JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
MINISTRY OF TRANSPORT, VIETNAM

THE COMPREHENSIVE STUDY ON THE SUSTAINABLE DEVELOPMENT OF TRANSPORT SYSTEM IN VIETNAM (VITRANSS 2)

Subsector Report No. 04
INLAND WATERWAY TRANSPORTATION

May 2010

ALMEC CORPORATION
ORIENTAL CONSULTANTS CO. LTD.
NIPPON KOEI CO. LTD.

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USD 1 = JPY 110 = VND 17,000

(Average Rate in 2008)

PREFACE

In response to the request from the Government of the Socialist Republic of Vietnam, the Government of Japan decided to conduct the Comprehensive Study on the Sustainable Development of Transport System in Vietnam (VITRANSS2) and entrusted the program to the Japan International cooperation Agency (JICA)

JICA dispatched a team to Vietnam between November 2007 and May 2010, which was headed by Mr. IWATA Shizuo of ALMEC Corporation and consisted of ALMEC Corporation, Oriental Consultants Co., Ltd., and Nippon Koei Co., Ltd.

In the cooperation with the Vietnamese Counterpart Team, the JICA Study Team conducted the study. It also held a series of discussions with the relevant officials of the Government of Vietnam. Upon returning to Japan, the Team duly finalized the study and delivered this report.

I hope that this report will contribute to the sustainable development of transport system and Vietnam and to the enhancement of friendly relations between the two countries.

Finally, I wish to express my sincere appreciation to the officials of the Government of Vietnam for their close cooperation.

May 2010

HIROYO SASAKI,
Vice President
Japan International Cooperation Agency

May 2010

HIROYO SASAKI
Vice President
Japan International Cooperation Agency
Tokyo

Subject: Letter of Transmittal

Dear Sir,

We are pleased to formally submit herewith the final report of the Comprehensive Study on the Sustainable Development of Transport System in Vietnam (VITRANSS2).

This report compiles the results of the study which was undertaken both in Vietnam and Japan from November 2007 to May 2010 by the Team comprising ALMEC Corporation, Oriental Consultants Co., Ltd., and Nippon Koei Co., Ltd.

We owe a lot to many people for the accomplishment of this report. First, we would like to express our sincere appreciation and deep gratitude to all those who extended their extensive assistance and cooperation to the Team, in particular the Ministry of Transport of Vietnam.

We also acknowledge the officials of your agency, the JICA Advisory Committee, and the Embassy of Japan in Vietnam for their support and valuable advice in the course of the Study.

We hope the report would contribute to the sustainable development of transport system and Vietnam.

Very truly yours,

IWATA Shizuo
Team Leader
The Comprehensive Study
on the Sustainable Development
of Transport System in Vietnam
(VITRANSS2)

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ABBREVIATIONS

DD	Detail Design
DWT	Dead Weight Ton
FS	Feasibility Study
GOV	Government of Vietnam
GT	Gross Ton
HCMC	Ho Chi Minh City
IBRD	International Bank for Reconstruction and Development
IWT	Inland Waterway Transport
MCA	Multi Criteria Analysis
MOT	Ministry of Finance
MP	Master Plan
OD	Origin Destination
R-bridge	Reinforced Bridge
RC-bridge	Reinforced Concrete Bridge
SWOT	Strengthen, Weakness, Opportunity, Threat
TEU	Twenty-foot Equivalent Unit
VITRANSS	The Study on the National Transport Development Strategy in the Socialist Republic of Vietnam
VITRANSS 2	The Comprehensive Study on the Sustainable Development of Transport System in Vietnam
VIWA	Vietnam Inland Waterway Authority
VND	Vietnam Dong
WB	World Bank
WMF	Waterway Maintenance Fund

1 INTRODUCTION

1.1 Purpose

The purpose of this report is to review the past performance, present the existing situation, and summarize current plans of the inland waterway sub-sector of Vietnam; and, to propose development directions, in particular an investment strategy for the period 2011-2020.

This report relied heavily on interviews and discussions with Vietnam Inland Waterway Administration (VIWA) and information provided by VIWA, supplemented by field surveys of selected waterways and river ports.

The intention is to build on existing master plan for the sub-sector and to suggest realistic changes in orientation in the context VITRANSS2 overall transport strategy.

1.2 Structure of the Report

Subsequent chapters are as follows:

Chapter 2: Describes the current conditions of the inland water transport sub-sector in Vietnam.

Chapter 3: Reviews the plans of IWT authorities.

Chapter 4: Discusses key planning issues and policy directions in the sub-sector.

Chapter 5: Proposes a long-term development plan.

Chapter 6: Identifies projects and measures for the period 2011-2020.

2 PRESENT CONDITIONS

2.1 Waterway Network

1) Physical Setting

The number of rivers and canals in the country was counted at 2,360 with total length of 220,000 km. Of this, only about 19% (~41,900 km) is considered navigable and 7% (or 15,436 km) placed under management and operation. The latter is split – about 43% (or 6,612km) falls under the responsibility of the central government, with the balance under the local government units.

Table 2.1.1 Scale of Inland Waterways

	Length (km)	
Total Length	220,000	
Navigational Length	41,900	(19.0%)
Under Management	15,436	(36.8%)
By Central Government	6,612	(42.8%)
By Local Government	8,824	(57.2%)

Source: Prepared based on Revised IWT Master Plan

The river system in Vietnam fits into 3 geographical groupings: the North, the Central and the South. Each is described below.

(1) Northern Waterways

The northern region river system is defined by four major streams – Hong, Thai Binh, Luoc, and Duong. The minimum channel widths range from 30 to 36 meters, with minimum depths of 1.5–3.6 meters. Stream condition is affected by the northern hydrometeorology - where May to October is the wet season and November to May is the dry season. The water level difference between the two seasons amounts to 5 -7 meters. During the rainy season, the velocity of the river is very fast but once the dry season sets in, the depth may be too shallow. The sediment at the estuaries is very complex and difficult to manage, with shoals changing every year.

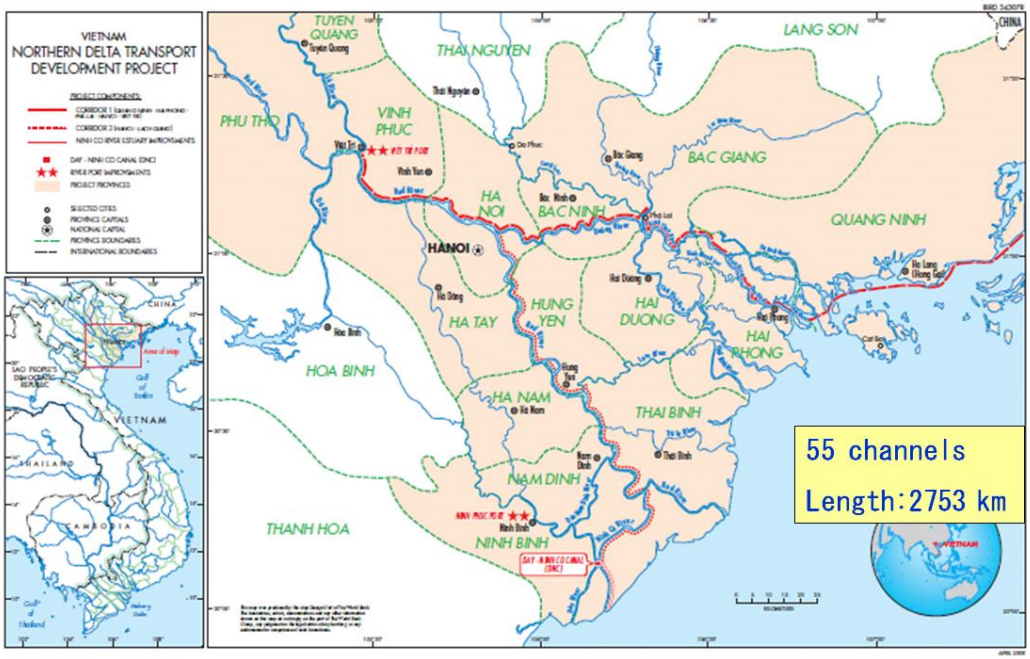
The northern region has 55 channels with a length of 2,753 km. Most of the waterways are under operation 24 hours a day due to a secured navigational depth. The biggest concern is that the connected waterways are of different grades, compounded by sharp curves. A few have limited vertical clearance under the bridges and other river-crossing structures - especially the 3.2 km section of the Dao River in Hai Phong, which allows only one-way navigation all year round. The section of Yen Bai - Lao Cai, a connection China and part of the waterway of Lao Cai - Viet Tri, is not navigable for vessels over 20 tons. Main waterways in the North are shown on Figure 2.1.1.

(2) Southern River System

IWT in the Mekong Delta is based on two major river streams – Mekong and Dong Nai rivers. The channels are more favorable for IWT than those in the northern region - with minimum widths of 30–100 meters and minimum depths of 2.5 – 4.0 meters. In some sections, the depth can reach up to six meters. The stream condition is affected by tidal conditions but there are not many shoals and the frequency of dredging is low. The channels are however constrained by low bridges and narrow clearances.

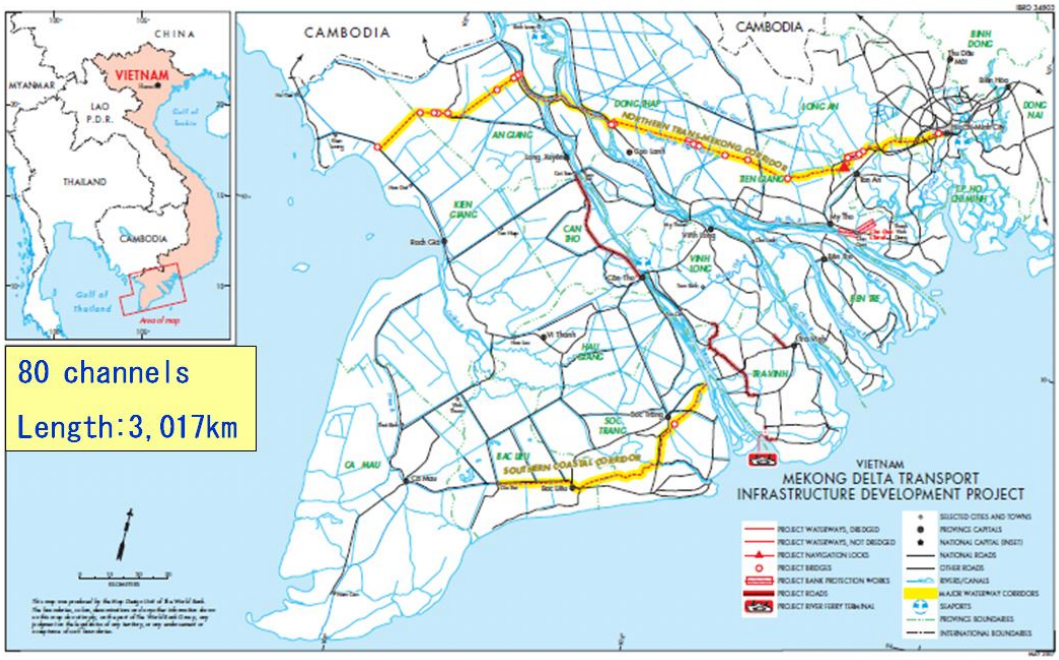
Transport routes are shown on Figure2.1.2. The south has 80 channels with a combined length of 3,017 km. Major waterways from HCMC to Mekong delta are operated 24 hours a day; others are operated during daytime only. The major challenges are: the limitations on vertical clearance below river-crossing facilities, the sharp curves, the encroachment on riverbanks by housing settlements, etc.

Figure 2.1.1 River System in the North



Source: World Bank Report No.4341-VN NORTHERN DELTA TRANPORT DEVELOPMENT PROJECT MAY 19, 2008

Figure 2.1.2 River System in the South



Source: World Bank Report No.39432-VN MEKONG DELTA TRANPORT INFRASTRUCTURE DEVELOPMENT PROJECT April 23, 2007

(3) IWT Central

In the central region, the rivers flow west to east (from the mountain to the sea) independently without forming a network. Channel lengths span 804 km. In the wet season, the water velocity is high. Conversely, in the dry season, the draft is insufficient to support traffic. Due to limitation of depth and presence of falls, river navigation is not conducive except for short 20-km sections near river mouths.

2) Channels and Routes

The MOT updated in December 2005 the list of inland waterways managed by the central government. The list included sixty-five (65) waterways in the north (total length of 2,726.9 km), twenty-one (21) in the central (802.5 km), and one hundred one (101) waterways in the south (3,083.2 km). Complete listing is in Annex 2A. The dimensions of specific sections are shown in Annex 2B.

A chain of sections constitutes a route. Twelve (12) inland waterway routes (combined length of 1,506 km) in the northern region are deemed major routes in the revised IWT master plan up to 2020 (Decision No. 13/2008/QD-BGTVT dated August 6th, 2008). The features and characteristic of these routes are shown on Table 2.1.2 and depicted on Figure 2.1.3.

In the south, fourteen (14) inland waterway routes (with a combined length of 3,047 km, including coastal) are deemed important (see Figure 2.1.4) for the region. These are described on Table 2.1.3 together with their key characteristics.

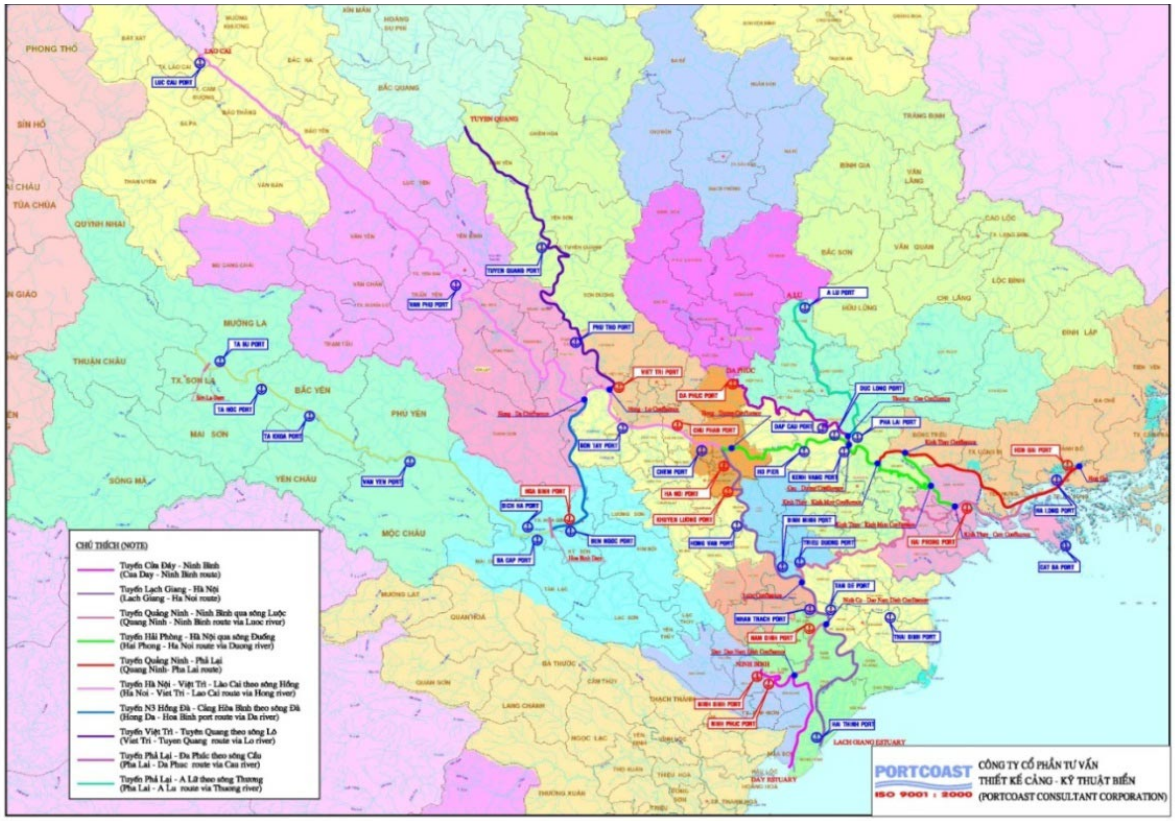
Table 2.1.2 Major Routes in the North

	Route		Location		Length (km)	Critical Dimensions			Obstacles	River Bed	Navigation Aid	Dredging Works
	From	To	River/Canal	Province		depth (m)	width(m)	radius (m)				
N1	Cua Day	Ninh Binh	Day Riv.	Nihn Binh	72.0	2.4	40	350	-	S	B	+
N2	Lach Giang	Ha Noi	Hong Riv, Ninh Co Riv.	Ha Noi, Hung Yen, Thai Binh, Nam Dinh	186.5	2.4	40	-	B	S	B	+
N3	Quang Ninh (canal)	Ninh Binh	Ba Mom Ch. Cai Trap Ch. Bach Dang Riv. Dinh Vu Ca. Cam Riv. Dao Riv. LachTray Riv. Van Uc Riv. Khe Ca. Luoc Riv. Hong Riv.Day Riv.	Quang Ninh, Hai Phong, Thai Binh, Hai Duong, Nam Dinh, Ninh Binh	251.2	1.5	30	-	B	S	B	+
N4	Quang Ninh (Lach Tray)	Ninh Binh										
N5	Hai Phong	Hanoi	Cam Riv. Han Riv. Kinh Thay. Thay Binh Riv. Duong Riv. Hong Riv.	Hai Phong, Hai Duong, Bac Ninh, Ha Noi	150.5	1.5	30	-	B	S	B	+
N5-	Hai Phong	Hanoi	Cam Riv. Kinh Mon Riv. Kinh Thay. Thai Binh Riv. Duong Riv. Hong Riv.	Hai Phong, Hai Duong, Bac Ninh, Ha Noi	152.0	1.5	30	-	B	S	B	+
N6	Quang Ninh	Pha Lai	Ba Mom Ch. Chang Riv. Da Bach Riv. Phi Liet Riv. KinhThay Riv. Thai Binh Riv.	Quang Ninh, Hai Duong	127.5	1.5	30	-	B	S	B	-
N7	Hanoi (Viet Tri)	Lao Cai	Hong Riv. Thao Riv.	Ha Noi, Ha Tay, Phu Tho, Yen Bai, Lao Cai	362.0	<1	30	300	B	S/R	-	-
N8	Hong Da Confluence	Hoa Binh Port	Da riv.	Hoa Binh	53.0	2.0	30	-	-	S/R	-	-
N9	Viet Tri	Tuyen Quang	Lo Riv.	Phu Tho, Tuyen Quang	106.0	1.2	30	-	-	S/R	-	-
N10	Pha Lai	Da Phuc	Cau Riv. Cong Riv.	Bac Ninh, Bac Giang, Thai Nguyen	88.0	1.4	20	-	-	S	-	-
N11	Pha Lai	A Lu	Thoung Riv.	Bac Giang	33.0	1.5	30	180	-	S	-	-
N12	Ninh Binh	Thanh Hoa			72.0							

Obstacle: B means existence of bridge(s).
River Bed: S means sandy bed, R means rocky bed.
Navigation Aid: B means existence of buoy(s).
Dredging: "+" means implementation of dredging works from 2002 to 2005

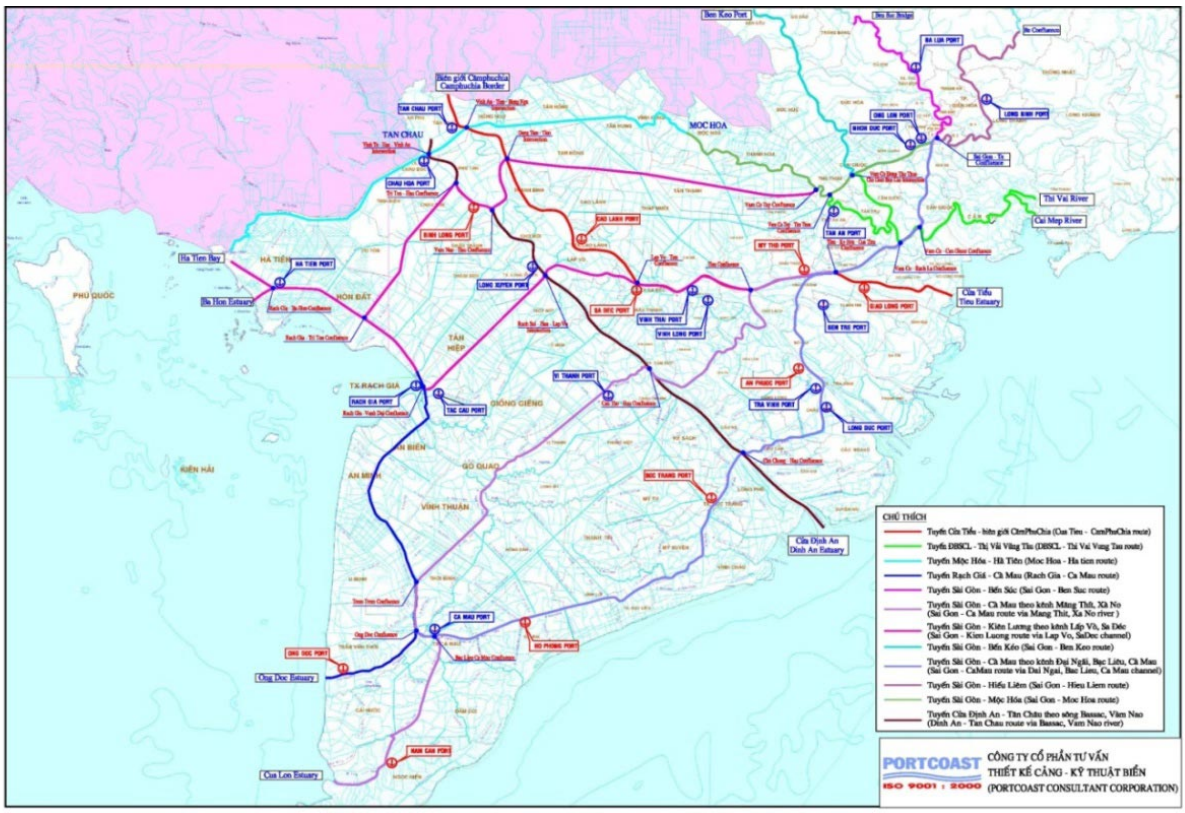
Source: VITRANSS2 Study Team

Figure 2.1.3 IWT Routes of the North



Source: VITRANSS2 Study Team

Figure 2.1.4 IWT Routes of the South



Source: VITRANSS2 Study Team

Table 2.1.3 Major Routes in the South

	Route			Location	Length (km)	Critical Dimensions			Obstacles
	From	to	Via	River/Canal		Depth (m)	Width (m)	Radius (m)	
S1	Cua Tieu	Hong Ngu		Tien Riv.	227.0	4.0	90	-	B
S2	Dinh An Estuary	Tan Chau		Hau Riv.	235.0	-	3	80	B
S3	Sai Gon	Ca Mau	Xa No Canal	Doi Ca. Ong Lon Ca. Cay Kho Ca. Can Giuoc Riv. Nuoc Man Ca. Vam Co Riv. Rach La Ca. Cho Gao Ca. Ky Hon Ca. Tien Riv. Cho Lach Ca. CoChien Ca. Mang Thit Riv. Tra On Ca. Hau Riv. Can Tho Ca. Xa No Ca. Cai Nhat Ca. Cai Tu Ca. Tat Cay Tram Ca. Nga Ba Dinh Ca. Trem Riv. Ong Doc Riv. Tat Thu Riv. Ganh Hao Riv.	341.0	2.7	20		B
S4	Sai Gon	Kien Luong	Lap Vo Canel	Doi Ca. Ong Lon Ca. Cay Kho Ca. Can Giuoc Riv. Nuoc Man Ca. Vam Co Riv. Rach La Ca. Cho Gao Ca. Ky Hon Ca. Tien Riv. Sa dac Ca. Lap Vo Ca. Hau Riv. Rach Soi Ca.(-Hau Giang) Vanh Dai Ca. Rach Gia Ca.(-Ha Tien) Ba Hon Ca.	319.0	2.2	22		B
S5	Sai Gon	Ben Suc	SG river	Sai Gon Riv.	132.5	1.0	35	250	B
S6	Sai Gon	Ben Keo	Vam Co Dong river	Sai Gon Riv. Nha Be Riv. Soai Rap Riv. Can Giuoc Riv. Nuoc Man Ca. Vam Co Riv. Vam Co Dong Riv.	154.7	6.1	80	205	B
S7	Sao Gon	Moc Hoa	Vam Co Tay river	Sai Gon Riv. Nha Be Riv. Soai Rap Riv. Can Giuoc Riv. Nuoc Man Ca. Vam Co Riv. Vam Co Tay Riv.	129.7	3.7	80	250	B
S8	Sai Gon	Ca Mau	Coastal		380.4	1.0	16	-	B
S9	Sai Gon	Kien Luong	Dong Thap Muoi Province	Te Ca. Doi Ca. Ben Luc Riv. Vam Co Dong Riv. Thu Thua Ca. Vam Co Tay Riv. Thap Muoi Ca. Lagrange Ca. Dong Tien Ca. Tien Riv. Vam Nao Riv. Hau Riv. Tri Ton Ca.(-Hau Giang) Rach Gia Ca.(Ha Tien)	337.2	1.9	20	-	B
S10	Moc Hoa	Ha Tien		Vam Co Tay Riv. Hong Ngu-Vinh Hung Cha. Vinh An Cha. Vinh Te Cha.	183.5	-	-	-	-
S11	Sai Gon	Hieu Liem	Dong Nai River	Dong Nai Riv. Sai Gon Riv.	98.8	0.6	18	220	B
S12	Phuoc Xuyen Canel	Canal 28		Phuoc Xuyen Ca. Canal 4 bis. Tu Moi Ca. Canal 28	91.5	1.2	20	-	
S13	Rach Gia	Ca Mau			91.4	2.3	30	400	B
S14	Mekong River Delta	Vung Tau, Thi Vai	A		60.5	1.6	40	150	B
S14'	Mekong River Delta	Vung Tau, Thi Vai	B		58.2				

Obstacle: B means existence of bridge(s).

Source: VITRANSS2 Study Team

2.2 Technical Classification

To guide the planning, management, and development of the waterways, the government has adopted a system of classification based on the channel dimension and corresponding vessel types. Initially, the classification had six (6) classes for all waterways. These were subsequently revised in consideration of technical differences in the south and north, a draft version of which is shown on Table 2.2.1. Corresponding to the classification are the matching sizes of river vessels that could be accommodated in Table 2.2.2.

