

## 5.27 Vinh Quynh (V15) Station Area

### 5.27.1 Development Character

#### a) Existing Condition and Issues

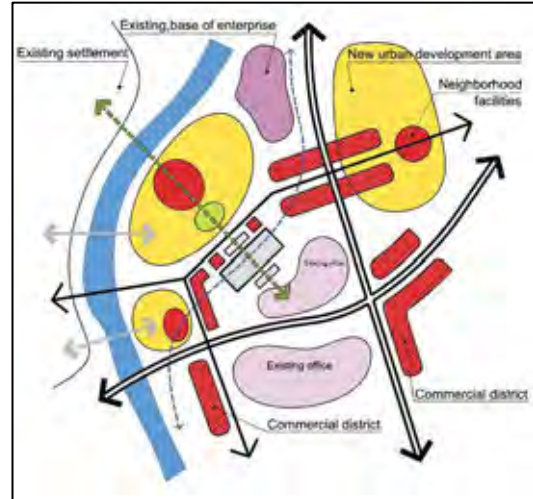
5272 Vinh Quynh Station will be located app. 500m west from NH-1. At present, there are only agricultural lands except for the Center of Technology Transfer and Agricultural Expansion and rural villages. Along NH-1, many factories and industries are clustered but few commercial and public facilities.

#### b) Development Objectives

5273 Station area development concept of Transit Oriented Development (TOD) is applied to Vinh Quynh Station, with UMRT and Ring-Railway in future, and trunk roads.

5274 With conversion of agricultural land into urban use, commercial and business facilities will be clustered around station and residential areas will be developed around it with pedestrian malls and road network.

**Figure 5.27.1 Conceptual Diagram of Vinh Quynh Station Area (V15)**



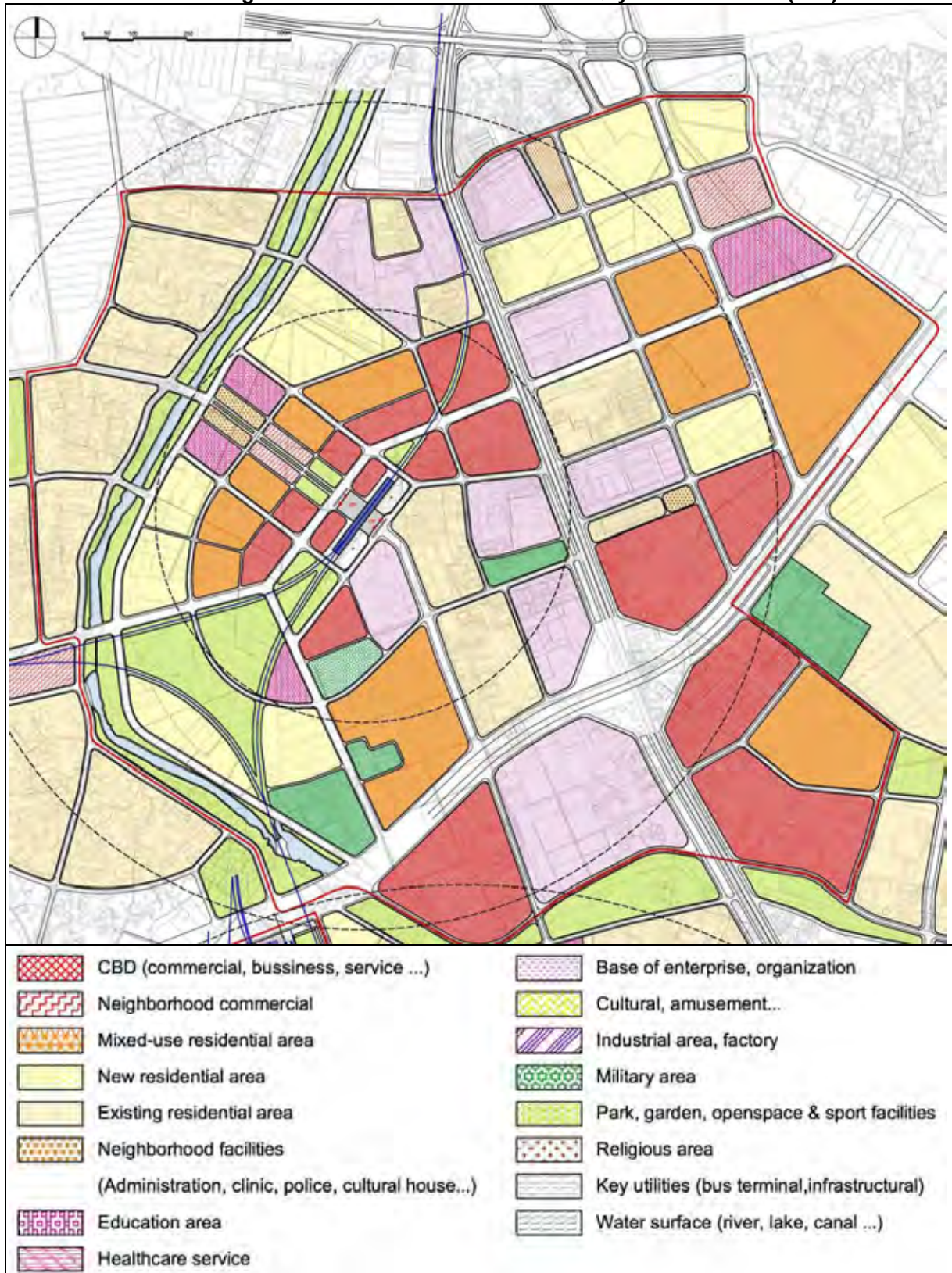
Source: JICA Project Team

**Table 5.27.1 Demand Outlook for Vinh Quynh Station Area (V15)**

|   |            | Present | UMRT with integrated Urban Development |        |
|---|------------|---------|--|--------|
|   |            |         | Without                                | With   |
| Population of Station Area of radius 500m (persons) | Population | 420     | 3,600                                  | 10,400 |
|   | Employment | 738     | 1,200                                  | 23,700 |
|   | Student    | 1,412   | 598                                    | 1,700  |
| Ridership (persons/day)                             |            | -       | 11,200                                 | 15,900 |

Source: JICA Project Team

**Figure 5.27.2 Landuse Plan of Vinh Quynh Station Area (V15)**



Source: JICA Project Team



### 5.27.2 Long-Term Plan

5275 Main intermodal facility will be developed in north, which is an agricultural land at present. Station access roads with radial or grid networks will be developed, and commercial and business facilities are developed near the station. Residential area development will be promoted around the station in future.

5276 In south, agricultural center and its related facilities and condominiums are clustered. Station access road will be widened, and neighboring commercial and service facilities will be developed in agricultural land.

5277 In future, long-distance railway will be improved as a Ring-Railway of Hanoi City. The triangle zone enclosed railways will be utilized as a park and openspace used for agricultural research purpose.

**Figure 5.27.3 Long-term Concept Plan of Vinh Quynh Station Area (V15)**



Source: JICA Project Team

**Table 5.27.2 Project Component for Integrated Urban Development of Vinh Quynh Station Area (V15)**

| Category                       | ID    | Projects/Program                                    | Scale/Area | Implementation Body |         |     | Phase     |
|--------------------------------|-------|---|------------|---------------------|---------|-----|-----------|
|                                |       |   |            | Public              | Private | PPP |           |
| Road and Walkway               | TR-1  | Station Access Road Development (south)             | 0.6 km     | ●                   | --      | --  | Short     |
|                                | TR-2  | Station Access Road Development (north)             | 0.8 km     | ●                   | --      | --  | Short-mid |
|                                | TR-3  | Highway No.1 Width Partial Expansion (planned)      | --         | ●                   | --      | --  | --        |
|                                | TR-4  | Ring Road No.4 Development (planned)                | --         | ●                   | --      | --  | --        |
| Intermodal Facilities          | ITF-1 | Inter-modal Transfer Facilities –I (north) incl P&R | 0.7ha      | ●                   | ○       | --  | short     |
|                                | ITF-2 | Inter-modal Transfer Facilities–II (south) incl P&R | 0.3ha      | ●                   | ○       | --  | Short-mid |
| Feeder Service                 | FS-1  | Bus Stop Station Facilities and Route Service       | 1 unit     | --                  | ●       | --  | Short     |
|                                | FS-2  | Taxi & Xe-om Stop Station Facilities and Service    | 1 unit     | --                  | ●       | --  | Short-mid |
| Traffic Control & Management   | TM-1  | Crosswalk with Signal Control at ITF                | 2 unit     | ●                   | --      | --  | Short     |
| Urban Redevelopment            | UR-1  | Station Urban Plaza Redevelopment (east)            | 0.6ha      | --                  | ●       | --  | Short-mid |
| New Urban Development          | ND-1  | Station Front New Urban Area Development            | 72 ha      | --                  | ●       | --  | Mid-long  |
| Urban Renovation Promotion     | RP-1  | NH1 Street Front Commercial Consolidation (west)    | 2.6ha      | --                  | ●       | --  | Mid-long  |
|                                | RP-2  | Station Commercial Business Consolidation (east)    | 7.5 ha     | --                  | --      | --  | Mid-long  |
| Living Environment Improvement | LEI-1 | Vinh Quynh Community Improvement                    | 11 ha      | ●                   | ○       | --  | Mid-long  |

Source: JICA Project Team

### 5.27.3 Issues to be Clarified

5278 Not specified.

## 5.28 Cau Den (C11) Station Area

### 5.28.1 Development Character

#### a) Existing Condition and Issues

5279 Cau Den Station will be located under Hue Street, on the east of Vin Com Tower which is one of the largest high-rise shopping center in the city center. On the east side of station, Nguyen Cong Tru KTT (public apartment complex) is located. Living condition of this complex has been worsened while traditional lifestyle with community is still remained. There is an urban redevelopment plan to rebuild high-rise residential complex, but feasibility is not clear. There are many schools around there, and Optic Central Hospital, and Traditional Medicine Hospital are located app. 500m far from the station.

