

Appendix F

Economic Evaluation

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Economic Evaluation

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Appendix F Economic Evaluation

1 GENERAL

Economic analysis has been examined for the following ten alternatives for the water resources development and management of the Huong River Basin:

Project Features of the Alternatives					
Alter- native	Project Component	Flood Control	Hydro- power (GWh)	Irrigation (improve- ment, ha)	Water supply (mil. m ³)
I-B.1	Max. Ta Trach Reservoir only	Farmland: 10-year EF Urban area: 20-year MF	70	51,800	43.61 (in 2020)
I-B.2	Max. Ta Trach + Max. Huu Trach Reservoirs	- ditto -	70 80.6	- ditto -	- ditto -
I-B.3	Max. Ta Trach + Min. Huu Trach Reservoirs	- ditto -	70 68	- ditto -	- ditto -
I-B.6	Max. Ta Trach + Max. Huu Trach + Max. Co Bi Reservoirs	- ditto -	70 80.6	- ditto -	- ditto -
I-B.7	Max. Ta Trach + Max. Huu Trach + Min. Co Bi Reservoirs	- ditto -	70 80.6	- ditto -	- ditto -
I-B.8	Max. Ta Trach + Min. Huu Trach + Max. Co Bi Reservoirs	- ditto -	70 68	- ditto -	- ditto -
I-B.9	Max. Ta Trach + Min. Huu Trach + Min. Co Bi Reservoirs	- ditto -	70 68	- ditto -	- ditto -
I-C.2	Min. Ta Trach + Max. Huu Trach Reservoirs	- ditto -	70 71	- ditto -	- ditto -
I-C.6	Min. Ta Trach + Max. Huu Trach + Max. Co Bi Reservoirs	- ditto -	70 71	- ditto -	- ditto -
I-C.7	Min. Ta Trach + Max. Huu Trach + Min. Co Bi Reservoirs	- ditto -	70 71	- ditto -	- ditto -

Note: Max: Maximum, Min: Minimum, EF: early flood, MF: major flood

Economic analysis has been conducted devising into two steps, 1) comparison of alternatives and 2) evaluation of optimum plan. In a discounted cash flow analysis, the effects of costs and benefits come out in later year have very small influence to the results of the analysis. Therefore, for the comparison of the alternatives, simultaneous construction is assumed for all the alternatives in order to see the difference of economic efficiency of the project components. Then, for evaluation of an optimum alternative, stage construction will be considered. As for the irrigation improvement and water supply, a practical schedule has been applied for both the steps of the analyses.

2 METHODOLOGY OF ECONOMIC ANALYSIS

The economic analyses of the alternatives are conducted by the methodologies discussed below:

2.1 Assumptions

The economic analyses are examined based on the following assumptions:

(A) Price Level and Exchange Rate

The analyses are made at the price level of December 2001 and applied foreign exchange rate is one U.S. dollar equivalent to VND15,068 and 100 Japanese Yen equivalent to VND12,212.

(B) Project Life

The project life of 50 years after construction is assumed for the economic analysis. Average lifetime of the electrical and mechanical facilities related to the projects is assumed 25 years after installation. Replacement costs cover the cost for replacement of such facilities after the lifetime within project life.

(C) Discount Rate

A discount rate of 12% is applied to reflect the opportunity cost of capital in Vietnam.

(D) Standard Conversion Factor (SCF)

The standard conversion factor (SCF) of 0.9 with reference to recent similar studies is applied to adjust the effects of trade distortion, foreign exchange premiums, the local costs for non-traded goods and services.

(E) Transfer Payment

From the viewpoint of national economy, the transfer payment such as taxes, duty, subsidy and interest is merely a domestic monetary movement without direct productivity. Therefore, it is excluded from the costs of goods and services.

(F) Economic Prices of Agricultural Outputs

The prices of agricultural outputs are adjusted by SCF on assumption that most of the incremental outputs are for domestic consumption.

(G) Economic Price of Electricity

The economic price of electricity is assumed at 5 US Cents/KWh, which is generally used as a price of electricity in economic analyses.

(H) Economic Price of Domestic and Industrial Water Supply

The economic price of domestic and industrial water is assumed at VND1,800/m³, the long-term marginal cost of production adjusted by SCF.

(I) Economic Project Cost

The economic project cost has been estimated from the financial project cost adjusting by SCF after deducting the direct transfer payment.

(J) Operation and Maintenance Cost

The following annual operation and maintenance costs are assumed:

- Civil construction including dam and irrigation facilities: 0.5% of construction cost
- Mechanical and electrical facilities including hydropower facility: 1.5% of facility cost
- Domestic and industrial water supply: 5% of the construction cost

(K) Replacement Cost

The following replacement costs are assumed for replacement of facilities 25 years after installation:

- Mechanical and electrical facility for dam and hydropower generation
- Pumps and gates for irrigation and water supply facilities

2.2 Project Benefits

2.2.1 Flood Control Benefit

a) Definition of Flood Control Effect

Flood control effects are measured from difference of flood damages between those with and without project conditions. In other words, they are flood damage mitigation benefit.

b) Procedure of Flood Damage Estimation

The downstream area of the Huong River basin was suffered from extremely serious damages by the flood in November 1999. The damages were assessed by several institutions after the flood. General Statistical Office of Thua Thien Hue Province also conducted a damage assessment. The results are shown in Table F.1 and summarized below:

Flood Damage in November 1999

Item	Damage (VND million)
A. Flood, storm prevention structure and infrastructure	481,122.9
1. Flood and storm prevention structure	76,500.6
2. Water resources	58,292.8
3. Transportation and fishery	293,081.5
4. Electricity and post office	53,248.0
B. Damages to business	523,548.7
C. Damages to welfare, cultural structure	86,227.3
D. Damages to houses	235,921.8
E. Other damaged assets	419,585
Total	1,746,405.7

The result of the assessment is quite detail and broad though the damages to houses seemed under evaluated comparing with the actual value of houses. The damages to household durable assets, such as TV, radio, other electric devices, cooking stoves, tableware, cloths, and furniture, were not included.

According to the rainfall analysis, two-day rainfall at the time of the flood in November 1999 was almost the same as the rainfall of the occurrence probability of 50 years. The rainfall in November 1999 lasted for more than five days and the continual rain might make the flood damage worse. However, after reviewing the flood damage record discussed above, the damages due to long lasting inundation are not very significant. Therefore, it is assumed that if a 50-year flood occurred, the same scale of damages may happen regardless of duration of inundation.

From the above consideration, the study team uses this flood damage record for the basis for estimation of the probable flood damages by adjusting the damages to houses and household durable assets.

The procedure to estimate probable flood damages is as follows:

- 1) To estimate the damages to agricultural production due to early flood for the magnitudes of 2-year, 5-year, and 10-year.
- 2) To estimate the damages to houses including household durable assets due to major floods of the magnitudes of 2-year, 5-year, 10-year, 20-year, 50-year, and 100-year.
- 3) Newly estimated damages to houses and household durable assets due to 50-year major flood are combined with the actual flood damage statistical data in 1999 except its housing damage.
- 4) The actual flood damage data except the housing damage are adjusted in proportion with the newly estimated housing damage in different magnitude of floods.
- 5) The same procedures from 1) to 4) are examined for with-project conditions.

- 6) Annual mean flood damages are calculated.
- 7) Flood damage mitigation benefit will be obtained by the difference of the annual mean flood damages under with and without project conditions.

c) Flood Conditions

Based on the point elevations shown in the topographical maps of 1/50,000, the elevation-volume curve (HV curve) and the elevation-area curve (HA curve) have been prepared by the study team as shown in Figure F.1.

Inundation volumes under various magnitudes of floods have been calculated by flood simulation analyses. The flood conditions based on HV/HA curves and the inundations volumes under various magnitudes of floods are summarized below:

Flood Conditions by Magnitude of Flood				
Magnitude of flood		Inundation volume (Million m3)	Max. inundation depth (m)	Inundation area (km2)
Early flood	5-year	12	1.4	14
- ditto -	10-year	41	2.7	26
Major flood	2-year	206	3.1	30
- ditto -	5-year	393	4.7	59
- ditto -	10-year	534	5.7	87
- ditto -	20-year	686	6.5	125
- ditto -	50-year	879	7.3	179
- ditto -	100-year	1,050	8.0	226

d) Estimation of Flood Damage

Agricultural Produce in Early Flood Season

According to the information obtained during the site reconnaissance, farmers in the flood prone area do not cultivate crops during the major flood season in order to avoid flood damages. However, in the early flood season, paddy cultivation is widely practiced and it suffers from flood damage sometimes.

The paddy cultivation area is estimated at about 72% of inundation area from the present land use map. The expected value of unit gross output under present condition is VND6.3 million/ha.

Flood damage to paddy cultivation is decrease in yield due to submergence. In order to estimate the flood damage to paddy cultivation, the flood damage rates developed by Ministry of Construction, Japan are applied since no such uniformed standard is available in Vietnam.

Flood Damage Rates to Paddy

	Depth of Submergence		
	- 49cm	50-99cm	100cm-
Paddy	0.30	0.44	0.54

Source: Manual for flood control benefit survey, Ministry of Construction, Japan

It is assumed that the cultivation area and unit production volume will not change during the project life. The flood damage due to the early flood has been estimated as shown in Table F.2 and summarized below:

Damage to Agricultural Produce due to Early Flood

	Flood Damage (VND million)		
	Without project	With project	Damage reduction
Early Flood 2-year	0	0	0
Early Flood 5-year	2,767	0	2,767
Early Flood 10-year	5,489	0	5,489

Note: "With project" means all the alternatives.

Houses/building

Number and value of houses are estimated by the following procedures:

- Average value of a house is estimated based on "Average current sales value of house by type of house and region" in Viet Nam Living Standards Survey (VLSS) 1997-1998, GSO. The prices have been adjusted by CPI to the prices in 2001.
- In order to separate the value of land use right from the sales value of house, half the value is considered as the value of house. The estimated value of a house is shown in Table F.3 and summarized below:

Unit Value of House

Region	Unit Value (VND million)	Equivalent (US\$ million)
North Central Coast	71	4.7

- Numbers of houses in flood prone areas are estimated from population density of the districts in flood prone areas dividing by average family size. The flood prone area of the Huong River basin is about 536 km² as shown in Figure F.2. The household density has been estimated as shown below:

Number of Houses in Flood Prone Areas					
City/District	Flood prone area (km ²)	Population in flood prone area	Ave. family size	Number of household	Household density (per km ²)
Urban area					
Hue City	47	272,800	5.1	53,490	1,138
Suburban area					
Phong Dien	28	31,800	5.1	6,235	223
Quang Dien	91	66,600	5.1	13,058	143
Huong Tra	74	90,800	5.1	17,803	241
Huong Thuy	53	74,600	5.1	14,627	276
Phu Vang	194	142,600	5.1	27,960	144
Phu Loc	49	54,600	5.1	10,705	218
Sub-total	489	461,000	5.1	90,388	185
Total	536	733,800	5.1	143,878	268

- The ground elevation of Hue City is higher than 2.5m and it is slightly higher than surrounding suburban areas. Therefore, if the maximum inundation depth is less than 2.5 m, Hue City will not be suffered and the housing density of 185 houses/km² is applied. If the maximum inundation depth is more than 2.5 m, both Hue City and suburban area will be suffered and both the housing densities of 1,138 and 185 are applied according to the ratios of the flood prone area of urban and suburban areas.

Household Durable Assets

Value of the household durable assets has been estimated based on “Average value of durable assets per household at current price by 10 regions” in the same VLSS. The price has been adjusted by CPI to 2001 price. The estimated value of household durable assets is presented in Table F.4 and summarized below:

Unit Value of Household Durable Assets	
Region	Unit Value (VND1,000)
Large cities	15,895
Rural area of North Central Coast	3,677

With respect to house/building and household durable assets, basically the standard flood damage rates developed by Ministry of Construction, Japan are applied since no such uniformed standard is available in Vietnam. Floor level of houses is assumed 30cm above ground level based on actual situation observed through site reconnaissance (no flood damage considered for 30 cm depth inundation above ground level).

Flood Damage Rates

	Inundation depth above floor level				
	- 49cm	50-99cm	100-199cm	200-299cm	300cm-
House	0.092	0.119	0.266	0.580	0.834
Household effects	0.145	0.326	0.508	0.928	0.991

Source: Manual for flood control benefit survey, Ministry of Construction, Japan

Flood damages to houses and household durable assets are estimated from number of houses in inundation areas, unit value of houses and assets multiplied by the damage rate corresponding to inundation conditions. Difference of the flood damage between those with and without project is the flood reduction benefit.

From now to the target year, 2020, the number of houses in the flood prone area is supposed to increase and the urban area will expand according to population increase and economic development. In other words, flood damage potential will increase gradually to 2020. The future number of houses has been estimated by applying the increasing rates discussed in the socio-economic target in Phase-I study. The flood damages have been estimated for the conditions without project and with the various alternatives under both the situations in 2001 and 2020. It should be noted that even after implementation of the alternatives, flood inundation may occur in the low-lying areas and flood damages may remain. The results of calculation are summarized in Table F.5 and the process of calculation is shown in Table F.6.

Other Damages

Based on the newly estimated flood damages to houses and household durable assets, the flood damage in November 1999 has been recalculated as shown below:

Recalculation of Flood Damage in November 1999

Item	Damage (VND million)	Ratio to Item 1
1. Newly estimated damages to houses and household durable assets (50-year flood)	1,417.2	
2. Flood, storm prevention structure and infrastructure	481.1	33%
3. Damage to business	523.5	36%
4. Damage to welfare, cultural structure	86.2	6%
5. Other damaged assets	419.6	29%
Total	2,927.6	

The above calculation is regarded as the flood damages of 50-year probable flood and the same ratios against the newly estimated housing damages are applied for

the damage estimation of other magnitudes of floods. The results of calculation are shown in Table F.7(1). The relation between flood magnitude and probable flood damage is visually shown in Figure F.3.

e) Annual Mean Flood Damage and Flood Mitigation Benefit

Annual mean flood damage is estimated as accumulation of flood damage segments derived from various magnitude of probable flood damage multiplied by the corresponding probability of occurrence, from non-damageable flood up to design protection level of flood. Table F.7(2) shows the annual mean flood damage under the conditions without project and with various alternatives.

Difference of the annual mean flood damage between those with and without project is considered as annual flood reduction benefit. The results of calculation is summarized below:

Annual Mean Flood Damage and Flood Mitigation Benefit (VND billion)				
Alternative	2001		2020	
	Annual mean flood damage	Flood mitigation benefit	Annual mean flood damage	Flood mitigation benefit
Without project	479.0	-	595.2	-
I-B.1	42.6	436.4	49.0	546.2
I-B.2	6.6	472.4	7.6	587.6
I-B.3	6.6	472.4	7.6	587.6
I-B.6	6.6	472.4	7.6	587.6
I-B.7	6.6	472.4	7.6	587.6
I-B.8	6.6	472.4	7.6	587.6
I-B.9	6.6	472.4	7.6	587.6
I-C.2	13.1	465.9	15.0	580.2
I-C.6	13.1	465.9	15.0	580.2
I-C.7	13.1	465.9	15.0	580.2

2.2.2 Incremental Agricultural Benefit

Agricultural benefits of the projects have been estimated for production of crop, livestock, and aquaculture.

According to the agronomic study, using model crops and cropping patterns based on the characteristics of the project area, after implementation of the projects, improvement in crop yields and production of higher value crops are expected. The benefits of incremental crop production are estimated as presented in Table F.8 (1) and summarized below:

Incremental Crop Benefit		
	Planted Area (ha)	Net Income (US\$1,000)
Without Project	44,386	7,949
With Project (all the alternatives)	51,800	22,376
Incremental Crop Benefit	7,414	14,427

Unit values of livestock and aquaculture have been estimated by the study referring to "Statistical Data of Vietnam, Agriculture, Forestry, and Fishery 1995 - 2000, GSO". The process of estimation is shown in Table F.8 (2).

