. Drinking water for the port area is supplied by PTPI. The water is supplied from 13 deep wells with a combined capacity of 40 tons/hour, with two reservoirs each of 2,000 m³. Shallow water wells generally cannot be used due to seawater intrusion. There is no sewage treatment plant in the port area. Sewage is treated by septic tanks or directly discharged into the watercourses. Solid waste and refuse are deposited in concrete bunkers, collected by truck, and dumped at a landfill site. Environmental sanitation in the Belawan area is generally poor and is closely related to the diseases suffered by the local population such as cholera; worms; and digestive, respiratory, and skin diseases.

C. Screening of Potential Environmental Impacts and Mitigation Measures

1. Preconstruction Phase

50. Since the lands for the new passenger terminal, palm oil storage facility, and dry bulk loading facility are within the existing port area and owned by PTPI I, no land acquisition or resettlement is required. The lands for the widening of the road connected to the new passenger terminal are also owned by PTPI I and the State-owned Railway Corporation (PERUMKA), and no resettlement is required.

2. Construction Phase

51. The construction of the new passenger terminal is the most significant civil engineering construction activity of the entire Project. Nevertheless, the scale of civil engineering work is not large. In addition, other than the approach road widening and laying of a sewer to the sewage treatment plant, all activities will be confined within the port boundary. Also, construction activity for the palm oil loading installation, dry bulk loading facility, and quay rehabilitation at Ujung Baru is small scale. The anticipated impacts of these works are by noise, vibration, and dust. By adopting mitigation measures such as the restriction of nighttime work and water spray for dust control, environmental impacts will be minimized.

52. Some dredging work is involved, but this will be highly localized, and the quantity of dredged material is estimated to be small (370,000 m³). Dredged material will be disposed of out of the port at the dump site designated by the port authority.

3. Operation Phase

53. The potential adverse impacts due to the relocation of the passenger terminal are increased road traffic, ship traffic, and number of travelers in and around the new location. Mitigation measures to cope with the increased passenger traffic are incorporated in the Project. The new terminal is designed to cope with the increase in future passenger traffic and is planned to be more spacious than the existing terminal, while with widening of the approach road the new terminal is designed to deal with the increased road and passenger traffic. It is therefore considered that necessary mitigation measures for the operation of the new passenger terminal have been incorporated in the project planning. The adverse environmental effect due to the operation of an additional gantry crane at the existing container terminal will be very minor.

54. The sewage treatment plant will treat all sewage generated from the operation of the passenger terminal and also sewage transported by truck tankers from berthed ships. The treated wastewater will be discharged into the drainage system, the effect of which is evaluated to be insignificant in consideration of the low quantity of discharge involved and the high degree of treatment level provided.

55. The Project is expected to improve security and environmental conditions in the port area. The significant benefits of the new passenger terminal will be the physical separation of passenger and cargo traffic, resulting in enhanced security within the port. The oil waste reception facility has been incorporated as an environmentally oriented project component. Sludge and residues generated by physical separation will be disposed of at the municipal disposal site in Medan. The provision of covered belt conveyors will reduce potential dust pollution from loading bulk animal feed. Also, the rehabilitation of the quay apron surface will improve the safety of cargo handling operators.

D. Institutional Requirements and Environmental Monitoring Program

56. The Government administration office at Belawan Port will be responsible for environmental management and monitoring in the port including (i) ship inspections and surveys to ensure compliance with international standards; (ii) a reporting system for incidents involving oil, noxious liquids, and harmful substances; (iii) an emergency response plan to deal with accidents including oil spills and leakage of chemicals or other

hazardous materials during transportation; (iv) monitoring of coastal water and air quality; and (iv) proper operation and management of the waste reception facility provided under the Project.

E. Findings and Recommendations

57. No significant adverse environmental impacts are anticipated in the implementation of the Project. Most of the potential adverse impacts will be temporary and limited to the construction and installation stages. These temporary impacts will be managed and minimized by proper planning and execution of the construction works. Through the improved cargo handling and waste reception facilities, the Project is expected to result in a long-term improvement in the port environment.