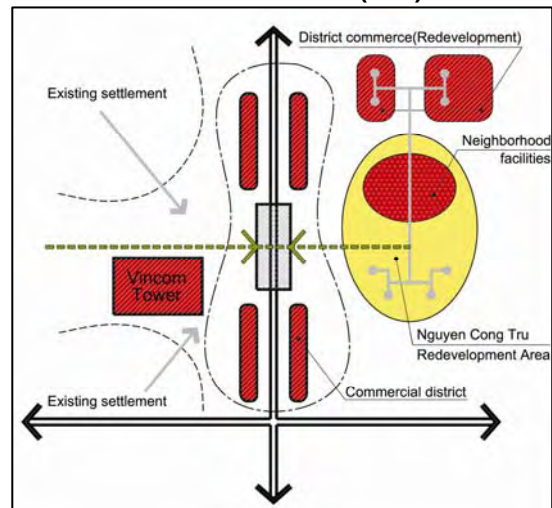
5280 Many cars and motorbikes park roadside in this area and traffic is often congested, since there are many restaurants, cafés and shops. Walking condition is not safe though grid road network is developed. This station is a south-easternmost station of UMRT Line 2, so it is expected users from south-east use this station. Accessibility to bus stops and walking environment to access to hospitals, schools and shopping areas need to be improved.

#### b) Development Objectives

5281 Cau Den Station Area will be developed as a new commercial center harmonized with cultural environments.

5282 As a historical south gateway of Hanoi, urban design of new commercial development will be harmonized with pagodas, residential areas and lakes around the station.

**Figure 5.28.1 Conceptual Diagram of Cau Den Station Area (C11)**



Source: JICA Project Team

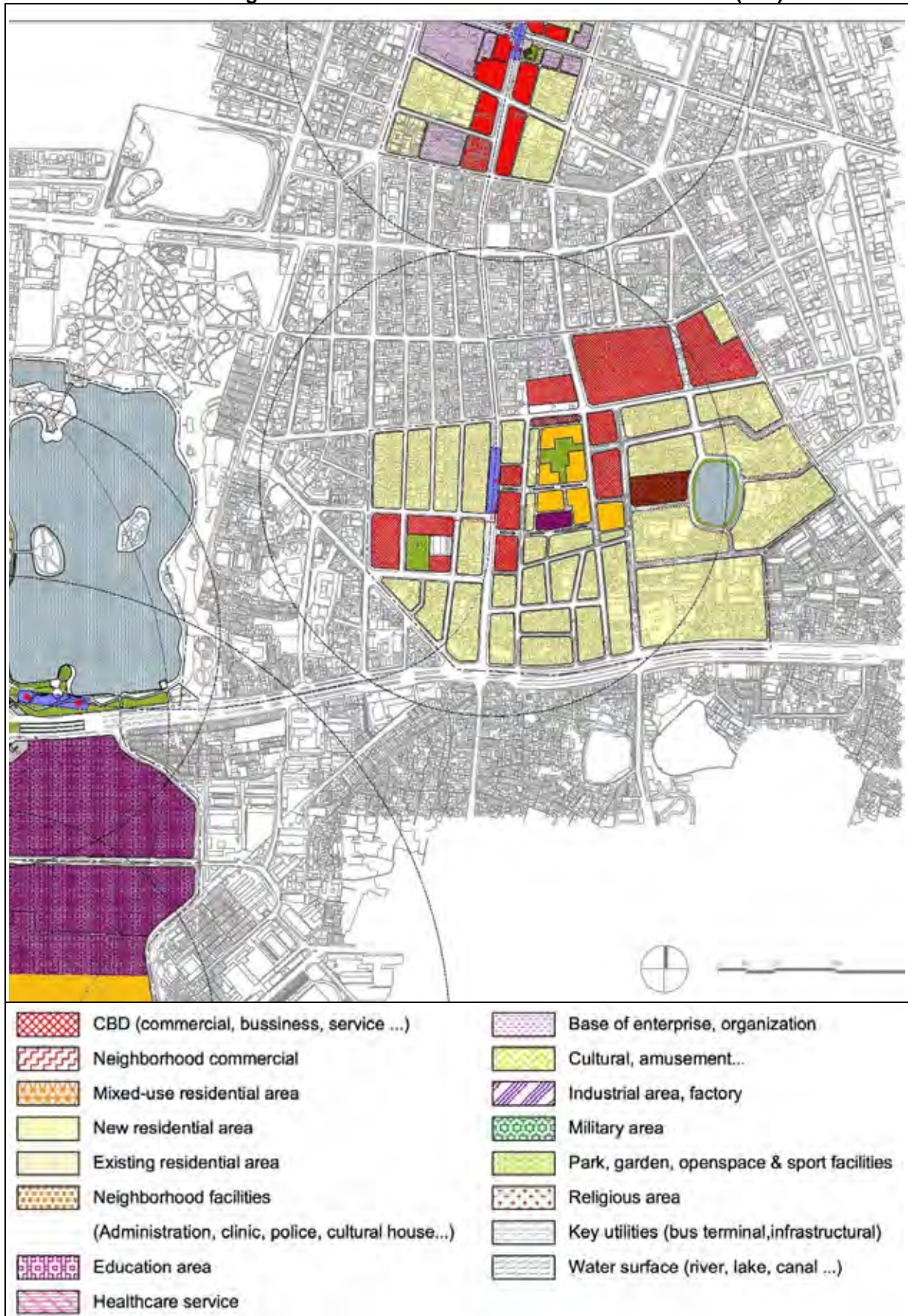
**Table 5.28.1 Demand Outlook for Cau Den Station Area (C11)**

|   |            | Present | UMRT with integrated Urban Development |        |
|---|------------|---------|--|--------|
|   |            |         | Without                                | With   |
| Population of Station Area of radius 500m (persons) | Population | 37,260  | 27,300                                 | 28,800 |
|   | Employment | 16,705  | 24,500                                 | 27,800 |
|   | Student    | 18,744  | 7,200                                  | 7,600  |
| Ridership (persons/day)                             |            | -       | 7,020                                  | 11,430 |

Source: JICA Project Team



**Figure 5.28.2 Landuse Plan of Cau Den Station Area (C11)**



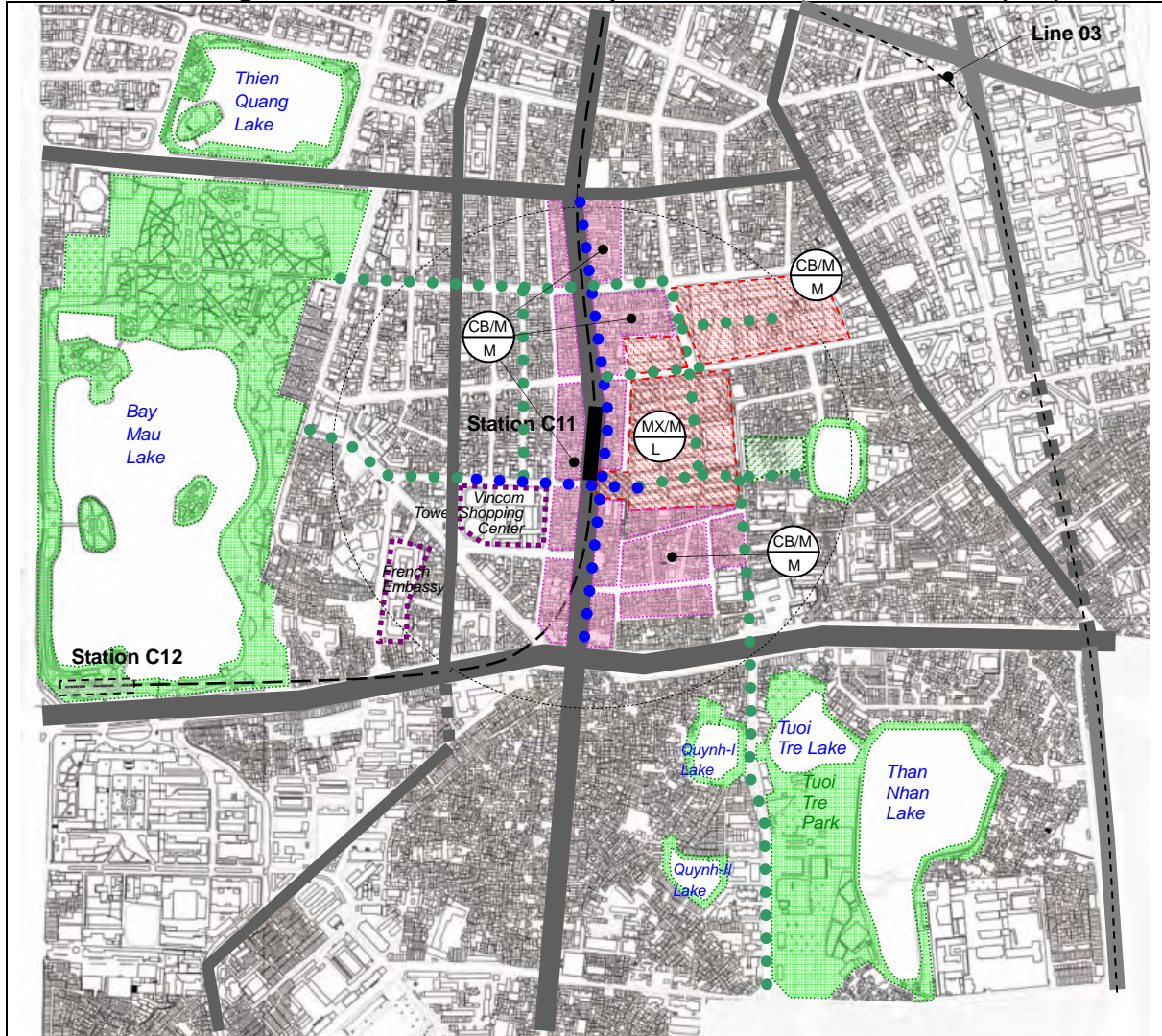
Source: JICA Project Team



### 5.28.2 Long-Term Plan

5283 Along NH-1, commercial and business facilities along Hue Street will be clustered with appropriate urban design control. Nguyen Cong Tru KTT (apartment district) will be redeveloped to improve living condition environment. A west-east station access road from Vincom Tower, KTT, Hai Ba Trung Temple and Hai Ba Lake will be developed as a pedestrian mall.

