

5.2 Other Power Sources

5.2.1 Applicability of Gas TPP Development in the North

The potential of gas in the north region has not been found as sufficient for generation as stated by Petrovietnam and IE. Thus, it is assumed that gas thermal power development is applicable only in the central and south region at least until 2020.

5.2.2 Applicability of Coal TPP Development in the South

Since gas TPPs have been planned and developed as a main power source in the south, early depletion of the gas resource and the possible appreciation of gas prices due to an increase of exploitation and transport expenses of gas is a concern. Therefore, the JICA Team studied that economical efficiency of coal TPP development in the south using domestic coal in the north. In case that coal TPPs are developed in the south as a basic power source, gas TPP can be back on form and operated as a middle and/or peaking power source.

A geographical study of the seacoast from lat. 45° N to the south was carried out using topographical map of 1/50,000 and seven candidate sites were nominated (refer to Fig 5-2-1) in view of the following points.

- ✓ To secure the sufficient water depth in the turning basin and navigation channel without dredging (natural environment condition)
- ✓ To be unnecessary to build seabreak by leveraging peninsula or island (natural environment condition)
- ✓ To be equipped with access road (social environment condition)

JICA Team selected three sites of Phong So, Vinh Hy, and Son Hai which have favorable conditions among seven nominated sites, and drew up a layout of the plant facilities and estimated the construction costs. Then the unit generation cost of each power plant at the busbar was calculated under the following assumptions.

Two kinds of coal, anthracite and sub-bituminous coal reserved under the Red river delta, were considered. Port and harbor facilities such as breakwater, berth, reclamation and ash disposal are designed assuming that 30,000 – 50,000DWT tanker is used for transportation of coal from the north to the south.

(1) Assumptions of the Study**a. Coal Price**

Current transaction prices are adopted for calculation (subbituminous coal price is pursuant to Hon Gai #5's price).

Table 5-2-1 Transaction Coal Prices

Coal		Heat value (Kcal/Kg)	Coal price* FOB(VND/t)	remarks
Anthracite	Hon Gai #3	7,100	432,040	price for domestic use (28US\$/t)
	Hon Gai #4	6,050	332,000	
	Hon Gai #5	5,500	305,000	
Subbituminous	Red River V3	5,100	305,000	assumed price (same as Hon Gai #5)

exchange rate: 15,430 VND/US\$

*:transportation cost excluded

The transportation fee from Haiphong port to the site is estimated as the following three cases based on that to Ho Chi Minh City of 7UD\$/ton as stated by Vinacoal.

- case1 : 7US\$/ton (transported by 5,000DWT tanker) regardless the distance from the Haiphong port.
- case2 : discounted in proportion to the distance from the Haiphong port
“=7US\$/ton/1,500km x the distance”.
- case3 : assumed that a half of 7US\$/ton is a fixed cost and the other half is in proportion to the distance “=3.5US\$/ton + 3.5US\$/ton/1,500km x the distance”.

b. Installed Capacity

Installed capacity is assumed as 1,200MW as a the first plant and premise for additional 1200MW is secured as much as possible.

- 1,200MW for one plant
 - 4 units of 300MW for Anthracite (Hon Gai)
 - 2 units of 600MW for Subbituminous coal (Red River)

The premise area is assumed 35ha for either case of 4 units of 300MW or 2 units of 600MW and its breakdown is as follows.

- BTG Yard : 15ha
- Coal Yard : 7.5ha
- Utility Yard : 12.5ha, total : 35ha

c. Specifications of the Private Harbor

The specifications of the navigation channel, turning basin and berth length intended for 45,000DWT tanker are displayed in Table 5-2-2.

Table 5-2-2 Specifications of the Private Harbor

	Vessel			Navigation Channel			Turning Basin		Birth length
	Class (DWT)	Length (L)	Draft (d)* ¹	width	length* ²	depth	diameter	depth	
Coal ship	45,000	227.0m	11.6m	230.0m	1,200.0m	-15.0m	460.0m	-13.0m	280.0m
Oil tanker	5,000	103.0m	7.8m	110.0m	520.0m	-10.0m	310.0m	-8.5m	130.0m
Lime/Gypsum ship	2,000	74.0m	5.0m	120.0m	37.0m	-	230.0m	-5.5m	100.0m

*1:full load draft

*2:stopping distance

(2) Evaluation and Selection of Promising Candidate Sites

7 candidate sites were nominated from the viewpoints of natural and social environment conditions. And the result of evaluation and selection of the promising candidates are shown in Table 5-2-3. The locations of seven candidate sites are shown in Fig. 5-2-1.