Table 2.2.1 Technical Classification

Class	Features of the Waterways					The minimum size of dry lock					Height of Clearance		Depth to lay cable/pipe line	
	River		Channel		Curve Radius	Length	Width	Depth level	Bridge Span		Bridge	Electric Wire	Channel	River
	Depth	Width	Depth	Width					Channel	River				
	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)
I-North	>3.4	>125	>4.0	>80	>600	145.0	12.5	3.8	>75	>120	11	12+Δ H	2.0	2.0
I-South	>3.4	>125	>4.0	>80	>450	100.0	12.5	3.8	>75	>120	11	12+Δ H	2.0	2.0
II-North	2.5-3.4	40-125	3.1-3.9	70-80	500-600	145.0	12.5	3.4	>75	>120	9.5	12+Δ H	2.0	2.0
II-South	3.0-3.4	50-125	3.7-3.9	35-80	400-450	100.0	12.5	3.5	>75	>120	9.5	12+Δ H	2.0	2.0
III-North	2.0-2.4	35-40	2.5-3.0	30-40	350-500	120.0	10.5	3.3	>28	>38	7	12+Δ H	1.5	1.5
III-South	2.8-3.0	35-50	3.3-3.6	25-35	300-400	95.0	10.5	3.4	>33	>48	7 (6)	12+Δ H	1.5	1.5
IV-North	1.6-1.9	25-35	2.0-2.4	20-30	100-350	85.0	10.5	2.2	>24	>33	6(5)	7+Δ H	1.5	1.5
IV-South	2.2-2.8	20-35	2.6-3.2	15-25	70-300	75.0	9.5	2.7	>24	>33	6(5)	7+Δ H	1.5	1.5
V-North	1.4-1.5	12-25	1.8-1.9	10-20	60-100	26.0	6.0	1.8	>15	>24	4(3.5)	7+Δ H	1.5	1.5
V-South	1.3-2.2	14-20	1.6-2.5	10-15	60-70	18.0	5.5	1.9	>15	>19	4(3.5)	7+Δ H	1.5	1.5
VI-North	0.9-1.3	<12	0.9-1.7	10	<60	13.0	4.0	1.3	>10	>11	3 (2.5)	7+Δ H	1.5	1.5
VI-South	0.9-1.2	<14	1.0-1.5	<10	<60	12.0	4.0	1.3	>10	>13	3 (2.5)	7+Δ H	1.5	1.5

Notes:
X-North: Class x as for inland waterway in the North
X-South: Class x as for inland waterway in the South
Safe sideline Δ H is stipulated in Ordinance No.54/1999/ND-CP of the Prime Minister dated July 8th 1999 on High Voltage Network Safe Protection
The depth to lay cable/pipeline: the depth under the design bottom of planned vessel channel Value in ( ) is applied in case of approval by the authorized agencies

Source: National technical Regulation on Technical Classification of Inland waterways (Draft) Hanoi 2007, provided by VIWA (translated into English)

Table 2.2.2 River Fleet by Waterway Class

Class	Self propelled vessel				Pushed Barge				Sea cum River Vessels			
	Weight	Length	Width	Draft	Weight	Length	Width	Draft	Weight	Length	Width	Draft
	(ton)	(m)	(m)	(m)	(ton)	(m)	(m)	(m)	(ton)	(m)	(m)	(m)
		50%/90%	50%/90%	50%/90%		50%/90%	50%/90%	50%/90%		50%/90%	50%/90%	50%/90%
Special									>1000	>49	>9.0	>2.85
I-North	601-1050	49/52	8.8/9.5	2.5/3.1	4*400/600	121/132	20.0/22.0	1.85/2.70	600-1050	49/52	9.0/10.0	2.85/3.10
I-South		44/50	9.0/10.0	2.85/3.1		87/92	20.6/22.0	2.55/2.80				
II-North	301-600	44/47	7.50/8.50	2.10/2.60	4*400/600	121/132	20.0/22.0	1.85/2.70				
II-South		39/42	7.70/8.80	2.50/2.75		87/92	20.6/22.0	2.55/2.80				
III-North	101-300	34/40	6.00/7.30	1.70/2.00	2*200/250/400	104/108	7.0/8.5	1.50/2.70				
III-South		25/36	6.50/7.50	2.15/2.55		80/87	8.5/9.4	2.30/2.80				
IV-North	51-100	27/30	4.80/6.00	1.35/1.60	2*100	71/79	6.0/9.0	1.10/1.20				
IV-South		18/22	5.10/5.80	1.80/2.10		54/68	6.10/8.00	1.20/1.60				
V-North	10-50	19/24	4.00/5.20	1.20/1.40								
V-South		14/16	3.40/4.40	1.05/1.50								
VI-North	<10	12/18	1.90/3.00	0.55/0.85								
VI-South		11/13	2.30/2.70	0.65/0.85								

Source: National technical Regulation on Technical Classification of Inland waterways (Draft) Hanoi 2007, provided by VIWA (translated into English)

2.3 Ports and Landing Stages

1) General Description

The waterway network is dotted by more than 7,189 ports and berths of various categories: 126 general-purpose river ports (of which 122 are in-operation), 4,809 freight-handling ports (3,484 with licenses), and 2,348 river-crossing docks (1,005 with licenses). As more industries locate along riverbanks, improvised berths of simple design and low-cost have also proliferated. While convenient to their owners, such improvised landings tend to hamper navigation and safety. Except for a few, throughput in many of the ports is generally low compared to capacity.

Small berths operated by local companies can be seen in many rural areas - only a few of which are under local authorities. Controlling these activities is difficult – because the authorities have limited resources, and there is a natural incentive to utilize what is perceived to be a free resource. As long as they follow the river protocol, their benefits may outweigh the absence of regulatory compliance.

2) IWT Port System

(1) Kinds based on use and scale

Inland waterway ports and landing stages are classified administratively as shown on Table 2.3.1. The number of registered ports and other landing facilities are shown on Table 2.3.2.

Table 2.3.1 Kinds of Ports/Landing Stations

Ports System	Landing Stations	Other Ports/Landing
- Public	- Public	Fishery
- Exclusive	- Exclusive	Defense, Public Security

Source: Article 13(1) Law on inland waterway navigation

Table 2.3.2 Registered Number of Ports/Piers

Unit	Number of ports and piers			Number of ports and piers with license			Number of ports and piers without license			% w/out
	Total	Ports	Piers	Total	Ports	Piers	Total	Ports	Piers	
	2915	90	2825	2072	87	1985	843	3	840	71%

Source: VIWA

(2) Key Ports in the Northern Region

There are11 Major/Terminal river ports in the northern region (Figure 2.3.1), viz:

(i) Freight Ports: Hanoi Port (Hanoi), Khuyen Luong Port (Hanoi), Viet Tri Port(Phu Tho), Ninh Binh Port (Ninh Binh), Ninh Phuc Port (Ninh Binh), Hoa Binh Port(Hoa Binh), Da Phuc Port (Thai Nguyen), Phu Dong Port (Hanoi/under construction)

(ii) Passenger Ports: Hanoi Port(Hanoi), Hai Phong Port (Hai Phong), Ha Long Port (Quang Ninh)

The following ports are classified as local in the sense that they cater to local traffic and owned by local governments:

(iii) Freight Ports: Chem (Hanoi), Bac Hanoi (Hanoi), Chu Phan (Vinh Phuc), Duc Bac (Vinh Phuc), Trieu Duong (Hung Yen), Binh Minh(Hung Yen), Son Tay (Ha Tay), Hong Van (Ha Tay), Nam Dinh (Nam Dinh), Tan De (Thai Binh), Nhu Trac (Ha Nam), Dap Cau (Bac Ninh), A Lu (Bac Giang), Duc Long(Bac Ninh), Ben Ho (Bac Ninh), Kenh Vang (Bac Ninh), Cong Cau (Hai Duong), So Dau (Hai Phong), Van Phu (Yen Bai), Phu Tho - An Dao(Phu Tho), Tuyen Quang (Tuyen Quang), Luc Cau (Lao Cai), Ta Bu (Son La), Ta Hoc (Son La), Van Yen (Son La), Ba Cap (Hoa Binh), Ben Ngoc (Hoa Binh)

(iv) Passenger Ports: Hung Yen (Hung Yen), Thai Binh (Thai Binh), Cat Ba (Quang Ninh)

(3) Key Ports in the Southern Region

There are 18 freight ports and 16 passenger ports in the South that have been shortlisted for development (Figure 2.3.2), these are:

(i) Freight Ports: Phu Dinh (HCMC), Rach Ong Lon (HCMC), Nhon Duc (HCMC), Long Binh(HCMC), Long Binh Tan (Dong Nai), Ba Lua (Binh Duong), Ba Ria (Ba Ria – Vung Tau), Ben Keo (Tay Ninh), Tan An –new (Long An), Long Duc (Tra Vinh), Giao Long (Ben Tre), An Phuoc (Vinh Long), Vi Thanh –new (Hau Giang), Tan Chau –new (An Giang), Binh Long (An Giang), Tac Cau (Kien Giang), Ho Phong –new (Bac Lieu), Ong Doc –new (Ca Mau),

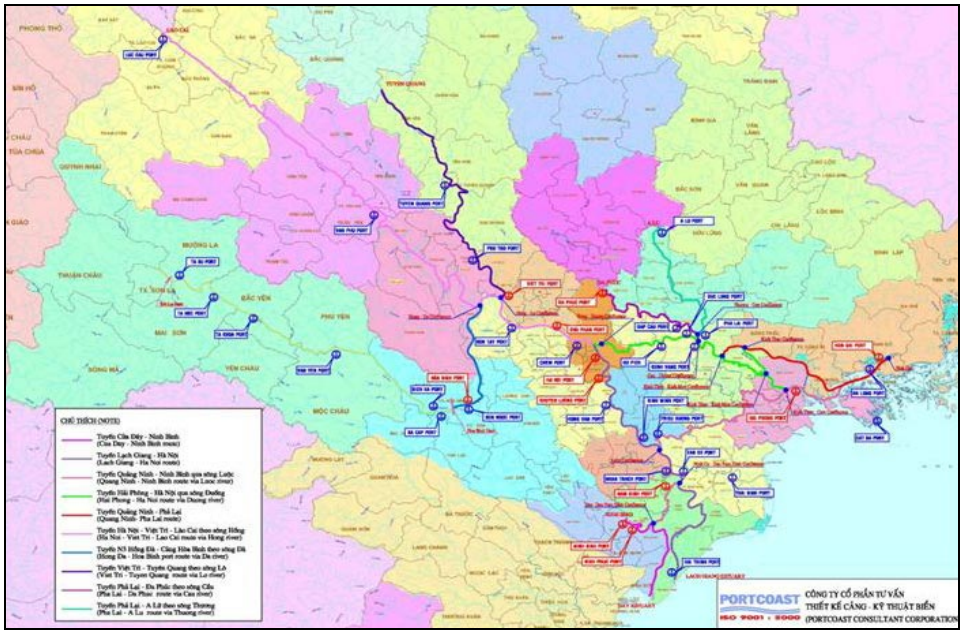
(ii) Passenger Ports: Cau Da (BR-VT), Tan An (Long An), My Tho (Tien Giang), Cao Lanh (Dong Thap), Tra Vinh (Tra Vinh), Vinh Long (Vinh Long), Ben Tre (Ben Tre), Long Xuyen (An Giang), Chau Doc (An Giang), Rach Gia (Kien Giang), Ha Tien (Kien Giang), Soc Trang (Soc Trang), Bac Lieu (Bac Lieu), Ca Mau (Ca Mau), Nam Can (Ca Mau), Ong Doc (Ca Mau)

In the South, the ports of Cao Lanh, Long Xyuyen and Vinh Long have been classified as seaports.

(4) Key Ports in the Central Region

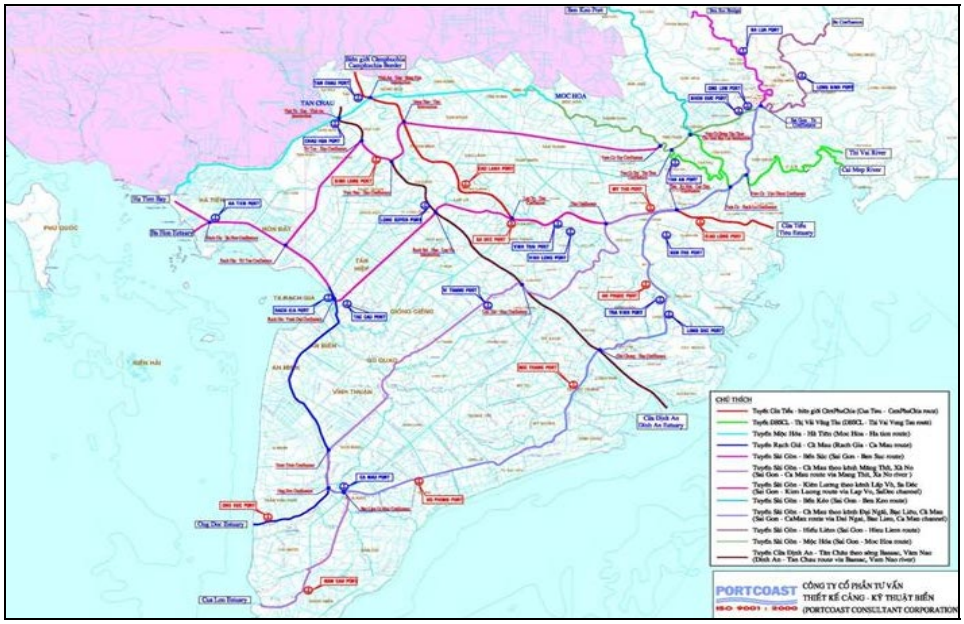
The limited scale of IWT in the Central region also meant fewer, local, and for-freight only, river Ports. These are: Ho Do-new (Ha Tinh), Dong Ha (Quang Tri), Do Len (Thanh Hoa), Quang Phuc (Quang Binh), Quang Thuan (Quang Binh) and Hoi An (Quang Nam).

Figure 2.3.1 Northern River Ports



Source: VITRANSS2 Study Team

Figure 2.3.2 Southern River Ports



Source: VITRANSS2 Study Team

(5) Technical standards for ports

VIWA has drafted the technical parameters to be followed in the preparation of plans and designs for freight ports, passenger ports, freight landing stations, and passenger landing stations.

Six classes of river ports (as shown on Table 2.3.3) primarily intended for handling cargoes emerged based on the following factors:

(i) The scale of infrastructure (the size of wharf, warehouse, freight yard and ancillary facilities)

(ii) The size and type of vessel that the port can accommodate (in terms of DWT and draft)

(iii) Throughput capacity of port per year (in tons of cargo per year)

Similar technical criteria were used in classifying a passenger port, except that the throughput is based on number of passengers rather than tonnage of cargoes (Table 2.3.4).

Table 2.3.3 Technical Classification of Freight Port

Class	Scope of works	Size (type) of accommodated vessel	Throughput capacity
I-A	RC-bridge or R-bridge; Warehouse, freight yard and supporting facilities;	≥ 1,500 DWT vessel or Draft > 3.5m	>1.5 million ton
I-B	RC-bridge or R-bridge; Warehouse, freight yard and supporting facilities;	≥ 1,000 DWT vessel or Draft > 3.0m	1.5 ÷1 million ton
II-A	RC-bridge or R-bridge; Warehouse, freight yard and supporting facilities;	≥ 600 DWT vessel or Draft > 2.5m	>1million ton
II-B	RC-bridge or R-bridge; Warehouse, freight yard and supporting facilities;	≥ 400 DWT vessel or Draft > 2.0 m	500 ÷1 million ton
III-A	RC-bridge or R-bridge; Warehouse, freight yard and supporting facilities;	≥ 300 DWT vessel or Draft ≥ 1.5m	>500,000 ton
III-B	RC-bridge or permanent supports Warehouse or freight yard	< 300 DWT vessel or Draft <1.5 m	200,000 ÷500,000 ton
IV-A	RC-bridge or permanent supports Warehouse or freight yard	≥ 200 DWT vessel or Draft ≥ 1.0 m	>200,000 ton
IV-B	RC-bridge or permanent supports Warehouse or freight yard	< 200 DWT vessel or Draft < 1.0 m	<200,000 ton

Source: National technical Regulation on Technical Classification of Inland waterways, Ports and Landing Stages (Draft) Hanoi 2007, provided by VIWA (translated into English).

Table 2.3.4 Technical Classification of Passenger Port

Class	Scope of works	Size (type of vessel)	Capacity (passenger/year)
1	RC-landing stage with departure house, control center and other service system	Vessel with the capacity of 300 pax or Draft >2.5m	>500,000 pax /year
2	RC-landing stage with departure house, control center and other service system	Vessel with the capacity ≥ 200 pax or Draft >2.0m	300,000÷500,000 pax/year
3	RC-landing stage with departure house, ticket room and control center	Vessel with the capacity ≥ 100 pax or Draft >1.5m	200,000 ÷300, 000 pax/year
4	RC-landing stage with departure house, ticket room	Vessel with the capacity > 70 pax or Draft >1.0 m	100,000÷200,000 pax/year
5	RC-landing stage with departure house	Vessel with the capacity < 70 pax or Draft <1.0m	<100,000 pax/year

Source: National technical Regulation on Technical Classification of Inland waterways, Ports and Landing Stages (Draft) Hanoi 2007, provided by VIWA (translated into English).

Simpler in construction and use than a port, a landing station either for freight or passenger has to conform to a qualitative set of criteria, viz,

(i) Freight landing station must be outside the channel protection corridor and construction-prohibited area under existing regulations.

(ii) Location of landing station must be on stable topography, convenient hydrography and not susceptible to erosion.

(iii) Sufficient number of anchors to hold vessel safely, and equipped with signaling and lighting devices for nighttime operation.

(iv) The location of wharf system or landing-stage must be suitable with handling equipment operated on wharf or landing-stage.

In addition, a freight landing station has to be provided with equipment for handling cargoes; while that for passengers has to be provided with shelter, ticket room, WC and convenient entrance and exit.

2.4 Past Performance of IWT

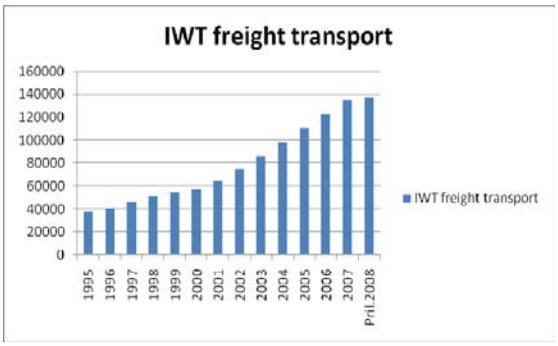
1) Waterway Traffic

(1) Official freight and passenger data

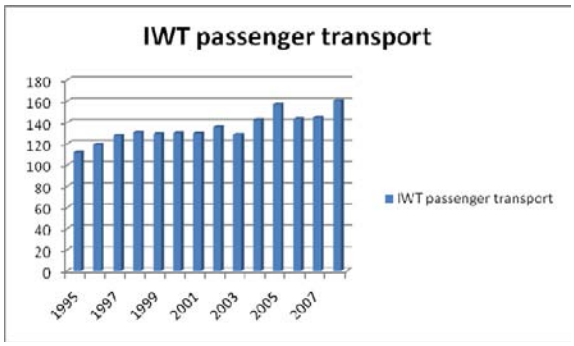
The published statistics on IWT traffic showed steady increase in cargo but erratic passenger traffic trend from 1995 to 2008 (See Figure 2.4.1) on a nationwide basis. Cargo exceeded 137.2 million tons in 2008, or an annual rate of increase of 11.2% since 1995. Passenger volumes dipped in 2003 then increased to reach 160.5 million passengers in 2008. It is however noted that field surveys conducted by VITRANSS2 estimates 234 million tons (1.7 times compared with SYB 2008 of GSO) in 2008. The difference in estimates may be because VIWA statistics is derived from major ports traffic (which may not include all ports), while VITRANSS2 estimate is based on channel traffic. Nonetheless the trend is informative.

Figure 2.4.1 Cargo and Passenger Volumes

IWT cargo transport capacity (Thousand.ton)



IWT passenger transport capacity (Mil.person)



Source: SYB 2008 of GSO

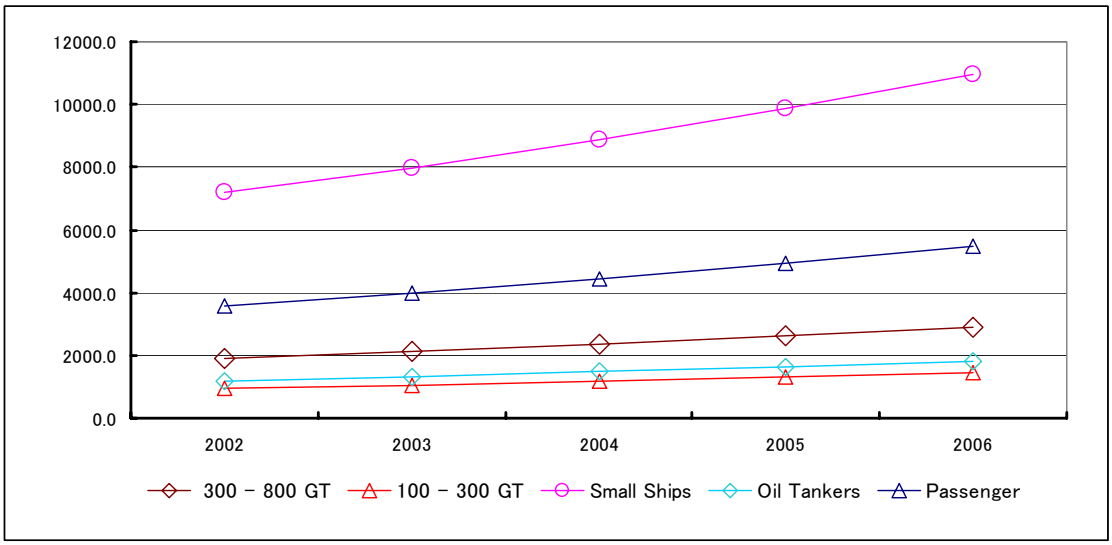
In terms of regional distribution, the southern region accounted for nearly 60% of the country's freight tonnage carried on waterways, followed by the northern region with 33% share. Only less than 9% were carried in the central region.

(2) Cross-border traffic

As a result of increasing cross-border trade in the Greater Mekong Delta, IWT cross border traffic recorded steady growths. Figure 2.4.2 showed the number and type of IWT vessels crossing the Cambodia-Vietnam border, while Figure 2.4.3 refers to ocean-going vessels. The main commodities carried on IWT are oil, cement and steel products from Vietnam and wood and garment from Cambodia.

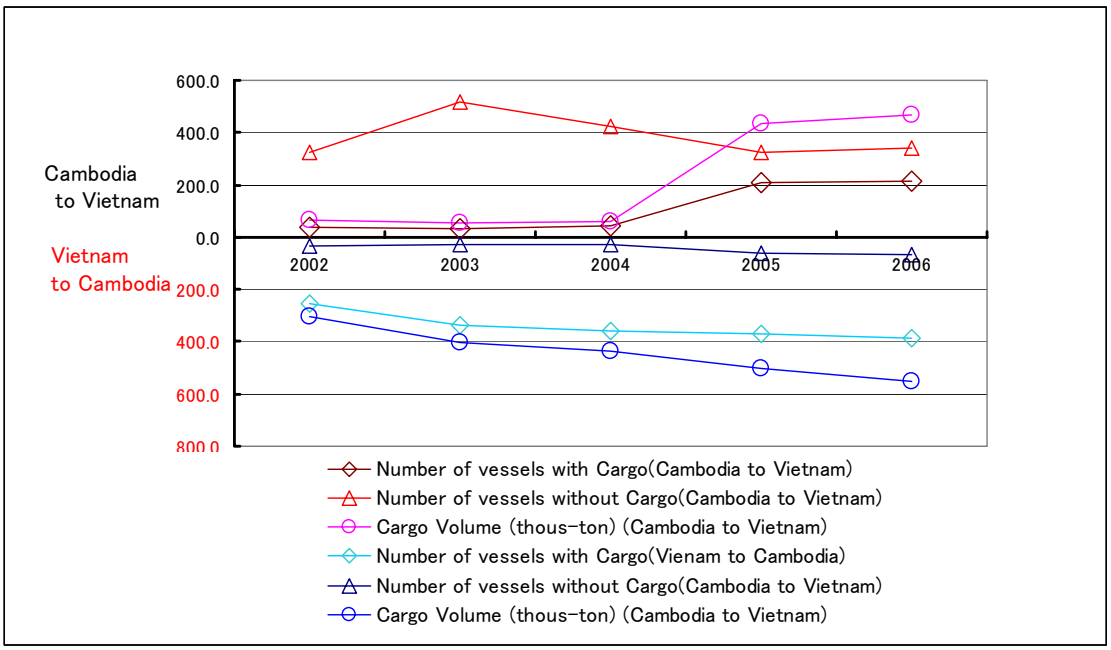
So far, there is no other notable cross-border traffic by IWT in the country; in particular, there is no IWT traffic between China and Vietnam in Lao Cai.

Figure 2.4.2 Cross-border Traffic on River Vessels



Source: VIWA

Figure 2.4.3 Cross-border Traffic on Sea Vessels



Source: VIWA

(3) Field Survey

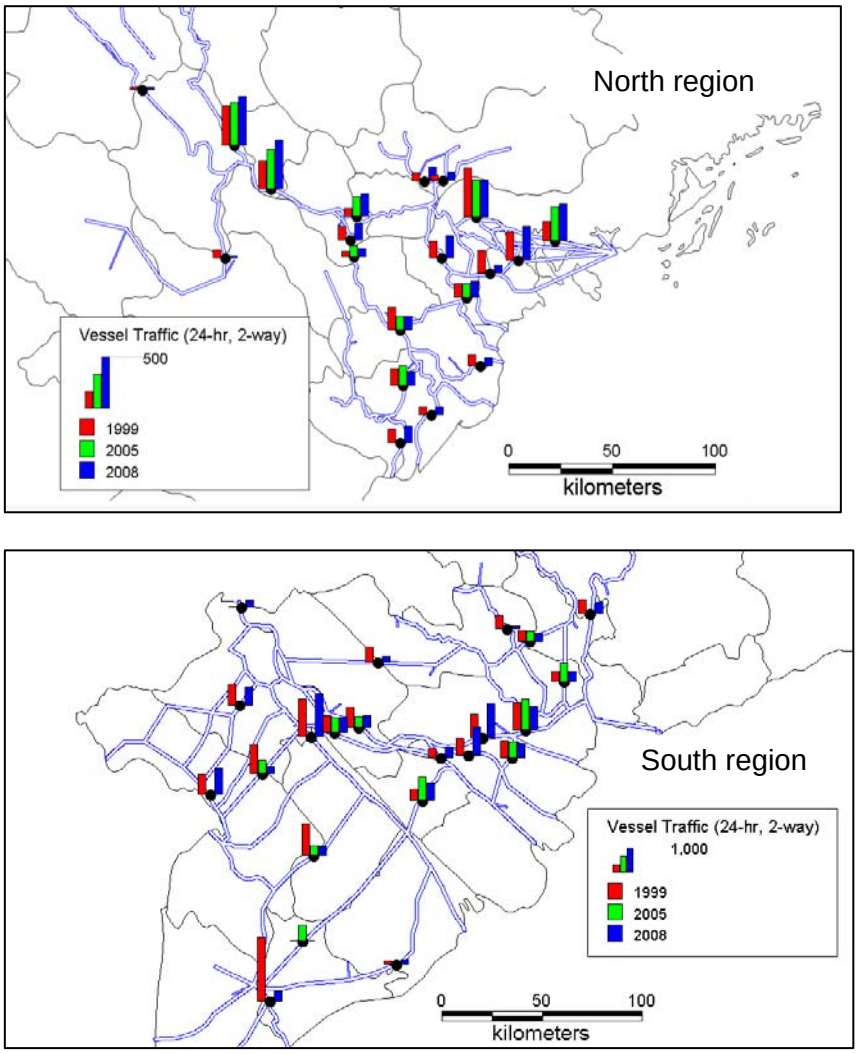
Field surveys were conducted during the 1999 VITRANSS (40 survey stations) and the 2005 VITRANSS Follow-up Study (18 of the 1999 stations and one new station). To derive updated information on inland waterway traffic, the 1999 stations were resurveyed and an additional survey point was added on the cross-border point between Vietnam and Cambodia along Song Tien for a total of 41 stations.

Traffic count (2 days, 14 survey hours per day) in each of the station and OD interview was conducted (1 day, 14 survey hours per day) in 16 stations including the cross-border station. OD interview was conducted with the assistance of the IWT police, wherein vessels are boarded and the captains interviewed. A total of 1,268 vessels were surveyed

- producing vessel traffic volumes, OD patterns, load characteristics, and vessel characteristics.

