



Global Environment Facility

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April 27, 2006

Dear Council Member,

The World Bank, as the Implementing Agency for the project, ***Regional (Indonesia, Malaysia): Marine Electronic Highway Demonstration***, has submitted the attached proposed project document for CEO endorsement prior to final approval of the project document in accordance with the World Bank procedures.

A minor increase (\$0.3m) in the total GEF allocation has been necessary mostly to cover the costs of additional activities under the Marine Environment Protection component of the project, as requested by the Secretariat.

The Secretariat has reviewed the project document. It is consistent with the proposal approved by the Council in August 2003, and the proposed project remains consistent with the Instrument and GEF policies and procedures. The attached explanation prepared by the World Bank satisfactorily details how Council's comments and those of the STAP have been addressed. I am, therefore, endorsing the project document.

We have today posted the proposed project document on the GEF website at www.theGEF.org. If you do not have access to the Web, you may request the local field office of the World Bank or UNDP to download the document for you. Alternatively, you may request a copy of the document from the Secretariat. If you make such a request, please confirm for us your current mailing address.

Sincerely,

A handwritten signature in black ink, appearing to read "L. Good", is written over a horizontal line. To the left of the signature is a small, stylized mark that looks like a lowercase "j" or "l".

for Leonard Good
Chief Executive Officer and Chairman

cc: Alternates, Implementing Agencies, STAP

OFFICE MEMORANDUM

DATE: April 27, 2006

TO: Mr. Leonard Good, CEO/Chairman, GEF

FROM: Steve Gorman, GEF Executive Coordinator



EXTENSION: 35865

SUBJECT: **Indonesia, Malaysia and Singapore: Marine Electronic Highway Demonstration Project - Request for CEO Endorsement**

1. Please find attached the electronic file of the GEF Project Document, the agreed minutes of negotiations with Indonesia (to confirm its co-financing), and the Memorandum on Arrangements (sections F and G of which confirm the shipping industry's co-financed inputs) for the above-mentioned project for your final review and endorsement. This project was approved for Work Program entry in August 2003, under streamlined CEO endorsement procedures. We would appreciate receiving your endorsement as soon as possible, so that we may finalize the World Bank Board submission package.
2. The proposed final project is fully consistent with the objectives and scope of the project proposal that was approved for Work Program entry. At the GEF Secretariat's request prior to CEO endorsement, the project's Marine Environment Protection component has been expanded to (a) map all environmentally-sensitive areas within the demonstration site, in collaboration with the national environment institutions; (b) incorporate these maps into an oil spill impact prediction model for the demonstration area; and (c) add simulated oil spill response exercises in all three countries that will use these outputs and involve the national environment agencies. As a result of these enhancements, the estimated cost of this component has increased from US\$0.61 million at the time of Work Program entry to US\$0.85 million now. An additional US\$200,000 in GEF resource allocation is requested to cover the incremental costs of these additional activities. Cost inflation, and particularly oil price increases over the nearly three years since the project's Work Program entry, has also increased the cost of other components, particularly the production of electronic navigation charts for the demonstration site. Consequently, the project's estimated total cost has increased from US\$15.45 million at the time of Work Program entry to US\$17.00 million now. An additional \$100,000 in GEF resource allocation is also requested to help cover a small portion of these additional incremental costs. Thus a total of \$300,000 in additional GEF project co-financing, over and above the \$8 million approved at Work Program entry, is now requested to complete the project financing plan.
3. The GEF Secretariat conditions for CEO endorsement have been met as follows:

(a) *Confirm commitment of co-financing:* Indonesia's co-financing is confirmed by the minutes of negotiations. Co-financing commitment letters from the other financing partners, INTERTANKO and the International Chamber of Shipping, are attached.

(b) *Environmentally-sensitive areas will be mapped for inclusion in the MEH information system:* This work comprises component 4.2.

(c) *Involvement of the environment institutions in the countries will be strengthened:* The national environmental institutions will coordinate the activities under the Marine Environment Protection component and participate in the sensitive area mapping, the national emergency response system exercises, and in the project evaluation.

4. The issues raised by Council members at the time of Work Program entry have been addressed as follows:

(a) *What is the baseline, number of accidents in the project area, severity of oil spills and targeted outcome?* An expert, independent economic cost-benefit analysis of the potential full-scale Straits of Malacca and Singapore MEH system that the project is designed to catalyze has been performed and is summarized in Annex 9. This analysis defines the baseline – i.e. ship movements through the MEH demonstration area, the baseline ship accident rate, and the risk of a major oil spill. The analysis then projects the impact of a potential full-scale MEH system on the baseline ship accident and major oil spill risk rates and estimates both the system's economic rate of return, which is 21% for its oil spill reduction benefits alone. The analysis also notes that the owner/operators of large vessels using the full-scale MEH system's precision navigation tools to navigate the Straits would reap additional benefits from the opportunity it would offer to reduce their ship's required under-keel clearance and thus carry more cargo. These potential cost-savings are estimated to be more than sufficient to cover the full-scale system's development and operating costs, and thus make it economically viable.

Many thanks.

Attachments

cc: Messrs./Mmes. Ramankutty, GEF Program Coordination, Merla, Duda and Severin (GEFSec); Bajpai, Burningham, Broadfield (EAP); Hatziolos, Khanna, Wedderburn, Illouz (ENV); ENVGC ISC, Regional Files

Document of
The World Bank

Report No: 34042-ID

PROJECT DOCUMENT
ON
TWO PROPOSED GRANTS FROM THE
GLOBAL ENVIRONMENT FACILITY TRUST FUND
TO THE
INTERNATIONAL MARITIME ORGANIZATION
IN THE AMOUNT OF US\$6.86 MILLION
AND TO THE
REPUBLIC OF INDONESIA
IN THE AMOUNT OF US\$1.44 MILLION
FOR A
MARINE ELECTRONIC HIGHWAY DEMONSTRATION PROJECT
April 10, 2006

CURRENCY EQUIVALENTS
(Exchange Rate Effective December 2005)

Currency Unit	=	US\$
Indonesia Rupiah 10,000	=	US\$1
Malaysia Ringgit 3.78		US\$1
Singapore dollar 1.647		US\$1

FISCAL YEAR (International Maritime Organization and Indonesia)
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

AIS	Automatic Identification System
ASEAN	Association of South East Asian Nations
DGPS	Differential Global Positioning System
DGST	Directorate General of Sea Transport, Government of Indonesia
EA	Environmental Assessment
ECDIS	Electronic Chart Display and Information System
EMPS	Environmental Management and Protection Systems
GEF	Global Environmental Facility
ICS	International Chamber of Shipping
IHO	International Hydrographic Organization
IMO	International Maritime Organization
INTERTANKO	International Association of Independent Tanker Owners
MIO	Marine Information Objects
MOA	Memorandum on Arrangements
MOE	Ministry of Environment (Indonesia)
MOU	Memorandum of Understanding
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PEMSEA	Partnerships in Environmental Management for the Seas of East Asia
PIP	Project Implementation Plan
PMU	Project Management Unit
PSC	Project Steering Committee
SOLAS	International Convention on the Safety of Life at Sea
STRAITREP	Straits of Malacca and Singapore Mandatory Ship Reporting System
STRAITSREP	Straits (of Malacca and Singapore) Reporting System
TC	Technical Committee
TSS	Traffic Separation Scheme
ULCC	Ultra Large Crude Carrier
UNCLOS	United Nations Convention on the Law of the Sea
VLCC	Very Large Crude Carriers
VTS	Vessel Traffic Service
ENC	Electronic Navigation Chart
ULCC	Ultra Large Crude Carrier

Acting Vice President:	Jeffrey Gutman
Country Manager/Director:	Andrew Steer, Ian Porter
Sector Manager:	Jitendra N. Bajpai
Task Team Leader:	Sally Burningham

MARINE ELECTRONIC HIGHWAY DEMONSTRATION PROJECT

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on behalf of the participating countries, coordination of the design, development and operation of the MEH demonstration system and also provide for key technical inputs to the project. The main functions will be performed by the staff of a Project Management Office (PMO), which will operate under the responsibility of the IMO. The PMO will be located on the island of Batam, Indonesia, almost directly across the Straits from Singapore. It will be co-located with Indonesian Government's marine management bureau that is responsible for the Indonesian waters of the Marine Electronic Highway (MEH) demonstration section and will be housed in facilities provided and serviced by the Government of Indonesia.

Component 2: MEH System Development (US\$7.04 million)

This component will provide for production of the navigational information on which the MEH system will be based, and its incorporation into real-time electronic charts that ship operators will be able to use to navigate with precision through the MEH demonstration section of the Straits. These activities will be coordinated by the PMO, under the direction of the IMO, and comprise the Tide and Current Facilities to be executed by Republic of Indonesia and Hydrographic Survey Electronic Navigation Charts and Information Exchange System.

Component 3: Ship-board Equipment and Communications (US\$6.00 million)

Carrying out of testing of the demonstration MEH system by about 160 ships fitted with type-approved electronic chart display and information systems, including internet connectivity. This component will be executed by the owners of at least 160 large oil tankers and container ships that regularly transit the Straits, and will be facilitated by two major ship owner representative organizations, the International Association of Independent Tanker Owners (INTERTANKO) and the International Chamber of Shipping (ICS). With the facilitation of INTERTANKO and ICS, the ship owners will arrange that, by the end of year three, at least 160 of their ships that regularly transit the Straits are fitted with internationally-approved ECDIS and AIS and have internet connectivity—these elements comprise the suite of technical equipment required to use all the elements of the MEH demonstration system. In addition, the ship owners will ensure that, once the MEH demonstration system is operational, all of the 160 ships which are so equipped always use it when transiting the Straits and provide detailed and timely feed-back on its performance to the PMO and later to the independent experts tasked with evaluating the demonstration system and assessing the costs, benefits and legal/financial feasibility of expanding it to cover the entire Straits.

Component 4: Marine Environment Protection (US\$0.85 million)

This component will be executed jointly by the institutions in the littoral states that are responsible for marine navigation and environmental management and the International Maritime Organization and will consist of Oil Spill and Sand Wave Models, Sensitive Area Mapping and Emergency Response Systems.

Component 5: Information Dissemination, Evaluation and Scale-Up Plan (US\$0.23 m)

This component will be managed by the IMO through the PMO, and will consist of Website and Publicity, Evaluation of the MEH system and System Development.

Which safeguard policies are triggered, if any? The project only triggers OP/BP 7.50 "Projects on International Waterways". However the requirement of notification of other riparians does not arise since the three littoral states of the Strait of Malacca, namely Indonesia, Malaysia and Singapore, are participating in the implementation of the project, and have signed an Memorandum of Understanding regarding their participation.

Significant, non-standard conditions, **if any**: There are no significant, non-standard conditions

A. STRATEGIC CONTEXT AND RATIONALE

1. Country and sector issues

The Straits of Malacca and Singapore, situated between Sumatra and the Malay Peninsula, are approximately 1,000km long, 300km wide at their north-west entrance, and just 12km wide at their south-east entrance, between Singapore and Indonesia's Riau Archipelago. They are shallow, with narrow channels, irregular tides and shifting bottom topography, and hence are hazardous to navigation for large ships. They are also rich in natural resources on which many of the coastal inhabitants depend.

Despite their difficult navigational features, the Straits are the shortest and hence the preferred shipping route between the Indian Ocean and the South China Sea, and for oil tankers trading between the Persian Gulf and the fast-growing countries of East Asia. Over 200 very large crude oil carriers and container ships pass through the Straits each day, and traffic is growing by 10 percent per year. There is also much cross-Strait traffic which cuts through the major shipping lanes.

Recent enhancements in maritime safety infrastructure and regulatory mechanisms have improved navigational safety and traffic flow. Singapore has an efficient radar-based ship position monitoring system covering the Singapore Strait. In 1998, the three littoral states (Indonesia, Malaysia, and Singapore) jointly commissioned a mandatory ship-reporting system (STRAITREP) for the most congested 300 km section of the Straits from One Fathom Bank to the Singapore Strait, which combines radar and automatic ship identification and tracking.

These recent improvements to navigational aids and facilities have reduced the frequency of ship collisions, groundings and oil spills. However, several vessel groundings and collisions occurred in the past five years that caused significant oil spills, such as those involving the 'Natuna Sea' (October 2000) and the 'Singapura Timur' (May 2001). Total compensation claims for the 'Natuna Sea' accident were over US\$127 million. A recent economic valuation of the natural resources at risk in the Malacca Straits estimated them at US\$5 billion, and identified more than 50 species of marine coral and fish on the endangered species list. So, despite the improved navigation system, the threat of collision and grounding and of consequent environmental damage is still significant and, with rapid traffic growth, is increasing.

All three littoral states have oil spill response capabilities and oil spill contingency plans, including a cooperative response agreement. However, the several recent serious shipping accidents highlighted the need for an improved ship management system, for quicker and more accurate deployment of spill response equipment and manpower, and for more efficient institutional arrangements for dealing with them. In addition to more rapid response, immediate access to information on spill location and track and the environmental resources at risk are also needed if the impact of any spill is to be minimized. Better communication is the key to more effective oil spill response, but a more effective ship monitoring and control system is required to prevent major incidents, as well as to serve as early warning of their potential environmental damage and where it will occur.

Recent advances in marine navigation, communications and environmental impact prediction technologies offer an opportunity to upgrade existing systems to further reduce the risk of ship

accidents in the Straits and the environmental damage they cause. By providing mariners with very accurate, real-time navigational information (depth, tide, and location of sand bars) the new technologies could also reduce shipping costs by permitting safe navigation in poor weather and optimal loading, and may even reduce marine insurance costs.

The best-proven of the new marine navigation technologies is the “Marine Electronic Highway” (MEH). First installed in Canada’s St. Lawrence River in the early 1990s, a MEH combines an Electronic Chart Display and Information System (ECDIS), an Automated Identification System (AIS), shore-based marine information databases and advanced ship-to-shore communications. The ECDIS involves the use of electronic navigational charts which replaces traditional paper charts as the ship operator’s primary navigation tool. It shows the ship’s exact location, plus real-time data on water depth, tidal flow and navigational risks. The AIS gives shore controllers precise information on ship location, direction and speed, which help them avert collisions or groundings. The same data used to compile the electronic navigation charts can predict the direction and speed of any oil spill movements and help to identify and deter ships that illegally flush their bilges or dump other oily wastes. The foundation for this technology already exists in the Straits and the littoral states are committed to its installation, but the cost to them of developing and operating it, and the uncertainty of whether they can recover those costs, has deterred them from making the investment. In addition, an external catalyst is needed to bring about the new institutional arrangements between national governments, the International Maritime Organization (IMO) and the ship operators that are needed to make the system work.

2. Rationale for Bank and Global Environmental Facility (GEF) involvement

The rationale for Bank involvement is that it has a unique combination of convening power and technical skills that can help the littoral states overcome the barriers that have prevented implementation of the system until now. The Bank can facilitate collaboration between the IMO, the international institution responsible for promoting environmentally-sound marine navigation, the International Hydrographic Organization (IHO), responsible for marine mapping, major international ship-owner representative organizations and the governments of the three littoral states. Financially, it can access the resources of GEF, which, in its International Waters Focal Area, can provide grant or concessional funding to help countries address major environmental threats to shared water bodies, such as the Straits of Malacca and Singapore.

The project is consistent with one of the major objectives of the GEF's International Waters Operational Program 10, as it will overcome the barriers to the adoption of best-practice technology in marine navigation and pollution control in the Straits, and thereby reduce the risk of contamination of an international water body. As the project is a partnership between governments, the GEF and the private sector, it is also consistent with one of the GEF's key strategic objectives, to promote public-private partnerships that benefit the global environment.

GEF support for the project is further justified because the Straits of Malacca and Singapore are a zone of high marine biological diversity, rich in the marine fauna and flora that are characteristic of tropical estuarine environments. The abundance of sea-grass beds, mangrove swamps, coral reefs, and wetlands, enriches the associated coastal marine environments, which are also stopovers for migratory birds on seasonal transition. Natural resource-related activities,

such as fishing and coastal tourism, are key to the regional economy. By catalyzing the development of a MEH system that will protect these natural resources, the GEF can help achieve global and local environmental benefits and poverty reduction, which is also the Bank's core objective.

3. Higher level objectives to which the project contributes

The Marine Electronic Highway (MEH) project is the first (demonstration) phase of a proposed two-phase program to establish a MEH in the Straits of Malacca and Singapore. The Demonstration Project's objective is to determine if a full-scale MEH for the Straits is economically justified and financially feasible. If the MEH is successful in the Straits of Malacca and Singapore, it has the potential to be extended to the whole shipping route from Europe and the Middle East to East Asia. Other East Asian countries have already expressed interest in such an extension and are awaiting the outcome of the demonstration phase before taking specific actions on extension. There is also interest from states that are littoral to other major sea lanes in applying the MEH principles and methods to their own regions.

B. PROJECT DESCRIPTION

1. Lending instrument

The World Bank mobilized co-financing for this project in the form of a GEF grant. This is the most appropriate co-financing instrument because: (a) the feasibility of the Marine Electronic Highway (MEH) system that the project will demonstrate and test is unproven, and (b) the MEH system promises to deliver significant global as well as local environmental benefits. The bulk of its non-Bank co-financing will be provided by the commercial shipping industry, which is appropriate because it stands to gain commercial benefit from a successful MEH system.

Commitment of the littoral states and other essential participants in the Project has been confirmed by the signing of two Memoranda on September 8, 2005:

- a *Memorandum of Understanding (MOU)* by and among the three littoral states, Indonesia, Malaysia, Singapore, and the International Maritime Organization. Articles IIIA and IIIB of this Memorandum show clearly the roles and responsibilities of IMO and Indonesia (through the MOE) respectively, and;
- a *Memorandum on Arrangements (MOA)* among the three littoral states, Indonesia, Malaysia, Singapore, the International Maritime Organization, the International Hydrographic Organization (IHO), the International Association of Independent Tanker Owners, and the International Chamber of Shipping (ICS). This Memorandum indicates the arrangements for the implementation of specific activities indicated in the MOU.

2. Program objective and phases

The program's objective is to reduce the user costs and environmental damage of marine navigation through the Straits of Malacca and Singapore (the Straits). These objectives will be achieved by developing a Marine Electronic Highway (MEH) for the entire Straits

(approximately 1,000km) which will: (a) reduce the frequency of ship collisions in the Straits' busy and congested sea lanes and port arrival and departure areas; (b) make marine navigation in the Straits feasible more often in poor weather; (c) allow ships in transit to optimize their loads for passage through the Straits; (d) facilitate more effective monitoring of vessel operations, such as illegal bilge water releases, thus deterring such environmentally-damaging behavior; and (e) generate more resources and increase capacity for environmental protection of the Straits and its surrounding coasts.

This first phase project will facilitate the program's objective by: (a) developing and testing a demonstration MEH system for the most congested 300 km section of the Straits; and (b) based on the results of these tests and on international marine navigation law, assessing the financial, economic, and legal feasibility and environmental benefits of developing a MEH system for the entire Straits. If, based on the results of this assessment, the three participating littoral states and representatives of the international shipping industry decide to develop such a system, the project will prepare the design, of and financing and institutional plan for, a MEH system covering the entire Straits.

The expected duration of the Demonstration Project is four years and its total cost is about US\$17 million. Its implementation will be coordinated and technically supported by the IMO, on behalf of the littoral states. The Governments of Indonesia, Malaysia and Singapore, primarily through their ministries responsible for marine navigation and the environment, will collaborate in and steer the project. The trigger for moving from phase one to phase two of the program to develop a marine electronic highway for the entire Straits of Malacca and Singapore will be a decision by the concerned governments and representatives of the commercial shipping industry. The cost of such a system is not known at this time, but will be estimated by the project. The process of designing the full-scale MEH system will take account of the rapid advances in marine navigation technology that are currently occurring.

3. Project development and global environment objectives and key indicators

The project's development objective is to assist the Republic of Indonesia, Malaysia, the Republic of Singapore and representatives of some of the large commercial ship owners that use the Strait of Malacca and the Strait of Singapore, to collectively decide whether to establish a marine electronic highway for the entire length of the Straits of Malacca and Singapore. The indicator of the project's success is that these key stakeholders reach a decision on this issue.

The project's global environment objective is to improve maritime safety and reduce environmental damage to the globally-significant shared natural resources of the Straits of Malacca and Singapore. It will not be possible to determine with certainty if it has achieved this objective in its short life. An evaluation of the MEH demonstration system's technical performance and the project stakeholders' decision whether to maintain and/or expand it will indicate if this objective is likely to be achieved in the longer term.

4. Project components

The project has five components (see Annex 4 for a detailed description). The total project costs is US\$17 million, of which US\$8.3 million will be financed by the GEF, US\$6.0 million by private sector participants (ship-owners), and US\$2.7 million by the three littoral states. IMO will manage all components of the project. GOI will execute the Tide and Current Facilities of Component 2.

Component 1: MEH System Design, Coordination and Operation (US\$2.88 million)

This component will provide for project management by the IMO on behalf of the participating countries, coordination of the design, development and operation of the MEH demonstration system and also provide for key technical inputs to the project. The main functions will be performed by the staff of a Project Management Office (PMO), which will operate under the responsibility of the IMO. The PMO will be located on the island of Batam, Indonesia, almost directly across the Straits from Singapore. It will be co-located with Indonesian Government's marine management bureau that is responsible for the Indonesian waters of the MEH demonstration section and will be housed in facilities provided and serviced by the Government of Indonesia.