Three promising sites are selected as follows.

- Son Hai : lat. 11° 22' N (1,100km from Haiphong)
- Vinh Hy : lat. 11° 43' N (1,050km from Haiphong)
- Phong So : lat. 12° 52' N (950km from Haiphong)

Table 5-2-3 Evaluation and Selection of Promising Candidate Sites of coal TPP in the South

Site name	Breakwater	Dredging	Seawall	Reclamation	Issues	Evaluation
Phong So	No	No	Needed	Needed	Nil	○
Van Phuoc	No	Needed	Needed	Needed	Nil	△
Bai Vung Tau	Needed	Needed	Needed	Needed	Nil	△
Vin Nguyen	No	No	Needed	Needed	Worldwide resort	×
Cam Ranh	No	No	Needed	Needed	Military port exists in the bay	×
Vinh Hy	Needed	No	Needed	Needed	Candidate site of Nuclear	○
Son Hai	Needed	No	Needed	Needed	Candidate site of Nuclear	○

(3) Layout Design of the Promising Sites

As for selected three sites, the layout was designed. Phong So and Son Hai can secure the premise of the additional 1,200MW plant, however, Vinh Hy cannot secure it because of the land constraint. The layout of each plant is displayed in Fig. 5-2-2, Fig. 5-2-3 and Fig. 5-2-4.