**Figure 5.28.3 Long-term Concept Plan of Cau Den Station Area (C11)**



Source: JICA Project Team

**Table 5.28.2 Project Component for Integrated Urban Development of  
 Cau Den Station Area (C11)**

| Category                       | ID    | Projects/Program                                 | Scale/<br>Area | Implementation Body |         |     | Phase     |
|--------------------------------|-------|--|----------------|---------------------|---------|-----|-----------|
|                                |       |  |                | Public              | Private | PPP |           |
| Feeder Service                 | FS-1  | Bus Stop Station Facilities and Route Service    | 2unit          | --                  | ●       | --  | short     |
|                                | FS-2  | Taxi & Xe-om Stop Station Facilities and Service | 2 unit         | --                  | ●       | --  | short     |
| Traffic Control & Management   | TM-1  | Shopping Mall Area Traffic Control Program       | 8ha            | ●                   | --      | --  | Short-mid |
|                                | TM-2  | Factories Area Access Control & Improvement      | 700m           | ●                   | --      | --  | Short-mid |
| Urban Redevelopment            | UR-1  | Factories Area Redevelopment (planned)           | 3.8ha          | --                  | ●       | --  | Short-mid |
|                                | UR-2  | Nguyen Cong Tri Housing Area (planned)           | 4.3ha          | --                  | ●       | --  | Mid-long  |
|                                | UR-3  | Hue St Side Block Station Gate Plaza             | 0.5ha          | --                  | ●       | ○   | Short-mid |
| Urban Renovation Promotion     | RP-1  | Corridor Commercial Business Consolidation       | 2 ha           | --                  | ●       | --  | Mid-long  |
| Living Environment Improvement | LEI-1 | Hoa Binh Market Improvement                      | 2.5ha          | ●                   | ●       | --  | Short-mid |

Source: JICA Project Team

### 5.28.3 Issues to be Clarified

5284 Urban redevelopment of Nguyen Cong Tru KTT: Urban redevelopment project of this KTT has been planned. It is necessary to take into consideration with the station development, especially for access road development.



## 5.29 Kim Lien (C13) Station Area<sup>1</sup>

### 5.29.1 Development Character

#### a) Existing Condition and Issues

5285 Kim Lien Boc Station will be located inside the area of Kim Lien KTT (app 5.2ha, 4600 persons). Kim Lien KTT is an old public apartment complex, including 16 buildings of 4<sup>th</sup> floor and 2 buildings of 11<sup>th</sup> floor. Most of housings are disposed to individual households. Income level of this KTT is low, and there are many old persons who live there for many decades. There are not any public facilities like kindergarten, public agency, supermarket, etc.

5286 Several years ago, urban redevelopment project was implemented, and two (2) mid-rise buildings of 11<sup>th</sup> floor were built. It is said that some of original households could not resettle into new apartments because of financial constraints. At present, there is a plan of urban redevelopment of Kim Lien KTT proposed by a private developer. In the project area, there are two cultural historic works in Kim Lien commune which are Uncle Ho memorial and war martyr memorial, which will be preserved.

#### b) Development Objectives

5287 Orientation of Kim Lien station area development is “formulation of public transport oriented residential area development” which will be a center of residential areas in suburban area.

**Table 5.29.1 Demand Outlook of Kim Lien Station Area (C13)**

|   |            | Present | UMRT with integrated Urban Development |        |
|---|------------|---------|--|--------|
|   |            |         | Without                                | With   |
| Population of Station Area of radius 500m (persons) | Population | 41,200  | 17,900                                 | 17,900 |
|   | Employment | 12,600  | 9,300                                  | 9,300  |
|   | Student    | 16,400  | 5,000                                  | 5,000  |
| Ridership (persons/day)                             |            | -       | 4,600                                  | 8,260  |

Source: JICA Project Team

### 5.29.2 Issues to be Clarified

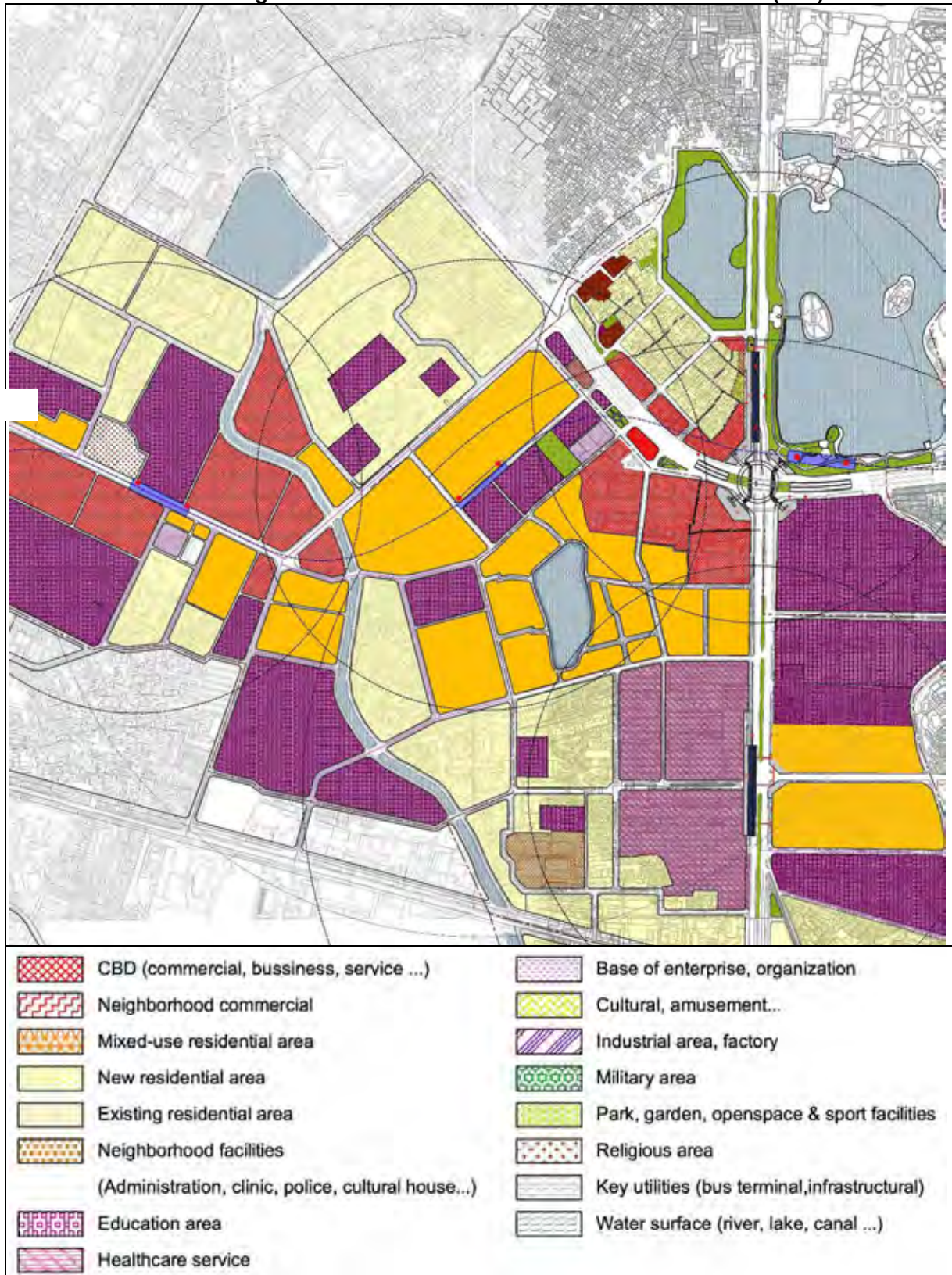
5288 Coordination and integration with Kim Lien KTT redevelopment plan (short-term): Kim Lien Station will be developed together with KTT redevelopment. HRB should coordinate with the developer of KTT and relevant agencies such as HAUPA, HDOT to implement UMRT development in an integrated manner.

5289 Service facility development (Short& mid-term): Station will be located under Hoang Tich Tri Street in the new Kim Lien apartment complex. It is expected many residents around this area as well as Kim Lien residents will use this subway station. Most of building floors will be used for residential purpose, but it is recommended to provide service facilities for station users, such as supermarket, bookstore, restaurants, etc.

5290 Adjustment of road network planning (Short& mid-term): Hoang Tich Tri street will be widened, but will not connect to the intersection of Pham Ngoc Thach Street and Chua Boc Street, which is a trunk road to connect to south-west of suburban area. Overall road network should be carefully planned to reduce traffic congestion in this area.

<sup>1</sup> Kim Lien Station was newly proposed by the Feasibility Study which has been implemented by HRB and TEDI-South. JICA Project Team verified this proposal and proposed at the 3<sup>rd</sup> Steering Committee Meeting. S/C basically agreed with it.

**Figure 5.29.1 Landuse Plan of Kim Lien Station Area (C13)**



Source: JICA Project Team



### 5.30 Chua Boc (C14) Station Area

#### 5.30.1 Development Character

##### a) Existing Condition and Issues

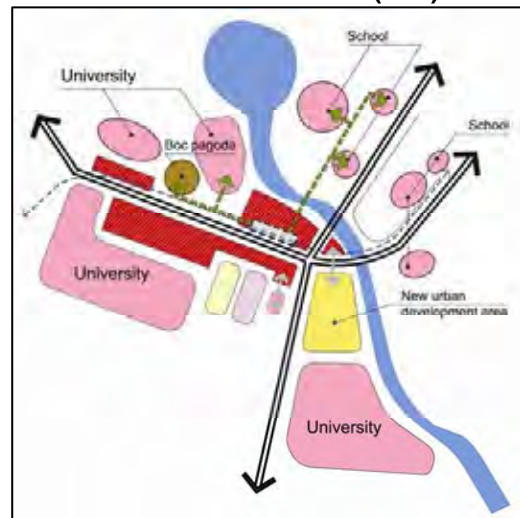
5291 Chua Boc Station will be located along Chua Boc Street, where many urban facilities such as supermarket, hotels, universities and schools are clustered. Residential area is rather high dense, and there are five old KTT (public apartment complex) named Kim Lien, Khuong Thuong, Trung To, Nam Dong, Vinh Ho, are located. Since this area is far from urban center interrupted by intersection of NH-1 and Dai Co Viet Street, most of urban services are clustered independently for residents.