58. The proper functioning of waste reception facilities is identified as the key in mitigating adverse environmental impacts from the operation of the Project. As a consequence, the establishment of a waste management unit in PTPI I is recommended to ensure proper functioning of the waste reception facilities provided under the Project.

F. Conclusions

59. It is concluded that adverse environmental impacts from the implementation of the Project are not significant. No further environmental assessment study is required prior to the implementation of the proposed project components.

IV. SIEE OF THE BANJARMASIN PORT COMPONENT

A. Description of the Component

60. Banjarmasin Port is the main port of Kalimantan Island, serving much of both South Kalimantan, with 2.6 million population, and Central Kalimantan, with 1.4 million. The port is located about 25 km upstream from the estuary of the Barito River in the western part of South Kalimantan. PTPI III is responsible for operation and maintenance of the port. It comprises three terminals, namely Trisakti, New Martapura, and Old Martapura. Trisakti terminal is used mainly by both foreign and domestic oceangoing vessels. New Martapura terminal, constructed in 1992, is used by small interisland vessels. Old Martapura terminal, the facilities of which are worn out, is located in the middle of the city's commercial area, about 5 km upstream of New Martapura terminal on the Martapura River, and hence interferes with the commercial activities of the city. This terminal is used only by sailing vessels, but will be permanently closed when a bridge currently under construction will be completed in 1998. At that time, the vessels using Old Martapura will be shifted to a new location.

61. Trisakti terminal is very congested and requires expansion to facilitate exclusive berth allocation for container cargo handling, general cargo handling, and passenger terminal, thereby realizing an efficient operation of the terminal. The Project, aimed at providing capacity expansion and operational improvements in Trisakti terminal, comprises (i) extension of the multipurpose berth and development of dedicated container handling facilities at Trisakti terminal, (ii) construction of a long quay at New Martapura, and (iii) procurement of cargo handling equipment. Construction work is scheduled to start

in the end of 1999 and to be completed at the beginning of 2002. The total cost of the Banjarmasin Port component, excluding contingencies, taxes, and IDC is estimated at \$74.6 million equivalent, of which \$51.7 million is the foreign exchange portion and \$22.9 million equivalent is the local currency portion.

B. Description of the Environment

1. Physical Environment

62. Banjarmasin, the capital of South Kalimantan Province, is located on the Barito River Basin. The area in and around the city is composed of low and wet land, and most part of the urban area suffers from flooding in the rainy season. The flood waters come from the Martapura River, which runs through the city, and other small rivers whose water levels are affected by the tidal effects of the Barito River. High tide at the Banjarmasin Port area is 1.05 m above MSL, and low tide is 1.3 m below MSL. The soil in and around the port area is composed of clay, silt, and sand.

63. Since there is a wide sand bar in the estuary of the Barito River, an access channel approximately 14 km long, 100 m wide, and 6 m deep was developed in 1977. Because of heavy siltation, more than 2 million m³ of maintenance dredging is undertaken every year.

64. The climate of Banjarmasin is tropical, with a mean temperature of 26.8°C. The average relative humidity is 79 percent and the mean precipitation is 2,470 mm/year. The prevailing wind direction is west during the rainy season (October-April) and south during the dry season (May-September).

2. Ecological Environment

65. In and around Banjarmasin there are no dense mangrove or other lowland forests. Also, no protected or endangered species are reported. Various types of fishes including freshwater and marine varieties are captured in the area.

3. Socioeconomic Environment

66. The municipality of Banjarmasin covers about 72km², with a population of approximately 516,000 in 1994. The real economic growth rate in South Kalimantan Province was 7.3 percent excluding the oil and gas sector. This was slightly less than the national average of 7.5 percent. Rice cultivation is the most significant agricultural activity. Wood processing by plywood factories and coal mining are among the major industries.