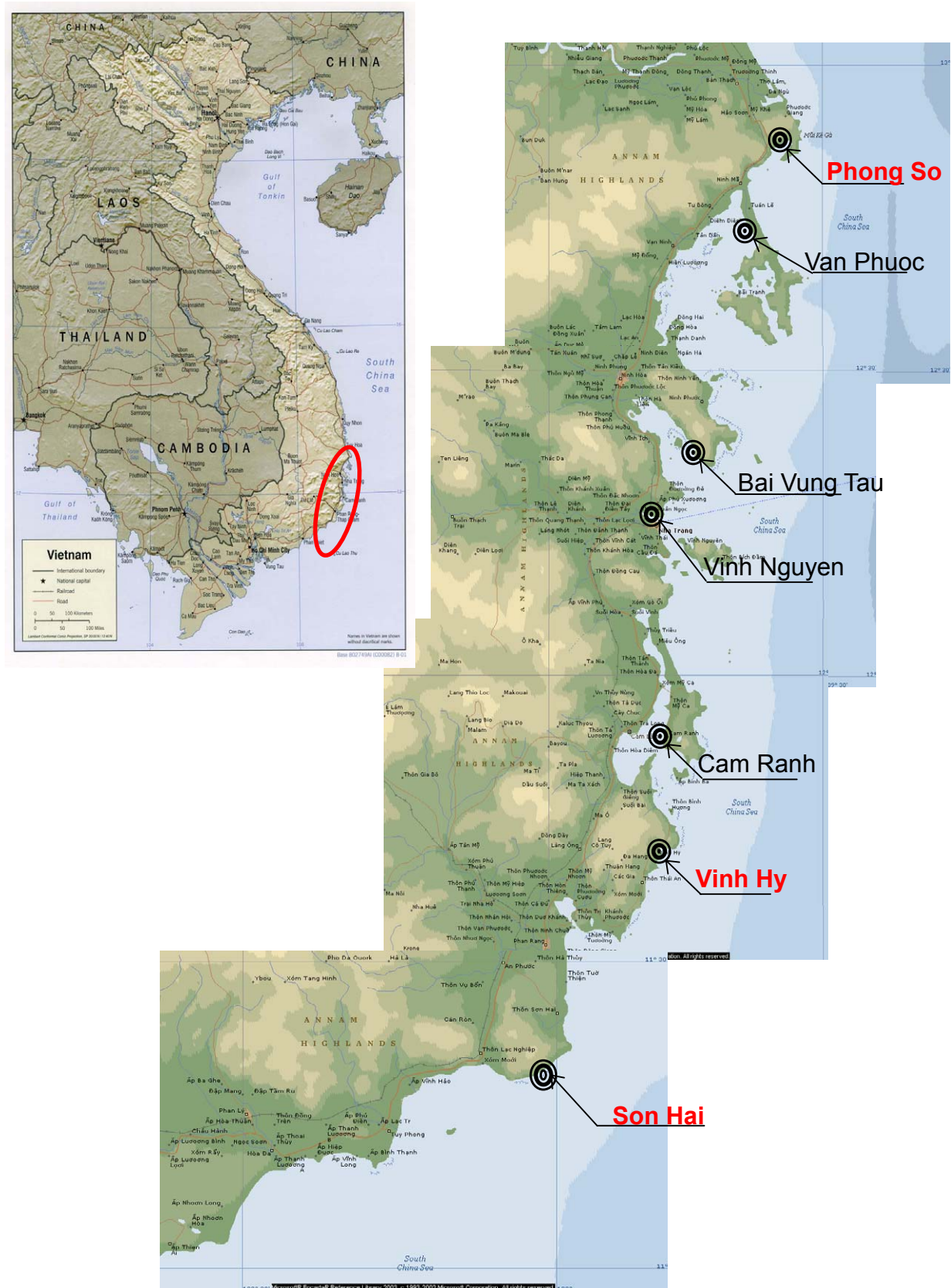


Figure 5-2-1 Location of Seven Candidate Sites of Coal TPP in the South

