7.7 Implementation and Management System for Hoa Lac High-Tech Park (HHTP)

7.7.1 Basic Roles of the Organizations for HHTP Implementation and Management

In planning for efficient implementation and management of HHTP, the following basic points should be taken into consideration:

1) It was decided that HHTP would be a model project for development of high-tech parks and would be carried out with the approval of the Prime Minister as an important state project. So, government development plans should be taken into account.

2) HHTP is a major project for the regional development of Ha Tay Province and also a major project of the Hoa Lac New City Project consisting of four components namely High-Tech Park, National University, Industrial Zone, and Housing Zone. The development plans of this province should also be taken into consideration.

3) In obtaining the land use right and land lease right, under Ha Tay Province control, it is necessary to strive for smooth and speedy implementation of the project.

4) The implementation of HHTP should be successful. To achieve the project's success, an economical mind and an enterprising spirit should be introduced.

5) HHTP is a multi-functional project involving, profit-earning components and non-profit components. The public sectors, SOEs and FDI are expected to be the implementation organizations. The organizations involved in implementing and managing the entire HHTP should cooperate to ensure that the management of these various organizations is effective.

6) HHTP is a component of the Hoa Lac New City Project. Coordination of water supply, power supply, roads and other infrastructures development should be studied.

7) Private financing and public financing are both essential to HHTP implementation. The possibility of using bilateral and multilateral official development assistance should also be studied. The organizations involved in the implementation and management of HHTP shall be in a position to arrange these types of financing and requirement it from the governments concerned.

7.7.2 HHTP Implementation and Management Organizations

HHTP is a development project under the decision of the Prime Minister and the organizations involved in the project should also be those under the Prime Minister's direct supervision. In addition, HHTP is one of the components of the regional development plan. For these reasons, two alternatives can now be considered: 1) to make these separate organizations not concerned with the implementation and management organizations for higher-level projects; or 2) to make the organizations part of the organizations for high-level projects. However, at present, details of the higher-level project remain unclear. In addition, this project is a large-scale new city development project. And it will be started later than HHTP. Considering these factors, it will be better to make the organizations for HHTP implementation and management bodies exclusively responsible for the project and the promotion of HHTP-related plans, including construction work.

The proposed organizations for HHTP implementation and management including three government bodies such as a Steering Committee (HHTP-SC), a Board of Management (HHTP-BOM) and a ministry are shown in Figure 7-7-1. HHTP Infrastructure Development Company (HHTP-IDC) could be set up as SOE, and a Functional Zone Infrastructure Development Company (FZ-IDC) could be set up as a joint venture (J/V) with a foreign direct investment company (FDI).

1) Steering Committee (HHTP-SC)

The HHTP-SC would be a body led by the Vice Prime Minister that would support and promote HHTP, as a state project under the decision of the Prime Minister. It would meet regularly to discuss how HHTP should be positioned and operated as a state project. It would also make adjustment among different ministries and agencies and provide proper support at the request of the Board of Management (HHTP-BOM).

2) Board of Management (HHTP-BOM)

The HHTP-BOM would represent the substantial administrator of HHTP and be responsible for the project. It would play the role of a government agency at the HHTP site. It would also play the role of a contact organization for one-stop service concerning investment applications for IDCs as investors and general investors. The HHTP-BOM would supervise HHTP-IDC in promoting HHTP.

3) HHTP Infrastructure Development Company (HHTP-IDC)

The promotion of the entire HHTP is the responsibility of a State-owned Enterprise (SOE). Controlled by HHTP-BOM as HHTP-IDC, this SOE has the right to use HHTP land. It is considered that the SOE will conduct One-Stop Service entrusted by HHTP-BOM.

For the development of profitable functional zones, HHTP-IDC would establish an SOE using its right to use land as capital and establish a joint venture (J/V) with a foreign direct investment company (FDI) to perform the development. This J/V would be regarded as a Functional Zone Infrastructure Development Company (FZ-IDC).

The functional zones mentioned above have the clusters as shown in the following table. The non-profit (but contain some projects likely to earn profits) zones are R&D Zone (Institute Sub-Zone), Center Area and New Town Zone.

Functional Zones in HHTP

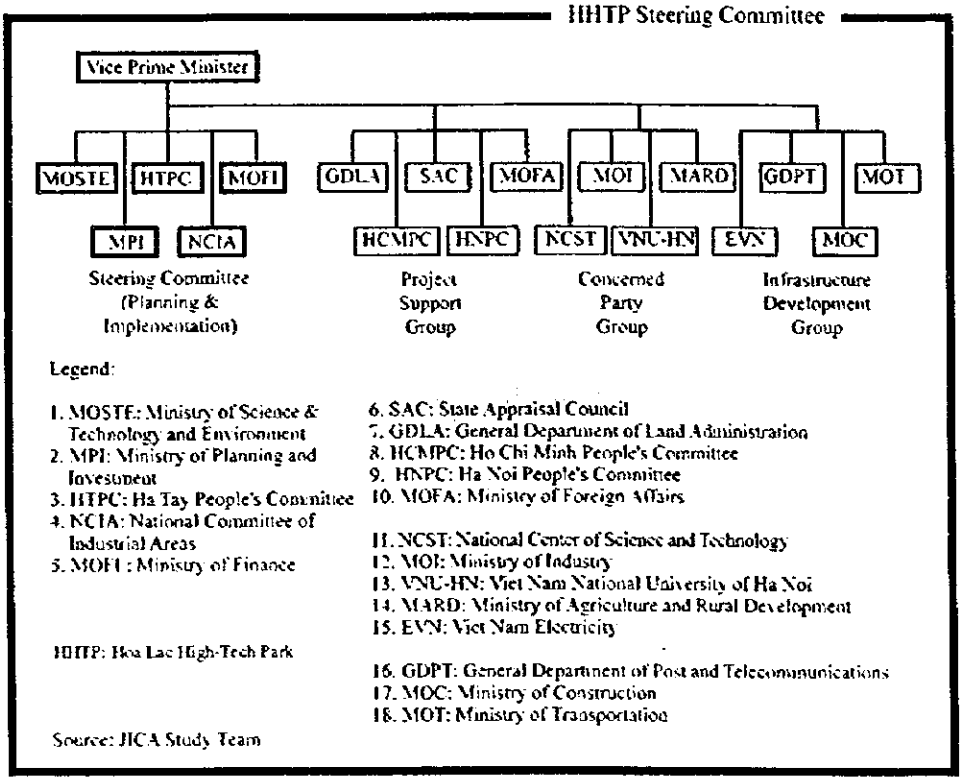
Function Zone	Profitable Zone	Non-profitable Zone
R&D (Software Park)	○	–
R&D (Institute Sub-Zone)	–	○
Center Area	–	○
High-Tech Industrial Zone	○	–
Urban/Business Zone	○	–
New Town Zone	–	○
High Grade Residential Zone	○	–

7.7.3 Establishment of HHTP Steering Committee (HHTP-SC)

In this Master Plan stage, the HHTP Steering Committee functions as a coordinator and is in the charge of the Ministry of Science, Technology and Environment (MOSTE). This makes clear the principle that the development of high-tech parks is led by MOSTE and defines the role sharing and responsibility regarding HHTP. This rule was clearly stated in Decree No.36/CP. But to make management more efficient and effective and to secure a closer coordination among government agencies concerned, the Vice Prime Minister should take part in the committee to help in the coordination work. Since HHTP is a state project under the decision of the Prime Minister, the participation of the Vice Prime Minister will have the effect of making consultations and exchanges of opinions with the Prime Minister smoother and will promote cooperation among these agencies.

The members of the HHTP Steering Committee (HHTP-SC) can roughly be divided into four groups: (1) project implementation group; (2) project support group; (3) tenants group; and (4) infrastructure group. To reduce the size of the committee, it is important to make the project implementation group a virtual steering committee and have it lead the entire committee and build a collaborative relationship with the other three groups as shown below.

HHTP Steering Committee



The members of the project implementation group, which will substantially play the role of a steering committee, should be mainly the representatives from the Ministry of Science & Technology and Environment (MOSTE) (responsible for promotion of science and technology and for high-tech industries) and should include members from the Ministry of Planning and Investment (MPI) (responsible for development plans, introduction of investment and acceptance of official development assistance (ODA)), National Committee of Industrial Areas (NCIA) (responsible for industrial land planning, including large-scale high-tech park projects), the Ministry of Finance (MOFI) (responsible for acceptance of development investment and ODA) and the Ha Tay People's Committee (HT-PC) (having control over HHTP, responsible for land

acquisition and expected to contribute to the project site). The functions of these agencies are as follows:

Steering Committee (planning and implementation group)

- MOSTE: Promotion of science and technology; high-tech industries
- MPI: Development plans; introduction of investment; adjustment of state budget, including financial aid
- HT-PC: Development plans; land acquisition; infrastructure development; residents' participation
- MOFI: Adjustment of state budget, including development investment and financial aid
- NCIA: Land acquisition for large-scale development; promotion of industrial zones

Project support group

- SAC: Evaluation of development plans
- GDLA: Application procedure for Land acquisition
- HN-PC: Formulation of development plans for the wide-area Hanoi area
- HCM-PC: Cooperation and coordination with the development of Ho Chi Minh High-Tech Park
- MOFA: Interact with foreign countries regarding state projects

Concerned party group

- NCST: Relocation of R&D institutes; development of R&D functional zones
- MOI: Invitation and relocation of manufacturing industries
- VNU-HN: Relocation of state universities
- MARD: Development of infrastructure for HHTP; water supply; rural development

Infrastructure development group

- EVN: Power resources development and supply
- GDPT: Development of telecommunications networks and construction of necessary facilities
- MOC: Urban facilities development, water supply and discharge

- MOTC: Roads and public traffic facilities

7.7.4 HHTP Board of Management (HHTP-BOM)

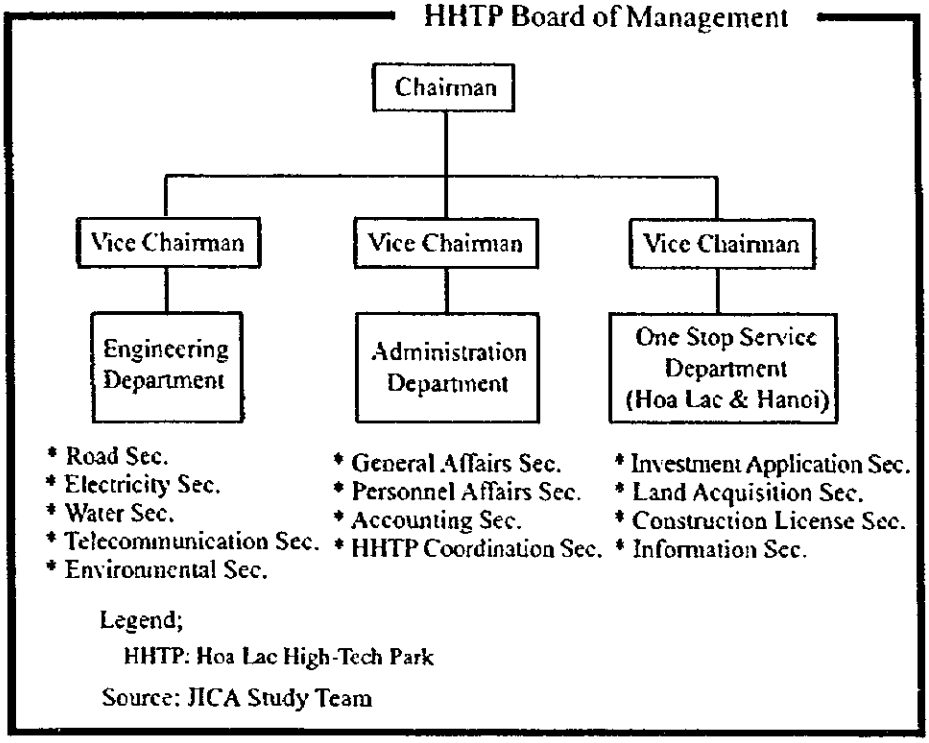
HHTP Board of Management (HHTP-BOM) will be established in accordance with Decree No.36/CP. Because of this, its chairman and vice-chairmen will be appointed by the Prime Minister directly. Other member is employed with the approval of the Prime Minister.

Together with HHTP-SC, HHTP-BOM is a government agency established during Phase 1. Its main functions include the formation of development concepts for HHTP, coordination with the government and a liaison organization for accepting private investment efficiently. Other tasks include the following:

1) Drafting and proposing a fill for High-Tech Park Law and Special Development Law for HHTP
2) Responsible for HHTP implementation and management as a state project
3) Approving a development Master Plan for 1,650 ha of land
4) Approving the development of individual functional zones according to the Master Plan
5) Land acquisition for entire HHTP
6) Applying to the government for development budget
7) Coordinating matters among related government agencies and settling problems as to the project's implementation
8) Preparing a budget for the state project promptly
9) Coordination with a wide-area infrastructure project needed for HHTP
10) Providing support to IDCs
11) Supervise for HHTP engineering
12) Marketing activities for the High-Tech Park

HHTP-BOM is an important liaison body for the government and the private sector. Because of this, it should be headquartered in Hoa Lac, the base for HHTP development. It also needs to establish a liaison office in the Hanoi City to perform business with outside parties. The organization of HHTP-BOM and roles of its sections are as shown below:

Organization for HHTP-BOM



Roles of HHTP-BOM's Sections

Administration Department	Management and operation
One Stop Service Department	Acceptance of applications from investors, examination of investment application forms, issuance of investment licenses, investment promotion (at the Hoa Lac and Hanoi offices)
General service Department	Information service for investors
Engineering Department	Entire management of HHTP construction works

7.7.5 Establishment of HHTP Infrastructure Development Company (HHTP-IDC)

The site of HHTP is not merely a set of different functional zones. It also contains existing residential quarters, provincial roads, neighborhood parks, reserved zones and common-use spaces. Therefore, the development of HHTP means not only development of HHTP's entire infrastructure but that of each functional zone as well. Two options are available for the IDC to be established for HHTP development:

1) To give an SOE (=IDC) the right to develop the entire HHTP and to land use. The SOE would supervise the entire project and develop infrastructure and

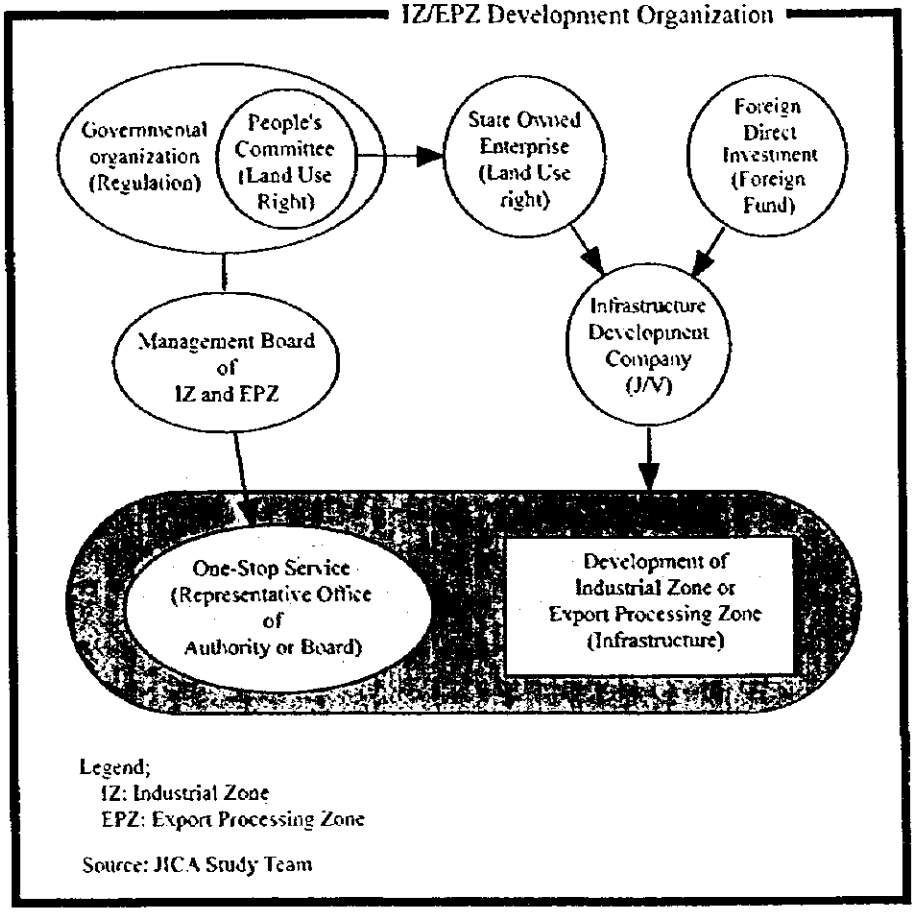
unprofitable facilities for the entire HHTP. To develop and construct facilities in each functional zone, the SOE would start a J/V with an FDI. While HHTP-BOM supervises the entire development project, HHTP-IDC is in charge of management of construction work.

2) Infrastructure and unprofitable facilities would be constructed by related ministries under the control of HHTP-BOM. For the development of profitable functional zones, to establish an SOE for each project and to give it the right to own land. At the same time, to found a J/V of an SOE and FDI so as to develop each functional zone. The HHTP-BOM would take charge of coordination and management of the entire project.

The former option is advantageous in that since a single IDC (=SOE) supervises the entire HHTP, the HHTP-BOM's burdens would be reduced. In addition, it will be possible to grasp development stages as a whole and to draw up a consistent development plan. The HHTP-BOM would be able to concentrate on the entire development plan and coordination among government agencies, too. On the other hand, the latter option would make it possible to carry out profitable projects quickly. However, the construction of infrastructure and other necessary facilities may be delayed and no balanced development might be achieved. Moreover, it will be relatively difficult to do the entire coordination work.

In general, the construction of industrial zones in Vietnam is carried out by the organization as shown in the following table. In most cases, the HHTP-BOM, SOE and IDC shown here are established newly.

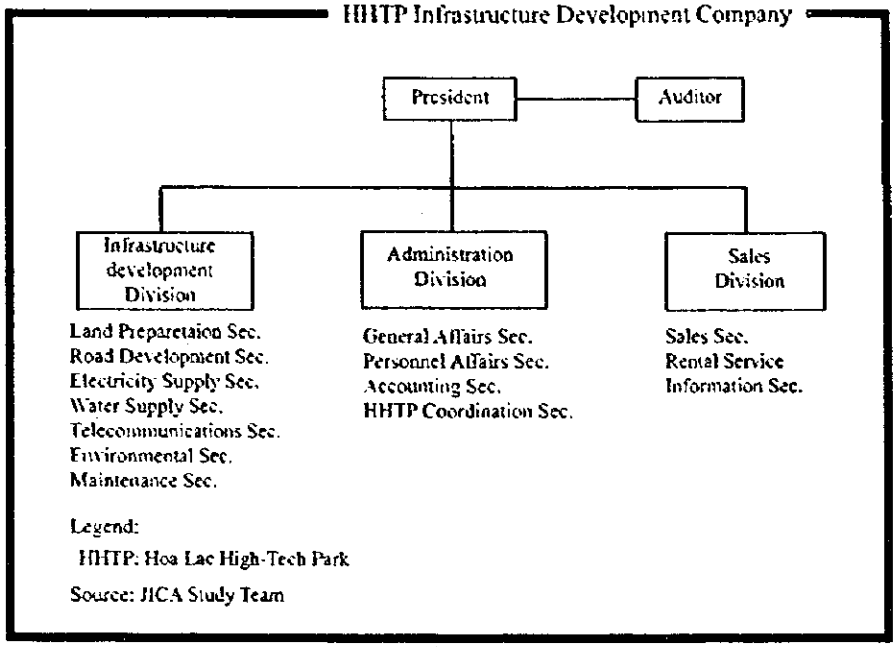
Organization for Development of Industrial Zones and
Export Processing Zones



As noted, it is possible to establish HHTP-IDC anew as an SOE. However, considering the scale of the development, government agencies concerned and the entire coordination, it will be more desirable to give an existing SOE having achievements in science and technology the right to develop and use land, and to leave the entire development work to the SOE.

Therefore, we recommend giving an SOE under MOSTE control the right to promote the entire HHTP and land use, to establish an HHTP-IDC, and to have the HHTP-IDC construct infrastructure and unprofitable facilities on a priority basis using state budget. As for profitable functional zones, it will be desirable to set up a J/V for each case and to make the J/V perform development work.

HHTP Infrastructure Development Company (HHTP-IDC)



The main functions of the organization are the construction and management of the entire HHTP and individual functional zones. Actual construction work will be contracted out in an effort to streamline and raise the efficiency of the organization.

The infrastructure to be developed includes roads, parks, public facilities, and reserved zones. The development activities to be performed in these zones are as follows:

- Management and operation of the entire High-Tech Park
- Road construction and land preparation work, including cut and fill of land
- Construction of power transmission and substation and power distribution facilities
- Construction of water purification, supply and distribution facilities
- Construction of sewerage and sewage treatment facilities
- Construction of center facilities and other common-use facilities
- Construction of buffer greenbelts and parks

7.7.6 Establishment of Functional Zone Infrastructure Development Company (FZ-IDC)

In an ordinary industrial zone development project, the right to own and use land is transferred to an SOE founded by the people's committee, and this SOE and a foreign company with foreign currency capital establish a J/V. This J/V serves as a Functional Zone IDC (FZ-IDC) in charge of the development of industrial zones and export processing zones. There are several types of J/Vs other than those with SOEs. Public corporations and other organizations may become partners, too. Also, besides FDI, Vietnamese businesses may provide investment in a J/V.