The benefits from livestock and aquaculture production have been estimated as shown in Tables F.8 (3) and (4). The results of the estimation are summarized below:

Incremental Livestock and Aquaculture Benefits		
	Livestock (US\$ million)	Aquaculture (US\$ million)
Without Project	2.5	0.9
With Project (all the alternatives)	6.0	3.7
Incremental Benefit (2020)	3.5	2.8

2.2.3 Hydropower Generation Benefit

Electricity production in Vietnam by mid-2000 was 350kWh per capita, about the half the level of Indonesia and one-fifth of that of Thailand. Although electricity output rose by 111% between 1993 and 1999, it has had difficulty in keeping up with demand.

The government has a master plan to increase power generation double by 2010 and five times from present level by 2020. Especially the government gives priority to develop hydropower plants, which bring about combined benefits such as flood control, water supply, irrigation, and electricity generation. The plan also mentions that exchange of electricity with neighboring countries will necessary in order to meet power demand in each region and whole country.

The economic price of electricity is assumed at 5 US Cents/kWh, which is generally used as a price of electricity in economic analyses. Annual mean energy produced by the projects is calculated as shown in Table F.9:

2.2.4 Water Supply Benefit

Future demand increase of domestic and industrial water supply in the Huong River Basin has been estimated at 14.50 million m³/year in the year 2010, 27.29 million m³/year in 2015, and 43.61 million m³/year in 2020 as discussed in Chapter 1.9. The economic value of water is estimated at VND1,800/m³. Therefore, annual benefits of the water supply are estimated as summarized

below:

Water Supply Benefit (Million US\$)			
	2013	2015	2020
	(Completion of Dam)		
Water supply benefit	2.85	3.26	5.21

2.2.5 Other Intangible Benefits

Other than benefits discussed above, various effects are expected by the implementation of the projects as listed below:

- Contribution to national food security,
- Reduction of food import and saving foreign exchange holdings,
- Creation of new job opportunity,
- Improvement of self-sufficiency and nutritional level of rural farmers,
- To narrow the earnings differentials among regions,
- Convenience of rural population by improvement of access roads to the dam sites and the roads may reduce the cost of moving produce from the farm to the consumer,
- Improvement of public health and quality-of-life by supplying better quality water including decrease of water-related disease,
- To ease the water carrying works,
- Groundwater recharge and improvement of vegetation, and
- Stabilization of rural farmers' livelihood and prevention of influx of rural population into urban areas.

The benefits listed above are very valuable, they are nevertheless virtually impossible to value satisfactory in monetary terms.

2.2.6 Indirect Benefit

During construction period, the construction works may fuel various demand for other industries. Meanwhile, after construction works, incremental agricultural production will also arouse various demands for many different industries such as chemical industries, transportation services, trade services, etc. Flood control effect may prevent inundation of highway or railway and paralysis of economic activity may be prevented or mitigated. Such ripple effects must be enormous. However, such benefits are also very hard to value in money terms without more detailed study.

2.3 Economic Project Cost

The financial and economic costs of the alternatives are shown in Table F.10.

Annual project costs of the alternatives for comparative purposes (simultaneous construction) are presented in Table F.11. Annual project cost of the optimum plan (alternative I-B.2) based on stage construction is shown in Table F.12.

2.4 Cost-Benefit Analysis

Based on the benefits and costs discussed above, economic viabilities of the projects are examined by cost-benefit analysis. The analysis is conducted by the discounted cash flow analysis. The cash flow of the alternatives is presented in Table F.13 and that of the optimum alternative I-B.2 is shown in Table F.14. The results of the economic analysis are summarized in Subsection 2.16.2.1.

2.5 Sensitivity Analysis

Sensitivity analysis of the economic evaluation has been examined for the optimum plan I-B.2 by increase in cost and decrease in benefit. The results of the analysis are shown below:

Sensitivity Analysis (EIRR %)	
Case	Alternative I-B.2
a) Base estimate	17.4
b) Cost increase of 10%	16.4
c) Cost increase of 20%	15.5
d) Benefit decrease of 10%	16.3
e) Benefit decrease of 20%	15.0
f) Combination of c) and e)	13.2

Even under the most downbeat case, the combination of cost increase of 20 % and benefit decrease of 20%, the alternative has sufficient economic efficiency (EIRR more than 12%).

3 RESULTS OF ECONOMIC ANALYSIS

The results of the economic analyses showed all the alternatives have sufficient economic efficiency with EIRRs of more than 16%, which are far higher than the opportunity cost of capital in Vietnam (12%). The results did not show significant difference among the alternatives from the viewpoint of economic efficiency. All the alternatives can be rated as being economically feasible. However, the alternative I-B.2 showed the largest NPV and EIRR of 17.3%, which is slightly higher than others except the alternative I-B.1. Economic indicators are calculated as shown in Table F.13 and summarized below:

Economic Indicators (simultaneous construction)			
Alternative	EIRR (%)	B/C Ratio	NPV (Million US\$)
I-B.1	17.5	1.73	57.6
I-B.2	17.3	1.68	61.5
I-B.3	17.3	1.68	60.8
I-B.6	16.6	1.58	55.6
I-B.7	16.8	1.61	57.3
I-B.8	16.6	1.58	55.1
I-B.9	16.8	1.61	56.8
I-C.2	17.3	1.68	60.6
I-C.6	16.6	1.58	54.6
I-C.7	16.8	1.61	56.3

Note: B/C and NPV are calculated with a discount rate of 12%.

The economic analyses based on practical implementation schedule (stage construction) have been examined for the alternative I-B.2. The results also indicated the alternative has sufficient economic efficiency with EIRRs of 17.4%, which is higher than the opportunity cost of capital. The alternative can be rated as being economically feasible. The cash flow table of the analysis is shown in Table F.14 and the results are summarized below:

Economic Indicators (stage construction)			
Alternative	EIRR (%)	B/C Ratio	NPV (Million US\$)
I-B.2	17.4	1.70	59.9

Note: B/C and NPV are calculated with a discount rate of 12%.

Table F.1 Results of Flood Damage Assessment, November 1999

(1/2)

(Source: General Statistical Office of Thua Thien Hue Province)

FROM NOVEMBER, 1st TO 6th, 1999

A. HUMAN DAMAGE

1. Dead: 352 people (357)

2. Lost: 11 people (12)

3. Injured: 305 people

CRITERIA	UNIT	QUANTITY	TOTAL (MILLION VND)
A	B	1	2
A. Flood, storm prevention structure and infrastructure		x	481,123
I. Flood and storm prevention structure		x	76,501
1. Length of bursted, floated dykes	m	20,270	x
2. Length of eroded dykes	m	132,250	x
3. Estimated quantity of landslide	m ³	595,750	14,893
4. Length of broken, floated revetment	m	1,930	x
5. Estimated quantity of floated dyke	m ³	28,950	44,343
6. Estimated quantity of eroded, floated concrete	m ³	28,776	17,266
II. Water resources		x	58,293
7. Destroyed culvert...	unit	218	14,649
8. Damaged culvert...	unit	247	7,167
9. Damaged, destroyed pumping station	unit	124	874
10. Length of eroded, floated canal	m	449,955	x
11. Estimated quantity of landslide..	m ³	959,332	23,332
12. Estimated quantity of stone slide...	m ³	218,595	6,132
13. Estimated eroded concrete	m ³	16,542	6,140
III. Transportation and fishery		x	293,082
14. Destroyed, sunk boats and ships	unit	1,431	15,240
15. Damaged boats and ships	unit	1,175	8,048
16. Lost boats and ships	unit	256	x
17. Destroyed bridges and culverts	unit	384	18,239
18. Damaged bridges and culverts	unit	1,369	8,860
19. Length of eroded, floated road	m	395,147	22,841
20. Length of inundated road	m	220,700	x
21. Estimated quantity of eroded, floated land, stone, concrete...	m ³	1,126,801	42,371
22. Destroyed, floated cars	unit	9	15
23. Damaged cars	unit	150	322
24. Other damage to transportation		x	27,146
Managed by transportation department	million VND		150,000
IV. Electricity and post office		x	53,248
Electricity	million VND	x	28,248
Post office	million VND	x	25,000
Of which:			
24. Collapsed mid and high voltage pole	pole	273	143
25. Collapsed low voltage pole	pole	624	945
26. Inundated and damaged transformer station	station	256	4,280
27. Collapsed communication pole	pole	469	237
28. Floated communication wire	km	83	4,210
B. DAMAGE TO BUSINESS		x	523,549
29. Inundated, damaged paddy area	ha	345	x
29.1. Of which, dead loss area	ha	255	1,398
30. Inundated, damaged sown area	ha	241	28
31. Inundated, damaged subsidiary crop	ha	4,450	x
31.1. Of which, dead loss area	ha	3,963	8,322
32. Damaged fruit trees area	ha	2,077	10,383
33. Inundated, damaged industrial plants	ha	2,299	9,461
34. Damaged protective forest area	ha	5,154	23,646
35. Damaged seedling garden	ha	526	10,200
36. Dead buffalo and cows	head	5,062	11,342
37. Dead pigs	head	86,862	45,460
38. Damaged livestock, poultry	head	869,872	23,316
39. Damaged aquaculture area	ha	2,459	32,852
40. Amount of damaged factories, warehouse, restaurant, shop, and others for manufacture and business.	unit	729	2,479
41. Floated machines, devices, materials and products			10,130
Destroyed agricultural machines	unit	330	574
Inundated, damaged pumping machines	unit	125	506
Inundated, damaged fertilizer	ton	1,258	2,515
Inundated, floated pesticide	ton	8	611
Paddy	ton	4,199	7,558

Table F.1 Results of Flood Damage Assessment, November 1999

(2/2)

(Source: General Statistical Office of Thua Thien Hue Province)

FROM NOVEMBER, 1st TO 6th, 1999

A. HUMAN DAMAGE

1. Dead: 352 people (357)

2. Lost: 11 people (12)

3. Injured: 305 people

CRITERIA	UNIT	QUANTITY	TOTAL (MILLION VND)
A	B	1	2
— Rice	ton	139	411
— Wet, floated cement	ton	919	16
— Fishing devices: Fish net	ton	2,742	
— Net	ton	127	30,930
— Say	unit	50,700	
— Lost fish of all kinds	ton	293	
— Fish breed	million heads	4	11,529
— Other kinds of fish	ton	290	
— Others		x	46,631
42. Amount of each wet, inundated, but can be recovered machine, device, material, product			53,940
— Paddy	ton	15,656	28,180
— Cement	ton	500	400
— Foods of all kinds	ton	110	1,620
— Petrol of all kinds	litre	50,000	200
— Others		x	23,540
Damage of sectors in provincial level	million VND		189,442
— Industry	million VND		100,978
— Service	million VND		58,400
— Tourism	million VND		15,000
— Construction	million VND		15,064
C. DAMAGE TO WELFARE, CULTURAL STRUCTURE		x	86,227
— Damage to cultural sector	million VND		20,516
— Damage to health care	million VND		20,000
— Damage to education	million VND		45,712
Of which:			
43. Collapsed, floated classroom	classroom	126	
44. Inundated, damaged classroom	classroom	938	
45. Inundated, floated clinics, hospitals	room	45	
46. Partly damaged clinics, hospitals	room	192	
47. Other damaged cultural, welfare constructions, included:			
— Floated desks, chairs	set		
— Books and learning aids			
— Drugs and medical device			
— Others			
D. DAMAGED HOUSES		x	235,922
48. Collapsed, floated houses	house	12,390	112,872
49. Inundated houses	house	152,024	30,405
50. Eroded, non-roof houses	house	15,853	92,645
E. ECOLOGICAL ENVIRONMENT AND LIVELIHOOD			
51. Homeless people because of collapsed or floated houses	person	71,876	x
52. Temporarily homeless because of inundation	person	66,686	x
53. Inundated residential area because of pesticide, petrol, fertilizer, toxic chemicals...	km ²	262	x
F. OTHER DAMAGED ASSETS (IF ANY)		x	419,585
— Wet and floated paddy, including seedling paddy	ton	78,987	126,379
— Petrol of all kinds	litre	4,850	17
— Subsidiary crop	ton		1,018
— Floated Vinh Hien estuary		788	35,000
— Others		x	225,369
Administration and armament		x	31,803
— Administration	million VND		25,303
— Armament	million VND		6,500
G. ESTIMATED TOTAL DAMAGE			1,746,406
H. INITIALLY FLOOD, STORM DAMAGE RECOVERY			
1. Human and asset safeguard			
— Rescued people			
— Rescued asset			
— ...			
2. Relief, support and stabilization			
— Supported people	person		
— Supported sum	million VND		

Table F.2 Estimated Flood Damage to Agricultural Production due to Early Flood (1/2)
(Huong River Basin, Without Project)

Flood Scale: Early Flood 2-Year

Areas	Flood Condition			Damage Rate		Agricultural Production (Summer-Autumn)								Flood Damage		Total flood damage to agriculture (VND Million)
	Area (km2)	Inundation Depth		Paddy	Upland crop	Paddy				Upland crop				Paddy (VND Million)	Upland crop (VND Million)	
		from (m)	to (m)			Area in flood area (km2)	Productivity (ton/km2)	Farmgate price (VND1,000/ton)	Expected output (VND Million)	Area in flood area (km2)	Productivity (ton/km2)	Farmgate price (VND1,000/ton)	Expected output (VND Million)			
a	b	c	d	e	f=a x 72%	g	h	i = f x g x h	j	k	l	m = j x k x l	n=d x i	o=e x m	p=n+o	
A		-	0.49	0.30	0.42				-				-	-	-	-
B		0.50	0.99	0.44	0.48				-				-	-	-	-
C		1.00		0.54	0.67				-				-	-	-	-
Total	-					-			-	-			-	-	-	-

Flood Scale: Early Flood 5-Year

Areas	Flood Condition			Damage Rate		Agricultural Production (Summer-Autumn)								Flood Damage		Total flood damage to agriculture (VND Million)
	Area (km2)	Inundation Depth		Paddy	Upland crop	Paddy				Upland crop				Paddy (VND Million)	Upland crop (VND Million)	
		from (m)	to (m)			Area in flood area (km2)	Productivity (ton/km2)	Farmgate price (VND1,000/ton)	Expected output (VND Million)	Area in flood area (km2)	Productivity (ton/km2)	Farmgate price (VND1,000/ton)	Expected output (VND Million)			
a	b	c	d	e	f=a x 72%	g	h	i = f x g x h	j	k	l	m = j x k x l	n=d x i	o=e x m	p=n+o	
A	4	-	0.49	0.30	0.42	2.9	300	2,100	1,814				-	544	-	544
B	5	0.50	0.99	0.44	0.48	3.6	300	2,100	2,268				-	998	-	998
C	5	1.00		0.54	0.67	3.6	300	2,100	2,268				-	1,225	-	1,225
Total	14					10			6,350	-			-	2,767	-	2,767

Flood Scale: Early Flood 10-Year

Areas	Flood Condition			Damage Rate		Agricultural Production (Summer-Autumn)								Flood Damage		Total flood damage to agriculture (VND Million)
	Area (km2)	Inundation Depth		Paddy	Upland crop	Paddy				Upland crop				Paddy (VND Million)	Upland crop (VND Million)	
		from (m)	to (m)			Area in flood area (km2)	Productivity (ton/km2)	Farmgate price (VND1,000/ton)	Expected output (VND Million)	Area in flood area (km2)	Productivity (ton/km2)	Farmgate price (VND1,000/ton)	Expected output (VND Million)			
	a	b	c	d	e	f=a x 72%	g	h	i = f x g x h	j	k	l	m = j x k x l	n=d x i	o=e x m	p=n+o
A	6	-	0.49	0.30	0.42	4.3	300	2,100	2,722				-	817	-	817
B	5	0.50	0.99	0.44	0.48	3.6	300	2,100	2,268				-	998	-	998
C	15	1.00		0.54	0.67	10.8	300	2,100	6,804				-	3,674	-	3,674
Total	26					19			11,794	-			-	5,489	-	5,489

Table F.2 Estimated Flood Damage to Agricultural Production due to Early Flood (2/2)
(Huong River Basin, With Project)