5292 Living condition of this area is not good since housing condition of old public apartments and utilities have been degraded, and collector roads inside of residential areas are lacking. Chua Boc Street and Phan Ngo Thach Street are always crowded since these are one of the major trunk roads to go to the urban center from south-west of the city. Walking environment around the station and access to the station is expected.

##### b) Development Objectives

5293 Orientation of Chua Boc station area development is “formulation of educational and residential area development” which serves for university and school students and residents who live in KTTs and existing settlements.

**Figure 5.30.1 Conceptual Diagram of Chua Boc Station Area (C14)**



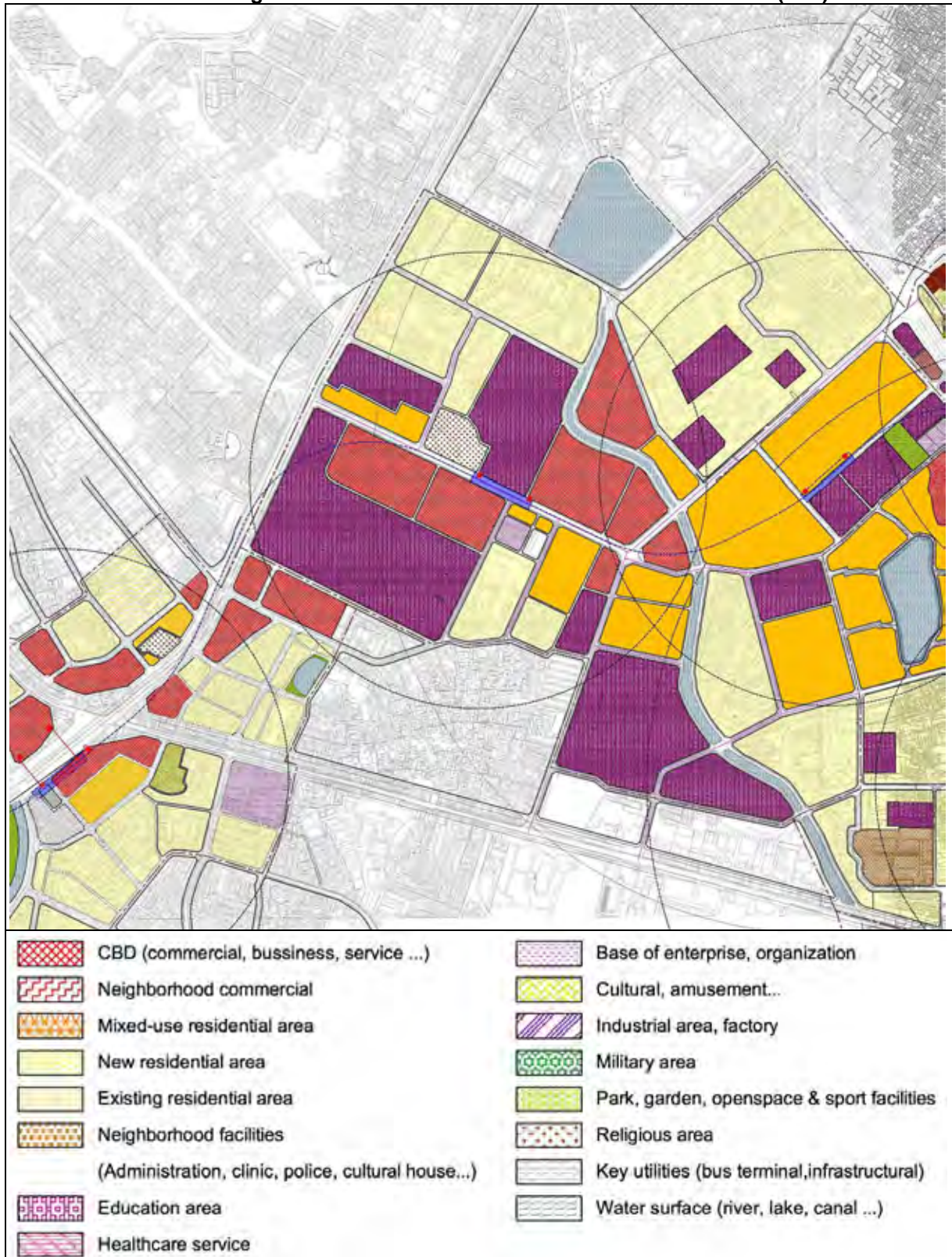
Source: JICA Project Team

**Table 5.30.1 Demand Outlook of Chua Boc Station Area (C14)**

|   |            | Present | UMRT with integrated Urban Development |        |
|---|------------|---------|--|--------|
|   |            |         | Without                                | With   |
| Population of Station Area of radius 500m (persons) | Population | 30,189  | 27,000                                 | 28,200 |
|   | Employment | 10,980  | 14,300                                 | 19,000 |
|   | Student    | 12,342  | 14,000                                 | 14,700 |
| Ridership (persons/day)                             |            | -       | 4,610                                  | 7,450  |

Source: JICA Project Team

**Figure 5.30.2 Landuse Plan of Chua Boc Station Area (C14)**



Source: JICA Project Team

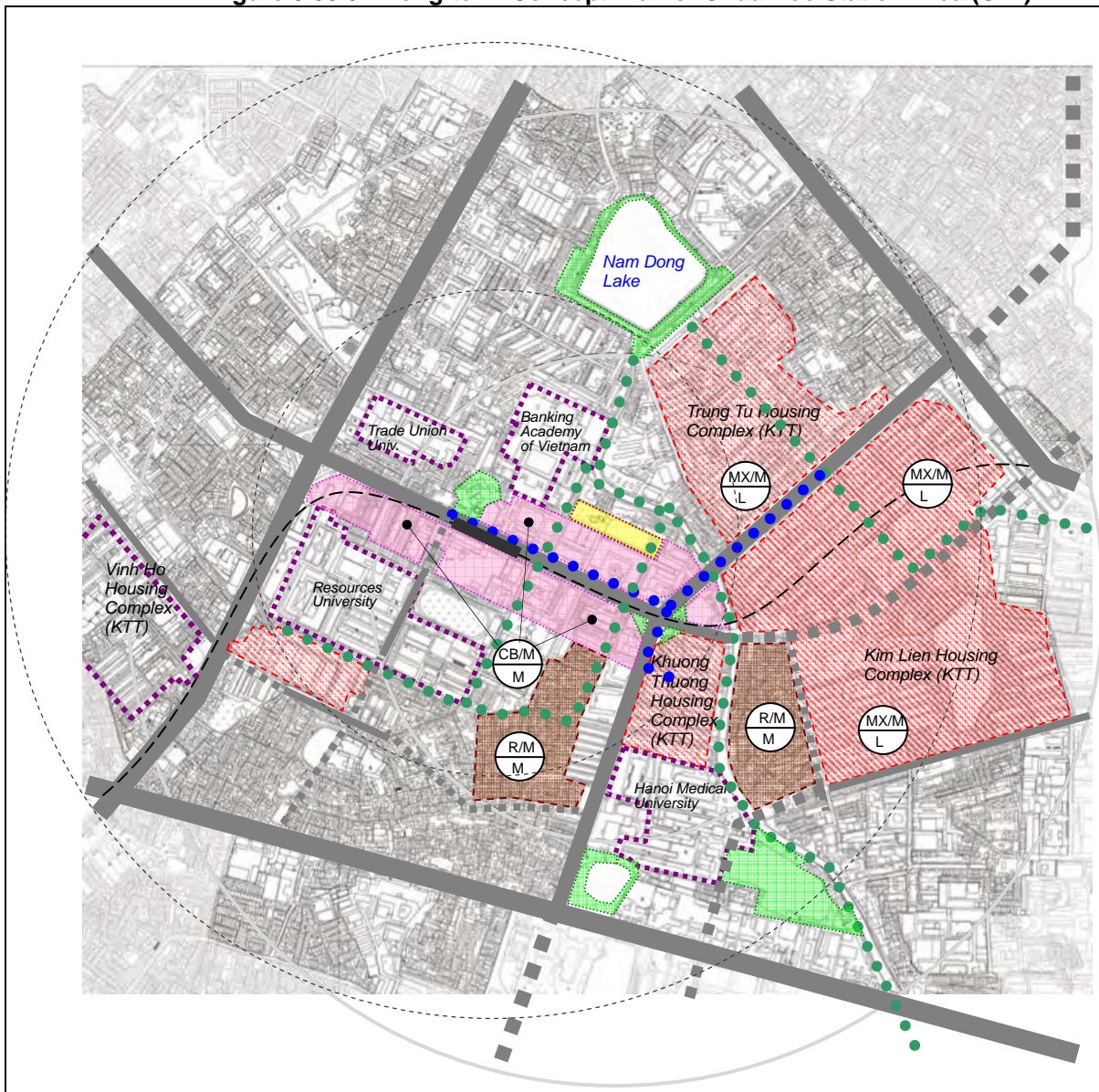


### 5.30.2 Long-Term Plan

5294 Station will be located nearby the intersection of Pham Ngoc Thach Street, Chua Boc Street and Ton That Tung Street. The corner of intersections will be developed as an entrance of station with openspace. Along Lu River, pedestrian space will be created to connect river, lake and station with green network.

5295 Along Chua Boc Street, commercial and business facilities will be developed which will serve for university students and neighboring residents mainly. KTTs such as Khuong Thuong, Trung Tu and Kim Lien will be redeveloped in mid and long-term. New residential districts will be convenient with appropriate access roads to station and neighboring service facilities.