This J/V method enables partners to compensate for each other's weak points. While an SOE is given the right of land ownership and land use right and can land as a capital, a foreign business is unable to acquire land freely because of legal restrictions. An SOE generally has no adequate funds, while a foreign company would have sufficient funds, marketing capacity, and business administration skill. Because of these advantages, the J/V strategy is now used widely for the country's industrial zone development projects and has achieved many good results.

The role of this FZ-IDC is to develop the profitable functional zones. The details of development activities in the functional zones are as follows:

- Land preparation work in land lots in functional zones, including cut and fill
- Construction of roads in functional zones
- Construction of power distribution facilities in functional zones
- Construction of water supply and distribution facilities, waste water treatment facilities, reusable waste processing facilities and solid waste treatment facilities in functional zones
- Investment promotion activities
- O&M of functional zones

As the targets of the development are the profitable functional zones, private-sector vitality and funds is expected to be introduced. Because of this, the J/V with foreign enterprises will be the most common choice. Based on experience, this is a good and stable development technique since it is complementary to its Vietnamese partner. The organization of FZ-IDC is the same as that of HHTP-IDC. Its main tasks are the management of construction work, marketing, and operation of the industrial zone. Actual construction work is contracted out.

The options of the development bodies are as shown below.

Options of Development Bodies by Functional Zone

	SOE or Public Corporation	Government Bodies	Joint Venture (FDI)
1. Whole HHTP	◎ HHTP-IDC	-	-
2. R&D Zone (Institute Sub-Zone)	○ HHTP-IDC	◎ National High-tech R&D Center	-
3. R&D Zone (Software Park)	-	-	◎
4. Center Area	○ HHTP-IDC	◎ MOSTE	-
5. High-Tech Industrial Zone	○ HHTP-IDC	-	◎
6. Urban/Business Zone	○ HHTP-IDC	-	◎
7. High Grade Residential Zone	○ HHTP-IDC	-	◎
8. New Town Zone	○	◎ Concerned Ministry	-

Source: JICA Study Team

The possible option of the development bodies for center facilities are shown in the following table.

Options of Development Bodies for Center Facilities

	HHTP-IDC	MOSTE	MOET	MOI
1. High-Tech Park Center	◎	○	-	-
2. Technopartnership Center	-	◎	-	-
3. Technical Institute	-	-	◎ (MOET-SOE)	-
4. OJT Technical Support Center	-	-	◎ (MOET-SOE)	○
5. National Software Center	-	◎ (MOSTE-SOE)	-	-

N.B. ◎: Most likely, ○: Likely, ( ): Possible
Source: JICA Study Team

7.7.7 Priority Categories of Enterprises and Preferential Treatments

(1) Preferential Treatments for Enterprises

Priority categories of enterprises for the promotion for inviting into HHTP are selected based mainly on their intensity of R&D. Enterprises classified into R&D type (institutes) and production type (enterprises) including manufacturing and computer software, regardless of their type of capital; Vietnamese, foreign or joint venture. These enterprises who meet the conditions for the priority enterprises should be given the

most preferential treatments among these applied in the industrial zones in Vietnam. Hereunder, the conditions are shown with the possible figures as examples.

① Enterprises or institutes should be engaged in either research, development or production in the one or more of priority high-tech fields.

② Enterprises should be self-financing ones.

③ Sizes of the capitals of the enterprises should exceed certain level and their office space and facility should be of appropriate sizes for their R&D and production.

④ R&D expenditure ratio to the total sales of the enterprises should exceed certain level, 3 % for example.

⑤ Sum of the royalty revenue and high-tech production value in the total revenue of the enterprises should exceed certain level, 50 % for example.

⑥ Operation period of the enterprises or institutes should be 10 years or longer.

⑦ In the case of the R&D type enterprises (institutes), share of the employees with bachelor's degrees or the higher engaged in the scientific or engineering works in the total employees should exceed certain level, 30 % for example and share of these engaged in R&D works should exceed certain level, 10 % for example. In the case of the production type enterprises (enterprises), share of the employees with bachelor's degree or the higher in the scientific or engineering works should exceed certain level, for example 20%.

⑧ Enterprises and institutes should be "Clean types" meeting at least one of the followings.

i) They should be classified as clean industry/enterprise acknowledged by the Board of Management of HHTP in compliance with the relevant environmental law in Vietnam.

ii) They should discharge no toxic waste in any form.

The priority screening criteria should be set up by the concerned board and agencies with reference to the above and also paying attention to the followings.

i) The criteria should be realistic considering the level of comparative advantages observed by the investors and should not be prohibitive nor too strict.

ii) If deemed appropriate, a group of enterprises, comprising high-tech enterprises and their supporting ones, should be treated as an enterprise for the evaluation in the screening of priority enterprises.

iii) It might be worth considering to set a couple of priority levels for the enterprises to be promoted, applying corresponding levels of preferential treatment.

(2) Preferential Treatments for the Researchers and Overseas Vietnamese

In order to promote the relocation or establishment of the state research institutes in HHTP, it is advisable that priority should be given for the researchers of the state research institutes and overseas Vietnamese for allocating the houses in the New Town Zone. These houses should be rent at favorable rates. As a part of the incentives for researchers, entrusted and cooperative researchers with the enterprises, the foreign ones in particular, should be encouraged. Co-ownership of the patents and intellectual property right should be allowed for the researchers.

7.7.8 Restrictions and Incentive Policy

(1) Overall Framework

Guidelines on high-tech park facilities intend to provide developers / investors with appropriate planning / design concepts and standards so that the park facilities can be planned, constructed and maintained without causing any environmental problems. Moreover, authorities or management can also have an effective reference in issuing permits and monitoring the developed infrastructure and industrial / R&D facilities.

Guidelines for the site layout, landscaping and buildings are related to the environmental control plan, which specifics the types and scale of industrial / R&D activities allowed for classified zoning.

Guidelines on construction and operation intend to provide investors / operators with requirements and incentives in doing business and, at the same time, to ensure the utilization of local resources.

The preliminary guidelines worked out in this study should be further elaborated on and incorporated into any existing administrative framework or institutions for effective implementation, including enforcement.

(2) Development Guidelines

Guidelines on site layout, such as roads, factory and R&D facility lots, residential lots, commercial lots, center facilities lots, open spaces as parks, playgrounds, green

and water areas, etc., are some issues already available with the Ministry of Construction. However, it has been found that mechanical application of these standards, that is, without due consideration of specific local conditions, and lowering or neglecting the required standards during the implementation stage are more critical to environmental degradation in the Hoa Lac project site.

Existing guidelines for general use in projects are not suitable for large scale development projects such as HHTP. Especially, fundamental guides for floor area ratio (FAR) and building coverage ratio (BCR) are regulated into two categories of more or less than 500m^2 of site area.

Therefore, these existing guidelines cannot cover hectare unit base developments such as this project.

The only way to improve the situation is the strict application of form and provision of sufficient financial sources and technical measures.

Therefore, a set of development guidelines with particular regard to the High-Tech Park development for an area in Ha Tay province has been prepared, covering architecture and landscape planning.

1) Planning guidelines for the site layout

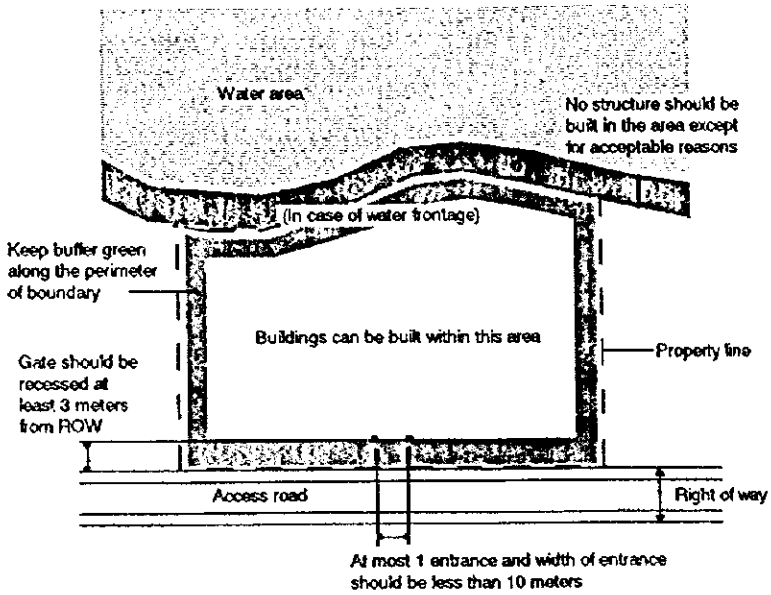
The guidelines on site layout cover density of facility units, building coverage ratio, building height, building set-back, landscaping, lighting, sing boards, fencing, parking, footpaths etc. The facilities should be located with sufficient public space and low density to provide a "Park" atmosphere that is superior and of a high grade.

The following should be considered for the site layout;

- Site constraints such as topography, form, area, waterway
- Relationship between surroundings and neighboring facilities
- Service efficiency of water, electricity, sanitation, storm water drainage, etc.

and lot arrangement;

- Basically, each lot should not be divided to subdivision lot. (prevention from indiscriminate and irregular development)
- No lot should be changed in lot form except for acceptable reasons.
- A lot should have at most one entrance and the width of entrance should be less than 10 m.
- Location of the gate should be recessed 3 m from the boundary of right of way.



Basic Lot Arrangement

2) Guidelines for the facility layout

(a) Facility layout

Floor area ratio (FAR) and building coverage ratio (BCR) should be not exceed the designate percentage. The standard of existing construction density by the Ministry of Construction is shown in Appendix IV. The following table shows preferable BCR and FAR for the HHTP suggested by the Study Team.

Preferable Maximum Building Coverage Ratio (BCR) and Floor Area Ratio (FAR) for HHTP by the Study Team

Lot Area (m^2)		~ 1ha	1ha ~ 5ha	5ha ~
R&D Zone	BCR	50%	40%	30%
	FAR	300%	200%	100%
High-Tech Industrial Zone	BCR	60%	50%	40%
	FAR	300%	200%	100
Urban/Business Zone	BCR	80%	70%	60%
	FAR	500%	400%	300%

Source: JICA Study Team

(b) Building setback

The minimum distance between any building and the lot boundary should be no less than that set out in the following table for new buildings. All of new buildings in the HHTP should be kept away from this setback distance.

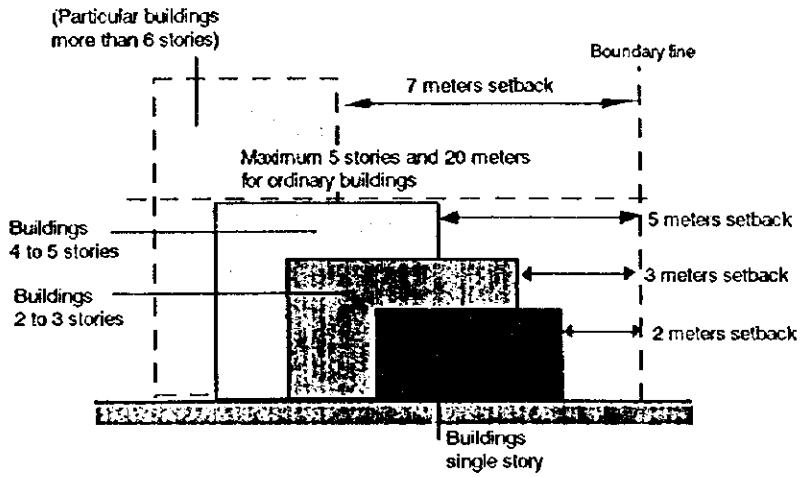
Building Set-back

Number of Story of the Building	Minimum Setback
Single story	2 m
2 ~ 3 stories	3 m
4 ~ 5 stories	5 m
*(More than 6 stories)	(7 m)

Remark: * Particular buildings with permission

(c) Building height

The standard height of HHTP facilities should not exceed 5 stories and 20 meters above the average elevation of the finished grade of building, because building shapes ought to be in harmony with the surrounding view of trees. However, buildings as landmarks, water towers, antennas for microwave networks and power supply towers/poles may exceed 20 meters in height, but must not impair the visual appearance of the whole scenery.



Relationship with Building Height and Minimum Building Setback within the Facility Lot

(d) Design principles of the architecture

- Provide comfortable space in the nature of a modern and scientific
- Atmosphere
- Appropriate buildings, adequately reflect the region's traditional style of architecture and materials to suit the climate.
- Harmony with natural environment and scenery of surrounding area.
- Contribution to local economy by using local materials such as brick, roof tile, timber etc., for appropriate buildings.

(e) Design themes of the architecture

- The most important feature in architecture is the international and futuristic style which represent science and technology.
- Especially, architecture design need not exactly reproduce traditional style but rather can incorporate some traditional features into modern design and still reflect traditional architecture's uniqueness.

(f) Color scheme

- The predominant colors of the project site are the greens of natural vegetation (sometimes with colorful flowers) and farm products, earth clay color of cultivated land and bare ground, sky blue.
- It is recommended that the external color schemes for the facilities of HHTP be chosen in harmony with natural tones and the color of modern materials.
- Color contrast should be provided through extensive use of monotone (such as off-white, beige, light-green,-gray,-brown, etc.), especially for the buildings and other superstructures.

(3) Measures for Promoting High-Tech Companies' Investment

There are three points for promoting High-Tech Companies' investment:

- the quality of infrastructure which high-tech industries require,
- incentives which attract companies, and
- sales promotion activities for HHTP.

1) Infrastructure

HHTP, as mentioned above, shall provide high quality infrastructure of international standards.

Water and electricity

Stable service for utilities such as water and electricity should be secured in both volume and quality. Not only blackout but also brownout of electricity, for example, might seriously damage certain industry. Therefore, as for electricity, a double supply service should be considered.

Industrial waste

Some high-tech industries use special chemicals and have difficulty in disposing of industrial waste. HHTP should provide a disposal facility or introduce a reliable disposer.

Telecommunications

As high-tech enterprises are targeting the world market, they require market information on real time. The production system is thought to be developed through electric data exchange (e.g. CALS). HHTP should provide excellent telecommunications infrastructure such as optical cable lines.

Good condition for foreigners

High-tech companies have many foreign engineers. HHTP should offer good condition for them. High-grade houses, shopping center and international school should be established.

Center facilities

The center facilities will be established in HHTP and offer several services such as human resource development, technical support, and incubation.

2) Attractive incentives

Incentives are divided into two categories: monetary and non monetary incentives as described below:

(a) Monetary Incentives

HHTP being the front runner for the high-tech industry development, special preferential treatment should be given to the enterprises and research institutes which should include the followings as shown below. It should be noted that the figures given below are for reference and they should be studied in depth by the concerned ministry/board of the Government of Vietnam.

Corporate income tax	Exemption for 10 years and 10 % reduction in the following 5 years
Accelerated depreciation Factory Institutes	 100% in 2 years 100% in 1 year
Expenditure for R&D	Double deduction
Import duty on facilities and equipment for production and R&D	Exemption
Tax on royalty income	Exemption
Tax on remitting royalty income abroad	2.5 % or 5 % (half of usual cases)
Amount-of-tax deduction according to royalty payment expenditure	Partly or wholely
Amount-of-tax deduction according to R&D expenditure	Partly or wholely
Subsidy to cooperative research with State Research Institutes	Certain amount below half of the expenditure
Subsidy to R&D activities by private enterprises	Certain amount below half of the expenditure
Subsidy to vocational and technical training	50%
Land ownership fee (lease charge of lots)*	Exemption for 5 years
Land ownership fee for the factory with R&D institutes	40% reduction
Land ownership fee for R&D institutes	50% reduction

* Applicable for particular companies which are recognized as contributing greatly to the success of HHTP including bringing in and transferring high-technology and stimulate and accelerate the location of high-tech enterprises into HHTP.

(b) Non Monetary Incentives

Companies often face difficulty in setting up and operating factories outside their home country. Supporting services are also attractive incentives.

The following services are considered to be provided.

- One stop service
- Maintenance service for infrastructure
- Maintenance service for green belt
- Match making service

3) Sales promotion

First, it is necessary to inform foreign investors about HHTP. The sales promotion activities should be conducted in cooperation with related organizations. If possible, HHTP will have its own sales promotion body. This organization will conduct investment seminars both in foreign countries and in Vietnam, attend investment missions from abroad, and dispatch the latest information about HHTP through the Internet.

When some companies build facilities in HHTP, new investors gather information from the located companies. Therefore, HHTP should take care of the located companies and grasp their requirement as an activity of sales promotion.

(4) Incentives for Inviting State Research Institutes to HHTP

The following incentives should be provided so that state research institutes could locate and researchers could move to HHTP, considering that HHTP will be a new developed area.

- Incentives for salary should be provided to researchers who will move to HHTP from Hanoi, etc. by means of an allowance having the character of migration allowance. A commuting allowance should be provided to researchers who will commute to HHTP.
- State should provide researchers who will move to HHTP together with their families with housing lots, free of charge, as well as financial support for house construction.
- Social infrastructure such as hospitals and schools should be constructed for the living of researchers and their families.

(5) Legal Measures (Restrictions and Incentive Policies)

A two-stage enactment will be needed for an HHTP-related legal system. The first stage is the enactment of a law for high-tech park construction in all of Vietnam and the second one, that of a law for the construction of individual high-tech parks or, in this case, for HHTP development.

HHTP will be divided into (1) R&D Zone, (2) Center Area, (3) High-Tech Industrial Zone, (4) Urban/Business Zone, (5) High Grade Residential Zone, (6) New Town Zone and (7) parks and buffer greenbelts. All of these form an entire HHTP.

To operate and use these functional zones effectively, a law covering the management of high-tech parks ("Hoa Lac High-Tech Park Law") will be needed.

The type and standard of incentives for the tenants of the park will differ from zone to zone. Criteria will have to be established for each high-tech park. These should cover development objectives, characteristics of the area, necessary functions and priorities given to these functions according to the Master Plan. For this purpose, a law for Hoa Lac High-Tech Park ("Hoa Lac High-Tech Park Law") should be enacted separately.

In this section, basic matters related to this legislation will be discussed.

1) Elements of a high-tech park law

The High-Tech Park Law should be applicable nationwide and should be observed in constructing high-tech parks in the country.

(a) General provisions for the establishment of a high-tech park

- Definitions of terms
- Scope of the law

(b) Provisions for the organization of high-tech parks

- HHTP-Steering Committee (HHTP-SC)
- HHTP-Board of Management (HHTP-BOM)
- HHTP-Infrastructure Development Company (HHTP-IDC)
- Functional Zone-Infrastructure Development Company (FZ-IDC)

(c) Approval of a Master Plan for high-tech parks

- Preparation of a Master Plan
- Approval of the Master Plan by the Prime Minister
- Approval of the Master Plan by government and governmental agencies

(d) Designation of the property land location of high-tech parks

- Preparation and approval of an land property map of the entire high-tech park
- Preparation and approval of sub-division maps in a high-tech park
- Approval of the designation of the sites of high-tech parks

(e) Determination of incentives for each function to be introduced

- Types of industry and investment period
- Investment scale
- Preferential treatment in HHTP

(f) Transfer and management of the right to own, use and rent land

- Bodies having the right to own and rent land
- Right to use and rent land to tenant businesses

(g) Transfer and management of the right to own, use and rent water and water surface

- Bodies having the right to own and rent water and water surface
- Right to own, use and rent land to tenant businesses

(h) Limited usage and development control in high-tech parks

- Criteria for the height, location and coloring of buildings
- Construction of district park and neighborhood parks
- Provision of buffer greenbelts and afforestation

(i) Environmental standards in the high-tech park

- Noise standards
- Water quality standards
- Air pollution standards

(j) Return of benefits to the neighborhood surrounding the high-tech park

- Employment of residents in and near the high-tech park on a priority basis
- Wide-area use and management of water resources

7.7.9 Estimate of Development Cost and Revenue

(1) Estimate of Development Cost

1) Preconditions

Major conditions applied for the estimate of development cost are summarized below:

(a) All the expenditures and revenues shall be made in US dollar. The exchange rate applied in the estimate is USD 1.0 = Dong 11,700, USD 1.0 = Yen 120, Dong 1.0 = Yen 0.01.

(b) Prices are estimated as of October 1997.

(c) The construction cost will cover the preparation works, main works, engineering service cost, physical contingency and price escalation contingency.

(d) Prices comprise the labor, materials and equipment cost.

(e) Import duty on material and machinery and value added tax scheduled to be applied from 1999 are assumed to be exempted and excluded from the cost estimation.

(f) The engineering service expense is estimated in proportion to the direct construction cost. The detailed design and supervision work are estimated at about 7% and 5% of total direct construction cost.