Flood Scale: Early Flood 2-Year

Areas	Flood Condition			Damage Rate		Agricultural Production (Summer-Autumn)								Flood Damage		Total flood damage to agriculture (VND Million)
	Area (km2)	Inundation Depth		Paddy	Upland crop	Paddy				Upland crop				Paddy (VND Million)	Upland crop (VND Million)	
		from	to			Area in flood area (km2)	Productivity (ton/km2)	Farmgate price (VND1,000/ton)	Expected output (VND Million)	Area in flood area (km2)	Productivity (ton/km2)	Farmgate price (VND1,000/ton)	Expected output (VND Million)			
		(m)	(m)			f=a x 72%	g	h	i = f x g x h	j	k	l	m = j x k x l			
A		-	0.49	0.30	0.42									-	-	-
B		0.50	0.99	0.44	0.48									-	-	-
C		1.00		0.54	0.67									-	-	-
Total	-					-			-	-			-	-	-	

Flood Scale: Early Flood 5-Year

Areas	Flood Condition			Damage Rate		Agricultural Production (Summer-Autumn)								Flood Damage		Total flood damage to agriculture (VND Million)
	Area (km2)	Inundation Depth		Paddy	Upland crop	Paddy				Upland crop				Paddy (VND Million)	Upland crop (VND Million)	
		from (m)	to (m)			Area in flood area (km2)	Productivity (ton/km2)	Farmgate price (VND1,000/ton)	Expected output (VND Million)	Area in flood area (km2)	Productivity (ton/km2)	Farmgate price (VND1,000/ton)	Expected output (VND Million)			
		a	b			c	d	e	f=a x 72%	g	h	i = f x g x h	j			
A		-	0.49	0.30	0.42	-	300	2,100	-				-	-	-	-
B		0.50	0.99	0.44	0.48	-	300	2,100	-				-	-	-	-
C		1.00		0.54	0.67	-	300	2,100	-				-	-	-	-
Total	-					-			-	-			-	-	-	

Flood Scale: Early Flood 10-Year

Areas	Flood Condition		Damage Rate		Agricultural Production (Summer-Autumn)								Flood Damage		Total flood damage to agriculture (VND Million)	
	Area (km2)	Inundation Depth		Paddy	Upland crop	Paddy				Upland crop				Paddy (VND Million)		Upland crop (VND Million)
		from (m)	to (m)			Area in flood area (km2)	Productivity (ton/km2)	Farmgate price (VND1,000/ton)	Expected output (VND Million)	Area in flood area (km2)	Productivity (ton/km2)	Farmgate price (VND1,000/ton)	Expected output (VND Million)			
	a	b	c	d	e	f=a x 72%	g	h	i = f x g x h	j	k	l	m = j x k x l	n=d x i		o=e x m
A	-	0.49	0.30	0.42	-	300	2,100	-	-	-	-	-	-	-	-	
B	0.50	0.99	0.44	0.48	-	300	2,100	-	-	-	-	-	-	-	-	
C	1.00		0.54	0.67	-	300	2,100	-	-	-	-	-	-	-	-	
Total	-				-			-	-	-		-	-	-		

Table F.3 Average Value of House**Region: North Central Coast**

		Distr.	%	Ave. unit value in 1998 (Million VND)	Ave. unit value in 2001 (Million VND)	Weighted ave. value of house (Million VND)
1	City house with garden	46.62	49%	233	255	124
2	Multi-storied house with private bathroom/kitchen	1.77	2%	204	223	4
3	Multi-storied house with separate bathroom/kitchen	10.73	11%	109	119	13
4	Permanet one-story house with private bath/kitchen/toilet	4.11	4%	147	161	7
5	Permanent one-story house with separate bath/kitchen/toilet	8.4	9%	43	47	4
6	Semi-permanent house	19.72	21%	20	22	5
7	Temporary house	4.52	5%	6	7	0
8	Total	95.87	100%			157
9	Adjustment to deduct value of land use right					50%
10	Average value of house without land (Financial)					79
11	SCF					90%
12	Average value of house without land (Economic)					71
13	Equivalent US Dollar (US\$1,000)					4.7

Table F.4 Average Value of Durable Assets per Household

Region	Ave. value of household assets in 1998 (1,000 VND)	Ave. value of household assets in 2001 (1,000 VND)	SCF	Ave. value of household assets in 2001 (1,000 VND)
1 Hanoi and Ho Chi Minh Cities	26,909	29,404	90%	26,464
2 Other large cities	16,162	17,661	90%	15,895
3 Small towns	10,431	11,398	90%	10,258
4 Rural area of North Mountain and Midland	4,170	4,557	90%	4,101
5 Rural area of Red River Delta	4,258	4,652	90%	4,187
6 Rural area of North Central Coast	3,740	4,086	90%	3,677
7 Rural area of South Central Coast	6,462	7,061	90%	6,355
8 Rural area of Central Highlands	7,539	8,238	90%	7,414
9 Rural area of Southeast	10,509	11,483	90%	10,335
10 Rural area of Mekong River Delta	5,124	5,600	90%	5,040

Table F.5 Flood Damages to House and Household Durable Assets

Alter- native	Project Component	Year	Flood Damage by Magnitude of Flood (VND billion)					
			2-year	5-year	10-year	20-year	50-year	100-year
	Without project	2001	119.0	328.9	572.5	984.5	1,417.2	1,954.0
		2020	136.9	395.9	716.7	1,313.5	1,891.5	2,607.0
I-B.1	Max. Ta. TrachReservoir only	2001	13.7	27.0	35.9	51.5	190.4	290.8
		2020	15.6	30.8	41.0	58.8	222.4	347.6
I-B.2	Max. Ta Trach +Max. Huu Trach Reservoirs	2001	-	-	-	15.5	79.5	203.3
		2020	-	-	-	17.6	90.7	238.4
I-B.3	Max. Ta Trach +Min. Huu Trach Reservoirs	2001	-	-	-	15.5	79.5	203.3
		2020	-	-	-	17.6	90.7	238.4
I-B.6	Max. Ta Trach +Max. Huu Trach + Max. Co Bi Reservoirs	2001	-	-	-	15.5	79.5	203.3
		2020	-	-	-	17.6	90.7	238.4
I-B.7	Max. Ta Trach +Max. Huu Trach +Min. Co Bi Reservoirs	2001	-	-	-	15.5	79.5	203.3
		2020	-	-	-	17.6	90.7	238.4
I-B.8	Max. Ta Trach +Min. Huu Trach +Max. Co Bi Reservoirs	2001	-	-	-	15.5	79.5	203.3
		2020	-	-	-	17.6	90.7	238.4
I-B.9	Max. Ta Trach +Min. Huu Trach +Min. Co Bi Reservoirs	2001	-	-	-	15.5	79.5	203.3
		2020	-	-	-	17.6	90.7	238.4
I-C.2	Min. Ta Trach +Max. Huu Trach Reservoirs	2001	-	-	23.6	45.6	93.5	193.6
		2020	-	-	27.0	52.1	106.6	227.1
I-C.6	Min. Ta Trach +Max. Huu Trach +Max. Co Bi Reservoirs	2001	-	-	23.6	45.6	93.5	193.6
		2020	-	-	27.0	52.1	106.6	227.1
I-C.7	Min. Ta Trach +Max. Huu Trach +Min. Co Bi Reservoirs	2001	-	-	23.6	45.6	93.5	193.6
		2020	-	-	27.0	52.1	106.6	227.1

Table F.6 Estimated Flood Damage to Houses due to Major Flood (1/16)
(Huong River Basin, Without Project, in 2001 (1/2))

Flood Scale: Major Flood 2-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house	Total value of house	Major city/town		Other district		Damage to house	Damage to household goods	Total
		from	to			Density of house	Area	Number of houses	Density of house	Area	Number of houses			Unit value of household goods	Total value of household goods	Unit value of household goods	Total value of household goods			
	(km2)	(m)	(m)	(house/km2)	(km2)	(house)	(house/km2)	(km2)	(house)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	4	-	0.29	-	-	1,138	0.4	401	185	4	675	71	76,357	15.9	6,369	3.7	2,497	-	-	-
B	5	0.30	0.79	0.092	0.145	1,138	0.3	300	185	5	876	71	83,538	15.9	4,777	3.7	3,242	7,685	1,163	8,848
C	5	0.80	1.29	0.119	0.326	1,138	-	-	185	5	925	71	65,675	15.9	-	3.7	3,423	7,815	1,116	8,931
D	7	1.30	2.29	0.266	0.508	1,138	-	-	185	7	1,295	71	91,945	15.9	-	3.7	4,792	24,457	2,434	26,891
E	9	2.30	3.29	0.580	0.928	1,138	-	-	185	9	1,665	71	118,215	15.9	-	3.7	6,161	68,565	5,717	74,282
F	-	3.30		0.834	0.991	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	30						1	701		29	5,436		435,730		11,146		20,115	108,522	10,430	118,952

6,137

Flood Scale: Major Flood 5-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house	Total value of house	Major city/town		Other district		Damage to house	Damage to household goods	Total
		from	to			Density of house	Area	Number of houses	Density of house	Area	Number of houses			Unit value of household goods	Total value of household goods	Unit value of household goods	Total value of household goods			
	(km2)	(m)	(m)	(house/km2)	(km2)	(house)	(house/km2)	(km2)	(house)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	8	-	0.29	-	-	1,138	0.7	801	185	7	1,350	71	152,715	15.9	12,738	3.7	4,994	-	-	-
B	12	0.30	0.79	0.092	0.145	1,138	1.1	1,202	185	11	2,025	71	229,072	15.9	19,107	3.7	7,491	21,075	3,857	24,932
C	6	0.80	1.29	0.119	0.326	1,138	0.5	601	185	5	1,012	71	114,536	15.9	9,554	3.7	3,746	13,630	4,336	17,966
D	12	1.30	2.29	0.266	0.508	1,138	0.8	961	185	11	2,064	71	214,782	15.9	15,286	3.7	7,636	57,132	11,644	68,776
E	8	2.30	3.29	0.580	0.928	1,138	-	-	185	8	1,480	71	105,080	15.9	-	3.7	5,476	60,946	5,082	66,028
F	13	3.30		0.834	0.991	1,138	-	-	185	13	2,405	71	170,755	15.9	-	3.7	8,899	142,410	8,819	151,229
Total	59						3.1	3,565		56	10,335		986,940		56,685		38,242	295,193	33,738	328,931

13,901

Flood Scale: Major Flood 10-Year

Flood Scale: Major Flood 10-Year																				
Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house	Total value of house	Major city/town		Other district		Damage to house	Damage to household goods	Total
		from	to			Density of house	Area	Number of houses	Density of house	Area	Number of houses			Unit value of household goods	Total value of household goods	Unit value of household goods	Total value of household goods			
	(km2)	(m)	(m)	(house/km2)	(km2)	(house)	(house/km2)	(km2)	(house)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	9	-	0.29	-	-	1,138	0.8	901	185	8	1,518	71	171,804	15.9	14,331	3.7	5,618	-	-	-
B	14	0.30	0.79	0.092	0.145	1,138	1.2	1,402	185	13	2,362	71	267,251	15.9	22,292	3.7	8,740	24,587	4,500	29,087
C	14	0.80	1.29	0.119	0.326	1,138	1.2	1,402	185	13	2,362	71	267,251	15.9	22,292	3.7	8,740	31,803	10,116	41,919
D	17	1.30	2.29	0.266	0.508	1,138	1.5	1,702	185	16	2,868	71	324,519	15.9	27,069	3.7	10,612	86,322	19,142	105,464
E	12	2.30	3.29	0.580	0.928	1,138	1.0	1,082	185	11	2,044	71	221,927	15.9	17,197	3.7	7,563	128,718	22,977	151,695
F	21	3.30		0.834	0.991	1,138	-	-	185	21	3,885	71	275,835	15.9	-	3.7	14,375	230,046	14,246	244,292
Total	87						5.7	6,489		81	15,040		1,528,587		103,181		55,648	501,476	70,981	572,457

21,529

Table F.6 Estimated Flood Damage to Houses due to Major Flood (2/16)
(Huong River Basin, Without Project, in 2001 (2/2))

Flood Scale: Major Flood 20-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house	Total value of house	Major city/town		Other district		Damage to house	Damage to household goods	Total
		from	to			Density of house	Area	Number of houses	Density of house	Area	Number of houses			Unit value of household goods	Total value of household goods	Unit value of household goods	Total value of household goods			
	(km2)	(m)	(m)			(house/km2)	(km2)	(house)	(house/km2)	(km2)	(house)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	19	-	0.29	-	-	1,138	1.7	1,903	185	17	3,206	71	362,698	15.9	30,254	3.7	11,861	-	-	-
B	20	0.30	0.79	0.092	0.145	1,138	1.8	2,003	185	18	3,374	71	381,787	15.9	31,846	3.7	12,485	35,124	6,428	41,552
C	14	0.80	1.29	0.119	0.326	1,138	1.2	1,402	185	13	2,362	71	267,251	15.9	22,292	3.7	8,740	31,803	10,116	41,919
D	28	1.30	2.29	0.266	0.508	1,138	2.5	2,804	185	26	4,724	71	534,502	15.9	44,584	3.7	17,479	142,178	31,528	173,706
E	14	2.30	3.29	0.580	0.928	1,138	1.2	1,402	185	13	2,362	71	267,251	15.9	22,292	3.7	8,740	155,006	28,798	183,804
F	30	3.30		0.834	0.991	1,138	2.6	3,004	185	27	5,062	71	572,680	15.9	47,769	3.7	18,728	477,615	65,899	543,514
Total	125						11.0	12,518		114	21,090		2,386,169		199,037		78,033	841,726	142,769	984,495

33,608

Flood Scale: Major Flood 50-Year

Flood Damage, Major Flood 2014																				
Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house	Total value of house	Major city/town		Other district		Damage to house	Damage to household goods	Total
		from	to			Density of house	Area	Number of houses	Density of house	Area	Number of houses			Unit value of household goods	Total value of household goods	Unit value of household goods	Total value of household goods			
	(km2)	(m)	(m)	(house/km2)	(km2)	(house)	(house/km2)	(km2)	(house)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	19	-	0.29	-	-	1,138	1.7	1,903	185	17	3,206	71	362,698	15.9	30,254	3.7	11,861	-	-	-
B	33	0.30	0.79	0.092	0.145	1,138	2.9	3,305	185	30	5,568	71	629,948	15.9	52,546	3.7	20,601	57,955	10,606	68,561
C	32	0.80	1.29	0.119	0.326	1,138	2.8	3,205	185	29	5,399	71	610,859	15.9	50,953	3.7	19,976	72,692	23,123	95,815
D	28	1.30	2.29	0.266	0.508	1,138	2.5	2,804	185	26	4,724	71	534,502	15.9	44,584	3.7	17,479	142,178	31,528	173,706
E	27	2.30	3.29	0.580	0.928	1,138	2.4	2,704	185	25	4,555	71	515,412	15.9	42,992	3.7	16,855	298,939	55,538	354,477
F	40	3.30		0.834	0.991	1,138	3.5	4,006	185	36	6,749	71	763,574	15.9	63,692	3.7	24,971	636,821	87,865	724,686
Total	179						15.8	17,926		163	30,201		3,416,993		285,021		111,743	1,208,585	208,660	1,417,245