The results of the more recent surveys by VITRANSS2 compared with the results of the 1999 and 2005 surveys are shown in Figures 2.4.4; these were. They validate the observation that IWT traffic has been increasing overall. Some stations, however, experienced dramatic drop in vessel traffic - particularly in the South. The cause was traced to the completion of a highway that induced a modal shift.

Figure 2.4.4 Vessel Traffic Volumes



Source: VITRANSS2 Study Team

(4) Differences in IWT characteristics between North and South

In the north, vessel traffic is primarily restricted to self-propelled vessels, while in the south a more diversified fleet was observed. This is a reflection of the differences in the characteristics of the river channels. River sections of higher technical classes afford operators greater flexibility in deploying vessels appropriate to the requirements of the market, rather than constrained by channel limitations.

Key observations about the northern IWT system are as follows:

(i) Traffic is very directional with traffic from the west of Hanoi mostly going downstream loaded and returning empty, while traffic from Quang Ninh/Hai Phong goes upstream loaded and returns empty;

(ii) The primary corridor is Phu Tho – Hanoi – Hai Duong – Hai Phong/Quang Ninh;

(iii) Vessel sizes around Quang Ninh are relatively bigger, while further upstream vessel sizes are very small;

(iv) Primary commodities are coal and ore, construction materials, and cement; and

(v) The flows converge towards the center of the Red River delta, with the major IWT corridors coming mainly from Hai Phong/Quang Ninh and Phu Tho.

(vi) Key observations about the southern IWT system are as follows:

(vii) Traffic is multidirectional, resulting in relatively higher load factors of IWT vessels;

(viii) IWT traffic is more concentrated in a smaller area around HCMC and Tien Giang/Ben Tre;

(ix) Vessel sizes in the Mekong delta are comparatively smaller, while vessel traffic along the periphery of HCMC is relatively larger;

(x) A more diversified mix of commodities is seen in the south; and

(xi) Load center of gravity is HCMC and Tien Giang/Ben Tre.

2) Existing Fleet

The records of the Vietnam Register showed that, as of late 2006, there were a total of 86,461 registered river vessels - including 72,151 freight vessels (about 70 tons/vessel) and 14,310 passenger vessels (total capacity of 322,221 seats or 22 seats per vessel). On the other hand, according to the data of the IWT Survey Steering Committee (May 2007), another 700,000 river vessels exist - with average capacities of 1–10 tons per vessel and mostly owned by households.

Available information on the fleet quality is as follows: Good 25%, Fair 61.6%, Bad 13%. The average age of the fleet is 12 years; those under 10 years comprised 76%, 10–15 years 13%, 15–20 years 7.2%, and over 20 years 3.3%.

There are several state enterprises engaged in the building and repair of vessels, such as VINASHIN, units under central ministries, local governments as well as cooperatives and private entities. These enterprises appear to be thriving, but the domestic content of their outputs is still low, since engines and vital spare parts are imported. Privately owned builders are said to be not disadvantaged, and could compete fairly.

3) Safety records on the waterways

The accident rates in the IWT sub-sector is deemed low, with less than 400 accidents recorded annually since 2001, and fatalities of less than 300 per year. Although there are only a few IWT accidents, the loss of lives and damage to properties are worth attending. The major causes of accidents are pilot error and poor quality of vessel. Accidents happen mostly at river-crossing docks where navigational safety rules are poorly observed, and during the rainy season.

Table 2.4.1 Traffic Accidents, 2006

Modes	Accidents	%	Fatal	%	Injury	%
Road	14,161	96,16	12373	96.99	11097	98.31
Rail	292	1.98	136	1.07	158	1.40
IWT	215	1.46	210	1.65	18	0.16
Shipping	59	0.40	38	0.29	13	0.13
Total	14,727	100.00	12757	100.00	11,288	100.00

Source: Revised IWT master plan up to 2020

Navigation aids are being improved, but there is difficulty in maintaining them. The number of navigation aids over the river network is about 2 units/km of navigable rivers.

2.5 Institutional Aspects

1) Legal Basis

The basic law for inland waterway navigation is Decision No.23/2004/QH11 promulgated on 15 June 2004. It consists of eight chapters: general provisions; planning, construction and protection of inland waterway navigation infrastructure; inland waterway vessels; crewmen and pilots; navigation rules and vessel's signals; responsibilities of ports authorities and waterway pilots; inland waterway transport; and administration of inland waterway navigation.

Article 10 prescribes guidelines on IWT planning, to wit:

(i) Planning must be based on the socio-economic strategies, river basin plans, other related plans, as well as the needs of defense and security;

(ii) Written opinions of relevant state agencies have to be solicited when formulating a plan;

(iii) The Prime Minister shall approve the overall plan based on the recommendation of the Minister of Transport;

(iv) The Minister of Transport shall be responsible in amplifying the overall plan approved by the Prime Minister;

(v) Provincial-level People's Committees shall be responsible for the formulation and approval of the detailed plans in their respective localities;

(vi) The concerned agencies have to publicize the plan, and to make periodic adjustments.

Another article of the Basic Law classifies inland waterway as to jurisdictions (see Table 2.5.1).

Table 2.5.1 Responsibilities for Inland Waterways

Waterways	Responsibility for Management and Maintenance
National inland waterways	Ministry of Transport (VIWA)
Local inland waterways	People's Committee of the provinces and centrally-run cities
Exclusive inland waterways	Organizations and individuals having the waterways

Source: VITRANSS2 Study Team

2) Administration

One of the specialized semi-autonomous agencies of MOT is the Vietnam Inland Waterway Administration (VIWA). It is responsible for the whole sub-sector – from planning, policy, implementing rules and regulations on inland water throughout the country. In addition, two regional enterprises exist under MOT: the Northern Inland Waterway Transport Corporation and Southern Inland Waterway Transport Corporation.

Following the Decision 51/2008/QD-TTg of Prime Minister on the approval of function, responsibilities, tasks, power and organizational structure of MOT, the Minister of MOT issued Decision No. 27/2008/QD-BGTVT regulating the function, tasks, responsibilities, power and organizational structure of VIWA, dated December 4th, 2008

The functions of VIWA are the following:

(i) To formulate strategy, master plan, and development plan of waterway transportation in the whole country;

(ii) To formulate rules and regulations on inland waterway, including issuance of technical and economic standards and criteria;

(iii) To recommend to MOT the assignment and classification for managing inland waterway infrastructures and waterway routes;

(iv) To serve as investment arm of the government on inland waterway infrastructures under State management;

(v) To designate inland waterway transportation routes and river ports that vessels may use;

(vi) To develop navigation aids, participate in the granting of construction permits for river crossing projects and projects on/in the river, and monitor the utilization and any obstruction of waterway;

(vii) To regulate the registration as well as operations of vessels, and the licensing of pilots thereof;

(viii) To inspect waterways and their safety features, and to coordinate with relevant agencies and provincial authorities in protecting waterway projects and ensuring safety;

(ix) To administer the operation of river ports that are under central government control;

(x) To conduct research on advanced technology for waterway transportation;

(xi) To administer the collection of fees and other charges, on behalf of the Ministry of Finance;

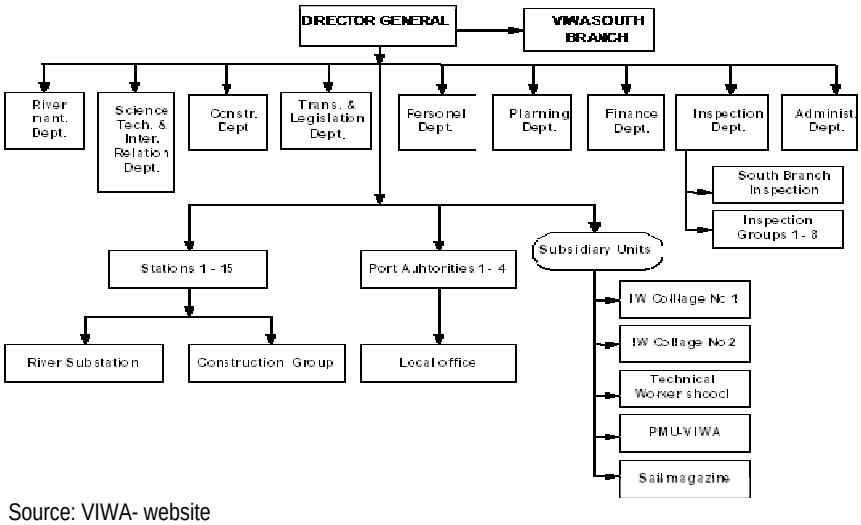
(xii) To recommend to MOT the country's participation in international conventions, agreements, and treaties on waterways;

(xiii) To train and issue driving licenses and certifications of technical workers in inland waterways;

(xiv) To manage the personnel and other assets assigned by law and the State.

The organization of VIWA is shown on Figure 2.5.1.

Figure 2.5.1 Organization of VIWA



Source: VIWA- website

3) River Management

The network of rivers in Vietnam is divided into fifteen (15) management units located in each region of the country. These are:

(i) River Management Station No. 1 – for 489 km of rivers and lakes, encompassing 288 km of the Hong river from the confluence of Viet Tri to the confluence of Nam

Thi (Lao Cai), 115 km of the Lo river from the confluence of Viet Tri to the confluence of LoGam, 37 km of the Gam river from the confluence of Lo Gam to the confluence of Chiem Hoa, and 50km of Thac Ba lake area in six provinces of Lao Cai, Yen Bai, Phu Tho, Tuyen Quang, Vinh Phuc, and Ha Tay.

(ii) River Management Station No. 4 - for 352 km comprising six rivers in six provinces in the North of Vietnam.

(iii) River Management Station No. 7 - 200.5 km comprising the five rivers of Mao Khe, Kinh Mon, Lai Vu, Thai Binh and Kinh Thay which are located in four provinces (Hai Duong, Bac Ninh, Quang Ninh, Hai Phong).

(iv) River Management Station No. 9 – 261 km consisting of 58 km downstream of Hoa Binh hydroelectric dam, 95 km and 108 km of lake regions.

(v) River Management Station No. 10 - 644.5km of inland waterways located in five provinces (Dong Nai, Binh Duong, Tay Ninh, Long An, Tien Giang and Ho Chi Minh city).

(vi) River Management Station No. 11 - 366 km of waterways located in four provinces (Tien Giang, Ben Tre, Vinh Long and Tra Vinh).

(vii) River Management Station No. 12-413.5 km of waterways consisting of 60.5 km of the Hau river, 83.5 km of Omon-Tac Cau route, 105.5km of Can Tho-Ca Mau route, 65.5km of May - Cai Mon - Ca Mau, 60.5km of Dai Ngai - Ca Mau route and 38km of the Cai Lon river.

(viii) River Management Station No. 13 - 529 km of waterways located in four provinces (An Giang, Kien Giang, Can Tho and Dong Thap), consisting of 72 km of the Hau river from the confluence of Tan Chau to Cai San, 6.5 km of the Vam Nao river from the confluence of the Tien river to the confluence of the Hau river, 16 km of the Năng Gù Thị Ḥa ditch from Binh Thuy starting bank to Ba Hoa ending bank, 7.5 km of the Hau river from Ong Ho starting bank to Pho Ba ending bank, 5 km of the Vĩnh Tế channel from the confluence of the Chau Doc river to Nui Sam approach channel, 1.5 km of the Chau Doc river from the confluence of the Hau river to the confluence of the Vinh Te channel, 57.5 km of Tri Tôn - Hậu Giang channel from the confluence of the Hau river to the confluence of the Rach Gia Ha Tien channel, 36 km of Tám Ngàn channel from the confluence of Mặc Cần Dưng channel to the confluence of Rạch Giá Hà Tiên channel, 12.5 km of Mặc Cần Dưng channel from the confluence of Ba Thê channel to the confluence of Tám Ngàn channel, 81.5 km of Rạch Giá Hà Tiên channel from the confluence of the Rạch Giá Long Xuyên channel to the confluence of Hà Tiên town, 7 km of Ba Ḥn channel from the confluence of Rạch Giá Hà Tiên channel to Ba Ḥn outfall, 57 km of Ba Thê channel from the confluence of the Hau river to the confluence of Rạch Giá Hà Tiên channel, 12.5km of Ông Hiển Tà Niên channel from the confluence of Rạch Giá Long Xuyên channel to the confluence of the Cái Bé river, 4 km Tắt Ráng channel from the confluence of Rạch Sỏi channel to the confluence of Ông Hiển Tà Niên channel, 59 km of Rạch Sỏi Hậu Giang channel from Cái Sắn to the confluence of Rach Soi, 63.5 km of Rạch Giá Long Xuyên channel from Long Xuyên to Rạch Giá, and 23 km of Rạch Ông Chưởng ditch from the confluence of the Hau river to the confluence of the Tien river.

(ix) River Management Station No. 14 - 431 km of waterways located in two provinces (Ca Mau and Bac Lieu).

(x) River Management Station No. 15 - 529 km of inland waterways.

(xi) At stations 2, 3, 5, 6 and 8, joint stock companies have been established to pursue their respective businesses. Thus, Inland Waterway Management Joint Stock Company No.2 maintains the waterway channels; controls the river traffic; removes obstacles; operates (pulling, pushing) vessels to maintain traffic safety and offer pilotage service; manufactures and installs aids to navigation; conduct dredging, irrigation and civil construction; operates cargo transport and ancillary services relating to repair of vessels, sale of spare parts and refuelling; engages in the trading of construction materials, agricultural products, as well as real estate business and import-export.

4) Financial Aspects

(1) River Ports

Revenues collected by port authorities amounted to VND 26,127 million in 2007, while expenditures totaled VND 25,360 million (Table 2.5.2). The small surplus indicates that ports cover their operating cost, but any surplus is remitted to the government, as they have no fiscal autonomy. Investment and maintenance costs are treated separately, and dependent on the national budget.

Table 2.5.2 Revenue and Expense by Port Group

Unit: VND million

	Revenue	Expense	Surplus	No. of Ports	Ave.Revenue
Total Amounts, in 2007	26,127	25,360	1,829	88	296.9
Port No 1 (Haiphong)	11,670	11,451	732	22	530.4
Port No 2 (Hanoi)	3,712	3,685	232	25	148.5
Port No 3 (HCMC)	6,626	6,558	591	26	254.8
Port No 4 (Can Tho)	4,119	3,936	274	15	274.6
Estimated Amounts in 2008	26,501	25,630	-	88	301.1

Source: VIWA.

(2) Pricing

The river port fees are set by the Ministry of Finance. The prevailing rates are contained under Circular 58/2005/TT-BTC dated 18 July 2005 and shown on Table 2.5.3.

Table 2.5.3 River Port Fees

Tonnage Fee	Unit charge
- On Entry (full & empty) - On Exit (full & empty)	150 VND/ GT 150 VND/ GT
Procedure Fee	
- Boat from 10 GT to 50 GT	5.000 VND/ call
- Boat from 51 GT to 200 GT or passenger boat 13 - 50 seats	10.000 VND/ call
- Boat from 201GT to 500 GT or passenger boat 51 - 100 seats	20.000 VND/ call
- Boat over 501 GT, or passenger boat over 101 seats, sea vessel under 200 GT	30.000 VND/ call
- Sea vessel 200 GT – under 1000 GT	50.000 VND/ call
- Sea vessel 1000 GT - under 5000 GT	100.000 VND/ call
- Sea vessel over 5000 GT	200.000 VND/ call

Source: Circular of the Ministry of Finance 58/2005/TT-BTC dated 18 July 2005.

Since 1995, there has been no change in the cargo freight rates of IWT carriers. The two North and South Companies adopt the basic tariff x 1.1. The rates differ according to designated river class (classes 1, 2 and 3) and cargo category (categories 1, 2 and 3). There is a minimum charge which is based on a minimum distance of <30 km for transport of cargo along river class 1, as shown in Table 2.5.4. Beyond the minimum distance, an additional charge per ton-km is applied.

Table 2.5.4 Basic Tariff for Cargo Transport (on River Class 1)

Cargo Category	Cargo	Charge by Distance	
		Distance < 30 km (VND/ton)	Distance ≥31 km (VND/ton km)
1	Coal, sand gravel, bricks	21,670	150
2	Tile, bagged food, petrol, oil, stones, medicine against termite and wood-borer	23,760	163
3	Fertilizer, insecticide, cement, salt	26,300	178

Source: Decision No. 36/VGCP-CNTD.DV (July 1995) rate x 1.1.

Thus, category 1 goods are charged the lowest with a minimum rate of VND 21,670 for a distance of up to 30 km when traveling on river class 1. Class 1 rivers are deemed easiest to navigate, hence the tariff is lowest. The rate for river class 2 is 1.5 times higher than class 1, and class 3 is 3 times higher.

At the point of loading/unloading point, the cargoes are subject to cargo-handling fees. The tariff is differentiated for general cargoes, container, and vehicles. The handling rates presented in Table 2.5.5 are based on the seven cargo groups shown in Table 2.5.6 as well as the type of handling movements. Since the cargo-handling tariff is determined by weight and type of commodities, rules have been issued on weight conversion (see Table 2.5.7).

Table 2.5.5 Cargo Handling Tariffs

Unit:VND/Ton

Group of Cargo	Ship, barge ⇔ storage	Ship, barge ⇔ truck, car	Barge ⇔ Barge	Storage ⇔ truck	Storage ⇔ car
1	8,200	6,160	5,500	4,730	6,380
2	9,900	7,370	6,600	5,720	7,700
3	14,000	10,560	9,460	8,140	11,000
4	16,700	12,540	11,100	9,570	12,980
5	21,200	15,840	14,080	12,155	16,390
6	27,800	20,790	18,590	15,950	21,560
7	31,300	23,430	20,900	17,930	24,200
Note: Dangerous cargo or those requiring additional processing is surcharged.					

Source: Decision No. 709/PC – VT (Jul. - 1995) x 1.1

Table 2.5.6 Cargo Groups

Group	Description
Group 1	-Dust coal, sand, gravel, and broken stone
Group 2	-Coal with a diameter of 35mm, coal sheet, peat coal, coal cinder
Group 3	-Packaged food and foodstuff such as rice, grain, maize, bean, pea, peanut, potato, manioc, sugar, ore, broken brick, clinker, brim stone, fertilizer
Group 4	-Packaged cargo such as chemical substance, salt, cement, fertilizer, ore Coal with a diameter of > 35 mm, gypsum, rock stone
Group 5	-Iron, steel (piece, sheet, roll), cast iron pipe, steel pipe, iron sheet, steel sheet, concrete pipe, aluminum (piece, sheet, roll)

Group	Description
	-Cargo in boxes made from iron and wood with a weight of 300 kg -Cargo in package with a weight of 301-500 kg. -Wood -Bamboo, tree branches, tree roots.
Group 6	-Cargo in tanks or barrels such as: asphalt, petroleum, oil, calcium carbide, chemical substance. -Animals -Cargo in boxes with a weight of 301-2,000 kg. -Baskets of food stuff, fruit (fresh and dry), beer, wine, refreshment. -Goods such as household appliances, sporting goods, stationery, soap, health care equipment, goods made from bamboo, cane and asphalt goods.
Group 7	-Cargo in wooden and iron boxes with a weight of 2,000 kg (except for container, car and cargo with a length of more than 12 m, a width of more than 3 m, a weight of more than 2.5 m, or a weight of more than 15 tons) -Wood
Note: Handling fees of cargo that are not mentioned above will be calculated based on standard of package, quality and capacity of handling.	

Source: Saigon Port Website

Table 2.5.7 Rules in Weight Conversion

No.	Cargo	Unit	Converted Weight for Fee Calculation
1	Aluminum, cane, bamboo and wooden goods	1 ton	2 tons
2	Wool, duck feature	1ton	4 tons
3	Wood, bamboo	$1m^3$	1 ton
4	Large basket	$1m^3$	0.2 ton
5	Buffalo, horse, goose, sheep, pig	1	0.2 ton
6	Animal in cage	$1m^3$	1 ton

Source: Decision No. 709/PC – VT (Jul. - 1995)

The handling tariffs for containers and vehicles are shown on Table 2.5.8. Storage charge in the yard, which is open to the elements, is set at a monthly rate of VND 10,000/m^2; while storage in warehouse is at a higher monthly rate of VND 32,000/m^2.

Table 2.5.8 Container Handling Charge

Cargo Type		Ship, barge Yard
Container 20'	stuffed	387,000
	empty	205,000
Container 40'	stuffed	650,000
	empty	420,000
Vehicle	< 5 tons	na
	> 5 tons	na

Source: The North Inland waterway General Company (as of April 2008)

The fare for passenger transport on inland waterway is deregulated. The Government has chosen to steer clear from fixing fares for passengers, hence operators can charge a rate it sees fit according to market and service standards. This is sound policy, as it enables operators to optimize their service offerings.

2.6 Summary Assessment

1) Waterways

Inland waterways are distributed mainly in the north (Red River Delta) and in the south (Mekong River Delta). Channel conditions changes due to meteorological situation – especially in the north. In the absence of regular surveys, the conformity of existing waterways to the technical standards of its class cannot be ascertained. A corollary consequence is the inability to publish current or updated navigation chart to guide vessels. Siltation levels are also indeterminate as to guide maintenance dredging programs, which could not be implemented rigorously and regularly due to lack of funds. Nighttime navigation is not possible in several sections of the waterways – especially in the south.

The boundary between inland water and coastal shipping is often blurred – when the same channels are used by both modes. This situation becomes problematic on the issue of who initiates and pays for maintenance dredging and to what extent it should be done. For example, shallower depths may be acceptable to inland water, but not to coastal shipping. The problem also arises when a nearby island can be linked by larger river crafts as well as either by smaller-sized sea vessels, or when the route combines links over a river and on sea. River traffic management can also become ambiguous.

2) Public ports

Public ports (whether under central or local management) are generally small-scale, with outdated handling facilities, low mechanization, poorly maintained, and poor access to hinterland. On the other hand, dedicated ports appear to be well provided and maintained. Piers are built for specific requirements without any particular pattern or order, although guidelines have been issued by VIWA to mitigate the problem.

The overlap between coastal and river transport is critical when one port is re-classified from one mode to the other, or when the same port serves both inland and sea traffic.

3) Vessels

Vessel registration is outdated, with the smaller vessels – which numbers in the thousands – not being counted or identified. The situation is understandable, but not acceptable when they lead to accidents. Except for larger vessels owned by transport enterprises, generally the crew, or pilot, are poorly trained and without proper certification.

Vessel type and crew licensing also becomes an issue when the operations transcend inland and coastal links.

3 CURRENT POLICIES, PLAN AND PROJECTS

3.1 IWT in Various Government Plans

The development of inland waterway transport, in relation to the other sectors of the country, is recognized in several national and sub-national development plans, viz:

(i) National Socio-Economic Development Plan 2006-2010: gives priority to the upgrading of important waterway routes and river ports in the Mekong delta and Red River delta.

(ii) Northern Focal Economic Zone Development Plan: gives priority to the upgrading the Giang and Day river mouths, including the improvement of the Quang Ninh - Ninh Binh route, as well as the development of IWT container terminals in several river ports.

(iii) Southern Focal Economic Zone Development Plan: focuses on upgrading of the Saigon - Ca Mau and the Saigon - Lien Luong routes.

3.2 Master Plan to 2020

1) Basic Directions

For the sub-sector, the government is guided by the 'Master Plan for Vietnam Inland Waterway Sector to 2020 (Decision No. 16/2000/QD-TTg, dated February 2nd 2000). This plan has undergone some revisions, adjustment and approved by Minister of Transport, Decision No. 13/2008/QD-BGTVT dated August 6th, 2008. It encompasses programs that VIWA wants to undertake in the area of infrastructure, transport services, fleet development, and vessel-manufacturing industries.

The Inland Waterway Transport revised master plan was intended to become the basis for: a) detailed planning for construction, upgrading of infrastructure and facility and improvement of services, b) coordination and integration with other transport sub-sector plans for road, rail and other sectors with direct links with IWT and c) fund mobilization (budget, ODA, FDI, and others).

The basic directions of the master plan are as follows:

(i) Exploit the natural advantages of waterways in transporting bulk cargo at lower costs and minimal impact on the environment;

(ii) Achieve vertical integration within IWT by synchronizing development of routes, ports, handling equipment, vessels, and managerial capacity to meet the demand for cargo and passenger transportation at higher quality and safety;

(iii) Develop IWT infrastructure to form a seamless system with other transport modes, and in coordination with irrigation and hydropower sectors.

(iv) Upgrade the fleet with more efficient configuration that are also safe and suited to existing conditions of canals and rivers;

(v) Widen the financing base for IWT, with the public sector focusing on the river channels, and collaborating with the private sector in ports development.

Aside from aiming to expand the IWT network of routes and services, the plan also set objectives about the vessel fleet, navigational channels, and ports.

(i) On the vessel fleet: capacity of 12 million tons, lower the average age of vessels from 12 to 5-7 years, change the vessel mix to 30-35% to-push, and 65-70% self-propelled.

(ii) On navigational channels: increase the length of rivers and channels under government control, ensure the same grade in main channels, modernize marking buoys, and secure channel right-of-way through big cities.

(iii) On ports and landing stages: modernize selected hub ports, main ports in key region and special port, increase loading/unloading efficiency through mechanization, build a number of passenger ports and landing stages.

2) Main routes to be developed

Forecasted demand in the revised and adjusted 'Master Plan for Vietnam Inland Waterway Sector to 2020' (13/2008/QD-BGTVT) had been translated into flows along river paths or routes, shown on Table 3.2.1, for cargo and passengers in the South and North.

Table 3.2.1 Main Routes through Inland waterway

North			
Cargo			
	Hai Phong-Hanoi-Viet Tri-Tuyen Quang	Sand, chemicals, fertilizer for Red River delta Coal, cement, imported goods	
	Hai Phong, Cai Lan to Ninh Binh	Container:	New
	Hai Phong to Hanoi (via Duong river)	Container:	New
	Quang Ninh-Pha Lai-Dap Cau-A Lu	Coal forThermal power, Bac Giang fertilizer Crystal sand for Dap Cau, Cement, Imported goods from Hai Phong, Coal for thermal power, cement (to Ninh Binh), Cargos from Ninh Binh to neighboring provinces, Construction stone (from Ninh Binh to Thai Binh, Nam Dinh)	
	Coastal line: -Quang Ninh-Ninh Binh	Reducing congestion on man-made river of Hai Phong.	New
	Coastal line: -Ninh Binh-Central provinces		New
	Coastal line: - Port Group 1		New
Passenger			
	Hai Phong-Quang Ninh		
	Hai Phong-Cat Ba		
	Quang Ninh-Mong Cai		
	Hanoi-Viet Tri,		
	Hanoi-Nam Dinh, Thai Binh, Hung Yen		
	Hanoi - Thai Binh (via Hung Yen).	Re-opening	New
	Hanoi -neighboring provinces (Red river)	Tours	New
South			
	Cargo		
	Sai Gon-Kien Luong (via Lap Vo canal)	Agricultural materials, coal, steel, imported goods (from Sai Gon)	
	Mekong River Delta - Vung Tau-Thi Vai	Opennig	New
	Tien River	Opening international line	New
	Hau River	Opening international line	New
Passenger			
	Provincial lines in the Mekong river delta		
	Mekong river delta provinces - Ho Chi Minh City		
	Ho Chi Minh - Vung Tau	Express route	New
	Can Tho – Cambodia	Opening international line	New

Source: Revised and adjusted Master Plan for IWT, MOT.

Several of the planned river routes are new, many of which are classified as international. Another novel feature of the plan is the barging of containers - suggesting non-bulk cargoes. Major improvement and upgrading of river channels are detailed in Table 3.2.2, 3.2.3 and 3.2.4 for the north, south and central region respectively.