The major tasks to be undertaken within this component will be:

1. System Planning and International Maritime Organization Management
 - (a) Management of the operational aspects of the Project by the International Maritime Organization.
 - (b) Development of a system for the management and on-line access and storage of data and information, including links to the MEH Data Centers and financial and economic assessments.
 - (c) Development of criteria and measurable indicators for Project performance assessment, including the carrying out of a baseline survey to compile and analyze data and information covering a period of about thirty years up to the inception of the Project, as a basis for evaluation of the impact of the MEH system.
2. Project Management Office
 - (a) Strengthening the capacity of the staff of the Project Management Office, including relevant training.
 - (b) Establishment of MEH Data Centers in the Republic of Indonesia, Malaysia and the Republic of Singapore, including provision of relevant training to the staff of the MEH Data Centers in operation and management of the MEH system and in data handling and exchange.
3. Project Steering Committee Support Carrying out of meetings of the Project Steering Committee, the Technical Committees and the Working Groups, including travel and accommodations for participants.

Incremental Operating Cost. Component 1(c) and part of component 1(b) above, can be described as incremental operating costs which consist of travel and per diem by staff of the PMO, PSC, WGs and TCs, communications, consumables, advertising of bidding, printing and publication of Project information, rental of meeting facilities (but excluding staff salaries), which would not have been incurred without the project.

Component 2: MEH System Development (US\$7.04 million)

This component will provide for production of the navigational information on which the MEH system will be based, and its incorporation into real-time electronic charts that ship operators will be able to use to navigate with precision through the MEH demonstration section of the Straits. These activities will be coordinated by the PMO, under the direction of the IMO, and comprise the following sub components:

1. Tide and Current Facilities. Tidal and current monitoring on the Republic of Indonesia's coast of the Strait of Malacca, including provision of relevant equipment.
2. Hydrographic Survey. (a) Carrying out of a hydrographic survey within the designated traffic separation scheme in the Strait of Malacca within the Project Area and (b) Provision of training to the hydrographic surveyors of the hydro-oceanographic services of the Republic of Indonesia, Malaysia and the Republic of Singapore.
3. Electronic Navigation Charts. Production of high resolution electronic navigation charts for the Project Area, including provision of relevant computer software licenses to the Republic of Indonesia and to Malaysia.
4. Information Exchange System. Establishment of a MEH information exchange system, including data servers, data exchange protocols and training of staff in data exchange.

Component 3: Ship-board Equipment and Communications (US\$6.00 million)

Carrying out of testing of the demonstration MEH system by about 160 ships fitted with type-approved electronic chart display and information systems, including internet connectivity. This component will be executed by the owners of at least 160 large oil tankers and container ships that regularly transit the Straits, and will be facilitated by two major ship owner representative organizations, the International Association of Independent Tanker Owners (INTERTANKO) and the International Chamber of Shipping (ICS). With the facilitation of INTERTANKO and ICS, the ship owners will arrange that, by the end of year three, at least 160 of their ships that regularly transit the Straits are fitted with internationally-approved ECDIS and AIS and have internet connectivity—these elements comprise the suite of technical equipment required to use all the elements of the MEH demonstration system. In addition, the ship owners will ensure that, once the MEH demonstration system is operational, all of the 160 ships which are so equipped always use it when transiting the Straits and provide detailed and timely feed-back on its performance to the PMO and later to the independent experts tasked with evaluating the

demonstration system and assessing the costs, benefits and legal/financial feasibility of expanding it to cover the entire Straits (see component 5).

Component 4: Marine Environment Protection (US\$0.85 million)

This component will be executed jointly by the institutions in the littoral states that are responsible for marine navigation and environmental management and the International Maritime Organization and will consist of the following activities:

1. Oil Spill and Sand Wave Models. Carrying out of a modeling and analyses of: (i) the likely movement of oil spills originating in the Project Area, and (ii) the sand wave formation and movement in the Project Area.
2. Sensitive Area Mapping. Research and development of options for providing real-time geo-referenced environmental protection information to mariners navigating in the Straits of Malacca and Singapore and for conservation and coastal resources management and mapping of sensitive areas.
3. Emergency Response Systems. Carrying out of simulated oil and chemical spill emergency response exercises to determine the cost-effectiveness and efficiency of the MEH system in the event of chemical and oil spill incidents from ships.

Component 5: Information Dissemination, Evaluation and Scale-Up Plan (US\$0.23 m)

This component will be managed by the IMO through the PMO, and will produce the following outputs:

1. Website and Publicity. Production and dissemination of information through the Internet on the MEH system, including technical reports, progress reports and a newsletter, and carrying out of national and regional workshops and seminars to provide information and seek feedback on the benefits and applicability of the MEH system.
2. Evaluation. (a) Assessment of the cost and benefits of the establishment and use of the MEH system in terms of maritime safety and marine environment protection, including (i) the development of criteria and measurable indicators for the socio-economic assessment of the MEH system, and (ii) the carrying out of a socio-economic survey to evaluate the benefits of the MEH system; (b) (i) Carrying out of an assessment of the technical functionalities of the MEH system, including system performance, (ii) Carrying out of a continuous monitoring of new and potential technologies that could be linked to the MEH system or enhance its performance, including the carrying out of technical evaluations on the new technologies to determine their suitability, value added contribution, enhancing performance and cost effectiveness, (c) Carrying out of an assessment of the MEH system, including institutional and legal aspects, and (d) Consolidation of the technical, institutional, legal, financial and economic assessments of the MEH system, including the implementation of the Project, and development of a managing tool blueprint.

3. System Development. Carrying out of marketing strategies to package and market the MEH system and its marine information and other products, and the services it could provide.

5. Lessons learned and reflected in the project design

The concept of a marine electronic highway (MEH) was initiated in Canada in the early 1990s with the application of digital technology to navigation, particularly in the development of ENCs and the ECDIS. The core of the Canadian version of the MEH was the integration and interconnection of the ECDIS and the AIS with powerful shore-based databases to provide a basis for optimized shipping traffic management decisions.

Since 1995, the ECDIS has been widely deployed in the Great Lakes and the St. Lawrence River corridor with considerable success, especially in assisting with navigating through treacherous waters even in heavy fog conditions. However, standards for electronic navigational charts and the unavailability of type-approved ECDIS during this early period led to the use of non-conforming ECDIS by the Canadian shipping sector. Thus, many Canadian ships plying the Great Lakes and the St. Lawrence Seaway had difficulty in switching to standardized technology subsequent to the commercial launching of the first type-approved ECDIS in 1999, and the wider adoption of the IHO S-57 (electronic chart standard). Although the full MEH concept remains to be realized, the pioneering efforts in Canada have led to the widespread adoption of electronic navigational charts and the ECDIS. Since 1999, several type-approved ECDIS have appeared on the market, and many national hydrographic agencies have the capacity to produce approved S-57 electronic navigation charts.

The utility of ENCs combined with ECDIS is now well accepted in the maritime industry as a means to increase the safety of vessels and improve their commercial performance, particularly in areas with restricted under keel clearance and water depth. Placing these technologies in the framework of the MEH system will provide greater benefits not only for the shipping industry but also for the marine environment sector. From the marine environment protection standpoint, the reduction of vessel accidents and online availability of marine information could lead to improved monitoring and lower response time to marine environmental incidents, and lower clean-up costs and better quantification of damages, as well as enhanced management of the coastal and marine resources in the Straits.

6. Alternatives considered and reasons for rejection

The alternative of making incremental improvements to existing navigational facilities and ship control systems in the Straits was considered but rejected because it has very limited potential for reducing ship-related environmental damages or for improving navigational efficiency compared with the proposed MEH system.

New technology is now under development that would enhance the value of the MEH. This technology involves using real time satellite monitoring of the sea bed and depth of water, with accuracy to within one meter. This, along with the application of real time tide and weather information to mathematical models would give vessel operators a much higher level of

confidence to load their ships with a reduced under keel clearance than an estimate of the available water depth based on hydrographic surveys. . However this technology is not yet proven and its cost is unknown. The concept of the MEH is to make maximum use of available technology and not use it as an experimental application of new technology. Although new technologies have been rejected for now, their development will be monitored during the Demonstration Project and their viability reassessed before design of the Full-Scale MEH project.

C. IMPLEMENTATION

1. Partnership arrangements

The demonstration phase of the Project will be managed by the IMO, a UN organization with a global mandate for navigation safety and marine environmental protection. The governments of Indonesia, Malaysia and Singapore have signed a Memorandum of Understanding (MOU) that defines their relative responsibilities under the project. Other partners in the project, that have signed a Memorandum on Arrangements (MOA), are INTERTANKO (representing the owners of tanker vessels using the Straits), the ICS representing the interests of owners of container vessels using the Straits, and the IHO, the intergovernmental organization with responsibility for the quality of hydrographic information included in marine charts. Negotiations are under way with other national governments that have expressed an interest in participating in the Project.

2. Institutional and implementation arrangements

The Project Steering Committee (PSC) established during the project preparation will continue to act as the overall regional body to implement the MEH Demonstration Project. The PSC will operate, administer and manage the MEH system under a cooperative agreement among all the stakeholders of the MEH. Four TCs and two WGs will be established under the guidance and direction of the PSC. They will evaluate various technical issues and outputs of the project for the purpose of adapting the structure of the MEH Demonstration Project for the Full-scale Project. The PSC will participate in the annual GEF Project Implementation Review.

A PMO will be established at Batam, Indonesia (agreed to and partly funded by the government of Indonesia) to administer and manage the project. It will be staffed by a Project Manager, four technical experts, and administrative staff. The local (or onsite) management of the project will be carried out by the Project Manager who will be supervised by the Director of the Marine Environment Division of IMO. The staff will work closely with the counterpart agencies, and staff of the national Data Centers. The staff of the PMO will also oversee/coordinate the work of the consultants and review their reports as well as providing support to the PSC, the TCs, and the WGs.

3. Monitoring and evaluation of outcomes/results

The objective of the demonstration project is to determine whether the Full-Scale MEH project will be technically, politically, operationally, and financially viable. Monitoring and evaluation of the progress and outcomes of the Demonstration Project will be an important contribution to a

decision whether to proceed with the Full-Scale MEH. In addition, there will be a mid-term review and annual reviews by the Project Steering Committee, bi-annual internal reviews on project implementation as well as the results and outputs. The PSC will participate in the annual GEF Project Implementation Review (PIR). The findings of these reviews will be used to assess project progress and the need to modify approaches and the mobilization of resources.

The key performance indicators as shown in Annex 3 will be used to assess the outputs and impacts of the MEH Demonstration Project.

The PMO will be responsible for preparing terms of reference, contracting and supervising the consultants who will undertake the basic monitoring and evaluation tasks. One of the main results of the Demonstration Project will be an assessment of the viability of the Full-Scale MEH and of the conditions necessary for its successful implementation and operation. Although the assessment will be made by consultants contracted by and working under terms of reference prepared by the PMO, it is the PSC that will have final responsibility for all conclusions of the monitoring and evaluation studies.

4. Sustainability and Replicability

Although the full-scale MEH project is limited to the area of the Straits of Malacca and Singapore, there is an intention that the scope should be extended to the whole of the sea-lanes between the Suez Canal and the major ports of East Asia. There are other sea lanes with a high density of shipping where the principles of the MEH could be applied, including the Black Sea and Bosphorus, the Baltic Sea, the North Sea and English Channel, the River Plate, the Red Sea, the approaches to the Panama Canal, the St. Lawrence Seaway (where the concept of a MEH was first applied).

5. Critical risks and possible controversial aspects

The Demonstration Project risks to the development and establishment of the full-scale MEH are that the private sector will not be willing to commit, finance and implement the activities designed to develop and establish the MEH system, as well as the lack of commitment from governments to engage in such partnership arrangements. However, the implementation of the two stages of the MEH Project means that ample time and effort will be provided for the development and establishment of the Full-Scale MEH.

	Potential risks	Risks Mitigation	Rating
<i>Political</i>	This is a multi-national project, requiring cooperation among countries that have not been consistent in maintaining such relations. In addition, the MEH covers international waters, where the authoritative institution is the IMO. The activities of shipping in international waters are subject to a large number of conventions and agreements that are administered by the IMO, however it has few powers of enforcement of these, other than by persuasion and cooperation with industry.	During the project preparation phase, the three countries involved in the project have demonstrated a high level of cooperation and coordination of their respective activities. Their commitment, as well as the commitment of all other participating organizations, is further codified in the MOU and the MOA, which have been signed by all parties concerned. Other agreements will be developed in the course of project implementation, which will cover partnerships with various agencies, organizations and groups to carry out specific activities under the five project components. These agreements will spell out the specific commitments of each of the parties whose participation is essential to the success of the project.	S
<i>Managerial</i>	The demonstration MEH will involve a large number of agencies, the procurement of a large volume of highly sophisticated equipment and the integration of several different technologies.	The required managerial capacity and experience will be provided by the IMO as project manager. The strength of the IMO in this role was demonstrated during the project preparation phase, as well as in numerous similar projects that depend on international cooperation of a group of maritime littoral states in their mutual interest. The day-to-day management of the project will be provided by a specially recruited project management team under the supervision of IMO and guidance of the PSC including the four TCs and two <i>ad hoc</i> WGs.	M
<i>Technical</i>	The MEH project is the first to implement a coordinated set of marine operational and environmental tools and as such is subject to the risks associated with such demonstration projects, with the principal technological risk being in the provision of the needed software and models.	Since the required software and associated models does not involve any new or innovative technology, this risk is considered minimal and not exceptional for a project based on electronic procedures.	M
<i>Financial</i>	The project is fully dependent on support from the shipping industry and, in particular, on the willingness of the ship operators who make most use of the Malacca and Singapore Straits to accept MEH-user charges and to invest in equipping their vessels to use the MEH.	<p>The three littoral States, INTERTANKO and ICS have already committed to their financial contribution and these commitments have been confirmed in the MOU-MEH and the MOA-MEH, respectively. INTERTANKO and ICS have committed that their members will supply at least 60 and 100 respectively, adequately equipped vessels. On-going consultations with representatives of other shipping interests will be maintained in the expectation that further commitments to equipping ships to participate in the demonstration project will be made. Importantly, owners will continue to have the choice of not using the MEH and passing the Straits completely, free of any charges.</p> <p>The cost of the Project may exceed the estimates in this PAD. Korea and Japan have already expressed an interest in contributing expert personnel, equipment, and/or financial resources for the Project.</p>	M S
Overall Risk Rating			M

Risk Rating – H (High Risk), S (Substantial Risk), M (Modest Risk), N (Negligible or Low Risk)

6. Grant conditions and covenants

6.1 Grant Agreement with the International Maritime Organization

Conditions of Board Presentation

The International Maritime Organization (IMO) and the Republic of Indonesia have concluded an Agreement, acceptable to the Bank, specifying the functions; staffing, including support staff; facilities including office space to be provided to the Project Management Office in Batam, as well as who will provide the required staff, facilities, and operating costs.

Conditions of Effectiveness

- (a) The GEF Trust Fund Grant Agreement shall have been executed on behalf of the Republic of Indonesia and the Bank.
- (b) The Recipient shall have provided to the Bank a Project management memorandum, acceptable to the Bank.
- (c) The Project Implementation Plan, acceptable to the Bank, shall have been adopted by the Recipient and endorsed by the Republic of Indonesia, Malaysia and the Republic of Singapore.

Conditions for Continued Implementation

- The IMO shall take all steps necessary to ensure that the PSC shall be maintained until completion of the Project.
- The IMO shall employ a Project Manager for the Project Management Office in Batam, Indonesia, acceptable to the Bank, by December 31, 2006.
- The IMO shall adopt and, thereafter apply in the implementation of the Project, the PIP, acceptable to the Bank, which shall include the description of: (a) implementation arrangements, (b) the procurement procedures, (c) reporting requirements, financial management procedures and audit procedures, (d) the project performance indicators, and shall not amend, suspend, abrogate, repeal or waive any provisions of the PIP without the prior agreement of the Bank.
- The Project Steering Committee through IMO shall furnish to the Bank for its review and comments not later than September 30 in each year, commencing September 30, 2007, and until completion of the project, draft revisions to the PIP for the components of the project not yet carried out, with emphasis on the activities to be implemented in the following calendar year, including the scope of the activities to be carried out, cost estimates, time based implementation schedules, financing plan, budget arrangements and the relevant procurement plan.
- The IMO will revise the PIP by November 30, in each year, commencing November 30, 2007, taking into account the comments of the Bank thereon.
- The IMO shall maintain until the completion of the Project, the PMO, with terms of reference, facilities and staff (including a Project Manager), at all times acceptable to the Bank.

- The IMO shall, until completion of the Project, ensure the involvement of its staff responsible for procurement.
- The Bank shall have the right to suspend or cancel the GEF Grant to IMO if the GEF Grant to Indonesia does not become effective six months after the signing of the first of the Grants to Indonesia and IMO.

Completion of the following Studies/Technical Assistance:

- IMO shall provide cooperation and technical assistance to the Republic of Indonesia, Malaysia and the Republic of Singapore to ensure the completion of production of electronic navigational charts (ENC) by March 31, 2008.
- IMO shall provide the required technical assistance to ensure that INTERTANKO and ICS have each, by December 31, 2008, at least 60 and 100 ships, respectively, equipped with type-approved ECDIS and AIS including internet connectivity.
- IMO shall furnish to the Bank by May 31, 2010 the draft final report on the technical, financial, economic, and legal feasibility of a scaled-up MEH system for the entire Straits of Malacca and Singapore.
- IMO shall by August 31, 2010, taking into account the comments of the Bank, furnish to potential participants and beneficiaries of the Full-Scale MEH system the finalized feasibility study, including the design of an operational and financing plan, and an institutional structure for the Full-Scale MEH system.

Monitoring and Reporting:

- IMO shall maintain policies and procedures adequate to enable it to monitor and evaluate on an ongoing basis, the carrying out of the Project and the achievement of the objectives thereof in accordance with the indicators set forth in Annex 3 of this PAD.
- IMO, shall prepare, under terms of reference satisfactory to the Bank, and furnish to the Bank on or about June 30 of each year commencing June 30, 2007, a report integrating the results of the monitoring and evaluation activities on the progress achieved in carrying out the components of the Project carried out by IMO during the period preceding the date of such report, and setting out the measures recommended to ensure the efficient carrying out of the components of the Project carried out by IMO, and the achievement of the objectives thereof, during the period following such date.
- IMO shall review with the Bank, by September 30 of each year, commencing September 30, 2007, or such later date as the Bank shall request, the report referred to above, and thereafter take all measures required to ensure the efficient completion of the components of the Project carried out by IMO, and the achievement of the objectives grants, thereof, based on the conclusions and the recommendations of the said report and the Bank's views on the matter.
- The IMO shall prepare under terms of reference satisfactory to the Bank, and furnish to the Bank on or about September 30, 2008, a report integrating the results of the monitoring and evaluation activities mentioned above, on the progress achieved in the carrying out of the Project, including an assessment of the commitment of the partners in the Project, the interest of other countries in the scaled-up MEH, evaluation of new

technologies and their potential applicability and inclusion in the MEH, and determination of the need for Project restructuring , if any.

- The IMO shall review with the Bank and with the parties to the Memorandum on Arrangements, by December 31, 2008, the report referred to above, and, thereafter, take all measures required to ensure the efficient completion of the Project and the achievement of the objectives thereof.
- As from the end of the first calendar quarter after the effective date of the grants, IMO shall prepare and furnish to the Bank quarterly financial management reports (FMR) not later than 45 days after the end of the quarter (February 15, May 15, August 15, and November 15) of each year. These reports will cover financial management, including projected sources and applications of funds for the six month period following the period covered, physical progress in project implementation, and procurement under the project and expenditures under contracts financed out of the proceeds of the grants.
- IMO, assisted by the MOE, shall within six months of the closing date of the GEF grants provide to the Bank an implementation completion report in a format acceptable to the Bank.
- IMO shall furnish to the Bank audited accounts for the project not later than six months from the end of the fiscal year, that is by June 30, starting June 30, 2007.

6.2 Grant Agreement with the Republic of Indonesia

Conditions of Board Presentation

The International Maritime Organization (IMO) and the Republic of Indonesia have concluded an Agreement, acceptable to the Bank, specifying the functions; staffing, including support staff; facilities including office space to be provided to the Project Management Office in Batam, as well as who will provide the required staff, facilities, and operating costs.

Conditions of Effectiveness

- (a) The GEF Trust Fund Grant Agreement shall have been executed on behalf of the International Maritime Organization and the Bank.
- (b) The Project Coordination Unit shall have been established
- (c) The Project Implementation Unit shall have been established
- (d) The Recipient shall have established auditing arrangements, acceptable to the Bank, including provisions to make the audit report available to the public.
- (e) The Project Implementation Plan, acceptable to the Bank, shall have been adopted by the Recipient.

Conditions for Continued Implementation

- Indonesia shall continue as a permanent member of the Project Steering Committee (PSC) and play an active role in the PSC activities.
- Indonesia shall maintain until completion of the Project, the PMO, with facilities and support staff at all times acceptable to the Bank.

- Indonesia shall maintain until completion of the Project, the PIU with terms of reference, facilities and staff, including a procurement officer and a financial officer, at all times acceptable to the Bank.
- Indonesia shall adopt and, thereafter apply in the implementation of the Project, the PIP, acceptable to the Bank, which shall include the description of: (a) implementation arrangements, (b) the procurement procedures, (c) reporting requirements, financial management procedures and audit procedures, (d) the project performance indicators, and shall not amend, suspend, abrogate, repeal or waive any provisions of the PIP without the prior agreement of the Bank.
- The Bank shall have the right to suspend or cancel the GEF Grant to GOI if the GEF Grant to IMO does not become effective six months after the signing of the first of the Grants to Indonesia and IMO.