48,127

Flood Scale: Major Flood 100-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house	Total value of house	Major city/town		Other district		Damage to house	Damage to household goods	Total
		from	to			Density of house	Area	Number of houses	Density of house	Area	Number of houses			Unit value of household goods	Total value of household goods	Unit value of household goods	Total value of household goods			
	(km2)	(m)	(m)			(house/km2)	(km2)	(house)	(house/km2)	(km2)	(house)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)
a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s	
A	19	-	0.29	-	-	1,138	1.7	1,903	185	17	3,206	71	362,698	15.9	30,254	3.7	11,861	-	-	-
B	33	0.30	0.79	0.092	0.145	1,138	2.9	3,305	185	30	5,568	71	629,948	15.9	52,546	3.7	20,601	57,955	10,606	68,561
C	32	0.80	1.29	0.119	0.326	1,138	2.8	3,205	185	29	5,399	71	610,859	15.9	50,953	3.7	19,976	72,692	23,123	95,815
D	54	1.30	2.29	0.266	0.508	1,138	4.8	5,408	185	49	9,111	71	1,030,825	15.9	85,984	3.7	33,710	274,199	60,805	335,004
E	28	2.30	3.29	0.580	0.928	1,138	2.5	2,804	185	26	4,724	71	534,502	15.9	44,584	3.7	17,479	310,011	57,594	367,605
F	60	3.30		0.834	0.991	1,138	5.3	6,009	185	55	10,123	71	1,145,361	15.9	95,537	3.7	37,456	955,231	131,796	1,087,027
Total	226						19.9	22,633		206	38,131		4,314,193		359,858		141,083	1,670,088	283,924	1,954,012

60,763

Table F.6 Estimated Flood Damage to Houses due to Major Flood (3/16)
(Huong River Basin, Without Project, in 2020 (1/2))

Flood Scale: Major Flood 2-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house	Total value of house	Major city/town		Other district		Damage to house	Damage to household goods	Total
		from	to			Density of house	Area	Number of houses	Density of house	Area	Number of houses			Unit value of household goods	Total value of household goods	Unit value of household goods	Total value of household goods			
	(km2)	(m)	(m)	(house/km2)	(km2)	(house)	(house/km2)	(km2)	(house)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	4	-	0.29	-	-	1,138	0.6	683	211	3	717	71	99,414	15.9	10,857	3.7	2,654	-	-	-
B	5	0.30	0.79	0.092	0.145	1,138	0.5	512	211	5	960	71	104,523	15.9	8,142	3.7	3,552	9,616	1,696	11,312
C	5	0.80	1.29	0.119	0.326	1,138	-	-	211	5	1,055	71	74,905	15.9	-	3.7	3,904	8,914	1,273	10,187
D	7	1.30	2.29	0.266	0.508	1,138	-	-	211	7	1,477	71	104,867	15.9	-	3.7	5,465	27,895	2,776	30,671
E	9	2.30	3.29	0.580	0.928	1,138	-	-	211	9	1,899	71	134,829	15.9	-	3.7	7,026	78,201	6,520	84,721
F	-	3.30		0.834	0.991	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	30						1	1,195		29	6,108		518,538		18,999		22,601	124,626	12,265	136,891

7,303

Flood Scale: Major Flood 5-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house	Total value of house	Major city/town		Other district		Damage to house	Damage to household goods	Total
		from	to			Density of house	Area	Number of houses	Density of house	Area	Number of houses			Unit value of household goods	Total value of household goods	Unit value of household goods	Total value of household goods			
	(km2)	(m)	(m)	(house/km2)	(km2)	(house)	(house/km2)	(km2)	(house)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	8	-	0.29	-	-	1,138	1.2	1,366	211	7	1,435	71	198,828	15.9	21,713	3.7	5,309	-	-	-
B	12	0.30	0.79	0.092	0.145	1,138	1.8	2,048	211	10	2,152	71	298,243	15.9	32,570	3.7	7,963	27,438	5,877	33,315
C	6	0.80	1.29	0.119	0.326	1,138	0.9	1,024	211	5	1,076	71	149,121	15.9	16,285	3.7	3,982	17,745	6,607	24,352
D	12	1.30	2.29	0.266	0.508	1,138	1.4	1,639	211	11	2,228	71	274,548	15.9	26,056	3.7	8,244	73,030	17,424	90,454
E	8	2.30	3.29	0.580	0.928	1,138	-	-	211	8	1,688	71	119,848	15.9	-	3.7	6,246	69,512	5,796	75,308
F	13	3.30		0.834	0.991	1,138	-	-	211	13	2,743	71	194,753	15.9	-	3.7	10,149	162,424	10,058	172,482
Total	59						5.3	6,077		54	11,322		1,235,341		96,624		41,893	350,149	45,762	395,911

17,399

Flood Scale: Major Flood 10-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house	Total value of house	Major city/town		Other district		Damage to house	Damage to household goods	Total
		from	to			Density of house	Area	Number of houses	Density of house	Area	Number of houses			Unit value of household goods	Total value of household goods	Unit value of household goods	Total value of household goods			
	(km2)	(m)	(m)	(house/km2)	(km2)	(house)	(house/km2)	(km2)	(house)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	9	-	0.29	-	-	1,138	1.4	1,536	211	8	1,614	71	223,682	15.9	24,427	3.7	5,972	-	-	-
B	14	0.30	0.79	0.092	0.145	1,138	2.1	2,390	211	12	2,511	71	347,950	15.9	37,998	3.7	9,290	32,011	6,857	38,868
C	14	0.80	1.29	0.119	0.326	1,138	2.1	2,390	211	12	2,511	71	347,950	15.9	37,998	3.7	9,290	41,406	15,416	56,822
D	17	1.30	2.29	0.266	0.508	1,138	2.6	2,902	211	14	3,049	71	422,510	15.9	46,140	3.7	11,281	112,388	29,170	141,558
E	12	2.30	3.29	0.580	0.928	1,138	1.6	1,844	211	10	2,190	71	286,396	15.9	29,313	3.7	8,104	166,110	34,723	200,833
F	21	3.30		0.834	0.991	1,138	-	-	211	21	4,431	71	314,601	15.9	-	3.7	16,395	262,377	16,247	278,624
Total	87						9.7	11,061		77	16,306		1,943,089		175,876		60,332	614,292	102,413	716,705

27,367

Table F.6 Estimated Flood Damage to Houses due to Major Flood (4/16)
(Huong River Basin, Without Project, in 2020 (2/2))

Flood Scale: Major Flood 20-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area (km2)	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km2)	Area (km2)	Number of houses (house)	Density of house (house/km2)	Area (km2)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s	
A	19	-	0.29	-	-	1,138	2.9	3,243	211	16	3,408	71	472,217	15.9	51,568	3.7	12,608	-	-	-
B	20	0.30	0.79	0.092	0.145	1,138	3.0	3,414	211	17	3,587	71	497,071	15.9	54,283	3.7	13,272	45,731	9,795	55,526
C	14	0.80	1.29	0.119	0.326	1,138	2.1	2,390	211	12	2,511	71	347,950	15.9	37,998	3.7	9,290	41,406	15,416	56,822
D	28	1.30	2.29	0.266	0.508	1,138	4.2	4,780	211	24	5,022	71	695,899	15.9	75,996	3.7	18,581	185,109	48,045	233,154
E	14	2.30	3.29	0.580	0.928	1,138	2.1	2,390	211	12	2,511	71	347,950	15.9	37,998	3.7	9,290	201,811	43,883	245,694
F	30	3.30		0.834	0.991	1,138	4.5	5,121	211	26	5,381	71	745,607	15.9	81,424	3.7	19,908	621,836	100,420	722,256
Total	125						18.8	21,338		106	22,419		3,106,694		339,267		82,949	1,095,893	217,559	1,313,452

43,756

Flood Scale: Major Flood 50-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house	Total value of house	Major city/town		Other district		Damage to house	Damage to household goods	Total
		from	to			Density of house	Area	Number of houses	Density of house	Area	Number of houses			Unit value of household goods	Total value of household goods	Unit value of household goods	Total value of household goods			
						(house/km2)	(km2)	(house)	(house/km2)	(km2)	(house)			(VND Million)	(VND Million)	(VND Million)	(VND Million)			
(km2)	(m)	(m)	(house/km2)	(km2)	(house)	(house/km2)	(km2)	(house)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)		
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	19	-	0.29	-	-	1,138	2.9	3,243	211	16	3,408	71	472,217	15.9	51,568	3.7	12,608	-	-	-
B	33	0.30	0.79	0.092	0.145	1,138	5.0	5,633	211	28	5,919	71	820,167	15.9	89,566	3.7	21,899	75,455	16,162	91,617
C	32	0.80	1.29	0.119	0.326	1,138	4.8	5,462	211	27	5,739	71	795,314	15.9	86,852	3.7	21,235	94,642	35,236	129,878
D	28	1.30	2.29	0.266	0.508	1,138	4.2	4,780	211	24	5,022	71	695,899	15.9	75,996	3.7	18,581	185,109	48,045	233,154
E	27	2.30	3.29	0.580	0.928	1,138	4.1	4,609	211	23	4,842	71	671,046	15.9	73,282	3.7	17,917	389,207	84,633	473,840
F	40	3.30		0.834	0.991	1,138	6.0	6,828	211	34	7,174	71	994,142	15.9	108,565	3.7	26,544	829,114	133,893	963,007
Total	179						26.9	30,555		152	32,104		4,448,785		485,829		118,784	1,573,527	317,969	1,891,496

62,659

Flood Scale: Major Flood 100-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area (km2)	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km2)	Area (km2)	Number of houses (house)	Density of house (house/km2)	Area (km2)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
		(m)	(m)			f	g	h=f x g	i	j	k=i x j			l	m=l x (h+k)	n	o=n x h			
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	19	-	0.29	-	-	1,138	2.9	3,243	211	16	3,408	71	472,217	15.9	51,568	3.7	12,608	-	-	-
B	33	0.30	0.79	0.092	0.145	1,138	5.0	5,633	211	28	5,919	71	820,167	15.9	89,566	3.7	21,899	75,455	16,162	91,617
C	32	0.80	1.29	0.119	0.326	1,138	4.8	5,462	211	27	5,739	71	795,314	15.9	86,852	3.7	21,235	94,642	35,236	129,878
D	54	1.30	2.29	0.266	0.508	1,138	8.1	9,218	211	46	9,685	71	1,342,092	15.9	146,563	3.7	35,834	356,996	92,658	449,654
E	28	2.30	3.29	0.580	0.928	1,138	4.2	4,780	211	24	5,022	71	695,899	15.9	75,996	3.7	18,581	403,621	87,767	491,388
F	60	3.30		0.834	0.991	1,138	9.0	10,242	211	51	10,761	71	1,491,213	15.9	162,848	3.7	39,816	1,243,672	200,840	1,444,512
Total	226						33.9	38,578		192	40,533		5,616,902		613,393		149,973	2,174,386	432,663	2,607,049

79,111

Table F.6 Estimated Flood Damage to Houses due to Major Flood (5/16)
(I-B.1: With Max. Ta Trach only, in 2001 (1/2))

Flood Scale: Major Flood 2-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area (km ²)	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km ²)	Area (km ²)	Number of houses (house)	Density of house (house/km ²)	Area (km ²)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
		(m)	(m)			f	g	h=f x g	i	j	k=i x j			n	o=n x h	p	q=p x k			
A	3	-	0.29	-	-	1,138	-	-	185	3	555	71	39,405	15.9	-	3.7	2,054	-	-	-
B	5	0.30	0.79	0.092	0.145	1,138	-	-	185	5	925	71	65,675	15.9	-	3.7	3,423	6,042	496	6,538
C	4	0.80	1.29	0.119	0.326	1,138	-	-	185	4	740	71	52,540	15.9	-	3.7	2,738	6,252	893	7,145
D	-	1.30	2.29	0.266	0.508	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
E	-	2.30	3.29	0.580	0.928	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	12						-	-		12	2,220		157,620		-		8,215	12,294	1,389	13,683

2,220

Flood Scale: Major Flood 5-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area (km ²)	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km ²)	Area (km ²)	Number of houses (house)	Density of house (house/km ²)	Area (km ²)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
		(m)	(m)			f	g	h=f x g	i	j	k=i x j			n	o=n x h	p	q=p x k			
A	1	-	0.29	-	-	1,138	-	-	185	1	185	71	13,135	15.9	-	3.7	685	-	-	-
B	5	0.30	0.79	0.092	0.145	1,138	-	-	185	5	925	71	65,675	15.9	-	3.7	3,423	6,042	496	6,538
C	5	0.80	1.29	0.119	0.326	1,138	-	-	185	5	925	71	65,675	15.9	-	3.7	3,423	7,815	1,116	8,931
D	3	1.30	2.29	0.266	0.508	1,138	-	-	185	3	555	71	39,405	15.9	-	3.7	2,054	10,482	1,043	11,525
E	-	2.30	3.29	0.580	0.928	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	14						-	-		14	2,590		183,890		-		9,585	24,339	2,655	26,994

2,590

Flood Scale: Major Flood 10-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area (km ²)	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km ²)	Area (km ²)	Number of houses (house)	Density of house (house/km ²)	Area (km ²)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
		(m)	(m)			f	g	h=f x g	i	j	k=i x j			n	o=n x h	p	q=p x k			
A	2	-	0.29	-	-	1,138	-	-	185	2	370	71	26,270	15.9	-	3.7	1,369	-	-	-
B	3	0.30	0.79	0.092	0.145	1,138	-	-	185	3	555	71	39,405	15.9	-	3.7	2,054	3,625	298	3,923
C	5	0.80	1.29	0.119	0.326	1,138	-	-	185	5	925	71	65,675	15.9	-	3.7	3,423	7,815	1,116	8,931
D	6	1.30	2.29	0.266	0.508	1,138	-	-	185	6	1,110	71	78,810	15.9	-	3.7	4,107	20,963	2,086	23,049
E	-	2.30	3.29	0.580	0.928	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	16						-	-		16	2,960		210,160		-		10,953	32,403	3,500	35,903

2,960

Table F.6 Estimated Flood Damage to Houses due to Major Flood (6/16)
(I-B.1: With Max. Ta Trach only, in 2001 (2/2))

Flood Scale: Major Flood 20-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area (km ²)	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km ²)	Area (km ²)	Number of houses (house)	Density of house (house/km ²)	Area (km ²)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
		(m)	(m)			f	g	h=f x g	i	j	k=i x j			n	o=n x h	p	q=p x k			
A	4	-	0.29	-	-	1,138	-	-	185	4	740	71	52,540	15.9	-	3.7	2,738	-	-	-
B	3	0.30	0.79	0.092	0.145	1,138	-	-	185	3	555	71	39,405	15.9	-	3.7	2,054	3,625	298	3,923
C	3	0.80	1.29	0.119	0.326	1,138	-	-	185	3	555	71	39,405	15.9	-	3.7	2,054	4,689	670	5,359
D	11	1.30	2.29	0.266	0.508	1,138	-	-	185	11	2,035	71	144,485	15.9	-	3.7	7,530	38,433	3,825	42,258
E	-	2.30	3.29	0.580	0.928	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	21						-	-		21	3,885		275,835		-		14,376	46,747	4,793	51,540

3,885

Flood Scale: Major Flood 50-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area (km ²)	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km ²)	Area (km ²)	Number of houses (house)	Density of house (house/km ²)	Area (km ²)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
		(m)	(m)			f	g	h=f x g	i	j	k=i x j			n	o=n x h	p	q=p x k			
A	4	-	0.29	-	-	1,138	0.4	401	185	4	675	71	76,357	15.9	6,369	3.7	2,497	-	-	-
B	5	0.30	0.79	0.092	0.145	1,138	0.4	501	185	5	844	71	95,447	15.9	7,961	3.7	3,121	8,781	1,607	10,388
C	6	0.80	1.29	0.119	0.326	1,138	0.4	505	185	6	1,028	71	108,820	15.9	8,025	3.7	3,803	12,950	3,856	16,806
D	8	1.30	2.29	0.266	0.508	1,138	-	-	185	8	1,480	71	105,080	15.9	-	3.7	5,476	27,951	2,782	30,733
E	9	2.30	3.29	0.580	0.928	1,138	-	-	185	9	1,665	71	118,215	15.9	-	3.7	6,161	68,565	5,717	74,282
F	5	3.30		0.834	0.991	1,138	-	-	185	5	925	71	65,675	15.9	-	3.7	3,423	54,773	3,392	58,165
Total	37						1.2	1,406		36	6,616		569,594		22,355		24,481	173,020	17,354	190,374