Table 3.2.2 Plan for Major IWT routes in the North

Route	As Revised in 2008		
	Technical Grade	B (m)	H (m)
Cua Day – Ninh Binh	I	70	>3
Lach Giang – Hanoi	I	70	>3
Quang Ninh – Ninh Binh (via Dao river)	III	50	>1.5
QN-NB (via Lach Tray)	II	70	>2
Quang Ninh -Hanoi (Duong river)	II	70	>2
Quang Ninh-Pha Lai	II	70	>2
Hanoi-Viet Tri-Lao Cai	II, III, IV	70, 50, 30	>2, >1.5, >1.2
Hanoi- Viet Tri	II	70	>2
Viet Tri- Yen Bai	III	50	>1.5
Yen Bai- Lao Cai	IV	30	>1.2
Hong Ha confluence – Hoa Binh port	III	50	>1.5
Viet Tri – Tuyen Quang	III	50	>1.5
Pha Lai – Da Phuc	III	50	>1.5
Pha Lai – A Lu	III	50	>1.5
Ninh Binh – Thanh Hoa	III ~ IV	30~50	>1.2

Source: from Revised adjusted IWT Master Plan up to 2020

Table 3.2.3 Plan for Major Routes in the South

Route	As Revised in 2008		
	Technical Grade	B (m)	H (m)
Cua Tieu – Cambodia	I	>90	>7
Dinh An estuary – Tan Chau	I	>90	>7
Sai Gon – Ca Mau (via Xa No cannel)	III	30-40	>2.5
Sai Gon – Kien Luong (via Lap Vo cannel)	III	30-40	>2.5
Sai Gon–Ben Suc (SG river)	III	50-70	>1.5
Sai Gon – Ben Keo (Vam Co Dong river)	III	50-70	>1.5
Sao Gon - Moc Hoa (Vam Co Tay river)	III	50-70	>1.5
Sai Gon – Ca Mau (coastal)	III	30-40	>2.5
Sai Gon – Kien Luong (Dong Thap Muoi)	III	30	>2.5
Moc Hoa – Ha Tien	IV	20-30	>2
Sai Gon – Lieu Liem (Dong Nai River)	III	50-70	>1.5
Phuoc Xuyen cannel – Cannel 28	III	20-30	>2
Rach Gia – Ca Mau	III	50-70	>1.5
Vung Tau- Thi Vai	I	90	>7
Thi Vai- Mekong Delta	III	50-70	>1.5

Source: from Revised adjusted IWT Master Plan up to 2020

Table 3.2.4 Plan for Major River Routes in the Central Region

Route	As Revised in 2008		
	Technical Grade	B (m)	H (m)
Ma River: Lach Trao-Ham Rong	III	50-70	>2
Lam River: Cua Hoi-Ben Thuy	II	50-70	>2.5
Ben Thuy – Do Luong	III	70-90	>2
Nghen River: Cua Sot – Cau Nghen	III	50-70	>2
Gianh River: Cua Gianh-Quang Truong	II	70-90	>2.5
Thach Han river: Cua Viet-Dap Tran	III	50-70	>2
Huong River: Thuan An-Tuan T-junction	III	50-70	>2
Cua Ky Ha-Cua Han	III	50-70	>2

Source: from Revised IWT Master Plan

3) Development Plan for Ports

(1) Ports in the North Region

In the north, eight freight ports and three passenger ports are listed as major terminal river ports in the revised plan. Hanoi Port (as part of the Hanoi–Khuyen Luong Port Group) will be downscaled into handling 'clean' cargo only, while a dedicated container port is envisaged in Phu Dong.

In addition, 33 local freight ports and three passenger ports are listed in the revised plan. Of the 41 freight ports, 34 are added to the plan of which 4 are new ones, while Nam Dinh Port is to be relocated to a new site along the Red River. The planned maximum vessel size at Ninh Phuc is 3000 T, and 6 ports with maximum vessel size of 1000T, including Nam Dinh and Tan De ports is 1000 tons and those of other ports are planned 100 to 600 tons. Ports with planned capacities of more than 1 million tons/year are Viet Tri (2.5-3 million T) Bac Hanoi and Ninh Binh (2 million tons/year), So Dau (1.5 million tons/year), Khuyen Luong (1.68 million tons/year) and Phu Dong Port (1.1 million tons/year). Other ports are planned to have 120 to 650 thousand tons/year. Considering passenger vessels of 120-200 seats, the ports for passengers are planned to handle 100,000 to 200,000 passengers a year.

(2) Ports in the South Region

In the south, the major terminals/ports of Cao Lanh, Long Xuyen, and Vinh Long were included in the Prime Minister's Decision 1024/2005/QD-TTg on Seaport Group 6. Thus these ports were not included in the river port plan. Eighteen (18) local freight river ports - including five new ports and 16 passenger ports - are listed in the revised plan. The planned maximum vessel size for the major ports of Phu Dinh, Rach Ong Lon, and Nhon Duc which are located in HCMC would be 3,000 tons and 4 other ports in Dong Nai province including Nhon Trach, Tin Nghia, Ha Duc, TRACOMECO are planned for vessed size of 5000 tons and that for other ports range in size from 500 to 2,000 tons. Planned capacities of ports would be around 300 to 3,000 thousand tons/year. Passenger ports would be planned to handle vessel of 100-seat to 250 seat capacity, with the largest port at Ca Mau at 4 million passenger/year.

(3) Ports in the Central Region

In the Central region, Ho Do, Do Len and Hoi An Port is planned to have a capacity of 1 million tons/year and maximum vessel size of 1000 DWT and Dong Ha port capable of 200 thousand tons/year and maximum vessel size of 1000 DWT.

4) Plans for IWT-related Industries

Ship repairing and building factories are also envisaged, as shown in Table 3.2.5. Factories that can build 1000 DWT vessels, 800 DWT vessels and 600 DWT vessels are planned.

Table 3.2.5 Development of Inland Waterway Industries

Factory	Size	Facilities	Land Area (ha)	Capacity		Orientation for development up to 2020
				Repair (unit/y)	Build (unit/y)	
	800 DWT (*),(**)	-1 Strip along 800DWT (2 platforms) -1 Strip along 400DWT (8 platforms) -1 Dock:150m -Workshop: 3200m2	6	200	60	In-depth investment, enlarging capacity
	600 DWT (*), (**)	-1 Strip along 600DWT -1 Strip along 400DWT -1 Dock: 600DWT -Workshop: 2500 m2	12	220	50	In-depth investment, enlarging capacity
Nha Be ship repairing and building factory	1000 DWT (*), (**)	-2 Strips (8 platforms) along 1500-2000 DWT - Dock :200m - Workshop: 4000m^2	5	150	40	In-depth investment, enlarging capacity
Can Tho ship repairing factory (SOWOTRACO)	1000 DWT (*) 200DWT (**)	-1 Strip along 600DWT -1 dock -Workshop: 4500m^2	17.5	50	10	In-depth investment, enlarging capacity
(*)New production (**) Repair and rehabilitation.						

Source: from Revised adjusted IWT Master Plan up to 2020

5) Capital Investment Program

The plan is estimated to require more than 73 trillion VND up to 2020 – of which about VND 16.4 trillion VND (or 22.4%) will be spent for projects to 2010, and 56.950 trillion VND (77.6%) from 2010 to 2020 (Table 3.2.6).

Investment for channel works amounts to 29.6 trillion VND divided into 23.88 trillion VND for construction/upgrading and 5.7 trillion VND for maintenance. Another 7.2 trillion VND is programmed for ports, 36.3 trillion VND for vessels, and 270 billion VND for support industries.

Table 3.2.6 Investment Program up to 2020

Item	Total Amount	Amount in VND billion		Possible Source
		to 2010	2011-2020	
Infrastructure	36,780	7,030	29,750	State Budget, Enterprises
Channel	*29,580*	*5,080*	*24,500*	State Budget
Construction/upgrade	*(23,880)*	*(3,880)*	*(20,000)*	
Maintenance	*(5,700)*	*(1,200)*	*(4,500)*	
Ports	*7,200*	*1,950*	*5,250*	State Budget, Enterprises
Vessels	36,300	9,300	27,000	Enterprises
Support Industry	270	70	200	Enterprises
Total	73,350	16,400	56,950	

Source: from Revised adjusted IWT Master Plan up to 2020, MOT

(1) Channel Projects

The ten major channelization projects are shown on Table 3.2.7. They would entail dredging, widening, radius enlargement, smoothing sharp curves, securing the banks, heightening vertical clearances of bridges, etc. The estimated cost is 5.6 trillion VND, proposed to be funded by a mixture of state budget, enterprise income, and ODA (e.g. World Bank).

Table 3.2.7 Major Channel Development Projects

	Channel Section	Description	Cost (Bil VND)	Funding
1	Quang Ninh-Hanoi-Viet Tri	Expanding radius, cutting curves, regulating the field, heightening air clearance of bridges.	500	ODA
2	Quang Ninh-Ninh Binh (via man-made cannel of Hai Phong)	Expanding radius, cutting curves, heightening air clearance of bridges	500	ODA
3	Lach Giang-Hanoi	Regulating the estuary, dredging the current	690	ODA
4	Hanoi-Viet Tri	Widening the radius, regulating the sandbar	400	ODA
5	Viet Tri-Yen Bai-Lao Cai	Dredging, building …	1,000	ODA
6	Viet Tri-Tuyen Quang	Widening the radius, regulating the sandbar	350	ODA
7	Sai Gon-Ha Tien (via Rach Chanh, Thap Muoi 2 canal)	Building Rach Chanh…, widening current, heightening air clearance for bridges	800	WB
8	Sai Gon-Ca Mau (via Tra Vinh canal, Phu Huu-Bai Sau)	Widening the current, heightening bridge air clearance	800	WB
9	Tien river (section from Vinh Xuong-Vam Nao river)		120	WB
10	Phuoc Xuyen canal - 4Bis- Canal 28	Upgrading bridge air clearance	120	WB
	Total Project Cost		5,160	bil. VND

Source: from Revised IWT Master Plan up to 2020

(2) River Ports Projects

The investment program for nine major ports in the north, nine ports in the south and one port in the central are described in Table 3.2.8. It has a total price of 366 billion VND to be funded from local sources.

Table 3.2.8 Major Port Development Projects

	Name of Port	Description	Cost (Bil VND)	Funding
The North			256	
1	Hanoi-Khuyen Luong port	Upgrading, expanding	35	SB+C
2	Phu Dong container port	Newly building	702	SB+C
3	Ninh Binh-Ninh Phuc port	Upgrading, expanding	109	SB+C
4	Hoa Binh port	Upgrading, expanding	6	SB+C
5	Viet Tri port	Upgrading, expanding	21	SB+C
6	Da Phuc port	Newly building	19	SB+C
7	Hanoi passenger port	Building Stage 1	10	C
8	Ben Binh passenger port	Upgrading, expanding	30	C
9	Ha Long passenger port	Upgrading, expanding	26	C
The South			98	
1	Phu Dinh port	Building	15	
2	Tan Chau port	Building Stage 1	17	
3	Ho Phong port	Building Stage 1	15	
4	Giao Long port	Building Stage 2	6	
5	An Phuoc port	Upgrading, expanding	6	
6	Binh Long port	Upgrading, expanding	9	
7	Long Duc port	Building Stage 1	10	
8	HCM passenger port	Upgrading, expanding	10	
9	Can Tho passenger port	Upgrading, expanding	10	

The Central			12	
	Ho Do port (new)	Building	12	
			366	bil.VND

SB: State Budget, C: Company Fund

Source: from Revised adjusted IWT Master Plan up to 2020

6) Other features of the Plan

The plan also mentioned several measures to be undertaken to improve safety of inland waterway transport, in terms of routes and currents, vehicles, operational personnel and organization and management of transportation activities. On environmental aspect, the report provides forecasts on environmental impact factors during construction, upgrading and operation of inland waterway routes, and some mitigating measures.

In addition, the government plans to improve administration and plan management of the sub-sector. It stipulated policies on infrastructure development, policies on transportation development, promotion of new technologies, and human resource development.

4 PLANNING ISSUES

4.1 Issues in IWT

1) Channel Development and Maintenance

Despite Vietnam having an extensive river network, the modernization of the sub-sector is constrained by its limited budget allocation in relation to its output. And yet, IWT cannot be abandoned. The consequence of neglect is far more damaging to the economy than what is regularly allotted to the sub-sector. If IWT is closed, about 643 thousand tons of freight a day would have to be moved on road or rail. Even considering a fraction of IWT traffic would shift, roads would be congested, pavements deteriorate faster, road safety would be compromised, and there would be significant environmental degradation. Moreover, some industries – like the transport of coal to power plants and to cement factories of the NFEZ – are dependent on IWT for viability. And in the Mekong Delta, a varied range of industries thrive; many poor villages depend on it for access and livelihood, not to mention the cross-border trade to the GMS countries.

There is, therefore, an irreducible set of IWT channels whose navigability must be maintained at all cost, which does not necessarily mean the entire 6,612 km of waterways under the care of the central government. The 6,612 km of nationally-listed waterways is too extensive to be managed effectively given the funds available, therefore prioritization is required. Development and maintenance of IWT needs to follow a prescribed hierarchical framework, to ensure that the impact of available funds is maximized .

Most of the users of the waterways that require higher technical standards of inland waterways are big enterprises that operate their own barges. Their long-term direction is to shift bigger vessels and barges to achieve efficiency, but cannot do so for reason of channel limitations and low bridge clearances in some cases. These routes need to be identified and upgraded in a selective manner.

VIWA plans to expand the IWT network, based on ‘Master Plan for Vietnam Inland Waterway Sector to 2020’, from the current 6,612 km IWT network. Given the funding constraints, it is deemed recommendable to instead focus on improving selected IWT channels and removing bottlenecks of key channels. New route development is risky and unless a clear business case can be established, it should be considered low priority. At any rate by improving a defined IWT corridor, some new users will locate their business activities along this corridor instead of spreading out. Higher density of users along the corridor will improve IWT operation. The scope of maintenance activities will also lessen if the IWT network is maintained at its current scale.

Maintenance needs to be given priority. Benefits of upgraded channels can only be realized if it induces the use of bigger and more efficient IWT vessels. Investment in these vessels is expensive so if there is a risk that channel standards could not be guaranteed by regular maintenance then operators will not invest in better vessels. Investment in channel development and upgrading will become ineffective, unless standards are maintained. Currently, funds for channel maintenance – mainly for dredging and bank protection works - are derived from State fund and falls short of needs. Although there is no firm estimate on what is the minimum amount necessary for maintenance, the consensus is that only 60% is being made available.

2) Port Services

The role of IWT in the future needs to be clarified to guide investment strategies in port. It is clear that IWT will play a key role in bulk transport. IWT is however competitively weak in passenger transport and general cargo transport. VIWA plans include directions expansion of passenger terminals and public ports, including containers. Passenger movement is mostly local traffic and in the Mekong Delta. It is has been observed that a highway alternative will outcompete inland waterway passenger service, unless the origin and destination is located along the riverbanks. Further investment in passenger transport is therefore risky and considered low priority, with the exception of improving existing passenger terminals that are already in operation.

General cargo operations by IWT can only work for cargo owners with large lots, for example a fertilizer trader. Small lot cargo owners require consolidators to coordinate IWT shipment schedules. Given the scope of IWT and more demand for frequent and door-to-door logistics, the use of IWT for small lot cargo owners is impractical. Container operation is similar, wherein each box would have different destinations and timing requirements therefore, consolidation for IWT shipment is impractical. Investment in new public ports and expansion of public ports needs to be toned down, especially that many ports still have reserved capacity. It is expected that much of the port activity will be done in industrial ports, which is the responsibility of the port users.

Public ports however still have a role to play for large-scale shippers as mentioned earlier. These goods are first brought in bulk by inland waterway vessels to a port for distribution and shipped in small lots by trucks. IWT can continue to play a role in this market. It is strategic for the subsector to continue to be competitive in this service, not just for its viability, but also to discourage the use of highway alternatives, which would contribute to road congestion. The inherent disadvantage of inland waterway transportation is the unavoidable double handling; but this can be countered if the subsector can offer better interface with other modes, particularly with trucking.

The improvement of cargo handling at inland ports is therefore important (i.e. viz-a-viz new ports or port expansion). Another critical aspect is the improvement of warehouses and warehouse services. Goods are delivered from the factory to the ports which become the point to carry inventory. Being closer to the market, these warehouses can enhance delivery response and will allow IWT to carry the goods cheaply in large lots, while still being able to deliver to customers in small lots and high frequency. It is therefore strategic for IWT ports to examine the potential of warehousing function as part of their business model, along with the improvement of cargo handling.

For the IWT port operation to be modernized it is therefore recommendable to devolve the operation of major inland ports to a private operator under a landlord port arrangement. Competition between ports could incentivize investment in cargo handling and storage facilities at the expense of the users who will benefit most from the improvements. Investment in port modernization can then be taken off the list of projects to be funded by limited state funds.

3) Management and Administration

(1) Role of Private and Public Entities

Introduction of market principles in the IWT sub-sector need to be intensified. It is noteworthy that the sub-sector has already made some progress towards promoting

private-led and market oriented IWT market. Some state-owned companies have been transformed to joint-stock companies on a trial basis, and some ports are being operated by the private sector. Privatization should focus on key areas of ship building, vessel operation, and port operation.

Public agencies would then focus primarily on planning and technical regulation. Measure to enhance the organizational capacity of VIWA, including human resource development, equipment, technical know-how, and database should be given priority.

(2) Data for Planning and Operation

It is presently difficult to know the number of IWT vessels operating in Vietnam due to weak registration and enforcement system. Hence, the ownership status and consequent liability becomes outdated – when the asset is sold or transferred. This makes it difficult to enforce standards in safety and navigation. The vessel registry system could also be used to generate funds for channel maintenance, where the annual fees form part of the registration process.

A tedious but necessary effort is the conduct of periodic surveys of rivers and ports, to establish a current database of information – to guide the issuance of navigation charts or restrictions, to identify and quantify maintenance and repair works, and to plan future projects. Unlike roads, the state of a river section cannot be visually ascertained. Without updated information on river conditions, determination of required level of maintenance and remedial measures is not possible.

(3) Interface of IWT and Coastal Shipping

The major seaports of Vietnam are physically located on rivers. This gives rise to an understandable ambiguity as to where IWT ends and coastal shipping starts. The former sometimes seek to attract ocean-going vessels for bigger inland ports, or stake out routes into islands or routes that combine river and sea journeys. On the other hand, coastal shipping wants rivers to be dredged deeper. This overlap has ramifications on the current uses and maintenance of ports and channels.

4.2 Strategies for a Sustainable IWT

1) SWOT Analysis

The formulation of a sustainable strategy for IWT has to consider the sub-sector's inherent strengths and weaknesses, as well as future threats and opportunities.

Table 4.2.1 SWOT Analysis of IWT

	PRESENT	FUTURE	
STRENGTHS	• Extensive river systems that enables low-cost & fuel-efficient transport of bulk goods; • Willingness of private sector to invest in IWT vessels; • Prevalence of industrial (own-use) river ports which reduce pressure on public resources; • Legislation and implementing regulations are in-place, including a good classification to guide development of waterways	• Rising cost of petroleum – globally and domestically - could tilt the balance in favor of IWT; • Congestions on roads may push non-bulk cargoes into IWT; • Lessons to learn from success stories in other countries as well as in the Mekong Delta area	OPPORTUNITIES
WEAKNESSES	• Unclear articulation of planning priorities, with strong bias for capacity-build up per se of river ports; • Low funding allocations to IWT vis-a-vis extent of its role in freight transport; • Low utilization of water vessels in the north, less so in the south	• Weak inter-modal planning (and expanding road network) is reducing the market of IWT; • Climate changes could destabilize the usability of waterways, especially in the south; • Increasing soil erosion and deforestation in the mountain regions can worsen siltation of rivers.	THREATS

Source: VITRANSS2 Study Team

The elements of the recommended IWT strategy are shown on Table 4.2.2 below.

Table 4.2.2 Generic Strategies for IWT

	In Response to Threats	To Capture Opportunities
Capitalizing on Strengths	• Focus intervention on key markets – bulk freight and key sections of the waterways; • Reduce span of responsibilities and concentrate on improved navigability	• Involve stakeholders (with special interests in particular river ports) in their development and financing;
Remedying Weaknesses	• Improve capability in inter-modal planning, and focus IWT interventions on increasing connectivity with other modes;	• Change the business model in IWT so it can be more effective; • Involve provinces in environmental protection, and in development and management of common-use river ports

Source: VITRANSS2 Study Team

2) Return to its Core Competitive Advantage

As can be seen from Table 4.2.2, a key strategy entails narrowing down its target market. Increasing motorization and massive investments in roads have virtually taken away most of the passenger market from IWT. A large part of the freight market (the segment characterized by break-bulk, short-distance, door-to-door, and fast delivery) is being taken by other modes. Several railway lines parallel to the main rivers have also been rehabilitated, or in the process of improvements. A different transport market, therefore, is emerging and it would require a different response.

The sub-sector's competitive advantage lies in bulk commodities – like cement, coal, iron ore, sand, and gravel. Even on this niche market, it faces severe competition from railways and highways when they share similar corridor. What is contemplated, therefore,

is a strategic retreat for IWT. By concentrating its limited resources in key corridors and targeting key commodities, the IWT will have a chance. By competing on several corridors at once, its service would remain poor and decline through time.

3) Strategy of Devolution

As part of a market re-positioning, the central government should concentrate its limited resources on a reduced set of network that it can protect and improve according to technical classification standards. This is contrary to the present direction of expanding the waterway routes. With appropriate lighting, markings, and navigational aids, these select river sections can be operational 24-hours and permit bigger barges.

Investing in more and bigger river ports can be transferred to provinces and the private sector. The big or more important ones are already with 'maritime' agencies, outside its scope, while most of the river ports are essentially industrial, and for private use. VIWA is already hand over the remaining ports to IWT general companies and provinces. The fiscal (and management) burden for these ports will be absorbed by provinces or companies. There are instances of local governments or companies taking a stake or developing their own IWT projects. For example, HCMC is planning to develop its 574-km waterway in order to improve the city's connection with its neighboring provinces (at a cost of VND2.2 trillion), or Phu Dong new port is under constructed by North IWT general company.

Plans for IWT also include several river-based Inland Container Depots. Following the port devolution mentioned above, development of ICD should be left to provinces and especially the private sector to invest in. If there is market for container operations, the private sector would show interest.

The port devolution strategy should also fit well with the few provinces where IWT still serve intra-provincial passenger trips. There, the need for common-user ports can be better justified and sustained. In addition, the provinces can consider the establishment of "river stations" or landing stages that can provide a common market for the livelihood of the poor. As has been observed, many landing stages emerged without permits. While viewed negatively, it is actually a positive reflection of private sector's responding to a need.

Government should also consider withdrawing from direct ferry and barging operations; leaving this service to the private sector. State-owned vessels constitute less than 10% of the river fleet. Passenger service, in particular, is a losing proposition in most areas where road has become widespread - especially for short inter-city movement. This is not to say that river ferry service will be prevented or stopped. In a few provinces, there may be a need for it (such as local transport or tourism); in which case, let the provincial government provide for the service or let the private sector invest and cater to that market.

Traffic on IWT comes largely from industrial users who have a long-term stake to continue or operate the service on their own. It is this constituency that VIWA has to harness.

4) Competing on Target Corridors

Consistent with the preceding devolution, the IWT sector should focus only on the corridor and market segments where it has high probability of succeeding and yield the rest to road and rail transport.

Segments where IWT is advantageous are in the transport of high-volume, low-cost products in bulk - particularly coal, ore, and aggregates. Investments in the IWT system should focus on those corridors where this kind of commodities move. And it need not do everything on that waterway route, only the basic obligation to maintain and protect the navigability of the channels. If the government concentrates its resources on this front, the private sector can take of optimal vessel selection. The issue of barge size, whether tow or push, is best left to markets; rather than for government to decide. In the north, self-propelled barges became predominant because users felt that they more suited to the conditions in the Red River Delta. In the case of the south, a more diversified vessel fleet has emerged in response to the channel conditions in the Mekong Delta. This does not mean, however, that the government shall develop the channels without regard to vessel types; it needs to, which it can - by consulting the industrial users as to what needs to be prioritized.

Exemplifying the geographic and corridor approach to market is the cross-border trade with Cambodia. A waterway route is already existing and thriving. It is currently being served by three companies utilizing 50 to 150 TEU vessels with one-way journey taking two to three days at a freight rate of US$250 per TEU. This is very competitive over the coastal route. Maintaining and upgrading this waterway should therefore be a central part of the southern IWT strategy.

A more difficult issue is the utilization of the Hong River as potential cross-border link to China. While cross-border trade with Yunnan in China is growing, the rail and road transport capacity is being expanded. IWT will face difficulties in competing. The Hong River has a lot of drops that at its natural state could not cater to IWT vessels. The development of locks to allow vessels to navigate across drops has been proposed, but the costs – both economic and environmental – pose a big hurdle.

5) Strengthening Funding for IWT Maintenance

The ability of IWT to be competitive, even on select corridor only – will be impaired if waterways cannot be maintained. One of the needed actions to solve this problem is to strengthen funding for IWT maintenance

One obvious source is a channel fee – much like a toll fee. This can be collected at key points of the waterway. Apparently, the issue of collecting user fees for channel maintenance has been piloted three years ago, but has failed. By studying the reasons for failure, a better system can be introduced. Alternatively, an annual levy can be imposed. The potentials are enormous. With an estimated fleet of 5 million registered tonnage, at say, 20,000 VND per registered ton, WMF could net 100 billion VND a year – which could cover 50% of the proposed VIWA maintenance program. However, this would require an effective vessel registry system. Another alternative is a fuel levy - a portion going to roads and a portion to IWT. The road sector has estimated that 2.5 trillion VND can be generated for the road fund. If only 10% of this is given to IWT, then 250 billion VND can be added to WMF every year. A third source is a kind of frontage fee. Businesses locate along riverbanks because there is value in it. At 50,000 VND per meter per year, and assuming only 1,000 km of riverbank fronts to be eligible, the amount could reach 50 billion VND. All unregistered “ferry terminals” would be captured by such a frontage tax.

A full-blown feasibility study needs to be initiated by VIWA – preferably with donor assistance. The study has to determine the target funding level, as well as design the institutional mechanism for administering the fund.

6) Addressing the Safety Issue

The basic requirement for improving safety on the waterways is good and updated data – about the vessels that ply the rivers, and about the conditions of the waterways. Both are inadequate now.

An annual vessel registration system should be introduced – so that vessel inspection can be made periodically. The occasion can also be used as a window of opportunity in conducting training classes for vessel owners-skippers, as well as an incentive/disincentive mechanism for fleet renewal and modernization. Small boats maybe excluded from the registration net, although local governments may want to record them also for purposes of accurate inventory. After all, when a boat capsized, authorities need to identify the parties and the attendant liability.