**Figure 5.30.3 Long-term Concept Plan of Chua Boc Station Area (C14)**



Source: JICA Project Team

**Table 5.30.2 Project Component for Integrated Urban Development of Chua Boc Station Area (C14)**

| Category                   | ID   | Projects/Program                                 | Scale/<br>Area | Implementation Body |         |     | Phase     |
|----------------------------|------|--|----------------|---------------------|---------|-----|-----------|
|                            |      |  |                | Public              | Private | PPP |           |
| Road and Walkway           | TR-1 | Underpass and underground shopping street        | 200m           | ●                   | --      | ○   | Short-mid |
| Feeder Service             | FS-1 | Bus Stop Station Facilities and Route Service    | 2unit          | --                  | ●       | --  | short     |
|                            | FS-2 | Taxi & Xe-om Stop Station Facilities and Service | 2 unit         | --                  | ●       | --  | short     |
| Urban Redevelopment        | UR-1 | Khuong Thuong Housing Area (planned)             | 2.7ha          | --                  | ●       | --  | Mid-long  |
| New Urban Development      | ND-1 | Station Gate Plaza Development                   | 0.3 ha         | ○                   | ●       | --  | Short     |
| Urban Renovation Promotion | RP-1 | Private Company Facilities Renovation            | 3.5ha          | ○                   | ●       | --  | Mid-long  |

Source: JICA Project Team

### 5.30.3 Issues to be Clarified

5296 Urban redevelopment of KTTs (mid-term): For urban redevelopment of KTTs, it is necessary to take into consideration with the station development, especially for access road development.



## 5.31 Nga Tu So (C15) Station Area

### 5.31.1 Development Character

#### a) Existing Condition and Issues

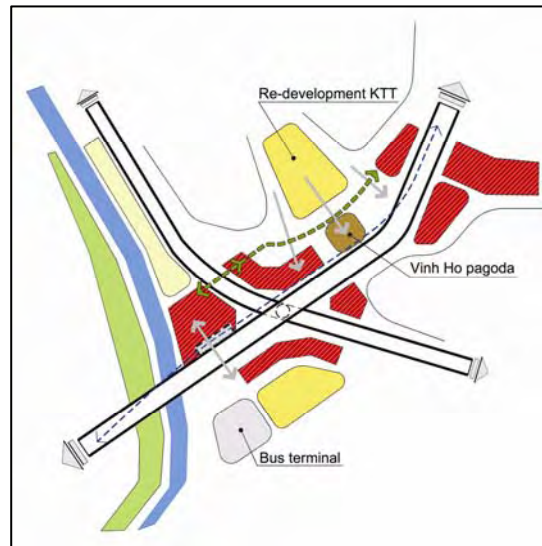
5297 Nga Tu So Station will be located under the intersection of Nguyen Trai Street and Thuong Chinh Street. Flyover of Nguyen Trai Street is located, and pedestrian subway was recently constructed. Though traffic volume of this intersection is large, it is well managed. Tu Lich River flows from north to south in this station area.

5298 There are few commercial and business facilities except for Nga Tu So market in this area. Sport center and puppet theater is located near the intersection. Hanoi Mechanical Company and several companies are located along Nguyen Trai Street. Co Khi Hanoi KTT and Vinh Ho KTT are located within 500m from the station.

#### b) Development Objectives

5299 Integrated with trunk road network, bus services and UMRT, orientation of Nga Tu So station area development is “an extensive commercial and business services and facilities will be promoted as an urban center of south-west of Hanoi City.”

**Figure 5.31.1 Conceptual Diagram of Nga Tu So Station Area (C15)**



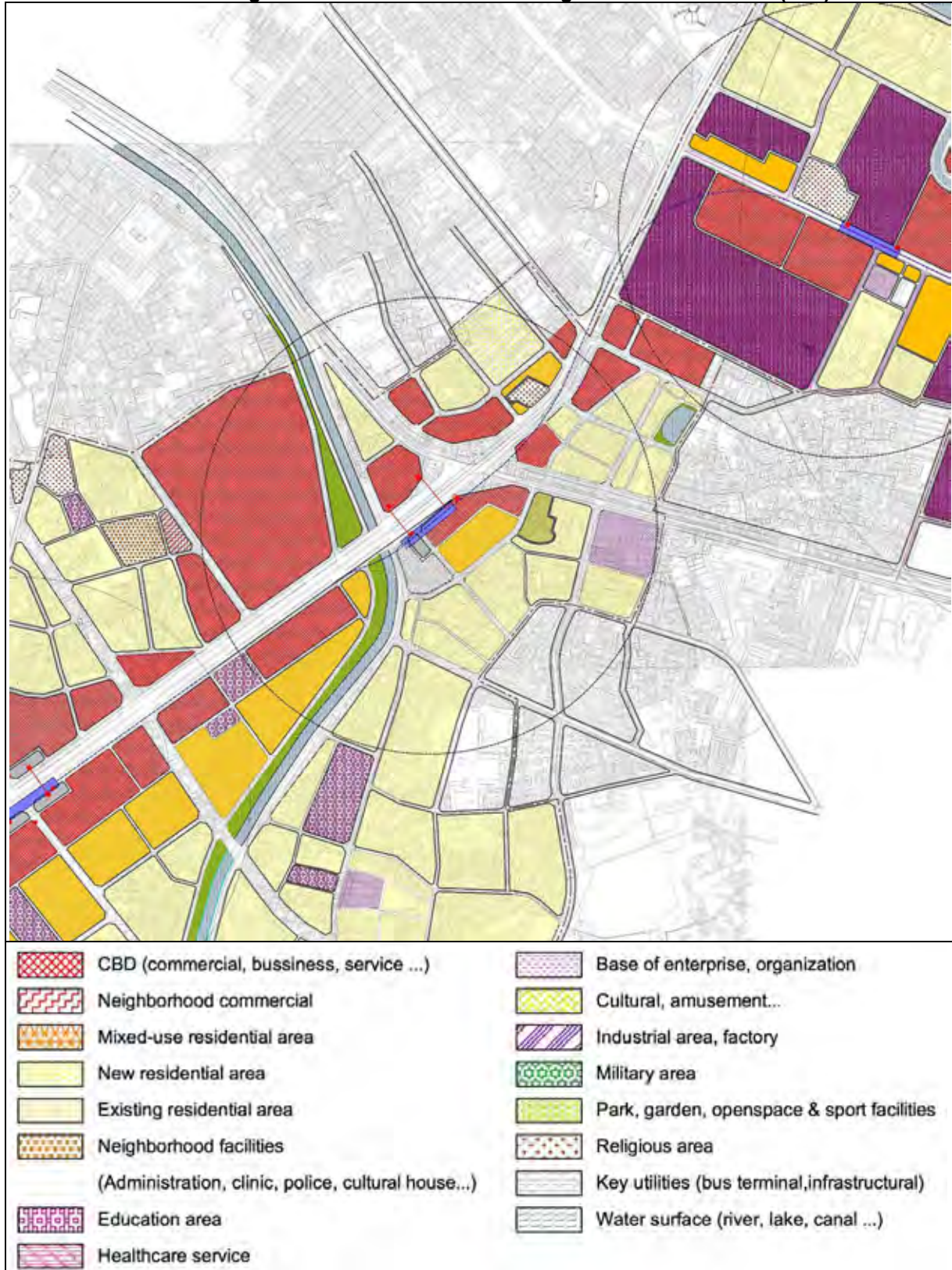
Source: JICA Project Team

**Table 5.31.1 Demand Outlook for Nga Tu So Station Area (C15)**

|   |            | Present | UMRT with integrated Urban Development |        |
|---|------------|---------|--|--------|
|   |            |         | Without                                | With   |
| Population of Station Area of radius 500m (persons) | Population | 23,022  | 17,700                                 | 17,700 |
|   | Employment | 9,180   | 12,100                                 | 13,700 |
|   | Student    | 6,910   | 6,600                                  | 6,600  |
| Ridership (persons/day)                             |            | -       | 4,030                                  | 6,380  |

Source: JICA Project Team

**Figure 5.31.2 Landuse Plan of Nga Tu So Station Area (C15)**



Source: JICA Project Team



### 5.31.2 Long-Term Plan

5300 The station will be located under the urban redevelopment area of Nga Tu So Market at present. It is proposed that the entrance will be directly connected to new facility or development area. The north station entrance will be connected to a pedestrian underground of Nga Tu So intersection.

5301 Most of industrial areas at present have been planned for commercial redevelopment area already. These urban redevelopment projects need to be integrated with UMRT development in terms of accessibility improvement and commercial and service development. Pedestrian and green network along river and trunk roads will be formulated.

**Figure 5.31.3 Long-term Concept Plan of Nga Tu So Station Area (C15)**



Source: JICA Project Team

**Table 5.31.2 Project Component for Integrated Urban Development of Nga Tu So Station Area (C15)**

| Category                       | ID    | Projects/Program                                 | Scale/<br>Area | Implementation Body |         |     | Phase     |
|--------------------------------|-------|--|----------------|---------------------|---------|-----|-----------|
|                                |       |  |                | Public              | Private | PPP |           |
| Road and Walkway               | TR-1  | Integration of Underpass Network                 | 100m           | ●                   | --      | --  | short     |
| Feeder Service                 | FS-1  | Bus Stop Station Facilities and Route Service    | 2unit          | --                  | ●       | --  | short     |
|                                | FS-2  | Taxi & Xe-om Stop Station Facilities and Service | 2unit          | --                  | ●       | --  | short     |
| Urban Redevelopment            | UR-1  | Cau Moi Commercial Center (planned)              | 1.4ha          | ●                   | --      | ○   | Short-mid |
| Urban Renovation Promotion     | RP-1  | Star City Sports Center Area Consolidation       | 1 ha           | --                  | ●       | --  | Mid-long  |
| Living Environment Improvement | LEI-1 | Cau Moi Community Improvement                    | 1ha            | ●                   | --      | ○   | Mid-long  |

Source: JICA Project Team

### 5.31.3 Issues to be Clarified

5302 Adjustment of station location (short-term): The Feasibility Study Team of Phase2 of Line2 proposed alternative station locations, which assess from viewpoints of technical condition and resettlement. It is necessary to consider the station location in terms of accessibility of pedestrian and bus users, and a potential for urban development. JICA Project Team recommends the station location will be under or neary the intersection of Thuong Chinh Street and Nguyen Trai Street, which are transport node of south-west suburban area of the city.