8,022

Flood Scale: Major Flood 100-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area (km ²)	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km ²)	Area (km ²)	Number of houses (house)	Density of house (house/km ²)	Area (km ²)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
		(m)	(m)			f	g	h=f x g	i	j	k=i x j			n	o=n x h	p	q=p x k			
A	8	-	0.29	-	-	1,138	0.7	801	185	7	1,350	71	152,715	15.9	12,738	3.7	4,994	-	-	-
B	8	0.30	0.79	0.092	0.145	1,138	0.7	801	185	7	1,350	71	152,715	15.9	12,738	3.7	4,994	14,050	2,571	16,621
C	6	0.80	1.29	0.119	0.326	1,138	0.5	601	185	5	1,012	71	114,536	15.9	9,554	3.7	3,746	13,630	4,336	17,966
D	11	1.30	2.29	0.266	0.508	1,138	0.6	705	185	10	1,920	71	186,404	15.9	11,210	3.7	7,105	49,583	9,304	58,887
E	7	2.30	3.29	0.580	0.928	1,138	-	-	185	7	1,295	71	91,945	15.9	-	3.7	4,792	53,328	4,447	57,775
F	12	3.30		0.834	0.991	1,138	-	-	185	12	2,220	71	157,620	15.9	-	3.7	8,214	131,455	8,140	139,595
Total	52						2.6	2,908		49	9,147		855,935		46,240		33,845	262,046	28,798	290,844

12,055

Table F.6 Estimated Flood Damage to Houses due to Major Flood (7/16)
(I-B.1: With Max. Ta Trach only, in 2020 (1/2))

Flood Scale: Major Flood 2-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area (km2)	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km2)	Area (km2)	Number of houses (house)	Density of house (house/km2)	Area (km2)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
		(m)	(m)			f	g	h=f x g	i	j	k=i x j			n	o=n x h	p	q=p x k			
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	3	-	0.29	-	-	1,138	-	-	211	3	633	71	44,943	15.9	-	3.7	2,342	-	-	-
B	5	0.30	0.79	0.092	0.145	1,138	-	-	211	5	1,055	71	74,905	15.9	-	3.7	3,904	6,891	566	7,457
C	4	0.80	1.29	0.119	0.326	1,138	-	-	211	4	844	71	59,924	15.9	-	3.7	3,123	7,131	1,018	8,149
D	-	1.30	2.29	0.266	0.508	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
E	-	2.30	3.29	0.580	0.928	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	12						-	-		12	2,532		179,772		-		9,369	14,022	1,584	15,606

2,532

Flood Scale: Major Flood 5-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area (km2)	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km2)	Area (km2)	Number of houses (house)	Density of house (house/km2)	Area (km2)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
		(m)	(m)			f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	1	-	0.29	-	-	1,138	-	-	211	1	211	71	14,981	15.9	-	3.7	781	-	-	-
B	5	0.30	0.79	0.092	0.145	1,138	-	-	211	5	1,055	71	74,905	15.9	-	3.7	3,904	6,891	566	7,457
C	5	0.80	1.29	0.119	0.326	1,138	-	-	211	5	1,055	71	74,905	15.9	-	3.7	3,904	8,914	1,273	10,187
D	3	1.30	2.29	0.266	0.508	1,138	-	-	211	3	633	71	44,943	15.9	-	3.7	2,342	11,955	1,190	13,145
E	-	2.30	3.29	0.580	0.928	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	14						-	-		14	2,954		209,734		-		10,931	27,760	3,029	30,789

2,954

Flood Scale: Major Flood 10-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area (km2)	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km2)	Area (km2)	Number of houses (house)	Density of house (house/km2)	Area (km2)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
		(m)	(m)			f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	2	-	0.29	-	-	1,138	-	-	211	2	422	71	29,962	15.9	-	3.7	1,561	-	-	-
B	3	0.30	0.79	0.092	0.145	1,138	-	-	211	3	633	71	44,943	15.9	-	3.7	2,342	4,135	340	4,475
C	5	0.80	1.29	0.119	0.326	1,138	-	-	211	5	1,055	71	74,905	15.9	-	3.7	3,904	8,914	1,273	10,187
D	6	1.30	2.29	0.266	0.508	1,138	-	-	211	6	1,266	71	89,886	15.9	-	3.7	4,684	23,910	2,379	26,289
E	-	2.30	3.29	0.580	0.928	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	16						-	-		16	3,376		239,696		-		12,491	36,959	3,992	40,951

3,376

Table F.6 Estimated Flood Damage to Houses due to Major Flood (8/16)
(I-B.1: With Max. Ta Trach only, in 2020 (2/2))

Flood Scale: Major Flood 20-Year

Areas	Flood Condition			Damage rate		Number of houses including household shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house	Total value of house	Major city/town		Other district		Damage to house	Damage to household goods	Total
		from	to			Density of house	Area	Number of houses	Density of house	Area	Number of houses			Unit value of household goods	Total value of household goods	Unit value of household goods	Total value of household goods			
	(km ²)	(m)	(m)			(house/km ²)	(km ²)	(house)	(house/km ²)	(km ²)	(house)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	4	-	0.29	-	-	1,138	-	-	211	4	844	71	59,924	15.9	-	3.7	3,123	-	-	-
B	3	0.30	0.79	0.092	0.145	1,138	-	-	211	3	633	71	44,943	15.9	-	3.7	2,342	4,135	340	4,475
C	3	0.80	1.29	0.119	0.326	1,138	-	-	211	3	633	71	44,943	15.9	-	3.7	2,342	5,348	763	6,111
D	11	1.30	2.29	0.266	0.508	1,138	-	-	211	11	2,321	71	164,791	15.9	-	3.7	8,588	43,834	4,363	48,197
E	-	2.30	3.29	0.580	0.928	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	21						-	-		21	4,431		314,601		-		16,395	53,317	5,466	58,783

4,431

Flood Scale: Major Flood 50-Year

Areas	Flood Condition			Damage rate		Number of houses including household shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house	Total value of house	Major city/town		Other district		Damage to house	Damage to household goods	Total
		from	to			Density of house	Area	Number of houses	Density of house	Area	Number of houses			Unit value of household goods	Total value of household goods	Unit value of household goods	Total value of household goods			
	(km ²)	(m)	(m)			(house/km ²)	(km ²)	(house)	(house/km ²)	(km ²)	(house)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	4	-	0.29	-	-	1,138	0.6	683	211	3	717	71	99,414	15.9	10,857	3.7	2,654	-	-	-
B	5	0.30	0.79	0.092	0.145	1,138	0.8	854	211	4	897	71	124,268	15.9	13,571	3.7	3,318	11,433	2,449	13,882
C	6	0.80	1.29	0.119	0.326	1,138	0.8	860	211	5	1,106	71	139,644	15.9	13,679	3.7	4,094	16,618	5,794	22,412
D	8	1.30	2.29	0.266	0.508	1,138	-	-	211	8	1,688	71	119,848	15.9	-	3.7	6,246	31,880	3,173	35,053
E	9	2.30	3.29	0.580	0.928	1,138	-	-	211	9	1,899	71	134,829	15.9	-	3.7	7,026	78,201	6,520	84,721
F	5	3.30		0.834	0.991	1,138	-	-	211	5	1,055	71	74,905	15.9	-	3.7	3,904	62,471	3,869	66,340
Total	37						2.1	2,397		35	7,363		692,908		38,107		27,242	200,603	21,805	222,408

9,759

Flood Scale: Major Flood 100-Year

Areas	Flood Condition			Damage rate		Number of houses including household shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house	Total value of house	Major city/town		Other district		Damage to house	Damage to household goods	Total
		from	to			Density of house	Area	Number of houses	Density of house	Area	Number of houses			Unit value of household goods	Total value of household goods	Unit value of household goods	Total value of household goods			
	(km ²)	(m)	(m)			(house/km ²)	(km ²)	(house)	(house/km ²)	(km ²)	(house)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	8	-	0.29	-	-	1,138	1.2	1,366	211	7	1,435	71	198,828	15.9	21,713	3.7	5,309	-	-	-
B	8	0.30	0.79	0.092	0.145	1,138	1.2	1,366	211	7	1,435	71	198,828	15.9	21,713	3.7	5,309	18,292	3,918	22,210
C	6	0.80	1.29	0.119	0.326	1,138	0.9	1,024	211	5	1,076	71	149,121	15.9	16,285	3.7	3,982	17,745	6,607	24,352
D	11	1.30	2.29	0.266	0.508	1,138	1.1	1,202	211	10	2,098	71	234,294	15.9	19,107	3.7	7,763	62,322	13,650	75,972
E	7	2.30	3.29	0.580	0.928	1,138	-	-	211	7	1,477	71	104,867	15.9	-	3.7	5,465	60,823	5,072	65,895
F	12	3.30		0.834	0.991	1,138	-	-	211	12	2,532	71	179,772	15.9	-	3.7	9,368	149,930	9,284	159,214
Total	52						4.4	4,957		48	10,053		1,065,710		78,818		37,196	309,112	38,531	347,643

15,010

Table F.6 Estimated Flood Damage to Houses due to Major Flood (9/16)

(I-B.2: With Max. Ta Trach + Max. Huu Trach, I-B.3: Max. Ta Trach + Min. Huu Trach,

I-B.6: Max. Ta Trach + Max. Huu Trach + Max. Co Bi, I-B.7: Max. Ta Trach + Max. Huu Trach + Min. Co Bi,

I-B.8: Max. Ta Trach + Min. Huu Trach + Max. Co. Bi, I-B.9: Max. Ta Trach + Min. Huu Trach + Min. Co Bi, in 2001 (1/2))

Flood Scale: Major Flood 2-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km2)	Area (km2)	Number of houses (house)	Density of house (house/km2)	Area (km2)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
	(km2)	(m)	(m)			f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	-	-	0.29	-	-	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
B	-	0.30	0.79	0.092	0.145	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
C	-	0.80	1.29	0.119	0.326	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
D	-	1.30	2.29	0.266	0.508	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
E	-	2.30	3.29	0.580	0.928	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	-						-	-		-	-		-		-		-	-	-	-

Flood Scale: Major Flood 5-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km2)	Area (km2)	Number of houses (house)	Density of house (house/km2)	Area (km2)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
	(km2)	(m)	(m)			f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	-	-	0.29	-	-	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
B	-	0.30	0.79	0.092	0.145	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
C	-	0.80	1.29	0.119	0.326	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
D	-	1.30	2.29	0.266	0.508	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
E	-	2.30	3.29	0.580	0.928	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	-						-	-		-	-		-		-		-	-	-	-

Flood Scale: Major Flood 10-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km2)	Area (km2)	Number of houses (house)	Density of house (house/km2)	Area (km2)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
	(km2)	(m)	(m)			f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	-	-	0.29	-	-	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
B	-	0.30	0.79	0.092	0.145	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
C	-	0.80	1.29	0.119	0.326	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
D	-	1.30	2.29	0.266	0.508	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
E	-	2.30	3.29	0.580	0.928	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	-						-	-		-	-		-		-		-	-	-	-

Table F.6 Estimated Flood Damage to Houses due to Major Flood (10/16)

(I-B.2: With Max. Ta Trach + Max. Huu Trach, I-B.3: Max. Ta Trach + Min. Huu Trach,

I-B.6: Max. Ta Trach + Max. Huu Trach + Max. Co Bi, I-B.7: Max. Ta Trach + Max. Huu Trach + Min. Co Bi,

I-B.8: Max. Ta Trach + Min. Huu Trach + Max. Co. Bi, I-B.9: Max. Ta Trach + Min. Huu Trach + Min. Co Bi, in 2001 (2/2))

Flood Scale: Major Flood 20-Year

Areas	Flood Condition			Damage rate		Number of houses including household shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house	Total value of house	Major city/town		Other district		Damage to house	Damage to household goods	Total
		from	to			Density of house	Area	Number of houses	Density of house	Area	Number of houses			Unit value of household goods	Total value of household goods	Unit value of household goods	Total value of household goods			
	(km ²)	(m)	(m)			(house/km ²)	(km ²)	(house)	(house/km ²)	(km ²)	(house)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	3	-	0.29	-	-	1,138	-	-	185	3	555	71	39,405	15.9	-	3.7	2,054	-	-	-
B	5	0.30	0.79	0.092	0.145	1,138	-	-	185	5	925	71	65,675	15.9	-	3.7	3,423	6,042	496	6,538
C	5	0.80	1.29	0.119	0.326	1,138	-	-	185	5	925	71	65,675	15.9	-	3.7	3,423	7,815	1,116	8,931
D	-	1.30	2.29	0.266	0.508	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
E	-	2.30	3.29	0.580	0.928	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	13						-	-		13	2,405		170,755		-		8,900	13,857	1,612	15,469

2,405

Flood Scale: Major Flood 50-Year

Areas	Flood Condition			Damage rate		Number of houses including household shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house	Total value of house	Major city/town		Other district		Damage to house	Damage to household goods	Total
		from	to			Density of house	Area	Number of houses	Density of house	Area	Number of houses			Unit value of household goods	Total value of household goods	Unit value of household goods	Total value of household goods			
	(km ²)	(m)	(m)			(house/km ²)	(km ²)	(house)	(house/km ²)	(km ²)	(house)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	4	-	0.29	-	-	1,138	0.2	254	185	4	699	71	67,624	15.9	4,034	3.7	2,585	-	-	-
B	5	0.30	0.79	0.092	0.145	1,138	-	-	185	5	925	71	65,675	15.9	-	3.7	3,423	6,042	496	6,538
C	3	0.80	1.29	0.119	0.326	1,138	-	-	185	3	555	71	39,405	15.9	-	3.7	2,054	4,689	670	5,359
D	9	1.30	2.29	0.266	0.508	1,138	-	-	185	9	1,665	71	118,215	15.9	-	3.7	6,161	31,445	3,130	34,575
E	4	2.30	3.29	0.580	0.928	1,138	-	-	185	4	740	71	52,540	15.9	-	3.7	2,738	30,473	2,541	33,014
F	-	3.30		0.834	0.991	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	25						0.2	254		25	4,584		343,459		4,034		16,961	72,649	6,837	79,486

4,837

Flood Scale: Major Flood 100-Year

Areas	Flood Condition			Damage rate		Number of houses including household shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house	Total value of house	Major city/town		Other district		Damage to house	Damage to household goods	Total
		from	to			Density of house	Area	Number of houses	Density of house	Area	Number of houses			Unit value of household goods	Total value of household goods	Unit value of household goods	Total value of household goods			
	(km ²)	(m)	(m)			(house/km ²)	(km ²)	(house)	(house/km ²)	(km ²)	(house)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	4	-	0.29	-	-	1,138	0.4	401	185	4	675	71	76,357	15.9	6,369	3.7	2,497	-	-	-
B	6	0.30	0.79	0.092	0.145	1,138	0.5	601	185	5	1,012	71	114,536	15.9	9,554	3.7	3,746	10,537	1,929	12,466
C	5	0.80	1.29	0.119	0.326	1,138	0.4	501	185	5	844	71	95,447	15.9	7,961	3.7	3,121	11,358	3,613	14,971
D	10	1.30	2.29	0.266	0.508	1,138	0.1	70	185	10	1,839	71	135,518	15.9	1,115	3.7	6,803	36,048	4,022	40,070
E	8	2.30	3.29	0.580	0.928	1,138	-	-	185	8	1,480	71	105,080	15.9	-	3.7	5,476	60,946	5,082	66,028
F	6	3.30		0.834	0.991	1,138	-	-	185	6	1,110	71	78,810	15.9	-	3.7	4,107	65,728	4,070	69,798
Total	39						1.4	1,572		38	6,959		605,748		24,999		25,750	184,617	18,716	203,333

8,532

Table F.6 Estimated Flood Damage to Houses due to Major Flood (11/16)

(I-B.2: With Max. Ta Trach + Max. Huu Trach, I-B.3: Max. Ta Trach + Min. Huu Trach,

I-B.6: Max. Ta Trach + Max. Huu Trach + Max. Co Bi, I-B.7: Max. Ta Trach + Max. Huu Trach + Min. Co Bi,

I-B.8: Max. Ta Trach + Min. Huu Trach + Max. Co. Bi, I-B.9: Max. Ta Trach + Min. Huu Trach + Min. Co Bi, in 2020 (1/2))