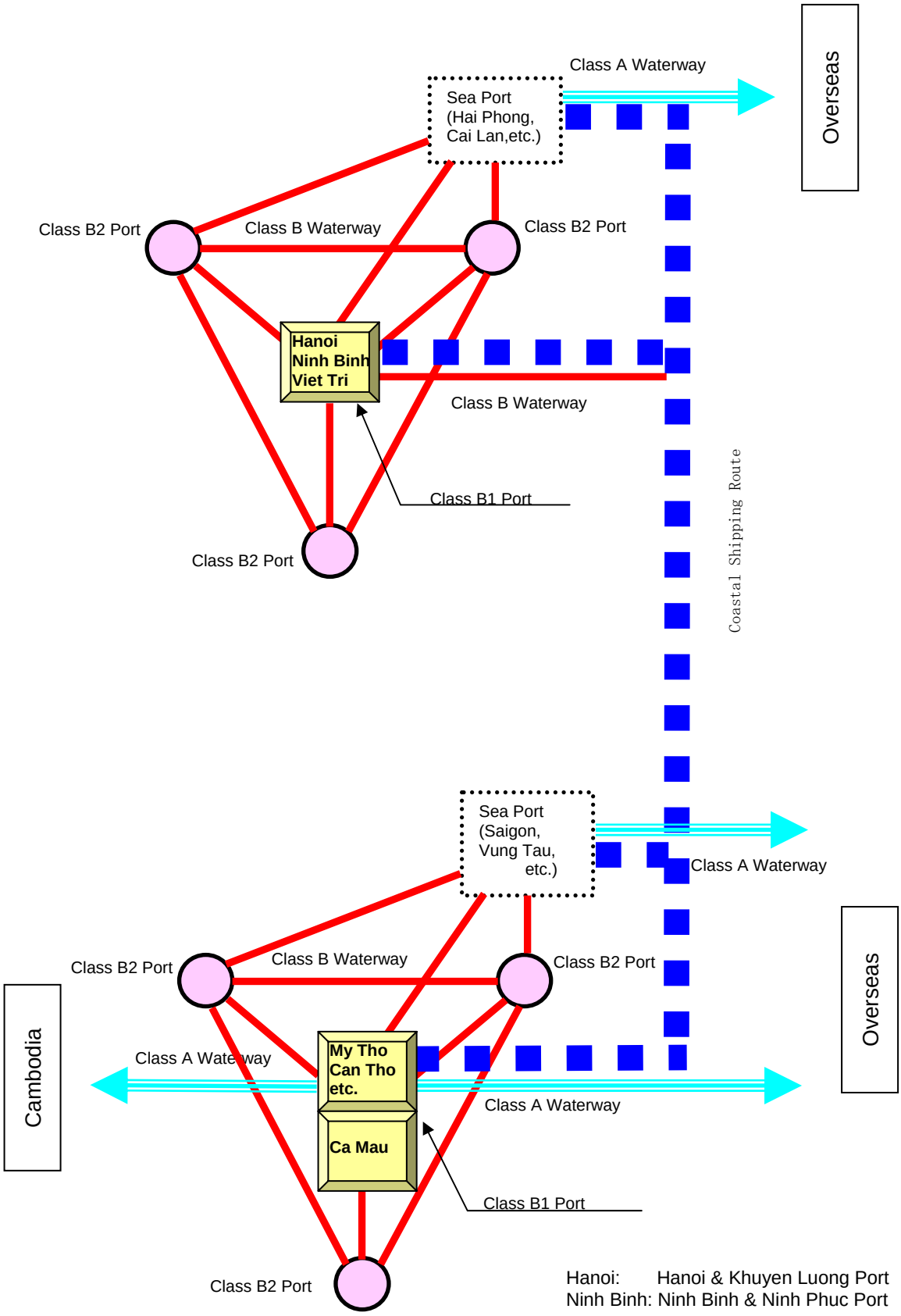
River surveys are not inexpensive. Funding for it often ranks lower than maintenance. It needs to be done periodically; continuous monitoring of the physical attributes of the river and estuary is essential to safe navigation. Survey stations and instruments have to be set up, but it is impossible to cover the entire network. Waterway authorities may have to accept "representative reach surveys" to gain an overview of river character for a sample stretch of a waterway route. The representative reach is defined by the river channel form and processes and hydrologic regime. Other agencies may need river information for other purposes – like chemical and biotic data. Hence, a good strategy for VIWA is to work with other agencies in order to minimize its data acquisition cost.

7) Hierarchy of River Routes

A basic feature of a good transport system is a hierarchy of roles. Waterways have their natural hierarchy – where small streams feed into a river that joins another to form a bigger waterway.

The waterway routes in a region can be seen as a network of 3 levels, as shown in figure 4.2.1. The plan aims to establish and re-enforce a hierarchy of waterway routes based on their function. In a way, this function is dictated by the physical characteristics of the rivers, although not always. Wide and deep rivers tend to attract large traffic on bigger vessels, while smaller rivers tend to become feeder routes that serve only local traffic. Higher standards will be afforded to the core routes. A hierarchical framework will properly guide investment strategies and maintenance works.

Figure 4.2.1 Hierarchy of Waterways



Source: The Study on the National Transport Development Strategy in the Socialist Republic on Vietnam (VITRANSS)

5 LONG TERM DEVELOPMENT PLANS

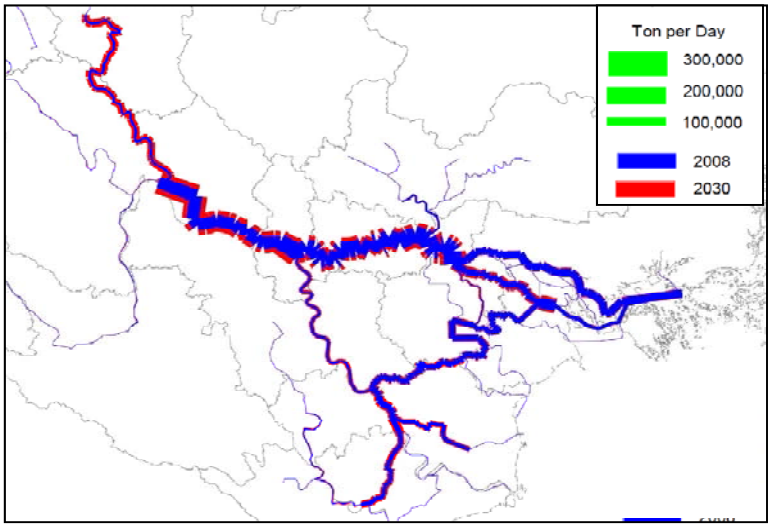
5.1 Basic Planning Concept

In this chapter, the long-term development trajectory up for IWT is fleshed out in terms of programme and specific projects. The long-term plan sees a select number of waterway routes in key transport corridors that need to be protected, enhanced, provided with appropriate facilities for safe navigation, and maintained according to the standards of their classification. The objective is to have a sustainable network of waterway routes. A large river network is not the objective.

The broad outlook is that demand on inland waterways will double from the 2008 level of 643 thousand tons/day to 1,210 thousand tons/day in 2030. That translates to 3% annual rate of increase, which is lower than the projected overall freight transport demand including all modes of 4.8% p.a. in the same period. The share of IWT of the overall transport demand will therefore decline from 48% to 32% in terms of tons, and 28% to 18% in term of ton-km up from 2008 to 2030. The decline in share of IWT is due to a combination, of growth in products that require frequent and fast transport, growth in areas outside the coverage of the IWT network and competition against trucking. Nonetheless, in absolute terms IWT will handle twice the volume of freight than it is currently carrying therefore it is important for IWT to maintain its role in the transport of bulk goods; otherwise, it will inundate the highway network. It is also important to account that growth, will not occur evenly across all corridors, and demand will tend to concentrate in a few corridors as shown in Figure 5.1.1 and Figure 5.1.2. In terms of passenger demand, IWT will lose out to road transport and therefore will have limited role in the future when the road network matures and motorization further intensifies.

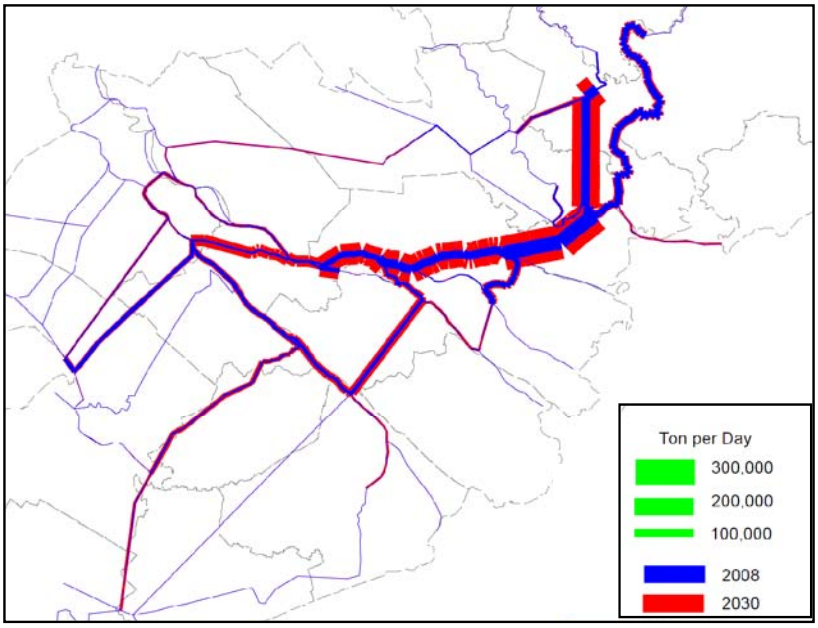
The future demand outlook for IWT confirms the strategy to focus the available limited funding of IWT to a select set of corridors, while maintaining the navigability of the rest of the network.

Figure 5.1.1 IWT Traffic in the North, 2030



Source: VITRANSS2 Study Team

Figure 5.1.2 IWT Traffic in the South, 2030



Source: VITRANSS2 Study Team

5.2 Northern Region

1) Corridor Framework

On the basis of the future outlook of the IWT network in the northern region, the inland waterway network shall be developed in accordance with the 3-level hierarchy depicted on Figure 5.2.1.

(i) The core routes for the northern region include the following routes: (i) Hanoi - Hai Phong/Quang Ninh; (ii) Lach Giang - Hanoi; (iii) Quang Ninh - Ninh Binh; and (iv) Hanoi - Viet Tri.

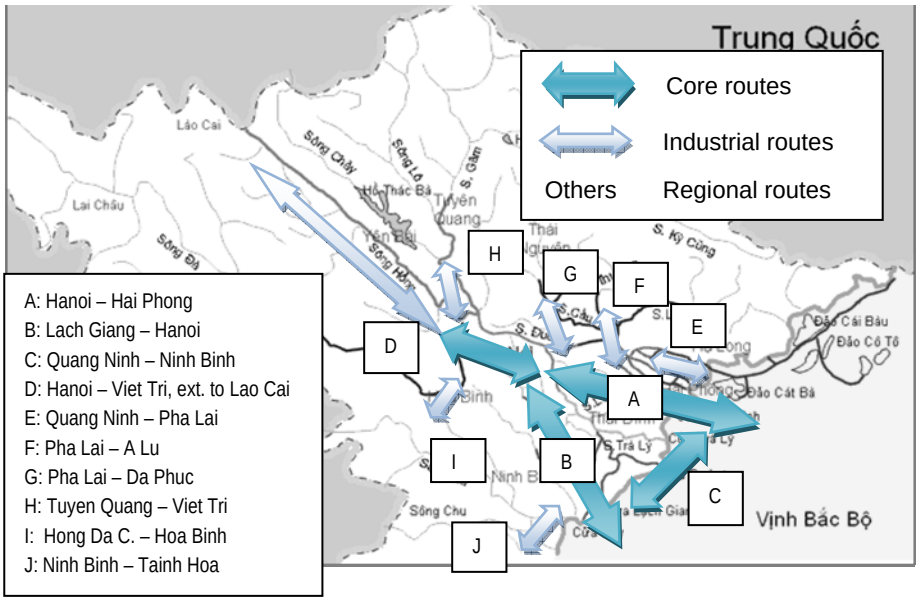
(ii) Industrial routes support the big industries whose supply-chains rely on the rivers.

(iii) Regional routes are localized in use, i.e., serve enclave industrial zones and often as feeder to the higher-level routes.

The development of the core routes should be given more weight, including the some key industrial routes. Regional routes are given lower priority. The following sections highlight the projects being proposed for the core routes and key industrial routes in the VIWA master plan. Details of the proposals are in Annex 5C.

There are no details pertaining to regional routes. Key bottlenecks need to be inventoried and worthwhile projects identified for funding. It is suggested that the overall IWT program allocate or earmark a portion of funding for regional route development in the northern region as identified by VIWA.

Figure 5.2.1 Planning Framework for North IWT



Source: VITRANSS2 Study Team

2) Core Route Development

(1) Hanoi - Hai Phong - Quang Ninh

The capacity of the Hanoi-Hai Phong-Quang Ninh route should be maximized, to the extent possible, because the traffic on this corridor is highest in the northern region. It is also forecasted to grow 1.7 to 2.1 times higher by 2030. To meet this demand, the route

has to be upgraded from Class III (with sections of Class I) to Class II, capable of handling 4X400 DWT barge convoy (Figure 5.2.2). The civil works will involve dredging, bend corrections, bank protection, shoal control, bridge clearance, and installation of navigation aids. Project cost is 38.2 million USD.

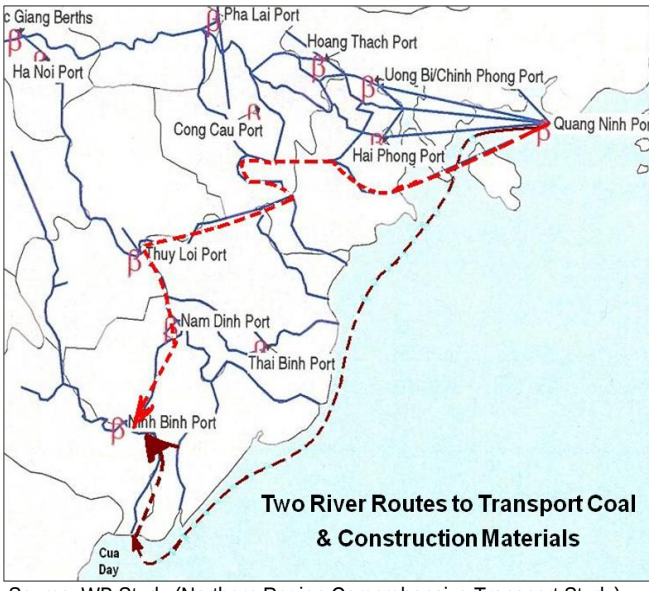
(2) Lach Giang - Hanoi

The Lach Giang - Ha Noi route (192 km) has the potential to be upgraded to Class I from its current Class II standards. Traffic growth in this corridor is not as high as the Hanoi – Hai Phong- Quang Ninh route, ranging from 1.2 to 1.9 times by 2030. It has the advantage of linking river routes to coastal shipping. The civil works will be similar in scope, but the incremental effort to deepen (from 0.9 to 3.0 m in some sections) is more. Key components include the following: (i) upgrading works (45.5 million USD); (ii) channel stabilization (125.6 million USD); (iii) navigational channel improvement (17.1 million USD); and (iv) Duong Bridge Improvement (21.9 million USD).

(3) Quang Ninh - Ninh Binh

The Quang Ninh - Ninh Binh Route is the third important route. It is 266 km long, following the inland rivers (such as Bach Dang, Dao, Lach Tray) via Hai Phong. It is proposed to develop the route to Class III standards. Project cost is 61.2 million USD. A coastal alternative will become possible when the Cua Day - Ninh Binh project (74 km) is implemented (Figure 5.2.2). Opening the coastal pathway will also serve to open Ninh Binh Port to coastal shipping. Project cost is 17 million USD.

Figure 5.2.2 Coastal Alternative of the Quang Ninh – Ninh Binh Route



Source: WB Study (Northern Region Comprehensive Transport Study)

(4) Hanoi - Viet Tri Route, and its extension to Yen Bai and Lao Cai

It is proposed that the Hanoi – Viet Tri segment be improved to Class II. This is part of an overall development plan of the Hanoi – Viet Tri – Lao Cai Route (362 km) which includes as follows: (i) Hanoi to Viet Tri will be from Class IV to Class II; (ii) Viet Tri to Yen Bai, Class V to Class III; and (iii) Yen Bai to Lao Cai, rehabilitated by Class VI. The Yen Bai – Lao Cai route is a cross-border route to China. Considering the planned railway and road development along the same corridor up to Lao Cai, the Yen Bai - Lao Cai segment

should be reconsidered. Project cost for the Hanoi – Viet Tri – Lao Cai route development is 133.3 million USD.

3) Key Industrial Routes Development

The key waterways falling on this category, as well as plans for their improvements, are as follows:

(i) Quang Ninh – Pha Lai Route is a key supply line for the power and cement plants in need of coal as feedstock. VIWA plans to upgrade the 128 km river from Class III to Class II, at a cost of US$29.4 million.

(ii) Pha Lai – A Lu Route can be viewed as an extension of the coal supply line by another 33 km, to serve the province of Bac Giang. This route is proposed to be upgraded from Class IV to Class III. Cost of this project is US$7.6 million.

(iii) Tuyen Quang – Viet Tri Route is 115 km long and follows the Lo River. Coal, sand and gravel are the main cargo. This route is proposed to be upgraded from Class IV to Class III. The project cost is US$36.75 million. Apparently, demand is temporary and may decline once the construction of a dam project is completed.

(iv) Upgrading of Phai Lai – Da Phuc Route, 87 km long, from Class V into Class III. Estimated cost is US$20.0 million.

(v) Improvement, widening and deepening of the Hong Da function – Hoa Binh Port, 58 km long, into Class III. Project cost is 13.3 million USD.

(vi) Improvement of Ninh Binh – Thanh Hoa to Class III-IV. Project cost is 11.5 million USD.

5.3 Southern Region

1) Framework

A similar 3-level hierarchy is adopted to guide development of the inland waterway network in the southern region. This is shown on Figure 5.3.1.

(i) Core routes include the following: (i) HCMC – Northwest Mekong Delta; (ii) HCMC – Southwest Mekong Delta; (iii) HCMC – Vung Tau/Cai Mep ; and (iv) Cua Tieu to Cross-border to Cambodia.

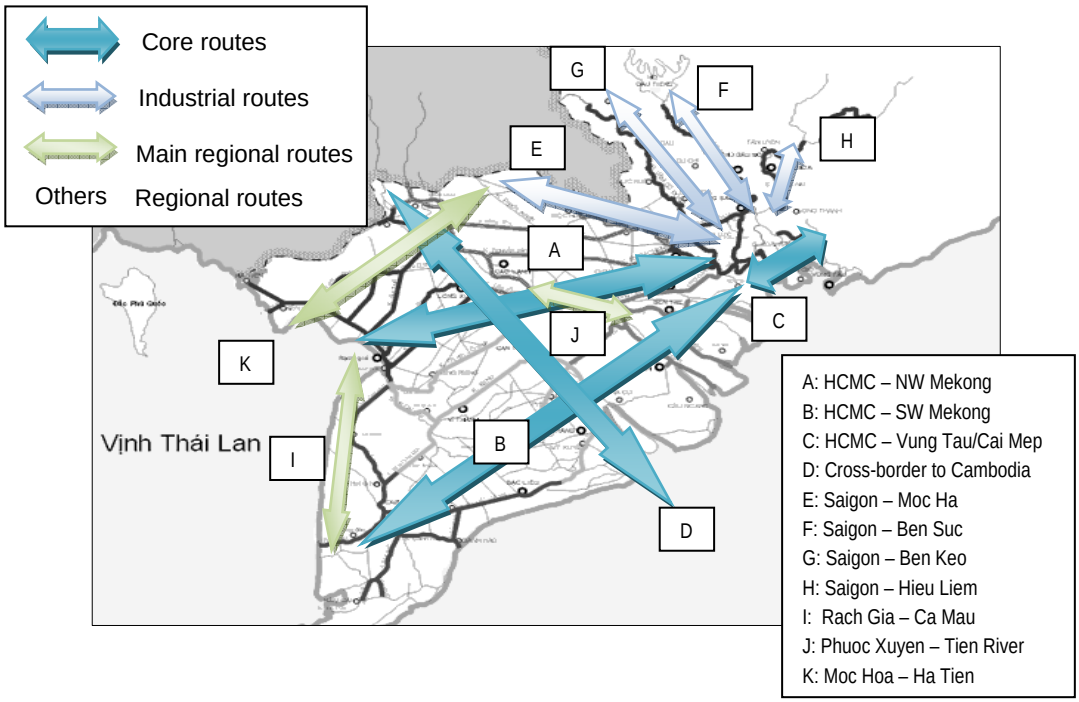
(ii) Industrial routes in the vicinity of HCMC

(iii) Regional routes in the Mekong Delta, with three main regional routes serving localized traffic and enclaved industrial sites.

Core routes are given higher priority to serve corridors with the highest demand and potential. Key industrial routes as well as main regional routes in the Mekong Delta are likewise important and should be considered for further development. Development directions, as proposed in the VIWA masterplan, are highlighted in the following sections. Details of the proposals are in Annex 5C.

There are no details pertaining to regional routes. Key bottlenecks need to be inventoried and worthwhile projects identified for funding. It is suggested that the overall IWT program allocate or earmark a portion of funding for regional route development in the northern region as identified by VIWA.

Figure 5.3.1 The IWT Corridor in the South



Source: VITRANSS2 Study Team

2) Core Route Development

(1) HCMC - Northwest Mekong Delta

This refers to the waterways connecting HCMC to Kien Luong- the north western area of the Mekong Delta either via Lap Vo canal or via Dong Thap Moui area. Among the proposed improvement projects are the following:

(i) Upgrading of Cho Gao Canal – dredging, widening, bends straightening, bank protections covering 11-km over 28-km section of the river, including bridge uplifting. Estimated project cost is US$138 million.

(ii) Improvement of Saigon - Kien Luong (Dong Thap Muoi) – sectional improvements to make channel conditions consistent (Class III) throughout 334 km route. Estimated project cost is US$76.8 million.

(iii) Improvement of the Saigon – Kien Luong (Lap Vo Canal) – project aims to establish consistent channel conditions (Class III) over the 315-km section of the route, at a cost of US$72.45 million.

(2) HCMC - Southwestern Mekong Delta

This route connects HCMC with the southwestern coastal provinces of Tien Giang, Vinh Long, Hau Giang, Can Tho, Ca Mau, and South of Kien Giang. The key projects for this route include the following:

(i) Improvement of Saigon–Ca Mau (thru Xa No canal) towards establishing consistency of channel conditions (Class III) over the entire route of 336 km, by widening, deepening and removal of obstacles. Estimated project cost is US$77.3 million.

(ii) Improvement of Saigon-Ca Mau (Coastal route) from HCMC to Ca Mau through Soc Trang and Bac Lieu (367 km) to Class III. Estimated cost is US$84.41 million.

(iii) Improvement of HCMC to Vung Tau/Cai Mep. This project involves improving the canal between Thi Vai-Nuoc Man to enhance connectivity of Vung Tau and Thi Vai to HCMC (Class III), about 75 km long, at an estimated cost of US$17.25 million

(3) Cambodia

The HCMC - My Tho - Cambodia corridor is 223-km long and follows Tien River to My Tho port, Cai Beo canal, and to the ports of Phnom Penh and Kong Pong Cham. Among the projects proposed are the following:

a) Improvement of Dinh An estuary – Tan Chau route, about 214 km long, to Class I with minimum depth of 7 meters, to cost US$49.2 million. The maritime entrance to Bassac River is limited to 3,000DWT at optimal conditions due to the dynamic offshore bar at Dinh An (shoal).

b) Improvement of Cua Tieu – Cambodia Route, about 223 km long to Class I, with an estimated project cost of US$51.29 million.

3) Key Industrial and Regional Routes

(1) Industrial Routes

Several inter-provincial waterway routes that serve key industrial areas and have important regional transport roles have also been proposed for improvements. These include the following:

a) Improvement of Saigon – Moc Hoa (Vam Co Tay River Route) to Class III (96 km), with estimated cost of US$22.08 million.

b) Improvement of Saigon – Ben Suc route to Class III (89 km), with estimated cost of US$20.47 million.

c) Improvement of Saigon – Ben Keo (Vam Co Dong River) to Class III (166 km), with estimated cost of US$38.18 million.

d) Improvement of Saigon – Hieu Liem (Dong Nai river) to Class III (88 km), with estimated cost of US$15 million.

(2) Regional Routes

Three major regional routes, that play a significant role in the Mekong Delta was identified, and development directions proposed include the following.

a) Improvement of Moc Hoa – Ha Tien Route to Class IV, about 108 km, to cost US$24.84 million

b) Improvement of Rach Gia – Ca Mau route to Class III (149 km). Estimated cost is US$34.27 million.

c) Improvement of Phuoc Xuyen –canal 28 to Class III (74.5 km). Estimated cost is US$17.25 million.

5.4 IWT Central Regions

Inland waterway has a very limited role in the central region. Hence, no regional breakdown of demand forecast was made. Following VITRANSS2 proposed strategy, the focus of works on these waterways should be on maintenance and flood protection, rather than upgrading for better navigability and more intensive use as a means of transport.

Based on the VIWA master plan for IWT, however, the plans include upgrading works on selected sections. The sections and their planned specifications are as follows.

(i) Lach Trao–Ham Rong (Ma River), Class II (Width: 50–70, Depth: >2)

(ii) Lach Sung–Len Bridge (Len River), Class III (Width: 50–70, Depth: >2)

(iii) Cua Hoi-Ben Thuy–Do Luong (Lam River), Class II section Cua Hoi- Ben Thuy (Width: 70–90, Depth: >2.5) and section Ben Thuy- Do Luong Class III (Width: 50–70, Depth: >2)

(iv) Cua Sot–Nghen Bridge (Nghen River), Class III (Width: 50–70, Depth: >2)

(v) Cua Gianh–Quang Truong (square) (Gianh River), Class II (width: 70–90, Depth: >2.5)

(vi) Nhat Le Estuary–Long Dai Bridge (Nhat Le River), Class III (Width: 50–70, Depth: >2)

(vii) Cua Viet–Dap Tran (spillway) (Thach Han River), Class III (Width: 50–70, Depth: >1.5)

(viii) Thuan An–Tuan T–junction (Huong River), Class III (Width: 50–70, Depth: >1.5)

(ix) Hoi An–Cua Dai (Thu Bon River -extended), Class III section Hoi An- Cua Dai (Width: 50–70, Depth: >2) and Class I section Cua Dai- Cu Lao Cham (Width: >90, Depth: >3)

(x) Ky Ha Estuary–Hoi An –Vinh Dien T–junction–Cua Han (Truong Giang River, Thu Bon River, Vinh Dien River, Han River, coastal), Class III Ky Ha Estuary- Hoi An (Width: 50–70, Depth: >2); Class III, Hoi An- Vinh Dien T-junction (Width: 50–70, Depth: >1.5); and, Class III Vinh Dien T-junction- Cua Han (Width: 50–70, Depth: >1.5).

5.5 IWT Port Development

In the future general cargo and cargo transported in small lots will progressively shift to highways when the road system improves. IWT however will continue to be competitive in the transport of bulk and industrial cargo. The role of public-use ports in the future will therefore not grow significantly, while industrial ports will be playing a stronger role. Industrial ports are to be developed by the private sector, therefore the government investment in public-use ports will focus more on quality and productivity enhancement, strengthening of warehousing and intermodal connections, and maintenance. Passenger operations are an even more difficult market for IWT. Passenger terminal development will therefore also not be a major priority, with the exception of improvement of exiting terminals. Nonetheless, VIWA has plans for IWT port development as follows. Details are in Annex 5C.

(i) Improvement/upgrading of cargo port system in the northern region covering 41 ports.

(ii) Improvement/upgrading of passenger port system in the northern region covering six ports.

(iii) Improvement/upgrading of cargo port system in the southern region covering 26 ports.

(iv) Improvement /upgrading of passenger port system in the southern region covering 15 ports.

(v) Improvement/upgrading of cargo port system in the central region covering 6 ports.

(vi) Various improvement of landing stages.

5.6 Maintenance and Operation

It is generally recognized that maintenance is inadequate, due to lack of funding. There is as yet no estimate on what the backlog on maintenance is. The 'Master Plan for Vietnam Inland Waterway Sector to 2020' stipulates as maintenance program of approximately 5700 billion VND for the period 2011-2020. This estimate is assumed by VITRANSS2.

Key waterways of national significance should be part of the channel maintenance program. The conditions of channels need to be monitored and the design specifications maintained. Maintenance is considered to be critical and should be given the highest priority. Benefits from improved channels stems from efficiency of vessels plying them. Higher standard channels will encourage IWT operators to use better vessels (e.g. deeper drafts). However if standards are not maintained, then it creates technical risk to operators. Operators will invest only in vessels that are designed for the worst case scenario. All the investment to improve channels will therefore not generate benefits if maintenance works is erratic.