C. Screening of Potential Environmental Impacts and Mitigation Measures

1. Preconstruction Stage

67. The land required for the general cargo terminal is owned by PTPI III. The land for container terminal development is leased to a rubber factory (P.T. Polimer) and a small coal terminal (P.T. Jaya Sakti Batubara) by PTPI III. The lease contract with the rubber factory has already expired in 1992 and compensation cost of relocating the factory

is under negotiations while the contract with the coal terminal will expire in 1998. No difficulty is foreseen in amicably terminating these lease agreements between the industries and PTPI III. There are no legal or illegal inhabitants in the proposed project area, and no resettlement is required.

2. Construction Stage

68. Some construction works like piling and demolition may generate dust, noise, and vibrations. However, since all these works will be confined to the port area, disturbance to the general public will be minimal. Also, the construction activities will cause only a limited increase in traffic to and from the port area. Nevertheless, proper planning and scheduling of transport will be made to minimize the disturbance to regular traffic. Since the construction works involve no dredging or land reclamation, no impacts on either river water quality or aquatic biota are anticipated.

69. It is estimated that about 300 persons on average will be employed during the construction of the Project, which will be a beneficial effect. Also, due to the increased port traffic, several ancillary business opportunities will arise, creating additional jobs in the local community.

3. Operation Stage

70. The anticipated impacts of air pollution are those by ships and vehicles for the transportation of cargo and passengers. However, the impacts will be limited to the port area, and their intensity will be relatively low. The air quality in the port area is currently significantly affected by the rubber and coal storage industries. With the relocation of these industries due to the expansion of the terminal under the Project, an overall improvement of air quality is expected.

71. Ships calling at the port might generate oil-containing wastewater including bilge water. Also, the terminal expansion will result in the increase of ships, passengers, and employees. This might cause deterioration of public health and sanitation at the port due to generation of garbage and wastewater. To deal with these problems, waste collection and handling facilities will be included as a project component. Solid wastes will be collected and disposed of by the municipal government of Banjarmasin as conducted at present.

D. Institutional Requirements and Environmental Monitoring Program

72. The Government administration office at Banjarmasin Port will be responsible for environmental management and monitoring in the port including (i) ship inspections and surveys to ensure compliance with international standards; (ii) a reporting system for incidents involving oil, noxious liquids, and harmful substances; (iii) an emergency response plan to deal with accidents including oil spills and leakage of chemicals or hazardous materials during transportation; (iv) monitoring of coastal water and air quality; and (v) proper operation and management of the waste reception facility provided under the Project.

E. Findings and Recommendations

73. The Project for the extension of Trisakti terminal consists of expansion of the multipurpose berths and development of dedicated container handling facilities at Trisakti terminal and of the local vessel berths in the New Martapura basin. The main works are construction of a concrete wharf and pavement, which will not entail significant adverse environmental impacts. The Project also includes the demolition of an old rubber factory and a small coal delivery center. The relocation of these industrial facilities will result in the improvement of environmental conditions in the port area, because these industries affect ambient air quality at present.

F. Conclusions

74. It is concluded that adverse environmental impacts from the implementation of the Project are not significant. No further environmental assessment study is required prior to implementation of the proposed project components.

Water Quality of the Kariangau Coastal Sea

	Unit	Low Tide	High Tide	Standard Criteria (Category B Water Quality)
<u>Physical Parameters</u>				
water temperature	°C	31.0	28.8 - 29.0	-
salinity	ppt	30.00 - 30.10	30.20 - 30.40	-
suspended solids	mg/L	5 - 8	3 - 5	-
				5
<u>Chemical Parameters</u>				
pH	-	7.5	7.5	5 – 9
dissolved oxygen	mg/L	5.0	5.0	>3 ^a
biochemical oxygen demand	mg/L	6.0 - 7.5	4.8 - 6.2	-
chemical oxygen demand	mg/L	18.0 - 21.8	14.6 - 18.0	-
ammonia	mg/L	<0.02	<0.02	0.5
nitrite	mg/L	0.018 - 0.029	0.023 - 0.027	1.0
cyanide	mg/L	<0.005	<0.005	0.1
oil	mg/L	<1	<1	0 - 1
phenol	mg/L	<0.002	<0.002	0.002
fecal coliform	colonies/100mL	9 - 24	12 - 20	2,000