Flood Scale: Major Flood 2-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km2)	Area (km2)	Number of houses (house)	Density of house (house/km2)	Area (km2)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
	(km2)	(m)	(m)			f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	-	-	0.29	-	-	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
B	-	0.30	0.79	0.092	0.145	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
C	-	0.80	1.29	0.119	0.326	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
D	-	1.30	2.29	0.266	0.508	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
E	-	2.30	3.29	0.580	0.928	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	-						-	-		-	-		-		-		-	-	-	-

Flood Scale: Major Flood 5-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km2)	Area (km2)	Number of houses (house)	Density of house (house/km2)	Area (km2)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
	(km2)	(m)	(m)			f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	-	-	0.29	-	-	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
B	-	0.30	0.79	0.092	0.145	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
C	-	0.80	1.29	0.119	0.326	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
D	-	1.30	2.29	0.266	0.508	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
E	-	2.30	3.29	0.580	0.928	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	-						-	-		-	-		-		-		-	-	-	-

Flood Scale: Major Flood 10-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km2)	Area (km2)	Number of houses (house)	Density of house (house/km2)	Area (km2)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
	(km2)	(m)	(m)			f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	-	-	0.29	-	-	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
B	-	0.30	0.79	0.092	0.145	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
C	-	0.80	1.29	0.119	0.326	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
D	-	1.30	2.29	0.266	0.508	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
E	-	2.30	3.29	0.580	0.928	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	-						-	-		-	-		-		-		-	-	-	-

Table F.6 Estimated Flood Damage to Houses due to Major Flood (12/16)

(I-B.2: With Max. Ta Trach + Max. Huu Trach, I-B.3: Max. Ta Trach + Min. Huu Trach,

I-B.6: Max. Ta Trach + Max. Huu Trach + Max. Co Bi, I-B.7: Max. Ta Trach + Max. Huu Trach + Min. Co Bi,

I-B.8: Max. Ta Trach + Min. Huu Trach + Max. Co. Bi, I-B.9: Max. Ta Trach + Min. Huu Trach + Min. Co Bi, in 2020 (2/2))

Flood Scale: Major Flood 20-Year

Areas	Flood Condition			Damage rate		Number of houses including household shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house	Total value of house	Major city/town		Other district		Damage to house	Damage to household goods	Total
		from	to			Density of house	Area	Number of houses	Density of house	Area	Number of houses			Unit value of household goods	Total value of household goods	Unit value of household goods	Total value of household goods			
	(km ²)	(m)	(m)			(house/km ²)	(km ²)	(house)	(house/km ²)	(km ²)	(house)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	3	-	0.29	-	-	1,138	-	-	211	3	633	71	44,943	15.9	-	3.7	2,342	-	-	-
B	5	0.30	0.79	0.092	0.145	1,138	-	-	211	5	1,055	71	74,905	15.9	-	3.7	3,904	6,891	566	7,457
C	5	0.80	1.29	0.119	0.326	1,138	-	-	211	5	1,055	71	74,905	15.9	-	3.7	3,904	8,914	1,273	10,187
D	-	1.30	2.29	0.266	0.508	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
E	-	2.30	3.29	0.580	0.928	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	13						-	-		13	2,743		194,753		-		10,150	15,805	1,839	17,644

2,743

Flood Scale: Major Flood 50-Year

Areas	Flood Condition			Damage rate		Number of houses including household shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house	Total value of house	Major city/town		Other district		Damage to house	Damage to household goods	Total
		from	to			Density of house	Area	Number of houses	Density of house	Area	Number of houses			Unit value of household goods	Total value of household goods	Unit value of household goods	Total value of household goods			
	(km ²)	(m)	(m)			(house/km ²)	(km ²)	(house)	(house/km ²)	(km ²)	(house)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	4	-	0.29	-	-	1,138	0.4	432	211	4	764	71	84,934	15.9	6,876	3.7	2,826	-	-	-
B	5	0.30	0.79	0.092	0.145	1,138	-	-	211	5	1,055	71	74,905	15.9	-	3.7	3,904	6,891	566	7,457
C	3	0.80	1.29	0.119	0.326	1,138	-	-	211	3	633	71	44,943	15.9	-	3.7	2,342	5,348	763	6,111
D	9	1.30	2.29	0.266	0.508	1,138	-	-	211	9	1,899	71	134,829	15.9	-	3.7	7,026	35,865	3,569	39,434
E	4	2.30	3.29	0.580	0.928	1,138	-	-	211	4	844	71	59,924	15.9	-	3.7	3,123	34,756	2,898	37,654
F	-	3.30		0.834	0.991	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	25						0.4	432		25	5,195		399,535		6,876		19,221	82,860	7,796	90,656

5,627

Flood Scale: Major Flood 100-Year

Areas	Flood Condition			Damage rate		Number of houses including household shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house	Total value of house	Major city/town		Other district		Damage to house	Damage to household goods	Total
		from	to			Density of house	Area	Number of houses	Density of house	Area	Number of houses			Unit value of household goods	Total value of household goods	Unit value of household goods	Total value of household goods			
	(km ²)	(m)	(m)			(house/km ²)	(km ²)	(house)	(house/km ²)	(km ²)	(house)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	4	-	0.29	-	-	1,138	0.6	683	211	3	717	71	99,414	15.9	10,857	3.7	2,654	-	-	-
B	6	0.30	0.79	0.092	0.145	1,138	0.9	1,024	211	5	1,076	71	149,121	15.9	16,285	3.7	3,982	13,719	2,939	16,658
C	5	0.80	1.29	0.119	0.326	1,138	0.8	854	211	4	897	71	124,268	15.9	13,571	3.7	3,318	14,788	5,506	20,294
D	10	1.30	2.29	0.266	0.508	1,138	0.1	119	211	10	2,088	71	156,721	15.9	1,900	3.7	7,725	41,688	4,890	46,578
E	8	2.30	3.29	0.580	0.928	1,138	-	-	211	8	1,688	71	119,848	15.9	-	3.7	6,246	69,512	5,796	75,308
F	6	3.30		0.834	0.991	1,138	-	-	211	6	1,266	71	89,886	15.9	-	3.7	4,684	74,965	4,642	79,607
Total	39						2.4	2,680		37	7,732		739,258		42,613		28,609	214,672	23,773	238,445

10,412

Table F.6 Estimated Flood Damage to Houses due to Major Flood (13/16)
(I-C.2: Min. Ta Trach + Max. Huu Trach, I-C.6: Min. Ta Trach + Max. Huu Trach + Max Co Bi,
I-C.7: Min. Ta Trach + Max. Huu Trach + Min. Co Bi, in 2001 (1/2))

Flood Scale: Major Flood 2-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area (km2)	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km2)	Area (km2)	Number of houses (house)	Density of house (house/km2)	Area (km2)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	-	-	0.29	-	-	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
B	-	0.30	0.79	0.092	0.145	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
C	-	0.80	1.29	0.119	0.326	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
D	-	1.30	2.29	0.266	0.508	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
E	-	2.30	3.29	0.580	0.928	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	-						-	-		-	-		-		-		-	-	-	-

Flood Scale: Major Flood 5-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area (km2)	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km2)	Area (km2)	Number of houses (house)	Density of house (house/km2)	Area (km2)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	-	-	0.29	-	-	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
B	-	0.30	0.79	0.092	0.145	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
C	-	0.80	1.29	0.119	0.326	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
D	-	1.30	2.29	0.266	0.508	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
E	-	2.30	3.29	0.580	0.928	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	-						-	-		-	-		-		-		-	-	-	-

Flood Scale: Major Flood 10-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area (km2)	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km2)	Area (km2)	Number of houses (house)	Density of house (house/km2)	Area (km2)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	2	-	0.29	-	-	1,138	-	-	185	2	370	71	26,270	15.9	-	3.7	1,369	-	-	-
B	4	0.30	0.79	0.092	0.145	1,138	-	-	185	4	740	71	52,540	15.9	-	3.7	2,738	4,834	397	5,231
C	6	0.80	1.29	0.119	0.326	1,138	-	-	185	6	1,110	71	78,810	15.9	-	3.7	4,107	9,378	1,339	10,717
D	2	1.30	2.29	0.266	0.508	1,138	-	-	185	2	370	71	26,270	15.9	-	3.7	1,369	6,988	695	7,683
E	-	2.30	3.29	0.580	0.928	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	14						-	-		14	2,590		183,890		-		9,583	21,200	2,431	23,631

2,590

Table F.6 Estimated Flood Damage to Houses due to Major Flood (14/16)
(I-C.2: Min. Ta Trach + Max. Huu Trach, I-C.6: Min. Ta Trach + Max. Huu Trach + Max Co Bi,
I-C.7: Min. Ta Trach + Max. Huu Trach + Min. Co Bi, in 2001 (2/2))

Flood Scale: Major Flood 20-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house	Total value of house	Major city/town		Other district		Damage to house	Damage to household goods	Total
		from	to			Density of house	Area	Number of houses	Density of house	Area	Number of houses			Unit value of household goods	Total value of household goods	Unit value of household goods	Total value of household goods			
	(km2)	(m)	(m)			(house/km2)	(km2)	(house)	(house/km2)	(km2)	(house)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	2	-	0.29	-	-	1,138	-	-	185	2	370	71	26,270	15.9	-	3.7	1,369	-	-	-
B	3	0.30	0.79	0.092	0.145	1,138	-	-	185	3	555	71	39,405	15.9	-	3.7	2,054	3,625	298	3,923
C	4	0.80	1.29	0.119	0.326	1,138	-	-	185	4	740	71	52,540	15.9	-	3.7	2,738	6,252	893	7,145
D	9	1.30	2.29	0.266	0.508	1,138	-	-	185	9	1,665	71	118,215	15.9	-	3.7	6,161	31,445	3,130	34,575
E	-	2.30	3.29	0.580	0.928	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	18						-	-		18	3,330		236,430		-		12,322	41,322	4,321	45,643

3,330

Flood Scale: Major Flood 50-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house	Total value of house	Major city/town		Other district		Damage to house	Damage to household goods	Total
		from	to			Density of house	Area	Number of houses	Density of house	Area	Number of houses			Unit value of household goods	Total value of household goods	Unit value of household goods	Total value of household goods			
	(km2)	(m)	(m)			(house/km2)	(km2)	(house)	(house/km2)	(km2)	(house)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	3	-	0.29	-	-	1,138	0.3	300	185	3	506	71	57,268	15.9	4,777	3.7	1,873	-	-	-
B	6	0.30	0.79	0.092	0.145	1,138	-	-	185	6	1,110	71	78,810	15.9	-	3.7	4,107	7,251	596	7,847
C	3	0.80	1.29	0.119	0.326	1,138	-	-	185	3	555	71	39,405	15.9	-	3.7	2,054	4,689	670	5,359
D	8	1.30	2.29	0.266	0.508	1,138	-	-	185	8	1,480	71	105,080	15.9	-	3.7	5,476	27,951	2,782	30,733
E	6	2.30	3.29	0.580	0.928	1,138	-	-	185	6	1,110	71	78,810	15.9	-	3.7	4,107	45,710	3,811	49,521
F	-	3.30		0.834	0.991	1,138	-	-	185	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	26						0.3	300		26	4,761		359,373		4,777		17,617	85,601	7,859	93,460

5,062

Flood Scale: Major Flood 100-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house	Total value of house	Major city/town		Other district		Damage to house	Damage to household goods	Total
		from	to			Density of house	Area	Number of houses	Density of house	Area	Number of houses			Unit value of household goods	Total value of household goods	Unit value of household goods	Total value of household goods			
	(km2)	(m)	(m)			(house/km2)	(km2)	(house)	(house/km2)	(km2)	(house)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)	(VND Million)
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	3	-	0.29	-	-	1,138	0.3	300	185	3	506	71	57,268	15.9	4,777	3.7	1,873	-	-	-
B	6	0.30	0.79	0.092	0.145	1,138	0.5	601	185	5	1,012	71	114,536	15.9	9,554	3.7	3,746	10,537	1,929	12,466
C	6	0.80	1.29	0.119	0.326	1,138	0.5	601	185	5	1,012	71	114,536	15.9	9,554	3.7	3,746	13,630	4,336	17,966
D	8	1.30	2.29	0.266	0.508	1,138	-	-	185	8	1,480	71	105,080	15.9	-	3.7	5,476	27,951	2,782	30,733
E	9	2.30	3.29	0.580	0.928	1,138	-	-	185	9	1,665	71	118,215	15.9	-	3.7	6,161	68,565	5,717	74,282
F	5	3.30		0.834	0.991	1,138	-	-	185	5	925	71	65,675	15.9	-	3.7	3,423	54,773	3,392	58,165
Total	37						1.3	1,502		36	6,601		575,310		23,885		24,425	175,456	18,156	193,612

8,103

Table F.6 Estimated Flood Damage to Houses due to Major Flood (15/16)
(I-C.2: Min. Ta Trach + Max. Huu Trach, I-C.6: Min. Ta Trach + Max. Huu Trach + Max Co Bi,
I-C.7: Min. Ta Trach + Max. Huu Trach + Min. Co Bi, in 2020 (1/2))

Flood Scale: Major Flood 2-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area (km2)	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km2)	Area (km2)	Number of houses (house)	Density of house (house/km2)	Area (km2)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
		(m)	(m)			f	g	h=f x g	i	j	k=i x j			n	o=n x h	p	q=p x k			
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	-	-	0.29	-	-	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
B	-	0.30	0.79	0.092	0.145	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
C	-	0.80	1.29	0.119	0.326	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
D	-	1.30	2.29	0.266	0.508	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
E	-	2.30	3.29	0.580	0.928	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	-						-	-		-	-		-		-		-	-	-	-

Flood Scale: Major Flood 5-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area (km2)	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km2)	Area (km2)	Number of houses (house)	Density of house (house/km2)	Area (km2)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
		(m)	(m)			f	g	h=f x g	i	j	k=i x j			n	o=n x h	p	q=p x k			
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	-	-	0.29	-	-	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
B	-	0.30	0.79	0.092	0.145	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
C	-	0.80	1.29	0.119	0.326	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
D	-	1.30	2.29	0.266	0.508	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
E	-	2.30	3.29	0.580	0.928	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	-						-	-		-	-		-		-		-	-	-	-

Flood Scale: Major Flood 10-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area (km2)	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km2)	Area (km2)	Number of houses (house)	Density of house (house/km2)	Area (km2)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
		(m)	(m)			f	g	h=f x g	i	j	k=i x j			n	o=n x h	p	q=p x k			
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	2	-	0.29	-	-	1,138	-	-	211	2	422	71	29,962	15.9	-	3.7	1,561	-	-	-
B	4	0.30	0.79	0.092	0.145	1,138	-	-	211	4	844	71	59,924	15.9	-	3.7	3,123	5,513	453	5,966
C	6	0.80	1.29	0.119	0.326	1,138	-	-	211	6	1,266	71	89,886	15.9	-	3.7	4,684	10,696	1,527	12,223
D	2	1.30	2.29	0.266	0.508	1,138	-	-	211	2	422	71	29,962	15.9	-	3.7	1,561	7,970	793	8,763
E	-	2.30	3.29	0.580	0.928	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	14						-	-		14	2,954		209,734		-		10,929	24,179	2,773	26,952

2,954

Table F.6 Estimated Flood Damage to Houses due to Major Flood (16/16)
(I-C.2: Min. Ta Trach + Max. Huu Trach, I-C.6: Min. Ta Trach + Max. Huu Trach + Max Co Bi,
I-C.7: Min. Ta Trach + Max. Huu Trach + Min. Co Bi, in 2020 (2/2))