Other key aspects that require funding and attention are as follows:

(i) Installation and maintenance of navigational aids

(ii) Enhancement of IWT search and rescue function

(iii) Institutional enhancement, including the purchase of equipment for IWT administration and enforcement, including the improvement of vessel registration system.

(iv) Human resource development programs

(v) Improvement of ship building and ship repair industry, however the role of the government should focus on being a facilitator rather than being involved in the actual operations.

6 DRAFT MASTER PLAN

A development strategy for the IWT sub-sector was laid out in the previous chapter. To implement this strategy, projects for implementation for the period 2009-2020 needs to be identified.

6.1 Candidate Projects

Through reviews of government plans and discussion with VIWA, a long list of candidate projects was collated, which includes 16 committed/on-going projects (Table 6.1.1) and 52 proposed projects (Table 6.1.2) and illustrated in Figure 6.1.1.

Table 6.1.1 Committed/on-going Projects

Code	Project Name	Description	FINANCING (in US$ m)		Original Schedule
			Cost	Sources	
CW01	Upgrading of Northern Trans Mekong corridor (to Class III)(253km) *	To Improve the standard (up to Class III/300DWT vessels) and connectivity of the canal network, involving 253 km. Dredging, bank protection, ship lock, bridge improvements, navigation aids for 24-hour navigation	99.30	WB(76.08) + GoV(23.21)	2015
CW02	Updating of Southern coastal corridor (to Class III) (153km) *	To improve the standard (up to Class III/300DWT vessels) and connectivity of the canal network in the southern coastal corridor(153km):Dredging, bank protection, ship lock, bridge improvements, navigation aids for 24-hour navigation	Included in above		2015
CW03	Upgrading of the feeder canals in Mekong Delta region (to Class IV) (58km) *	To upgrade two feeder canals of 58km of total length in An Giang and Ca Mau to class IV with widening and deepening, bank protection, raising bridges and navigation aids.	8.50	WB(5.8) + Australia(2.7)	2015
CW04	Upgrading of the east-west northern corridor in the northern delta region (to Class II)(Viet Tri - Quang Ninh) (280km) **	To improve the standard (up to class II, 4X400DWT barge convoy) and connectivity of the canal network, East-west northern corridor between Viet Tri and Quang Ninh (280km)): Dredging, bend corrections, bank protection, shoal regulation, air clearance, navigation aids	59.77	WB(56.99) + GoV(2.78)	2015
CW05	Upgrading of the north-south western corridor in the northern delta region (to Class I) (295km) **	To improve the standard (class I) and connection of North-south western corridor between Hanoi and Ninh Co River (259km). Dredging, bend corrections, bank protection, shoal regulation, air clearance, navigation aids.	6.48	WB(5.68) + GoV(0.80)	2015
CW06	Improvement to Ninh Co River Estuary**	To improve channel by-passing the mouth of the Ninh Co river estuary to accommodate 3000DWT : dredging, breakwaters, ship lock, bank protection, river training work	63.74	WB(61.57) + GoV (2.17)	2015
CW07	Inter-connecting canal between the Day and Ninh Co River**	To improve canal connecting the Ninh Co and Day Rivers: dredging, breakwaters, ship lock, bank protection, river training work / between the Day and Ninh Co River	Included in above	WB	2015
CW08	Improvement of Sai Gon-DongThap-Long Xuyen Route*	To improve the waterway in Sai Gon-DongThap-Long Xuyen section	4.40	GoV	
CW09	Improvement of Thi-Vai-Nuoc Man Canal Route*	To improve waterway in Thi-Vai-Nuoc Man section	3.10	GoV	

Code	Project Name	Description	FINANCING (in US$ m)		Original Schedule
			Cost	Sources	
	River Ports				
CW10	Improvement of Viet Tri Port **	To introduce new facilities (wharf, storage areas, warehouses, road access, e\waste disposal facilities) at Viet Tri Port for connection to the sea ports in the north as well as the central and south / Viet Tri Port	4.27	WB(4.12) + GoV(0.15)	2015
CW11	Improvement of Ninh Phuc Port**	To introduce new facilities (wharf, storage areas, warehouses, road access, e\waste disposal facilities) at Ninh Phuc Port for connection to the sea ports in the north as well as the central and south / Ninh Phuc Port.	2.75	WB(2.60) + GoV(0.15)	2015
CW12	Demonstration investment for provincial port facilities in Mekong Delta region*	To implement demonstration investment in provincial port facilities and rural landing stages as well as access roads.			2015
	Landing Stages				
CW13	Investment of small ferry boats stages**	To improve 15-30 ferryboats stages with technical support in project implementation and operation	4.57	WB(4.32) + GoV(0.25)	2015
	Institutional				
CW14	Institutional development concerned with Mekong Delta Inland waterways*	To develop planning and management and implement training	1.60	WB	2015
CW15	Institutional development concerned with Northern delta Region Inland waterways*	To develop planning and management and training etc.	5.11	WB	2015
	Maintenance				
CW16	Pilot maintenance project**	To implement various maintenance contracts to pilot novel maintenance schemes	1.00	WB	2015
		TOTAL COST =	264.6		

Notes: * - Part of the "Development of Transport Infrastructure of the Mekong Delta" being funded with IBRD loan, WB project
**- Part of the "Development of Transport in the Northern Delta Region" being funded with IBRD loan, WB project

Source: JICA Study Team

Table 6.1.2 Proposed Projects **

Proj. No.		Project Title	Project Description	Cost (mill USD)
Waterway improvement	W01	Upgrading of Quang Ninh/Hai Phong - Ha Noi Route (to Class II) (166km)	To upgrade the 166-km section of waterway to conform to Class II standards throughout the route	38.2
	W02	Upgrading of Lach Giang - Ha Noi Route (to Class I) (192km)	To upgrade the section of 192 km to class I through the route (45.5 mill. USD); channel stabilization (125.6 mill. USD); navigation channel improvement (17.1 mill. USD); Duong Bridge improvement (21.9 mill. USD)	210
	W03	Upgrading of Ha Noi – Viet Tri - Lao Cai Route (to Class II III and IV) (362 km)	To upgrade the section of 362 km to class II III and IV (Hanoi to Viet Tri: class II Viet Tri to Yen Bai: class III and Yen Bai to Lao Cai: III or IV)	133.3
	W04	Improvement of Quang Ninh - Ninh Binh Route (266.5km)	To establish consistent channel conditions over 266.5-km section of waterway to class III	61.2

Proj. No.		Project Title	Project Description	Cost (mill USD)
	W05	Upgrading of Cua Day - Ninh Binh (to Class I)(74.0km)	To upgrade the 74-km section of waterway to Class I throughout the route	17.0
	W06	Upgrading of Quang Ninh - Pha Lai Route (to Class II) (128km)	To upgrade the 128-km section to Class II throughout the route	29.4
	W07	Upgrading of Pha Lai - A Lu Route (to Class III) (33.0 km)	To upgrade the 33-km section to Class III throughout the route	7.6
	W08	Upgrading of Pha Lai - Da Phuc Route (to Class III) (87km)	To upgrade the 87-km section to Class III throughout the route	20
	W09	Upgrading of Viet Tri - Tuyen Quang – Na Hang Route (to class III and IV/V) (115km)	To upgrade the 115-km section to Class III (Viet Tri to Tuyen Quang) and Class IV/V (Tuyen Quang to Na Hang)	36.8
	W10	Improvement of Hong Đa T-Junction - Hoa Binh Port Route (58.0km)	To establish consistent channel conditions over 58-km section	13.3
	W11	Improvement of Ninh Binh-Thanh Hoa	To improve the section of Ninh Binh-Thanh Hoa Route to class III/IV	11.5
	W12	Various Regional/Feeder Routes	To improve several regional/feeder routes (proposed by study team)	50.0
	W13	Upgrading Cho Gao Canal Route (11km)	To improve 11km over 28.5-km section connecting the north and south routes (dredging, widening, raising bridge clearance) (F/S has been done already)	138.0
	W14	Improvement of Sai Gon - Kien Luong/Lap Vo canal Route (315km)	To establish consistent channel conditions over the 315-km section of the route to class III	72.5
	W15	Improvement of Sai Gon - Kien Luong/Dong Thap Muoi area Route (334km)	To establish consistent channel conditions over 334 km of the route to class III	76.8
	W16	Improvement of Sai Gon - Ca Mau/Xa No canal Route (336km)	To establish consistent channel conditions over 336 km of the route to class III	77.3
	W17	Improvement of Sai Gon - Ca Mau/coastal Route (367km)	To establish consistent channel conditions over 367 km of the route to class III	84.4
	W18	Improvement of Sai Gon - Moc Hoa Route (96km)	To establish consistent channel conditions over 96 km of the route to class III	22.1
	W19	Improvement of Sai Gon - Ben Suc Route (89km)	To establish consistent channel conditions over 89 km of the route to class III	20.5
	W20	Improvement of Sai Gon - Ben Keo Route (166km)	To establish consistent channel conditions over 166 km of the route to class III	38.2
	W21	Improvement of Sai Gon - Hieu Liem Route (88km)	To establish consistent channel conditions over 88 km of the route (Implemented 6 years ago; need to rehabilitate after 15 years), class III	15.0
	W22	Improvement of Mekong river Delta – Thi Vai - Vung Tau Route (75km)	To establish consistent channel conditions over 75 km of the route	17.3
	W23	Improvement of Cua Tieu – Cambodia Route (223km)	To establish consistent channel conditions over 223 km of the route to class I	51.3
	W24	Improvement of Dinh An estuary - Tan Chau Route (214km)	To establish consistent channel conditions over 214 km of the route to class I	49.2
	W25	Improvement of Moc Hoa - Ha Tien (108km)	To establish consistent channel conditions over 108 km of the route to class IV	24.8
	W26	Upgrading of Phuoc Xuyen – Tien river (canal 28) (to Class III) (75km)	To upgrade the 75-km section to Class III standards	17.3
	W27	Upgrading of Rach Gia - Ca Mau (to Class III) (149km)	To upgrade the 149-km section to Class III standards	34.3
	W28	Improvement of Lach Trao-Ham Rong	To establish consistent channel conditions as Class II waterway	2
	W29	Improvement of Lach Sung-Len Bridge	To establish consistent channel conditions as Class III waterway	2
	W30	Improvement of Cua Hoi-Ben Thuy-Do Luong	To establish consistent channel conditions as Class II and III waterway	4.6
	W31	Improvement of Cua Sot – Nghen Bridge	To establish consistent channel conditions as Class III waterway	2
	W32	Improvement of Cua Gianh-Quang Truong	To establish consistent channel conditions as Class II waterway	2

Proj. No.		Project Title	Project Description	Cost (mill USD)
	W33	Improvement of Nhat Le Estuary –Long Dai bridge	To establish consistent channel conditions as Class III waterway	2
	W34	Improvement of Cua Viet-Dap Tran (spillway)	To establish consistent channel conditions as Class III waterway	2
	W35	Improvement of Thuan An-Tuan T-junction	To establish consistent channel conditions as Class III waterway	2.3
	W36	Improvement of Hoi An –Cua Dai– Cu Lao Cham	To establish consistent channel conditions as Class I and III waterway	2.3
	W37	Improvement of Ky Ha Estuary- Hoi An – Vinh Dien T – junction - Cua Han	To establish consistent channel conditions as Class III waterway	13.8
Maintenance	W38	Maintenance Dredging to reduce backlogs	Multi year program of maintenance dredging to re-establish and maintain set standards (2011-2020)	120.0
Improvement of river port and landing stages	W39	Improvement/upgrading of cargo port system in the northern region	To improve/upgrade/develop one(1) port for accommodation of 3,000DWT vessels, seven(7) ports for 1,000DWT, five(5) ports for 600DWT, one(1) port for 500DWT, seven(7) ports for 400DWT vessels, three(3) ports for 300DWT and seventeen(17) ports for 200DWT	130.1
	W40	Improvement/upgrading of passenger port system in the northern region	To improve/upgrade/develop four(4) ports for accommodation of 150-200seats passenger vessels and two(2) ports for 100 seats	20.0
	W41	Improvement/upgrading of cargo port system in the southern region	To improve/upgrade/develop five(5) Ports for accommodation of 5,000DWT vessels, two(2) for 3,000DWT, three for 2,000DWT, nine(9) for 1,000DWT, three(3) for 500DWT, one(1) for 400DWT and three(3) for 300DWT	20.0
	W42	Improvement /upgrading of passenger port system in the southern region	To improve/upgrad/develop sixteen (14) ports for accommodation of 100 seats passenger vessels, one (1) for 250 seats	20.0
	W43	Improvement/upgrading of cargo port system in the central region	To improve/upgrade/develop four (4) ports for accommodation of 1,000DWT vessels, one(1) for 400DWT and one(1) for 300DWT	20.0
	W44	Selective Ports Investment Package	Investment in some ports with regional or national importance, plus assistance to provinces in ports devolution	50.0
Landing Stage Improvement	W45	Improvement of landing stages	To improve existing facilities in qualities and in safety	2.0
Safety Improvement	W46	Installment and improvement of navigation aids	To rehabilitate, improve and expand river traffic management facilities (e.g., buoys, beacons, channel marks, etc.)	5.0
	W47	Search and rescue	To improve search-and-rescue capability in north & south regions, by acquiring essential equipment and its operation	5.0
Ship Building	W48	Ship building	To build inland waterway ships	2080.0
	W49	Ship building and repair factory	To expand ship building and repair capacity	15.0
Institution Improvement	W50	Organizational Reforms	To improve institutional systems including removal of overlaps between VIWA and VINAMRINE, and improve coordination with other transport sub-sectors	2.0
	W51	Capacity development	To install appropriate systems improvements in the organizational processes, supported by continuous training or personnel	2.0
	W52	Database: River Surveys and Vessel Registry	To develop capability for continuous surveys of channel status (depth, width, bends, etc.) and to improve vessel registry system	20.0
Total				*3913.2*

NOTES: * included in the IWT Master Plan as revised in 2008.

* * These projects are most proposed by "Rivised adjusted Master Plan on Inland Waterway up to 2020" (No. 13/2008/QD-BGTVT) dated 6.8.2008

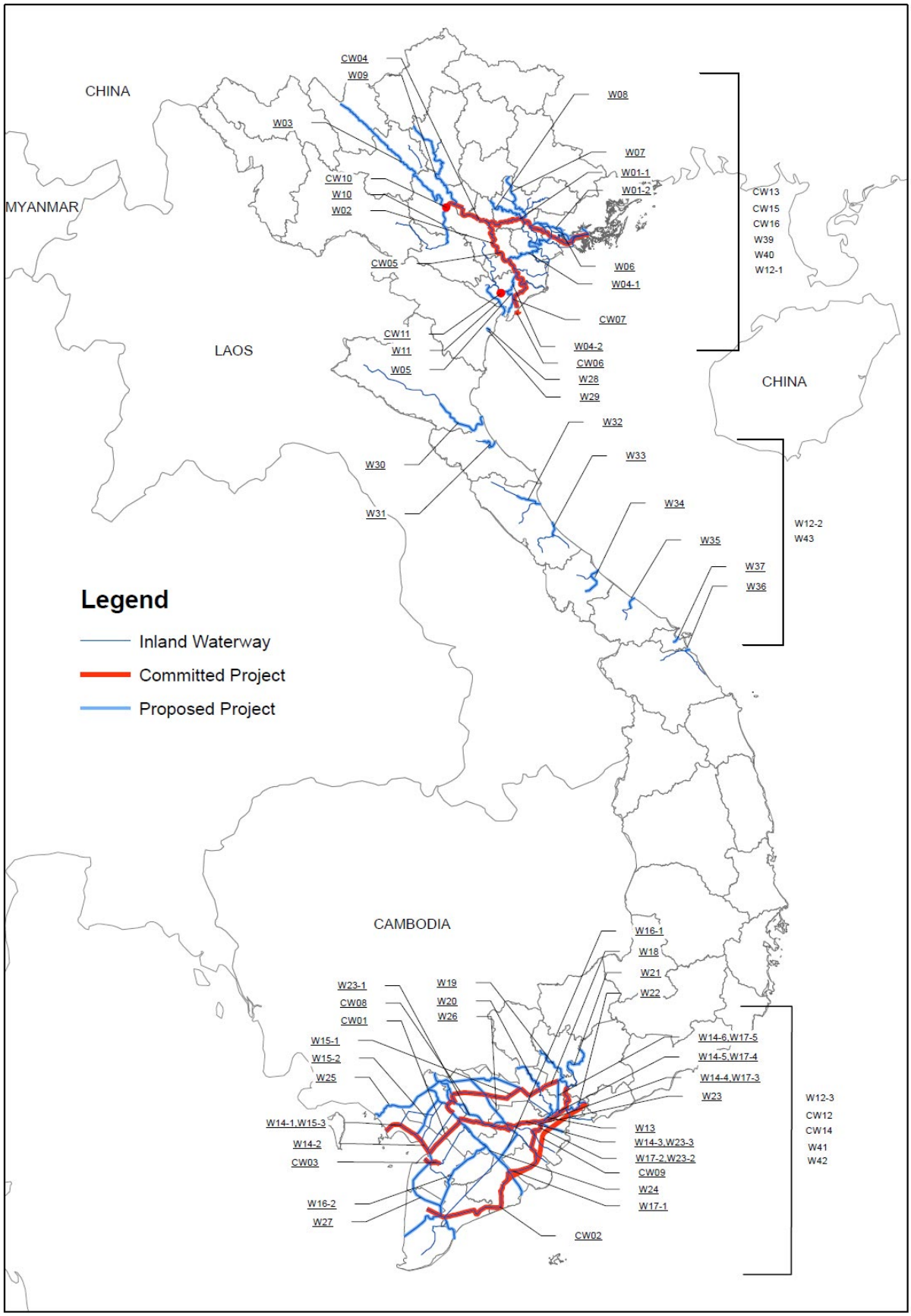
1- In general, VITRANSS2 adopted most of the projects proposed in the master plan. The key difference is in the timing, by recommending highest priority to waterway improvement projects on core routes where demand growth is expected to be highest.

2- Using a funding-constraint approach to planning and selection of projects, VITRANSS2 proposes to downscale investments in river ports, except for a few interventions from VIWA, and to devolve responsibilities for ports to provinces and local governments.

3- Shipbuilding is a business best left to private sector and industrial enterprises, where targets set in the master plan could be misleading. Investments in shipbuilding should be excluded from State Budget of MOT and VIWA. With majority of vessels already non-State-owned, if not private, there is no rationale for direct government intervention.

Source: VITRANSS2 Study Team

Figure 6.1.1 Location of Candidate Projects



Source: JICA Study Team

6.2 Project Prioritization

The biggest constraint in the implementation of the proposed development direction of the IWT sub-sector is funding. IWT only receives around 2% of the total investment funding in the transport sector, or about 20 million USD per year (1999-2007).

For the period 2009-2020, the funds expected to be allocated for IWT is around 850 million USD. Already committed/on-going projects in the IWT sub-sector will require around 250 million USD. Therefore up to 2020 only around 600 million USD can be spent on new projects. Projects illustrated in the previous chapter to strengthen the IWT network on the basis of a hierarchy of river networks have a total estimated cost of more than 3.9 billion USD. Projects therefore need to be carefully screened and prioritized.

To select from among the long list of projects to be developed during the period 2009-2020 as part of the VITRANSS2 master plan, a multi-criteria analysis (MCA) was conducted. The use of MCA allows projects to be evaluated holistically, and seven items were considered as shown in Table 6.2.1.

Table 6.2.1 MCA for Project Evaluation

Criteria		Indicator	No. of Categories
1	Demand	(ton-km + pax-km)/km	5
2	Economic feasibility	EIRR	5
3	Financial feasibility	FIRR or Demand/Cost	5
4	Network Composition	5: Core Route	5
		4-2: Industrial and Key Regional Route	
		1: Minor Regional Route	
5	Natural Environmental Impact	% of Length passing Restricted Area	5
6	Maturity/Progress	9: DD (completed)	9
		8: DD (ongoing)	
		7: FS (completed)	
		6: FS(ongoing	
		5: Pre-FS (completed)	
		4: Pre-FS (ongoing)	
		3: MP	
		2: Idea	
		1: No Progress	
7	Consistency with National Development Policy	3: Listed in Formal Plan	3
		2:. Seemingly Consistent	
		1: Unknown/ Inconsistent	

Source: JICA Study Team

(i) The methodology of evaluation scoring is as follows:

(ii) Demand: By comparing demand volume, the projects with top 10% demand are given 5 points, 4 points to next the 20%, 3 points to the next 40%, 2 points to the next 20% and 1 point to the last 10%.

(iii) Economic Feasibility: In the same way as demand, each project is given point corresponding to the economic IRR.

(iv) Financial Feasibility: In the same way as economic feasibility, a point is given according to the financial IRR, or demand divided by cost as a substitute of F-IRR.

(v) Network Composition: Points are based on importance to the overall network structure.

(vi) Natural Environmental Impact: Points are based on the potential impact to environmental.

(vii) Maturity/ Progress: In the order of (9) DD completed, (8) DD in Process, (7) FS completed, (6) FS in process, (5) Pre-FS completed, (4)Pre-FS in process, (3) Listed in Master Plan, (2) Still in concept stage, (1) No progress, each point was given.

(viii) Consistency with National Development Policy

(ix) An overall score is then assessed based on the evaluations mentioned above - A score of 5 is attached projects with the highest rating, and 1 for projects with the lowest rating.

MCA was used only on the non-committed projects, while committed projects are assumed to be part of the master plan already. For details of the evaluation methodology, including key assumptions on the calculation of economic benefits, the reader is referred to Chapter 8 of the Main Text of VITRANSS2. Table 6.2.2 summarizes the results of the MCA. Not all projects have sufficient information for MCA. These projects were qualitatively assessed and the results are in Table 6.2.3.

Based on the budget available for Inland waterway projects only the highest rated projects (5 score) can be accommodated during the period 2011-2020 including the projects listed below, with a total cost of 600 million USD consisting of various infrastructure operation and administration enhancement projects and maintenance works.

Much of the growth in port traffic will be at industrial ports, while growth in port traffic of general use ports will not grow significantly and much of the general purpose IWT ports have enough reserved capacity. Port operation is recommended to be devolved to either the private sector or the provincial governments. Investments to improve these ports will be shouldered by the port operators, and is considered off the portfolio for the central government. The role of the central government in IWT ports would focus on technical regulation.

(i) Waterway Improvement

a) W01: Upgrading of Quang Ninh/Hai Phong - Ha Noi Route (to ClassII) (166km) (38.2 mill. USD)

b) W06: Upgrading of Quang Ninh - Pha Lai Route (to ClassII) (128km) (29.4 mill. USD)

c) W13: Upgrading Cho Gao Canal Route (11km) (138.0 mill. USD)

d) W14: Improvement of Sai Gon - Kien Luong/Lap Vo canal Route (315km) (72.5 mill. USD)

e) W16: Improvement of Sai Gon - Ca Mau/Xa No canal Route (336km) (77.3 mill. USD)

f) W17: Improvement of Sai Gon - Ca Mau/coastal Route (367km) (84.4 mill. USD)

g) W21: Improvement of Sai Gon - Hieu Liem Route (88km) (15 mill. USD)

(ii) Maintenance

a) W38: Maintenance Dredging to reduce backlogs (120.0 mill. USD)

(iii) Operation and Administration Enhancement

a) W47: Search and rescue (5.0 mill. USD)

b) W52: Database river surveys and vessel registry (20.0 mill. USD)

Table 6.2.2 MCA for Project Evaluation

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo - mic	Finan- cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
Waterway Improvement											
W01	Upgrading of Quang Ninh/Hai Phong - Ha Noi Route (to ClassII) (166km)	38.2	59.6	5	5	5	5	5	6	3	5
W02	Upgrading of Lach Giang - Ha Noi Route (to Class I) (192km)	210.1	9.2	3	2	1	5	5	6	3	3
W03	Upgrading of Ha Noi – Viet Tri - Lao Cai Route (to Class II III and IV) (362 km)	133.3	15.1	4	3	2	4	5	6	3	4
W04	Improvement of Quang Ninh - Ninh Binh Route (266.5km)	61.2	6.3	3	2	1	5	5	3	3	3
W05	Upgrading of Cua Day - Ninh Binh (to Class I)(74.0km)	17.0	-	1	1	1	4	5	3	3	1
W06	Upgrading of Quang Ninh - Pha Lai Route (to ClassII) (128km)	29.4	59.6	4	5	4	5	5	6	3	5
W07	Upgrading of Pha Lai - A Lu Route (to Class III) (33.0 km)	7.6	9.2	1	2	1	4	5	3	3	2
W08	Upgrading of Pha Lai - Da Phuc Route (to ClassIII) (87km)	20.0	15.1	2	3	1	4	5	3	3	3
W09	Upgrading of Viet Tri - Tuyen Quang – Na Hang Route (to class III and IV/V) (115km)	36.8	6.3	4	2	3	4	5	9	3	4
W10	Improvement of Hong Đa T-Junction - Hoa Binh Port Route (58.0km)	13.3	-	1	1	1	4	5	3	3	1
W11	Improvement of Ninh Binh-Thanh Hoa	11.5	-	1	1	1	5	5	3	3	1
W12	Various Regional/Feeder Routes	50.0	-	-	-	-	-	-	-	-	4*
W13	Upgrading Cho Gao Canal Route (11km)	138.0	-	-	-	-	-	-	-	-	5*
W14	Improvement of Sai Gon - Kien Luong/Lap Vo canal Route (315km)	72.5	40.9	5	4	5	4	5	3	3	5
W15	Improvement of Sai Gon - Kien Luong/Dong Thap Muoi area Route (334km)	76.8	7.5	3	2	1	4	5	3	3	3
W16	Improvement of Sai Gon - Ca Mau/Xa No canal Route (336km)	77.3	37.0	5	4	5	5	5	3	3	5
W17	Improvement of Sai Gon - Ca Mau/coastal Route (367km)	84.4	24.6	5	4	4	5	5	3	3	5
W18	Improvement of Sai Gon - Moc Hoa Route (96km)	22.1	-	1	1	1	4	5	3	3	1
W19	Improvement of Sai Gon - Ben Suc Route (89km)	20.5	-	1	1	1	4	5	3	3	1
W20	Improvement of Sai Gon - Ben Keo Route (166km)	38.2	-	1	1	1	4	5	3	3	1
W21	Improvement of Sai Gon - Hieu Liem Route (88km)	15.0	34.2	4	4	4	4	5	3	3	5
W22	Improvement of Mekong river Delta – Thi Vai - Vung Tau Route (75km)	17.3	2.9	1	1	1	5	5	3	3	1
W23	Improvement of Cua Tieu – Cambodia Route (223km)	51.3	12.0	4	3	2	5	5	3	3	4

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo - mic	Finan- cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
W24	Improvement of Dinh An estuary - Tan Chau Route (214km)	49.2	9.8	3	2	2	4	5	3	3	3
W25	Improvement of Moc Hoa - Ha Tien (108km)	24.8	-	1	1	1	4	5	3	3	1
W26	Upgrading of Phuoc Xuyen – Tien river (canal 28) (to Class III) (75km)	17.3	-	1	1	1	4	5	3	3	1
W27	Upgrading of Rach Gia - Ca Mau (to Class III) (149km)	34.3	-	1	1	1	4	5	3	3	1
W28	Improvement of Lach Trao-Ham Rong	2.0	-	-	-	-	-	-	-	-	4*
W29	Improvement of Lach Sung-Len Bridge	2.0	-	-	-	-	-	-	-	-	4*
W30	Improvement of Cua Hoi-Ben Thuy-Do Luong	4.6	-	-	-	-	-	-	-	-	4*
W31	Improvement of Cua Sot – Nghen Bridge	2.0	-	-	-	-	-	-	-	-	4*
W32	Improvement of Cua Gianh-Quang Truong	2.0	-	-	-	-	-	-	-	-	4*
W33	Improvement of Nhat Le Estuary –Long Dai bridge	2.0	-	-	-	-	-	-	-	-	4*
W34	Improvement of Cua Viet-Dap Tran (spillway)	2.0	-	-	-	-	-	-	-	-	4*
W35	Improvement of Thuan An-Tuan T-junction	2.3	-	-	-	-	-	-	-	-	4*
W36	Improvement of Hoi An –Cua Dai– Cu Lao Cham	2.3	-	-	-	-	-	-	-	-	4*
W37	Improvement of Ky Ha Estuary-Hoi An – Vinh Dien T – junction - Cua Han	13.8	-	-	-	-	-	-	-	-	4*
Maintenance											
W38	Maintenance Dredging to reduce backlogs	120.0	-	-	-	-	-	-	-	-	5*
Port Improvement and Others											
W39	Improvement/upgrading of cargo port system in the northern region	130.1	-	-	-	-	-	-	-	-	4*
W40	Improvement/upgrading of passenger port system in the northern region	20.0	-	-	-	-	-	-	-	-	2*
W41	Improvement/upgrading of cargo port system in the southern region	20.0	-	-	-	-	-	-	-	-	4*
W42	Improvement /upgrading of passenger port system in the southern region	20.0	-	-	-	-	-	-	-	-	2*
W43	Improvement/upgrading of cargo port system in the central region	20.0	-	-	-	-	-	-	-	-	2*
W44	Selective Ports Investment Package	50.0	-	-	-	-	-	-	-	-	4*
Landing Stage Improvement											
W45	Improvement of landing stages	2.0	-	-	-	-	-	-	-	-	3*
Safety Improvement											
W46	Installment and improvement of navigation aids	5.0	-	-	-	-	-	-	-	-	4*
W47	Search and rescue	5.0	-	-	-	-	-	-	-	-	5*

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo - mic	Finan- cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
Ship Building											
W48	Ship building	2,080.0	-	-	-	-	-	-	-	-	3*
W49	Ship building and repair factory	15.0	-	-	-	-	-	-	-	-	4*
Institution Improvement											
W50	Organizational Reforms	2.0	-	-	-	-	-	-	-	-	4*
W51	Capacity development	2.0	-	-	-	-	-	-	-	-	4*
W52	Database: River Surveys and Vessel Registry	20.0	-	-	-	-	-	-	-	-	5*

Source: JICA Study Team

6.3 Investment Strategy by Region

Committed/on-going projects and projects identified from the long list of projects are to be implemented during the period 2009-2020. The breakdown of projects by region and by role is in Table 6.3.1, with a total cost of 864 million USD, consisting of 711 million USD for infrastructure projects and 153 million USD for non-infrastructure projects. The 2009-2020 portfolio of project aims to primarily strengthen the core routes, and some key regional and industrial routes. Limited funds are allocated to port investment, which is proposed to be devolved to provincial government and/or private operators. In total 711.6 million USD is needed for IWT infrastructure development for the period 2009-2020, or an average of 59 million USD per year. The historical average of IWT funding is 20 million USD for the period 1999-2007. The funding for infrastructure projects will come from state funding.