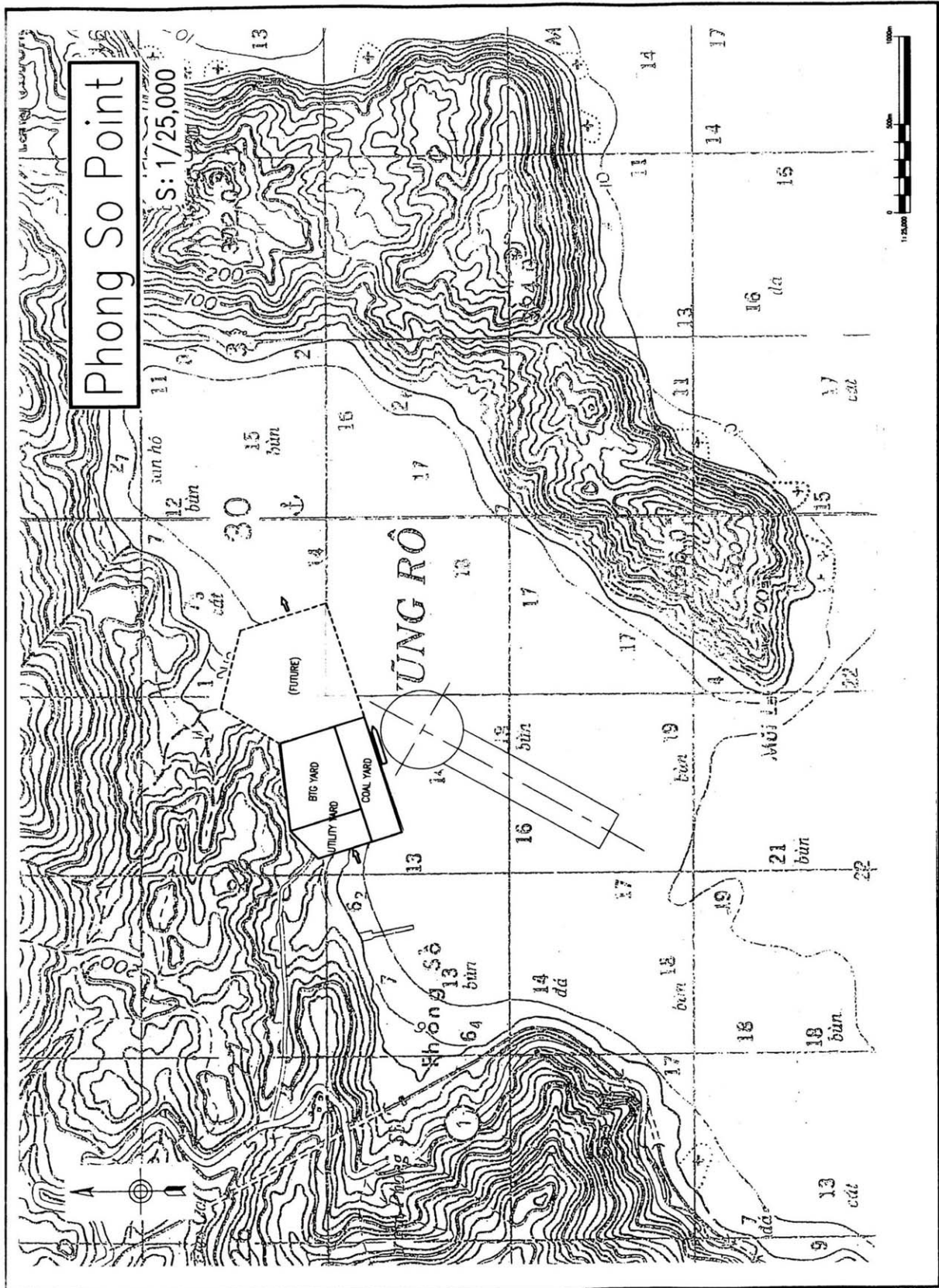


Fig. 5-2-2 The Layout of Phong So Coal TPP

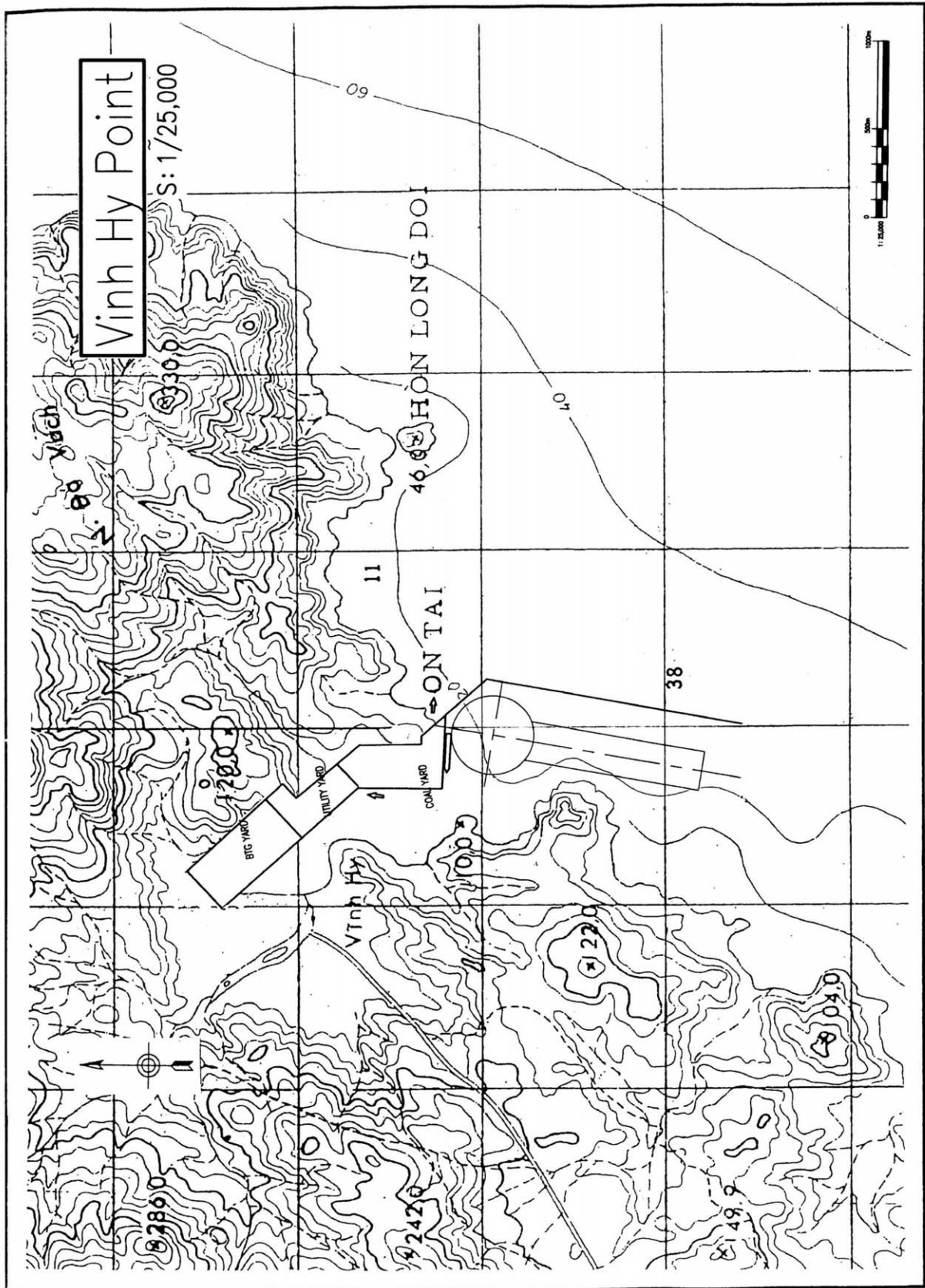