5303 Connection to pedestrian underground of Nga Tu So Intersection (short-term): It is necessary to study if station entrance will be connected to pedestrian underground from physical, technical and financial viewpoints.

5304 Coordination with urban redevelopment projects (short& mid-term): Station will be located under the urban redevelopment area, so it is necessary to coordinate the project how to connect a station and new facilities in planning level. It is recommended to propose private developers to develop a pedestrian underground and service facilities from station to these facilities with private finance.



### 5.32 Summary of Construction Cost

5305 Table 5.32.1 shows overall construction cost of short-term of Phase1 stations including projects of category A and B.

5306 Total project cost includes (i) construction cost and (ii) land acquisition cost. Land acquisition cost will be estimated and total project cost will be proposed in Draft Final Report.

**Table 5.32.1 Summary of Construction Cost of Short-term (Preliminary)**

| ID  | Station Name                    | Estimated Project Cost (000US\$) |               |         |
|-----|---------------------------------|----------------------------------|---------------|---------|
|     |                                 | A. Minimum                       | B. Short-term | Total   |
| V4  | Gia Lam                         | 9,700                            | 1,200         | 10,900  |
| V5  | Bac Cau Long Bien               | 5,900                            | 3,900         | 9,800   |
| V6  | Nam Cau Long Bien               | 85,100 <sup>1)</sup>             | 36,100        | 121,200 |
| V7  | Phung Hung                      | 1,600                            | 1,100         | 2,700   |
| V8  | Hanoi                           | 11,500                           | 2,700         | 14,200  |
| V9  | C.V. Thong Nhat                 | 6,800                            | 1,000         | 7,800   |
| V10 | B.V. Bach Mai                   | 3,300                            | 0             | 3,300   |
| V11 | Phuong Liet                     | 4,900                            | 2,200         | 7,100   |
| V12 | Giap Bat                        | 10,300                           | 8,000         | 18,300  |
| V16 | Ngoc Hoi                        | 1,400                            | 300           | 1,700   |
| C1  | Nam Thang Long                  | 5,100                            | 2,100         | 7,200   |
| C2  | Ngoai Giao Doan                 | 5,900                            | 1,100         | 7,000   |
| C3  | Tay Ho Tay                      | 10,800                           | 2,100         | 12,900  |
| C4  | Buoi                            | 7,100                            | 800           | 7,900   |
| C5  | Quan Ngua                       | 47,500 <sup>2)</sup>             | 1,000         | 48,500  |
| C6  | Bach Thao                       | 4,000                            | 400           | 4,400   |
| C7  | Ho Tay                          | 9,200                            | 600           | 9,800   |
| C8  | Hang Dau                        | (see V6)                         | (see V6)      | 0       |
| C9  | Hoan Kiem Lake                  | 900                              | 3,500         | 4,400   |
| C10 | Tran Hung Dao                   | 39,400 <sup>2)</sup>             | 2,900         | 42,300  |
| V   | Subtotal of Line1 <sup>3)</sup> | 138,900                          | 55,400        | 197,300 |
| C   | Subtotal of Line2               | 129,900                          | 14,500        | 144,400 |

Source: JICA Project Team

1) It is included the cost of underground parking space, which is planned by HPC.

2) It is included the cost of underground concourse to connect 2 lines of UMRT.

3) The construction cost of Phung Hung Station is excluded from the subtotal of Line1.





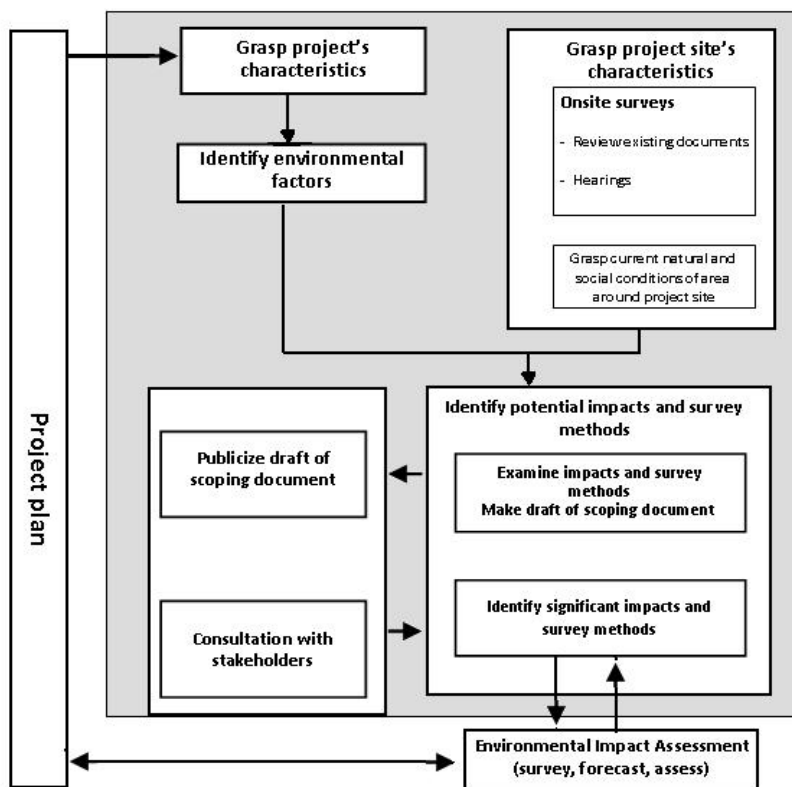
## 6 INITIAL ENVIRONMENTAL EXAMINATION

### 6.1 Objectives and Approaches

601 Scoping is generally known as a process for determining the issues to be addressed, the information to be collected, and the analysis required to assess the environmental impacts of a project. For the development projects of the station areas of Hanoi UMRT Line 1 and Line 2, the preliminary environmental scoping is carried out by applying the method shown in Figure 6.1.1 which involves 3 basic steps as followings:

- (i) Identifying the environmental indicators: Existing documents, such as Preparatory Study Report, F/S reports of the UMRT Line 1 and Line 2, HAIDEP Reports, etc., are referred to as sources of information to grasp characteristics of the development projects of the station areas. In addition, field reconnaissance surveys are also carried out to grasp the natural and socio-economic characteristics of the areas adjacent to the project sites. Hearings to stakeholders, as well as hearings to key persons (such as researchers of universities, staffs of local agencies, local NGOs, tourist offices, local well-informed persons, etc.) are also planned for this purpose.
- (ii) Preparing the development scenario and identifying the range of activities that will be involved in subprojects: Reports made by other members of the HAIMUD Study Team are referred to grasp components and subprojects of the station development projects. Factors, structures, and activities planned by the subprojects which may cause impacts to natural environment and local society during the stages of pre-construction (design), construction, and operation, are identified and listed up.
- (iii) Identifying the environmental issues: This step takes inventory of the potential impacts which are likely to arise, without considering the magnitude or importance of the impacts. The Scoping Checklist attached in the “Manual on Environmental Considerations for Transportation Technical Cooperation – Railway” (issued in 2004 by Japan Transport Cooperation Association and Japan Railway Technical Service) is referred to as inventory of potential impacts. Consultations and discussions with relevant experts, responsible agencies, and relevant communities are also contributable to this work. The next following step is aimed at eliminating or excluding those potential impacts which are considered irrelevant or unimportant, in order to produce a list of the possible significant impacts which are considered important and relevant for study in detail in the EIA. The list of significant impacts is prepared based on the matters considered important by communities in the vicinity of the stations, responsible agencies and experts.

**Figure 6.1.1 Scoping Flowchart**



Source: JICA Project Team

602 Table 6.1.1 shows an environmental scoping checklist that lists up all potential impacts likely caused by a development project of railway station and its surrounding areas. This table is made based mainly on the Scoping Checklist attached in the “Manual on Environmental Considerations for Transportation Technical Cooperation – Railway” (issued in 2004 by Japan Transport Cooperation Association and Japan Railway Technical Service).

603 Development components (i.e. the project’s characteristics) of each station area development plan are confirmed based on the Station Area Development Concept Plans. These development components may cause various impacts to natural environment and local communities surrounding the project areas.



**Table 6.1.1 Scoping Checklist for a UMRT Station Development Project**

| Potential impact                  |  | Description of impact  |
|-----------------------------------|--|--|
| <b>Socio-economic environment</b> |  |  |
| 1                                 | Involuntary resettlement                             | The projects to construct the station facilities, access roads, and develop the areas around the stations may have to acquire some lots of land, and it will cause the need of involuntary resettlement.   |
| 2                                 | Local economy such as employment and livelihood      | Business activities of shops, hotels, factories, companies, etc. located close to the planned stations may be disturbed temporarily during the construction phase. After the completion of construction works, lands and properties around the new stations may be developed and business activities around the newly-constructed stations may become more active. Since a great portion of residents living around the planned stations would have business activities as main source of income, the projects to develop the areas around the stations may help improve their livelihoods and living standards. |
| 3                                 | Land use and utilization of local resources          | Land use pattern surrounding the stations may significantly change. Agricultural lands and/or residential lands may be developed to urbanized land with higher population density and more active business activities.   |
| 4                                 | Split of communities                                 | Split of communities may be caused by the at-grade station. Development of new station may bring divisions of cultural, economic areas.  |
| 5                                 | Existing social infrastructures and services         | The railway and station may cause interception of road usually used by students to go to schools, traffic congestion, noise, traffic accidents, etc. to existing schools, hospitals, or other public facilities.   |
| 6                                 | The poor, indigenous and ethnic people               | If ethnic minorities and indigenous peoples are living in the project areas, considerations to avoid and/or reduce impacts on their culture and lifestyle should be taken.   |
| 7                                 | Misdistribution of benefit and damage                | The project may cause unequal distribution of development benefits, by increasing income disparities among groups brought by development, leading to the relative impoverishment of the economically weak.   |
| 8                                 | Cultural heritage                                    | The construction of the stations and the development of its surrounding areas may cause damages to the existing cultural and historical sites and establishments, archaeological sites and artifacts buried in the project areas. Continuous vibration caused by the operation through the underground sections may create impacts on the old cultural and historical sites and establishments.  |
| 9                                 | Local conflict of interests                          | Conflict among communities and peoples refers to friction due to conflicting interests between beneficiaries and non-beneficiaries, people in favor of and those against development, people resettling near the station and those resettling far from the station, etc.   |
| 10                                | Water usage or water rights and rights of common     | The impacts on water rights or rights of commons, such as the obstruction of fishing rights, rights covering water usage or mountainous forest commonage, will occur due to the loss of these rights after the accomplishment of projects.   |
| 11                                | Sanitation   | Health risks including disease hazards may occur due to lack of sanitation facilities (water supply and human waste disposal). Organic wastes generated from the construction sites during construction phase may cause water-transmitted diseases and affect health of local citizens.  |
| 12                                | Hazards (risk), infectious diseases such as HIV/AIDS | Heavy rains and typhoons during the operational stage can increase the possibility of the occurrence of natural hazards such as floods and cave-ins. In addition, during the construction phase, a number of mobile workers/ drivers may be hired to work for the project, and there may be high risk of increase in social evil activities and outbreaks of infectious diseases such as malaria, dengue and HIV/AIDS.   |
| <b>Natural Environment</b>        |  |  |
| 13                                | Topography and geographical features                 | Reformation of topographical and geological areas by excavation works or banking of soil may cause significant impacts to topographical and geological conditions. Hanoi is susceptible to flooding, and there are risks of flood during construction and operation phases.  |
| 14                                | Groundwater  | The impact on the shallower aquifer caused by construction activities and existence of underground establishments may be significant. Changes in groundwater movement and level may affect the surrounding environment such as utilization of water resources, ecosystems and increase potential of ground subsidence. Leakage of groundwater at construction sites and excessive pumping of groundwater during the construction phase may cause the decline of groundwater level and lead to serious damages to the adjacent  |

