

LOAN 1357-INO

GAS TRANSMISSION AND DISTRIBUTION PROJECT

REQUEST BY THE BORROWER

FOR

CHANGE IN PROJECT SCOPE

April 2002

SUMMARY ENVIRONMENTAL IMPACT ASSESSMENT

I. INTRODUCTION

1. The environmental impact assessment (EIA) of the revised Project was undertaken in accordance with the requirements of the Government's AMDAL (*Analisis Mengenai Dampak Lingkungan*, environmental impact assessment study). Perusahaan Gas Negara (PGN) prepared a revised EIA for the modifications of the original pipeline from Sakernan to Batam and an EIA for the Batam to Singapore segment of the pipeline. The EIAs were approved by the AMDAL Commission in December 2000.

2. This SEIA focuses on the modifications to the Project that have environmental concern and summarizes the environmental impact issues of the Batam-Singapore segment. The EIA study was conducted by a consulting group that assessed the following components: topography, geology, and morphology; soils; water quality; sea bottom sediment; oceanography; terrestrial flora and fauna; aquatic biota; and socioeconomic and cultural parameters. Methods of information collection included field sampling and assessment, interviews and review of secondary data.

II. PROJECT DESCRIPTION

3. The original Project involved constructing a 524-kilometer (km) long 28-inch diameter natural gas pipeline from Grissik (South Sumatra Province) to Duri (Riau Province, with 20-inch diameter extension pipeline to Batam. The first component was completed in 1998. The second component will now be expanded into a 28-inch diameter pipeline and extended from Batam to Singapore.

III. DESCRIPTION OF THE ENVIRONMENT

4. The general area of influence of the EIA study includes the intersection of administrative, ecological and socio-economic boundaries. The area includes the land along the pipeline to be constructed from Panaran, where it comes onshore from Kuala Tungkal, through the Strait of Bulan crossing four islands (Tanjungkubu, Telukdalam, Lumba Besar, and Pemping) to the Indonesian-Singapore Borderline.

5. The construction will affect a small section of southern Batam island; four kecamatan (subdistricts) – Sungai Beduk, Bulang, Sekupang, and Belakang Padang; and six villages – Tanjung Gundap, Dapur Duabelas, P, Buluh, Desa Kasu and Desa Pemping.

A. Physical Environment

6. The five islands effected by the pipeline form part of the northern extension of the Riau Archipelago. The largest is Batam covering 28 km at its widest part with the other islands no longer than 2 km. Batam Island contains low hills with elevation less than 65 meters. The four smaller islands also are of low hills and all have the same geologic deposits consisting of some tuffs, and compositions of shale, granite, schist, slate and quartzite.

7. The rainfall pattern in the island chain is considered to be a very wet regime, with the annual rainfall exceeding 2,000 mm and reaching as much as 3,000 mm. Winds generally blow

from the north and northeast from December to April with an average speed varying between 5 to 7 knots. From May to October the winds shift and come from the south. As is typical of the region, the months of March, October and December are prime times for tropical cyclones. The entire pipeline offshore area is effected by strong tides.

8. General air quality is considered good, because smaller land masses in coastal areas that cause dynamic air movements. Water quality as measured by temperature, turbidity and suspended solids show generally good surface conditions when compared to standards for marine fisheries. The range of pH, salinity, and concentration of dissolved oxygen indicate normal conditions for marine waters. Other parameters which yield good levels include BOD, COD, ammonia, oil and lipids, and several heavy metals including mercury, cadmium, copper and chromium. However, nitrite levels exceed maximum limits in all sampled stations, as do samples of phenols, lead and zinc. The researchers speculated this was expected due to the intense use of sea shipping in the region and corresponding ship bilge pumping. The temperature, turbidity and suspended solids of the bottom level waters are also within the range of good conditions for marine biota. The same higher levels for the parameters on the surface (nitrates, phenols, lead, and zinc) are found.

B. Biological Environment

9. There is varying quantity of mangrove forest along the island zones of the pipeline. These are not extensive, and have been under human stress for considerable time. In the southern Bulan Straits, there are still some extensive mangroves on smaller uninhabited islands. There are areas on each of the four islands in which the pipeline will traverse where moderate sized strips of mangrove can be found.