Fig. 5-2-3 The Layout of Vinh Hy Coal TPP

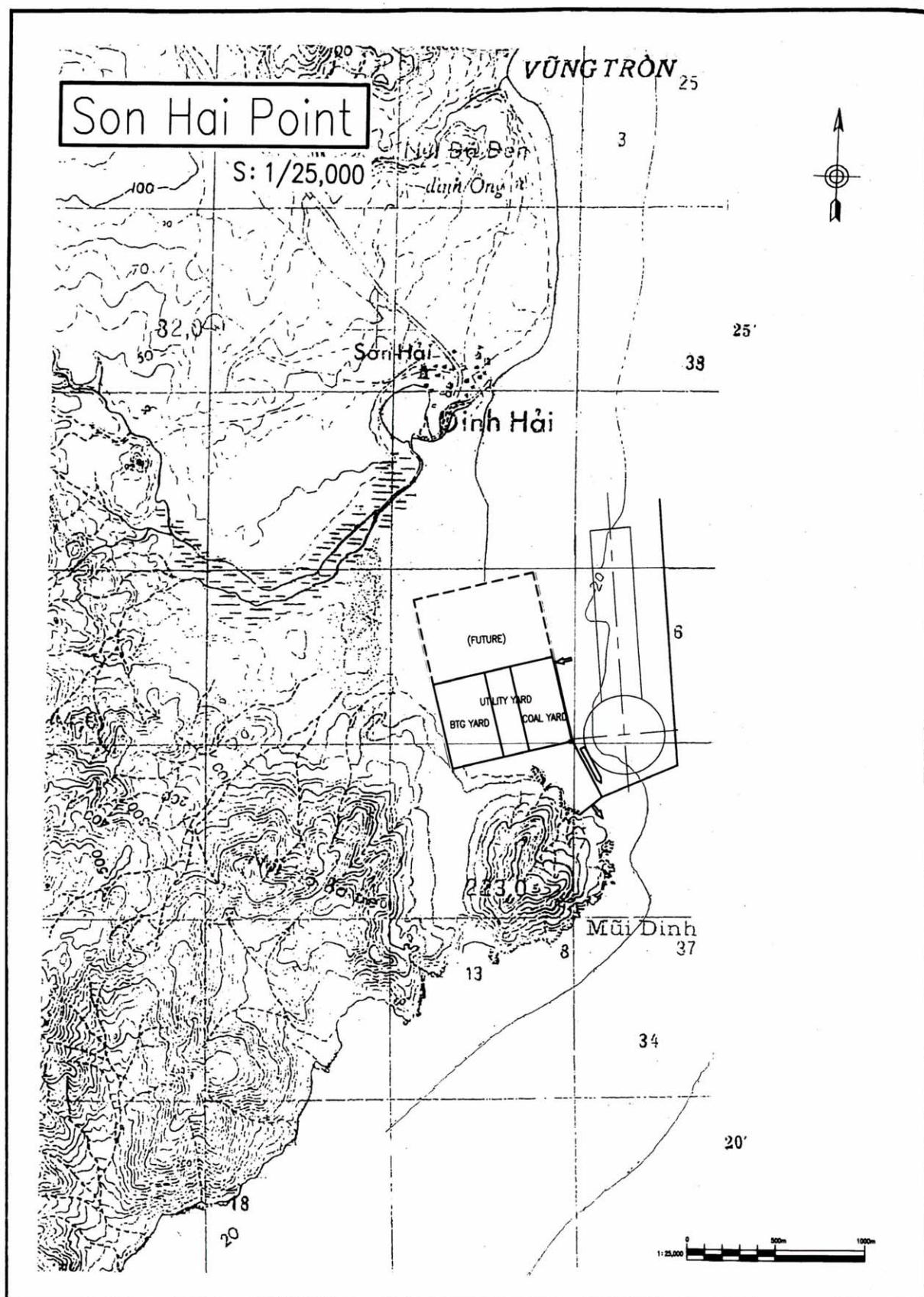


Fig. 5-2-4 The Layout of Son Hai Coal TPP