(g) The physical contingency is estimated at 10% of the direct construction cost and engineering service expenses. The price contingency is estimated on the basis of price escalation at the rate of 2% per annum for the foreign currency and 3% per annum for the local currency portion.

(h) The foreign currency portion is defined the cost of equipment, materials and engineering services which are specially imported for the purpose of the project.

2) Development cost

The development cost of Phase 1of HHTP is estimated at USD 688 million. The external portion for the main road in HHTP, water purification plant, sewage treatment plant, etc. will cost USD 255 million. Though the external portion does not include the development cost for the Hanoi - Hoa Lac Highway, USD 138 million, it should be considered as regional trunk highway aiming at the development of the planned Hoa Lac City as a whole, HHTP as a component, and other major provincial cities and the rural areas of the Ha Tay Province. The portion for public zones and profitable zones including housing and building will amount to USD 273 million and USD 160 million, respectively. The detailed estimate of the development cost is shown below and in Table 7-7-1.

Development Cost

(unit: USD million)

	Total			Infrastructures			Building		
	Total	Foreign Currency	Local Currency	Total	Foreign Currency	Local Currency	Total	Foreign Currency	Local Currency
1. External Infrastructure	254.78	140.26	114.52	254.78	140.26	114.52	-	-	-
2. Public Zones	273.20	59.11	214.09	47.28	18.51	28.77	225.92	40.60	185.32
3. Profitable Zones	160.08	49.20	110.88	44.70	14.58	30.12	115.38	34.61	80.76
Total	688.06	248.57	439.49	346.76	173.36	173.40	341.29	75.21	266.08

Note: /1 Inclusive of engineering service cost and physical contingency
/2 Exclusive of price contingency

3) Building cost of the center facilities

The building cost of the center facilities is estimated referring to the "Spon Asia Pacific Construction Costs Handbook (Second Edition) edited by Davis London & Seah International. This handbook gives the unit costs applied in international cooperation projects. Since the document was published in 1995, the unit costs are converted to current prices based on the trends of exchange rate and inflation in Vietnam. The floor area, which is a basic parameter for cost estimate, includes the wall thickness of internal rooms, that is gross area.

The costs include those for incidental facilities such as electric supply system, water supply system, sewerage system, health facilities, air conditioners and telecommunication facilities, and exclude those for land renting, compensation for relocation, furnitures, equipment, and so on. The cost excludes engineering fee for design and price escalation.

Each facility is assumed to be of a suitable grade based on Vietnamese experience on construction of each building type.

It is necessary to estimate the construction cost of the center facilities in detail at the time of implementation because the cost is estimated roughly, not based on the bill of quantity (BOQ).

Under the above conditions, the building cost exclusive of engineering service cost, physical and price contingency is estimated to be USD 36 million in total as shown in Table 7-7-2.

(2) Operation and Maintenance (O&M) Cost

The O&M cost for each facility and equipment in Phase 1 of HHTP is assumed to be 5.0% of the construction cost for the internal infrastructure.

However, the O&M cost is assumed to be offset by collected fee for O&M in the computation for financial analysis in this Study.

(3) Fund Arrangement

The sources of fund will be composed of own equity of the Developer (J/V between SOEs and J/V partner (FDI)), external soft loan, and private bank loan. The amount allocated to each source of fund is assumed as follows:

- Own finance of SOEs : Equivalent to land rent, compensation and relocation cost
- Own finance of FDI : 30% of construction cost
- External soft loan : 60% x (70% of construction cost)
- Private bank loan : 40% x (70% of construction cost)

The conditions of external soft loan and private bank loan are mentioned in Sub-section 7.8.1.

7.7.10 Development Schedule of Phase 1

The first operation of R&D Zone and High-Tech Industrial Zone will be started in 2002 or 2003 assuming that the feasibility study, detailed design and construction work will be conducted in the year 1998, 1999, and during two years of 2000 and 2001. To meet this schedule, the external infrastructure such as water purification plant, highway, etc. and residential facility as well as Urban/Business Zone should be constructed on time.

A difficulty is foreseen in the on-time service of the external infrastructure due to the implementation procedure. The external water supply facilities will be implemented in 2004 after F/S, design and construction of long conveyance pipeline and one year delay is foreseen for the operation of R&D facilities and factories which are expected to be open in 2003. Thus a temporary water supply system should be constructed for the start-up stage of HHTP utilizing the groundwater resources and Tan Xa Lake.

The early commencement of the construction work of the highway, main road in HHTP is recommendable in consideration of the huge volume of work.

The development schedule of Phase 1 of HHTP is diagrammed in Figure 7-7-2.

7.8 Project Evaluation

7.8.1 Financial Evaluation

In this sub-section, the financial evaluation is focused on the development of Phase 1 of HHTP according to the Basic Plan. The financial evaluation of the development under the Alternative Plan is discussed in Appendix III.

The financial evaluation aims at assessing the financial viability of investment in the construction of Phase 1 of HHTP, from the standpoint of the Developer of To be consistent with previous sections R&D Zone (Software Park), High-Tech Industrial Zone, Urban/Business Zone, High Grade Residential Zone and the whole HHTP (4 zones in total).

The projects for A R&D Zone (Institute Sub-Zone), Center Area, New Town Zone and Central Park shall be developed as public works, because these projects are considered to be non-profitable and have high public benefit.

The project for A New Town Zone is evaluated financially because the project has possible profitability.

In addition to the above-mentioned analysis, the financial viability of investment in the construction of Phase 1 of HHTP is evaluated from the viewpoint of the overall Project (7 zones in total).

(1) Concept of Financial Evaluation

The Project is evaluated in terms of "Financial Internal Rate of Return (FIRR)" based on the cashflow streams of revenues and expenses/costs. The internal rate of return is the discount rate at which the present value of cash inflow is equal to the present value of cash outflow. In other words, it is the discount rate at which the present value of the net receipts from the Project is equal to the present value of the investments. All inputs and outputs are valued at the market prices (current prices).

The construction cost of each zone in HHTP is supposed to be financed through equities and/or long-term loans. The loan repayability is evaluated on the basis of the sources and use-of-funds statements.

1) Viability for the Developer

(a) Viability for the Developer of A R&D Zone (Software Park)

The construction cost of R&D Zone (Software Park) in HHTP is the main financial outflow from the standpoint of the Developer. The income from software park lot sales is the main financial inflow for the Developer.

(b) Viability for the Developer of High-Tech Industrial Zone

The construction cost of High-Tech Industrial Zone in HHTP is the main financial outflow from the standpoint of the Developer. The income from factory lot sales is the main financial inflow for the Developer.

(c) Viability for the Developer of Urban/Business Zone

The construction cost including building cost of Urban/Business Zone in HHTP is the main financial outflow from the standpoint of the Developer. The income from floor rents of commercial buildings in Urban/Business Zone is the main financial inflow for the Developer.

(d) Viability for the Developer of New Town Zone

The construction cost of infrastructure and building cost of houses such as detached house, row house, medium rise apartment, high rise apartment and shop in New Town Zone are the main financial outflow from the standpoint of the Developer. The income from sales of various houses is the main financial inflow for the Developer.

(e) Viability for the Developer of High Grade Residential Zone

The construction cost of infrastructure and building cost of high grade houses such as detached house and apartment in HHTP are the main financial outflow from the standpoint of the Developer. The income from rents of high grade houses is the main financial inflow for the Developer.

(f) Viability for the Developer of HHTP (4 or 5 zones in total)

The development cost of 4 or 5 Zones in HHTP is the main financial outflow from the standpoint of the Developer. The cumulative income from the said Zones is the main financial inflow for the Developer.

2) Viability of the Development Project

Viability of the overall HHTP Development Project (7 zones in total)

The development cost of 7 Zones in total is the main financial outflow from the viewpoint of the overall Project. The cumulative income of 5 Zones (R&D Zone (Software Park), High-Tech Industrial Zone, Urban/Business Zone, New Town Zone, and High Grade Residential Zone) is the main financial inflow for the Project.

(2) Preconditions for Financial Analysis

1) Construction cost of external infrastructure

The scope and construction cost of external infrastructure are described in the previous chapter. The cost is assumed to be borne by the state budget or the provincial budget. It may be inevitable to raise fund from international financial institutions.

2) Construction cost of internal infrastructure of each zone in HHTP

The construction cost of R&D Zone (Software Park), High-Tech Industrial Zone, Urban/Business Zone, and High Grade Residential Zone in Phase 1 of HHTP is to be borne by the Developer.

This cost is inclusive of direct construction cost as a major financial outflow from the viewpoint of the Project. In this Study, the administrative cost and O&M cost are assumed to be offset by the collected fee for administrative and O&M.

3) Replacement cost

The Replacement is considered for the water supply facilities, sewerage facilities and drainage facilities of the internal infrastructure of R&D Zone (Software Park), High-Tech Industrial Zone, Urban/Business Zone and High Grade Residential Zone in Phase 1 of HHTP once in 20 years, and for the electric facilities and telecommunication facilities of the internal infrastructure of these zones once in 30 years, taking the length of their economic life into consideration.

4) Land rents in Phase 1 of HHTP

The land rents of R&D Zone, High-Tech Industrial Zone, Urban/Business Zone, and High Grade Residential Zone in Phase 1 of HHTP can be calculated by setting up the unit cost of land rent. In the case of foreign investment projects, the unit cost of land rent is set at 0.5625 USD/m^2/year* based on "Regulations on Rent of Land, Water, and Sea Surfaces for Foreign Investment Projects" issued in conjunction with The Minister of Finance's Decision No.1417 TC/TCDN dated 31 December 1994.

*Land rent = (Basic rate) × (Coefficient of location) × (Coefficient of infrastructure) × (Coefficient of industrial sector)

= 0.375 × 1.0 × 1.5 × 1.0 = 0.5625 (USD/m^2/year)

Considering the fact that the HHTP Project is a national project, the unit cost of land rent is set at less than 0.5625 USD/m^2/year under the approval of the Prime Minister, through discussion between the JICA Study Team and the General Department of Land Administration.

On the other hand, the land rents of the existing industrial zones located in the Northern Area are as follows:

IZ	Land Rents (USD/m^2/year)	Remark
Nomura IZ	0.2	(Permitted by GOV)
North Thang Long IZ	0.13	(Required by HPC)

Source: MOSTE

Considering the above, it is proposed to set the basic rate in set the following 2 cases rate in this Study:

Case	Land Rent (USD/m^2/year)
Case 1	0.375
Case 2	0.100

5) Compensation and resettlement cost

The compensation and resettlement cost for the Phase 1 area (794.2 ha) of HHTP is estimated on the basis of the "Investigations and Calculations for the Cost of Compensation and Relocation" conducted by the National Institute of Science Technology Policy Strategy (NISTPASS). The estimated cost is approximately 8.3 million USD for compensation and 4.7 million USD for resettlement in total as shown in Table 7-8-1.

6) Taxation

Several taxes, such as corporate tax, import duties, property tax, value-added tax in association with the transactions during the period of the infrastructure construction in and outside HHTP and during the operation period of the HHTP Project, are supposed to be imposed on the Developers.

On the other hand, according to the General Tax Department, the Developers may be entitled to exemption from import fees, customs duty and other taxes and fees subject to the approval of the Prime Minister, because the HHTP Project is a national project.

In this Study, they are assumed to be subject to tax exemption at this stage of the Study, taking into account the possibility of total tax exemption and uncertainties of taxation related to this kind of infrastructure construction.

7) Lot sale/lease price and facility sale/lease price in HHTP

(a) Sale price of factory lots to enterprises/investors in High-Tech Industrial Zone

The sale price of factory lots to enterprises/investors shall be assumed at a reasonable level, highly competitive compared with that in Vietnam and other Asian countries (Tables 7-8-2 and 7-8-3). This is the most influential factor which affects the financial viability of the Project, which fully depends on the market conditions. The price of lot sales to enterprises/investors located in the industrial estates in Vietnam ranges from 42 USD/ m^2 to 120 USD/ m^2. Besides, the average price of lot sales to enterprises/investors located in the industrial estates in and around metropolitan areas of other Asian countries ranges from 50 USD/ m^2 to 60 USD/ m^2.

Considering competitiveness with other industrial estates based on the circumstances mentioned above, the sale price of factory lots is set at 45 USD/m^2 at current price in this Study.

(b) Sale price of institute lots to enterprises/investors in R&D Zone (Software Park)

The sale price of software park lots to enterprises/investors is generally the same as that of factory lots. Therefore, the sale price of institute lots in R&D Zone (Software Park) is set at 45 USD/m^2 in this Study.

(c) Space rental price for business offices in Urban/Business Zone

Considering that the rental price of existing business offices, located in the suburbs of Hanoi City, is from about 20 to 30 USD/m^2/month, the space rental price for business offices in Urban/Business Zone is set at 20 USD/m^2/month in this Study.

(d) Rental price of detached houses and apartments in High Grade Residential Zone

According to the Japan External Trade Organization (JETRO), the average rental price of a detached house with a floor area of 150 m^2 for foreigners in Hanoi is 3,200 USD/unit/month (21 USD/ m^2/month). Based on the price per area, the rental price of a detached house with a floor area of 200 m^2 for foreigners in High Grade Residential Zone is set at 50,400 (=21 × 200 × 12) USD/unit/year.

The rental price of an apartment with a floor area of 150 m^2 can be assumed at 36,000 USD/unit/year by applying the ratio of the construction cost per unit to that of an apartment to that of a detached house.

(e) Sale price of houses in New Town Zone

The average sale price of an apartment (medium-rise) with a floor area of about 60 m^2 located in Hanoi is approximately 50,000 USD/unit. Based on the price, the sale price of an apartment (medium-rise) with a floor area of about 72 m^2 in New Town Zone is set at the same price as the existing apartment (medium-rise), that is 50,000 USD/unit.

The sale price of other houses can be assumed on the basis of the ratio of the construction cost per unit of an apartment (medium-rise) to that of each house. The sale prices of a detached house, row house, apartment (high-rise), and shop are set at 117,000 USD/unit, 93,000 USD/unit, 61,000 USD/unit, and 111,000 USD/unit, respectively.

8) Levy for administrative and utility services

The levy for administrative and utility services is assumed to be equal to the administrative cost and O&M cost for utility operation.

9) Lots or facilities sale/lease projection for Phase 1 of HHTP

The sale/lease of lots or facilities in Phase 1 of HHTP is projected as below. The sale/lease in the four zones exclusive of R&D Zone (Software Park) is assumed to take 5 years. The sale of software park lots in R&D Zone (Software Park) is projected to take 10 years based on the results of the investment demand survey.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
R&D Zone (Software Park)	5%	15%	10%	10%	10%	10%	10%	10%	10%	10%
High-Tech Industrial Zone	5%	35%	30%	20%	10%	-	-	-	-	-
Urban/Business Zone		5%	35%	30%	20%	10%	-	-	-	-
High Grade Residential Zone		5%	35%	30%	20%	10%	-	-	-	-
New Town Zone		5%	35%	30%	20%	10%	-	-	-	-

10) Fund arrangement

The sources of fund will be composed of own equity of the Developer (J/V between SOEs and J/V partner (FDI)), external soft loan and private bank loan. The amount allocated to each source of fund is assumed as follows:

- Own finance of SOEs : Equivalent to land rent cost, compensation and relocation cost
- Own finance of FDI : 30% of construction cost
- External soft loan : 60% × (70% of construction cost)
- Private bank loan : 40% × (70% of construction cost)

11) Loan conditions

The conditions for external soft loan are assumed as follows:

- Interest rate : 3.0% per annum
- Repayment period : 25 years
- Grace period : 10 years
- The repayment of interest shall be made during the construction period.

The conditions for private bank loan are assumed as follows based on the Singapore Inter Bank Official Rate (SIBOR):

- Interest rate : 9% per annum
- Repayment period : 10 years
- Grace period : 3 years
- The repayment of interest shall be made during the construction period.

12) Escalation

All the costs are assumed to escalate at an annual rate of 2% for the foreign currency portion and 3% for the local currency portion. All the revenues are assumed to escalate at an annual rate of 2.7%, which is the weighted average of all the costs in the foreign currency portion and the local currency portion.

(3) Results of Financial Analysis

1) Financial Internal Rate of Return (FIRR)

Under the preconditions mentioned above, the FIRR is calculated as shown in Table 7-8-4 and Table 7-8-5 and summarized below.

Results of FIRR Computation

Viability for the Developer

	FIRR(%)	
	Case 1	Case 2
1. R&D Zone (Software Park)	16.5%	20.6%
2. High-Tech Industrial Zone	14.5%	20.6%
3. Urban / Business Zone	17.1%	17.3%
4. High Grade Residence with Golf Course	12.0%	12.4%
5. HITP (4 Zones in Total)	14.4%	14.9%

Viability for the Overall Development Project

	FIRR(%)	
	Case 1	Case 2
1. HITP (7 Zones in Total)	9.3%	10.0%

(a) Viability for the Developer

Viability for the Developer of R&D Zone (Software Park)

The resulting FIRRs of 16.5% in Case 1 and 20.6% in Case 2 indicate that the development project for R&D Zone (Software Park) is financially viable.

Viability for the Developer of High-Tech Industrial Zone

The development project for High-Tech Industrial Zone has FIRRs of 14.5% in Case 1 and 20.6% in Case 2, i.e. it is financially viable.

Viability for the Developer of Urban/Business Zone

The development project for Urban/Business Zone with FIRRs of 17.1% in Case 1 and 17.3% in Case 2 is financially viable.

Viability for the Developer of High Grade Residential Zone

The resulting FIRRs of 12.0% in Case 1 and 12.4% in Case2 indicate that the development project for High Grade Residential Zone is financially viable.

Viability for the Developer of New Town Zone

The result of computation shows that FIRR for any cases is not available to be computed, which shows that the development project of New Town Zone is not financially viable with its currently planned conditions.

Viability for the Developer of HHTP (4 Zones in total)

The whole development of the whole HHTP Project (4 Zones in total: R&D Zone (Software Park), High-Tech Industrial Zone, Urban/Business Zone, High Grade Residential Zone) with FIRRs of 14.4% in Case 1 and 14.9% in Case 2 is financially viable.

For reference, the whole HHTP development project (5 Zones in total) has a FIRR of 10.6%, 10.8% and 10.9% in Case 1 and a FIRR of 11.0%, 11.1% and 11.3% in Case 2, respectively corresponding to the three alternative cases of development of New Town; the project is therefore deemed financially viable.

(b) Viability of the development project

Viability of the Overall HHTP Development Project (7 Zones in total)

The overall HHTP development project (7 Zones in total: R&D Zone (Institute Sub-Zone), R&D Zone (Software Park), Center Area, High-Tech Industrial Zone, Urban/Business Zone, High Grade Residential Zone, and New Town Zone) has FIRRs of 9.3% in Case 1 and 10.0% in Case 2; it is deemed financially viable because its FIRR is nearly 10%.

2) Repayability

The sources and use-of-funds statements of the development project for High-Tech Industrial Zone and the overall HHTP development project (4 Zones in total) in Case 1 are prepared as shown in Appendix III, for examination of loan repayability.

According to the table of statements of the development project for High-Tech Industrial Zone, the annual loan can be repaid from the factory lot sales revenue. The repayment of the external soft loan and the private bank loan will be finished in 2023 and in 2008, respectively. As the statement shows in the column of cumulative net cashflow, it is expected that the Developer can afford to repay both the external soft loan and the private bank loan.

According to the table of statements of the overall HHTP development project (4 Zones in total), the repayment of the external soft loan and the private bank loan will be finished in 2023 and in 2008, respectively. As the statement shows in the column of current surplus, it is expected that there will be no years of deficit for the Developer of the overall HHTP development project (4 Zones in

total) to. This means that the Developer can afford to repay both the external soft loan and the private bank loan.

3) Results of sensitivity analysis

A sensitivity test is conducted for the following two cases.

(a) Sensitivity of viability for the Developer (cost increase: 10 – 20%)

This case corresponds to the case that several taxes, such as import duties and value-added tax in association with the transactions during the period of infrastructure construction in and outside HHTP, are supposed to be imposed on the Developers.

(b) Sensitivity of viability for the Developer (delay of investment in High-Tech Industrial Zone)

	2001	2002	2003	2004	2005	2006	2007
High-Tech Industrial Zone (Normal Case)	5%	35%	30%	20%	10%	-	-
High-Tech Industrial Zone (Delay Case)	5%	25%	20%	15%	15%	10%	10%

The results of FIRR computation are as shown below. The detailed results are shown in Tables 7-8-6 to 7-8-9.

Results of Sensitivity Analysis for FIRR

Viability for the Developer
(Cost Increase)

	Cost+10%		Cost+20%	
	Case 1	Case 2	Case 1	Case 2
1. R&D Zone (Software Park)	13.5%	17.6%	10.4%	14.9%
2. High-Tech Industrial Zone	N.A.	15.5%	N.A.	N.A.
3. Urban / Business Zone	15.8%	15.9%	14.6%	14.7%
4. High Grade Residential Zone	11.0%	11.3%	10.1%	10.4%
5. HHTP (4 Zones Total)	13.1%	13.5%	11.9%	12.3%

Viability for the Developer
(Delay of Investment in High-Tech Industrial Zone)

	FIRR (%)	
	Case 1*)	Case 2
1. High-Tech Industrial Zone	10.0	14.5
2. HHTP (4 Zones Total)	14.3	14.7

*) Sales price of factory lots:47 USD/m^2

(4) Conclusion of Financial Evaluation

As presented in this sub-section, each of the three zones, namely R&D Zone (Software Park), Urban/Business Zone, High Grade Residential Zone has a FIRR of more than 10% from the standpoint of the Developer. With regard to High-Tech Industrial Zone, FIRR is calculated to be more than 10% in the case of land rent of less than 0.375 USD/m^2/year. Judging from FIRR of more than 10% for HHTP (4 zones in total), it can be said that the financial feasibility of this project from the viewpoint of the Developer is justified.