|                  |  |   |
|------------------|--|---|
|                  |  | structures.   |
| 15               | Soil erosion   | During the construction phase, unless suitable counter-measures are taken, the surface soil will be washed away by rain after land reclamation works and deforestation. Run off from unprotected excavated areas, and underground tunnel faces can result in excessive soil erosion, especially when the erodability of soil is high. Exposure of loose soil to rain water will increase turbidity in the run-off, especially during the rainy season.  |
| 16               | Hydrological situation                                   | Factors related to hydrological situation, such as the changes in flow volume and the riverbeds due to land reclamation or the changes in the flow of its drainage, will affect lakes, marshes, lagoons and rivers. The cut and cover method for station construction may change groundwater level. It may lead to the drying of wells, land subsidence and damages on establishments, decrease of water level in lakes and impact on ecosystems.   |
| 17               | Coastal zone (mangroves, coral reefs, tidal flats, etc.) | Factor related to coastal zone, such as coastal erosion and the decrease of coastal biodiversity due to land reclamation or to the changes in sea current, will be caused largely by the development projects implemented in or near the coastal zone.  |
| 18               | Flora, fauna and biodiversity                            | Contaminated drainage, dust, noise, vibration, etc. generated from the construction activities may cause impacts on fauna and flora systems around the project areas. Additionally, the construction activities may lead to the removal of a certain number of green trees and damage condition of the others. Underground establishments may disturb groundwater movement and affect the water environment in the lakes. Continuous vibration caused by the operation activities may also damage fauna and flora systems of the lakes. Vibration is expected to cause fluctuation of wave motion in the lakes. These changes of the aquatic environment may affect and frighten the living creatures in the lakes.   |
| 19               | Meteorology  | Meteorological impacts including changes in temperature or wind due to large-scaled reclamation will be rare for the railway station development projects.  |
| 20               | Landscape  | The construction activities and newly-established station facilities and viaducts may cause visual impacts on the scenery of the vicinities. Especially, the construction of bridges could bring topographic changes and, as a result, destruction of landscape /scenery of its vicinities. Beautiful old trees, rare trees, or century-old trees along the roads may be removed to make land for the stations.   |
| 21               | Global warming   | Construction machineries, transportation vehicles, etc would cause additional global warming by emitting greenhouse gases when using fossil fuels, burning of biomass. Large scale urbanization may contribute to the global warming by using carbon-based electricity in street lighting, driving motor vehicles, cooking, and the lighting, heating and cooling of housing.   |
| <b>Pollution</b> |  |   |
| 22               | Air pollution  | During the construction phase, the operation of construction machineries and transportation vehicles will affects the ambient air quality of adjacent residential areas by emitting pollutants. The magnitude of the pollution will depend on the types of equipment and the length of time the equipment is used. On the other hand, the air pollution during the operation phase of the railway is negligible.  |
| 23               | Water pollution  | Contaminated drainage from the construction activities may pollute surface water quality around the project areas, and cause damages to the ecosystems around the project sites. Chemical grouting methods for ground improvement at the underground sections may contaminate groundwater quality. Discharged water including sewage from the stations may also cause deterioration of water quality of the vicinities.   |
| 24               | Soil contamination                                       | During the construction phase, impacts on soil may be generated by: (i) poorly managed disposal of excess earthworks, (ii) loss of topsoil, (iii) damage to temporarily acquired land, (iv) failure to rehabilitate borrow areas, (v) soil erosion and siltation, and (vi) contamination by fuel and lubricants. During the operational phase, damage to soil could result from the spillage of hazardous wastes and materials, including hydrocarbons from the stations.   |
| 25               | Waste (including waste soil)                             | During the construction phase, generated solid wastes will consist of (i) domestic and construction waste from work camps, (ii) hazardous waste from worksites, and (iii) large quantities of spoil (construction waste, excavated waste soil, etc) generated from the demolition of old stations, existing rail tracks, etc, and from the construction of shield tunnels and stations. These wastes may cause adverse impacts on public health conditions and water quality. Dumping of construction spoils (concrete, bricks), waste materials (from construction camps) etc. may contaminate surface water and groundwater. Domestic wastes from labor camps can lead to soil pollution, and may contaminate the lands, rivers, marshes, lagoons and seacoasts around the project areas. Pollution risks may |



|    |                               |  |
|----|-------------------------------|--|
|    |                               | also arise from accidental leakage and spillage of oil or fuel, which may contaminate soil. Hazardous wastes (such as paints and petrochemicals) may be generated during both the construction phase and operation phase. Accidental spills of these hazardous wastes may cause significant adverse impacts to soil, groundwater, and adjacent water bodies. During the operation phase, wastes from the stations including garbage, rubbish, and floor sweepings etc. are main sources of pollutant.  |
| 26 | Noise and vibration           | During the construction phase, main potential noise impacts may be noise from vehicles, plant, and earthmoving equipment. Due to the high noise levels of construction machinery, the personnel operating the machines and the workers stationed close to the machines are prone to exposure of high levels of noise. During the operation phase, the main sources of noise are wheel-rail interaction, electric generator and miscellaneous noise from rolling stock. The ambient noise in railways increases with train speed. The roughness of the contact surfaces of rail, wheel and train speeds are the main factors influencing the magnitude of rail wheel noise. During the construction phase, vibrations generated by the operation of heavy earthmoving equipment may cause damage to the near-by structures, buildings, etc. During the operation phase, vibrations caused by the moving trains may give significant impact to residential houses, hospitals, schools, and other sensitive structures along the track. |
| 27 | Ground subsidence             | The ground subsidence may be induced by the construction activities, i.e. the cut and cover method and shield method. The decrease of pressure of groundwater caused by an excessive pumping or leakage of groundwater may cause the ground subsidence. Soft ground such as alluvium and clay deposits have a high possibility of ground subsidence. The ground subsidence damages surrounding establishments by cracks, subsidence and inclination of establishments.   |
| 28 | Offensive odor                | Offensive odor may be produced by exhaust gases from vehicles and malodorous substances from wastes, or the eutrophication of the closed surface water created near by the construction sites.   |
| 29 | Bottom sediment               | Settlement of transported sediment in rivers, estuaries, and reservoirs.   |
| 30 | Accidents, traffic congestion | Traffic congestion is already a big concern in Hanoi. It worsens air quality and noise environment. As the roadway will be narrow during the construction activities, traffic congestion may happen very often by different means of transportation (vehicles, construction machines, buses, cars, motorbikes, etc.) and material yards (sand, stones, irons, cements, etc.) around the project sites, especially around the populated areas. Visitors' accessibility to the shops, hotels, and other business entities around the planned stations may be impeded during the construction phase.  |
| 31 | Radio wave interference       | During the operation phase, electromagnetic radiation occurred by moving trains would cause impairment of television reception for residents along the alignment. This results from electromagnetic radiation generated by electricity discharges when the pantograph above the electric locomotive loses contact with the wire. Generally, this causes picture floating, doubling, and intermittent blurring. This can influence an area extending up to 50 m on both sides of the track.   |
| 32 | Sunshine shading              | The elevated stations may cause serious impact to surrounding establishments and lands in term of sunshine shading.  |

## 6.2 Result of Environmental Scoping

604 Result of the preliminary environmental scoping shown in Table 6.2.1 and Table 6.2.2 shall be reviewed and revised after discussions with stakeholders, relevant agencies, etc. And further detailed scoping will be carried out for selected priority station areas, after the relevant development plans are formulated.