Completion of the following Studies/ Technical Assistance:

Indonesia shall complete the purchase and installation of tidal stations and upgrading of existing stations by April 30, 2007.

Monitoring and Reporting:

- Indonesia shall maintain policies and procedures adequate to enable it to monitor and evaluate on an ongoing basis, the carrying out of its part of the Project and the achievement of the objectives thereof in accordance with the indicators acceptable to the Bank.
- Indonesia shall prepare, under terms of reference satisfactory to the Bank, and furnish to the Bank on or about June 30 of each year commencing June 30, 2007, a report integrating the results of the monitoring and evaluation activities on the progress achieved in carrying out its part of the Project during the period preceding the date of such report, and setting out the measures recommended to ensure the efficient carrying out of its part of the Project and the achievement of the objectives thereof, during the period following such date.
- Indonesia shall review with the Bank, by September 30 of each year, commencing September 30, 2007, or such later date as the Bank shall request, the report referred to above, and thereafter, take all measures required to ensure the efficient completion of its part of the Project, and the achievement of the objectives thereof, based on the conclusions and the recommendations of the said report and the Bank's views on the matter.
- As from the end of the first calendar quarter after the effective date of the grants, Indonesia shall prepare and furnish to the Bank quarterly financial management reports (FMR) not later than 45 days after the end of the quarter (February 15, May 15, August 15, and November 15) of each year. These reports will cover financial management, including projected sources and applications of funds for the six month period following the period covered, physical progress in project implementation, and procurement under the project and expenditures under contracts financed out of the proceeds of the grants.
- Indonesia shall within six months of the closing date of the GEF grants provide to the Bank an implementation completion report in a format acceptable to the Bank.

- Indonesia shall furnish to the Bank audited accounts for the project not later than six months from the end of the fiscal year, that is by June 30, starting June 30, 2007.

D. APPRAISAL SUMMARY

1. Economic and financial analyses

The full-scale MEH project has a very high economic rate of return, with a pay-back period of less than one year. The probable savings in ship operating costs in the first year of operation are several times greater than the total investment cost of the project. Even when the annual operating and maintenance costs and future investment costs in new hydrographic surveys are included, the economic rate of return is in excess of 100 percent (details in Annex 9). This indicates that the cost savings to ship operators in the first year of operation of the project are expected to exceed the total investment costs.

No financial analysis has yet been carried out, since the financial feasibility of the full-scale MEH is one of the activities to be undertaken during the Demonstration Project. The financial feasibility depends on the operators of ships, who will benefit from the reduced under-keel requirements of the Straits, being prepared to pay for the service that will enable them to take advantage of the reduced clearance.

2. Technical

From the technical standpoint, the critical aspects in the development of the MEH system will be the integration of maritime safety technologies, marine environment protection systems and the establishment of the managing tool (the full Technical Specifications of the MEH in the Straits of Malacca and Singapore is available in the project file). The risk associated with project implementation could be minimized by identifying and addressing the technical, socio-economic, financial and legal issues and by quantifying and promoting the benefits of the MEH system. The process will be a participatory approach and this will provide the opportunity for the relevant stakeholders to own the development of the MEH system and propel it to its completion. The co-operation initiated during the PDF Block B phase will be strengthened by the participatory approach and serve as an impetus to stronger public-private sector partnership and broader clientele (littoral States, user States, the private sector and technology providers and users).

3. Fiduciary

Procurement. A full Procurement Capacity Assessment has been conducted as part of the project preparation in accordance with the Revised Instructions for carrying out Assessment of Agency's Capacity Assessment to Implement Procurement (2002). The objective is to evaluate the capability of the implementing agencies and the adequacy of the procurement and related systems in place, assess the risks, develop an action plan to enhance capacity and minimize risks, and, to propose a suitable supervision plan (the full Procurement Capacity Assessment is available in the project file).

The International Maritime Organization (IMO) is responsible for the US\$6.86 million Grant and will undertake procurement of goods and consultancy packages and provide overall management of the project for the three littoral states. The IMO system is established and functioning in accordance with the applicable UN rules and regulations.

The Government of Indonesia (GOI) is responsible for the US\$1.44 million Grant. The Office of the Deputy Minister for Nature Conservation Enhancement and Environmental Destruction Control of the Ministry of Environment is the coordinating Ministry for the Project. The Directorate General of Sea Transport (DGST) of the Ministry of Transport is the implementing agency and will undertake all the procurement required for GOI part of the Project, namely four goods packages (Tidal Stations, DGPS Base Station, two AIS Base Stations, and Ocean Buoys).

The Assessment has rated the project risk as “*average*” due to the following identified aspects: (i) Procurement activities consist of a limited number of packages, about nine goods procurement and about 17 consultancy services; (ii) six of the packages for procurement of goods and non consulting services will be conducted through international competitive bidding and three packages will be procured through shopping procedures; (iii) Technical Committees will be established, with representatives of each of the Implementing Agencies, who will prepare the specifications of the Procurement Packages.

The actions to mitigate the risks include: (i) the prior review thresholds are set lower than the maximum thresholds for average risk projects (see below); (ii) the Procurement Plan (PP) for the project has been established and will be updated when necessary; (iii) a Procurement Officer will be appointed in MOE and the head of the Procurement Division within IMO will provide coordination and management of procurement activities; (iv) all the technical specification and bidding documents will be prepared well in advance of procurement implementation by the IMO and MOE; and (v) adoption of a set of disclosure policies to increase public accountability of the project. The following are the prior review thresholds and supervision plan that correspond to “average” risk:

- Goods and non-consulting services: US\$200,000.
- Consultant Services: US\$100,000 for firms and Individual Consultants. TORs for all contracts.
- Post Review ratio: a minimum of one of every 5 contracts or 20 percent.

Financial Management. The financial management arrangements for the MEH project activities implemented by the International Maritime Organization (IMO) are acceptable. As a specialized agency of the United Nations, the IMO follows acceptable accounting and reporting practices in accordance with the United Nations System Accounting Standards (UNSAS). In addition, IMO received an unqualified opinion on the most recent financial statements.

The Country Financial Accountability Assessment (CFAA) carried out by the Bank in 2000 concluded that the control environment in Indonesia is not strong despite commitment of the political leadership to improvement. This was corroborated by ADB’s Country Governance Assessment Report (September 2002). Although improvements have been made since then, the need to reform the financial management system persists, especially in view of the ongoing decentralization process and the continuing problem with corruption. Despite the preceding, the

financial management arrangements for the operations of the MOE as the coordinating agency for the Indonesian part of the project, are acceptable subject to completion of the agreed action plan. The financial assessment of MOE in 2004 concluded that MOE must: (i) establish a PIU within MOE, and (ii) recruit and assign a qualified Financial Officer to administer the project activities as described in the Action Plan for Financial Management which was agreed with MOE (Annex 7).

From a financial management perspective, the MEH is a low risk project. IMO is a reputable United Nations agency with extensive experience in implementing donor-financed projects. The nature of the project procurement (i.e., a small number of relatively large contracts) and simplified accounting and reporting also contribute to the low risk rating. Since about 15-20 percent of the grants will be used for the procurement of equipment, physical inspection to confirm the proper use of project funds will be possible.

Currently, MOE is implementing OTF-ODS Phase-Out Investment (TF-21982) and is supported by management consultants who assist the Project Manager and its Treasurer. MOE recognizes its limitation in financial management and agreed that the existing consultant for OTF-ODS Phase Out Investment project will also support MEH implementation.

4. Social

The project is expected to generate coastal development and environmental benefits for the littoral states; global environment benefits by reducing the pollution of shared marine water bodies; and economic benefits for the international shipping industry and their billions of customers. It will further result in reduced vulnerability to catastrophic pollution for the coastal states and the communities depending on the Straits' marine and coastal resources for their livelihoods. The technological innovations associated with the project's implementation and its information generation and sharing aspects, in particular, are expected to significantly contribute to improved environmental stewardship and natural resource management capacity across the three littoral states. No direct or indirect adverse social impacts are expected.

5. Environment

To the extent that no direct or indirect adverse impacts to the environment are associated with this project, it has been classified as an environmental category "C" project. The project is expected to have important positive environmental impacts on the Straits and the coastline of the littoral states. The approach proposed under the project will seek to significantly reduce marine pollution risks and pressures in the Straits' area in a way that is environmentally sustainable. Moreover, as an integral part of the MEH architecture a Marine Environmental Protection System (MEPS) will be designed and implemented for the demonstration area.

The MEPS component of the MEH system is an amalgamation of several models and systems. The demonstration project will evaluate several EMP models and systems for integration into the MEH system including meteorological, oceanographic and environmental information systems. The MEPSs that will be evaluated are: (i) a 3-Dimensional hydrodynamic model; (ii) an oil spill trajectory and fate model; (iii) coastal and ocean monitoring systems (e.g., tides and current); (iv)

environmental impact assessment; (v) an oil spill damage assessment model; (vi) sensitivity mapping, and; (vii) static and dynamic environmental information integration into ENC/ECDIS. The ENCs that will be produced from the hydrographic survey using multi-beam technology will be used as base maps for these models including the sensitivity mapping. Moreover, through the piloting of environmental marine information objects (MIO) to supplement the Straits' ENC, the project will not only provide mariners with key pollution prevention information but will also provide access to key geo-spatial information to conservationists and resource managers.

Existing models and systems in use by relevant authorities of the littoral States for marine pollution prevention and response, environmental monitoring and coastal resource management will be evaluated and harmonized for incorporation into the MEH system as appropriate. New models and systems will also be included such for sand waves monitoring and chemical spill response. Aside from the technical evaluation of the EMPS, related activities in other components will be implemented to promote the participation of relevant stakeholders in the environmental sector in the project and also to ensure long term utility of the MEH system for marine environment protection. Importantly, to the extent that such an effort entails bringing together mariners, hydrographers, conservationists, scientists and resource managers, it will enhance the open flow of marine geo-spatial information to environmental conservation and resource management applications.

6. Safeguard policies

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment (OP/BP/GP 4.01)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Natural Habitats (OP/BP 4.04)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pest Management (OP 4.09)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Cultural Property (OPN 11.03 , being revised as OP 4.11)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Involuntary Resettlement (OP/BP 4.12)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Indigenous Peoples (OD 4.20 , being revised as OP 4.10)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Forests (OP/BP 4.36)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Safety of Dams (OP/BP 4.37)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Projects in Disputed Areas (OP/BP/GP 7.60)*	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Projects on International Waterways (OP/BP/GP 7.50)	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Although the project triggers OP/BP 7.50 "Projects on International Waterways" the requirement of notification of other riparians does not arise. This is because the three littoral states of the Strait of Malacca, namely Indonesia, Malaysia and Singapore, are participating in the implementation of the project, and have signed an MOU regarding their participation.

7. Policy Exceptions and Readiness

The project does not require any exceptions from Bank policies. The project meets the Regional criteria for readiness for implementation.

* *By supporting the proposed project, the Bank does not intend to prejudice the final determination of the parties' claims on the disputed areas*

Annex 1: Country and Sector or Program Background

Marine Electronic Highway Demonstration Project

The Straits of Malacca and Singapore are relatively shallow, hazardous to navigation, and characterized by narrow channels, irregular tides and shifting bottom topography. The Straits are also of global marine biodiversity significance, rich in the marine fauna and flora that characterize tropical estuarine environments. Abundant sea grass beds, mangroves, coral reefs and wetlands enrich the associated coastal marine environments, which are also stopover points for migratory birds on seasonal transition. Marine natural resource-related activities such as fishing and coastal tourism are very important sources of income for the millions of people living in the coastal zone.

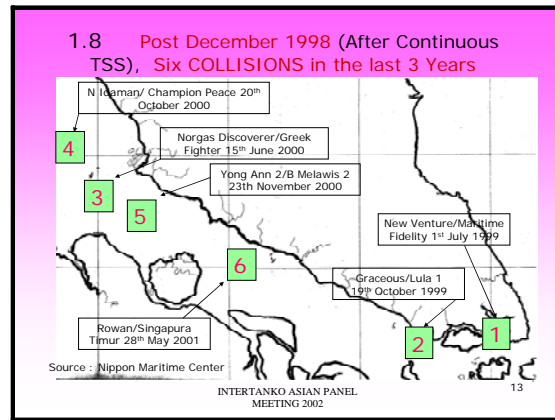
The Straits are also the preferred international route for the majority of ships en route between the Persian Gulf and the Far East, mainly because the two alternative routes (the Lombok-Makassar and Sunda Straits) add several days to the voyage. Recent enhancements in maritime safety infrastructures and regulatory mechanisms in the Straits have improved navigational safety, vessel traffic flow and the overall management of the Straits as a major international sea lane. However, the volume of international traffic passing through the Straits or calling at its ports is very heavy for such a confined and environmentally sensitive waterway and is increasing steadily. In 2001, 146,265 vessels (>75 gross tons) called at the port of Singapore. Vessel arrivals from 1995 to 2001 increased by an average 6.0 percent per year for the Port of Singapore and 11 percent for Port Klang in Malaysia. There is also substantial volume of cross-Straits traffic between the three littoral States for trade and fishing. Notwithstanding the current navigation system, the risk of ship collisions and groundings and of consequent environmental and economic damage is high.

Ship-based sources contribute 20 percent of the marine pollution in the Straits and have acute impacts on it. The major pollutants from ships are oil, chemicals, liquefied gases, sewage, garbage, bilge water, ballast water and antifouling paints. The biggest concern is a catastrophic oil spill due to collision and/or grounding of a very large tanker, thousands of which pass through the Straits each *year*. An oil spill can cover a vast area of the sea's surface, as well as neighboring beaches, and its damage can be considerable. The cost of cleaning-up an oil spill is very high and its environmental impact on living resources, particularly sea birds and near-shore sessile organisms, is significantly detrimental.

Despite recent incremental improvements to existing navigational aids and facilities in the Straits of Malacca and Singapore that have reduced the incidence of ship collisions and grounding or of chemical and oil spills (see Figure A1), there is still room for improvement. Although risk assessment of tankers in the Straits based on tanker accidents in the period from 1982 to 1993 showed a relative constant risk at 0.029 percent (Malacca Straits: refined risk assessment, GEF/UNDP/IMO Regional Program, 1999) a steady number of serious vessel accidents have occurred in recent years, such as the 'Natuna Sea' (October 2000) and 'Singapura Timur' (May 2001). Total compensation claims for the 'Natuna Sea' from the 3 littoral States were over US\$127 million, but only 8.48 percent was paid due to unsubstantiated and disallowed claims, especially on environmental and fishery-related damage.

Figure A1 Reduction in accident rate following implementation of Traffic Separation Scheme

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Source: Intertanko Asia Roundtable, Singapore, October 2002.

Although the three littoral States of Indonesia, Malaysia and Singapore have relatively good oil spill response capabilities, including oil spill contingency plans and response facilities and a cooperative response agreement, several recent serious shipping accidents have highlighted the need for quicker and better targeted deployment of spill response equipment and manpower and more efficient institutional arrangements. Immediate access to information on resources at risk, on spill location, and on the locations of stockpiled response equipment would also raise the effectiveness and efficiency of an oil spill response.

Annex 2: Major Related Projects Financed by the Bank and/or other Agencies
Marine Electronic Highway Demonstration Project

<i>Sector issue</i>	<i>Project</i>	<i>Latest supervision ratings (Bank/GEF-financed projects only)</i>	
		Implementation progress (IP)	Development objective (DO)
Bank/GEF financed			
Protection of international waters from ship oil spills and ship ballast water pollution	Oil Pollution Management for the South-west Mediterranean Sea (Algeria, Morocco and Tunisia)	Satisfactory	Satisfactory
Protection of international waters from ship oil spills; ship navigational safety	Western Indian Ocean Oil Spill Contingency Planning (Comoros, Seychelles, Madagascar, Mauritius)	Satisfactory	Satisfactory
Protection of international waters from ship oil spills and ballast water pollution; ship navigational safety	Western Indian Ocean Marine Highway Development and Coastal and Marine Contamination Prevention (under preparation)		
Protection of international waters from ship oil spills; ship navigational safety	Argentina: Coastal Contamination Prevention and Sustainable Fisheries Management (expected to close in December 2006)	Satisfactory	Satisfactory
Environmentally-sound disposal of ship wastes	China Ship Waste Disposal	Satisfactory	Satisfactory
Environmentally-sound disposal of ship wastes	Caribbean Ship-Generated Waste Management	Unsatisfactory	Unsatisfactory
Other agencies			
Protection of marine resources and regional environmental legislation	IOC Regional Environment Program		
Protection of international waters ship-based pollution	Intergovernmental Oceanographic Commission Regional Action Project for Maritime Security		
Protection of international waters from ship-based pollution	Inter-American Development Bank Environmental Protection and Maritime Transport Pollution Control in the Gulf of Honduras (under preparation)		
Protection of international waters from ship-based pollution	IMO/GEF/UNDP Global Ballast Water Management Program		

Annex 3: Results Framework and Monitoring
Marine Electronic Highway Demonstration Project

Results Framework

PDO/GEO	Outcome Indicators	Use of Outcome Information
<p>PDO - Help the littoral states (Indonesia, Malaysia and Singapore) and the commercial shipping industry jointly decide whether to establish a Marine Electronic Highway (MEH) for the entire Straits of Malacca and Singapore.</p> <p>GEO - Reduce marine pollution of the Straits of Malacca and Singapore.</p>	<p>The littoral states and commercial shipping users of the Straits jointly decide whether or not to develop a MEH for the entire Straits and an Environment Fund, based on evaluation of the demonstration project and a cost/benefit and financial/legal feasibility analysis of a potential full MEH system for the entire Straits.</p> <p>If their decision is positive, a full-scale MEH for the entire Straits of Malacca and Singapore and an Environment Fund are designed and a financing and institutional plan for them prepared.</p>	<p>YR4 - Surveys of littoral states' and ship users' initial satisfaction with demo system are used to refine it.</p> <p>YR5 – If stakeholders express serious interest in developing a MEH system for the entire Straits, prepare technical design, institutional arrangements and financing plan.</p>
Intermediate Results One per Component	Results Indicators for Each Component	Use of Results Monitoring
<p>Component One: Development and evaluation of a demonstration MEH system for the most congested 300km section of the Straits of Malacca and Singapore is well coordinated, managed and technically supported.</p>	<p>Component One: PIPs prepared and implemented on schedule and updated annually, financial management system effective, disbursements on schedule.</p> <p>All partners report project management system is functioning effectively.</p> <p>Four MEH data centers established. Data production and management system functioning satisfactorily.</p> <p>MEH demonstration system for congested 300km section of the Straits fully functional.</p>	<p>Component One: YR1 – Slow PIP execution and/or project management problems indicate need to assess adequacy of and if necessary upgrade PMO facilities, staffing or partner collaboration mechanisms.</p> <p>YR2 – Progress guides performance assessment of all PMO members and PMO staff hiring/retention decisions.</p> <p>YR3/4 – Project completion timetable adjusted, if necessary.</p>
<p>Component Two: Clear, accurate and user-friendly electronic navigation charts (ENCs) are produced for the Straits of Malacca and Singapore and are made available to ships transiting it that have the necessary electronic equipment to use them.</p>	<p>Component Two : Indonesian navigational data gathering system in Straits upgraded and data provided to MEH PMO.</p> <p>Hydrographic survey of MEH area completed.</p> <p>Well-functioning ENCs for MEH demonstration section of the Straits available for use by appropriately-equipped ships in transit.</p>	<p>Component Two YR2 – Failure to obtain required information indicates monitoring and communications equipment is not complete or fully functional.</p> <p>YR3 – Inoperability of the ENC system indicates technical problems and will delay project completion.</p>
<p>Component Three: A significant number of large ships that regularly transit the Straits are equipped and their staff trained to use all components of the marine electronic highway system and their electronic communication systems are fully compatible with it.</p>	<p>Component Three: At least 160 large oil tankers and container ships that regularly pass through the Straits are able and choose to navigate through the Straits using electronic charts and all other components of the demonstration MEH system.</p>	<p>Component Three: YR4 - The proportion of equipped ships using the MEH system and their assessment of its performance will guide refinement and promotion of it and color initial assessments of the feasibility of a potential full-scale system.</p>
<p>Component Four: Spatial and temporal factors that form and move sand waves in the Straits are analyzed, modeled and built into MEH system.</p>	<p>Component Four: Sand wave model for the Straits produced, tested and integrated into the MEH system.</p>	<p>Component Four: YR3 – Practical tests of sand wave modeling system determine if it's working satisfactorily.</p>

<p>Electronic navigation charts for the Straits show its environmentally-sensitive areas.</p> <p>Environment staff in the three littoral states can interpret marine environment threat information and to respond effectively to marine environment emergencies.</p>	<p>Environmentally sensitive areas within and near MEH demonstration area mapped and incorporated into MEH system's Electronic Navigation Charts.</p> <p>Environment staff in the three littoral states successfully complete simulated marine environment emergency response exercises.</p>	<p>YR 4 – Tests of the ENC system confirm environmentally sensitive area data has been incorporated.</p> <p>YR4 – Monitoring of the exercises by senior national environment officials will indicate if the training for and organization of them was effective and/or needs further improvement.</p>
<p>Component Five: Information on experience with developing the demonstration MEH is effectively disseminated to all regional and global stakeholders.</p> <p>Economic and financial viability, environment benefits, and legal feasibility of a full-scale MEH system for entire Straits and an Environment Fund co-financed by it evaluated, based on demonstration project's performance.</p> <p>Stakeholders decide whether to develop MEH system for the entire Straits and initiate planning.</p>	<p>Component Five: Well-designed and functioning Web Page created for MEH; suite of informative publications issued.</p> <p>Workshop held on demonstration system design and performance.</p> <p>Evaluation of potential economic, financial and environmental costs/benefits and legal feasibility of MEH system, based on performance of the demonstration, approved by key stakeholders.</p> <p>If, based on evaluation, stakeholders decide to develop MEH system for the entire Straits, proposal for design, financing plan, and institutional arrangements prepared.</p>	<p>Component Five: Stakeholder consultations indicate if dissemination program effective and how it could be improved.</p> <p>Stakeholder reactions to draft evaluation report indicate where and how it needs to be improved.</p> <p>Stakeholder consultations on evaluation indicate if they're likely to commit to MEH for the entire Straits and that this work should be done.</p>