Besides, it is not considered feasible for the Developer to develop New Town Zone, because the project is not financially viable with its currently planned conditions. Considering its high public benefit, it is desirable that the development of New Town Zone would be conducted as a project for public interests.

The whole project exclusive of external infrastructure of Phase 1 of HHTP involving 7 zones has a FIRR of nearly 10% from the viewpoint of the project. Therefore, it can be said that this proves the financial feasibility of the whole project of Phase 1 of HHTP.

(5) Financial Arrangement for HHTP

Considering the characteristics of the project components, the funds required for the implementation of HHTP can be classified into the following categories.

1) Fund for the external infrastructure

2) Fund for the public zones

(a) Public zones

R&D Zone (Institute Sub-Zone), Center Area, New Town Zone

(b) Centers for public interest

High-Tech Park Center, Technopartnership Center, Technical Institute, OJT Training Center, National Software Center

(c) Self-financing zones

High-Tech Industrial Zone, R&D (Software Park), High Grade Residential Zone, Urban/Business Zone

The following fund sources can be contemplated, depending on the above-mentioned characteristics:

(a) Government budget;

(b) Multi- or bi-lateral loans, grants or technical aid;

(c) BOT (Build, Operate and Transfer), BLT (Build, Lease and Transfer), BCC (Business Cooperation Contract); and

(d) Private investment including foreign direct investment.

The possible financial arrangement is shown in Table 7-8-10. The required cost to be borne by the Government, of which a part could be financed by means of bilateral and multilateral official development and, is estimated at USD 300 million as shown in the table.

7.8.2 Economic Evaluation

(1) Economic Impact/Effect

The HHTP development project will generate many economic effects, which will enhance socio-economic conditions not only in the Hoa Lac area but also in whole Vietnam.

1) Classification of economic impacts/effects

The economic impacts/effects can be classified as follows:

(a) Direct effects caused by the construction of HHTP and related external infrastructure;

(b) Effect caused by establishment of a legal system for high-tech industrial promotion and organizations for HHTP;

(c) Influence of high technology and industrial promotion upon other industries;

(d) Impact on regional development;

a) Effect on economic development caused by industrial linkage among Hoa Lac, surrounding four cities and Ha Tay Province;and

b) Mitigation of congestion in Hanoi caused by the establishment of a newly developed city center

2) Characteristics of economic impacts/effects and benefit

The economic benefit is defined by converting the effects into currency. The characteristics of economic impacts/effects and benefit are summarized below.

(a) There are direct and indirect benefits.

(b) The majority of benefit has high uncertainty (the economic impacts/effect are greatly influenced by external factors such as the policy of the Vietnamese Government and the trends of world economy).

(c) It is difficult to convert the economic impacts/effects into currency.

3) Concept of economic impacts/effects and benefit

The concept of calculating economic impacts/effects and benefit is as follows;

(a) Direct effects caused by the construction of HHTP and related external infrastructure

a) Sales of industrial products

b) Net incremental production values

c) Increase of employment

d) Benefit caused by integration of high-tech industries

e) Interface function among industry-university-government

In this Study, the net incremental production values approach is adopted for the economic evaluation.

(b) Impacts/effects caused by the establishment of a legal system for high-tech industrial promotion and organizations for HHTP

a) Impacts/effects caused by the establishment of a legal system for high-tech industrial promotion

- Strengthening of legal protection of intellectual property such as industrial property, copyright, designs, and trademark rights
- Promotion of technology transfer (introduction, safekeeping, utilization and transmission of technology)
- Promotion of commercialization through R&D activities
- Installation of investment incentives for high-tech enterprises
- Establishment of soft loan funds for small and medium industries
- Strengthening of assistance of venture business and tax incentives for venture capital

b) Impacts/effects caused by the establishment of organizations for HHTP

- Strengthening of R&D organizations (unification of organizations, strengthening of coordination of organizations)
- Rationalization of registration, management and utilization system for intellectual property

(c) Influence of high technology and industrial promotion upon other industries

a) Influence of high technology upon other industries

b) Strengthening of international competitiveness of overall industries caused by the installation of high-tech machinery and equipment

c) Creation of new private enterprises

d) Creation of job opportunity through the creation of new high-tech industries

e) Increase of export of high-tech products

f) Improvement of performance, quality, international competitiveness of industrial products in whole Vietnam caused by the influence of high technologies

(d) Impact for regional development.

a) Increase of gross regional product (GRP) and employment caused by industrial linkage among Hoa Lac, surrounding four cities and Ha Tay Province

b) Mitigation of congestion in Hanoi caused by the establishment of a newly developed city center

(2) Economic Evaluation (EIRR)

In this sub-section the economic evaluation is focused on the development of Phase 1 of HHTP according to the Basic Plan. The economic evaluation of the development under the Alternative Plan is discussed in Appendix III.

The economic evaluation aims at assessing the economic feasibility of the Project from the viewpoint of the regional/national economy, in which the high-tech industrial output to be generated in High-Tech Industrial Zone in Phase 1 of HHTP will be a dominant factor for the analysis.

In principle, the economic feasibility is evaluated in terms of economic internal rate of return (EIRR).

1) Concept of economic evaluation

The benefit of High-Tech Industrial Zone development could be evaluated by comparing the productivity between the current Value Added (VA), mainly agricultural production ("Without Project") and VA, high-tech industrial production ("With Project").

EIRR is calculated on a cashflow basis, consisting of the following:

Economic Cost

(+) Construction cost of the internal infrastructure of Phase 1 of High-Tech Industrial Zone

(+) Construction cost of the external infrastructure of HHTP

(+) Construction cost of factory buildings by investors

(+) Investment cost of machinery and equipment by investors

Economic Benefit

(+) VA (high-tech industrial production) in Phase 1 of HHTP

(-) VA (agricultural production) in Phase 1 of HHTP in the case "Without Project"

2) Preconditions for the economic cost

In general, the economic cost which is the cost for the country as a whole rather than the Developer, is obtained by deducting the transfer payment comprising import duties, turnover tax and profit, from the financial cost. As those taxes are assumed to be subject to tax exemption in this Study, the financial cost is used for the economic cost considering the importance of the HHTP Project as a national project. No escalation is considered for the economic cost.

(a) Construction cost of internal infrastructure of Phase 1 of HHTP and external infrastructure

The construction cost of the internal infrastructure of Phase 1 of HHTP and the external infrastructure is obtained by converting the financial cost.

(b) Construction cost of factory buildings by investors

Based on the "Asia Pacific Construction Costs Handbook" edited by Davis Langdon & Seah International, the cost of the factory buildings for high-tech industries is assumed to be 1,000 USD/m^2.

Assuming a coverage ratio of 40% of the building site, the construction cost of factory buildings is estimated at 246.4 million USD.

(c) Investment cost of machinery and equipment

The capital investment by sector to be required to induce such high-tech industrial production can be estimated based on the past historical performance in other Asian countries, that is, the trend of "machinery/equipment asset per employee". The value of "machinery/equipment asset per employee" is tentatively estimated at 100,000 USD/employee.

As the number of employees in High-Tech Industrial Zone is estimated to be about 8,634 in Sub-section 6.1.5, the investment cost of machinery/equipment asset buildings is estimated at 863.4 million USD.

(d) Replacement cost

The water supply facilities, sewerage facilities, drainage facilities of the internal infrastructure of Phase 1 of HHTP and the external infrastructure are considered to be replaced once every 20 years.

The replacement of the factory buildings and machinery/equipment is considered once every 20 years and once every 10 years, respectively.

The replacement of other components, is, due to the length of their economic life, not considered during the evaluation period of 30 years.

3) Preconditions for economic benefit of High-Tech Industrial Zone development

(a) Estimate of VA (mainly agricultural production)

According to the "Socio-Economic Survey Report" prepared by NISTPASS in May 1997, the agriculture and forestry land area in Phase 1 of HHTP amounts to approximately 600 ha.

Considering the fact that the production in Thach That District, which covers the project site, is 18.4 million VND/ha, the current VA of agricultural

production in Phase 1 of HHTP is estimated to be VND 10,920 million as shown in Table 7-8-11.

Based on the A growth rate during the past 10 years, VA of agricultural production in Phase 1 of HHTP is estimated to be 1.64 million USD in 2010 and 2.62 million USD in 2020 as shown in Table 7-8-12.

(b) Estimate of industrial production

The high-tech industrial productivity is assumed to grow in terms of "net product per number of employees" as shown in Table 7-8-13.

VA of high-tech industrial production is estimated to be 394.0 million USD in 2005. For the generation of benefit, it is assumed that the factory lots will be fully sold out within 5 years, the same as the conditions applied in the financial evaluation.

Taking into consideration, the growth of labor productivity of high-tech industries mentioned in Sub-section 6.1.5, the annual growth rate of high-tech industrial production is assumed as shown below:

	2005-2010	2010-2020	2020-
Annual Growth Rate of Industrial Production	1.084	1.059	1.033

(c) Comparison between VA agricultural production and industrial production

The ratio of productivity will further increase to more than 1:360 in 2010 when the factories in Phase 1 of High-Tech Industrial Zone of HHTP are in full operation.

	2010	2020
VA of agricultural production (million USD/year)	1.64	2.62
VA of high-tech industrial production (million USD/year)	591.00	1,047.21
Ratio	1:360	1:400

4) Results of economic analysis

(a) EIRR

It is considered that the whole cost concerned with the HHTP Project is the economic cost and only VA in High-Tech Industrial Zone is the economic benefit. EIRR is calculated to be 25.9% as shown in Table 7-8-14. This value demonstrates that the Project is economically viable.

(b) Results of sensitivity analysis

A sensitivity test is conducted for the following two cases.

- Fluctuation of both the construction cost and benefit (high-tech industrial production)
- Fluctuation of the unit investment cost of machinery and equipment
- Varying the investment schedule

The results of EIRR computation are as shown below.

(%)

	Cost (Normal Case)	Cost (+10%)	Cost (+20%)
High-Tech Industrial Production (Normal Case)	25.9	24.8	23.8
High-Tech Industrial Production (-10%)	13.8	12.7	11.6
Investment Cost of Machinery and Equipment per Employee (200,000 USD/Person)	17.9	17.4	16.8

5) Impact of HHTP on the Vietnamese economy

Besides the various ripple effects on the development of the Vietnamese economy, the HHTP Project will have a noticeable direct impact on the Vietnamese economy, that is the increase of the expected GDP of the country.

GDP in Vietnam and GVA in HHTP are estimated in the following table based on the macroeconomy analysis described on in sub-section 3.3.2 and the development framework described in sub-section 6.1.1 (2). The share of the GVA to be generated in HHTP in the total GDP is estimated to be 0.7 ~ 1.4 % in 2005, 0.8 ~ 1.7 % in 2010, and 1.2 ~ 1.9 % in 2020.

	2005	2010	2020
I. Estimate based on Macro Approach			
1) GDP in Vietnam (USD million)	56,212	91,960	246,080
2) High-Tech Industry GVA in Vietnam (USD million)	1,697	5,814	29,530
3) GVA in HHTP (USD million)	764	1,599	4,725
	(1.4%)	(1.7%)	(1.9%)
II. Estimation by Micro Approach			
1) GVA in HHTP (USD million)	(0.7%)	(0.8%)	(1.2%)
III. GDP Share by HHTP	0.7 ~ 1.4 %	0.8 ~ 1.7 %	1.2 ~ 1.9 %

6) Conclusion of economic evaluation

An EIRR of more than 10% of the opportunity cost is derived through the EIRR computation. This indicates that the Phase 1 development of the HHTP project including High-Tech Industrial Zone will have a significant impact on whole Vietnam.

Even if the construction cost, benefit, or the investment cost of machinery and equipment vary in the worst cases as assumed in the sensitive analysis, EIRRs are calculated to remain above 10%. Therefore, it can be said that the o Phase 1 development project of the HHTP project including High-Tech Industrial Zone is proved to be economically feasible.

7.8.3 Socio-Environment

(1) Current Socio-Environmental Conditions in HHTP Area

1) Geographic conditions

The proposed site of HHTP is located in Ha Tay Province which is 32 km west of Hanoi (in straight line). The site planned for HHTP (planned for Phase 3 in 2020) covers about 1,650 ha of land around Tan Xa lake, within the area of 5 communes. Tan Xa, Ha Bang, Thach Hoa and Binh Yen, of Thach That district, and Co Dong commune of Son Tay town, Ha Tay province. The locla people who have been concentratied in villages since a long time depend mainly on agricultural production for their having. On the terraces of land in the valleys and the hills people grow mainly rice, dry crops, and fruit. Most of hilly land are planted with perennial wood trees (Eucalyptus, Acacias), which the remaining area is covered by cassava and tea. In the middle of this land site there is a group of small natural lakes, connected with each other to form the Tan Xa lake. This lake constitutes a national drain of rain water and at the same time a water supply source for agricultural production and domestic use of the people in the area. The following table shows the area of the 5 communes including the area of HHTP.

Land Area of Five Communes

(Unit: ha)

Administrative unit	Thach That District				Son Tay Town	Total
	Tan Xa commune	Thach Hoa commune	Ha Bang commune	Binh Yen commune	Co Dong commune	
Land managed by commune	634	2,462	952	1,067	3,244	8,323

(Source: NISTPASS report, Preliminary Study on Direct Socio-Economic Impacts of the Hoa Lac High-Tech Park Project, Hanoi, May 1997)

Of the total of 8,323 ha of natural land controlled by the above mentioned 5 communes, the HHTP Project will use 1,650 ha up to the year 2020. In Phase 1 up to the year 2005, the Tan Xa lake will be the center of the construction area of about 800 ha which includes 120 ha of lake and 680 ha of land. This area of 800 ha belongs mainly to the territory: Tan Xa and Thach Hoa communes and a small part of Binh Yen commune.

2) Current land use

The present status of land use in the area of 800 ha eririasged for phase 1 development was studied and calculated by a NISTPASS team in September and October 1997. The land use was classified into 6 categories as follows

- Residential land for residents
- Agricultural land
- Forestry land
- Public area
- Area of fish-breeding ponds and lakes
- Green area

In order to calculate the area of each categorized land use, the NISTPASS team has adopted the following two methods;

- Calculation based on astral information on materials hold by the local Government and based on experience of professional cadastral officers of Thach That district and its three communes: Thach Hoa, Ha Bang and Tan Xa.
- Using a Remote Sensing Technique and Geographic Information System (GIS) and interpreting the photographs taken by aircraft to calculate the area, of various categories of land in the project area.

The following table shows the result of calculation made by the NISTPASS team which gives each area of the categorized land use in Phase 1 of 800 ha.

Current Land Use Area in HHTP

(Unit: ha)

Residential Land	Agricultural Land: Paddy Fields	Agricultural Land: Cassava Fields	Agricultural Land: Others	Forestry Land	Public Land	Fish Pond /Reservoir	Green Area	Total
31	123	167	74	119	32	83	190	819

(Source: NISTPASS, Investigations and Calculations of the Cost of Compensation and Relocation for HHTP - 800 ha, October 1997)

3) Population and number of households

According to the study conducted by NISTPASS in September 1997, the number of households in the area planned for first Phase development of the Project (to 2005) is estimated at 668. However there are no exact data on the population in Phase 1. Statistical data on the population around the Project area indicate that the average number of member per household is 3 to 4. Therefore, the population in the area of Phase 1 of the Project is presumed to be about 2,500. The following table shows the total number of households and the population in the 5 communes of Thach That district and Son Tay town around the Project area which includes the HHTP site:

Number of Households and Inhabitants in the Project Area

	District	Commune						
	Thach That	Ha Bang	Tan Xa	Binh Yen	Thach Hoa	Co Dong	Total of 5 Communes	Phase 1 Project Area
Household	28,454	1,183	752	1,579	1,961	1,834	7,309	668
Inhabitant (Pers.)	129,836	5,618	3,505	7,259	5,703	8,044	30,129	(2,500)(*)

(Source: NISTPASS, Preliminary Study on Direct Socio-Economic Impacts of the Hoa Lac High-Tech Park Project, May 1997)
(*): Estimated value.

The population growth rate in the Project area is considered to be the same as the overall level of the Thach That district, which was 1.5% in 1996. The main occupation of the whole population of the 5 communes in the HHTP area is farming. Farming households are divided into agricultural and forestry households. But the characteristics of their occupation are not much different. A small part of the population carry out service and small trade, mainly in the area around Hoa Lac, along the national road 21 A. The following table gives the population structure by age in Thach That district in 1996. Assuming that the working age is 15 - 59, the manpower in the area planned for Phase 1 is about 1,350 people accounting for 54% of the population.

Population Structure by Age in HHTP Area

Age	Rate (%)	
1 - 9	23.7	
10 - 14	11.7	
15 - 19	10.3	
20 - 34	25.2	53.8%
35 - 49	12.4	
50 - 59	5.9	
> 60	10.8	

(Source: 1996 Statistic Data of Thach That District)

4) Economy

The Planned project area is characterized mainly by agricultural economy . The mean annual GDP per capita is VND 1.2 - 1.3 million. Rice, cultivation of nice, dry crop, and cassava is the mains occupation and the main means of living for the people in the area. With regard to forestry, natural forests here are nearly absent. The planned forest here is mainly composed of eucalyptuses and acacias. Livestock breeding includes: cattle such as buffaloes, oxen as work animals pigs and poultry for meat, bees for honey. However the scale of breeding is small, mainly within families, since there is no land for industrial or semi-industrial scale livestock breeding.

Small industry and handicraft production is mainly carried out by private households,and no large scale production project has been proposed. In recent years, the local authorities have encouraged households to produce furniture, construction materials such as lime, bricks of various kinds, processing of agricultural products such as rice husking, processing of cassava, developing metal welding and soldering workshops.

5) Infrastructure

(a) Roads

In general, the road system is still poorly developed, consisting mainly of earthen and graded stone roads, except the national roads 32 and 21 A running outside the Project area. The network of inter-commune and inter-village roads has been built mainly spontaneously without any overall planning.

(b) Telecommunications network

In the Project area, a telephone network has extended to the villages and communes. However, telephones are still only limited to the People's

Committee offices of communes. Some private business households have also installed telephones. But in general the ratio is, insignificant.

(c) Power supply

The existing electricity system in the area planned for HHTP is within the national electricity network with 10 KV and 6 KV lines providing domestic electricity to the population.

(d) Water supply

The domestic water supply in the Project area is still mainly from dug wells. The surface water resource is abundant, concentrated in the system of rivers, streams and major lakes.

6) Culture, education, health care

(a) Religion

Most of the population in the Project area follow Buddhism, worshipping their ancestors and parents. Only one village (Phu Duc village) of Tan Xa commune and part of Van Loi village of Binh Yen commune follow Catholicism.

(b) Education

More than 90% of the population here have farming occupation, with 21% haveing high school education, 62% secondary school education, and 14% primary school education. In the whole area there is one high school, and in each commune there are one secondary school and one primary school.

(c) Health care

Each commune has a medical station. Each commune medical station has 3 - 4 medical workers carrying out the function of minimum primary health care for the people, preventive injection, treatment of ordinate diseases for the people, guiding the people to apply antiseptic and family planning measures.

(2) Socio-environmental Impacts

With the implementation of the Project, the current land use will change largely to High-Tech Industrial Zone, R&D Zone, Urban/Business Zone, Residential Zone, etc. This will have a great influence on the current social environment in the area. The Project needs a wide area for construction of workshop, buildings, laboratories, etc.,

causing considerable losses of cereal crops, orchards, forestry land, etc., reducing the amount of food, foodstuff and part of aquatic products, and job opportunities in this area. The Project will also change the economic life of the people, in particular the farmers who used to engage only in agricultural production. However, the project will creating opportunities for the local people. They can take part in the provision of service, supply of food, foodstuff, fruit, etc. Also the Project will create conditions to learn and to be trained, stimulating them to improve their knowledge, skills, and qualification so that they can be admitted to study / work in the HHTP.

Considering the above-mentioned social conditions in the Project area, the major social environmental impacts to which attention should be paid are compensation and relocation of local residents. In the area planned for Phase development of the Project, 668 households have been identified in the study of NISTPASS. The number of inhabitants now living in the area is presumed to be about 2,500 and some of these inhabitants are to be relocated to the resettlement area. A resettlement area will be arranged in the northern part of the Project area, outside the Phase development area but inside the Project area. In the case of HHTP, the number of local residents to be relocated to the resettlement area will be reduced as much as possible considering the present living conditions and the surrounding conditions after the project implementation. Therefore, a part of residents currently living in the area will remain there after the completion of the Project. For both the resident to remaining and to be relocated, possible optional measures for livelihood support and compensation should be taken prior to the Project implementation.