Maintenance works is to be given high priority however there is currently no clear information on how much maintenance works will entail, including backlog maintenance. A VIWA Master plan sets funding of more than 300 million USD for the period 2008-2020 for maintenance, and is assumed by VITRANSS2 of 120 million USD. A review of waterway maintenance is recommended and a long term maintenance program be instituted. The funding for maintenance works will come from state funding, however it is proposed to transition in user fees for maintenance works.

Other non-infrastructure projects, which include safety, navigation, institutional development, database development, vessel registry, and capacity building, are not expected to be substantial in amount, but it will result in significant benefits. It is therefore recommended to attach a high priority to these types of projects. Technical assistance from multilateral and bilateral agencies would be practical for technology transfer.

No major projects for IWT projects in the central region are proposed except for maintenance and operation improvements. The role of IWT in the central region is limited, thereby projects were assessed to be of low priority. As a result, no IWT projects in the central region were included in the proposed investment portfolio, given that the sub-sector needs to operate below the budget envelope.

Table 6.3.1 Proposed Infrastructure Investment for the Period 2009-2020 by Region

Region	Role	Project Code	Project	Cost (mil. USD)
Northern Region	Hanoi – Viet Tri Core Route	CW04	Upgrading of the east-west northern corridor in the northern delat region (to Class II)(Viet Tri - Quang Ninh) (280km)	59.8
		CW10	Improvement of Viet Tri Port	4.3
	Hanoi – Lach Giang Core Route	CW05	Upgrading of the north-south western corridor in the northern delta region (to Class I) (295km)	6.5
		CW06	Improvement to Ninh Co River Estuary	63.7 (including CW07)
		CW07	Inter-connecting canal between the Day and Ninh Co River	63.7 (including CW06)
		CW11	Improvement of Ninh Phuc Port	2.8
	Hanoi – Hai Phong Core Route	W01	Upgrading of Quang Ninh/Hai Phong - Ha Noi Route (to Class II) (166km)	38.2
	Regional and Industrial Routes	CW13	Investment of small ferry boats stages	4.6
		W06	Upgrading of Quang Ninh - Pha Lai Route (to Class II) (128km)	29.4

Region	Role	Project Code	Project	Cost (mil. USD)
Southern Region	HCMC – NW Mekong Core Route	CW01	Upgrading of Northern Trans Mekong coriddor (to Class III)(253km)	99.3 (including CW02)
		W14	Improvement of Sai Gon - Kien Luong/Lap Vo canal Route (315km)	72.5
	HCMC – SW Mekong Core Route	CW02	Updating of Southern coastal coriddor (to Class III) (153km)	99.3 (including CW01)
		W13	Upgrading Cho Gao Canal Route (11km)	138.0
		W16	Improvement of Sai Gon - Ca Mau/Xa No canal Route (336km)	77.3
		W17	Improvement of Sai Gon - Ca Mau/coastal Route (367km)	84.4
	Regional and Industrial Routes	CW03	Upgrading of the feeder canals in Mekong Delta region (to Class IV) (58km)	8.5
		CW08	Improvement of Sai Gon-DongThap-Long Xuyen Route	4.4
		CW09	Improvement of Thi-Vai-Nuoc ManCanal Route	3.1
		W21	Improvement of Sai Gon - Hieu Liem Route (88km)	15
		CW12	Demonstration investment for provincial port facilities in Mikong Delta region	n/a
Non-infrastructure projects		CW14	Institutional development concerned with Mekong Delta Inland waterways	1.6
		CW15	Institutional development concerned with Northern delta Region Inland waterways	5.1
		CW16	Pilot maintenance project	1.0
		W38	Maintenance Dredging to reduce backlogs	120.0
		W47	Search and rescue	5.0
		W52	Database: River Surveys and Vessel Registry	20.0
Infrastructure				711.6
- Committed projects				256.9
- Proposed projects				454.7
Non-infrastructure projects				152.7
- Maintenance, project cost needs to be reviewed and given high priority, especially for core routes, and major industrial and regional routes				121.0
- Institutional and capacity development, project cost needs to be reviewed and given high priority				31.7
Total				*864.3*

Source: JICA Study Team

6.4 Key Recommendations

Vietnam is endowed with an extensive natural waterway of more than 200,000 kilometers, of which 16% is deemed navigable and 7% or 15,346 km is under public management. The central government manages 6,612 km and the rest is managed by local government. Due to funding constraints, proper management of the 6,612 km national network of waterways could not be achieved.

IWT is not getting its rightful share of investments – which has averaged less than 3% of the total capital budget in recent years or 20 million USD per year. Only about 1/5 of the planned investments got realized in the past. This share of the budget envelope is unlikely to increase in the future. The estimated funding for the period 2009-2020 can only accommodate around 15% of projects being proposed.

Another key factor to be considered about the future of the IWT sub-sector is its role in the overall transport system. While IWT traffic is expected to increase, its overall modal share will be eroded. VITRANSS2 is proposing expansion and improvement of the road network, and it is known that IWT will lose out in competition with highways, with the exception of bulky industrial products. IWT is competitive in the transport of goods in bulk in a point-to-point or point-to-many logistics structure. The competitiveness of IWT in passenger transport will be even more affected by highway development. Investment in IWT will not be sufficient to reverse this trend. On the other hand, IWT is handling 48% of freight, and are located in and around congested cities particularly Hanoi and HCMC. If IWT fails to maintain its competitiveness in industrial goods transport, the shift from IWT to truck transport would be disastrous. Heavy trucks carrying bulk goods would damage road pavement, cause congestion, worsen road safety, and negatively impact the environment.

The competitiveness of IWT therefore needs to be maintained in the transport of bulky industrial goods, while surrendering other markets to other modes. This strategy will focus investments in IWT where it can be effective.

The competitive advantage of IWT lies in a few transport corridors, and these waterways are much less than the 6,612-km in the nationally-managed list. Selective improvement of existing key corridors is therefore recommended, while further expansion of the IWT network is assigned low priority. A framework of waterways hierarchy is proposed including core routes, industrial rotes, and regional routes to guide investment and manage of priorities.

In line with this outlook, much of the port traffic will be handled by industrial ports which should be developed by industry-users. The role of public ports will not be significant and further capacity development or new port development should be done selectively. Public IWT port projects should therefore focus on improving cargo handling and warehousing functions, as well as passenger amenities where passenger traffic is still robust. Public ports are recommended to be devolved to local governments or competitively concessioned to private operators. The local government and the private operators will be more responsive to the demands of shippers, and investments can be recouped from port fees rather than from the state budget.

For the period 2009-2020, IWT funding is expected to be in the region of 850 million USD. In line with the proposed hierarchy of waterways, an investment strategy for the period 2009-2020 was formulated by prioritization projects from a long list of projects totalling 3.9 billion USD. An infrastructure investment strategy amounting to 711.6 million USD is

proposed, which consists mainly of investment in core route waterways and some amount to selected ports, regional routes and industrial routes.

Non-infrastructure projects, including maintenance and management measures, have also been proposed. Maintenance for 2009-2020 is assumed to be 120 million USD although it is estimated at more than 300 million USD in the VIWA master plan. Additionally 31.7 million USD is allocated for institutional and capacity development. Non-infrastructure projects are highly cost-effective measures and in many ways it is considered as a prerequisite for the IWT sub-sector to function.

The critical non-infrastructure project is maintenance. From the limited funds that the sub-sector could get from the state budget, it should give highest priority for maintenance of the core set of waterways. Rivers need to be delisted regularly, and its curvature protected, in accordance with the technical standards to which they have been classified. It is said that 40% backlog of maintenance is occurring every year. Therefore, the sector needs to recover lost grounds by embarking on a major maintenance program in the next 10 years. In order to work, this needs to be empirically based - from regular and continuous river surveys. To stabilize funding for waterway maintenance, the sector should aim to establish a river maintenance fund, which is to be partly or fully sourced from user fees.

Next to asset maintenance, safety of river navigation should receive the second highest priority. Safety can be boosted through an annual process of vessel inspection and registration, as well as a more rigorous pilot licensing and training program.

APPENDIX 2A

List of National Inland Waterways

ANNEX 2A: LIST OF NATIONAL INLAND WATERWAYS

No	Name	Scale		Length (Km)
		Head point	Last point	
A	North			2,726.9
1	Hong River	N3 Nam Thi	Buoy 0 Ba Lat	541
2	Da River	Downstream of Hoa Binh power dam	N3 Hong Da	58
3	Hoa Binh Lake	Upstream of Hoa Binh power dam	Ta Bu	203
4	Lo River	N3 Lo Gam	N3 Viet Tri	115
5	Gam River	Chiem Hoa	N3 Lo Gam	36
6	Thac Ba Lake	Cam Nhan	Huong Ly port	42
		Dap Thac Ba	Huong Ly port	8
7	Duong River	N3 Cua Dau	N3 My Loc	68
8	Luoc River	N3 Cua Luoc	Quy Cao	72
9	Day River	Cang Van Dinh	Bouy 0 Cua Day	163
10	Hoang Long River	Cau Nho Quan	N3 Gian Khau	28
11	Dao River	N3 Hung Long	N3 Doc Bo	33.5
12	Ninh Co River	N3 Mom Ro	Upstream of Hai Thinh port 800m	50
13	Quan Lieu canal	N3 song Day	N3 song Ninh Co	3.5
14	Vac River	N3 song Van	N3 Kim Dai	28.5
15	Yen Mo canal	N3 Chinh Dai	N3 Duc Hau	14
16	Thai Binh River	N3 Lac	N3 Mia	64
	Thai Binh River	Quy Cao	Thai Binh mouth	36
17	Cau River	Ha Chau	N3 Lac	104
18	Luc Nam River	Chu	N3 Nhan	56
19	Thuong River	Bo Ha	N3 Lac	62
20	Cong River	Cai Dan	N3 Song Cau - Song Cong	19
21	Kinh Thay River	N3 Nau Khe	N3 Trai Son	44.5
22	Kinh Mon River	N3 Keo	N3 Nong	45
23	Kenh Khe River	N3 Van uc	N3 Thai Binh	3
24	Lai Vu River	N3 Vu Xa	N3 Cua Dua	26
25	Mao Khe River	N3 Ben Trieu	N3 Ben Dun	18
26	Cau Xe River	Au Cau Xe	N3 Mia	3
27	Gua River	N3 Mui Guom	N3 Cua Dua	4
28	Mia River	N3 Thai Binh	N3 Van uc	3
29	Hoa River	N3 Ninh Giang	Ba Giai mouth	36.5
30	Tra Ly River	N3 Pham Lo	Tra Ly mouth	70
31	Cam River	N3 Nong	Upstream of Vat Cach 200m	9
32	Da Bach River	N3 Dun	N3 Gia River- Bach Dang River	22.3
33	Cai Trap Lane	Canal head, Bach Dang channel	Canal head, Lach Huyen channel	4.5
34	Dao Ha Ly River	N3 Niem	N3 Xi mang	3
35	Han River	N3 Trai Son	N3 Nong	8.5
36	Lach Tray River	N3 Dong canal	Cua Lach Tray	49
37	Phi Liet River	N3 Trai Son	N3 Dun	8
38	Ruot Lon River	N3 Dong Vang Chau	N3 Tay Vang Chau	7
39	Van uc River	N3 Cua Dua	Cua Van uc	57
40	Uong River	Cau duong bo 1	N3 Dien Cong	14
41	Ba Mom Channel	Den Qua Xoai	Hon Vung Dai	15
42	Bai Tu Long Channel	Hon Mot	Hon Dua	13.5
43	Bai Tho Channel	Bai Tho mountain	Hon Dau Moi	7

No	Name	Scale		Length (Km)
		Head point	Last point	
44	Bai Beo Lane	Hon ngang Cua Dong	Hon Vay Rong	7
45	Cat Ba Bay	Cat Ba port	Hon Vay Rong	2
46	Cai Bau - Cua Mo Lane	Hon Buom	Cua Mo	48
	Nhanh	Va Ray ngoai - Giuoc giua	Dong Bia	12
47	Cua Mo - Sau Dong Lane	Cua Mo	Sau Dong	10
48	Chanh River	N3 Chanh- Bach Dang river	Den qua xoai	20.5
49	Hon Dua - Cua Doi Lane	Hon Dua	Cua Doi	46.6
50	Hon Gai channel	Hon Tom	Hon Dua	16
51	Ngan Lane	Ghenh Dau Phuon	Hon Mot	16
52	Dau Xuoi Lane	Hon Muoi Nam	Hon Sai Coc	9
53	Cua Van Lane	Hon Sai Coc	Cua Tung Gau	4.5
54	Tung Gau - Cua Dong Lane	Cua Tung Gau	Cua Dong	8
55	Giai Lane	Hon Mot	Hon Sai Coc	6
56	Sau Lane	Hon Vung Dai	Hon Mot	11.5
57	Buom Lane	Hon Dua	Hon Buom	11
58	Mong Cai - Cua Mo channel	Cua Mo	Van Tam	48
59	Mong Cai river	Mong Cai town	Van Tam	17
60	Van Don- Cua Doi channel	Cai Rong port	Cua Doi	37
61	Ha Long Bay channel	Hon Vung Dai	Hon Gai passenger berth	9.5
62	Tien Yen River	Tien Yen town	Cua Mo	31
65	Vung Duc Channel	Hon Buom	Vung Duc	2.5
B	Central			802.5
1	Kenh Nga Son	N3 Che Thon	Dien Ho	27
2	Le river	N3 Bong	N3 Yen Luong	31
3	De canal	N3 Yen Luong	N3 Truong Xa	6.5
4	Truong (Tao) river	N3 Truong Xa	N3 Hoang Ha	6.5
5	Choan canal	N3 Hoang Ha	N3 Hoang Phu	15
6	Ma river	N3 Vinh Ninh	Buoy “0” Lach Trao estuary	57
7	Buoi river	Kim Tan	N3 Vinh Ninh	25.5
8	Lam river	Do Luong	Upstream of Ben Thuy port 200m	96.5
9	Hoang Mai river	Cau Tay	Lach Con estuary	18
10	La river	N3 Linh Cam	N3 Nui Thanh	13
11	Nghen river	Cau Nghen	Cua Sot	38.5
12	Rao Cai river	Cam Xuyen town	N3 Son	37
13	Gianh river	Dong Lao	Upstream of Song Gianh petro port 200m	63
14	Son river	Hang Toi	N3 Van Phu	36
15	Nhat Le river	Long Dai bridge	Upstream of Nhat Le port 200m	19
16	Hieu river	Ben Duoi	Upstream of Cua Viet port 200m	27
17	Thach Han river	Ba Long	N3 Gia Do	46
18	Huong river	N3 Tuan	Upstream of Thuan An petro port 200m	34
19	Tam Giang lagoon and Thuy Tu lagoon	Van Trinh	Tu Hien estuary	74
20	Truong Giang river	N3 An Lac	Ky Ha port	67
21	Thu Bon river	Nong Son ferry	Dai estuary	65
C	South			3,083.2
1	Tri An Lake	La Nga Bridge	Upstream of Tri An dam	40

No	Name	Scale		Length (Km)
		Head point	Last point	
2	Dong Nai River	N3 Be River	N3 Sau river	84.5
	Ong Con Island			1
3	Sai Gon River	2km from downstream of Dau Tieng dam	Sai Gon Bridge	129.5
4	Vam Co Dong River	Ben Keo port	N3 songVam Co Dong - Tay	131
5	Vam Co Tay River	Vinh Hung	N3 Vam Co Dong – Tay River	158.5
6	Vam Co River	N3 Vam Co Dong – Tay River	N3 Soai Rap River	35.5
7	Te canal	N3 Sai Gon River	N3 Doi canal	4.5
8	Doi canal	N3 Te canal	N3 Cho Dem River Ben Luc	8.5
9	Cho Dem River Ben Luc	N3 Doi canal	N3 Vam Co Dong River	20
10	Thu Thua canal	N3 Vam Co Dong River	N3 Vam Co Tay River	10.5
11	Rach Ong Lon	N3 Te canal	N3 Cay Kho canal	5
12	Cay Kho canal	N3 Can Giuoc River	N3 Ong Lon canal	3.5
13	Can Giuoc River	N3 Cay Kho canal	N3 Soai Rap River	35.5
14	Kenh Nuoc Man	N3 kenh Nuoc Man - Can Giuoc	N3 kenh NuocMan-Vam Co	2
15	Rach ong Truc	Thi Vai River	Tat Nha Phuong	1.6
16	Tat Nha Phuong	Ong Truc canal	Dong Kho River	1.7
17	Dong Kho River	Tat Nha phuong	Tat ong Trung	7
18	Tat ong Trung	Dong Kho River	Dong Tranh River	3.4
19	Dong Tranh River	N3 Long Tau River	N3 Nga Bay River	25.3
20	Tat ong Cu - Tat Bai	N3 Go Gia River	N3 Dong Tranh River	7.5
21	Tat ong Nghia	N3 Long tau River	Kenh Ba Tong	3.3
22	Kenh Ba Tong	N3 Tat ong Nghia canal	N3 Soai rap river	3.2
23	Dan Xay River	N3 Long Tau River	N3 Dinh Ba river	4.4
24	Dinh Ba River	N3 Dan Xay River	N3 Lo Ren river	6.1
25	Lo Ren River	N3 Dinh Ba River	N3 Vam Sat river	4.1
26	Vam Sat river	N3 Lo Ren river	N3 Soai Rap river	9.7
27	Rach La	N3 Vam Co river	N3 Cho Gao canal	10
28	Cho Gao canal	N3 Rach La	N3 Rach Ky Hon	11.5
29	Ky Hon canal	N3 Cho Gao canal	N3 Tien river	7
30	Tien River	Cambodia border	500m from upstream of My tho port	176.7
	Binh Thanh island's branch	Binh Hang Trung - Cao Lanh	Binh Hang Tay - Cao Lanh	4
	Tay, Cu lao Ma island's branch	Phu Thuan B - Hong Ngu	Tan Long - Huyen Thanh Binh	27
	Long Khanh island's branch	Long Khanh A -Hong Ngu	Long Khanh B -Hong Ngu	10
31	Hong Ngu canal- Vinh Hung	Vinh Hung	N3 Tien river	42
32	Thap Muoi canal No1	N3 songTien	N3 Vam Co Tay River	90.5
33	Thap Muoi canal No 2	N3 Tien River	N3 Vam Co Tay River	93.5
34	Phuoc Xuyen canal	N3 Hong Ngu canal	N3 Canal4 Bis	28
35	Canal 4 bis	N3 Dong Tien canal	N3 Nguyen Van Tiep Canal	16.5
36	Tu Moi canal	N3 4 Bis canal	N3 Canal 28	10
37	Canal 28	N3 Tu Moi canal	N3 Tien River	20
38	Xang Long Dinh canal	N3 Tien River	N3 Thap Muoi canal No 2	18.5
39	Vam Nao River	N3 Tien River	N3 song Hau	6.5
40	Tan Chau canal	N3 Tien River	N3 song Hau	9.5
41	Lap Vo Sa Dec canal	N3 Tien River	N3 Hau River	50
42	Ong Chuong canal	N3 Tien River (Cho Moi)	N3 Hau River	23

No	Name	Scale		Length (Km)
		Head point	Last point	
43	Chet Say canal	N3 Tien River (Vam Gia Hoa)	N3 Ben Tre River	9
44	Ben Tre River	N3 Ben Tre River Ham Luong	N3 kenh Chet Say	7.5
45	Ham Luong River	N3 Tien River	Cua Ham Luong	86
46	Mo Cay canal	N3 Ham Luong River	N3 song Co Chien	16
47	Cho Lach canal	N3 Cho Lach- Tien River	N3 Cho Lach - Co Chien	10.7
48	Co Chien River	N3 Co Chien River - Tien River	Cua Co Chien	109
	Cung Hau branch	N3 Co Chien River	N3 Tra Vinh canal	4
49	Tra Vinh canal	N3 Co Chien River	Tra Vinh Bridge	4.5
50	Mang Thit river and canal	N3 Mang Thit - Co Chien	N3 Tra On canal	42
51	Tra On canal	N3 Mang Thit river	N3 Hau river	5
52	Hau river	N3 Tan Chau canal	300m from upstream of Can Tho port	107.5
	Ong Ho island's branch	An Chau town - Chau Thanh	My Hoa Hung - Long Xuyen city	7.5
	Nang Gu branch - Thi Hoa	Binh My - Huyen Chau Phu	An Hoa - Chau Thanh	16
53	Chau Doc river	N3 Hau river	N3 Vinh Te canal	1.5
54	Vinh Te canal	N3 Chau Doc river	Ben Da	8.5
55	Tri Ton Hau Giang canal	N3 kenh Rach Gia Ha Tien	N3 Hau river	57.5
56	Ba The canal	N3 Hau river	N3 kenh Rach Gia Ha Tien	57
57	Rach Gia canal Long Xuyen	N3 Hau river	Cua Rach Gia	63.5
58	Rach Soi canal Hau Giang	N3 Hau river	N3 Ong Hien canal Ta Nien	59
59	Mac Can Dung canal	N3 Ba The canal	N3 Tam Ngan canal	12.5
60	Tam Ngan canal	N3 Mac Can Dung canal	N3 Rach Gia canal Ha Tien	36
61	Rach Gia canal Ha Tien	N3 Rach Gia canal Long Xuyen	Cua bien	84.5
62	Ba Hon canal	N3 Rach Gia canal Ha Tien	Cong Ba Hon	5
63	Vanh dai canal - Rach Gia	Rach Soi canal Hau Giang	Kenh Rach Gia Ha Tien	8
64	Don Giong canal	Vanh Dai canal	Ong Hien Ta Nien canal	5
65	Ong Hien Ta Nien canal	N3 Cai Be river	N3 Tac Rang canal	8.5
66	Can Tho	N3 Hau river	N3 Xa No canal	16
67	Xa No canal	N3 Can Tho canal	N3 Cai Nhut canal	39.5
68	Cai Nhut canal	N3 Xa No canal	N3 Cai Tu canal	3
69	Cai Tu canal	N3 Cai Nhut canal	N3 Cai Lon river	12.5
70	Nga Ba Dinh canal	N3 Cai Tau canal	N3 Trem river canal Canh Den	11.5
71	Song Trem canal Canh Den	N3 Nga Ba Dinh canal	N3 Trem river canal	33.5
72	Tat Cay Tram canal	N3 Cai Lon river	N3 Cai Tau canal	5
73	Cai Tau canal	N3 Tat Cay Tram canal	N3 Cai Lon river	18
74	Cai Be river	N3 Thot Not canal	Khe Luong canal	54
75	Khe Luong canal	N3 Cai Be river	N3 Cai Lon river	1.5
76	Cai Lon river	N3 Tat Cay Tram	Cua Cai Lon	56
77	Tat Cau canal	N3 Cai Lon river	N3 Cai Be river	1.5
78	Cai Con canal	N3 Hau river	Nga bay Phung Hiep	16.5
79	Quan Lo Phung Hiep canal	Nga 7 Phung Hiep	Ca Mau	105
80	O Mon canal	N3 Hau river	N3 Thi Doi canal	15.2
81	Thi Doi O Mon canal	N3 Rach O Mon	N3 Thot Not canal	27.5
82	Thot Not canal	N3 kenh Thi Doi O Mon	N3 Cai Be river	4.8
83	Trem Trem	N3 Ong Doc river	N3 Tan Bang canal Can Gao	40
84	Tan Bang Can Gao canal	N3 Trem Trem river	N3 Cai Lon river	40
85	Tat Thu river	N3 Ong Doc river	N3 Ganh Hao river	4.5

No	Name	Scale		Length (Km)
		Head point	Last point	
86	Ong Doc river	N3 Trem Trem river	Cua Ong Doc	49.5
87	Tat Cu Lao May canal	Hau river (phia Tra On)	Hau river (phia Cai Con)	3.5
88	Dai Ngai canal	N3 Hau river	N3 Phu Huu Bai Xau canal	4.5
89	Phu Huu Bai Xau canal	N3 Dai Ngai canal	N3 Thanh Loi canal	15.5
90	Thanh Loi canal	N3 Phu Huu Bai Xau canal	N3 Ba Xuyen Dua Tho canal	1.5
91	Ba Xuyen canal Dua Tho	N3 Co Co river	N3 Thanh Loi canal	20
92	Co co river	N3 Ba Xuyen Dua Tho canal	N3 Bac Lieu Vam Leo canal	19
93	Bac Lieu - Vam Leo canal	N3 Co Co river	N3 Bac Lieu Ca Mau canal	18
94	Bac Lieu canal Ca Mau	N3 Bac Lieu Vam Leo canal	N3 Ganh Hao river	67
95	Ganh Hao river	N3 Tat Thu river	Bouy 0 Ganh Hao	62.5
96	Cai Nhap canal	N3 Bay Hap river	N3 Cua Lon river	11
97	Luong The Tran canal	N3 Ong Doc river	N3 Ganh Hao river	10
98	Ganh Hao canal	Ho Phong	N3 Ganh Hao canal	18
99	Bay Hap Ganh Hao canal	N3 Ganh Hao river	N3 Bay Hap river	9
100	Bay Hap river	N3 Bay Hap Ganh Hao canal	N3 Nam Can Bay Hap canal	25
101	Tat Nam Can canal	N3 Bay Hap river	Nam Can	11.5
	Total			6612.6