Arrangements for Results Monitoring

Outcome Indicators	Baseline	Target Values					Data Collection and Reporting		
		YR1	YR2	YR3	YR4	YR5	Frequency and Reports	Data Collection Instruments	Responsibility for Data Collection
<p>The littoral states and commercial shipping users of the Straits jointly decide whether or not to develop a MEH for the entire Straits and an Environment Fund, based on evaluation of the demonstration project and a cost/benefit and financial/legal feasibility analysis of a potential full MEH system for the entire Straits.</p> <p>If their decision is positive, a full-scale MEH for the entire Straits of Malacca and Singapore and an Environment Fund are designed and a financing and institutional plan for them prepared.</p>	<p>No decision on a MEH for entire Straits</p> <p>No Straits MEH system design/plan</p>					<p>100%</p> <p>100%</p>	<p>During year 5</p> <p>By end of year 5</p>	<p>Agreed minutes of stakeholder decision meeting on possible MEH system for the entire Straits.</p>	<p>IMO/The Bank</p> <p>IMO/PMO</p>
Results Indicators for Each Component									
<p>Component One: PIPs prepared and implemented on schedule and updated annually, financial management system effective, disbursements on schedule.</p> <p>All partners report project management system is functioning effectively.</p> <p>Four MEH data centers established. Data production and management system functioning satisfactorily.</p> <p>MEH demonstration system for congested 300km section of the Straits fully functional.</p>	<p>No activity</p> <p>No activity</p> <p>No activity</p> <p>No activity</p>	<p>100%</p> <p>100%</p> <p>80%</p>	<p>100%</p> <p>100%</p> <p>100%</p>	<p>100%</p> <p>100%</p> <p>100%</p>	<p>100%</p> <p>100%</p> <p>100%</p>	<p>100%</p> <p>100%</p> <p>100%</p>	<p>Semi-annual</p> <p>Annual PSC meetings</p> <p>Semi-annual</p> <p>Semi-annual</p>	<p>Progress report</p> <p>Stakeholder consultations</p> <p>Progress report</p> <p>Progress report</p>	<p>IMO/PMO</p> <p>IMO/The Bank</p> <p>IMO/PMO</p> <p>IMO/PMO</p>
<p>Component Two Indonesian navigational data gathering system in Straits upgraded and data provided to MEH PMO.</p> <p>Hydrographic survey of MEH area completed.</p> <p>Well-functioning ENC's for MEH demonstration section of the Straits available for use by appropriately-equipped ships in transit.</p>	<p>No activity</p> <p>No activity</p> <p>No activity</p>	<p>40%</p> <p>20%</p>	<p>100%</p> <p>100%</p> <p>100%</p>	<p>100%</p> <p>100%</p> <p>25%</p>	<p>100%</p> <p>100%</p> <p>100%</p>	<p>100%</p> <p>100%</p> <p>100%</p>	<p>Semi-annual</p> <p>Semi-annual</p> <p>Semi-annual</p>	<p>Progress reports</p> <p>Progress report</p> <p>Progress report</p>	<p>GoI DG of Sea Communications, IMO/PMO</p> <p>IMO/PMO</p> <p>IMO/PMO</p>

<p>Component Three: At least 160 large oil tankers and container ships that regularly pass through the Straits are able and choose to navigate through the Straits using electronic charts and all other components of the demonstration MEH system.</p>	Ships use Straits' Auto Identification System				80%	100%	Quarterly	Reports from ships using the MEH	Ship captains, IMO/PMO, INTERTANKO and ICS
<p>Component Four: Sand wave model for the Straits produced, tested and integrated into the MEH system.</p> <p>Environmentally sensitive areas within and near MEH demonstration area mapped and incorporated into MEH system's Electronic Navigation Charts.</p> <p>Environment staff in the three littoral states successfully complete simulated marine environment emergency response exercises.</p>	No activity	25%	100%	100%	100%	Semi-annual	Progress report	IMO/PMO	
	No activity	25%	100%	100%	100%	Semi-annual	Progress report	IMO/PMO	
	No activity		25%	100%	100%	Semi-annual	Activity plans and completion reports	Env. agencies of Indonesia, Malaysia and Singapore	
<p>Component Five: Well-designed and functioning Web Page created for MEH; suite of informative publications issued.</p> <p>Workshop on demonstration system design and initial performance held.</p> <p>Evaluation of potential economic, financial and environmental costs/benefits and legal feasibility of MEH system for entire Straits and Environment Fund co-financed by it, based on performance of the demonstration, approved by key stakeholders.</p> <p>If, based on evaluation, key stakeholders decide to develop MEH system for the entire Straits, proposal for its design, financing plan and institutional arrangements prepared.</p>	No activity	50%	75%	90%	100%	Semi-annual	Progress report	IMO/PMO	
	No activity			50%	100%	On completion	Completion report	IMO/PMO	
	No activity			20%	100%	On completion	Completion report	IMO/PMO	
	No activity				100%	On completion	Completion report	IMO/PMO	

Annex 4: Detailed Project Description
Marine Electronic Highway Demonstration Project

The objectives of the US\$ 17 million Marine Electronic Highway Demonstration Project are:

(a) to assist the Republic of Indonesia, Malaysia, the Republic of Singapore and representatives of some of the large commercial ship owners that use the Strait of Malacca and the Strait of Singapore, to collectively decide whether to establish a marine electronic highway for the entire length of the Straits of Malacca and Singapore; and

(b) to improve maritime safety and reduce environmental damage to the globally-significant shared natural resources of the Straits of Malacca and Singapore.

The Project aims to establish whether or not an MEH system for the Straits of Malacca and Singapore is economically and environmentally justified and is financially sustainable through:

(a) Developing the MEH for the narrowest and most congested 300 km section of the Straits and demonstrating its value for improving navigation safety and marine environmental protection,

(b) Facilitating the integration of marine environment systems and data flow and information exchange through the MEH system,

(c) Developing the operational and administrative mechanisms for the sustainable management of the MEH system,

(d) Evaluating the financial, economic and legal feasibility and the environmental benefits of a larger MEH system covering the entire Straits and

(e) Developing the technical design of and the proposed legal, institutional and financial arrangements for a full-scale MEH system covering the entire Straits, and analyzing the feasibility of an MEH-linked Marine Environment Fund to support local marine environmental conservation activities.

The total project costs is US\$17 million, of which US\$8.3 million will be financed by the GEF, US\$6.0 million by private sector participants (ship-owners), and US\$2.7 million by the three littoral states.

Project components

The project has five components and a number of sub-components as follows:

Component 1: MEH System Design, Coordination and Operation (US\$2.88 million)

This component will provide for project management by the IMO on behalf of the participating countries, coordination of the design, development and operation of the MEH demonstration system and also provide for key technical inputs to the project. The main functions will be performed by the staff of a Project Management Office (PMO), which will operate under the responsibility of the IMO. The PMO will be located on the island of Batam, Indonesia, almost directly across the Straits from Singapore. It will be co-located with Indonesian Government's marine management bureau that is responsible for the Indonesian waters of the MEH demonstration section and will be housed in facilities provided and serviced by the Government of Indonesia.

The major tasks to be undertaken within this component will be:

1. System Planning and International Maritime Organization Management (US\$0.53 million)
 - (a) Management of the operational aspects of the Project by the International Maritime Organization.
 - (b) Development of a system for the management and on-line access and storage of data and information, including links to the MEH Data Centers and financial and economic assessments.
 - (c) Development of criteria and measurable indicators for Project performance assessment, including the carrying out of a baseline survey to compile and analyze data and information covering a period of about thirty years up to the inception of the Project, as a basis for evaluation of the impact of the MEH system.

This activity will develop long-term cost-effective and efficient system to handle the management of data/information for online access and storage. It will also link up with a number of activities dealing with the establishment of the MEH Data Centers and warehousing including financial and economic assessment.

The Demonstration Project is envisaged to lead to a full-scale project that will involve the entire Malacca Straits. As such, it is necessary to evaluate the performance of this project and as an initial step, this activity will deal with the development of criteria and measurable indicators for project performance assessment taking into account the GEF, the Bank and IMO requirements.

A consultative meeting will be organized to validate the criteria and indicators for performance assessment of the MEH Project

This activity will evaluate the impacts and contributions of the Demonstration MEH system on maritime safety and marine environment protection in the Straits of Malacca and Singapore. Part of this task will be to carry out a baseline survey to compile and analyze data/information covering a period of 30 years to the inception of the project. The output of the baseline survey

together with data gathered in the course of project implementation will be the basis for evaluation of the impacts and contribution of the MEH system.

2. Project Management Office (US\$1.71 million)

(a) Strengthening the capacity of the staff of the Project Management Office, including relevant training.

(b) Establishment of MEH Data Centers in the Republic of Indonesia, Malaysia and the Republic of Singapore, including provision of relevant training to the staff of the MEH Data Centers in operation and management of the MEH system and in data handling and exchange.

To ensure that the MEH system is effective and efficient, competent staff must handle its operation and maintenance. This sub-component will comprise capacity building for the MEH system for the purpose of developing the skills and aptitude of personnel to operate and maintain the MEH system including technical backstopping at the regional level. National staff assigned to the project's data centers will undergo training with a regional focus so that they will be able to appreciate and understand the objectives, components, and implementation arrangements for the project.

This activity will support the establishment and commissioning of three MEH Data Centers in Indonesia, Malaysia and Singapore including the selection of staff, organizational and management structure. The efficient and effective operation and management of the MEH Data Centers will depend on well-trained staff. This activity will support several short-term hands on training for the staff of the MEH Data Centers covering operation and management, data handling and exchange.

3. Project Steering Committee Support (US\$0.64 million). Carrying out of meetings of the Project Steering Committee, the Technical Committees and the Working Groups, including travel and accommodations for participants.

A Project Steering Committee (PSC) was established during the project preparation period and this will continue to be the directing force behind the project during the Demonstration phase. Members of the PSC are the agencies that were denominated as the counterparts representing the three participating countries. The PSC is and will continue to be advised by the IMO and the two shipping agencies that have committed ships to participate in the Demonstration phase will have observer status. The TCs and WGs already established by the PSC will continue into the Demonstration phase (see Annex 6).

This sub-component will finance the travel and accommodation costs of the three littoral states in attending meetings of the PSC and its TCs and WGs, which will be held in rotation among the countries unless they agree otherwise as committee members. In general the meetings of the PSC and its Technical and Working Committees will be concurrent. The costs of hire of facilities for the holding of meetings will also be met from this sub-component.

Incremental Operating Cost (US\$0.67 million). This cost is composed of item 1.C and a small portion of Item 1.B above. It includes travel and per diem by staff of the Project Management Office, Project Steering Committee, Working Groups and Technical Committees,

communications, consumables, advertising of bidding, printing and publication of Project information, rental of meeting facilities, but excluding staff salaries, which expenditures would not have been incurred absent the project.

Component 2: MEH System Development (US\$7.04 million)

This component will provide for production of the navigational information on which the MEH system will be based, and its incorporation into real-time electronic charts that ship operators will be able to use to navigate with precision through the MEH demonstration section of the Straits. These activities will be coordinated by the PMO, under the direction of the IMO, and comprise the following sub components:

1. Tide and Current Facilities (US\$2.63 million). Tidal and current monitoring on the Republic of Indonesia's coast of the Strait of Malacca, including provision of relevant equipment.

Navigational safety facilities in the Indonesian coast of the Malacca Strait are very limited compared to Malaysia and Singapore. Under this sub-component, Indonesia, will procure certain equipment such as DGPS, AIS and oceanographic equipment for tidal and current monitoring. Testing and commissioning of the equipment is included.

2. Hydrographic Survey (US\$3.21 million). (a) Carrying out of a hydrographic survey within the designated traffic separation scheme in the Strait of Malacca within the Project Area and (b) Provision of training to the hydrographic surveyors of the hydro-oceanographic services of the Republic of Indonesia, Malaysia and the Republic of Singapore.

This activity will comprise a bathymetry survey of the sea lanes of the Traffic Separation Scheme within the project area of the Malacca Strait using multi-beam echo sounder and DGPS to provide complete bottom coverage. The output of the multi-beam survey will be stored as a high precision database that will be used to produce high quality electronic navigation charts (ENCs). This task will include refinement of the hydrographic survey work plan by the Technical Committee on Hydrographic Survey and ENC Production to ensure that the survey adequately addresses the requirements of the project apart from the production of ENCs. The hydrographic survey will be contracted out through an international competitive bidding process, which will be conducted by the IMO in consultation with the PSC. The Hydrographic Offices of the three littoral States will carry out a joint supervision of the hydrographic survey. A capacity building component is included, mainly to provide training for the hydrographic surveyors of the three littoral States, in particular for the Hydro-Oceanographic Service of the Indonesia Navy (DISHIDROS) and the Hydrographic Department of the Royal Malaysian Navy.

3. Electronic Navigation Charts (US\$0.34 million). Production of high resolution electronic navigation charts for the Project Area, including provision of relevant computer software licenses to the Republic of Indonesia and to Malaysia.

Present ENCs in the Strait of Malacca from Jambo Ayer in the northern entrance to Karimun are based on hard-copy paper charts with the scales of 1:300,000 and 1:200,000. In order to assess

the value added of high density ENC's (e.g., 1:10,000 scale) for through maritime traffic and port approaches, a comparative assessment of the ENC's prepared using multi-beam technology with DGPS and the current ENC's prepared under the Joint Four Nation Survey will be carried out. Technical, economic, financial and market analyses will be conducted for comparative evaluation as well as risk assessment with respect to groundings and collision avoidance including maneuvering over a small area around the port. Specifically, this sub-component will cover the following activities:

Procurement of the production software will be carried out by IMO through a competitive bidding process with technical inputs from IHO and the Technical Committee for Hydrographic Survey and ENC Production. Six licenses of ENC production software will be procured through an international competitive bidding procedure. There is a training component in the software package. Hydrographic data from the survey will be processed through this software for the production of high resolution ENC's.

The ENC's will be produced by specialist cartographers of the Hydrographic Offices of Indonesia and Malaysia. Production will cover evaluation of survey data format and compilation into S-57 data sets for Sector 1 to 6 of the Malacca Strait. Field verification and sea trials will be carried out on the official ENC's produced as part of the final assessment before release for ship use. Product packaging includes data encryption, marketing and distribution including evaluation and formalization of data update mechanism. Official ENC's of Sectors 1 to 6 of the Malacca Strait will be joined with the existing ENC's of Singapore waters providing streamlined ENC's of the whole project area.

4. Information Exchange System (US\$0.86 million). Establishment of a MEH information exchange system, including data servers, data exchange protocols and training of staff in data exchange.

The core of the Marine Electronic Highway will be the exchange of data between various systems that would otherwise be independent of each other. The Information Exchange System will provide the hardware (data servers), software (data exchange protocols) and human resources (training of staff) to permit these exchanges to take place. At the end of the Demonstration Project an assessment of the efficiency with which the data exchanges are able to take place will be a critical component of its evaluation.

Component 3: Ship-board Equipment and Communications (US\$6.00 million)

Carrying out of testing of the demonstration MEH system by about 160 ships fitted with type-approved electronic chart display and information systems, including internet connectivity. This component will be executed by the owners of at least 160 large oil tankers and container ships that regularly transit the Straits, and will be facilitated by two major ship owner representative organizations, the International Association of Independent Tanker Owners (INTERTANKO) and the International Chamber of Shipping (ICS). With the facilitation of INTERTANKO and ICS, the ship owners will arrange that, by the end of year three, at least 160 of their ships that regularly transit the Straits are fitted with internationally-approved ECDIS and AIS and have internet connectivity—these elements comprise the suite of technical equipment required to use all the elements of the MEH demonstration system. In addition, the ship owners will ensure that,

once the MEH demonstration system is operational, all of the 160 ships which are so equipped always use it when transiting the Straits and provide detailed and timely feed-back on its performance to the PMO and later to the independent experts tasked with evaluating the demonstration system and assessing the costs, benefits and legal/financial feasibility of expanding it to cover the entire Straits (see component 5). A minimum of 160 ships fitted with type-approved ECDIS and AIS, including internet connectivity, have been committed by INTERTANKO and ICS to participate in the project. These ships will participate to test-run the Demonstration MEH system. The ECDIS will allow the ships to use the official ENCs and together with AIS and Internet connectivity will enable the flow of relevant information from the MEH Data Centers to the ships and vice versa.

Component 4: Marine Environment Protection (US\$0.85 million)

This component will be executed jointly by the institutions in the littoral states that are responsible for marine navigation and environmental management and the International Maritime Organization and will consist of the following activities:

1. Oil Spill and Sand Wave Models (US\$0.49 million). Carrying out of a modeling and analyses of: (i) the likely movement of oil spills originating in the Project Area, and (ii) the sand wave formation and movement in the Project Area.

Sand waves in the Malacca Straits are well known phenomena but little understood. This sub - component will include determination of the spatial and temporal factors that affect the behavior of sand waves. Assessment of the factors through model development will be carried out for the purpose of forecasting the phenomena with field-testing.

2. Sensitive Area Mapping (US\$0.33 million). Research and development of options for providing real-time geo-referenced environmental protection information to mariners navigating in the Straits of Malacca and Singapore and for conservation and coastal resources management and mapping of sensitive areas.

This activity will include research and development of options for providing real-time geo-referenced environmental protection information to mariners navigating in the Straits of Malacca and Singapore and will also be available for conservation and coastal resources management including sensitivity mapping. This supplemental navigation-related information to electronic navigation charts will be developed in accordance with IHO, IMO and International Electrotechnical Commission standards.

3. Emergency Response Systems (US\$0.03 million). Carrying out of simulated oil and chemical spill emergency response exercises to determine the cost-effectiveness and efficiency of the MEH system in the event of chemical and oil spill incidents from ships.

This sub-component will provide simulated oil and chemical spill emergency response exercises to determine the cost-effectiveness and efficiency of the MEH system in the event of chemical and oil spill incidents from ships. Factors that will influence the success of chemical and oil spill response and control will be critically evaluated in order to enhance the utility of the MEH system in emergency response and control.

The Demonstration MEH system is envisaged as a multi-user system capable of providing products and services not only to the shipping sector but also to those involved in marine and coastal management in the Straits, in particular, on the prevention and response to chemical and oil spills including deliberate discharges. Chemical and oil spill response and control are emergency situations and as such, appropriate guidelines and protocols need to be developed within the framework of the MEH system to avoid any disruption or system overload.

Component 5: Information Dissemination, Evaluation and Scale-Up Plan (US\$0.23 million)

This component will be managed by the IMO through the PMO, and will produce the following outputs:

1. Website and Publicity (US\$0.091 million). Production and dissemination of information through the Internet on the MEH system, including technical reports, progress reports and a newsletter, and carrying out of national and regional workshops and seminars to provide information and seek feedback on the benefits and applicability of the MEH system.

This sub-component will provide for the production and dissemination of information on the MEH system (such as technical reports, progress reports and a newsletter) via the Internet. In addition, national and regional workshops and seminars will be held, giving information and seeking feedback on the benefits and applicability of the MEH system.

2. Evaluation (US\$0.06 million). (a) Assessment of the cost and benefits of the establishment and use of the MEH system in terms of maritime safety and marine environment protection, including (i) the development of criteria and measurable indicators for the socio-economic assessment of the MEH system, and (ii) the carrying out of a socio-economic survey to evaluate the benefits of the MEH system; (b) (i) Carrying out of an assessment of the technical functionalities of the MEH system, including system performance, (ii) Carrying out of a continuous monitoring of new and potential technologies that could be linked to the MEH system or enhance its performance, including the carrying out of technical evaluations on the new technologies to determine their suitability, value added contribution, enhancing performance and cost effectiveness, (c) Carrying out of an assessment of the MEH system, including institutional and legal aspects, and (d) Consolidation of the technical, institutional, legal, financial and economic assessments of the MEH system, including the implementation of the Project, and development of a managing tool blueprint.

Economic and Social Evaluation.

The implementation of the MEH system is expected to have significant societal and economic impacts, particularly among the three littoral states. This sub-component will assess the cost as well as the benefits that accrued from the establishment and use of the MEH system in terms of maritime safety and marine environment protection. It will also evaluate the effects and impacts of the MEH functionalities against pre-MEH period on the coastal communities, the maritime

sector, and the public sector as well as those engaged in cross-channel trade. Specifically, this sub-component will cover the following activities:

Development of criteria and measurable indicators for the socio-economic assessment of the MEH system: This activity involves the preparatory phase for a socio-economic survey and covers the development of criteria and measurable indicators for the socio-economic evaluation of the MEH system. An appropriate survey questionnaire will be developed and statistical analysis will be established.

Socio-economic survey to evaluate the benefits of the MEH system: This activity deals with the conduct of a socio-economic survey for potential and target users of the MEH system and the subsequently analysis of the survey results.