(3) Countermeasures for Socio-Environment Impacts

1) Responsibility for compensation and resettlement

The responsibility for compensation and resettlement of any project belongs to the local authorities. The local authorities of a province where a project is implemented is responsible for making a decision to establishment of Field Clearance Committee (FCC). In this Project, the HHTP site lies completely untwine the area of Thach That district of Ha Tay province, and the main responsibility therefore the Ha Tay People's Committee will be mainly responsible for taking such action. The compensation and resettlement tasks will be undertaken by the FCC which is set up by the Ha Tay People's Committee. The FCC consists of the representatives from cadastral, financial, taxation, construction offices as from Developer well as the constructor and related institutions. The chairman of FCC will be the President or Vice

President of the Provincial People's Committee. The main legal documents to be applied to the implementation of the compensation and relocation are the tolling:

- Land Law (July 14, 1993)
- Decree No. 87/CP (August 17, 1994)
- Decree No. 90/CP (August 17, 1994)
- Decision issued by the Ha Tay People's Committee or the Hanoi City People's Committee
- Other relevant legal papers issued by related organizations such as Financial and Pricing Offices.

2) Compensation components

The procedure of compensation and resettlement is to be conducted in conformity with the above-mentioned laws, decrees, and decisions. In order to carry out compensation and resettlement, it is necessary to identify clearly the area of each categorized land use, as well as the number of households and the population in the area. After that the infrastructure construction plan for infrastructure facilities such as electric lines, water supply, transportation, etc. in the resettlement area is to prepared. The area of each categorized land use and the number of households and inhabitants studied by the NISTPASS team in the Phase, development area are as described above. Components to be considered for the compensation and resettlement are as follows:

- Compensation for land by category
  The land compensation cost is in general easily and relatively precisely calculated due to accurate data of land areas studied and regulations set forth by the Government Space Clearance Board. The calculation is made according to the Decree No. 87/CP.
- Compensation for available properties
  Calculation of the cost of this component includes houses of different types and categories, various vegetation and other supporting works. Accurate estimate seems much more difficult than that for compensation for land. This component also includes compensation for buildings, tombs and other architectural structures.

- Compensation for crops in agricultural land
  As for the annual crops such as rice, vegetable, maize, been, winter crops, etc., their capacity will be determined by existing level. In case of long-term crops, a compensation will be calculated based on a concrete number of existing plants and an average output of most recent three years.

3) Countermeasures

(a) Early commencement of indispensable administrative procedure

The compensation and resettlement will be carried out by the FCC established by Ha Tay People's Committee according to the legal documents mentioned above. The procedures of these activities include:

- preparation of documentation and other issues related to compensation cost;
- construction plan for a area resettlement new;
- arrangement for of employment residents to be reseltled.

However, the detailed rates to be applied for the compensation and resettlement under this project are not determined yet at present. In order to reduce unwanted difficulties, the Vietnamese government should issue formal written policies on land-use requirements in the Project area at an earliest date after the approval of this Project, according to which local land use and other natural resources could be well managed by the local authorities.

The relocation plan is prepared based on the actual status of number of households to be moved from the Project area. The relocation cost includes the compensation costs for removing properties and the cost of land to be allocated for new resettlement regions in addition to other investments for basic infrastructure such as roads, drainage system, etc. In the case of the Hanoi - Hoa Lac Highway construction, the relocation rate of USD 7,000 per household was used for the calculation of the total resettlement cost.

(b) Arrangement of resettlement area

In order to implement the resettlement smoothly, it is necessary to select the suitable resettlement area. The new resettlement area should be selected in the light of following issues:

- In general development and use of land is controlled by various laws and regulations. The proposed land should be secured with certainty and used for the purpose of resettlement.
- The people to be relocated in the new resettlement area are given priority of access to job opportunities generated in HHTP. In this meaning, if the proposed area is located in and around the HHTP area, it is convenient for commutation.
- In order to promote the resettlement, the relocateion place must have more favorable land conditions than that of the present place. The proposed place should be located within easy access to main roads and near existing commercial areas.
- In order to conduct land clearance activities smoothly, it is desirable that the present land form of the resettlement area relocated place should be a plain land with good draining conditions.

Considering the above mentioned criteria for selecting the new resettlement area, the proposed locations of resettlement areas of the HHTP Project are:

- inside and in the north of the whole Project area,
- outside of the phose 1 development phase area,
- on the east side of the national road 21A, and along both sides of the inter main road.

(c) Employment creation and support for new job training

Relocated residents will have priority of being employed and getting job training in the HHTP. Possible optional measures are:

- to give priority to the people who wish to get employment in the construction and operation phase of the HHTP Project;
- to give priority to the people who wish to get trained in order to obtain basic skills to be employed locally. The training zone to be constructed in the Center Area could be the one to provide training opportunities;and
- to give priority to the people who wish to get job counseling for local employment. In this case, the Ministry of Education and Training (MOET) could be the key governmental agency.

The total number of workers in the HHTP in the year 2005 is expected to be 14,300. On the other hand, the manpower in the Phase 1 at present is estimated at about 1,350 workers at the most. Therefore, those people who wish to obtain a job can be employed all within HHTP. The number of workers in HHTP in 2005 is estimated as tollowy.

Number of Workers in HHTP (2005)

(Unit: persons)

R&D Zone	Center Area	High-Tech Industrial Zone	Urban/ Business Zone	High Grade Residential Zone	New Town Zone	Total
4,000	200	8,600	1,300	100	100	14,300

(Source: JICA Study Team)

(4) Evaluation

The matrixes of socio-environmental impacts are shown in Tables 7-8-15 to 7-8-18. In these tables, the significance is expressed in three categories: MA (major impact), ME (medium impact), MI (minor impact). The environmental impacts in category MA must be subject to a detailed Environmental Impact Assessment (EIA).

In Phase 1 of the HHTP Project, the land use plan is formulated with a view of preserving the existing villages and minimizing the number of households to be resettled. It is necessary to provide a total of 668 households with (a) compensation for land, property, products and relocation, (b) resettlement area, and (c) job opportunity. The compensation and resettlement will be undertaken by the FCC established by the Ha Tay People's Committee.

The resettlement areas will be located to the north of the Project area along the proposed main road, considering the following conditions:

(a) possibility of securing available land
(b) more favorable land conditions
(c) adequate land area and infrastructure
(d) accessibility to commercial areas
(e) convenience of commutation

Relocated residents will be given priority in employment in HHTP and getting job in agriculture. The total number of workers in HHTP is expected to be 14,300 in the year 2005. The majority of workers will be semi-skilled labors, simple labors, clerks and workers in the service sector. The working population among the resettlers is estimated to be about 1,350. Those people will be provided with appropriate jobs by securing a priority access to adequate education and job training in the Technical

Institute and the Technopartnership Center to be planned in HHTP. In the short term, it is expected that those people will be given priority in employment in the construction of Phase 1 of the HHTP Project. The income level of relocated residents will rise, considering the current income differential between the agriculture sector and the industrial and service sector in Vietnam.

As mentioned above, negative impacts will be held to a minimum and various positive impacts are expected from the HHTP Project. Therefore, the Phase 1 development of the Project is viable from the social viewpoint.

7.8.4 Environmental Consideration

(1) Current Natural Environmental Conditions in HHTP Area

1) Geographic location

The HHTP Project area is located within the territory of Thach That District of Ha Tay Province, 32 km west of Hanoi and 11km east of Son Tay town, along the national road 21 A. In the north it is bounded by Phuc Tho District and Son Tay town, in the south by Xuan Mai District, in the east by Quoc Oai District, and in the west with the Dong Mo - Ngai Son tourist area of Ha Tay Province.

The HHTP is laid at the center of Hoa Lac City in the Mieu Mon - Xuan Mai - Hoa Lac project urban series of which will be built at the beginning of the 21st century.

2) Topography

Most of the relief features in the HHTP Project area are low hills, with common elevation of + 10 to + 40 m. The slope is commonly 3 - 7%. In the middle of the area is the Tan Xa lake with a water surface area of 300 ha in the rainy season. Around the Tan Xa lake are gentle hill slopes, forming wide and flat fields. Most of the plain land and low hill slopes are used for planting cassava, dry crops and paddy. On the hill slopes there are terraced fields with small elevation difference. The top of the hills is covered with gravely soil overlaying lateritic layers. On the hill slopes and in the valleys are the low terraced fields.

3) Land

The proposed site of HHTP is located in the territory of 5 communes: Binh Yen, Ha Bang, Thach Hoa, Tan Xa of Thach That District and Co Dong commune of Son Tay town. Of the total of 8,323 ha of natural land controlled

by these 5 communes, the HHTP Project will use 1,650 ha up to the year 2020. In Phase 1 up to the year 2005, the Project will use about 800 ha, most of the land of two communes of Tan Xa and Thach Hoa around the Tan Xa lake, and a small part of Binh Yen commune.

4) Climate

The Project area is characterized by a tropical climate. Winter is cold and dry, summer is hot and humid. In the hot season (May, June, July), the mean temperature is 28°C. The annual mean humidity is 84 - 86%, maximum 95% and minimum 59%, the mean humidity in summer is 82%. The total sunny duration is 1,555 hours in a year, the most sunny period is the one from May to August. Compared with other areas in the Northern part of Vietnam, this area has nice weather, little fog and hoarfrost. The mean annual rainfall is 1,400 - 1,600 mm, distributed unevenly in the year. The maximum rainfall occurs in July and August. The main wind direction in winter is SE - NW to NE - SW, with a mean velocity of 4 m/s. In summer the main wind direction varies from SE - NW to NW - SE, with a mean velocity of 2.5 m/s. Typhoons usually occur from August to October, but with low frequency, in average once every 3 years.

5) Rivers, lakes, irrigation system

The Tich river and small canal system form the main water supply and drainage system of the area. The Tich river has a narrow and shallow channel. In the dry season the water level is very low. The Tan Xa lake with a water surface area of 300 ha in summer is the main water source for agricultural production and domestic water supply of the population in the area.

6) Water and ambient air quality

Surface water quality

Although there are no regular monitoring data on surface water quality in the Red River Delta region including the Project area, some governmental agencies or institutions have conducted specific water quality surveys targeting particular issues, such as pesticides, in cities or specific projects. The following table shows the water quality of the red River monitored during 1992 - 1993 for reference.

Water Quality of the Red River

(Unit: mg/l)

Location	DO	BOD_5	Zn	As	Cu
Hanoi (Red river)	-	-	0.0025	0.21	0.042
Son Tay (Red river)	-	-	0.047	-	0.044
Trung Ha (Da river)	-	-	0.090	-	-
Red river					
- *Hanoi*	5.19	3.05	-	-	-
- *Viet Tri*	6.31	2.75	-	-	-
- *Trung Ha*	6.23	2.87	-	-	-
- *Son Tay*	6.35	3.01	-	-	-
- *Co Tuyet*	6.73	3.58	-	-	-
Permissible value	6(A), 2(B)	4(A), 2(B)	1(A), 2(B)	0.05(A), 0.1(B)	0.1(A), 1(B)

(Source: Proceeding of the National Seminar on Environmental Protection and Sustainable Development Research, Hanoi, 1993, p66 - 67)
Note:Permissible value A: to be applied to the surface water to be used as a source of domestic water supply with appropriate treatment; B: to be applied to the surface water to be used for purposes other than domestic water,supply

Figures in the table indicate that the River water is slightly polluted by organic substances and heavy metals, but is generally good and stable condition. However, monitoring data on water quality are extremely poor, especially in rural areas.

Ambient air quality

There are no regular monitoring data on air quality in the Red River Delta region. There exist only short term air quality survey data on particular urban areas. However some monitoring data indicate that the air quality is relatively good in zones which are far from cities and industrial areas and most of air quality parameters are below the permissible levels. The following table shows the air quality in the northern part of Vietnam for reference.

Air Quality in Northern Part of Vietnam

(Unit: mg/m^3)

Location	SPM		SO_2		NH_3	
	Max	Min	Max	Min	Max	Min
Hanoi	45.8	2.1	0.098	0.001	0.005	0.002
Viet Tri	1.9	0.4	0.100	0.003	0.034	0.001
Bac Giang	19.0	1.0	0.0001	-	0.0017	-
Permissible value	0.3		0.5		0.2	

(Source: Proceeding of the National Seminar on Environmental Protection and Sustainable

Development Research, Hanoi, 1993, p65 - 66)

7) Parks, nature reserves, and cultural and historical sites

Vietnam classifies protected areas into three categories: national parks; national reserves (wildlife sanctuaries, environmental protection zones, etc.); and national cultural and historical sites, all under the responsibility of the Ministry of Forestry. The Ha Tay Province has one protected area within its area, 'Chua Huong Tich science site' with an area of 5 km^2. However the Project site does not include this protected area.

(2) Characteristics of Environmental Consideration

The objectives of environmental consideration is to assess the potential impact of the Project the environment of the Project area during both the construction and operation phases of the project, and to Propose policy recommendations for the environmental conservation in the Project area.

In Vietnam, Environmental Impact Assessment (EIA) for development projects is compulsory at present. The Law on Environmental Protection, which is the principal law for environmental management in Vietnam, states that "organizations, individuals when constructing, renovating production areas, population centers or economic, scientific, technical, health, cultural, social and defense facilities; owners of foreign investment or joint venture projects, and owners of other socio-economic development projects, must submit EIA reports to the MOSTE and the relevant authority on environmental protection for appraisal" (Chapter II, Article 18). The Government Decree No. 175/CP defines the details of EIA in Chapter III for the implementation of the Law. Accordingly, this HHTP Project shall also be subject to an EIA before its implementation in accordance with the Government environmental law and decrees concerned. Contents which should be included in the preliminary and detailed EIA report are given in Appendix II.

EIA is a study process to predict the consequences of a development project or program on the natural and social environments, and to prevent, mitigate and monitor any environmental deterioration that may result. For the execution of full-scale EIA, it is necessary to collect environment related data and information such as air/water quality data and climatologic data in and around the project area through out the year. Therefore, it takes about one year to carry out full-scale EIA. Hence, in this Study, the potential environmental impacts in the proposed area are studied preliminarily utilizing readily available data and information. A full-scale EIA should be undertaken, as required, by the Government of Vietnam after the completion of this Study.

(3) Possible Impacts of Project Implementation

If HHTP is not implemented in the proposed area, it is likely that the area will remain roughly as it is now. The land use plan of HHTP is that the proposed area of 796 ha in Phase 1 and 1,650 ha in Phase 3 is divided into 6 zones in accordance with the respectire functions, namely R&D Zone, Center Area inclusive of a training area, High-Tech Industrial Zone, Urban/Business Zone, High Grade Residential Zone, and New Town Zone. With the activities in each zone, residues in the form of solid wastes and gaseous/liquid effluents as well as waste heat, noise and variation will be produced. These pollutants and wastes might possibly have a serious impact on the environment in and around the Project area unless proper mitigating measures are taken. In addition to the effect on the physical environment in the area, the construction and operation of HHTP can have impacts on the socio-environment.

The principal concept of HHTP in relation to the environmental issues is environment-friendly or environment-harmonized. This means that the natural environment in the area such as forests, lakes, vegetation, etc. will be preserved as much as possible. In addition to this principal concept, environmental conservation measures should be taken in accordance with the concept of preventive environmental management. In other words, measures for reduction or elimination of pollutants at sources have priority over the treatment measures which are taken after the generation of pollutants in the processes. This concept includes the " Cleaner Production "(CP). While the most conventional environmental protection technology such as flue gas desulfurization plant and wastewater treatment plant, which are the so-called 'end-of-pipe' (EOP) technology, foevses on management of emissions and wastes after they have been generated in the process, the CP method focuses on the continuous application of an integrated preventive environmental strategy to processes and products to reduce risks to humans and the environment. For production, processes, CP includes conserving raw materials and energy, eliminating toxic raw materials, and reducing the quantity and toxicity of all emissions and wastes before they leave process. For products the strategy focuses on reducing environmental impacts along the entire life cycle of the product, from raw material extraction to the ultimate disposal of the product. Taking those concepts into consideration, if there is a possibility of discharging pollutants from facilities in the area into the surrounding environment, proper measures to minimize the pollutants should be taken. The landscape of each zone is also designed to harmonize with the surrounding scene keeping its natural characteristics.

The implementation of the Project will have both direct and indirect impacts on the surrounding areas. During the construction phase, fugitive dust, sediments and erosion from construction activities such as excavation, landfilling, construction of buildings and infrastructure will be the major pollutants which affect local air and water quality. During the operational phase, stack emission gases, effluent waters, and wastes from factories will have potentially damaging environmental impacts in and around the Project area. Furthermore, HHTP will increase traffic, and it will enhance demand for housing and services in the area. Implementation of HHTP will also increase other activities and business in the area, and thus increase the number of workplaces in the service sector. The landscape will change considerably from a majority the existing forest, paddy and crop fields, reservoirs, etc. to buildings, factories, etc. From the environmental conservation standpoint, it is necessary to pay careful attention to prevent pollution and changes during both construction and operational phases, and it is also necessary to consider how the landscape of the Project will blend into the surrounding area.

In the High-Tech Industrial Zone various high-tech industries such as electronics/information, mechatronics, biotechnology, etc. are to be located. Activities in the High-Tech Industrial Zone are assumed to exert a large influence on the Project area. Compared with the environmental impacts caused by traditional or conventional industries such as steel making industry, textile industry, pulp & paper industry, etc., that of high-tech industry is considered to be relatively small. However, high-tech industry has the environmental problem of its own. In order to take proper environmental protection measures for high-tech industry, it should be noted that the characteristic of possible environmental impacts of high-tech industry is not the same as that of traditional industry. Of course, as mentioned before, countermeasure at the source for minimizing the environmental impacts and risks to human health is the most important and basic concept for the environmental conservation plan.

(4) Characteristics of Environmental Impacts by High-Tech Industry

Traditional industries, such as textile industry, pulp & paper industry, chemical industry, machinery industry, etc., which have vital influence on the issues of environmental conservation are so-called "heavy and large" type industry. The characteristics of these types of industries are to require large scale of manufacturing facilities, to consume large quantities of raw materials, to discharge large quantities of wastes continuously with the manufacturing of products. In contrast with this, high-tech industry is so-called "light and small" type industry, namely it requires fine and precision techniques, consumes a relatively small amount of raw materials, and

produces a variety of kinds, but in small quantity, of products and wastes generally. Therefore, environmental problems arising from high-tech industry depend on these characteristics of this industry.

The development of high-tech industry brings both the increase in kinds of chemical substances to be used and the change in the application form of those. Accordingly, for the establishment of environmental protection measures relevant to high-tech industry, the characteristics proper to its own industry such as mentioned below should be taken into consideration.

1) The most remarkable feature of high-tech industry in relation to the environmental issues, compared with traditional industries, is that this industry consumes a variety of chemicals, and generates a variety of wastes. Chemical substances used often in high-tech processes such as manufacturing stage and disposal stage have the possibility of escaping into the environment unless those are managed and controlled appropriately. Table 7-8-19 shows major possible pollutants used in high-tech processes. In this table, general environmental problems and noteworthy chemicals used in the field of high-tech industry are summarized.

2) Unlike the environmental pollution caused by traditional and/or conventional industries which emit a large amount of flue gas or discharge a large amount of wastewater, that of high-tech industry is relatively difficult to be noticed. Therefore, careful attention should be paid to surveillance and monitoring of the environment in the Project area.

For the assessment of environmental impact in the area of HHTP, it is necessary to investigate and clarify the actual condition of pollution sources and the types of pollutants. The characteristics of the environmental issues for each category of high-tech industry are largely different. For example, microelectronics industry or biotechnology industry has a large influence on the environment, but on the other hand the environmental impact of mechatronics industry is relatively small. In relation with HHTP, 33 high-tech factories and R&D institutes are planned to be located in the Project area up to 2005. Table 7-8-20 gives the comparison of the environment related issues between traditional industry and high-tech industry.

(5) Measures for Environmental Conservation

As already mentioned previously, environment-friendly or environment-harmonized and preventive environmental management are the most important

and basic concepts for the environmental conservation planing and design of development projects. Thus all environmental aspects in concerning the HHTP should be planned in accordance with these concepts. The landscape of each divided zone is designed to harmonize with the natural conditions in the area. And careful attention should be paid to every potential impact on the environment which arises with the implementation of the Project. For this purpose, necessary actions to minimize and control adverse impacts, including those mentioned, belong should be taken:

- To adopt proper construction techniques such as cut and fill operation and water spraying on the roads, etc. during the construction phase for mitigating the negative environmental impacts.
- To study the vegetation in the area in order to make an afforestation plan suited to the area.
- To adopt appropriate measures in order to harmonize the artificial facilities with the natural scenic landscape in the area.
- To prepare well developed infrastructure for environmental conservation and antipollution measures such as water supply system, sewage system and waste disposal system.
- To adopt pollution prevention measures at the source rather than the end-of-pipe technology for minimizing the environmental impacts caused by the variety of activities in the area.