Flood Scale: Major Flood 20-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area (km ²)	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km ²)	Area (km ²)	Number of houses (house)	Density of house (house/km ²)	Area (km ²)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	2	-	0.29	-	-	1,138	-	-	211	2	422	71	29,962	15.9	-	3.7	1,561	-	-	-
B	3	0.30	0.79	0.092	0.145	1,138	-	-	211	3	633	71	44,943	15.9	-	3.7	2,342	4,135	340	4,475
C	4	0.80	1.29	0.119	0.326	1,138	-	-	211	4	844	71	59,924	15.9	-	3.7	3,123	7,131	1,018	8,149
D	9	1.30	2.29	0.266	0.508	1,138	-	-	211	9	1,899	71	134,829	15.9	-	3.7	7,026	35,865	3,569	39,434
E	-	2.30	3.29	0.580	0.928	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
F	-	3.30		0.834	0.991	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	18						-	-		18	3,798		269,658		-		14,052	47,131	4,927	52,058

3,798

Flood Scale: Major Flood 50-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area (km ²)	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km ²)	Area (km ²)	Number of houses (house)	Density of house (house/km ²)	Area (km ²)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	3	-	0.29	-	-	1,138	0.5	512	211	3	538	71	74,561	15.9	8,142	3.7	1,991	-	-	-
B	6	0.30	0.79	0.092	0.145	1,138	-	-	211	6	1,266	71	89,886	15.9	-	3.7	4,684	8,270	679	8,949
C	3	0.80	1.29	0.119	0.326	1,138	-	-	211	3	633	71	44,943	15.9	-	3.7	2,342	5,348	763	6,111
D	8	1.30	2.29	0.266	0.508	1,138	-	-	211	8	1,688	71	119,848	15.9	-	3.7	6,246	31,880	3,173	35,053
E	6	2.30	3.29	0.580	0.928	1,138	-	-	211	6	1,266	71	89,886	15.9	-	3.7	4,684	52,134	4,347	56,481
F	-	3.30		0.834	0.991	1,138	-	-	211	-	-	71	-	15.9	-	3.7	-	-	-	-
Total	26						0.5	512		26	5,391		419,124		8,142		19,947	97,632	8,962	106,594

5,903

Flood Scale: Major Flood 100-Year

Areas	Flood Condition			Damage rate		Number of houses including househokd shops and industries						House		Household durable goods				Damage to General Assets		
	Area (km ²)	Inundation Depth		House	Household durable goods	Major city/town			Other district			Unit value of house (VND Million)	Total value of house (VND Million)	Major city/town		Other district		Damage to house (VND Million)	Damage to household goods (VND Million)	Total (VND Million)
		from	to			Density of house (house/km ²)	Area (km ²)	Number of houses (house)	Density of house (house/km ²)	Area (km ²)	Number of houses (house)			Unit value of household goods (VND Million)	Total value of household goods (VND Million)	Unit value of household goods (VND Million)	Total value of household goods (VND Million)			
	a	b	c	d	e	f	g	h=f x g	i	j	k=i x j	l	m=l x (h+k)	n	o=n x h	p	q=p x k	r=m x d	s=(o+q) x e	t=r + s
A	3	-	0.29	-	-	1,138	0.5	512	211	3	538	71	74,561	15.9	8,142	3.7	1,991	-	-	-
B	6	0.30	0.79	0.092	0.145	1,138	0.9	1,024	211	5	1,076	71	149,121	15.9	16,285	3.7	3,982	13,719	2,939	16,658
C	6	0.80	1.29	0.119	0.326	1,138	0.9	1,024	211	5	1,076	71	149,121	15.9	16,285	3.7	3,982	17,745	6,607	24,352
D	8	1.30	2.29	0.266	0.508	1,138	-	-	211	8	1,688	71	119,848	15.9	-	3.7	6,246	31,880	3,173	35,053
E	9	2.30	3.29	0.580	0.928	1,138	-	-	211	9	1,899	71	134,829	15.9	-	3.7	7,026	78,201	6,520	84,721
F	5	3.30		0.834	0.991	1,138	-	-	211	5	1,055	71	74,905	15.9	-	3.7	3,904	62,471	3,869	66,340
Total	37						2.3	2,561		35	7,332		702,385		40,712		27,131	204,016	23,108	227,124

9,893

Table F.7 Estimation of Probable Flood Damage (1/8)
(Huong River Basin, Without Project, in 2001)

1. Estimation of Flood Damage by Magnitude of Flood

Unit: VND Million

17. Estimation of Flood Damage by Magnitude of Flood													Unit: VND Million
		Early Flood			Major Flood								
	Return	Crops			1. House			2. River	3. Business	4. Welfare	5. Other	Sub-total	Total
River System	Period	Paddy	Upland	Sub-total	House	Household	Sub-total	facilities and	activities	and cultural	/4		
	(Year)		crop			durable		infrastructure	/2	facilities			
						goods		/1		/3			
	a	b	c	d=b+c	e	f	g=e+f	h=g x 33%	i=g x 36%	j=g x 6%	k=g x 29%	l=g+h+i+j+k	m=d+l
Huong River	2	-	-	-	108,522	10,430	118,952	39,254	42,823	7,137	34,496	242,662	242,662
	5	2,767	-	2,767	295,193	33,738	328,931	108,547	118,415	19,736	95,390	671,019	673,786
	10	5,489	-	5,489	501,476	70,981	572,457	188,911	206,085	34,347	166,013	1,167,813	1,173,302
	20	5,489	-	5,489	841,726	142,769	984,495	324,883	354,418	59,070	285,504	2,008,370	2,013,859
	50	5,489	-	5,489	1,208,585	208,660	1,417,245	481,123	523,549	86,227	419,585	2,927,729	2,933,218
	100	5,489	-	5,489	1,670,088	283,924	1,954,012	644,824	703,444	117,241	566,663	3,986,184	3,991,673

Note: /1 This item includes the damages to the facilities for flood prevention, water utilization, transportation, fishery, electricity, and post office.

/2 This item includes the damages to crops, forest, livestock, aquaculture, factories, shops, offices, machines, materials, and products.

/3 This item includes the damages to the facilities for cultural sector, health care, and education.

/4 This item includes the damages to administrative sector, armaments, and others.

2. Estimation of Annual Mean Flood Damage

River System	Return Period	Exceedance	Difference of Exceedance	Damage (VND Million)		Annual Damage (VND Million)		Equivalent US\$ million
				Amount	Mean	Segment	Cumulative	
Huong River	-	1.00						
	2	0.50	0.50	242,662	121,331	60,666	60,666	4.03
	5	0.20	0.30	673,786	458,224	137,467	198,133	13.15
	10	0.10	0.10	1,173,302	923,544	92,354	290,487	19.28
	20	0.05	0.05	2,013,859	1,593,581	79,679	370,166	24.57
	50	0.02	0.03	2,933,218	2,473,539	74,206	444,372	29.49
	100	0.010	0.01	3,991,673	3,462,446	34,624	478,997	31.79

Table F.7 Estimation of Probable Flood Damage (2/8)
(Huong River Basin, Without Project, in 2020)

1. Estimation of Flood Damage by Magnitude of Flood

Unit: VND Million

1. Estimation of Flood Damage by Magnitude of Flood												Unit: VND million	
River System	Return Period (Year)	Early Flood			Major Flood							Total	
		Crops			1. House			2. River facilities and infrastructure /1 h=g x 33%	3. Business activities /2 i=g x 36%	4. Welfare and cultural facilities /3 j=g x 6%	5. Other /4 k=g x 29%		Sub-total l=g+h+i+j+k
		Paddy	Upland crop	Sub-total	House	Household durable goods f	Sub-total g=e+f						
	a	b	c	d=b+c	e	f	g=e+f						m=d+l
Huong River	2	-	-	-	124,626	12,265	136,891	45,174	49,281	8,213	39,698	279,257	279,257
	5	2,767	-	2,767	350,149	45,762	395,911	130,651	142,528	23,755	114,814	807,659	810,426
	10	5,489	-	5,489	614,292	102,413	716,705	236,513	258,014	43,002	207,844	1,462,078	1,467,567
	20	5,489	-	5,489	1,095,893	217,559	1,313,452	433,439	472,843	78,807	380,901	2,679,442	2,684,931
	50	5,489	-	5,489	1,573,527	317,969	1,891,496	624,194	680,939	113,490	548,534	3,858,653	3,864,142
	100	5,489	-	5,489	2,174,386	432,663	2,607,049	860,326	938,538	156,423	756,044	5,318,380	5,323,869

Note: /1 This item includes the damages to the facilities for flood prevention, water utilization, transportation, fishery, electricity, and post office.

/2 This item includes the damages to crops, forest, livestock, aquaculture, factories, shops, offices, machines, materials, and products.

/3 This item includes the damages to the facilities for cultural sector, health care, and education.

/4 This item includes the damages to administrative sector, armaments, and others.

2. Estimation of Annual Mean Flood Damage

River System	Return Period	Exceedance	Difference of Exceedance	Damage (VND Million)		Annual Damage (VND Million)		Equivalent US\$ million
				Amount	Mean	Segment	Cumulative	
Huong River	-	1.00						
	2	0.50	0.50	279,257	139,629	69,814	69,814	4.63
	5	0.20	0.30	810,426	544,842	163,452	233,267	15.48
	10	0.10	0.10	1,467,567	1,138,997	113,900	347,166	23.04
	20	0.05	0.05	2,684,931	2,076,249	103,812	450,979	29.93
	50	0.02	0.03	3,864,142	3,274,537	98,236	549,215	36.45
	100	0.010	0.01	5,323,869	4,594,006	45,940	595,155	39.50

Table F.7 Estimation of Probable Flood Damage (3/8)
(I-B.1: With Max. Ta Trach only, in 2001)

1. Estimation of Flood Damage by Magnitude of Flood

Unit: VND Million

1. Estimation of Flood Damage by Magnitude of Flood													Unit: VND Million
River System	Return Period (Year)	Early Flood			Major Flood								Total
		Crops			1. House			2. River facilities and infrastructure /1 h=g x 33%	3. Business activities /2 i=g x 36%	4. Welfare and cultural facilities /3 j=g x 6%	5. Other /4 k=g x 29%	Sub-total l=g+h+i+j+k	
		Paddy b	Upland crop c	Sub-total d=b+c	House e	Household durable goods f	Sub-total g=e+f						
Huong River	a	b	c	d=b+c	e	f	g=e+f	h=g x 33%	i=g x 36%	j=g x 6%	k=g x 29%	l=g+h+i+j+k	m=d+l
	2	-	-	-	12,294	1,389	13,683	4,515	4,926	821	3,968	27,913	27,913
	5	-	-	-	24,339	2,655	26,994	8,908	9,718	1,620	7,828	55,068	55,068
	10	-	-	-	32,403	3,500	35,903	11,848	12,925	2,154	10,412	73,242	73,242
	20	-	-	-	46,747	4,793	51,540	17,008	18,554	3,092	14,947	105,141	105,141
	50	-	-	-	173,020	17,354	190,374	62,823	68,535	11,422	55,208	388,362	388,362
	100	-	-	-	262,046	28,798	290,844	95,979	104,704	17,451	84,345	593,323	593,323

Note: /1 This item includes the damages to the facilities for flood prevention, water utilization, transportation, fishery, electricity, and post office.

/2 This item includes the damages to crops, forest, livestock, aquaculture, factories, shops, offices, machines, materials, and products.

/3 This item includes the damages to the facilities for cultural sector, health care, and education.

/4 This item includes the damages to administrative sector, armaments, and others.

2. Estimation of Annual Mean Flood Damage

River System	Return Period	Exceedance	Difference of Exceedance	Damage (VND Million)		Annual Damage (VND Million)		Equivalent US\$ million
				Amount	Mean	Segment	Cumulative	
Huong River	-	1.00						
	2	0.50	0.50	27,913	13,957	6,978	6,978	0.46
	5	0.20	0.30	55,068	41,491	12,447	19,425	1.29
	10	0.10	0.10	73,242	64,155	6,416	25,841	1.71
	20	0.05	0.05	105,141	89,192	4,460	30,300	2.01
	50	0.02	0.03	388,362	246,752	7,403	37,703	2.50
	100	0.010	0.01	593,323	490,843	4,908	42,611	2.83

Table F.7 Estimation of Probable Flood Damage (4/8)
(I-B.1: With Max. Ta Trach only, in 2020)

1. Estimation of Flood Damage by Magnitude of Flood

Unit: VND Million

1. Estimation of Flood Damage by Magnitude of Flood													Unit: VND/ha/yr
River System	Return Period (Year)	Early Flood			Major Flood								Total
		Crops			1. House			2. River facilities and infrastructure /1 h=g x 33%	3. Business activities /2 i=g x 36%	4. Welfare and cultural facilities /3 j=g x 6%	5. Other /4 k=g x 29%	Sub-total l=g+h+i+j+k	
		Paddy	Upland crop	Sub-total	House	Household durable goods f	Sub-total						
	a	b	c	d=b+c	e	f	g=e+f						m=d+l
Huong River	2	-	-	-	14,022	1,584	15,606	5,150	5,618	936	4,526	31,836	31,836
	5	-	-	-	27,760	3,029	30,789	10,160	11,084	1,847	8,929	62,809	62,809
	10	-	-	-	36,959	3,992	40,951	13,514	14,742	2,457	11,876	83,540	83,540
	20	-	-	-	53,317	5,466	58,783	19,398	21,162	3,527	17,047	119,917	119,917
	50	-	-	-	200,603	21,805	222,408	73,395	80,067	13,344	64,498	453,712	453,712
	100	-	-	-	309,112	38,531	347,643	114,722	125,151	20,859	100,816	709,191	709,191

Note: /1 This item includes the damages to the facilities for flood prevention, water utilization, transportation, fishery, electricity, and post office.

/2 This item includes the damages to crops, forest, livestock, aquaculture, factories, shops, offices, machines, materials, and products.

/3 This item includes the damages to the facilities for cultural sector, health care, and education.

/4 This item includes the damages to administrative sector, armaments, and others.

2. Estimation of Annual Mean Flood Damage

River System	Return Period	Exceedance	Difference of Exceedance	Damage (VND Million)		Annual Damage (VND Million)		Equivalent US\$ million
				Amount	Mean	Segment	Cumulative	
Huong River	-	1.00						
	2	0.50	0.50	31,836	15,918	7,959	7,959	0.53
	5	0.20	0.30	62,809	47,323	14,197	22,156	1.47
	10	0.10	0.10	83,540	73,175	7,317	29,473	1.96
	20	0.05	0.05	119,917	101,729	5,086	34,560	2.29
	50	0.02	0.03	453,712	286,815	8,604	43,164	2.86
	100	0.010	0.01	709,191	581,452	5,815	48,979	3.25

Table F.7 Estimation of Probable Flood Damage (5/8)
(I-B.2: With Max. Ta Trach + Max. Huu Trach, I-B.3: With Max. Ta Trach + Min. Huu Trach,
I-B.6: With Max. Ta Trach + Man. Huu Trach + Max. Co Bi, I-B.7: With Max. Ta Trach + Man. Huu Trach + Min. Co Bi,
I-B.8: With Max. Ta Trach + Min. Huu Trach + Max. Co Bi, I-B.9: With Max. Ta Trach + Min. Huu Trach + Min. Co Bi, in 2001)

1. Estimation of Flood Damage by Magnitude of Flood

Unit: VND Million

1. Estimation of Flood Damage by Magnitude of Flood													Unit: VND/Million
River System	Return Period (Year)	Early Flood			Major Flood								Total
		Crops			1. House			2. River facilities and infrastructure /1 h=g x 33%	3. Business activities /2 i=g x 36%	4. Welfare and cultural facilities /3 j=g x 6%	5. Other /4 k=g x 29%	Sub-total l=g+h+i+j+k	
		Paddy b	Upland crop c	Sub-total d=b+c	House e	Household durable goods f	Sub-total g=e+f						
	a	b	c	d=b+c	e	f	g=e+f	h=g x 33%	i=g x 36%	j=g x 6%	k=g x 29%	l=g+h+i+j+k	m=d+l
Huong River	2	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	13,857	1,612	15,469	5,105	5,569	928	4,486	31,557	31,557
	50	-	-	-	72,649	6,837	79,486	26,230	28,615	4,769	23,051	162,151	162,151
	100	-	-	-	184,617	18,716	203,333	67,100	73,200	12,200	58,967	414,800	414,800

Note: /1 This item includes the damages to the facilities for flood prevention, water utilization, transportation, fishery, electricity, and post office.