Source: Decision No. 68/2005/OD-BGTVT (translated into English)

APPENDIX 2B

List of Inland Waterway Sections

ANNEX 2B: LIST OF INLAND WATERWAY SECTIONS

	River/Canal	Section		Length (m)	Present situation				
					Depth(m)	Width(m)	Radius(m)	Clearance (m)	Grade
North				**2752.6**					
1	Hong River	Nga ba Nam Thi	Nga ba Hong Lo	288.0	0.7	30	200	2.0	III
2	Hong River	Phuoug Bach hac	cang Ha Noi	75.0	2.0	30	300	2.9	III
3	Hong River	Cang Ha Noi	Ben do Phu Khe	45.0	2.5	30	500	-	II
4	Hong River	Ben Phu Khe	Pha Tan De(cu)	59.0	2.0	30	500	10.0	II
5	Hong River	Tan De	Nga ba Mom Ro	27.0	1.5	30	400	-	I
6	Hong River	Nga ba Mom Ro	Phao so 0 Ba Lat	47.0	2.5	40	400	-	III
7	Song Da	Ha luu dap thuy dien Hoa Binh	Nga ba Hong Da	58.0	1.2	40	300	7.4	II
8	Ho Hoa Binh	Ta Bu Muong La Son la	Van Yen Tan phoung Phu Yen Son La	108.0	1.3	40	250	6.5	III
9	Ho Hoa Binh	Van Yen Tan phoung Phu Yen Son La	Throung luu dap thuy dien Hoa Binh	95.0				-	I
10	Song Lo	Nga ba Lo Gam	Nga ba Hong Lo-Thanh Pho Viet Tri Phu Tho	115.0	0.9	30	150	6.0	III
11	Song Gam	Chiem Hoa	Nga ba Lo Gam Tuyen Quang	36.0	1.1	30	250	2.5	IV
12	Ho Thac Ba	Cam Nhan	Huong Ly Yen Bai	42.0	1.5	30	300	-	I
13	Ho Thac Ba	Cang Hurong Ly	Dap Thac Ba	8.0	1.2	30	350	-	I
14	Song Duong	Cua Dau	Dong Vien	20.0	2.0	30	350	1.7	III
15	Song Duong	Keo	My Loc	48.0	2.0	30	300	-	III
16	Song Luoc	Nga ba cua Luoc	Pha Quy Cao(cu)	72.0	2.0	30	300	7.0	II
17	Song Day	Cang Van Dinh	Nga ba Phu Van	45.5	1.1	30		3.2	III
18	Song Day	Nga ba Phu Van	Phao so 0 cua Day	117.5	3.0	40		-	I
19	Song Hoang Long	Cau Nho Quan	Nga ba Gian Khau	28.0	1.5	20	200	3.0	III
20	Song Nam Dinh	Nga ba Hung Long	Nga ba Doc Bo	33.5	1.8	30	400	6.2	I
21	Song Ninh Co	Nga ba Mom Ro	Throung luu cang Hai Thinh 200m	50.0	0.8	20		10.7	I
22	Song Quan Lieu	Nga ba song Day	Nga ba song Ninh Co	3.5	1.5	25	300	2.5	II
23	Song Vac	Nga ba song Van	Nga ba Kim Dai	28.5	1.5	20	200	2.0	III
24	Kenh Yen Mo	Nga ba Chinh Dai	Nga ba Duc Hau	14.0	1.2	25	300	2.6	III
25	Song Thai Binh	Nga ba Lac	Nga ba Lau Khe	7.0	2.0	30	500	2.3	III
26	Song Thai Binh	Nga ba Nau Khe	Nga ba Mia-Thai Binh	57.0	1.5	30	200	3.8	III
27	Song Thai Binh	Pha Quy Cao	Nga ba Cua Thai Binh	36.0	1.5	30	300	-	
28	Song Cau	Nga ba Cau-Cong	Pha Lai	83.0	1.5	30	300	3.9	III
29	Song Cau	Ha Chau	Nga ba Cau-Cong	21.0	1.0	30	200	-	IV

	River/Canal	Section		Length (m)	Present situation				
					Depth(m)	Width(m)	Radius(m)	Clearance (m)	Grade
30	Song Luc Nam	Chu	Nga ba nhan	56.0	1.0	30	200	9.4	III
31	Song Trong	Bo Ha	Nga ba Lac	62.0	1.2	30	300	-	III
32	Song Cong	Cai Dan	Da Phuc	14.0	1.0	30	200	-	IV
33	Song Cong	Da Phuc	Nga ba Cau Cong	5.0	1.5	30	200		III
34	Song Kinh Thay	Nga ba Nau Khe	Nga ba Trai-Son, Nga ba Nong	44.5	2.0	40	200	4.0	III
35	Song Kinh Mon	Nga ba Keo	Nga ba Nong	45.0	2.0	30	200	4.0	III
36	Song Kenh Khe	Nga ba Thai Binh-Kenh Khe	Nga ba song Moi	3.0	2.0	30	>500	7.2	III
37	Song Lai Vu	Nga ba Vu Xa	Nga ba Cua Dua	26.0	1.5	30	200	3.0	IV
38	Song Mao Khe	Nga ba Ben Trieu	Nga ba Ben Dun	18.0	1.5	30	150	3.2	IV
39	Song Cau Xe	Au Cau Xa	Nga ba Mia Thai Binh	3.0	1.2	30	200	2.8	III
40	Song Cua	Nga ba Mui Guom	Nga ba Cua Dra	4.0	1.2	30	200	-	III
41	Song Mia	Nga ba Mia Thai Binh	Nga ba Van uc	3.0	1.2	30	200	-	III
42	Song Hoa	Nga ba Ninh Giang	Cua Ba Giai	36.5	1.5	30	300	4.0	III
43	Song Tra Ly	Nga ba Pham Lo	Cua Tra Ly	70.0	1.8	30	300	6.0	III
44	Song Bach Dang	Nga ba song Chanh	Nga ba Dong vang Chau	7.0	2.5	30	500	-	I
45	Song Cam	Nga ba Nong	Cang Vat Cach	9.0	2.5	40	500	2.5	I
46	Song Da Bach	Nga ba Dun	Nga ba song Chanh	23.0	2.0	30	500	10.0	I
47	Song Cai Trap	Cua Nam Trieu	Cua Lach Huyen	4.5	2.2	60			III
48	Song Dao Ha Ly	Nga ba Niem	Nga ba Xi Mang	3.0	2.0	30	500	3.2	III
49	Song Han	Nga ba Trai Son	Nga ba Nong	8.5	2.5	40	350	-	III
50	Song Lach Tray	Nga ba Kenh Dong	Nga ba Cua Lach Tray	49.0	1.8	30	300	3.2	III ,IV
51	Song Phi Liet	Nga ba Trai Son	Nga ba Dun	8.0	2.0	30	300	-	III
52	Song Ruet Len	Nga ba Dong Vang Chau	Nga ba Tay Vang Chau	7.0	2.0	30	350	-	III
53	Song van Uc	Nga ba cua Dua	Cua Van Uc	57.0	2.0	30	500	7.0	III
54	Song Uong	Cauduong bo 1	Nga ba Dien Cong	14.0	1.5	30	300	3.2	IV
55	Luong Ba mom	Den quai soaai	Hon vung dai	15.0	2.5	90	700		I
56	Luong Bai tu long	Hon mot	Hon dua	13.5	3.0	90	700		I
57	Luong Bai Tho	Nui Bai Tho	H Dau moi	7.0	3.0	90	700		I
58	Lach bai beo	Hon ngang cua dong	Hon vay rong	7.0	3.0	90	700		I
59	Vinh Cat Ba	Cang Cat Ba	Hon vay rong	2.0	3.0	90	700		I
60	Luong cai bau- Cua Me Nhanh	Hon Buom	Cua mo	48.0	3.0	90	700		I
61		Hon va ray	Dong bia	12.0	3.0	90	700		I
62	Kluong Cua Mo - Sau Do	Cua Mo	Sau Dong	10.0	3.5	90	700		I

	River/Canal	Section		Length (m)	Present situation				
					Depth(m)	Width(m)	Radius(m)	Clearance (m)	Grade
63	Song Chanh	Den qua Soai	Nga ba song Bach Dang	20.5	2.5	70	500	9.0	II
64	Song Dien Vong	Cua luc	Khe Tam	17.0	0.9	20	300	6.0	III
65	Luong hon Dua-Cua D	Hon Dua	Cua doi	46.6	3.0	90	700		I
66	Luong Hon Gai	Hon tom	Hon dua	16.0	3.0	90	700		I
67	Lach ngan	Chenh dau phuon	Hon mot	16.0	3.0	90	700		I
68	Lach dau xuoi	Hon Muoi Nam	H. Sai Soc	9.0	3.0	90	700		I
69	Lach cua van	Hon Sai soc	Cua Tung Gau	4.5	3.5	90	700		I
70	Luong Tung Gau-cua Dong	Cua Tung Gau	Ngang cua Dong	8.0	3.5	90	700		I
71	Lach Giai	Hon mot	H. Sai Soc	6.0	3.5	90	700		I
72	Luong lach sau	Hon Vung dai	Hon mot	11.5	3.5	90	700		I
73	Luong Lach buom	Hon Dua	Hon Va ray ngoai	11.0	3.0	90	700		I
74	Luong Mong Cai – Cua	Cua Mo	Van tam	48.0	3.0	90	700		I
75	Song Mong cai	Van tam	TX Mong Yen	17.0	0.7	10	150		IV
76	Song Mong Duong	Pha Tai xa	Khe cham	5.5	0.9	20	200	10.0	III
77	Song Tien Yen	Cua Mo	Thi tran Tien Yen	31.0	0.8	10	200		III
78	Luong Van Don Co To	Cang cai rong	Co to	55.0	3.5	90	700	10.0	I
79	Luong vinh Ha Long	Hon Vung dai	Ben khach Ho Gai	9.5	3.0	90	700		I
80	Luong Vung Duc	Hon Buom	Vung Duc	2.5					II
81	Song Bang Giang	Thi xa Cao bang	Thuy Khau	56.0	0.8	20	200		V
Central				**804.5**					
1	Kenh Nga Son	N3 Che Ton	Dien Ho	27.0	1.2			3.5	IV
2	Song Len	N3 Bong	N3 Yen Luong	31.5	1.5	20	600	5.0	III
3	Song De	N3 Yen Luong	N3 Truong Xa	6.5	1.2	17	300		V
4	Song Truong	N3 Truong Xa	N3 Kenh Choan	7.0	1.2	30	300		III
5	Kenh Choan	N3 song Truong	N3 Hoang Phu	15.0	1.2	20	300		V
6	Song ma	N3 Vinh Ninh	TL cang Le Mon 200m	42.0	1.2	23	500	6.0	III
7	Song Buoi	Kim Tan	N3 Vinh Ninh	25.5	1.2	30	300		IV
8	Song Lam	Do Luong	TL Cang Ben Thy 200m	96.5	1.2	10	250	6.0	IV ,V
9	Song Hoang Mai	Cau Tay	Cua Lach Con	18.0	1.5	40	250	3.0	IV
10	Song La	N3 Linh Cam	N3 Nui Thanh	13.0	1.9	50	500	3.0	IV
11	Song Nghen	Cau Nghen	Cua Sot	38.5	1.5	50	400	2.5	IV
12	Song Rai Cai	Thi tran Cam Xuyen	N3 Son	37.0	1.2	30	400	2.5	V
13	Song Gianh	Dong Lao	TL cang Giang 200m	45.0	1.5	20	300		III
14	Song GIanh	Cho Gat	Dong Lao	18.0	1.5	20	200	6.0	IV

	River/Canal	Section		Length (m)	Present situation				
					Depth(m)	Width(m)	Radius(m)	Clearance (m)	Grade
15	Song Son	Hang Toi	N3 Van Phu	36.0	1.2	20	200	3.5	IV
16	Song Nhat Le	Long Dai	TL cang Nhat Le 200m	19.0	1.5	40		5.0	IV
17	Song Hieu	Ben Duoi	TL cang Cua Viet 200m	27.0	1.3	40	300	6.8	IV ,V
18	Song Thach Han	Ba Long	N3 Gia Do	46.0	1.1	20	200	7.4	V
19	Somg Huong	N3 Tuan	Thuan An	34.0	1.5	40	200	4.5	III
20	Pha Tam Giang va dam	Van Trinh	Cua Tu Hien	74.0	1.5	40	200	6.0	III
21	Song Truong Giang	N3 An Lac	Cang Ky Ha	67.0	1.5	40	200	2.1	IV
22	Song Thu Bon	Pha Nong Son	Cang Dai	65.0	1.5	40	200	5.7	IV
23	Tuyen noi Cu Lao Cham	Cua Dai	Cu Lao Cham	16.0	2.0	60			III
South				**3106.8**					
1	Ho Tri An	Cau La Nga	Throung luu dap Tri An	40.0	3.0	30	120	2.4	III
2	S. Dong Nai	N3 S. Be	Throung cang Vitaico 300m	85.0	1.5	18	120	5.5	I
3	Nhanh Cu Lao Ong	-	-	1.0					
4	S. Sai Gon	Ha Luu dap Dau trng 5	cau Sai Gon	126.5	1.5	25	120	8.0	I
5	S. Vam Co Dung	Cang Ben Keo	N3 S. Vam CoDong Tay	131.0	6.0	80	220	6.5	I
6	S. Vam Co Tay	Vinh Hung	N3 S. Vam CoDong Tay	158.5	10.0	150	-	6.5	I
7	S. Vam Co	N3 S. Vam Co Dong-Tay	N3 S. Soai Rap	35.5	3.5	150	-	25.0	I
8	K. Te	N3 S. Sai Gon	N3 K. Doi	4.5	4.8	40	-	5.0	III
9	K. Doi	N3 K.Te	N3 S. Cho Dem Ben Luc	8.5	2.7	20	-	5.0	III
10	S. Cho Dem Ben Luc	N3 K. Doi	N3 S. Vam Co Dong	20.0	1.5	18	150	6.0	III
11	K. Thu Tha	N3 S. Vam Co Dong	N3 S. Vam Co Tay	10.5	1.9	20	-	3.5	III
12	R. Ong Lon	N3 Kenh Te	N3 Kenh eay Kho	5.0	4.0	30	-	5.0	III
13	K. Cay Kho	N3 S. Can Giuoc	N3 R.Ong Lon	3.5	3.0	22	-	5.0	III
14	S. Can Guioc	N3 K. Cay Kho	N3 S. Soai rap	35.5	6.8	80	250	5.0	I
15	K. Nuoc man	N3 K. Nuoc Man-C. Giuoc	N3 K.N.Man-V. Co	2.0	5.4	100	-	-	I
16	R. Ong Truc	S.Thi Vai	Tat Nha phoung	1.6	2.0	25	200	-	III
17	Tat Nha Phuong	R. Ong Truc	song Dong Kho	1.7	2.2	25	200	-	III
18	S. Dong Kho	Tat Nha phoung	Tat ong Trung	7.0	2.5	30	160	-	III
19	Tat ong Trung	S. Dong Kho	S.Dong Tranh	3.4	4.0	40	200	-	III
20	S. Dong Tranh	N3 Song Long tau	N3 song Nga Bay	25.3	4.0	25	250	-	III

	River/Canal	Section		Length (m)	Present situation				
					Depth(m)	Width(m)	Radius(m)	Clearance (m)	Grade
21	S. Go Gia	N3 Song Thi vai	N3 song Tat Bai	6.3	4.0	80	-	-	III
22	Tat omg Cu-Tat Bai	N3 Song Go Gia	N3 song Dong tranh	7.5	4.5	40	-	-	III
23	R. Tac Roi	N3 Song Dong tranh	N3 song Long tau	7.4	2.8	20	-	-	III
24	Tat ong Nghia	N3 Song Long tau	K. Ba Tong	3.3	3.5	25	-	2.0	III
25	K. Ba Tong	N3 K. Tat ong Nghia	N3 song Soai rap	3.2	4.0	25	-	2.0	III
26	S. Dan Xay	N3 Song Long tau	N3 song Dinh ba	4.4	4.5	35	230	-	III
27	S.Dinh Ba	N3 Song Dan xay	N3 song Lo ren	6.1	4.2	25	200	-	III
28	S.Lo Ren	N3 Song Dinh ba	N3 song Vam sat	4.1	3.0	25	200	-	III
29	S. Vam Sat	N3 Song Lo ren	N3 song Soai rap	9.7	3.5	2.5	230	-	III
30	R. La	N3 Vam Co	N3 K. Cho Gao	10.0	4.3	24	-	8.0	II
31	K. Cho Gao	N3 R. La	N3 Vam Ky Hon	11.5	2.5	25	-	8.0	III
32	R. Ky Hon	N3 K. Cho Gao	N3 S. Tien	7.0	4.5	30	-	8.0	II
33	S. Tien	Bien gioi Campuchia	Th. luu cang My Tho 200m	177.0	5.5	200	-	-	I
34	Nt	Nhanh cu lao Tan Long	-	12.5	5.5	150	-	-	I
35	Nt	Nhanh Cu Lao Binh Thanh	-	4.0					III
36	Nt	Nhanh Cu Lao Tay , Cu Lao Ma	-	27.0	6.0	80	-	-	I
37	Nt	Nhanh CU lao Long Khanh	-	10.0	4.0	90			I
38	Nt	Nhanh cu lao Con Chai	-	4.0					
39	-	Nhanh co Rong	-	13.0	5.5	150			
40	Hong ngr- Vinh Hung	Vinh Hung	N3 Song Tien	42.0	2.0	20			III
41	K. Thap Muoi so 1	N3 S. Tien	N3 S.Vam Co Tay	90.5	2.5	25	-	2.5	III
42	K. Thap Muoi so 2	N3 S. Tien	N3 S.Vam Co Tay	93.5	1.6	18	-	3.4	III
43	K. Phuoc Xuyen	K. Hong Ngu	K. $ bis	28.0	2.0	20			III
44	K. 4 bis	N3 K. Dong Tien	N3 K. Nguyen van Trep	16.5	2.2	22	-	3.0	III
45	Kinh Tu moi	Kinh 4 bis	Kenh 28	10.0	2.0	20			III
46	Kinh 28	Kinh Tu moi	Song Tien	20.0	2.0	20			III
47	K. Xang Long dinh	S. Tien	K. Thap Muoi so 2	18.5	3.0	50		3.6	III
48	S. Vam Nao	N3 S. Tien	N3 S. Hau	6.5	8.5	80	-	5.0	I
49	K. Tan Chau	N3 S. tien	N3 S. Hau	9.5	5.1	50	-		I
50	Kinh Lap Vo Sa Dec	N3 S. Tien	N3 song Hau	50.0	2.2	22	150	5.0	III
51	R. ong Choung	N3 S. Tien (Cho moi)	N3 S. Hau	23.0	2.0	18	120	7.0	III
52	K. Chet Say	N3 S. Tien (Vam Gia Hoa)	N3 S. Ben Tre	9.0	8.0	130	-	5.2	III
53	S. Ben Tre	N3 S. ben Tre Ham Luong	N3 K. Chet Sav	7.5	1.0	62	-	3.0	III

	River/Canal	Section		Length (m)	Present situation				
					Depth(m)	Width(m)	Radius(m)	Clearance (m)	Grade
54	S. Ham Luong	N3 S. tien	cua Ham Luong	86.0	4.0	300	-		I
55	R va K. Mo Cay	N3 S. Ham Luong	N3 S. Co Chien	16.0	1.0	22	-	4.5	III
56	K. ChoLach	N3 Cho Lach - S. Tien	N3 Cho Lach - Co Chien	10.7	1.8	22	425	7.0	III
57	S. Co Chien	Cua Co Chien	Cua Co Chien	109.0	3.5	140	-	-	I
58	Nhanh cung Hau	-	-	4.0					
59	K. Tra Vinh	N3 S. Co Chien	cau Tra Vinh	4.5	2.2	22	-	2.2	III
60	S. vaK. Mang Thit	N3 Mang Thit - Co Chien	N3 R.Tra On	42.0	5.0	20	205	7.0	III
61	R. Tra On	N3 Mang Thit	N3 S.Hau	5.0	5.0	40	305	7.0	III
62	Song Hau	N3 Kenh Tan chau	Th. luu cang can Tho 300m	107.5	8.3	150	-	5.5	I
63	Nt	Nhanh cu lao Thot Noi	-	18.0	5.0	200			I
64	Nt	Nhanh cu lao Ong Ho	-	7.5	2.4	150			I
65	Nt	Nhanh nang Gu - Thi Hoa	-	16.0	5.0	200			I
66	-	Nhanh cu lao May	-	21.5					
67	S.Chau Doc	N3 S. Hau	N3 k. Vinh Te	1.5	3.7	50		5.0	II
68	K. Vinh Te	N3 S. Chau Doc	Ben Da	8.5	2.0	30		5.0	III
69	K. Tri Ton Hau Giang	N3 Rach Gia Ha Tien	N3 S. Hau	57.5	2.2	20	-	4.5	III
70									
71	K. Rach Gia Long	N3 S.Hau	cua Rach Gia	63.5	1.6	20	500	5.5	III
72	K. rach Soi Hau Giang	N3 S.Hau	N3 K. Ong Hien Ta Nien	59.0	2.8	22	-	5.4	III
73	K. Mac Can Dung	N3 K. Ba The	N3 K. Tam Ngan	12.5	2.2	20	-	4.5	III
74	K. Tam Ngan	N3 K. Mac Can Dung	N3 K. Rach Gia Ha Tien	36.0	1.5	16	-	3.1	III
75	K. Rach Gia Ha Tien	N3 K. Rach Gia Long	Cua Bien	84.5	1.8	20	300	6.0	IV
76	K. Ba Hon	N3 K. Rach Gia Ha Tien	Cong Ba Hon	5.0	2.8	22	-	5.5	III
77	K. Vanhdai-Rach gia	K. Rach soi Hau Giang	K. Rach Gia Ha Tien	8.0	2.6	22	285	5.0	III
78	K. Don giong	K. Vanh Dai	K. ong Hien Ta Nien	5.0	2.6	22	-	3.8	III
79	K. Ong Hien Ta Nien	N3 S. Cai Be	N3 K. Tac Rang	8.5	2.8	16	-	6.0	III
80	K. Can Tho	N3 S. Hau	N3 K. Xa No	16.0	7.0	100	300	5.5	III
81	K. Xa No	N3 R. Can Tho	N3 R. Cai Nhut	39.5	2.4	18	-	3.2	III
82	R. CaiNhut	N3 K. Xa No	N3 R. Cai Tu	3.0	2.4	18	125	5.5	III
83	R. Cai Tu	N3 R. Cai Nhut	N3 S. Cai Lon	12.5	3.4	24	280	-	III
84	R. Nga Ba Dinh	N3 R. Cai Tau	N3 K. Song TremCanh Den	11.5	6.5	70	250	7.0	III
85	K. Song Trem Canh	N3 R. Nga Ba Dinh	N3 K. Ranh Hat	33.5	2.0	22	-	6.5	III
86	K. Tat Cay Tram	N3 S.Cai Lon	N3 R. Cai Tau	5.0					III
87	Rach Cai Tau	N3 Kenh tat Cay Tram	N3 Song Cai Lon	18.0					

	River/Canal	Section		Length (m)	Present situation				
					Depth(m)	Width(m)	Radius(m)	Clearance (m)	Grade
88	S. Cai Be	N3 K. Thot Not	K. Tat Cau	54.0	5.1	50	250	3.1	III
89	Rach Khe luong	Song Cai be	Song Cai Lon	1.5	3.0	30			III
90	S. Cai Lon	N3 Tat Cay Tram	N3 K. Tan Bang Can Gao	56.0	7.3	200			I
91	K. Tat Cau	N3 S. Cai Lon	N3 S. Cai Be	1.5	6.0	35		3.1	III
92	R. Cai Con	N3 S.Hau	nga bay Phung Hiep	16.5	6.2	7	-	3.9	III
93	K. QuanLoPhung Hiep	Nga 7 Phung Hiep	Ca Mau	105.0	1.9	17	-	4.5	III
94	Rach O Mon	N3 S. Hau	N3 Kenh Thi Doi	15.2	2.0	27	-	4.0	III
95	Kenh Thi Doi O Mon	Nga Rach O Mon	N3 Kenh Thot Not	27.5				3.9	III
96	Kenh Thot Not	N3 Kenh Thi Doi O Mon	N3 Song Cai Be	4.8					
97	S. TremTrem	N3 ong Doc	N3 K. Tan Bang Can Gao	40.0	4.0	32	-	5.0	III
98	K. Tan Bang Can Gao	N3 S. Trem Trem	N3 S. Cai Lon	40.0	1.8	22	-	5.0	III
99	S. Tai Thu	N3 S. Ong Doc	N3 S. Ganh Hao	4.5	3.0	50	200	4.7	III
100	S. Ong Doc	N3 S. Trem Trem	cua Ong Doc	49.5	2.0	100	-	4.7	II
101	Kenh Tat Cu Lao May	S. Hau (Pha Tra On)	S. Hau (Phia Cai Lon)	3.5					
102	R. Dai Ngai	N3 S. Hau	N3 K. Ohu Huu Bai Xau	4.5	5.0	40	250	5.2	II
103	K. Phu Huu Bai Xau	N3 R. Dai Ngai	N3 R. Thanh Loi	15.5	1.4	16	-	4.0	III
104	R. Thanh Loi	N3 K. Phu Huu Bai Xau	N3 K. Ba X. Dua Tho	1.5	1.5	18	-	4.5	IV
105	R. Ba Xuyen Dua Tho	N3 S. Co Co	N3 K. Thanh Loi	20.0	2.8	20	80	5.0	II
106	Song Co Co	N3 R. Ba Xuyen Dua Tho	N3 K. Bac Vam Leo	19.0	4.0	40	150	5.0	II
107	K. Bac Lieu - Vam Leo	N3 S. Co Co	N3 K. Bac Lieu Ca Mau	18.0	2.2	16	-	4.0	III
108	K. Bac Lieu Ca Mau	K. Bac lieu Vam Leo	S. Ganh Hao	67.0	1.2	22	-	5.0	III
109	S. Ganh Hao	N3 S. Tat Thu	phao so 0 Ganh Hao	62.5	3.6	22	150	4.7	II
110	Kenh Cai Nhap	N3 Song Bay Hap	N3 Song Cai Lon	11.0					
111	K. Luong the tran	N3 Song Ong Doc	N3 Song Ganh Hao	10.0	3.0	20			III
112	K. Ho Phong Ganh Hao	Ho Phong	N3 K. Ganh Hao	18.0	4.0	50	-	4.7	II
113	K. Bay Hap Ganh Hao	N3 S. Giang Hao	N3 S.Bay hap	9.0	4.6	50	-	4.7	II

	River/Canal	Section		Length (m)	Present situation				
					Depth(m)	Width(m)	Radius(m)	Clearance (m)	Grade
114	S. Bay Hap	N3 K.Bay Hap Ganh Hao	N3 K. Nam Can Bay hap	25.0	2.4	22	-	2.9	III
115	K. Tay nam Can	N3 S. Bay Hap	Nam Can	11.5	2.9	20	-	2.9	III
	TOTAL			**6663.8**					

Source: prepared based on Table provided by VIWA