Operational feasibility

Assessment of the technical functionalities of the Demonstration MEH system: This activity will cover system performance assessment of the Demonstration MEH system. The assessment will be based on agreed measurable indicators to be established by the Technical Committees on shore- and ship-based facilities such as interoperability, cost effectiveness, reliability, user friendliness, access, authentication of sources of information, flexibility, effective response to emerging needs, reduction in data collection burden and efficient use of resources, among others. These indicators will be defined based on standards, performance criteria or existing practices.

Survey of new potential technologies for the MEH system: This sub component will fund continuous monitoring of new and potential technologies in the market that could be linked to the MEH system or to enhance its performance and enable it to meet the increasing needs of the shipping industry as well as users from the other sectors. Applicable performance criteria, standards and guidelines will be adopted in the integration of new technologies into the MEH system. Technical evaluation will also be conducted on the new technologies to determine their suitability, value added contribution, enhancing performance and cost effectiveness, among others.

Financial feasibility and financing plan

This sub-component will provide an assessment of the financial viability of the MEH system (use, access, flow of information, real time communication and provision of services, etc.), which will cover the infrastructure, operation and management of the system as well as to conduct market analysis for potential users (e.g., willingness to pay). It will also include a review of potential revenue generation of additional value-added services. On the environmental aspects, the financial feasibility will include an assessment of the revenues and costs of integration of environmental systems.

A user survey will be undertaken to assess the acceptability of the proposed full-scale MEH. The population of potential users to be surveyed will include all actual and expected future maritime users of the Straits, including cross Straits users such as ferry operators.

There are many ways in which users could be charged for the services to be provided under the full-scale MEH. A review of the methods will be undertaken within this sub-component to assess their technical and operational feasibility and a recommendation will be presented to the PSC for a decision on which method to adopt. It is the method chosen by the PSC that will be included in the description of the project included in the user survey.

Once the user survey has been completed and before the PSC makes its final decision on whether to proceed with the full-scale MEH, and if so how it will function, a consultative meeting with potential users will be held to present the characteristics of the system to them and obtain their reaction and receive any alternative proposals.

Institutional analysis and plan.

This activity will consolidate the output of several activities covering, technical, institutional, legal, political, financial and economic assessment of the MEH system including the implementation of the project. The consolidated output will be the basis for the development of a managing tool blueprint. The preliminary draft of a managing tool blueprint will be submitted for a critical evaluation by a group of experts and to be followed by further refinement of such a blueprint.

3. System Development (US\$0.077 million) Carrying out of marketing strategies to package and market the MEH system and its marine information and other products, and the services it could provide.

This sub-component focuses on marketing strategies to package and market the MEH system and the essential marine information it carries, other products and the services it could provide, in order to draw in potential users and partners, especially those who are dealing with coastal management, marine environment management, certain NGOs, and user States including relevant entities outside the 3 littoral States.

Annex 5: Project Costs

Marine Electronic Highway Demonstration Project

Project Cost By Component and/or Activity	Local US \$million	Foreign US \$million	Total US \$million
1. System Design, Coordination and Operation ¹	0.84	1.80	2.64
2. System Development	0.68	5.76	6.44
3. Ship board equipment	0.63	5.37	6.00
4. Marine Environment Protection	0.18	0.59	0.77
5. Dissemination, Evaluation and Scaling-up	0.05	0.17	0.22
Total Baseline Cost	2.38	13.69	16.07
Price and Physical Contingencies	0.22	0.71	0.93
Total Project Costs²	2.60	14.40	17.00
Interest during construction	0	0	0
Front-end Fee	0	0	0
Total Financing Required	2.52	14.48	17.00

¹IMO management and technical supervision cost (US\$0.5million) and incremental operating costs (\$0.67 million) are included in Component 1.

²There are no identifiable taxes or duties and the total project cost, net of taxes, is US\$17.00 million and the share of project cost net of taxes is 100 percent.

Base costs are estimated in December 2005 prices.

Detailed Project Cost by Sub-Component

Component	Indicative Total Cost US\$	% of Total Cost	GEF Financing US\$	% of GEF
1. System Design, Coordination and Operation				
A. System Planning and IMO Management	500,000		500,000	
B. Project Management Office	1,550,000		1,110,000	
C. PSC Support	590,000		375,000	
Sub total	2,640,000	15.5%	1,985,000	75.2%
2. System Development				
A. Tide and current facilities	2,400,000		1,310,000	
B. Hydrographic survey	2,920,000		2,810,000	
C. Electronic Navigation Chrts	300,000		170,000	
D. Information Exchange Systems	830,000		350,000	
Sub total	6,450,000	37.9%	4,640,000	71.9%
3. Ship board equipment	6,000,000	35.3%	0	0 %
4. Marine Environment Protection				
A. Oil spill and wave models	440,000		440,000	
B. Sensitive area mapping	300,000		300,000	
C. Emergency Response system	30,000		30,000	
Sub total	770,000	4.5%	770,000	100%
5. Dissemination, Evaluation and Scaling up				
A. Web site and Publicity	80,000		80,000	
B. Evaluation	60,000		60,000	
C. System Development	70,000		70,000	
Sub total	210,000	1.3%	210,000	100%
Total without contingencies	16,070,000	94.5%	7,605,000	47.3%
Contingencies	930,000	5.5%	695,000	74.7%
Total	17,000,000	100 %	8,300,000	48.8%

Base costs are estimated in December 2005 prices

Equipment costs are based on prevailing market prices quoted by manufacturers and suppliers. The costs of consulting services are based on those of recent contracts for similar services carried out for IMO. The cost of the hydrographic survey is based on the rental cost of survey ships and their operating cost, and reflects the current supply-demand situation for the region.

Financing of the project will come from the participating governments, ship operators and the GEF. The governments will between them finance about 16 percent of the cost, the ship operators over 35 percent (for the on-ship equipment and crew training), and the GEF slightly

less than 49 percent. The GEF grant will be in two parts, one to the government of Indonesia (US\$1.44 million) to fund the purchase of essential equipment (marine buoys) that Malaysia and Singapore already have or will finance from their own resources and one grant to the International Maritime Organization (US\$6.86 million), to contract the hydrographic survey, the various technical studies, and for the professional staff of the Project Management Office (PMO). Indonesia has agreed to fund the secretarial staff of the PMO. It is probable that the contribution from the ship operators will exceed the US\$6.0 million indicated. This amount is based on the participation of 120 ships and an investment of US\$50,000 per ship, but the current commitment is already for 160 ships. The number of participating ships is expected to be significantly greater, the 160 being the number of commitments to participation at the time of project preparation.

Project Costs by Funding Source

Source	U\$m	% of total
Indonesia	1.50	8.8
Malaysia	0.90	5.3
Singapore	0.30	1.8
Ship operators	6.00	35.3
GEF	8.30	48.8
Total	17.00	100.00

Source : Own estimates

Since this is a demonstration project and it will cover a period of four years, the cost estimates are even less certain than usual. In particular, the costs of the hydrographic survey could be different than estimated. The cost could be much higher because of the uncertain effect of the need to avoid interference with commercial shipping on the rate of surveying that can be maintained, but then it could be lower because of a short term excess supply of surveying vessels.

There is also the possibility that a newly developed satellite based surveying method could dramatically reduce the overall costs. Since the surveys would be carried out continuously in real time, there would be no need for periodic resurveying and no need to develop and use the sand wave and tidal models. The new surveying technique could give the actual depth of water available as frequently as the satellite passes over the Straits, perhaps once every few hours. This technology is now in advanced state of development and is expected to be available in the early stages of the Demonstration Project.

Given the current widespread interest in the project by governments of the states most likely to benefit from the project and the prospect of a new technology that could dramatically enhance the quality of the project, a mid-term review is more necessary than usual for the project. The governments of some of the states that are potential beneficiaries of the MEH have recently expressed an interest in participating in the design and implementation of the demonstration project and in funding some of its activities. Responsibility for deciding whether such offers should be accepted, and if so, under what conditions, rests with the Project Steering Committee, but there has not yet been an opportunity to consider the offers.

Annex 6: Implementation Arrangements

Marine Electronic Highway Demonstration Project

General Approach to Implementation

The International Maritime Organization (IMO) is responsible for the management of the project and will initiate the startup activities covering procurement, recruitment of a project consultant and the establishment of the Project Management Office (PMO). The startup period will initiate the procurement and installation of Indonesia's project facilities as well as the hydrographic survey under Component 2.B of the Project. The implementation schedules of the individual project components are shown in the Project Implementation Plan (PIP).

An implementation consultant will be hired during the startup period to launch the Project and lay the ground work for the recruitment of a Project Manager. IMO will supervise and monitor the work of the project consultant in close consultation with the Bank, littoral States and partners. IMO will also work with Indonesia (Ministry of Environment and the local authorities) to establish the PMO in Batam through a Memorandum of Agreement.

IMO will delegate some level of authority to the Project Manager for a more direct, cost-effective and efficient onsite administration and management of the project. A standing management procedure for the PMO in the implementation of the project covering procurement, financial and administrative arrangements including backstopping from the IMO Headquarters will be formulated and will be put into effect following the appointment of the Project Manager.

Project Steering Committee

The Project Steering Committee (PSC) established during the PDF Block B Grant period will be re-established to act as the overall regional body to oversee the implementation of project activities in both the demonstration and the full-scale stages of the MEH Project. The PSC will provide the institutional arrangement for the development of the managing tool, which will operate, administer and manage the MEH system on a sustainable basis under a cooperative agreement among relevant stakeholders of the Malacca Straits. The PSC is composed of the following lead agencies and organizations:

Permanent Members:

- Indonesia - Ministry of Environment;
- Malaysia – Marine Department, Peninsular Malaysia;
- Singapore – Maritime and Port Authority;

Secretariat

- International Maritime Organization (IMO);

Observers with Advisory and Consultative Status

- International Hydrographic Organization (IHO);
- International Association of Independent Tanker Owners (INTERTANKO); and
- International Chamber of Shipping (ICS).

The terms of reference and the organizational structure of the PSC (as revised and approved by the third PSC Meeting of the PDF Block B) including the Rules of Procedure and terms of reference of Observers were approved by the first PSC Meeting, Putrajaya, Malaysia in March 2001 (in Annex A of the Memorandum of Understanding). The Memorandum of Understanding and the Memorandum on Arrangements further strengthen the cooperation and collaboration among all parties to implement the project.

International Maritime Organization (IMO)

IMO has for many years been associated with the development of maritime safety and marine environment protection mechanisms that have direct impacts on the Straits of Malacca and Singapore and developing close working relationship with the three littoral States at both national and regional levels. The IMO is cognizant of the regional and national sensitivities involved in the development, promulgation and implementation of maritime safety and marine environment mechanisms in the East Asian Seas region, in particular, the Straits, and has served as the focal point for regional and international consultation and the development of appropriate instruments, which are already in place in the region.

IMO serves as the Secretariat of the PSC but in the course of implementing the MEH Demonstration Project, the Project Management Office will carry out some of the secretariat functions of IMO in the conduct of PSC meetings. IMO will sign an agreement with the Bank on the implementation of the project, in particular on the application of its procurement procedure and financial regime. The IMO has the overall responsibility in the management of the project and will implement its various activities as contained in the Project Implementation Plan through the Project Management Office and will provide the necessary administrative, management and technical support and inputs to the Project, technical guidance to the PSC and undertake regular project review, monitoring and evaluation including audit to improve project performance and delivery. It will also submit quarterly progress reports for the project.

Indonesia, Malaysia and Singapore

The littoral States of Indonesia, Malaysia and Singapore are the major players and beneficiaries of this project. Aside from their membership in the Project Steering Committee, Technical Committees and Working Groups, the littoral States will co-finance the implementation of the Demonstration Project by providing in-kind contributions such as the use or access of maritime safety facilities, office space, equipment, utilities and deployment of local experts. Only Indonesia will sign a special agreement with the Bank regarding the procurement of maritime facilities to be installed in the Malacca Strait coast of Sumatra, which will be utilized by the project.

The littoral States together with their designated National Focal Points, alternate Focal Points and lead/implementing agencies will work with the project team in partnership with relevant stakeholders to implement the activities of the 5 components of the Demonstration Project including the development of the MEH Fund and the governing body of the MEH system (institutional arrangement). The littoral States will also work towards overcoming policy,

institutional and legal barriers to the establishment of the MEH system in the Straits of the Malacca and Singapore.

International Hydrographic Organization

As a partner, IHO will also be an observer member of the Project Steering Committee and will take part in the review and evaluation of the project and the implementation of its activities including membership in various technical committees and working groups of the project. Its major inputs to the project will be to provide technical assistance in the development and production of ENC's, the development of ENC-based ecological or sensitivity maps and mapping services as well as leveraging technical cooperation (e.g., training, expert advice, use of facilities/equipment) from among its member States for the development of the Straits ENC's and related products.

International Association of Independent Tanker Owners and International Chamber of Shipping

A keystone activity of the project is the demonstration exercise to evaluate the prototype MEH system involving ship to ship and ship to shore interactions (i.e., communication, information/data flow). The partnership with INTERTANKO and ICS will ensure that adequate commercial vessels will be made available for the technical evaluation of the MEH system (currently, about 160 ships from the two organizations have been committed to the project). Both INTERTANKO and ICS will identify ships that will be participating in the project (e.g., ships that regularly ply the Straits) including assessment of onboard availability of ECDIS and AIS as well as the use of digital technology, especially for Internet access.

INTERTANKO and ICS will also assist in monitoring participating ships to ensure that they adhere to the requirements of the project and also, to identify any constraints or problems that may arise onboard the ships during its participation in coordination with the PMO. As partners, INTERTANKO and ICS will be observer members of the Project Steering Committee with advisory and consultative status. Both organizations will take part in the review and evaluation of the project and the implementation of its activities as a member of the various technical committees and working groups of the project.

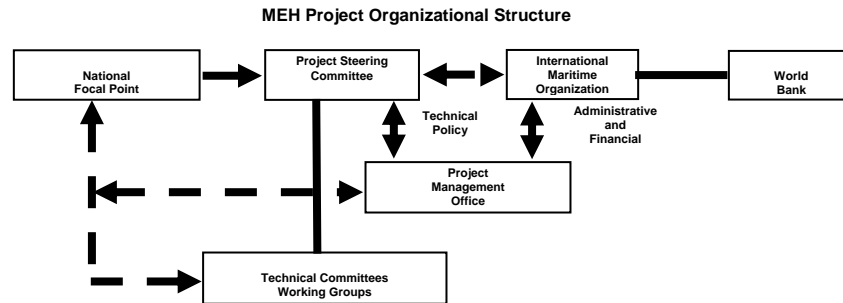
Potential Partners

Potential partners of the project (subject to the approval of the PSC) would include private sector partners such as technology providers like those engaged in digital technology and telecommunications and in the environment sector. Again subject to PSC approval, national governments of potential beneficiary countries (user states) might also participate in the project as observers with advisory and consultative status. These potential partners could be involved in the development of various products and services of the MEH system, including but not limited to online and real time communications and data exchanges, packaging and marketing. The status of any actual additional partners would be decided by the PSC.

Technical Committees and Working Groups

Four TCs and two WGs will be established by the PSC in the course of implementing the MEH Demonstration Project to evaluate various technical issues and outputs of the project for the purpose of refining project activities as well as activities slated for the MEH Full-scale Development Project. The Technical Committees and Working Groups will be composed of relevant stakeholders of the MEH Project and experts hired under the project including potential users under the direction of the PSC. The PSC will be developed into the governing body or managing tool (i.e., corporate body) of the MEH system. This corporate body will operate, administer, maintain and manage the MEH system within the public private partnership framework. It is envisaged that the corporate body will be fully commissioned at the latter part of the second stage of the MEH Project.

The overall organizational structure of the PSC, TCs and WGs is shown below:



The membership, frequency of meetings and responsibilities of the PSC, TCs and WCs are:

Project Steering Committee Meetings

Committee/ Working Group	Meeting	Membership	Responsibilities
Project Steering Committee	Annual	National Focal Points IMO, Partners	Overall policy directions/ strategies and guidance
TC on Survey and ENC	Standing	Hydrographic Department of Littoral States, PMO, Partners	Planning, implementation, monitoring, evaluation Survey and ENC
TC on Shore Base Infrastructure and Facilities	Standing	Sea Communications (I), Marine Department (M), MPA (S), IMO, PMO, KSTAS, DSMM, MMS, Dept of Meteorology, BAKOSUTANAL, Partners	Planning, implementation, monitoring, evaluation DGPS/AIS/Tide/Current Wind stations/Data Centers
TC on Ship Borne Equipment	Standing	Sea Communications (I), Marine Department (M), MPA (S), IMO, PMO	ECDIS/AIS equipment Standards/compatibility Practical sea trials
TC on Environmental System and Information	Standing	BAPEDAL (I), DOE (M), DOE (S), IMO, PMO	Modeling, system integration, environmental applications
WG on Cost Sharing for the Full Scale Project	<i>Ad hoc</i>	Same as PSC	Sustainable financing mechanism, managing tool
WG on Demonstration Evaluation	<i>Ad hoc</i>	Same as PSC	Monitoring and evaluation, full- scale project proposal

Project Management Office

A Project Management Office (PMO) will be established to administer and manage the project on site. It will be sited in Batam in Sumatra, Indonesia, close to Singapore¹ and will be hosted by the Government of Indonesia. The PMO has a pivotal role in the implementation of the MEH Project. It will carry out on site day to day operation, administration and management of the project. It will also assist the IMO in secretariat activities, in particular, for the PSC, TC and WG and will come under the direct supervision of the Director of Marine Environment Division, IMO. The PMO will have the following functions:

- To manage the project in accordance with the objectives and the planned activities set out in this PAD and in the PIP with the guidance of the PSC;
- To developed a detailed work plan for the implementation of project activities including milestones, schedules, monitoring strategies and evaluation/assessment criteria (e.g., updating the PIP);

¹ As agreed to at the Third PSC Meeting in Jakarta (13 – 15 October 2003), the Meeting requested IMO to carry out site assessment of Port Klang, Malaysia and Batam, Indonesia as potential PMO and to report back to the PSC at its next session. At the Fourth PSC Meeting held in Singapore from 15 to 16 December 2003, the Meeting, at its Intergovernmental Session, agreed that the PMO site is Batam, Indonesia.

- To handle the day-to-day administrative, financial and operation requirements of the project;
- To organize, prepare and review relevant documents for the PSC and the TCs and WGs including project progress and technical reports;
- To provide assistance in the establishment of the MEH National Data Centers including technical backstopping and monitoring of activities of such Centers;
- To organize project workshops, training courses, meetings and related activities;
- To develop a database of local and international experts and specialists for participating in project activities and in the recruitment of project consultants; and
- To promote the activities of the project, in particular, its products and services as well as to strengthen partnerships with relevant stakeholders.

The PMO will have a Project Manager, one Administrative Assistant, four experts and support staff that will be hired by the project. The terms of reference and qualifications of the Project Manager are available in the PIP. Senior staff of the PMO will be recruited through an international competitive process. (The Bank procurement procedure) whilst employment will be covered under IMO staff rules (series 100 and 200). The selection process for project staff will involve the littoral States and IMO. The Secretary-General of the IMO will appoint the senior project staff, including four experts/consultants to be recruited through an international competitive bidding to assist the PMO in the implementation of project activities. Local support staff will be nationally recruited through a competitive selection process.

Since hiring a Project Manager will require a long time, to facilitate an early start to implementation activities for the first year of the project, the IMO is expected to contract an interim Project Manager until the full time Project Manger can start his/her duties.

Mid-Term Review

It is planned to have a mid term review of the project to review progress, and main problems and ways to handle them, implementation till completion of the demonstration project, assess commitment of the partners to the project as well as interest of countries to be involved in the full MEH, evaluate new technologies and their potential applicability and inclusion in MEH, as well as to determine the need for project restructuring, if any. This review is expected to involve IMO, the World Bank, Indonesia's MOE, the Project Steering Committee, as well as representatives of all signatories to the Memorandum on Arrangements.

Annex 7: Financial Management and Disbursement Arrangements
Marine Electronic Highway Demonstration Project

Country Issues

The financial management arrangements for the Marine Electronic Highway (MEH) project activities implemented by the International Maritime Organization (IMO) are acceptable. As a specialized agency of the United Nations, the IMO follows acceptable accounting and reporting practices. In addition, IMO received an unqualified opinion on the most recent financial statements.

The country financial accountability Assessment (CFAA) carried put by the Bank in 2000 concluded that the control environment in Indonesia is not strong despite commitment of the political leadership to improvement. This was corroborated by ADB’s Country Governance Assessment Report (September 2002). Although improvements took place since then, the need to reform the financial management system persists, especially in view of the ongoing decentralization process and continuing corruption. Despite the preceding, financial management arrangements for the operations of the Office of the Deputy Minister for Nature Conservation Enhancement and Environmental Destruction Control of the Ministry of Environment (MOE), as the coordinating agency for the Indonesian part of the project, are acceptable subject to completion of the agreed action plan. The financial assessment of MOE in 2004 concluded that MOE must: (i) establish a Project Implementation Unit (PIU), and (ii) recruit and assign a qualified Financial Officer to administer the project activities as described in the following Action Plan for Financial Management which was agreed with MOE:

Action Plan for Financial Management

Issues/ Problems	Remedial Action	Resp. Member	Due Date
1. Agreement on the Finance Officer TOR acceptable to the Bank	TOR of Finance officer	MOE	Included in the PIP
2. Appointment of PIU staff which includes all parties involved in the project and is acceptable to the Bank	Decrees on the establishment of PIU, covering its agreed organization structure and job description.	MOE	By Project Effectiveness
3. Availability of an acceptable annual audit report which is accessible to the public.	Government of Indonesia sends letter to Bank confirming that it has established auditing arrangements, acceptable to the Bank, including terms of reference and provisions to make the audit report accessible to the public.	MOE	By Project Effectiveness

Strengths and Weaknesses

From a financial management perspective, the MEH is a low risk project. IMO is a reputable United Nations agency with extensive experience in implementing donor-financed projects. The nature of the project procurement (i.e., relatively few contracts, each being large in size) and resulting simplified accounting and reporting also contribute to the low risk rating. Since about 15-20 percent of the grants will be used for the procurement of equipment, physical inspection to confirm the proper use of project funds will be possible.