/2 This item includes the damages to crops, forest, livestock, aquaculture, factories, shops, offices, machines, materials, and products.

/3 This item includes the damages to the facilities for cultural sector, health care, and education.

/4 This item includes the damages to administrative sector, armaments, and others.

2. Estimation of Annual Mean Flood Damage

River System	Return Period	Exceedance	Difference of Exceedance	Damage (VND Million)		Annual Damage (VND Million)		Equivalent US\$ million
				Amount	Mean	Segment	Cumulative	
Huong River	-	1.00						
	2	0.50	0.50	-	-	-	-	-
	5	0.20	0.30	-	-	-	-	-
	10	0.10	0.10	-	-	-	-	-
	20	0.05	0.05	31,557	15,779	789	789	0.05
	50	0.02	0.03	162,151	96,854	2,906	3,695	0.25
	100	0.010	0.01	414,800	288,476	2,885	6,579	0.44

Table F.7 Estimation of Probable Flood Damage (6/8)
(I-B.2: With Max. Ta Trach + Max. Huu Trach, I-B.3: With Max. Ta Trach + Min. Huu Trach,
I-B.6: With Max. Ta Trach + Man. Huu Trach + Max. Co Bi, I-B.7: With Max. Ta Trach + Man. Huu Trach + Min. Co Bi,
I-B.8: With Max. Ta Trach + Min. Huu Trach + Max. Co Bi, I-B.9: With Max. Ta Trach + Min. Huu Trach + Min. Co Bi, in 2020)

1. Estimation of Flood Damage by Magnitude of Flood

Unit: VND Million

1. Estimation of Flood Damage by Magnitude of Flood													Unit: VND/Mln/ha
River System	Return Period (Year)	Early Flood			Major Flood								Total
		Crops			1. House			2. River facilities and infrastructure /1 h=g x 33%	3. Business activities /2 i=g x 36%	4. Welfare and cultural facilities /3 j=g x 6%	5. Other /4 k=g x 29%	Sub-total l=g+h+i+j+k	
		Paddy b	Upland crop c	Sub-total d=b+c	House e	Household durable goods f	Sub-total g=e+f						
Huong River	2	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-	-	-	-	-
	20	-	-	-	15,805	1,839	17,644	5,823	6,352	1,059	5,117	35,995	35,99
	50	-	-	-	82,860	7,796	90,656	29,916	32,636	5,439	26,290	184,937	184,93
	100	-	-	-	214,672	23,773	238,445	78,687	85,840	14,307	69,149	486,428	486,42

Note: /1 This item includes the damages to the facilities for flood prevention, water utilization, transportation, fishery, electricity, and post office.

/2 This item includes the damages to crops, forest, livestock, aquaculture, factories, shops, offices, machines, materials, and products.

/3 This item includes the damages to the facilities for cultural sector, health care, and education.

/4 This item includes the damages to administrative sector, armaments, and others.

2. Estimation of Annual Mean Flood Damage

River System	Return Period	Exceedance	Difference of Exceedance	Damage (VND Million)		Annual Damage (VND Million)		Equivalent US\$ million
				Amount	Mean	Segment	Cumulative	
Huong River	-	1.00						
	2	0.50	0.50	-	-	-	-	-
	5	0.20	0.30	-	-	-	-	-
	10	0.10	0.10	-	-	-	-	-
	20	0.05	0.05	35,995	17,998	900	900	0.06
	50	0.02	0.03	184,937	110,466	3,314	4,214	0.28
	100	0.010	0.01	486,428	335,683	3,357	7,571	0.50

Table F.7 Estimation of Probable Flood Damage (7/8)
(I-C.2: With Min. Ta Trach + Max. Huu Trach, I-C.6: With Min. Ta Trach + Max. Huu Trach + Max. Co Bi,
I-C.7: With Min. Ta Trach + Max. Huu Trach + Min. Co Bi, in 2001)

1. Estimation of Flood Damage by Magnitude of Flood

Unit: VND Million

River System	Return Period (Year)	Early Flood			Major Flood								Total
		Crops			1. House			2. River facilities and infrastructure /1 h=g x 33%	3. Business activities /2 i=g x 36%	4. Welfare and cultural facilities /3 j=g x 6%	5. Other /4 k=g x 29%	Sub-total l=g+h+i+j+k	
		Paddy b	Upland crop c	Sub-total d=b+c	House e	Household durable goods f	Sub-total g=e+f						
Huong River	2	-	-	-	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	-	-
	10	-	-	-	21,200	2,431	23,631	7,798	8,507	1,418	6,853	48,207	48,207
	20	15,805	1,839	17,644	41,322	4,321	45,643	15,062	16,431	2,739	13,236	93,111	110,755
	50	82,860	7,796	90,656	85,601	7,859	93,460	30,842	33,646	5,608	27,103	190,659	281,315
	100	214,672	23,773	238,445	175,456	18,156	193,612	63,892	69,700	11,617	56,147	394,968	633,413

Note: /1 This item includes the damages to the facilities for flood prevention, water utilization, transportation, fishery, electricity, and post office.

/2 This item includes the damages to crops, forest, livestock, aquaculture, factories, shops, offices, machines, materials, and products.

/3 This item includes the damages to the facilities for cultural sector, health care, and education.

/4 This item includes the damages to administrative sector, armaments, and others.

2. Estimation of Annual Mean Flood Damage

River System	Return Period	Exceedance	Difference of Exceedance	Damage (VND Million)		Annual Damage (VND Million)		Equivalent US\$ million
				Amount	Mean	Segment	Cumulative	
Huong River	-	1.00						
	2	0.50	0.50	-	-	-	-	-
	5	0.20	0.30	-	-	-	-	-
	10	0.10	0.10	48,207	24,104	2,410	2,410	0.16
	20	0.05	0.05	110,755	79,481	3,974	6,384	0.42
	50	0.02	0.03	281,315	196,035	5,881	12,265	0.81
	100	0.010	0.01	633,413	457,364	4,574	16,839	1.12

Table F.7 Estimation of Probable Flood Damage (8/8)
(I-C.2: With Min. Ta Trach + Max. Huu Trach, I-C.6: With Min. Ta Trach + Max. Huu Trach + Max. Co Bi,
I-C.7: With Min. Ta Trach + Max. Huu Trach + Min. Co Bi, in 2020)

1. Estimation of Flood Damage by Magnitude of Flood

Unit: VND Million

1. Estimation of Flood Damage by Magnitude of Flood													Unit: VND/million
River System	Return Period (Year)	Early Flood			Major Flood								Total
		Crops			1. House			2. River facilities and infrastructure /1 h=g x 33%	3. Business activities /2 i=g x 36%	4. Welfare and cultural facilities /3 j=g x 6%	5. Other /4 k=g x 29%	Sub-total l=g+h+i+j+k	
		Paddy b	Upland crop c	Sub-total d=b+c	House e	Household durable goods f	Sub-total g=e+f						
a	b	c	d=b+c	e	f	g=e+f	h=g x 33%	i=g x 36%	j=g x 6%	k=g x 29%	l=g+h+i+j+k	m=d+l	
Huong River	2	-	-	-	-	-	-	-	-	-	-	-	
	5	-	-	-	-	-	-	-	-	-	-	-	
	10	-	-	-	24,179	2,773	26,952	8,894	9,703	1,617	7,816	54,982	
	20	-	-	-	47,131	4,927	52,058	17,179	18,741	3,123	15,097	106,198	
	50	-	-	-	97,632	8,962	106,594	35,176	38,374	6,396	30,912	217,452	
	100	-	-	-	204,016	23,108	227,124	74,951	81,765	13,627	65,866	463,333	

Note: /1 This item includes the damages to the facilities for flood prevention, water utilization, transportation, fishery, electricity, and post office.

/2 This item includes the damages to crops, forest, livestock, aquaculture, factories, shops, offices, machines, materials, and products.

/3 This item includes the damages to the facilities for cultural sector, health care, and education.

/4 This item includes the damages to administrative sector, armaments, and others.

2. Estimation of Annual Mean Flood Damage

River System	Return Period	Exceedance	Difference of Exceedance	Damage (VND Million)		Annual Damage (VND Million)		Equivalent US\$ million
				Amount	Mean	Segment	Cumulative	
Huong River	-	1.00						
	2	0.50	0.50	-	-	-	-	-
	5	0.20	0.30	-	-	-	-	-
	10	0.10	0.10	54,982	27,491	2,749	2,749	0.18
	20	0.05	0.05	106,198	80,590	4,030	6,779	0.45
	50	0.02	0.03	217,452	161,825	4,855	11,633	0.77
	100	0.010	0.01	463,333	340,393	3,404	15,037	1.00

Table F.8 Agricultural Benefit of Huong River Project (1/2)

(1) Incremental Crop Benefit

Crop			Net Income per ha (US\$/ha)						Total		
			Unit Price		Unit Yeild ton/ha	Gross Income US\$/ha	Product. Cost		Net Income US\$/ha	Planted Area ha	Net Income US\$
			US\$/ton	adjust			US\$/ha	adjust			
Present Condition									\$307 /ha	44,386 ha	7,949,000
1. Winter - Spring Crop			-	-	-	-	-	-	25,900 ha	4,366,000	
	Paddy	Irrigated	125	-	2.80	350	210	60%	140	18,022 ha	2,523,000
	Maize	Rainfed	144	-	1.20	173	104	60%	69	78 ha	5,000
	Sweet Potatoes	Rainfed	63	-	4.80	302	181	60%	121	4,838 ha	585,000
	Groundnuts	Rainfed	375	-	1.20	450	270	60%	180	706 ha	127,000
	Vegetables	Rainfed	208	-	6.00	1,248	749	60%	499	2,256 ha	1,126,000
2. Summer - Autumun Crop			-	-	-	-	-	-	18,486 ha	3,583,000	
	Paddy	Irrigated	125	-	3.00	375	225	60%	150	15,197 ha	2,280,000
	Maize	Rainfed	144	-	1.20	173	104	60%	69	79 ha	5,000
	Groundnuts	Rainfed	375	-	1.20	450	270	60%	180	954 ha	172,000
	Vegetables	Rainfed	208	-	6.00	1,248	749	60%	499	2,256 ha	1,126,000
Future Condition									\$864 /ha	51,800 ha	22,376,000
1. Winter - Spring Crop			-	-	-	-	-	-	25,900 ha	11,062,000	
	Paddy	Irrigated	125	100%	5.00	625	250	40%	375	19,912 ha	7,467,000
	Maize	Irrigated	144	115%	4.00	576	230	40%	346	460 ha	159,000
	Sweet Potatoes	Irrigated	63	50%	7.00	441	176	40%	265	3,456 ha	916,000
	Groundnuts	Irrigated	375	300%	1.50	563	225	40%	338	72 ha	24,000
	Vegetables	Irrigated	208	166%	10.00	2,080	832	40%	1,248	2,000 ha	2,496,000
2. Summer - Autumun Crop			-	-	-	-	-	-	25,900 ha	11,314,000	
	Paddy	Irrigated	125	-	5.00	625	250	40%	375	19,912 ha	7,467,000
	Maize	Irrigated	144	-	4.00	576	230	40%	346	460 ha	159,000
	Groundnuts	Irrigated	375	-	1.50	563	225	40%	338	3,528 ha	1,192,000
	Vegetables	Irrigated	208	-	10.00	2,080	832	40%	1,248	2,000 ha	2,496,000
Increment			0.90	(SCF)	139	per ton			\$557 /ha	7,414 ha	14,427,000
									Irrigation Area	25,900 ha	

Table F.8 Agricultural Benefit of Huong River Project (2/2)

(2) Estimation of Unit Value of Livestock and Aquaculture**1) Livestock**

1 Livestock Gross Output of 1999 /1	
VND 25,388 billion (Adjusted to 2001 constant price)	
2 Conversion to Head Number of Cattle (Ox)	
(1) Head Number in Whole Country	
(a) Cattle (Ox)	3,638,900 heads
(b) Buffalo	2,955,700 heads
(c) Pig	16,306,400 heads
(2) Conversion Rate	
Weight Ratio is used.	
Weight Ratio is derived from daily water consumption rate. /2	
(a) Cattle (Ox)	35 lit/head/day
(b) Buffalo	35 lit/head/day
(c) Pig	15 lit/head/day
(3) Converted Head Number to Cattle (Ox)	
(a) Cattle (Ox)	3,638,900 heads
(b) Buffalo	2,955,700 heads
(c) Pig	6,988,500 heads
Total	13,583,100
3 Gross Output per Converted Head Number of Cattle (Ox)	
VND 1,869,087 per head	

2) Aquaculture

1 Aquaculture Gross Output of 1999 /1	
VND 7,978 billion (Adjusted to 2001 constant price)	
2 Aquaculture Area	535,000 ha
3 Gross Output per Pond Area	VND 14,912,100 per ha

/1: Ref.	"Statistical Data of Vietnam, Agriculture, Forestry and Fishery 1975 - 2000"
/2: Ref.	"Guideline for the Preparation of National Master Water Plans, Water Resources Series No.65, ESCAP, 1989"

(3) Incremental Livestock Benefit

Livestock	Cattle (Ox)	Buffalo	Pig	Converted Cattle (Ox)	Gross Output	Water Concerned 90%	Production cost 85%	Net Output	Economic net output SCF=0.9	Equivalent
	(10 ³ head)	(10 ³ head)	(10 ³ head)	(10 ³ head)	(10 ⁶ VND)	(10 ⁶ VND)	(10 ⁶ VND)	(10 ⁶ VND)	(10 ⁶ VND)	(10 ⁶ US\$)
1) Expected net output (2020)	68	42	666	395	738,289	664,460.1	564,791	99,669	89,702	6.0
2) Present condition (2010)	33	35	227	165	308,399	277,559.1	235,925	41,634	37,470	2.5
3) Incremental net output	35	7	439	230	429,890	386,901.0	328,866	58,035	52,232	3.5

(4) Incremental Aquaculture Benefit

Aquaculture	Coastal Shrimp	Inland Fish	Total Aquaculture	Gross Output	Water Concerned 100%	Production cost 50%	Net Output	Economic net output SCF=0.9	Equivalent
	(ha)	(ha)	(ha)	(10 ⁶ VND)	(10 ⁶ VND)	(10 ⁶ VND)	(10 ⁶ VND)	(10 ⁶ VND)	(10 ⁶ US\$)
1) Expected net output (2020)	4,514	3,693	8,207	122,384	122,384	61,192	61,192	55,073	3.7
2) Present condition (2010)	1,010	920	1,930	28,780	28,780	14,390	14,390	12,951	0.9
3) Incremental net output	3,504	2,773	6,277	93,603	93,603	46,802	46,802	42,121	2.8

Table F.9 Benefit of Hydropower Generation

Alternative	Project component	Power generation (GWh)	Economic benefit (US\$ million)
I-B.1	Max. Ta Trach Reservoir only	70.0	3.50
I-B.2	Max. Ta Trach + Max. Huu Trach Reservoirs	70.0 80.6	7.53
I-B.3	Max. Ta Trach + Min. Huu Trach Reservoirs	70.0 68.0	6.90
I-B.6	Max. Ta Trach + Max. Huu Trach + Max. Co Bi Reservoirs	70.0 80.6 0	7.53
I-B.7	Max. Ta Trach + Max. Huu Trach + Min. Co Bi Reservoirs	70.0 80.6 0	7.53
I-B.8	Max. Ta Trach + Min. Huu Trach + Max. Co Bi Reservoirs	70.0 68.0 0	6.90
I-B.9	Max. Ta Trach + Min. Huu Trach + Min. Co Bi Reservoirs	70.0 68.0 0	6.90
I-C.2	Min. Ta Trach + Max. Huu Trach Reservoirs	70.0 71.0	7.05
I-C.6	Min. Ta Trach + Max. Huu Trach + Max. Co Bi Reservoirs	70.0 71.0 0	7.05
I-C.7	Min. Ta Trach + Max. Huu Trach + Min. Co Bi Reservoirs	70.0 71.0 0	7.05

Note: Assuming of kWh value of 5 US Cents.