10. Other terrestrial vegetation includes dispersed segments of cut over forest and secondary vegetation. In general, the forest habitat is of degraded quality. Much of the islands in the study area have small parcels of coconut, rubber, cassava and clove. The aquatic biota samples, including plankton, benthos and coral reefs indicate conditions are not pristine. This is to be expected in the area since it has been under coastal resource extraction for many years contributing to its current declined state. There was no data collected on the status of the key fish species in the area. The most important fish include Dingkis fish (Indian Rabbitfish, *Siganus luridus*), pari (*Taeniura* spp.), kerapu (*Ephinepelus* spp.), kembung (*Rastrelliger* spp.), kakap (*Lates calcarifer*), kuaru (*Polynemus* spp.) and others.

C. Socioeconomic Environment

11. The area traversed by the pipeline from Batam to Pemping consists of smaller fishing communities on the island waterfronts and various homesteads on the four smaller islands. The ANDAL did not contain any survey data on local infrastructure, population distribution and human settlement on the islands, island employment sources, and use of natural resources nor general economic conditions.

12. However, a site visit indicates that the economic status on the four islands is considerably variable as indicated by the quality of homes and that the coastal resource is a key foundation for transportation, resource use and income generation. Batam serves as a major ship building and servicing facility for the heavy regional and international marine freight and transport industry. The local economy is driven by the demand side aspects of the Singapore market for seafood, shipbuilding and repair and labor. A large collection of ship building and dry

dock facilities is situated on Batam's western coast along the Bulan Strait within the area of influence of the pipeline.

13. The overall level of social infrastructure development on the four islands is limited to five small elementary schools, two secondary schools, three health centers, nine health posts, and localized wells for water supply. There are permanent school teachers on the islands as well as health workers, but no permanent doctors.

14. Fishing is a significant income source for locals. Many of the fishermen use dugout canoes with various size outboard engines. There are still significant numbers of fisherman that do not have outboards and are restricted in their range of fishing activities. Common fishing practices found throughout the archipelago include use of kelongs (live fish traps), seine nets, coral blasting, and cyanide poisoning. Floating fish pens are universally used to collect and hold live fish until they can be transported to the Batam and Singapore markets via a hierarchy of merchants.

15. The effected fishermen are around Tanjung Gundap, Buluh island, Tanjungkubu, Telukdalam, Lumba Besar, Kasu and Pemping. Income derived from fishing is based on the fishing gear used and the daily income is estimated at: Rp8,000-25,000/day for line fishing and Rp15,000–150,000 for net fishing depending on boat size. Kelong fishermen can earn Rp100,000–5000,000 per month and have it increase to Rp5,000,000–70,000,000 during the Chinese New Year months of January and February.

16. Agriculture activity on the four islands is characterized by small land holdings producing a variety of crops such as, cassava, coconut, rubber, and fruits and vegetables. The island soil formations have very shallow organic horizons and are not suitable for high yield agriculture production.

IV. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Onshore Construction

1. Air and Noise

17. The effect of project activities on air quality during construction is the result of equipment use. The expected increase in dust, noise, and vehicle emission will be minimal, with the extent of impact limited to the route of mobilization and ROW activities. This is based on criteria that include the number of people exposed, narrow areal extent of impacts, short duration, low intensity, and no cumulative effects of the impacts. Reducing the limited impacts from heavy equipment use includes basic operational plans that considers the location of households and time of equipment operation.

2. Land and Water

18. The clearing of vegetative cover for the ROW will expose the island soils to potential erosion. The 25m width of the ROW is small and land clearing will be performed sectionally followed by pipeline installment. Therefore the cumulative impact on erosion will be the time of exposure which is relatively limited. A secondary impact of land clearing is erosion runoff into the nearby coastal waters.

19. All erosion and runoff is effected by the length of time the soil remains exposed and the amount and intensity of rainfall. PGN needs to improve its erosion control measures along the ROW at points of steep inclination. The Grissik to Duri line still has erosion problems as a result of poor revegetation and absence of simple erosion control measures such as siltation fences, rip rap and diversion channels.