Currently, MOE is implementing OTF-ODS Phase Out Investment (TF-21982); and is supported by management consultants who assist the project manager and its treasurer. MOE recognizes its limitation in financial management and agreed that the existing consultant in OTF-ODS Phase Out Investment project will also support MEH implementation. The TOR for the existing consultant will be extended to cover support for MEH.

Implementing Entity

The project will engage the three littoral states, Indonesia, Malaysia, and Singapore and a number of international governmental and non-governmental organizations. Given the number of counterparts, the project will rely upon a Project Steering Committee to provide guidance, review the project progress and resolve obstacles to project implementation. The leading implementing agencies will be the IMO and the Indonesia's Ministry of Environment. The implementation arrangements for the project are presented in Annex 6.

Funds Flow

For the activities implemented by IMO, the grant funds will be disbursed from the Bank to the IMO in London. IMO will then make all necessary payments. There are no counterpart funds involved in IMO's project activities; since all activities are financed by the GEF Grant.

IMO will use report-based disbursement procedures using Financial Monitoring Reports (FMR). All documentation for the expenditures as reported in the FMR would be retained at the IMO and shall be made available to auditors for the annual audit and to the Bank, as requested. The Bank's disbursement would be for the six months projected expenditures as reported in the FMR.

The MOE funds flow will follow the common arrangement for donor-financed projects in Indonesia. A Special Account specifically for the project will be open by MoF. The Bank will deposit funds to the Special Account as requested based on the project quarterly FMR. The PIU's Project Manager at MOE, with the assistance of the Treasurer, will be responsible for authorizing expenditures for all components of the project in accordance with the agreed budgets prepared. SPP (payment request) will be submitted to KPKN (government treasury office) for SPM (payment remittance order) issuance.

Staffing

As indicated above, IMO has sufficient qualified staff to carry out the FMS functions imposed by the GEF grant to IMO. The financial management function of the project will be handled by a Finance Officer. Currently, MOE has agreed to utilize OTF-ODS Phase Out Investment management consultant staff to also assist MEH. Finance Officer. The proposed draft of the TOR for the Financial is available in attachment 1 of the financial management assessment report.

Accounting Policies and Procedures

IMO accounts are maintained in accordance with its Financial Regulations on an accrual basis. The Financial Regulations are adopted by the IMO Assembly and are acceptable to the IMO member nations and other donors who finance IMO activities. Externally-financed projects are subject to the same internal controls and reporting as all other IMO funds. The IMO operates on a biennium financial period, with annual audited financial statements.

The IMO finance unit is responsible for the accounting and reporting on a large number of externally-financed projects. IMO implements projects financed by bilateral and multilateral donors, including France, United Kingdom, Japan, United States, European Commission and UN agencies. They have sufficient capacity to take on the accounting for the MEH project. MOE will follow the government standardized accounting policies and procedures. The transactions will include limited payments of four procurement packages of equipments and their maintenance through out the period of the project implementation.

Internal Audit

MOE has its own internal audit unit (IG) which has a right to conduct an audit assignment to the project. The respected IG mostly conducts operational audits on all units under MOE, including Loan/Credit/Grant financed by donor agencies.

External Audit

As part of the United Nations, IMO is subject to the usual UN audit requirements and procedures. IMO is currently audited by the Comptroller and Auditor General (C&AG) of India and received an unqualified opinion on its financial statements for the year ended December 31, 2002. The audited entity financial statements include an annex with details for each of the numerous donor-financed projects implemented by the IMO. This IMO entity audit report and auditor are considered acceptable to the Bank.

The MOE project audit will be the annual project accounts to be prepared based on the quarterly FMRs. The MOE shall prepare the project financial statement, including disclosure of the special account, for audit by independent auditor acceptable by the Bank. The annual audit report will be furnished to the Bank not later than six months after the end of the government's fiscal year (June 30).

The audit requirement for this project will be:

Type of Audit Report	Implementing Entity	Due Date
Entity financial statements	IMO	Six months after IMO's fiscal year end (June 30)
Project Financial Statement	MOE	Six months after the end of the Government fiscal year (June 30)

Reporting and Monitoring

Financial Monitoring Reports (FMR) will be submitted on a quarterly basis by IMO. The format of the FMR will be aligned with the normal periodic financial reports prepared by IMO for each of its externally-financed projects.

The format of the normal IMO annual financial statements is acceptable. IMO prepares annual financial statements for the entire organization, including annexes with detailed financial reports on each externally-financed project. This format will provide a sufficient level of information to the Bank.

For MOE, the FMR format would cover the following:

(i) Financial Report

- Report 1-A Project Sources and Uses of Funds by category
- Report 1-B Cumulative Use of Funds by Project Activity
- Report 1-C Project Cash Forecast
- Report 1-D Special Account Activity Statement
- Report 1-E Disbursements and Expenditures Status for Loan Fund
- Report 1-F Summary Statement Expenditures for Contract subject to Prior Review
- Report 1-G Summary Statement Expenditures for Contract NOT subject to Prior Review

(ii) Output Monitoring Report

- Report 2-B Output Monitoring Report (Unit of Output by Project Activity)

(iii) Procurement Management Report

- Report 3-A Procurement Process Monitoring (Goods and Works)
- Report 3-B Procurement Process Monitoring (Consultants' Services)
- Report 3-C Contract Expenditure Report (Goods and Works)
- Report 3-D Contract Expenditure Report (Consultants' Services)

The FMR will be submitted to the World Bank on a quarterly basis within 45 days of the end of the reporting quarter. The first report will cover the planning part of the report including Report 1-C Project Cash Forecast, Report 3-A and 3-B for the amount of initial deposit required for the first six months of project implementation.

Information Systems

IMO has suitable computerized information systems. However, MOE does not have computerized accounting system at the project level. The Financial Monitoring Reports will be prepared by the PIU using a simple Microsoft Excel program.

Disbursement Arrangements

A special account (SA) denominated in US Dollars will be established at and maintained by IMO for this project. Also, a Special Account denominated in US dollars will be opened in the Central Bank of Indonesia under the name of Ministry of Finance. The Bank's disbursement would be for the six months projected expenditures as reported in the FMRs. The management of the Special Accounts would essentially be the responsibility of the Disbursement Division in IMO (assisted by PMO in Batam) and the PIU in Indonesia. Disbursements from the Bank would be made to the Special Accounts based on the submission of the FMRs prepared by the Disbursement Division at IMO/PMO and the PIU in Indonesia. All documentation for the expenditures as reported in the FMRs would be retained at the PMO and PIU and shall be made available to auditors for the annual audit and to the Bank during the supervision missions.

Table below shows the estimated disbursements by quarter from the grant to each of IMO and Indonesia.

Disbursement of Indonesia and IMO Grants (U\$m)

Calendar Year and Quarter	Indonesia Disbursements	Indonesia Cumulative Disbursements	IMO Disbursements	IMO Cumulative Disbursements	Total Disbursements	Total Cumulative Disbursements
2006 ii	0.00	0.00	0.00	0.00	0.00	0.00
2006 iii	0.30	0.30	0.40	0.40	0.70	0.70
2006 iv	0.5	0.80	0.60	1.00	1.10	1.80
2007 i	0.50	1.30	1.00	2.00	1.50	3.30
2007 ii	0.05	1.35	1.00	3.00	1.05	4.35
2007iii	0.05	1.40	0.80	3.80	0.85	5.20
2007iv	0.04	1.44	0.50	4.30	0.54	5.74
2008 i	0	1.44	0.36	4.66	0.36	6.10
2008 ii	0	1.44	0.30	4.96	0.30	6.40
2008 iii	0	1.44	0.30	5.26	0.30	6.70
2008 iv	0	1.44	0.30	5.56	0.30	7.00
2009 i	0	1.44	0.30	5.86	0.30	7.30
2009 ii	0	1.44	0.30	6.16	0.30	7.60
2009 iii	0	1.44	0.15	6.31	0.15	7.75
2009 iv	0	1.44	0.15	6.46	0.15	7.90
2010 i	0	1.44	0.10	6.56	0.10	8.00

2010 ii	0	1.44	0.10	6.66	0.10	8.10
2010 iii	0	1.44	0.10	6.76	0.10	8.20
2010 iv	0	1.44	0.10	6.86	0.10	8.30

Grant Allocation

Allocation of the GEF grant proceeds to International Maritime Organization and Republic of Indonesia will be according to the following schedule:

Allocation of Grants to International Maritime Organization and Indonesia by Category

Category	International Maritime Organization	Indonesia	Total GEF	% of eligible expenses to be Financed
Goods	464,000	1,310,000	1,774,000	100%
Management (IMO)	500,000	0	500,000	100%
Consulting services	4,664,000	0	4,664,000	100%
Incremental operating cost	672,000	0	672,000	100%
Unallocated	560,000	130,000	690,000	100%
Total	6,860,000	1,440,000	8,300,000	100%

Supervision Plan

The Bank will supervise the project on the average once every 6 months. This will include supervision of financial aspects of the project, including review of the project's financial management and disbursement arrangements (including a review of FMRs and movements on the Special Account) to ensure compliance with the Bank's requirements. The Bank will also supervise the project's financial management arrangements through review of the project's quarterly financial management reports as well as the project's annual audited financial statements and auditor's management letter. A Bank-accredited Financial Management Specialist will assist in the supervision process, as needed.

Annex 8: Procurement Arrangements

Marine Electronic Highway Demonstration Project

A. General

Procurement for the proposed project would be carried out in accordance with the Bank's "Guidelines: Procurement under IBRD Loans and IDA Credits" dated May 2004; and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated May 2004, and the provisions stipulated in the Legal Agreements. The various items under different expenditure categories are described below. For each contract to be financed by the Grants, the different procurement methods or consultant selection methods, the need for pre-qualification, estimated costs, prior review requirements, and time frame are agreed between the International Maritime Organization (IMO) and the Ministry of Environment (MOE) of the Government of Indonesia and the World Bank in the Procurement Plan. The Procurement Plan will be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

Procurement of Works: No works will be procured using funds from the grants under this Project. However, a small amount of civil works will be procured by the Government of Indonesia using its own resources and procurement procedures.

Procurement of Goods and non Consulting Services: Goods and non consulting services estimated to cost US\$200,000 or more will be procured through International Competitive Bidding (ICB). Goods estimated to cost less than US\$200,000 may be procured through Shopping on the basis of at least three written quotations obtained from qualified suppliers.

Selection of Consultants: Consultancy services to be provided by consultancy firms estimated to cost US\$100,000 or more will be procured through Quality and Cost Based Selection (QCBS) method. Consultancy services to be provided by consultancy firms estimated to cost less than US\$100,000 may be procured through Consultants' Qualifications (CQS) method. Individual Consultants will be selected in accordance with Section V of the Consultancy Guidelines.

Operating Costs: The operating costs for the Project Management Office (PMO) covering office supplies, utilities, operating and maintenance expenditures of equipment and vehicles, fuel, communication, utilities, travel expenses, among others, will be disbursed on the basis of annual budgets to be prepared by the IMO and agreed with the Bank.

The World Bank's Guidelines, Standard Bidding Documents to be used for each procurement method, as well as Consultant Selection documents were provided to the implementing agencies and the updated documents are available in the Bank's external web-site.

B. Assessment of the agency's capacity to implement procurement

International Maritime Organization (IMO). The IMO will be responsible for the procurement of Goods and Consultant Services. The procurement under the grant for IMO will be implemented by IMO, either through its Headquarter office or the PMO in Batam. The technical specifications

or TORs as the case may be, will be developed by the relevant TC. In the case of items to be prepared during the first year of implementation, the specifications were prepared by a consultant hired by IMO (approved by the Bank) during implementation of the PDF Block B grant. These specifications will be reviewed and the bid documents prepared by IMO. Procurement oversight within IMO is done through the IMO's Internal Auditor. In addition, there is also an audit conducted by external Auditors.

Government of Indonesia. The Office of the Deputy Minister for Nature Conservation Enhancement and Environmental Destruction Control of the Ministry of Environment is the coordinating Ministry for the Project. The Directorate General of Sea Transport (DGST) of the Ministry of Transport is the implementing agency and will undertake all the procurement required for GOI part of the Project, namely four goods packages (Tidal Stations, DGPS Base Station, two AIS Base Stations, and an Ocean Buoy). The Hydro-Oceanographic Service of the Navy of the Recipient will be responsible for the maintenance and operation of the tidal stations and the Directorate General of Sea Transport will be responsible for the maintenance and operation of the remaining equipment procured under the Project. Furthermore the Hydro-Oceanographic Service will represent the Republic of Indonesia in the hydrographic surveys and the production of Electronic Navigation Charts to be carried out by the International Maritime Organization. On the GOI side, audits will be undertaken by the Internal Audit Unit of the Ministry of Environment.

Disclosure. To support the disclosure policy pilot by the Bank and GOI, it is agreed that the project is adopting the greater disclosure of information to the public. Guidelines on disclosure of information to the public on project and procurement activities include the following key actions:

- (a) The IMO and GOI will and the Bank may make publicly available, promptly after completion of a mid-term review of the project carried out in accordance with the grant agreement, the mid-term review report and the aide-memoire prepared for this purpose.
- (b) The IMO and GOI will and the Bank may make publicly available promptly after receipt all final audit reports (financial or otherwise, and including qualified audit reports) prepared in accordance with the grant agreements and all formal responses of the government in relation to such reports.
- (c) The IMO and the GOI (and the Bank) will:
 - Make publicly available promptly after finalization the procurement plans and schedules, including all updates thereof;
 - Make available to any member of the public promptly upon request all bidding documents and requests for proposal issued in accordance with the procurement provisions of the grant agreements, subject to payment of a reasonable fee to cover the cost of printing and delivery. In the case of request for proposals, the relevant documents will only be made available after notification of award to the successful firm. Each such document will continue to be made available until a year after completion of the contract entered into for the goods or services in question ;

- Make available to any member of the public promptly upon request all shortlists of consultants and, in cases of pre-qualification, list of pre-qualified contractors and suppliers.
- Disclose to all bidders and parties submitting proposals for specific contracts, promptly after the notification of award to the successful bidders / consultants, the summary of the evaluation of all bids and proposals for such proposed contracts. Information in these summaries will be limited to a list of bidders / consultants, all bid prices and financial proposals as read out at public openings for bids and financial proposals, bids and proposals declared non responsive (together with reasons for such an assessment), the name of winning bidder / consultant and the contract price. Such summaries will be made available to the public, promptly upon request.
- Make publicly available and publish widely, contract award information for all contracts, promptly after such award; and
- Make available, promptly upon request by any person or company, a list of all contracts awarded in the three months preceding the date of such request in respect of a project, including the name of the contractor / supplier / consultant, the contract amount, the number of bidders / proposes, the procurement method followed and the purpose of the contract.

Record-keeping: There is a mandatory requirement for maintaining written records of procurement within both the IMO and GOI, however, they are not available to the general public. All documents related to procurement activities will be mandated to be kept at the PMO during the course of the project. With the use of the Bank Guidelines in this project, procurement documents will be made available to the public.

Staffing: Staff/Procurement Officers will be appointed in IMO and MOE to act as the focal points on procurement issues during the course of the project. The Procurement Officers in IMO and MOE will provide the necessary coordination and management of procurement activities in each of the Implementing Units.

The assessment of procurement risk in this project is rated as 'average' due to the following reasons:

- Procurement activities consist of a limited number of packages, e.g. 8 goods, 1 non consulting services and about 17 consultancy services packages (out of which six are for firms, while the remaining are individuals);
- Six packages of goods and non consulting services will be procured through International Competitive Bidding and three packages through Shopping;
- Technical Committees will be established, with representatives of each of the Implementing Agencies, who will prepare the specifications of the procurement packages;

- (d) An interim implementation advisor will be recruited by IMO for the initial period of the project to expedite preparation while the selection of the project manager is being processed. IMO has a procurement division which is familiar with the UN system, but has little experience with Bank procurement procedures. IMO procurement staff will be trained in Bank procurement procedures prior to start up of project implementation.

Respectively, the following action plan is proposed to mitigate the “average” risk and will be agreed with GOI during project appraisal:

Procurement Action Plan

Action	Responsibility	Completion Dates
<i>Capacity enhancement by adding Capacity</i>		
1. Head of General Services at IMO will coordinate and manage procurement under the respective Grants	IMO	Done
<i>Enhanced planning and controlling mechanisms</i>		
2. The draft procurement plan for the overall project has been prepared and will be finalized prior to effectiveness. Updates of the procurement plan will be incorporated when required.	IMO and GOI	Included in PIP
3. The Bank’s Standard Bidding Document and Standard Request For Proposals will be used for the project. These will be prepared by the IMO prior to implementation of procurement.	IMO, MOE	Included in PIP and Grant Agreements
4. The prior review threshold is set lower than the maximum prior thresholds for average risk projects.	IMO, MOE	Done
5. The project will adopt a disclosure policy to increase public accountability of the project.	IMO, MOE	Included in PIP

C. Procurement Plan

To anticipate the procurement activities under this project, a procurement plan was prepared by the IMO. This procurement plan provides the basis for the procurement methods and includes all packages that are anticipated under the project, covering the whole period of implementation. Any updates to the plan will be incorporated accordingly as required throughout the project period. The Procurement Plan will be available in the project’s database and in the Bank’s external website, and will be updated in agreement with the task team annually or as required to reflect the actual project implementation needs.

D. Frequency of Procurement Supervision

In addition to the prior review supervision to be carried out from Bank offices, the capacity assessment of the Implementing Agency has recommended a yearly supervision mission to visit the field to carry out post review of procurement actions.

E. Details of the Procurement Arrangements

1. Goods

(a) List of goods contracts and the non consultancy services packages and method of procurement is shown below:

Procurement of Goods Including Non-Consulting Services

1	2	3	4	5	6	7	8	9
Re f. No	Contract (Description)	Estimated Cost US\$	Procurement Method		Domestic Preference (yes/no)	Review by Bank (Prior / Post)	Expected Bid-Opening Date	Comments
1	Supply and Installation of Marine Tech Infrastructure: Tide Stations	210,000	ICB	1 package consisting of: 3 units for 3 locations	No	Prior	30 October 2006	Procured by GOI-DGST
2	Supply and Installation of Marine Navigation. Infrastructure: i) DGPS Beacon Station ii) AIS Base Stations iii) Ocean Data Buoy	1,100,000 <i>300,000</i> <i>250,000</i> <i>550,000</i>	ICB	 1 unit 2 units 1 unit	No	Prior	8 January 2007	Procured by GOI-DGST
3	Computer Server	84,000	Shopping	2 units	No	Post	14 December 2006	Procured by IMO
4	Procurement of Software i) ENC Production Software ii) Modeling Software	360,000 <i>60,000</i> <i>300,000</i>	Shopping ICB	6 licenses 1 license	No	Prior	12 March 2007 14 Sept, 2007	Procured by IMO
5	Office Equipment	20,000	Shopping	1 lot	Yes	Post	30 October 2006	Procured by IMO
6	Hydrographic Survey	2,810,000	ICB for non-consulting services		No	Prior	8 January 2007	Procured by IMO
	Total goods	4,584,000						

(b) ICB contracts estimated to cost above US\$ 200,000 per contract and first shopping contract by Indonesia will be subject to prior review by the Bank.

2. Consulting Services

(a) List of consulting assignments and method of procurement is shown below:

Procurement of Consulting Services

No	Contract	Estimated Cost (US\$)	Selection method	Review by Bank	Duration (Months)	Advert/ Invitation
1	Implementation advisor	72,000	IC	Prior	5 months	12-04-06
2	Project Manager	388,000	IC	Prior	48 months	20-06-06
3	Administrative Assistant	95,000	IC	Post	47 months	25-09-06
4	Maritime specialist	108,000	IC	Prior	15 months	31-01-07
5	Maritime economist	60,000	IC	Post	8 months	27-07-07
6	Maritime Environment Specialist	72,000	IC	Post	9 months	23-03-07
7	Systems manger	70,000	IC	Post	5 months	21-05-07
8	Data Center advisor	144,000	IC	Prior	18 months	10-12-06
9	Hydrodynamic model	200,000	QCBS	Prior	8 months	16-06-07
10	Oil spill model	100,000	QCBS	Post	6 months	16-06-07
11	Sand wave model	110,000	QCBS	Prior	11 months	04-01-08
12	MIO symbology	300,000	QCBS	Prior	12 months	23-03-07
13	Baseline survey	60,000	CQS	Post	4 months	20-10-06
14	Emergency Response System Design	30,000	CQS	Post	5 months	04-05-07
15	Network Manager/ Webmaster	60,000	IC	Post	4 months	15-10-06
16	Economic and Financial Evaluation	41,000	IC	Post	5 months	09-03-07
17	System Development Action Plan	34,000	IC	Post	10 months	31-10-08
18	Procurement Consultant	24,000	IC	Post	3 months	12-04-06
19	MEH System Evaluation	41,000	IC	Post	11 months	10-08-07
	Estimated total cost	2,009,000				

Procurement methods for Consulting Contracts:

QCBS = Quality and Cost Based Selection

IC = Individual Consultant

CQS = Selection Based on Consultants Qualifications

(b) Consultancy services estimated to cost US\$100,000 or more per contract for the selection of consultants (firms) and individual consultant assignments estimated to cost US\$100,000 or more will be subject to prior review by the Bank as well as the first contract for the selection of a firm using CQS and the first contract for selection of an individual consultant regardless of value.