As described in the previous section, the environmental issues relevant to high-tech industry have their own characteristics. Therefore, in order to take proper environmental measures for high-tech industry, it is necessary to grasp fully the characteristics of high-tech industry in environmental issues. However, in the case of a large scale high-tech park like HHTP, it is not sufficient to take measures only at each factory level. For environmental management and protection in and around the area of HHTP or HTIZ, a comprehensive or integrated environmental conservation plan which is so to speak a basic environmental plan should also be set up. This plan should be prepared taking overall environmental situations of the area into consideration. Items to be included in this plan are as follows:

1) Measures for wastewater

An industrial plant should ideally be located in an area which will tend to minimize its environmental effects. The proper location of a plant will not

eliminate the need for final treatment for environmental protection, but it may lessen the degree of treatment needed. In controlling pollution, HHTP or HTIZ has the advantage that a large number of relatively modern and homogeneous firms are clustered together. In the case of HHTP, the proposed area is divided into 6 zones according to their functions. Wastewaters generated from each zone, including High-Tech Industrial Zone, are to be treated by the central wastewater treatment plant installed in the area. This wastewater treatment plant also treats the wastewater generated from the area of VNUH adjacent to the HHTP Project area considering the economic efficiency of the wastewater reatment in and around the area.

Wastewaters generated in the factories of HHTP are to be treated by the central treatment plant after being pre-treated by each factory level wastewater treatment plant. The central wastewater treatment plant receives wastewater from the factories in HHTP. The treatment method to be applied for the central treatment plant is oxidation ditch method. This process is the general wastewater treatment method, but can mainly treat organic pollutants such as BOD, COD in wastewaters. Each factory should pre-treat pollutants in wastewaters peculiar to its own, if contained, before discharging it to the central treatment plant. Therefore, a national or local level agency responsible for environmental management should prepare standards for wastewater effluents from factory that are allowed to be discharged to the central treatment plant.

A wastewater treatment facility consists of four main facilities, namely sewage conveyance system, sewage treatment plant, water reuse plant, and treated sewage discharge system. And the facilities are planned to be equipped in accordance with the quantity of wastewater to be generated by development stage. The final wastewater treatment capacity in the year 2020 is planned to be 100,000 m^3 per day.

Wastewater is discharged to a receiving water body after being treated by the central wastewater treatment plant, and if should meet the Vietnam national industrial effluent standards, TCVN 5945 - 1995, provided by MOSTE or the local level industrial effluent standards provided by DOSTE. Careful attention should be paid to the selection of wastewater discharging point,. Discharging of treated wastewater into the Tan Xa Lake should be avoided due to the fact that the Tan Xa Lake is a closed water body. Considering the condition of the receiving water body in and around the Project area, the treated wastewater from the central wastewater treatment plant should be discharged into the Tich river.

2) Measures for air pollution

The main sources of air pollutants in HHTP are stacks and particular production processes of high-tech industry. Attention should be paid to the volatile organic compounds (VOCs) and special gases (e.g. benzene, styrene, acetone, silane, diboran, etc.) which are used in the high-tech production processes as well as significant air pollution indices of SO2, Nox, and dust. VOCs embrace both hydrocarbons and compounds of carbon and hydrogen containing other elements such as oxygen, nitrogen or chlorine. They evaporate readily and contribute to air pollution directly or through chemical or photochemical reactions to produce secondary air pollutants. These gaseous substances must be controlled and treated at each source by adopting gas capture devices, pollution control systems, etc. Furthermore, emission and ambient air quality monitoring programs must be established to ensure efficiency of the control systems. For these purposes, ambient air quality and emission standards referring to VOCs and special gases should be set up, if they are not available now. Of course, the typical pollutants such as SO2, NOx, dust, etc. in emission gases must meet the allowable limits provided in the Vietnamese air quality/emission standards (TCVN 5937, TCVN 5939). However, compared with the environmental impacts caused by the gaseous emission from large cale traditional industry, that of high-tech industry is not a problem if controlled and treated sufficiently since the amount of emission is relatively small.

3) Waste disposal

As mentioned already in Sub-section 7.6.7, wastes generated as a result of human activities are divided into two categories, one is municipal waste and the other is industrial waste.

Wastes generated in HHTP are collected, transported and disposed ultimately. Most of wastes, both industrial and municipal, will be disposed by landfill. The disposal site will be selected by the Government or Local Government considering the access to the landfill site and the surrounding conditions outside the Project area. A landfill site is expected to be equipped with both landfill gas and leachate collection systems. The selected site should comply with the Vietnamese waste disposal/treatment guidelines similar to those listed below so that the environmental impact is minimized.

- All deposits of waste be made in individual layers which are compacted on deposition.

- Layers be no more than 2.5 meters in depth.
- Each layers be covered with earth, or similar, at least 200 to 250 mm thick.
- Waste be covered within 24 hours.
- No waste be tipped in water.
- Screens be erected to collect windblown rubbish.
- Precautions be taken to prevent fire and vermin.
- Organic waste be covered with 600 mm of earth.
- Each deposit be kept tidy.
- Adequate competent labor be available.
- Each layer be allowed to settle before the next layer is started.

Estimate of the present and future generation quantity of wastes is the basis for the design and planning of waste-management systems. For this purpose, it is desired to know the average generation rate of waste from various kinds of sources in the area, such as HTIZ, High Grade Residential Zone, Urban/Business Zone, etc. However, few data exist on the generation rate for the sources mentioned above. In this Study, the quantity of waste to be generated in HHTP has been estimated based on the population and the number of employees in HHTP with reference to the data studied in Japan, USA, and others. Estimatie of waste quantity and disposal of wastes generated in HHTP are described below:

(a) Municipal waste

The sources of municipal waste include domestic and commercial wastes, construction and demolition debris, street and alley cleanings, waste from recreational areas, etc., except for industrial waste. At present, there are only a few villages in the Project area and most of people are engaged in agriculture. Therefore sources of municipal waste in this area are considered to be the domestic waste. At present, these domestic wastes generated are treated by burning or dumping in the garbage disposal area in each village by local people.

When HHTP is implemented in the proposed area, the quantity of municipal waste generated in the area will increase with the variety of activities within the zones, such as Urban/Business Zone, High Grade Residential Zone, Center Area, etc., which will be newly constructed, and with the increase of

population by natural growth, migrants, and relocated families. The following table shows the estimated quantity of municipal waste generation in HHTP in the year 2005. In general, the average generation rate of municipal waste is considered to be 0.7 - 1.0 kg per capita per day. In this table, the average generation rate is assumed to be 1.0 kg capita per day.

Estimated Municipal Waste Generation in 2005(Unit: ton/year)

	New Town Zone & High Grade Residential Zone	Urban/Business Zone, Center Area, etc.	Municipal Waste Total
Amount of Waste Generation	4,670	420	5,090

Furthermore, the quantities of municipal waste generation in 2005, 2010 and 2020 are forecast as shown below.

Forecast Municipal Waste Generation

(Unit: ton/year)

	Year		
	2005	2010	2020
Amount of Municipal Waste Generation	5,090	6,080	13,000

Generally, collection and disposal of municipal waste are the responsibility of the central or local agencies. In the case of HHTP, municipal waste generated in the area will be collected, transported, and treated by the central/local agency or the private firm entrusted by this agency. The planned disposal method of the municipal waste is sanitary landfill and in the future part of the waste will be treated by incineration. The disposal site is to be selected by the central/local agency or the entrusted firm outside the Project area.

(b) Industrial waste

As already mentioned, industrial wastes are usually divided into two categories, general waste and hazardous waste. Among the 6 zones in HHTP, it is considered that High-Tech Industrial Zone and the R&D Zone generate industrial wastes, both general waste and hazardous waste. The quantity of industrial wastes generated from High-Tech Industrial Zone and the R&D Zone in the year 2005 have been estimated as shown in the following tables:

Estimated Industrial Waste Generation in 2005

	High-Tech Industrial Zone					R&D Zone	Industrial Waste Total
	Level-1 Brain Intensive	Level-2 Engineering Intensive	Level-3 Skilled Labor Intensive	Level-4 Engineering Intensive	High-Tech Industry Total		
Number of Employees (Prs.)	1,037	546	3,949	3,102	8,634	4,000	12,634
Amount of Industrial Waste Generation (ton/yr.)	3,140	1,090	7,870	9,100	13,600	1,200	14,800

Estimated Industrial Wastes Generated in HHTP
(Year: 2005)

(Unit: ton/year)

	Waste Utilized (Re-use, Recycling, etc.)	Waste Disposed (General Waste)	Total Waste Generated
High-Tech Industrial Zone	4,760	8,840	13,600
R&D Zone	300	900	1,200
Total	5,060	9,740	14,800

The calculation was made on the basis of employees in each level/category of the High-Tech Industrial Zone and the R&D Zone. The generation rates of industrial waste by level/category were assumed to be the values between 2 and 5 tons per employee per year respectively with reference to the values studied in Japan and the USA concerning waste generation rates. In the advanced countries, the ratio of resource recovery to the total waste generated is 30% to 40% in general. In this table, 35% of the waste generated in HTIZ and 25% of the waste generated in R&D Zone were assumed to be utilized by re-use and/or recycling, etc. Therefore the are remain 65% or 75% of wastes. Furthermore, the quantities of industrial waste generated from HTIZ and R&D Zone in 2005, 2010 and 2020 are forecast as shown below.

Forecast Industrial Waste Generation

(Unit: ton/year)

	Year		
	2005	2010	2020
High-Tech Industrial Zone	13,600	17,700	39,820
R&D Zone	1,200	1,200	1,650
Total	14,800	18,900	41,470

Treatment and disposal of general wastes

There are two major methods for the treatment and disposal of general wastes. One is by landfill and the other is by incineration. General wastes generated in the Project area will be treated either by landfill or incineration

within or outside near the Project area. The Basic concept of treatment by landfill is described in Sub-section 7.6.7.

Treatment and disposal of hazardous wastes

The hazardous wastes should be treated by own treatment facilities in R&D Zone and HTIZ in principle. The discharged hazardous wastes exceptionally are expected to be treated by the specified facilities which are to be constructed for the treatment and disposal of hazardous wastes in the Project area or adjacent to it. The methods to be applied for the treatment of hazardous wastes are the physical-chemical treatment, solidification, stabilization, incineration, and/or the combined treatment system of these. The treatment facility should be constructed by the governmental authorities concerned.

4) Monitoring plan

A monitoring system should be established to conduct a surveillance over the environment in the project area. The following is an outline of monitoring plans for air and water quality.

Monitoring of air pollution

The Monitoring station, must be able to grasp the level of air pollution and the pattern of its changes over the entire area they cover. their covering range must be determined in the light of meteorological conditions, topographical features, and the distribution of pollution sources in the area. Upon determining the number of monitoring stations in areas crowded with pollution sources, such as industrial zones, it is considered that one monitoring station should cover an area of about 3 km in radius. And a broader area of about 5 to 10 km in radius should be covered for residential and other less polluted areas in general. The following factors must be considered in selecting the location of a monitoring station:

- The station must be located in a densely polluted area and in the area that represent the characteristic air pollution pattern.
- An additional station must be set on the periphery of the area to monitor the amount of pollutants coming into the area from the neighboring area.
- The monitoring station must be arranged taking future land use plan into consideration.

- The monitoring station must be arranged in a proper manner to effectively evaluate the air pollution control measurers being planned.

Generally, for the purpose of investigating air pollution caused by industrial activities, the main items to be monitored are SO_2, NO_x and suspended particulate matter (SPM).

Monitoring of water pollution

Water pollution monitoring stations should be installed in HHTP in the same manner as the monitoring stations for air pollution. Wastewater generated in factories will be discharged into rivers after being treated and have an effect on the receiving environment. Therefore, water quality should be monitored for both the effluent water and the receiving environment. Monitoring of effluent water should be undertaken both before and after the wastewater treatment process. Measurement items and frequency differ depending on the characteristics of the water quality between effluent waters and the receiving environment. Significant items that must be monitored are those that contain any of the following categories:

- Primary pollutants arising from the process or the site.
- Heavy metals or chlorinated hydrocarbons which are known to bioaccumulate.
- Nutrients (compounds of phosphorus or nitrogen)

Monitoring of effluent waters should be carried out continuously, daily, monthly, and sporadically according to the necessity. However, it is not necessary to monitor the water quality of the receiving environment as frequently as in-factory monitoring because of its long time average influence.

5) Agreement on environmental conservation

Together with the environmental countermeasures at each factory, it is necessary to conclude an agreement on environmental conservation in the Project area between the national or the local level authority, which is responsible for environmental management, and each company in the area. Items to be included in the agreement are:

(a) Establishment of the environmental conservation council.

(b) Notification of the environmental conservation plan.

(c) Safety management of chemical substances.

(d) Safety management of biotechnology.

(e) Safety management of radioactive material.

(f) Air and water pollution control measures.

(g) Solid waste control and management.

(h) Measures for disaster and accident prevention.

(i) Establishment of an environmental monitoring system.

(j) Execution of an on-the-spot inspection of the factories by the governmental authority.

(k) Others

- Pollution control measures other than those mentioned above, such as the control for noise, vibration, offensive odor, etc.
- Establishment of measures in case of contravention of the agreement

(6) Evaluation

The previous sections describe the current natural environmental conditions in the project area, the possible environmental impacts, the characteristics of high-tech industry, which are considered to exert a major influence on the environment in and around the Project area, and the relevant countermeasures against them when the HHTP Project is implemented. In this section, main potential environmental impacts are screened and evaluated,then mitigative measures to reduce these environmental impacts are studied. The study items are screened from the natural environment at factors such as water quality, air quality, and biological resource, and study focuses on both the construction and operation stages because the in the form of environmental impacts is those stayes are considered to be different from each other. The of study results shown environmental impact matrixes are in Tables 7-8-21 to 7-8-23. In these tables, the important environmental elements such as physical resource, and biological resource. are screened and evaluated, and the significance of possible impacts the mitigative measures, and the monitoring plans are shown. The significance of possible impacts is expressed at three levels: Major impact (MA), medium impact (ME), and minor impact (MI). Among these, items, to evaluated as MA should be subject further detailed investigation EIA.

The implementation of the HHTP Project will have an important influence on the natural environment in the Project area. Especially the pollutants and/or wastes to be generated by the activities of facilities in HHTP might possibly have adverse impacts

on the environment in and around the Project area unless proper mitigating measures are taken. In Vietnam, the Government has established the legal framework for the conservation and protection of the environment. Therefore, there are several laws and regulations such as Laws on Environmental Protection, Decree No. 175/CP,and standards for environmental quality, being enforced by the central and local governments. Quality of the environment quality in and around the HHTP Project area will be preserved within permissible levels set forth in the environmental standards by constructing suitable facilities for pollution prevention such as a sewage treatment plant, in addition to the observance of these laws and regulations as a matter of course.

7.8.5 Overall Evaluation

As mentioned above, the HHTP Project would bring about various large impacts to Vietnams' economy and industries. The viability of Phase 1 development of the Project is confirmed by the following figures:

(a) EIRR : 25.9%

(b) FIRR of all the functional zones (7 zones in total) : 9.3% (Case 1), 10.0% (Case 2)

(c) FIRR of the profitable zones (4 zones in total) : 14.4% (Case 1), 14.9% (Case 2)

(d) Projected number of workers : 14,300 (in 2005)

Assuming the opportunity cost to be 8 – 10%, the HHTP Project is judged feasible for implementation.

The negative socio-environmental impacts can be held to a minimum by preserving the existing villages, providing resettlement area and giving priority in access to education and job training, and employment to the relocated people. Also the negative impacts on the natural environment can be maintained within permissible levels set forth in the environmental standards, by preserving the natural topography and vegetation, conforming to environmental regulations and standards, and constructing suitable facilities for pollution prevention such as a sewage treatment plant.

The HHTP Project has a role of leader in the promotion of high-tech industries in Vietnam and is a core project for the establishment of a new satellite city in Hoa Lac. The Project would bring large impacts and is judged viable for implementation.

Table 7-3-1 Land Use Plan of Phase 1 (Basic Plan)

	Area (ha)	Ratio (%)	Remarks
I R & D Zone	117.5	14.8	
1 R & D institute	83.3		} 98.3
2 Software park	15.0		
(inclusive of national software center:1.4ha)			
3 Park	5.7		
4 Internal main road	11.6		width=26m, length=4,450m
5 Internal sub-main road	2.0		width=14m, length=1,400m
II Center Area	16.3	2.1	
1 Technical institute	4.7		
2 Hi-Tech park center	6.1		
3 OJT technical support center	1.4		
4 Techno partnership center	4.1		
III Hi-tech Industrial Zone	70.7	8.9	
1 Factory lot	61.6		
2 Park	2.1		
3 Internal main road	0.5		width=26m, length=200m
4 Internal sub-main road	6.5		width=20m, length=3,225m
IV Urban/Business Zone	25.7	3.2	
1 Business/commercial lot	13.6		
2 Park in urban/business area	10.3		
3 Bus terminal	1.8		
V High Grade Residential Zone with Golf Course	75.6	9.5	
1 Golf course	52.0		9 holes of 1st phase
2 High grade residence	23.6		
1) Housing lot	10.1		
- Detached house	4.9		
- Apartment	5.2		
2) International school	1.4		
3) Road	4.3		
Type1	1.6		width=12m, length=1,350m
Type2	0.6		width=14m, length=450m
Type3	2.1		width=22m, length=950m
4) Park	1.0		inclusive of swimming pool, sport ground, tennis court
5) Green area	6.8		
VI New Town Zone	74.3	9.4	
1 Housing lot	30.9		
1) Detached house lot	9.6		
2) Row house lot	7.5		
3) Apartment (medium-rise)	13.4		
4) Apartment (high-rise)	0.5		
2 Neighboring commercial lot	1.9		Shop house
3 Health center/Community center	0.3		
4 School	6.9		
1) Kindergarten	2.1		2 kindergartens
2) Primary School	2.5		
3) Secondary School	2.3		
5 Road	10.4		
1) Main road of new town	4.0		width=22m, length=1,820m
2) Feeder road	4.2		width=14m, length=2,990m
3) Collector road	2.3		width=7.5m, length=3,000m
6 Park	13.7		
7 Green area	10.2		
VII Skeleton Road of High-Tech Park	49.8	6.3	
1 Main road	29.8		width=50m, length=5,950m
2 Sub-main road	16.3		width=26m, length=6,260m
3 Road in urban/business area	1.2		width=14m, length=850m
4 Connection roads with Highway & R.21	2.6		width=50m, length=410m, width=26m, length=200m,
VIII Others	364.3	45.9	
1 Central park	45.8		
2 Reservoir(Tan Xa Lake)	120.3		
3 Sewage treatment plant	10.0		net plant site is app. 4 ha
4 Retention pond	34.2		
5 Green area	107.7		
6 Reserve area	46.3		
IX Total	794.2	100.0	

Table 7-3-2 Population Projection in HHTP (Basic Plan)

Work Opportunity in HHTP

Land Use	Number(Cumulative)			Increment		
	2005	2010	2020	~2005	2005~2010	2010~2020
1 R&D Zone	3,900	3,900	5,400	3,900	0	1,500
2 Center Area	300	300	900	300	0	600
1) Technical Institute	50	50	150	50	0	100
2) High Tech Park Center	130	130	450	130	0	320
3) OJT Technical Support Center	20	20	100	20	0	80
4) Techno-Partnership Center	100	100	200	100	0	100
3 High-Tech Industrial Zone	8,600	11,200	25,200	8,600	2,600	14,000
4 Urban/Business Zone	1,300	1,900	5,400	1,300	600	3,500
5 High Grade Residential Zone	100	200	200	100	100	0
6 New Town Zone	100	100	200	100	0	100
7 Total	14,300	17,600	37,300	14,300	3,300	19,700

(persons/ha)

Land Use	Number		
	2005	2010	2020
R&D Zone	40.0	40.0	40.0
Center Area	20.0		25.0
Technical Institute			
High Tech Park Center			
OJT Technical Support Center			
OJT Technical Support Center			
High-Tech Industrial Zone	120.0	120.0	120.0
Urban/Business Zone	200.0	150.0	150.0
High grade Residential Zone (commercial)	1.0	1.8	
New Town Zone(commercial)	1.0	1.0	0.5
Total			

Population Resided in HHTP

Land Use	Population (Worker x 2.0)			Medium/High Income Ratio (%)	Medium/High Income Population			Ditto (Increment)		
	2005	2010	2020		2005	2010	2020	2005	2010	2020
1 R&D Zone	7,800	7,800	10,800	95	7,400	7,400	10,300	7,400	0	2,900
2 Center Area	600	600	1,800	85	500	500	1,500	500	0	1,000
3 High-Tech Industrial Zone	17,200	22,400	50,400	20~30	3,400	5,000	13,300	3,400	1,600	8,300
4 Urban/Business Zone	2,600	3,800	10,800	50	1,300	1,900	5,400	1,300	600	3,500
5 High Grade Residential Zone (commercial j	200	400	400	10	0	0	0	0	0	0
6 New Town Zone (commercial job)	200	200	400	100	200	200	400	200	0	200
7 Total	28,600	35,200	74,600		12,800	15,000	30,900	12,800	2,200	15,900

Population Distribution by New Town in HHTP

Land Use	Area (semi gross, ha)			Increment of Population			Cumulative Population			Population Density(pop/ha)		
	~2005	2005~2010	2010~2020	2005	2010	2020	2005	2010	2020	2005	2010	2020
1 New Town Area No 7	74.3			11,700			11,700	11,700	11,700	157		
2 New Town Area No 8		23.0			2,000		0	2,000	2,000		87	
3 New Town Area No 6			33.8			3,600	0	0	3,600			107
4 New Town Area No 2			36.5			3,900	0	0	3,900			107
5 New Town Area No 3			15.9			1,700	0	0	1,700			107
6 New Town Area No 5			28.4			3,000	0	0	3,000			106
7 New Town Area No 4			15.1			1,600	0	0	1,600			106
8 New Town Area No 1			20.3			2,100	0	0	2,100			103
9 High Grade Residential Zone	22.6	56.4		1,100	200		1,100	1,300	1,300	49	23	
10 Total	96.9	79.4	150.0	12,800	2,200	15,900	12,800	15,000	30,900	132	189	206
(Note)												
13 Residential Demand (7 x 2.0)				28,600	6,600	39,400	28,600	35,200	74,600			
14 Percentage against demand(10/13)				45%	33%	40%	45%	43%	41%			

Note 1: Percentage of high/medium income households

(unit:%)

	Technicians'			
	Manager	Staff	Total	Labor
R&D Zone	9	86	95	5
Center Area	40	45	85	15
High-Tech Industrial Zone	5	15~25	20~30	70~80

Note 2: Estimation in 2010 and 2020 are made for the reference use.