3. Disposal of Solid Waste and Wastewater

20. The primary source of solid wastes are from construction camps. Although there is soil waste during trenching, all this material will be used for refill. The use of water for hydrotesting entails flushing the pipes to remove solid debris (including mill cuttings, spent welding rods, plastic materials, stones and rubble). PGN will not add anti-corrode additives or methanol to hydrostatic water. The contaminated hydrostatic water discharge will be disposed through storm water drains or street curbing along the Batam distribution network and will be eventually routed directly to the coastal areas. On the islands, the hydrostatic wastewater will be discharged onto the land or into channels. Some discharge will be absorbed while most will eventually enter the near shore coastal areas.

21. PGN has established technical guidelines on worker camp facilities and solid waste management and removal. The projected pollution impact of hydrostatic water discharge is minimal and controlling the rate of disposal release will reduce concentrations. PGN will test the discharge to assure that oil content is below 15 ppm. If this threshold is exceeded, PGN will require oil separation from the discharge flow.

4. Interference with Existing Socioeconomic Conditions

22. The pipeline route runs adjacent to privately owned property and land, but the encroachment on such lands is limited to the narrow ROW activities. Currently PGN is preparing to begin the initial process of land acquisition (socialization to be followed by a complete census of affected persons) for the Batam-Singapore section. This will follow procedures used for the Grissik-Duri sector where all compensation related issues appear to have been addressed. Compensation payment has also been completed in the Sakernan-Kuala Tungkal section, although some related issues remain outstanding and could point to potential unrest. It is important to deal with these problems carefully and rapidly and use the lessons learned in the current Batam to Singapore route. PGN would benefit from clear grievance-redress procedures and also implement these for the Batam to Singapore route. ADB is involved in policy dialogue with the Government on land acquisition and related issues.

23. Although social concerns in the project are important and significant, there would seem to be little need for much resettlement. The routes selected have generally avoided habitations and structures of any great economic, social or cultural value. There is also no evidence that vulnerable, indigenous communities who may deserve special consideration have been affected.

5. Onshore Construction Conclusions

24. Land use impacts resulting from construction activities may temporarily affect private property. Potential impacts include noise, dust, storage and spillage of construction wastes and materials. Some short-term impacts may occur to agricultural lands as a result of disruption to crops and some limited structures. For the distribution network on Batam, road and utility

crossings can be bored to avoid disruption. Inadequate land reclamation along the ROW could result in continued erosion.

25. PGN will not permit liquid waste material from construction equipment and hydrostatic testing to be disposed onto agricultural fields or in the vicinity of community dwellings. PGN will not permit the disposal of solid wastes generated

B. Offshore Construction

1. Mangroves

176. The distribution of mangrove habitat directly impacted by the pipeline is limited to narrow strips along the interface of land and water on the five islands. All of these mangrove forests have been under pressure for many years. PGN has specified the locations of mangrove and will bore under those places where there is a narrow width, when possible.

27. In those areas where the mangrove is cut for ROW access and pipe laying, PGN will require the contractor to replant mangroves according to the prevalent species at that location. Mangrove restoration has been practiced in Indonesia and there are several well-established procedures and specialists available to use.

2. Coastal Biota and Coral Reefs

188. The influence of pipe offshore installation on water quality will reach an area 3km away from dredging and digging. Due to sea currents this impact will be temporary and limited. The larger impact will be on those corals undergoing dredging. This impact is restricted to those areas less than 13 meters in depth on the westside of Lumba Besar, on the north side of Pemping island and on the north side of Kasu island.

199. On the coral reef ROW, dipper dredger technology will be implemented to minimize the amount of impact caused by coral destruction, breaking and degradation. This technology limits the actual cutting area.

3. Interference to Fishery Activities

30. A significant number of fisherfolks are likely to be affected by the revised Project during its construction phase. The total number of effected kelongs is 94, including small, moderate and big kelongs. Compensation will be based on the size category of kelong as well as its temporary or permanent status. This is mainly because fishing nets and fishing grounds will be affected. In addition, sand mining in the Batam area could pose a serious risk. It will be important to have adequate consultations with affected parties so that impacts can be minimized. The problem of concessions for sand mining will need to be discussed with local government authority and may need to be revoked.