Annex 9: Economic and Financial Analysis

Marine Electronic Highway Demonstration Project

There are three potential impacts of the MEH that will result in benefits to the littoral states and ship operators. First there will be a reduced risk of collisions and groundings of ships, that will reduce the damage repair costs to ship operators (or in financial terms, might result in reduced insurance premiums) and reduced costs of the clean-up of oil spills to the littoral states, and less risk of interference to their maritime based economic activities, mostly fishing and tourism. A further advantage, that of reduced impact of deliberate spills and illegal discharges of oil and waste from passing ships, has not been quantified. This will be attempted with the more detailed data that will be collected during the course of the Demonstration Project. Second, operators of the largest oil tankers will be able to load their vessels with more oil, reducing the number of voyages and ship operating costs, as well as further reducing the risk of collisions and groundings. There will also be reduced risk of damage to the rich environmental resources of the Malacca Straits. It is also possible that reducing the risk of piracy will also be facilitated by some of the components of the MEH. However, management of this risk is not one of the objectives of the MEH and will be dealt with separately by the littoral states (they have recently declined Japanese assistance in this respect) and so has not been evaluated as a benefit of this project. A final potential benefit, and another that has not been evaluated, is that of increased capacity of the shipping lanes of the Straits, so that in the long term future, fewer ships will be forced by capacity constraints to make longer voyages using alternative routes.

The scale of all of these benefits is proportional to the related number, type and size of ships passing through the Straits, so the first section of this Annex is a projection of shipping in the Straits.

Shipping in the Straits of Malacca and Singapore

Although growth in the volume of shipping stagnated in 2003 at just over 62,000 ships, over the period 1999 to 2003 the average annual rate of growth was over 9 percent. The two most significant types of ships passing through the Straits are oil tankers and container ships, with the number of the latter surpassing that of the former for the first time in 2002. Between them, they account for more than two thirds of the total movements. There are therefore two drivers of growth in the volume of shipping through the Straits— demand for oil and the volume of world trade, particularly exports from East Asia.

Oil demand and tanker movements

China recently passed Japan as the world's second highest oil consumer after the United States, and the fifth largest oil importer (Japan is second after the United States and South Korea is fourth). Some of the regions current net exporters, including Malaysia, will soon become net importers. Current East Asia demand for oil of about 21 mbd (million barrels per day) is expected to increase to 38 mbd between 2001 and 2025, a long term growth of more than 3.5 percent per year. However, as regional production is expected to remain constant at about 8 mbd, imports will need to grow at nearly 5 percent to satisfy demand.

The Middle East currently supplies about 65 percent of East Asia's oil, and despite the emergence of alternative sources such as Kazakhstan and Siberia that could supply East Asia by pipeline, the Middle East's contribution is expected to increase to more than 75 percent²³. Already fears that the Malacca Straits could become a bottleneck for this flow of oil and leading to a revival of ideas of alternative routes such as the Kra Canal through the Thailand Peninsula, but such projects are at least two decades away from realization¹.

Number of Ship Movements recorded by the StraitsRep System

Month	1999	2000	2001	2002	2003
Jan	2,554	4,174	5,013	5,167	5,152
Feb	2,703	4,212	4,509	4,627	4,616
Mar	3,386	4,569	5,119	5,169	5,156
Apr	3,312	4,518	4,902	5,057	4,972
May	3,465	4,797	5,006	4,989	5,156
Jun	3,668	4,683	4,807	4,843	4,905
Jul	3,905	4,932	5,056	5,260	5,265
Aug	4,120	4,995	5,066	7,482	5,470
Sep	4,055	4,713	4,848	4,970	5,390
Oct	4,345	4,863	5,084	4,996	5,472
Nov	4,224	4,697	4,871	4,908	5,309
Dec	4,227	4,802	5,033	4,925	5,471
Total	43,964	55,955	59,314	62,393	62,334

Oil tankers make up just under one third of the total vessels passing the Straits, and of these about 20 percent are either ULCCs (ultra large crude carriers) and VLCCs (very large crude carriers) of over 250,000 DWT (dead weight tons-dwt). They are currently limited in the amount of oil they can carry by the depth constraint of the Malacca Straits. The maximum depth for these vessels in the eastbound channel of the Straits is 21 meters.

In 2002 there were 2,258 Eastbound transits of the Malacca Straits by VLCCs, about one third of them ULCC oil tankers of 250,000 dwt or more, and they transported an average of about 246,500 tons of oil per vessel on each voyage. These ULCCs are currently constrained in the amount of oil they can carry by the limited depth of the Malacca Straits as there does not appear to be any constraint at either their loading or discharging ports. However, neither the maximum or average size of ULCCs passing through the Straits is expected to increase in the foreseeable future, so the number of tankers transiting the Straits is likely to grow at the same rate as oil imports from the Middle East, other than the impact of the MEH on allowing a greater loading of ULCCs.

² Long-term view and Strategic issues on Oil Supply-Demand in Asia, Toshiki Ogawa, Northeast Asia Petroleum Forum, November 2003, http://www.wbai.org/artman/publish/article_505.php

³ Asia's Energy Insecurity is a Dilemma for the U.S., Asian Wall Street Journal, March 22, 2004.

¹ China's Demand for Oil may make Thailand Canal a Reality, Global news, July 22, 2003
http://www.wbai.org/artman/publish/article_505.php

With demand for oil exports through the Straits expected to grow by 5 percent per year, and average size to increase by 3 percent per year, the number of ship movements would grow by 2 percent per year, reaching some 30,000 transits by 2025. Of these, almost 90 percent (27,000) would be ULCCs of over 250,000.

Demand And Supply For Oil Products In East Asia

Country	1999			2020		
	Demand	Supply	Deficit	Demand	Supply	Deficit
Brunei	428	9,712	-9,284	1,109	11,204	-10,095
China	204,291	159,896	44,395	497,249	151,886	345,363
Chinese Taipei	38,227	44	38,183	51,085	0	51,085
Hong Kong	11,241	0	11,241	23,876	0	23,876
Indonesia	46,666	70,053	-23,387	100,023	42,040	57,983
Japan	266,438	746	265,692	288,359	0	288,359
Korea	99,913	446	99,467	163,045	446	162,599
Malaysia	22,231	37,348	-15,117	52,129	32,874	19,255
Philippines	17,682	41	17,641	36,996	1,124	35,872
Singapore	21,218	0	21,218	27,842	0	27,842
Thailand	33,859	4,138	29,721	73,117	3,560	69,557
Vietnam	7,532	15,331	-7,799	32,238	30,529	1,709
Total	769,726	297,755	471,971	1,347,068	273,663	1,073,405

Note: All quantities are in thousands of tons

Source: Asia Pacific Energy Research Center

Trade Demand And Container Ship Movements

World container trade reached about 55 million TEU in 2002 (excluding empty and transshipment containers), and East Asia –Europe container had been growing at more than 10 percent per year for at least a decade.⁴ Loading volume in the region made up 40 percent of the world total, but unloading made up only 28 percent, indicating East Asia's high trade dependence on exports. While most East Asia exports are on the trans-Pacific routes, about 30 percent are on the routes to Europe. Most if not all container ships en route from East Asia to Europe, the Middle East and Africa pass through the Straits. There are also a number of container ships on intra-Asia trade, North –South routes and on feeder routes to Singapore, Port Klang and Tanjung Pelepas. Container ships on these routes currently make up about 30 percent of the total movements through the Straits. Projections of the largest of these movements, those from East Asia to Europe, are rather inconsistent, with long term growth rates varying between 5 percent and 10 percent.

⁴ Container Trade Supply Demand forecasts for Three Major east-West Trades, Research Office, Mitsui O.S.K Lines <http://www.mol.co.jp/research-e/report/annualreport2001.pdf>

In 2003 these container ship movements through the Straits totaled about 20,000. In projecting the future number, not only is it necessary to project the total container trade on these routes, but also the rapidly increasing average ship size, and the uncertain prospects for what has become known as the Malacca –max design. While the average number of containers carrier per ship is relatively low at less than 2,500 per ship, the largest container vessels presently using the Straits can carry up to 8,500 containers, and this is probably the largest economically feasible for a single screw vessel that can maintain current speeds and schedules. The next step up would be to a double screw vessel, and if operated within the current constraints of the Malacca Straits would be of about 250,000 gross tons and able to carry perhaps 15,000 containers. Although some sources consider such a ship to be already technically and financially feasible, most experts consulted do not believe that such a large container vessel will be operating for at least another decade. So if the projections of about 8 million TEU of containers to be transported westward through the Straits are to be realized, and the average ship size increases to 5,000 TEU, this would require 1,600 passages per year, or taking into account the return voyages, almost 100 passages per day.

Total Ship Movements

Many different ship types make up the remaining number, including general cargo, mixed cargo, ore and grain carriers, and a few passenger ships that have not been deterred by the recent piracy attacks. If the numbers of these ships are assumed to increase at their historic rate of about 3.5 percent per year, and the resulting number is added to the projections of oil tankers and container ships, the projected total for the year 2025 is almost double that recorded in 2003, representing an average growth rate of about 3 percent.

Actual and Projected shipping movements in the Malacca Straits

Ship type	2002	2025
Non VLCC tankers	17,400	30,000
ULCC tankers	3,300	16,500
Container ships	23,000	34,200
Malacca Max	0	3,800
Other	18,600	41,000
Total	62,300	125,500

Source: World Bank estimates based on various sources

Reduced accident risk and cost

Previous research on risk assessment of tankers in the Straits⁵ has shown the risk of accidents to tanker traffic of approximately 0.029 percent per tanker passage through the Straits. The risk of a major spill has been estimated at 10 percent of this, that is about 0.0029 percent per tanker. There are several interacting characteristics of the MEH that could affect the probability of an oil spill. First, the availability of accurate ENCs and other electronic navigation aides will allow more reliable navigation, which would reduce the risk. There is however a chance that with the additional electronic measures available, more risks would be taken thereby increasing the risk of

⁵ Malacca Straits: Refined Risk Assessment, PEMSEA, 1999

a grounding, collision or spill. If the MEH allows a reduction in the under keel clearance, it is reasonable to assume that this would still result in a reduction in the risk of a grounding, compared to the operation of an unequipped vessel operating with the existing under keel clearance. Combining these effects, it might be expected that the overall risk of a major spill would reduce by at least 10 percent with the introduction of the MEH.

There is not much economic or financial quantification of the costs of oil spills in the Straits. One accident for which substantial evidence is available is used as the source for the reduced costs of future accidents. The Natuna Sea incident that occurred in October 2000 resulted in a spill of about 7,000 tons or about 46,000 barrels of oil. The total clean-up cost was about U\$127 million, made up of U\$102 million compensation to Indonesia for environmental damage, about U\$10 million in compensation, again mostly to Indonesia for fishing-related compensation and about U\$15 million in clean-up costs, mostly incurred by Singapore. This is equivalent to about U\$18,000 per ton of oil spilt, which is the unit cost used here.

Economic Evaluation

Taking the situation in 2002 as a base case, there were 20,700 transits of tanker vessels (excluding LNG/LPG carriers). The average size of oil spills in the Malacca Straits in the period 1975 to 1997 was 5,680 tons, and using the average clean-up cost of U\$18,000 per ton of oil spilt with a total expected cost of about U\$60 million per year. If the number of spills had been reduced by 10 percent this would have resulted in a saving of some U\$6 million per year. Since about half of the coastline of the Straits is in Malaysian territory and about half in Indonesian territory, these benefits would have been approximately equally divided between these two littoral states.

When the same unit costs are applied to the projected number of tanker voyages through the Straits, and the investment costs are taken to include operating and maintenance and resurveying every four years, the net present value is about U\$26 million (using a discount rate of 12 percent), the economic rate of return is about 32 percent and the modified economic rate of return (using a rate of return of 12 percent for reinvested benefits) is about 21 percent. These values are robust to projections in the number of voyages, even with a continuation of the 2002 number of voyages the evaluation results are U\$13 million for the NPV, 24 percent for the IRR and 18 percent for the MERR. The switching value for costs (the cost increase needed to result in a zero NPV) is an increase of about 240 percent, or for the benefits to be reduced to 43 percent of their estimated value, or for costs to increase by 45 percent while benefits reduce to 65 percent.

Summary of Economic Evaluation Results

	NPV	ERR	MERR
Basic values	U\$26m	32%	21%
Constant voyages	U\$13m	24%	18%
Switching values	Cost + 240%	Cost + 240%	Cost + 240%
	Benefits 43%	Benefits 43%	Benefits 43%
	Cost +145%,	Cost +145%,	Cost +145%,

Source: World Bank estimates

These are a conservative estimates as they do not allow for any benefits arising from reducing the minimum required under-keel clearance or other benefits stemming from the MEH project such as reductions in minor oil spills and damage to vessels as a consequence of improved safety, less congestion in the Straits, avoidance of the dumping of ships' waste & bilge, enhanced speed of response to incidents, greater levels of real time information, reduced risks of loss of cargo and fatal & non-fatal injuries to seafarers.

Reduced Under-keel Clearance

A further benefit stems from a possible reduction, if agreed, in the minimum required under-keel clearance from 3.5 meters to 3.0 meters because of the more accurate and up-to-date hydrographic information and availability of Ends and other electronic navigation aides. This should lead to increased loads for any tankers which are currently draft constrained⁶ (namely VLCC vessels over 250,000 DWT) resulting in fewer transits of the Straits.

In 2002, there were about 17,400 transits by conventional tankers and they carried an average of about 80,000 tons per transit and 3,300 transits by VLCCs that carried an average of 246,500 tons of oil per transit. If the under keel clearance were to be reduced to 3.0 meters, the ULCCs would have been able to transport about an additional 16,500 tons per laden voyage. That is, the same amount of oil that in 2002 was transported in 1,000 transits by VLCCs could be transported in 938 transits, a reduction of 62 laden transits.

These 62 transits would imply a saving of 8 vessels employed only in the Middle East to Far East trade. For these vessels the running costs per vessel are about U\$7.8 million per year (about U\$62.4 million for 8 vessels) and the fuel cost savings of the 62 voyages would be a further U\$33 million per year, giving an annual saving for the 2002 volume of oil transported of U\$95.8 million. Using the same vessel operating costs, but the 2020 volume of oil transported, would give a saving of about 1,000 voyages, equivalent to about 129 vessels and annual cost saving for that year of about U\$1.27 billion.

The size of these financial benefits to ship operators is an indication of the opportunities for implementing a voluntary charging system for the MEH.

Additional Reduced Risk Of Collision Or Grounding

The saving in voyages would further reduce the cost of accidents by reducing the number of voyages through the Straits. This would have amounted to about U\$0.17 million in 2002 and will be about U\$2.69 million by 2020.⁷ (Note that, in these calculations, the risk of accidents has been reduced by 10 percent to allow for the increased safety in navigation of vessels arising from the operation of the MEH).

⁶ The authors have found no evidence that an extra 0.5 meters of draft would pose any difficulties for VLCCs transiting the Malacca Straits and bound for ports in China, Japan or South Korea, since both China and South Korea have ports that can accommodate ULCCs and China has some facilities that can accommodate VLCCs carrying up to 270,000 tons of crude oil (Lloyd's Register -Fairplay Ports and Terminals Guide 2003-2004, various Drewry Monthly Reports).

The estimates assume that when the MEH is operational most ships passing through the Straits will be fitted with ECDIS even though the net benefits accruing to ship owners from doing so could not be quantified⁷.

References:

- [1]. Traffic figures 2002 for the Malacca and Singapore Straits come from www.marine.gov.my/misc/statistic/kp_2002.
- [2]. Marine Pollution Management in the Malacca/Singapore Straits: Lessons Learned. Published by GEF/UNDP/IMO Regional Program for the Prevention and Management of Marine Pollution in the East Asian Seas. March 1998. Table 13 p25
- [3]. Malacca Straits: Initial Risk Assessment prepared by Peter Calow and Valery Forbes for the GEF/UNDP/IMO Regional Program for the Prevention and Management of Marine Pollution in the East Asian Seas. March 1997. Table 20 and pp61-63
- [4]. Marine Pollution Management in the Malacca/Singapore Straits: Lessons Learned. Published by GEF/UNDP/IMO Regional Program for the Prevention and Management of Marine Pollution in the East Asian Seas. March 1998. Table 25 p103
- [5]. Traffic figures 2002 for the Malacca and Singapore Straits come from www.marine.gov.my/misc/statistic/kp_2002.
- [6]. Swinnerton R. A description of regional shipping routes: navigational and operational considerations. December 1994. Table 4 p3.
- [7]. Marine Pollution Prevention Management in the East Asian Seas: a Benefit-Cost Framework. Published by GEF/UNDP/IMO Regional Program for the Prevention and Management of Marine Pollution in the East Asian Seas. March 1999. pp22-24.

⁷ A sensitivity analysis was conducted which showed that the estimated total cost per barrel spilt could fall to below \$1900 before the NPV became zero or alternatively the reduction in the risk of a major oil spill could fall to 6.9 percent for the same effect.

UNIT COST OF OIL SPILLS

This cost was derived from the Natuna Sea incident that occurred on 3 October 2000. The estimated size of spill was 7,000 tons, equivalent to 46,340 barrels.

Country	Costs claimed in US dollars	Category
Singapore	12,751,196	Clean-up
Malaysia	342,106	Clean-up
Indonesia	2,051,822	Clean-up
Singapore	81,776	Fishing-related
Malaysia	238,159	Fishing-related
Indonesia	9,807,666	Fishing-related
Indonesia	101,730,500	Environmental damage
Total Cost	<u>127,003,225</u>	

Cost per ton	=	US\$	127,003,225/7000
	=	US\$	18143.32
Cost per barrel	=	US\$	18,143.32/6.62
	=	US\$	2740.68

Source: 2001 Annual Report of the International Oil Pollution Compensation Funds

VLCC OPERATING COSTS (US DOLLARS)

The figures are based on a vessel with a capital cost of US\$68 million and a life of 25 years.

The running cost elements⁸ include:

Manning, including victualling	892,000
Lubes and stores	386,000
Spares, R & M	263,000
Dry docking (annualized cost)	688,000
Insurance	582,000
Administration	110,000
Misc.	<u>65,000</u>
Running costs per annum =	\$2,986,000
Capital costs* per annum =	<u>\$4,825,000</u>
Total operating costs per annum =	\$7,811,000

* Annual capital costs calculated on a 5 percent rate of return over 25 years on an initial cost of \$68 million.

⁸ Source: Personal contact at Drewry Consultants Ltd.

FUEL ADJUSTMENT CALCULATIONS

These figures calculate the effect on fuel consumption of carrying extra cargo as a result of a reduction of 0.5 meters in under keel clearance and based on a cost of US\$155 per ton of fuel.⁹

Original payload of VLCC	=	246,500 tons
Daily fuel consumption	=	97 tons
Reduced under keel clearance allows pay load of 263,000 tons and the daily fuel consumption	=	98 tons.

i.e. the vessel uses 1 extra ton of fuel for every additional 16,500 tons of payload.

Daily fuel consumption in ballast	=	82 tons
-----------------------------------	---	---------

Assuming the longest voyage (Gulf-Yokohama) would take 21 days each way plus 3 days in port, then the round trip would take 45 days and the vessel could make 8 round trips per annum.

In 2002 we have estimated that there were 1000 VLCC laden transits of the Straits. If each VLCC can now carry an additional 16,500 tons of cargo this implies that, ceteris paribus, only 938 laden transits will be required to transport the same volume of oil.

1000 transits ÷ 8 round trips	=	125 ships
938 transits ÷ 8 round trips	=	117 ships

Assuming 350 working days each year, of which 24 are spent in port leaves 326 days at sea, half of which will be laden and half in ballast.

Fuel consumption (laden)	=	98 tons/day
Fuel consumption (ballast)	=	82 tons/day

The fuel saved when sailing loaded using fewer ships and allowing for the payload penalty is given by:

Number of ships x days at sea x fuel consumption

i.e. (125 x 163 x 97) – (117 x 163 x 98)	=	107,417 tons
The total savings (loaded)	=	107,417 x 155
	=	\$16,649,635

There are also fuel savings from making fewer ballast voyages:

8 x 163 x 82	=	106,928 tons @ \$155 per ton
	=	\$16, 573,840

Hence, the total fuel savings are 16,649, 635 + 16, 573,840 = \$33,223,475

⁹ Source: Drewry Consultants Ltd.

Annex 10: Safeguard Policy Issues
Marine Electronic Highway Demonstration Project

Projects on International Waterways

The project triggers [OP/BP/GP](#) 7.50 (Projects on International Waterways). However, the requirement of notification of other riparians does not arise. This is because the three littoral states of the Strait of Malacca, namely Indonesia, Malaysia and Singapore, are participating in the implementation of the project, and are indeed the beneficiary states of the project. The three states (Indonesia, Malaysia and Singapore) have further signed a Memorandum of Understanding committing to the Project and its implementation.

Natural Habitats

The project was further carefully assessed for possible implications related to [OP/BP](#) 4.04 (Natural Habitats) and it was concluded that the project does not trigger it.