Table 7-3-3 Population Living in Phase 1 of HHTP (Basic Plan)

	Household	Population	No of houses/ apartments	Density (pop/ha)	Site area (ha)	House Unit				Remarks
						Lot area (m2:net)	Floor area (m2:net)	Dimension (average) Lot	Floor	
1 High Grade Residential Zone										
1) Detached house	100	400	100	82	4.9	500	200m2	20m x 25m	1 -2 floor	
2) Apartment	165	660	11	127	5.2	-	150	-	10m x 15m	5household x 3 floor x 11 apart.=165 households
3) Residential area total	265	1,060		45	23.6					inclusive of road, etc.
2 New town Zone										
1) Detached house	340	1,700	-	177	9.6	280	120m2	14m x 20m	1 -2 floor	
2) Row house	370	1,850	62	247	7.5	96	100	6m x 16m	6m x 10m x 2F	6household x 62 houses=370 households
3) Apartment(medium-rise)	1,650	7,425	55	554	13.4	-	72	-	6m x 12m	6household x 5 floor x 55apart.=1,650households
4) Apartment(high-rise)	80	360	2	720	0.5	-	84	-	-	4household x 10floor x 2apart.=80households
5) Shop house	80	480	80	253	1.9	120	120	6m x 20m	2 -3 floor	inclusive of super market area
6) Subtotal	2,520	11,815		159	74.3					inclusive of road, etc.
3 Total	2,785	12,875		131	97.9					

Employment Opportunity in HHTP (Option 1)

	Worker
1 R & D	3,900
2 High-Tech Industrial Zone	8,600
3 Urban/Business Zone	1,300
4 Commercial Job in Golf Course	100
5 Commercial Job in New Town	100
6 Center Area	300
1) *Technical Institute*	50
2) *Hi-Tech Park Center*	130
3) *OJT Technical Support Center*	20
4) *Technopartnership Center*	100
7 Total	14,300

HHTP Pop/Pop Total= 45%

Table 7-7-1 Development Cost of Phase 1 of HHTP Project

(USD Million)

Project	Development Cost								
	Total			Infrastructure			Building		
	Total	Foreign Portion	Local Portion	Total	Foreign Portion	Local Portion	Total	Foreign Portion	Local Portion
1 External Infrastructures									
1.1 Road	57.79	8.67	49.12	57.79	8.67	49.12			
(1) Bus Terminal	0.37	0.06	0.31	0.37	0.06	0.31	-	-	-
(2) Main Road	57.42	8.61	48.81	57.42	8.61	48.81	-	-	-
1.2 Water Supply Facilities	75.84	48.01	27.82	75.84	48.01	27.82	-	-	-
1.3 Sewerage Facilities	26.59	8.87	17.72	26.59	8.87	17.72	-	-	-
1.4 Drainage Facilities	3.90	1.35	2.54	3.90	1.35	2.54	-	-	-
1.5 Power Supply Facilities	44.16	28.68	15.47	44.16	28.68	15.47	-	-	-
1.6 Telecommunication Facilities	46.51	44.67	1.84	46.51	44.67	1.84	-	-	-
Sub-Total	254.78	140.26	114.52	254.78	140.26	114.52	-	-	-
2 Public Zones									
2.1 R&D Zone (Institute Sub-Zone)	15.29	6.39	8.91	15.29	6.39	8.91	-	-	-
2.2 Center Area (Infrastructure)	0.89	0.23	0.66	0.89	0.23	0.66	-	-	-
2.3 Center Area (Building)	44.73	13.42	31.31	-	-	-	44.73	13.42	31.31
(1) National Software Center	8.14	2.44	5.70	-	-	-	8.14	2.44	5.70
(2) High-Tech Park Center	9.43	2.83	6.60	-	-	-	9.43	2.83	6.60
(3) Techno-Partnership Center	13.77	4.13	9.64	-	-	-	13.77	4.13	9.64
(4) Technical Institute	6.84	2.05	4.79	-	-	-	6.84	2.05	4.79
(5) OIT Training Center	6.55	1.96	4.58	-	-	-	6.55	1.96	4.58
2.4 New Town Zone(Infrastructure)	18.12	6.75	11.37	18.12	6.75	11.37	-	-	-
2.5 New Town Zone(Building)	181.19	27.18	154.01	-	-	-	181.19	27.18	154.01
2.6 Park, Green Area	12.97	5.15	7.82	12.97	5.15	7.82	-	-	-
Sub-Total	273.20	59.11	214.09	47.28	18.51	28.77	225.92	40.60	185.32
3 Self-financing Zone									
3.1 High-Tech Industrial Zone	15.96	6.83	9.13	15.96	6.83	9.13	-	-	-
3.2 R&D Zone (Software Park)	2.75	1.15	1.60	2.75	1.15	1.60	-	-	-
3.3 High Grade Residential Zone	80.81	22.69	58.12	23.09	5.37	17.72	57.72	17.32	40.40
3.4 Urban/Business Zone	60.56	18.53	42.03	2.90	1.23	1.67	57.66	17.30	40.36
Sub-Total	160.08	49.20	110.88	44.70	14.58	30.12	115.38	34.61	80.76
Total	688.06	248.57	439.49	346.76	173.36	173.40	341.29	75.21	266.08

Note: *1) Engineering service cost and physical contingency are included.
*2) Price escalation is not included.

Table 7-7-2 Project Cost of the Center Facilities

Facility	Floor Area	Unit	Cost Portion (US$ x 1,000)			Total Cost (US$ x 1,000)	
			Local Currency	Foreign Currency			
				Without Import Tax	With Import Tax	Without Import Tax	With Import Tax
1. High-Tech Park Center	6,380	m2	5,359	2,297	2,641	7,656	8,001
2. Techno-Partnership Center	10,160	m2	7,823	3,353	3,856	11,176	11,679
3. Technical Institute	6,170	m2	3,887	1,666	1,916	5,553	5,803
4. OJT Technical Support Center	4,830	m2	3,719	1,594	1,833	5,313	5,552
5. National Software Center	6,010	m2	4,628	1,983	2,281	6,611	6,908
Total Development Costs	33,550		25,416	10,893	12,527	36,309	37,943

Table 7-8-1 Compensation Cost for Land and Relocation Cost for Residents

(Basic Plan: Total Area of Phase 1 of HHTP)

	Land Area of Phase1 of HHTP (ha)	Nos. of Residents in Phase1 of HHTP (household)	Relocation Cost/ Household (USD/ household)	Compensation Cost (1000USD)	Relocation Cost (1000USD)
	(a)	(b)	(c)		(b)X(c)
1 R&D Zone	121.6	78	7000	1542.9	546.0
2 Center Area	12.2	28	7000	126.0	196.0
3 High-Tech Industrial Zone	71.0	67	7000	908.8	469.0
4 Urban / Business Zone	25.7	14	7000	318.8	98.0
5 High Grade Residential Zone	75.6	1	7000	887.6	7.0
6 New Town Zone	74.3	240	7000	834.8	1680.0
7 Skeleton Road of HHTP	49.8	18	7000	569.7	126.0
8 Others (Central Park, Tan Xa Lake, etc.)	364.0	222	7000	3133.3	1554.0
Total	794.2	668	7000	8321.9	4676.0

Table 7-8-2 Selling and Leasing Prices of Industrial Estates in Vietnam

Name of GIE, EPZ	Region	Distance from Major City (km)	Total Area (ha)	Factory lot Area (ha)	Factory Lot Lease Period (year)	Factory Lot Selling Price (US$/m2)	Factory Lot Lease Price (US$/m2/y)
Dong Anh I.E.	North	25km(Hanoi)	200~300	-	-	-	2~2.5
Noi Bai (Soc Son) EPZ	North	45km(Hanoi)	100	-	-	115	-
Thang Long North I.E.	North	5km(Hanoi)	128(Phase 1)	87	-	100~120	-
Nomura-Haiphong I.Z.	North	5km(Hai Phong)	153	123	50	-	2.2
Phu Thai I.E.	North	20km(Hai Phong)	More than 50	-	20~50	-	1.5~2
Da Nang EPZ	Central	(Da Nang)	120	70	50	42	-
Tan Thuan EPZ	South	4km(Ho Chi Minh)	300	-	50	-	2.16
Linh Trung EPZ	South	16km(Ho Chi Minh)	60	40	-	-	2.2
Can Tho EPZ	South	170km(Ho Chi Minh)	150(Phase 1)	57	-	-	1.125~1.3
Amata I. P.	South	30km(Ho Chi Minh)	700	-	-	60~65	-
Bien Hoa Industrial Zone II	South	40km(Ho Chi Minh)	236	162	-	90	1.8
Ho Chi Minh High-Tech Park	South	15km(Ho Chi Minh)	300	220	-	-	around 3.0
Long Binh Techno Park	South	30km(Bien Hoa)	100(Phase 1)	72	50	65	-

Table 7-8-3 Selling and Leasing Prices of Industrial Estates in Metropolitan Areas of Other Asian Countries

(1995 price)

Name of GIE, EPZ	Country	Distance from Major City (km)	Total Area (ha)	Factory Lot Area (ha)	Factory lot Sales Price (US$/m2)	Factory lot Lease Price (US$/m2/y)
East Jakarta I.P.	Indonesia	40km(Jakarta)	320	306	60~65	-
MM2100 I.P.	Indonesia	30km(Jakarta)	500	307	65~80	-
Bukit Indah City (SBI Area)	Indonesia	65km(Jakarta)	1,300	1,300	55	5~5.5
Karawang Int'l Industrial City	Indonesia	6km(Karawang)	1,200	296	53~57	0.5
Pasir Gudang Tambahan	Malaysia	36km(Johor Baru)	-	383	-	4.3~5.2
Masjid Tanah I.E.	Malaysia	32km(Malacca)	-	71	-	2.4
Pulau Indah I.P.	Malaysia	43km(Kuala Lumpur)	-	1,680	-	6.8
Selat Kelang Utara Peringkit III	Malaysia	47km(Kuala Lumpur)	-	418	-	5.6
Holy Angel I.E.	Philippines	80km(Metro Manila)	52	32	-	2.4
Luisita Industrial Park	Philippines	120km(Metro Manila)	120	-	-	2.4
First Cavite I.E.	Philippines	30km(Makati)	272	-	65	-
Gateway Business Park	Philippines	38km(Metro Manila)	120	-	100	-
Canlubang I.E.- Terelay Phase	Philippines	40km(International Airport)	170	-	56	-
Laguna International I.E.	Philippines	25km(Makati)	117	-	64	-
Kranji	Singapore	25km(Changi Airport)	101	97	-	13~22
Sungei Kadut	Singapore	28km(Changi Airport)	226	-	-	13~15
Woodland East	Singapore	24km(Changi Airport)	193	133	-	13~17
Kallang Basin	Singapore	22km(Changi Airport)	74	-	-	56~62
Loyang	Singapore	2.5km(Changi Airport)	119	-	-	16~23
Siam Cement Industrial Land	Thailand	86km(Bangkok)	277	-	59.7	-
Bangpakong I.P	Thailand	57km(Bangkok)	260	-	72.5	-
Dallian I.E (PhaseII)	China	30km(Dalian)	200	140	85	-
Qingdao I.E	China	3km(Qingdao)	660	-	37	-

Source:ASEAN CENTRE, Tokyo

Table 7-8-4 Results of FIRR Computation (Case 1: Land Rent; 0.375 USD/m²/y)

1. Viability for the Developer

1-1 FIRR of Each Zone

		Compensation Cost Bearing		Land Rents (0.375$/m2/y) Bearing		Construction Cost Bearing		Sales/Lease Conditions	Cases	FIRR (%)
		IDCs	Public	IDCs	Public	IDCs	Public			
1.	R&D Zone (Software Park)	O		O		O		45.0US$/m2	Case RD-S	16.5%
2.	Hi-Tech Industrial Park	O		O		O		45.0US$/m2	Case IP	14.5%
3.	Urban / Business Area	O		O		O		20.0US$/m2/month	CaseUB	17.1%
4.	High Grade Residence with Golf Course	O		O		O		50,400US$/Unit/y (Detached House)	Case HGR	12.0%
5.	New Town Area	O		O		O		50,000US$/Unit (Apart. Medium)	Case NT-1	N.A.
		O			O	O		50,000US$/Unit (Apart. Medium)	Case NT-2	N.A.
			O		O	O		50,000US$/Unit (Apart. Medium)	Case NT-3	N.A.

1-2 FIRR of Whole HHTP

		Sales/Lease Conditions	Cases	FIRR (%)
1.	HHTP(4 Zones Total)	(Case RD-S)X(Case IP)X(Case UB) X(Case HGR)	R&D(SW):45$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year	Case ZT	14.4%
2.	HHTP(5 Zones Total)	(Case RD-S)X(Case IP)X(Case UB) X(Case HGR)X(Case NT-1)	R&D(SW):45$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart-m):50,000$/Unit	Case ZT-1	10.6%
		(Case RD-S)X(Case IP)X(Case UB) X(Case HGR)X(Case NT-2)	R&D(SW):45$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart-m):50,000$/Unit	Case ZT-2	10.8%
		(Case RD-S)X(Case IP)X(Case UB) X(Case HGR)X(Case NT-3)	R&D(SW):45$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart-m):50,000$/Unit	Case ZT-3	10.9%

2. Viability for the Project

2-1 FIRR of Whole HHTP

		Compensation Cost Bearing		Land Rents (0.375$/m2/y) Bearing		Construction Cost Bearing		Sales/Lease Conditions	Cases	FIRR (%)
		IDCs	Public	IDCs	Public	IDCs	Public			
1.	HHTP(7 Zones Total)	O		O		O		R&D(Institute Lot):0$/m2, R&D(SW):45$/m2, HHTP Center:0$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart-m):50,000$/Unit	Case ZT-a	9.3%

Note: IDCs means Infrastructure Development Companies.

Table 7-8-5 Results of FIRR Computation (Case 2: Land Rent; 0.100 USD/m²/y)

1. Viability for the Developer

1-1 FIRR of Each Zone

		Compensation Cost Bearing		Land Rents (0.100$/m2/y) Bearing		Construction Cost Bearing		Sales/Lease Conditions	Cases	FIRR (%)
		IDCs	Public	IDCs	Public	IDCs	Public			
1.	R&D Zone (Software Park)	O		O		O		45.0US$/m2	Case RD-S	20.6%
2.	Hi-Tech Industrial Park	O		O		O		45.0US$/m2	Case IP	20.6%
3.	Urban / Business Area	O		O		O		20.0US$/m2/month	CaseUB	17.3%
4.	High Grade Residence with Golf Course	O		O		O		50,400US$/Unit/y (Detached House)	Case HGR	12.4%
5.	New Town Area	O		O		O		50,000US$/Unit (Apart. Medium)	Case NT-1	N.A.
		O			O	O		50,000US$/Unit (Apart. Medium)	Case NT-2	N.A.
			O		O	O		50,000US$/Unit (Apart. Medium)	Case NT-3	N.A.

1-2 FIRR of Whole HHTP

		Sales/Lease Conditions	Cases	FIRR (%)
1.	HHTP(4 Zones Total)	(Case RD-S)X(Case IP)X(Case UB) X(Case HGR)	R&D(SW):45$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year	Case ZT	14.9%
2.	HHTP(5 Zones Total)	(Case RD-S)X(Case IP)X(Case UB) X(Case HGR)X(Case NT-1)	R&D(SW):45$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart-m):50,000$/Unit	Case ZT-1	11.0%
		(Case RD-S)X(Case IP)X(Case UB) X(Case HGR)X(Case NT-2)	R&D(SW):45$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart-m):50,000$/Unit	Case ZT-2	11.1%
		(Case RD-S)X(Case IP)X(Case UB) X(Case HGR)X(Case NT-3)	R&D(SW):45$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart-m):50,000$/Unit	Case ZT-3	11.3%

2. Viability for the Project

2-1 FIRR of Whole HHTP

		Compensation Cost Bearing		Land Rents (0.100$/m2/y) Bearing		Construction Cost Bearing		Sales/Lease Conditions	Cases	FIRR (%)
		IDCs	Public	IDCs	Public	IDCs	Public			
1.	HHTP(7 Zones Total)	O		O		O		R&D(Institute Lot):0$/m2, R&D(SW):45$/m2, HHTP Center:0$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart-m):50,000$/Unit	Case ZT-a	10.0%

Note: IDCs means Infrastructure Development Companies.

Table 7-8-6 Sensitivity Analysis of FIRR Computation (Case 1: Land Rent; 0.375 USD/m2/y) (1/4)

1. Sensitivity of Viability for the Developer (Increasing Cost)

1-1 FIRR of Each Zone (Increasing Cost)

		Compensation Cost Bearing		Land Rents (0.375$/m2/y) Bearing		Construction Cost Bearing		Sales/Lease Conditions	Cases	Cost+10%	Cost+20%
		IDCs	Public	IDCs	Public	IDCs	Public			FIRR (%)	FIRR (%)
1.	R&D Zone (Software Park)	O		O		O		45.0US$/m2	Case RD-S	13.5%	10.4%
2.	High-Tech Industrial Zone	O		O		O		45.0US$/m2	Case IP	N.A.	N.A.
3.	Urban / Business Zone	O		O		O		20.0US$/m2/month	CaseUB	15.8%	14.6%
4.	High Grade Residence with Golf Course	O		O		O		50,400US$/Unit/y (Detached House)	Case HGR	11.0%	10.1%
5.	New Town Zone	O		O		O		50,000US$/Unit (Apart. Medium)	Case NT-1	N.A.	N.A.
		O			O	O		50,000US$/Unit (Apart. Medium)	Case NT-2	N.A.	N.A.
			O		O	O		50,000US$/Unit (Apart. Medium)	Case NT-3	N.A.	N.A.

1-2 FIRR of Whole HHTP (Increasing Cost)

		Sales/Lease Conditions	Cases	Cost+10%	Cost+20%
				FIRR (%)	FIRR (%)
1.	HHTP(4 Zones Total)	(Case RD-S)X(Case IP)X(Case UB) X(Case HGR)	R&D(SW):45$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year	Case ZT	13.1%	11.9%
2.	HHTP(5 Zones Total)	(Case RD-S)X(Case IP)X(Case UB) X(Case HGR)X(Case NT-1)	R&D(SW):45$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart-m):50,000$/Unit	Case ZT-1	9.1%	7.9%
		(Case RD-S)X(Case IP)X(Case UB) X(Case HGR)X(Case NT-2)	R&D(SW):45$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart m):50,000$/Unit	Case ZT-2	9.2%	8.0%
		(Case RD-S)X(Case IP)X(Case UB) X(Case HGR)X(Case NT-3)	R&D(SW):45$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart m):50,000$/Unit	Case ZT-3	9.4%	8.1%

2. Viability for the Project (Increasing cost)

2-1 FIRR of Whole HHTP (Increasing Cost)

		Compensation Cost Bearing		Land Rents (0.375$/m2/y) Bearing		Construction Cost Bearing		Sales/Lease Conditions	Cases	Cost+10%	Cost+20%
		IDCs	Public	IDCs	Public	IDCs	Public			FIRR (%)	FIRR (%)
1.	HHTP(7 Zones Total)	O		O		O		R&D(Institute Lot):0$/m2, R&D(SW):45$/m2, HHTP Center:0$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart m):50,000$/Unit	Case ZT-a	8.0%	6.9%

Note: IDC's means Infrastructure Development Companies

Table 7-8-7 Sensitivity Analysis of FIRR Computation (Case 1: Land Rent; 0.375 USD/m²/y) (2/4)

1. Viability for the Developer (Investment Schedule of High-Tech Industrial Zone: Delay Case)

1-1 FIRR of Each Zone (Investment Schedule of High-Tech Industrial Zone: Delay Case)

		Compensation Cost Bearing		Land Rents (0.375$/m2/y) Bearing		Construction Cost Bearing		Sales/Lease Conditions	Cases	FIRR (%)
		IDCs	Public	IDCs	Public	IDCs	Public			
1.	R&D Zone (Software Park)	O		O		O		45.0US$/m2	Case RD-S	16.5%
2.	Hi-Tech Industrial Park	O		O		O		47.0US$/m2	Case IP	10.0%
3.	Urban / Business Area	O		O		O		20.0US$/m2/month	CaseUB	17.1%
4.	High Grade Residence with Golf Course	O		O		O		50,400US$/Unit/y (Detached House)	Case HGR	12.0%
5.	New Town Area	O		O		O		50,000US$/Unit (Apart. Medium)	Case NT-1	N.A.
		O			O	O		50,000US$/Unit (Apart. Medium)	Case NT-2	N.A.
			O		O	O		50,000US$/Unit (Apart. Medium)	Case NT-3	N.A.