^a Greater than 6.0 for surface water

COASTAL ECOLOGY IN THE KARIANGAU AREA

Table 1: Phytoplankton Abundance

(unit: individuals/m³)

Organism	Station	
	1	2
BACILLARIPHYCEAE		
<i>Chaetoceros</i> sp.	49,656,342	31,321,693
<i>Nitzschia</i> sp.	2,291,832	—
<i>Navicula</i> sp.	190,986	—
<i>Thalassionema</i> sp.	572,958	636,620
<i>Amphiporora</i> sp.	—	127,324
<i>Surirella</i> sp.	190,986	—
<i>Pleurosigma</i> sp.	190,986	—
<i>Rhizosolenia</i> sp.	190,986	—
<i>Dithyllum</i> sp.	763,944	—
<i>Cyclotella</i> sp.	190,986	—
<i>Leptocylindrus</i> sp.	—	254,648
<i>Bacteriastrium</i> sp.	—	127,324
<i>Coscinodiscus</i> sp.	190,986	127,324
<i>Amphora</i> sp.	—	127,324
<i>Skeletonema</i> sp.	190,986	—
<i>Gyrosigma</i> sp.	—	127,324
<i>Asterionella</i> sp.	190,986	—
Total	54,812,964	32,849,581

(unit: individuals/m³)

Organism	Station	
	1	2
MASTOGOPHORA:		
<i>Ceratium</i> sp.	22,203	6,601
<i>Dinophysis</i> sp.	2,467	943
<i>Peridinium</i> sp.	9,868	2,829
<i>Favella</i> sp.	4,934	—
CILIPHORA:		
<i>Codonellopsis</i> sp.	7,461	—
<i>Tintinopsis</i> sp.	34,538	9,401
CRUSTACEA:		
<i>Nauplius</i> sp.	19,736	11,316
<i>Euterpina</i> sp.	—	2,467
<i>Microsetella</i> sp.	—	943
<i>Cyclops</i> sp.	2,476	943
<i>Oithona</i> sp.	4,934	943
Total	108,617	38,386

Table 3: Benthos Abundance

(unit: individuals/m²)

Organism	Station	
	1	2
GASTROPODA:		
<i>Heliacus</i> sp.	16	32
<i>Nerita</i> sp.	—	16
<i>Planaxis</i> sp.	80	—
<i>Pyrena</i> sp.	—	16
PELECYPODA:		
<i>Dorax</i> sp.	16	—
<i>Tellina</i> sp.2	48	32
POLYCHAETA:		
<i>Sphaerodorum</i> sp.	—	32
Total	168	128

Table 2. Zooplankton Abundance

VEGETATION IN THE PROPOSED KARIANGAU PORT AREA

Type	Species
Natural Vegetation	<i>Avicennia</i> sp. <i>Bruguera</i> sp. <i>Shorea</i> sp. <i>Dipterocarpus</i> sp. <i>Dryobalanops</i> sp.
Cultivated Vegetation	<i>Musa</i> sp. (banana) <i>Manihot esculenta</i> (cassava) <i>Acacia aurculiformis</i> (acacia) <i>Mangifera</i> sp. (mango) <i>Artrocarpus heterophylla</i> (grapefruit) <i>Cocos nucifera</i> (coconut) <i>Cupresus papuana</i> (pine) <i>Carica papaya</i> (papaya) <i>Pandanus tectorius</i> (pandanus) <i>Psidium Guajava</i> (guava) <i>Arthrocarpus integra</i> (grapefruit) <i>Aeca cathecu</i> (palm) <i>Metroxylon sagu</i> (sago) <i>Spondias pinnata</i> (kedondong) <i>Bambusa</i> sp. (bamboo) <i>Baccauera motlyana</i> (rambai) <i>Eugenis augea</i> (rose apple)