Institutional Capacity for Safeguard Policies. All institutions with project implementation responsibilities have been already involved in the implementation of World Bank projects and have the institutional capacity to apply the Bank's Safeguard's Policies, including for screening and mitigation of possible negative environmental and/or social impacts. The implementing institutions will continue to assess the potential for any such possible impacts throughout project implementation.

Annex 11: Project Preparation and Supervision
Marine Electronic Highway Demonstration Project

	Planned	Actual
PCN review	October, 2002	June 23, 2003
Initial PID to PIC		
Initial ISDS to PIC		
Appraisal	March, 2003	December 22, 2005
Negotiations	March, 2003	February 6, 2006 with IMO March 14, 2006 with GOI
Board/RVP approval	June, 2003	May, 2006
Planned date of effectiveness	September, 2003	June 30, 2006
Planned date of mid-term review	January 2005	October 2008
Planned closing date	December, 2008	June 30, 2011

Key institutions responsible for preparation of the project:

International Maritime Organization and Government of Indonesia

World Bank staff and consultants who worked on the project included:

Name	Title	Unit
Marc Juhel	Original Task Manager	TUDTR
Robin Carruthers	Second Task Manager and Economist	TUDTR
Hatim Hajj	Third Task Manager	EASTR
Robin Broadfield	Senior Regional Coordinator, GEF	EASEN
Milen Dyoulgerov	E.T. Consultant	ENV
Guoy Kiat	Maritime Specialist, Consultant	
Firman Dharmawan	Procurement Specialist	EACIF
Richard Goss	Maritime Economist, consultant	
Novira Asra	FMS Specialist	EACIF
Karin Nordlander	Lead Legal Advisor (Retired)	LEGEA
Anthony Toft	Chief Counsel	LEGEA
Sri Oktorini	Team Assistant	EACIF

Bank funds expended to date on project preparation:

- | | | |
|----|---------------------------|--|
| 1. | Bank resources: | US\$322,369 as of April 3, 2006 |
| 2. | Trust funds: GEF Block B: | US\$560,826.52 (originally US\$574,210 was signed with US\$13,383.48 subsequently cancelled) |
| | Total: | US\$867,028 |

Estimated Approval and Supervision costs:

- | | | |
|----|------------------------------------|---------------------|
| 1. | Remaining costs to approval: | US\$13,000 |
| 2. | Estimated annual supervision cost: | US\$60,000 from GEF |

Annex 12: Documents in the Project File
Marine Electronic Highway Demonstration Project

General Documents

Memorandum of Understanding	September 2005
Memorandum on Arrangements	September 2005
Project Implementation Plan	November 2005
GEF Project Brief	June 2003
Regional Action Plan, for Phase I MEH	January 2002
Present Status of Development of the MEH	May 2003
Report of Proceedings of the:	
First Project Steering Committee Meeting	March 2001
Second Project Steering Committee Meeting	May 2002
Third Project Steering Committee Meeting	October 2003
Fourth Project Steering Committee Meeting	December 2003

Economic/ Feasibility Studies

Feasibility Study, IFC	1999
Cost Benefit Report for MEH, Cardiff University	June 2004
An Economic Approach to Maritime Legal Liability Benefit – Cost Analysis of Tourism Development and Sustainability in the Malacca Straits, GEF/UNDP/IMO	January 2004
	June 1998

Environmental Studies/ Documents

Oil Spill Modeling in East Asia Region, UNDP/ KORDI	1997
Malacca Straits Environmental Profile, GEF/UNDP/IMO	1997
Marine Pollution Management in the Malacca/ Singapore Straits : Lessons Learned, GEF/UNDP/IMO	March 1998
Natural Resource Damage Assessment and the Malacca Straits, GEF/UNDP/IMO	March 1999
Sustainable Financing for Ship-based Pollution in the Malacca Straits, GEF/UNDP/IMO	March 1999
Marine Pollution Prevention and Management in the East Asia Seas: A Benefit –Cost Framework, GEF/UNDP/IMO	March 1999
Regional Consultative Workshop on the Recovery of Oil Spill Clean-Up Costs and Pollution Damage Claims, GEF/UNDP/IMO	September 1999
Malacca Straits: Refined Risk Assessment, GEF/UNDP/IMO	1999
Challenges and Opportunities in Managing Pollution in the East Asia Seas, GEF/UNDP/IMO	March 1999
Proceedings of the Senior Experts Dialogue on Coastal and Marine Policy, PEMSEA	July 2001

Environmental Strategy for the Seas of East Asia, PEMSEA	August 2001
Regional consultative Workshop on Strengthening Recovery of Ship Pollution Clean-up Costs and damage Claims, PEMSEA, Singapore	September 2001

Procurement and FMS Documents

Consulting Services for Economic Analysis	June 2004
Technical Specification of the Marine Electronic Highway System in the Straits of Malacca and Singapore	March 200
Procurement Plan	June 2005
Procurement Capacity Assessment	June 2004
Financial Management Systems Assessment	June 2004

Annex 13: Statement of Loans and Credits

Marine Electronic Highway Demonstration Project

Project ID	FY	Purpose	Original Amount in US\$ Millions				Cancel.	Undisb.	Difference between expected and actual disbursements	
			IBRD	IDA	SF	GEF			Orig.	Frm. Rev'd
P097535	2006	Community Recovery Through the KDP						51.2		
P085133	2005	Govt Finl Mgt & Revenue Admin Project	55	5				55.69		
P071318	2004	ID - Coral Reef Rehab and Management II	0.00	0.00	0.00	7.50	0.00	7.02	0.68	0.00
P071316	2004	ID - Coral Reef Rehab and Mgmt Prog II	33.20	23.00	0.00	0.00	0.00	50.78	0.17	0.00
P074290	2004	ID-2nd Eastern Indonesia Reg. Transport	200.00	0.00	0.00	0.00	0.00	199.00	2.00	0.00
P064728	2004	ID-LAND MANAGEMENT & POLICY DEVT PROJECT	32.80	32.80	0.00	0.00	0.00	64.76	3.17	0.00
P063913	2003	ID-Java-Bali Pwr Sector & Strength	141.00	0.00	0.00	0.00	0.00	139.59	-1.41	0.00
P073772	2003	ID-Health Workforce & Services (PHP 3)	31.10	74.50	0.00	0.00	0.00	107.93	-4.31	0.00
P076271	2003	ID-PPITA	17.10	0.00	0.00	0.00	0.00	14.64	4.61	0.00
P079156	2003	ID Third Kecamatan Development Project	204.30	45.50	0.00	0.00	0.00	92.48	0.08	0.00
P059931	2003	ID-Water Resources & Irr.Sector Mgt Prog	45.00	25.00	0.00	0.00	0.00	70.09	12.33	0.00
P040578	2002	ID-Eastern Indonesia Region Transport	200.00	0.00	0.00	0.00	0.00	71.48	20.48	0.00
P072852	2002	ID-UPP2	29.50	70.50	0.00	0.00	0.00	93.30	19.90	0.00
P073970	2002	ID-GLOBAL DEV LEARNING (LIL)	2.66	0.00	0.00	0.00	0.00	1.75	1.04	0.00
P068949	2001	ID-LIBRARY DEVELOPMENT PROJECT - LIL	0.00	4.15	0.00	0.00	0.00	1.29	0.48	0.00
P049539	2001	ID-PROVINCIAL HEALTH II	63.20	40.00	0.00	0.00	0.00	92.27	59.15	0.00
P073025	2001	ID-SECOND KECAMATAN DEVELOPMENT PROJECT	208.90	111.30	0.00	0.00	0.00	131.25	-203.37	0.00
P068051	2001	ID-GEF-W. JAVA ENVT MGMT	0.00	0.00	0.00	2.54	0.00	2.75	7.78	0.00
P040528	2001	ID-W. JAVA ENVMT MGMT	11.70	5.75	0.00	0.00	0.00	11.61	8.25	0.00
P059930	2000	ID-DECNT. AGRICULTURAL/FORESTRY EXT	13.00	5.00	0.00	0.00	0.00	1.39	0.77	0.00
P059477	2000	ID-WSSLIC II	0.00	77.40	0.00	0.00	0.00	55.54	-27.74	0.00
P049545	2000	ID-PROVINCIAL HEALTH I	0.00	38.00	0.00	0.00	0.00	18.70	1.09	-2.12
P036049	1999	ID-EARLY CHILD DEVELOPMENT	21.50	0.00	0.00	0.00	10.65	1.96	12.63	12.63
P041895	1999	ID-SULAWESI BASIC EDUC.	47.90	15.93	0.00	0.00	0.00	16.58	17.33	0.00
P040196	1999	ID-SUMATRA BASIC EDUCATION	54.50	20.10	0.00	0.00	0.00	5.38	6.01	0.00
P036956	1998	ID-SAFE MOTHERHOOD	42.50	0.00	0.00	0.00	9.15	2.20	11.35	5.35
P040061	1998	ID - BENGKULU REGIONAL DEVELOPMENT	20.50	0.00	0.00	0.00	5.00	7.61	12.61	7.61
P003993	1998	ID-SUMATRA REG'L RDS	234.00	0.00	0.00	0.00	50.00	11.22	61.22	0.56
P004026	1997	ID-Railway Efficiency	105.00	0.00	0.00	0.00	47.33	1.93	49.26	-0.14
Total:			1,814.36	593.93	0.00	10.04	122.13	1,381.39	75.56	23.89

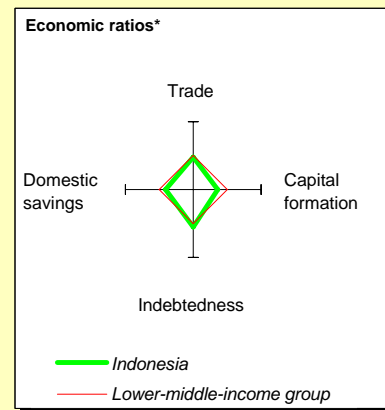
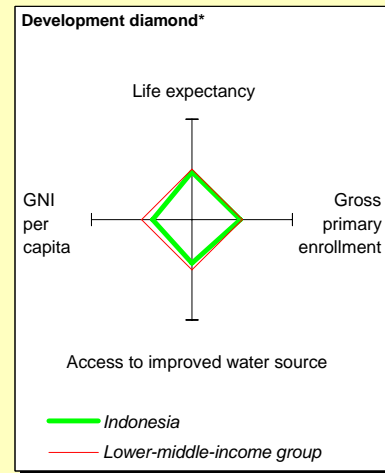
**STATEMENT OF IFC's
Held and Disbursed Portfolio
In Millions of US Dollars**

FY Approval	Company	Committed				Disbursed			
		IFC				IFC			
		Loan	Equity	Quasi	Partic.	Loan	Equity	Quasi	Partic.
2003	Buana Bank	0.00	12.16	0.00	0.00	0.00	12.16	0.00	0.00
1999	ITCF	40.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LYON-MLF-Ibis	2.01	0.00	0.00	2.01	2.01	0.00	0.00	2.01
1985	Manulife	0.00	0.32	0.00	0.00	0.00	0.32	0.00	0.00
2002	P.T. Gawi	11.50	0.00	0.00	4.65	5.35	0.00	0.00	4.65
2004	P.T. Indorama	48.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1989	PT Agro Muko	0.00	2.20	0.00	0.00	0.00	2.20	0.00	0.00
1997	PT Alumindo	8.87	0.00	0.00	2.00	8.87	0.00	0.00	2.00
1989/94/03	PT Astra	0.00	0.91	0.00	0.00	0.00	0.91	0.00	0.00
	PT Astra Graphia	0.00	2.00	0.00	0.00	0.00	2.00	0.00	0.00
	PT Astra Otopart	0.00	1.07	0.00	0.00	0.00	1.07	0.00	0.00
1995	PT Bakrie Pipe	23.71	0.00	9.53	0.00	23.71	0.00	9.53	0.00
2000/02/04	PT Bank NISP	35.00	0.00	0.00	0.00	35.00	0.00	0.00	0.00
1997	PT Berlian	0.00	13.96	0.00	0.00	0.00	10.61	0.00	0.00
1993/96	PT Bina Danatama	4.41	1.73	0.00	8.19	4.41	1.73	0.00	8.19
2004	PT Ecogreen	30.00	0.00	0.00	0.00	30.00	0.00	0.00	0.00
	PT Grahawita	0.00	0.00	5.00	0.00	0.00	0.00	5.00	0.00
1991/95/99/01/03	PT Indo-Rama	5.00	0.00	0.00	0.00	4.88	0.00	0.00	0.00
1992/96	PT KIA Keramik	1.65	0.00	0.00	53.49	1.65	0.00	0.00	53.49
1995	PT KIA Serpih	4.50	0.00	0.00	49.50	4.50	0.00	0.00	49.50
1997	PT Kalimantan	15.00	15.00	0.00	0.00	15.00	15.00	0.00	0.00
2000	PT Makro	0.00	2.61	0.00	0.00	0.00	2.61	0.00	0.00
1998	PT Megaplast	5.25	2.50	0.00	0.00	5.25	2.50	0.00	0.00
1993	PT Nusantara	7.63	0.00	0.00	5.93	7.63	0.00	0.00	5.93
2004	PT Prakars (PAS)	35.00	0.00	0.00	10.00	24.12	0.00	0.00	6.88
1993	PT Samudera	0.00	5.00	0.00	0.00	0.00	5.00	0.00	0.00
1997	PT Sayap	4.17	0.00	0.00	0.00	4.17	0.00	0.00	0.00
2001	PT Sigma	0.00	3.00	0.00	0.00	0.00	3.00	0.00	0.00
1995/04	PT Viscose	9.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997	PT Wings	3.62	0.00	0.00	0.00	3.62	0.00	0.00	0.00
2003	SMM	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	Sunson	12.41	0.00	0.00	7.85	12.41	0.00	0.00	7.85
2004	Wilmar	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total portfolio:		330.23	62.46	14.53	143.62	192.58	59.11	14.53	140.50

Approvals Pending Commitment					
FY Approval	Company	Loan	Equity	Quasi	Partic.
2005	Astra Otoparts 2	0.02	0.00	0.00	0.00
2005	NISP Bussan	0.02	0.00	0.00	0.00
Total pending commitment:		0.04	0.00	0.00	0.00

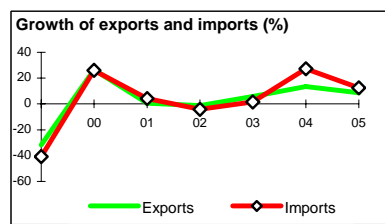
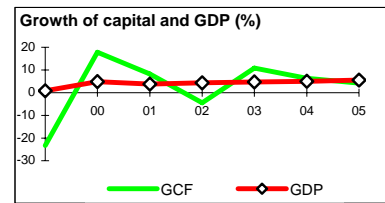
Annex 14: Country at a Glance: Marine Electronic Highway Demonstration Project

POVERTY and SOCIAL	Indonesia	East Asia & Pacific	Lower-middle-income		
2005					
Population, mid-year (millions)	221.3	1,870	2,430		
GNI per capita (Atlas method, US\$)	1,240	1,280	1,580		
GNI (Atlas method, US\$ billions)	273.9	2,389	3,847		
Average annual growth, 1999-05					
Population (%)	1.4	0.9	1.0		
Labor force (%)	2.7	1.1	0.7		
Most recent estimate (latest year available, 1999-05)					
Poverty (% of population below national poverty line)	17		
Urban population (% of total population)	46	41	49		
Life expectancy at birth (years)	66	70	70		
Infant mortality (per 1,000 live births)	31	32	33		
Child malnutrition (% of children under 5)	27	15	11		
Access to an improved water source (% of population)	70	78	81		
Literacy (% of population age 15+)	91	90	90		
Gross primary enrollment (% of school-age population)	111	113	114		
Male	112	113	115		
Female	110	112	113		
KEY ECONOMIC RATIOS and LONG-TERM TRENDS					
	1985	1995	2004	2005	
GDP (US\$ billions)	87.3	202.1	254.3	287.2	
Gross capital formation/GDP	28.0	31.9	23.2	22.2	
Exports of goods and services/GDP	22.2	26.3	32.1	33.5	
Gross domestic savings/GDP	29.7	30.6	27.9	26.6	
Gross national savings/GDP	49.2	56.3	24.9	23.4	
Current account balance/GDP	-2.2	-3.2	0.6	0.3	
Interest payments/GDP	2.7	3.1	4.6	1.7	
Total debt/GDP	42.0	61.5	53.9	46.5	
Total debt service/exports	28.8	29.9	-25.7	-27.0	
Present value of debt/GDP	
Present value of debt/exports	
	1985-95	1995-05	2004	2005	2005-09
<i>(average annual growth)</i>					
GDP	7.7	2.2	5.1	5.6	6.3
GDP per capita	5.9	0.8	3.6	3.8	4.9
Exports of goods and services	9.3	2.4	13.5	8.6	11.2



STRUCTURE of the ECONOMY

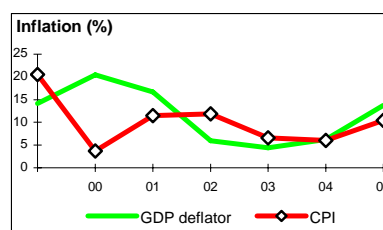
	1985	1995	2004	2005
<i>(% of GDP)</i>				
Agriculture	23.2	17.1	15.6	13.4
Industry	35.8	41.8	44.3	45.8
Manufacturing	16.0	24.1	28.7	28.1
Services	40.9	41.1	40.1	40.8
Household final consumption expenditure	59.1	61.6	63.7	65.2
General gov't final consumption expenditure	11.2	7.8	8.4	8.2
Imports of goods and services	20.4	27.6	27.4	29.2
	1985-95	1995-05	2004	2005
<i>(average annual growth)</i>				
Agriculture	3.4	2.4	4.1	0.6
Industry	9.7	2.1	3.9	4.2
Manufacturing	11.2	3.3	6.2	4.8
Services	7.9	2.2	6.8	9.1
Household final consumption expenditure	6.5	3.3	9.4	7.4
General gov't final consumption expenditure	4.6	3.6	4.0	8.1
Gross capital formation	11.0	-3.4	6.4	4.2
Imports of goods and services	8.5	0.0	27.1	12.3



Note: 2005 data are preliminary estimates.

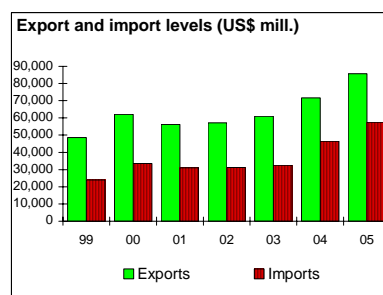
PRICES and GOVERNMENT FINANCE

	1985	1995	2004	2005
Domestic prices				
(% change)				
Consumer prices	4.8	9.4	6.1	10.5
Implicit GDP deflator	4.3	9.7	6.3	13.7
Government finance				
(% of GDP, includes current grants)				
Current revenue	19.8	15.6	17.6	18.2
Current budget balance	-2.3	7.8	7.4	7.6
Overall surplus/deficit	-1.0	4.1	-1.0	-0.5



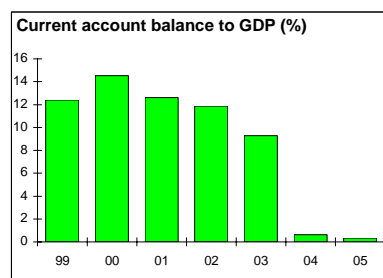
TRADE

	1985	1995	2004	2005
(US\$ millions)				
Total exports (fob)	18,527	45,418	71,585	85,625
Fuel	..	10,465	15,803	19,155
Rubber	..	2,916	1,144	1,468
Manufactures	..	18,312	22,063	22,343
Total imports (cif)	10,259	40,629	46,525	57,600
Food	..	3,022	3,786	3,888
Fuel and energy	..	3,007	11,797	17,429
Capital goods	..	16,290	12,175	13,949
Export price index (2000=100)	..	24	107	124
Import price index (2000=100)	..	26	114	130
Terms of trade (2000=100)	..	95	94	95



BALANCE of PAYMENTS

	1985	1995	2004	2005
(US\$ millions)				
Exports of goods and services	19,371	52,923	89,783	89,783
Imports of goods and services	17,840	54,461	79,116	79,116
Resource balance	3,062	-3,076	10,667	10,667
Net income	-3,542	-11,748	-10,917	-10,768
Net current transfers	88	981	1,138	1,189
Current account balance	-1,923	-6,431	1,564	930
Financing items (net)	2,433	9,578	-1,255	-1,315
Changes in net reserves	-510	-3,147	-309	385
Memo:				
Reserves including gold (US\$ millions)	5,880	14,787	36,320	34,729
Conversion rate (DEC, local/US\$)	1,110.6	2,248.6	8,938.9	9,504.0



EXTERNAL DEBT and RESOURCE FLOWS

	1985	1995	2004	2005
(US\$ millions)				
Total debt outstanding and disbursed	36,715	124,398	137,024	133,482
IBRD	3,590	12,503	8,943	8,131
IDA	844	756	996	1,000
Total debt service	5,823	16,416	-23,647	-24,855
IBRD	384	1,875	1,931	1,865
IDA	12	26	34	34
Composition of net resource flows				
Official grants	273	501	29	134
Official creditors	980	1,129	-2,927	-3,017
Private creditors	154	2,303	554	-400
Foreign direct investment (net inflows)	310	4,346	-3,408	-3,118
Portfolio equity (net inflows)	0	1,493	4,409	6,084
World Bank program				
Commitments	1,068	1,312	773	900
Disbursements	777	2,090	649	646
Principal repayments	133	975	1,389	1,417
Net flows	644	1,115	-740	-771
Interest payments	262	926	576	482
Net transfers	382	188	-1,316	-1,253