1-2 FIRR of Whole HHTP (Investment Schedule of High-Tech Industrial Zone: Delay Case)

		Sales/Lease Conditions	Cases	FIRR (%)
1	HHTP(4 Zones Total)	(Case RD-S)X(Case IP)X(Case UB) X(Case HGR)	R&D(SW):47$/m2, IE:47$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year	Case ZT	14.3%
2	HHTP(5 Zones Total)	(Case RD-S)X(Case IP)X(Case UB) X(Case HGR)X(Case NT-1)	R&D(SW):47$/m2, IE:47$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart-m):50,000$/Unit	Case ZT-1	10.5%
		(Case RD-S)X(Case IP)X(Case UB) X(Case HGR)X(Case NT-2)	R&D(SW):47$/m2, IE:47$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart-m):50,000$/Unit	Case ZT-2	10.7%
		(Case RD-S)X(Case IP)X(Case UB) X(Case HGR)X(Case NT-3)	R&D(SW):47$/m2, IE:47$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart-m):50,000$/Unit	Case ZT-3	10.9%

2. Viability for the Project (Investment Schedule of High-Tech Industrial Zone: Delay Case)

2-1 FIRR of Whole HHTP (Investment Schedule of High-Tech Industrial Zone: Delay Case)

		Compensation Cost Bearing		Land Rents (0.375$/m2/y) Bearing		Construction Cost Bearing		Sales/Lease Conditions	Cases	FIRR (%)
		IDCs	Public	IDCs	Public	IDCs	Public			
1	HHTP(7 Zones Total)	O		O		O		R&D(Institute Lot):0$/m2, R&D(SW):47$/m2, HHTP Center:0$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart-m):50,000$/Unit	Case ZT-a	9.3%

Table 7-8-8 Sensitivity Analysis of FIRR Computation (Case 2: Land Rent; 0.100 USD/m2/y) (3/4)

1. Sensitivity of Viability for the Developer (Increasing Cost)

1-1 FIRR of Each Zone (Increasing Cost)

	Compensation Cost Bearing		Land Rents (0.100$/m2/y) Bearing		Construction Cost Bearing		Sales/Lease Conditions	Cases	Cost+10%	Cost+20%
	IDCs	Public	IDCs	Public	IDCs	Public			FIRR (%)	FIRR (%)
1. R&D Zone (Software Park)	O		O		O		45.0US$/m2	Case RD-S	17.6%	14.9%
2. High-Tech Industrial Zone	O		O		O		45.0US$/m2	Case IP	15.5%	N.A.
3. Urban / Business Zone	O		O		O		20.0US$/m2/month	CaseUB	15.9%	14.7%
4. High Grade Residence with Golf Course	O		O		O		50,400US$/Unit/y (Detached House)	Case HGR	11.3%	10.4%
5. New Town Zone	O		O		O		50,000US$/Unit (Apart. Medium)	Case NT-1	N.A.	N.A.
	O			O	O		50,000US$/Unit (Apart. Medium)	Case NT-2	N.A.	N.A.
		O		O	O		50,000US$/Unit (Apart. Medium)	Case NT-3	N.A.	N.A.

1-2 FIRR of Whole HHTP (Increasing Cost)

		Sales/Lease Conditions	Cases	Cost+10%	Cost+20%
				FIRR (%)	FIRR (%)
1. HHTP(4 Zones Total)	(Case RD-S)X(Case IP)X(Case UB) X(Case HGR)	R&D(SW):45$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year	Case ZT	13.5%	12.3%
2. HHTP(5 Zones Total)	(Case RD-S)X(Case IP)X(Case UB) X(Case HGR)X(Case NT-1)	R&D(SW):45$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart.m²):50,000$/Unit	Case ZT-1	9.5%	8.2%
	(Case RD-S)X(Case IP)X(Case UB) X(Case HGR)X(Case NT-2)	R&D(SW):45$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart.m²):50,000$/Unit	Case ZT-2	9.5%	8.3%
	(Case RD-S)X(Case IP)X(Case UB) X(Case HGR)X(Case NT-3)	R&D(SW):45$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart.m²):50,000$/Unit	Case ZT-3	9.7%	8.4%

2. Viability for the Project (Increasing cost)

2-1 FIRR of Whole HHTP (Increasing Cost)

	Compensation Cost Bearing		Land Rents (0.100$/m2/y) Bearing		Construction Cost Bearing		Sales/Lease Conditions	Cases	Cost+10%	Cost+20%
	IDCs	Public	IDCs	Public	IDCs	Public			FIRR (%)	FIRR (%)
1. HHTP(7 Zones Total)	O		O		O		R&D(Institute Est):0$/m2, R&D(SW):45$/m2, HHTP Center:0$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart.m²):50,000$/Unit	Case ZT-a	8.6%	7.4%

Note: IDCs means Infrastructure Development Companies

Table 7-8-9 Sensitivity Analysis of FIRR Computation (Case 2: Land Rent; 0.100 USD/m2/y) (4/4)

1. Viability for the Developer (Investment Schedule of High-Tech Industrial Zone: Delay Case)

1-1 FIRR of Each Zone (Investment Schedule of High-Tech Industrial Zone: Delay Case)

		Compensation Cost Bearing		Land Rents (0.100$/m2/y) Bearing		Construction Cost Bearing		Sales/Lease Conditions	Cases	FIRR (%)
		IDCs	Public	IDCs	Public	IDCs	Public			
1	R&D Zone (Software Park)	O		O		O		45.0 US$/m2	Case RD-S	20.6%
2	High-Tech Industrial Zone	O		O		O		45.0 US$/m2	Case IP	14.5%
3	Urban/Business Zone	O		O		O		20.0 US$/m2/month	CaseUB	17.3%
4	High Grade Residential Zone	O		O		O		50,400 USD$/Unit/y (Detached House)	Case HGR	12.4%
5	New Town Zone	O		O		O		50,000 US$/Unit (Apart. Medium)	Case NT-1	N.A.
		O			O	O		50,000 US$/Unit (Apart. Medium)	Case NT-2	N.A.
			O		O	O		50,000 US$/Unit (Apart. Medium)	Case NT-3	N.A.

1-2 FIRR of Whole HHTP (Investment Shcdule of High-Tech Industrial Zone: Delay Case)

		Sales/Lease Conditions	Cases	FIRR (%)
1	HHTP(4 Zones Total)	(Case RD-S)X(Case IP)X(Case UB)X (Case HGR)	R&D(SW):45$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year	Case ZT	14.7%
2	HHTP(5 Zones Total)	(Case RD-S)X(Case IP)X(Case UB)X (Case HGR)X(Case NT-1)	R&D(SW):45$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart-m):50,000$/Unit	Case ZT-1	10.9%
		(Case RD-S)X(Case IP)X(Case UB)X (Case HGR)X(Case NT-2)	R&D(SW):45$/m2, IE:45$D/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart-m):50,000$/Unit	Case ZT-2	11.0%
		(Case RD-S)X(Case IP)X(Case UB)X (Case HGR)X(Case NT-3)	R&D(SW):45$/m2, IE:45$./m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart-m):50,000$/Unit	Case ZT-3	11.2%

2. Viability for the Project (Investment Schedule of High-Tech Industrial Zone: Delay Case)

2-1 FIRR of Whole HHTP (Investment Schedule of High-Tech Industrial Zone: Delay Case)

		Compensation Cost Bearing		Land Rents (0.100 $/m2/y) Bearing		Construction Cost Bearing		Sales/Lease Conditions	Cases	FIRR (%)
		IDCs	Public	IDCs	Public	IDCs	Public			
1	HHTP(7 Zones Total)	O		O		O		R&D(Institute Lot):0$/m2, R&D(SW):45$/m2, HHTP Center:0$/m2, IE:45$/m2, UB:20$/m2/month, HGR(Detached H.):50,400$/Unit/year , NT (Apart-m):50,000$/Unit	Case ZT-a	9.9%

Table 7-8-10 Development Cost of Phase 1 of HHTP Project and Possible Financial Arrangement

(USD Million)

Project	Development Cost									Source of Public Fund			Source of Private Fund				
	Total			Infrastructure			Building			/1			/2				
	Total	Foreign Portion	Local Portion	Total	Foreign Portion	Local Portion	Total	Foreign Portion	Local Portion	Government Budget	Grants or Technical Aid	Total	JV	SOE	BOT	Total	Foreign Fund
1.External Infrastructures																	
1.1 Road	57.79	8.67	49.12	57.79	8.67	49.12				◎		57.79					
(1) Bus Terminal	(0.37)	(0.06)	(0.31)	(0.37)	(0.06)	(0.31)	-	-	-			(0.37)					
(2) Main Road	(57.42)	(8.61)	(48.81)	(57.42)	(8.61)	(48.81)	-	-	-			(57.42)					
1.2 Water Supply Facilities	75.83	48.01	27.82	75.83	48.01	27.82	-	-	-	◎		75.83			○		
1.3 Sewerage Facilities	26.59	8.87	17.72	26.59	8.87	17.72	-	-	-	◎		26.59					
1.4 Drainage Facilities	3.89	1.35	2.54	3.89	1.35	2.54	-	-	-	◎		3.89					
1.5 Power Supply Facilities	44.15	28.68	15.47	44.15	28.68	15.47	-	-	-	◎		44.15			○		
1.6 Telecommunication Facilities	46.51	44.67	1.84	46.51	44.67	1.84	-	-	-	○					◎	46.51	
Sub-Total	254.76	140.25	114.51	254.76	140.25	114.51	-	-	-			208.25				46.51	
2.Public Zones																	
2.1 R&D Zone (Institute Sub-Zone)	15.30	6.39	8.91	15.30	6.39	8.91	-	-	-	◎		15.29					
2.2 Center Area (Infrastructure)	0.89	0.23	0.66	0.89	0.23	0.66	-	-	-	◎		0.89					
2.3 Center Area (Building)	44.72	13.41	31.31	-	-	-	44.72	13.41	31.31			44.72					
(1) National Software Center	(8.14)	(2.44)	(5.70)	-	-	-	(8.14)	(2.44)	(5.70)	◎		(8.14)		○			
(2) High-Tech Park Center	(9.43)	(2.83)	(6.60)	-	-	-	(9.43)	(2.83)	(6.60)	◎		(9.43)		○			
(3) Technopartnership Center	(13.77)	(4.13)	(9.64)	-	-	-	(13.77)	(4.13)	(9.64)	◎	○	(13.77)		○			
(4) Technical Institute	(6.84)	(2.05)	(4.79)	-	-	-	(6.84)	(2.05)	(4.79)	◎	○	(6.84)		○			○
(5) OJT Training Center	(6.54)	(1.96)	(4.58)	-	-	-	(6.54)	(1.96)	(4.58)	◎	○	(6.54)		○			○
2.4 New Town Zone(Infrastructure)	18.12	6.75	11.37	18.12	6.75	11.37	-	-	-	◎		18.12	○	○			
2.5 New Town Zone(Building)	181.19	27.18	154.01	-	-	-	181.19	27.18	154.01	○			◎			181.19	
2.6 Park, Green Area	12.97	5.15	7.82	12.97	5.15	7.82	-	-	-	◎		12.97					
Sub-Total	273.19	59.11	214.08	47.28	18.52	28.76	225.91	40.59	185.32			92.00				181.19	
3.Self-financing Zone																	
3.1 High-Tech Industrial Zone	15.96	6.83	9.13	15.96	6.83	9.13	-	-	-				◎			15.96	
3.2 R&D Zone (Software Park)	2.75	1.15	1.60	2.75	1.15	1.60	-	-	-				◎			2.75	
3.3 High Grade Residential Zone	80.81	22.69	58.12	23.09	5.37	17.72	57.72	17.32	40.40				◎			80.81	
3.4 Urban/Business Zone	60.56	18.53	42.03	2.90	1.23	1.67	57.66	17.30	40.36				◎			60.56	
Sub-Total	160.08	49.20	110.88	44.70	14.58	30.12	115.38	34.62	80.76							160.08	
Total	688.03	248.56	439.47	346.74	173.35	173.39	341.29	75.21	266.08			300.25				387.78	

◎: Proposed Source of Fund
○: Alternative Source of Fund

Note: /1 Including bilateral and multilateral official development aid.
/2 Including BOT, BLT and BCC.
*1) Engineering service cost and physical contingency are included.
*2) Price escalation is not included.

Table 7-8-11 Current VA (Agriculture Production) in Phase 1 of HHTP

Commune	Area by Commune in HHTP (1,800ha) Site (ha)	Area in the 1st Phase of HHTP (800 ha) Site (ha)	Area by Land Use						Estimate of Current GDP in the 1st Phase of HHTP Site (million VN dong) /1
			Residential Land (ha)	Agriculture Land (ha) (1)	Forestry Land (ha) (2)	Public Land (ha)	Fish Pond / Reservoir (ha)	Army Quarters (ha)	
Tan Xa	582	391 100.0%	19 4.9%	103 26.4%	111 28.5%	157 40.3%	0 0.0%	0.1 0.0%	3946.8
Thach Hoa	458	458 100.0%	33 7.2%	226 49.3%	66 14.4%	19 4.1%	41 9.0%	73 15.9%	5372.8
Ha Bang	242	48 100.0%	0 0.0%	44 91.7%	0 0.0%	4 8.3%	0 0.0%	0 0.0%	809.6
Binh Yen	458	48 100.0%	5 10.4%	22 45.8%	21 43.8%	0 0.0%	0 0.0%	0 0.0%	791.2
Co Dong	167	0 100.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0
Total	1,907	945 100.0%	57 6.0%	395 41.8%	198 21.0%	180 19.1%	41 4.3%	73 7.7%	10920.4

/1:GDP/ha of Thach That District (18.4 million VN Dongs)X((1)+(2))

Source of current land use data: Socio-Economic Survey Report conducted by NISTPASS, May, 1997

Table 7-8-12 Estimate of VA (Agriculture Production) in Phase 1 of HHTP

	Estimate of GDP in the 1st Phase of HHTP (1,000 US$) /1	Estimate of Cumulative GDP in the 1st Phase of HHTP (1,000 US$)
1997	892	892
1998	935	1,827
1999	979	2,806
2000	1,026	3,833
2001	1,076	4,908
2002	1,127	6,035
2003	1,181	7,217
2004	1,238	8,455
2005	1,297	9,752
2006	1,360	11,112
2007	1,425	12,536
2008	1,493	14,029
2009	1,565	15,594
2010	1,640	17,234
2011	1,718	18,952
2012	1,801	20,753
2013	1,887	22,640
2014	1,978	24,617
2015	2,072	26,690
2016	2,172	28,861
2017	2,276	31,137
2018	2,385	33,522
2019	2,499	36,022
2020	2,619	38,641
2021	2,745	41,386
2022	2,876	44,262
2023	3,014	47,277
2024	3,159	50,436
2025	3,310	53,746
2026	3,469	57,215

/1:The growth rate of GDP is assumed to be 1.048 based on the growth rate of GDP in agriculture sector in Vietnam during the past 10 years.

Table 7-8-13 Estimate of VA (Industrial Production) in Phase 1 of High-Tech Industrial Zone in 2005

(at 1997 price)

ISIC Code	Japanese Industrial Code	Products Description	Estimated Nos. of Enterprises in HHTP (Phase 1)	Lot Area/ Factory	Development Area	Estimated Nos. of Employees /1	Industrial Productivity per Nos. of Employees /2	Estimate of Industrial Production in 1st Phase of Hi-Tech Industrial Zone
				(ha/enterprise)	(ha)	(Persons)	(US$/person)	(million US$)
242	206	Pharmaceuticals	1	4.62	4.62	338	239,645	81.0
331	323	Medical Equipment, etc.	2	1.48	2.96	495	44,444	22.0
242	205	Detergents, Surfactans, Paints, etc.	1	2.95	2.95	204	122,549	25.0
300	298	Office Equip., Air-Conditioners, etc.	2	1.77	3.54	546	56,777	31.0
322	304	Communications Equipment,CD,CD-ROM	4	1.26	5.04	1,182	39,763	47.0
291	297	Industrial Electrical Macinery/Equip.	1	1.54	1.54	248	32,258	8.0
319	309	Other Electrical/Electronic Products	4	2.14	8.56	1,068	30,899	33.0
331	329	Other Precision Instruments	1	1.12	1.12	225	40,000	9.0
312/319	308	Electronic Parts/Devices, etc.	3	0.96	2.88	684	16,082	11.0
332	325	Optical Equipment & Lenses	1	1.26	1.26	276	18,116	5.0
333	327	Watches/Clocks & Parts	1	1.20	1.20	266	18,797	5.0
300 323 331	305 306	Computers, X Ray Equip. VTR, etc.	2	1.43	2.86	660	63,636	42.0
293	302	Electrical Home Appliance	1	1.74	1.74	311	35,370	11.0
343	311	Motor Vehicles & Parts, etc.	2	2.91	5.82	654	22,936	15.0
292	296	Special Industrial Macinery	2	2.12	4.24	390	38,462	15.0
291	299	Other General Macinery/Equip.	1	1.46	1.46	188	26,596	5.0
281/289	294	Metal Processing Macinery/Equip.	3	2.04	6.12	621	27,375	17.0
261	251	Glass and Glass Products	1	3.69	3.69	278	43,165	12.0
			33		**61.60**	**8,634**		**394.0**

/1 Refer to section 6.1.5

/2 Source: Industrial Statistics in Japan

Table 7-8-14 Economic Cost and Benefit Flow and EIRR (Basic Plan)

(at 1997 constant price)

	Cost of Internal Infrastructure of 1st Phase of HHTP (1,000 US$)	Cost of External Infrastructure of HHTP (1,000 US$)	Cost of Factory Building by Investors (1,000 US$)	Investment Cost of Machinery and Equipment by Investors (1,000 US$)	Total Cost (1,000 US$)	Estimate of Hi-Tech Industrial Production in the 1st Phase of HHTP (1,000 US$)	Estimate of Agriculture Production in the 1st Phase of HHTP (1,000 US$)	Total Benefit (1,000 US$)	Balance (1,000 US$)
1997					0		892	-892	-892
1998					0		935	-935	-935
1999	15,091				15,091		979	-979	-16,070
2000	13,207	12,218			25,425		1,026	-1,026	-26,451
2001	70,749	171,976	12,320	43,170	298,215		1,076	-1,076	-299,291
2002	146,173	242,422	86,240	302,190	777,025	157,600	1,127	156,473	-620,552
2003	99,102	5,991	73,920	259,020	438,033	275,800	1,181	274,619	-163,414
2004	57,647		49,280	172,680	279,607	354,600	1,238	353,362	73,755
2005			24,640	86,340	110,980	394,000	1,297	392,703	281,723
2006					0	427,282	1,360	425,922	425,922
2007					0	463,375	1,425	461,950	461,950
2008					0	502,517	1,493	501,024	501,024
2009					0	544,966	1,565	543,401	543,401
2010					0	591,000	1,640	589,360	589,360
2011				43,170	43,170	625,795	1,718	624,077	580,907
2012				302,190	302,190	662,639	1,801	660,838	358,648
2013				259,020	259,020	701,651	1,887	699,764	440,744
2014				172,680	172,680	742,961	1,978	740,984	568,304
2015				86,340	86,340	786,703	2,072	784,631	698,291
2016					0	833,020	2,172	830,848	830,848
2017					0	882,064	2,276	879,788	879,788
2018					0	933,995	2,385	931,610	931,610
2019					0	988,984	2,499	986,485	986,485
2020					0	1,047,211	2,619	1,044,591	1,044,591
2021	12,312	25,892	12,320	43,170	93,694	1,082,060	2,745	1,079,315	985,621
2022	2,747	48,502	86,240	302,190	439,679	1,118,068	2,876	1,115,192	675,513
2023		11,910	73,920	259,020	344,850	1,155,276	3,014	1,152,261	807,411
2024			49,280	172,680	221,960	1,193,721	3,159	1,190,562	968,602
2025			24,640	86,340	110,980	1,233,445	3,310	1,230,135	1,119,155
2026					0	1,274,492	3,469	1,271,023	1,271,023
	417,028	518,911	492,800	2,590,200	4,018,939	18,973,225	57,215	18,916,010	14,897,071
								EIRR=	25.9%