4. Obstruction of Shipping, Navigation and Sand Mining

31. The Sea Communication Directorate General and Hydrooceanography of the Indonesian Navy will be informed of all construction activities in the sea-lanes. Navigation warning signs will be required in Bulan Strait, from Tanjung Kenggal at Batam to Tamjungkubu. The navigation diversion plan is to shift the traffic to the west side of Menkada island and then to the east side

of Menkada during pipeline installation as the ROW moves. Installation of floats will start from Tanjungkubu and extend to Menkada waters. The markers will be clearly visible during the day and have lights for nighttime display.

32. Numerous sand-mining concessions are in the area of influence. These areas have been mapped and requests for restricting mining activities around the seabed ROW will be made to the Mining and Energy Department.

5. Conclusions

33. PGN will develop a framework for a coastal resource management (CRM) fund for the local fishing communities that utilize coastal resources along the pipeline route in the Batam to Pemping area. This fund, designed along the lines of the general PGN social fund, will allocate financial resources to replicate similar programs being undertaken in the Indonesia archipelago by the Asian Development Bank. The CRM framework will include a description of targeted CRM activities, identification of all key stakeholders including resource users, government and nongovernment organizations and private sector parties, and estimated costs for these actions. The framework for CRM fund will also include a brief overview of similar programs being currently implemented in the country including their objectives, scope and expected results. This overview should form the basis of defining a set of applied initiatives that would enhance the coastal resource base for local fishing in a three to five-year time frame.

V. ECONOMIC ENVIRONMENTAL BENEFITS

34. Replacing natural gas for other fuels has several positive environmental benefits, including improved energy efficiency during combustion, reducing emissions of greenhouse gases (GHGs) and reducing pollutant loads that have harmful human health effects. Determining the overall environmental benefits of this project entails understanding several key components of the entire gas extraction, production and utilization system. Consequently, an analysis requires defining the energy use, emissions and discharges, human health risks, and environmental changes of all upstream and downstream facets. In the past, many natural gas projects simply state that there is an overall environmental benefit due to using a cleaner fuel. However, estimating overall environmental benefits is a complicated matter that requires acquiring details throughout the gas process.

VI. INSTITUTIONAL REQUIREMENTS AND THE ENVIRONMENTAL MONITORING PLAN

35. PGN will develop a monitoring program consistent with the environmental impacts identified in the AMDAL. All significant impacts will have associated mitigation provisions (see table 1) detailed in the tender specifications for all contracts. All impacts will be observed in the field in pre-defined and standard formats according to a schedule. All records will be documented within the document control system in order to ensure they are accessible through the PMC for PGN HSE staff. Environmental monitoring will be undertaken for the following phases: pre-construction, construction and operation.

36. PGN will ensure effective environmental management and monitoring through the following procedures: monitoring of corrective and preventive actions by the contractor through formal reports to ensure non-compliance corrections, and regular monthly assessment by PGN

management of the environmental monitoring program and formal notification to contract management if non-compliance persists.

VII. PUBLIC INVOLVEMENT

37. The Government's AMDAL process requires participation by effected communities and provisions to solicit their feedback on the project activities. PGN engaged in consultations with landowners and local communities in their AMDAL process. Representatives from local government were also invited to voice their opinions at the discussion of the EIA during the AMDAL Central Committee, Ministry of Mines and Energy on November 7, 2000.

38. PGN has a unit that will continue dialog with effected communities and individuals and plans to conduct formal discussions with such parties at least twice a year at minimum one-year before construction begins. There will also be employment opportunities to local people, which is estimated to be 40 individuals. The compensation process for land acquisition and kelong and other fish traps will continue throughout the construction process.

VIII. CONCLUSIONS

39. Based on the AMDAL process and other project evaluations, the significant environmental issues of the Project relate to the social and environmental impacts that will occur primarily during construction. Most impacts will be temporary and are not expected to have long term significant effects. The significant impacts requiring mitigation measures include both onshore and offshore actions; land acquisition, income compensation for lost revenue from agriculture and fishing activities, coral reef destruction, interference with sea navigation and shipping, hydrostatic testing, and operational emergency response. Procedures for compensation for land and income generation will be implemented by PGN based on a consultation process. A CRM framework will be defined by PGN that enhances resource use and management use through a public private partnership. PGN will also undertake a corporate health, safety and environment study to improve its management and operational capabilities. The environmental benefits that would result from using natural gas from the Project include energy efficiency, reduced GHG emissions and improved human health. Environmental management and monitoring plans have been defined by PGN.