**Table 6.2.1 Result of Environmental Examination of Line 1 Stations**

| UMRT                              |  | Line 1   |           |           |         |           |         |         |            |        |                      |          |             |          |            |          |            |          |
|-----------------------------------|--|----------|-----------|-----------|---------|-----------|---------|---------|------------|--------|----------------------|----------|-------------|----------|------------|----------|------------|----------|
| Station Number                    |  | 1        | 2         | 3         | 4       | 5         | 6       | 7       | 8          | 9      | 10                   | 11       | 12          | 13       | 14         | 15       | 16         |          |
| Station Name                      |  | Yen Vien | Cau Duong | Duc Giang | Gia Lam | Long Bien | Bac Cau | Nam Cau | Phung Hung | Ha Noi | Cong vien Thong Nhat | Bach Mai | Phuong Liet | Giap Bat | Hoang Liet | Van Dien | Vinh Quynh | Ngoc Hoi |
| <b>Socio-economic environment</b> |  |          |           |           |         |           |         |         |            |        |                      |          |             |          |            |          |            |          |
| 1                                 | Involuntary Resettlement                                 | A        | B         | B         | A       | A         | A       | A       | A          | A      | B                    | B        | B           | B        | B          | -        | B          |          |
| 2                                 | Local economy such as employment and livelihood          | C        | C         | C         | C       | C         | C       | C       | C          | C      | -                    | C        | C           | C        | C          | C        | C          | B        |
| 3                                 | Land use and utilization of local resources              | B        | C         | C         | B       | B         | C       | C       | C          | C      | -                    | C        | C           | C        | C          | C        | C          | B        |
| 4                                 | Community disorganization (split of communities)         | -        | -         | -         | -       | -         | -       | -       | -          | -      | -                    | -        | -           | -        | -          | -        | -          | C        |
| 5                                 | Existing social infrastructures and services             | -        | -         | C         | C       | -         | A       | C       | C          | -      | C                    | -        | -           | -        | -          | -        | -          | -        |
| 6                                 | The poor, indigenous and ethnic people                   | -        | -         | -         | -       | -         | -       | -       | -          | -      | -                    | -        | -           | -        | -          | -        | -          | -        |
| 7                                 | Misdistribution of benefit and damage                    | C        | C         | C         | C       | C         | C       | C       | C          | C      | C                    | C        | C           | C        | C          | C        | C          | -        |
| 8                                 | Cultural heritage  | -        | -         | -         | -       | -         | B       | C       | C          | -      | -                    | -        | -           | -        | -          | -        | -          | -        |
| 9                                 | Local conflict of interests                              | C        | C         | C         | C       | C         | C       | C       | C          | C      | C                    | C        | C           | C        | C          | C        | C          | -        |
| 10                                | Water usage or water rights and rights of common         | -        | -         | -         | -       | -         | -       | -       | -          | -      | -                    | -        | -           | -        | -          | -        | -          | -        |
| 11                                | Sanitation   | A        | A         | A         | A       | A         | A       | A       | A          | B      | B                    | B        | B           | B        | B          | B        | B          | B        |
| 12                                | Hazards (risk), infectious diseases such as HIV/AIDS     | B        | B         | B         | B       | B         | B       | B       | B          | B      | B                    | B        | B           | B        | B          | B        | B          | B        |
| <b>Natural Environment</b>        |  |          |           |           |         |           |         |         |            |        |                      |          |             |          |            |          |            |          |
| 13                                | Topography and Geographical features                     | -        | -         | -         | -       | -         | -       | -       | -          | -      | -                    | -        | -           | -        | -          | -        | -          | -        |
| 14                                | Groundwater  | -        | -         | -         | -       | -         | -       | -       | -          | -      | -                    | -        | -           | -        | -          | -        | -          | -        |
| 15                                | Soil Erosion   | -        | -         | -         | B       | -         | -       | -       | -          | -      | -                    | -        | -           | -        | -          | -        | -          | -        |
| 16                                | Hydrological Situation                                   | B        | -         | -         | -       | -         | -       | -       | -          | -      | -                    | -        | -           | B        | -          | -        | -          | B        |
| 17                                | Coastal zone (mangroves, coral reefs, tidal flats, etc.) | -        | -         | -         | -       | -         | -       | -       | -          | -      | -                    | -        | -           | -        | -          | -        | -          | -        |
| 18                                | Flora, Fauna and Biodiversity                            | -        | -         | -         | -       | -         | -       | -       | -          | -      | -                    | -        | -           | -        | -          | -        | -          | -        |
| 19                                | Meteorology  | -        | -         | -         | -       | -         | -       | -       | -          | -      | -                    | -        | -           | -        | -          | -        | -          | -        |
| 20                                | Landscape  | -        | -         | -         | -       | -         | C       | -       | -          | -      | -                    | -        | -           | -        | -          | -        | -          | -        |
| 21                                | Global Warming   | -        | -         | -         | -       | -         | -       | -       | -          | -      | -                    | -        | -           | -        | -          | -        | -          | -        |
| <b>Pollution</b>                  |  |          |           |           |         |           |         |         |            |        |                      |          |             |          |            |          |            |          |
| 22                                | Air Pollution  | A        | A         | A         | A       | A         | A       | A       | A          | A      | A                    | A        | A           | A        | A          | A        | B          | B        |
| 23                                | Water Pollution  | A        | A         | A         | A       | A         | A       | A       | A          | A      | A                    | A        | A           | A        | A          | A        | B          | B        |
| 24                                | Soil Contamination                                       | A        | A         | A         | B       | B         | A       | A       | A          | A      | A                    | A        | A           | A        | A          | A        | B          | B        |
| 25                                | Waste (including waste soil)                             | A        | A         | A         | B       | B         | A       | A       | A          | A      | A                    | A        | A           | A        | A          | A        | B          | B        |
| 26                                | Noise and Vibration                                      | B        | B         | B         | B       | B         | B       | B       | B          | B      | A                    | B        | B           | B        | B          | B        | B          | B        |
| 27                                | Ground Subsidence  | -        | -         | -         | -       | -         | -       | -       | -          | -      | -                    | -        | -           | -        | -          | -        | -          | -        |
| 28                                | Offensive Odor   | -        | -         | -         | -       | -         | -       | -       | -          | -      | -                    | -        | -           | -        | -          | -        | -          | -        |
| 29                                | Bottom sediment  | -        | -         | -         | -       | -         | -       | -       | -          | -      | -                    | -        | -           | -        | -          | -        | -          | -        |
| 30                                | Accidents, traffic congestion                            | B        | B         | B         | B       | B         | B       | B       | A          | A      | A                    | A        | A           | A        | A          | A        | B          | B        |
| 31                                | Radio wave interference                                  | B        | B         | B         | B       | B         | B       | B       | A          | B      | A                    | B        | B           | B        | B          | B        | -          | -        |
| 32                                | Sunshine shading   | -        | B         | B         | -       | A         | A       | A       | A          | A      | A                    | A        | B           | B        | B          | B        | -          | -        |

Note A: serious negative impact is expected; B: negative impact is expected to some extent;  
C: extent of impact is unknown, further study is needed; -: limited impact/negligible impact

**Table 6.2.2 Result of Initial Environmental Examination of Line 2 Stations**

| UMRT                              |  | Line 2         |                 |            |      |           |           |        |          |              |               |         |           |          |          |           |             |
|-----------------------------------|--|----------------|-----------------|------------|------|-----------|-----------|--------|----------|--------------|---------------|---------|-----------|----------|----------|-----------|-------------|
| Station Number                    |  | 1              | 2               | 3          | 4    | 5         | 6         | 7      | 8        | 9            | 10            | 11      | 12        | 13       | 14       | 15        | 16          |
| Station Name                      |  | Nam Thang Long | Ngoai Giao Doan | Tay Ho Tay | Buoi | Quan Ngua | Bach Thao | Ho Tay | Hang Dau | Den Ngoc Son | Tran Hung Dao | Cau Den | Bach Khoa | Kim Lien | Chua Boc | Nga Tu So | Thuong Dinh |
| <b>Socio-economic environment</b> |  |                |                 |            |      |           |           |        |          |              |               |         |           |          |          |           |             |
| 1                                 | Involuntary Resettlement                                 | B              | -               | -          | -    | B         | B         | B      | B        | -            | A             | C       | -         | -        | A        | A         | A           |
| 2                                 | Local economy such as employment and livelihood          | C              | -               | -          | C    | C         | C         | C      | C        | C            | C             | C       | C         | C        | C        | C         | C           |
| 3                                 | Land use and utilization of local resources              | C              | C               | C          | C    | C         | C         | -      | C        | C            | C             | C       | C         | C        | C        | C         | C           |
| 4                                 | Community disorganization (split of communities)         | B              | C               | -          | -    | -         | -         | -      | -        | -            | -             | -       | -         | -        | -        | -         | -           |
| 5                                 | Existing social infrastructures and services             | -              | -               | -          | -    | -         | -         | -      | -        | -            | -             | -       | -         | -        | -        | -         | -           |
| 6                                 | The poor, indigenous and ethnic people                   | -              | -               | -          | -    | -         | -         | -      | -        | -            | -             | -       | -         | -        | -        | -         | -           |
| 7                                 | Misdistribution of benefit and damage                    | C              | -               | -          | C    | C         | C         | C      | C        | C            | C             | C       | C         | C        | C        | C         | C           |
| 8                                 | Cultural heritage  | -              | -               | -          | C    | -         | -         | C      | B        | C            | -             | -       | -         | -        | C        | C         | -           |
| 9                                 | Local conflict of interests                              | C              | -               | -          | C    | C         | C         | C      | C        | C            | C             | C       | C         | C        | C        | C         | C           |
| 10                                | Water usage or water rights and rights of common         | -              | -               | -          | -    | -         | -         | -      | -        | -            | -             | -       | -         | -        | -        | -         | -           |
| 11                                | Sanitation   | B              | -               | -          | B    | B         | B         | B      | B        | B            | B             | B       | B         | C        | B        | B         | B           |
| 12                                | Hazards (risk), infectious diseases such as HIV/AIDS     | B              | C               | C          | B    | B         | B         | B      | B        | B            | B             | B       | B         | B        | B        | B         | B           |
| <b>Natural Environment</b>        |  |                |                 |            |      |           |           |        |          |              |               |         |           |          |          |           |             |
| 13                                | Topography and Geographical features                     | -              | -               | -          | -    | -         | -         | -      | -        | -            | -             | -       | -         | -        | -        | -         | -           |
| 14                                | Groundwater  | -              | -               | -          | B    | B         | B         | B      | B        | A            | A             | A       | A         | B        | A        | A         | B           |
| 15                                | Soil Erosion   | -              | -               | C          | B    | B         | B         | B      | B        | A            | A             | A       | A         | B        | B        | B         | B           |
| 16                                | Hydrological Situation                                   | -              | -               | -          | -    | -         | -         | -      | -        | A            | -             | -       | B         | -        | -        | -         | -           |
| 17                                | Coastal zone (mangroves, coral reefs, tidal flats, etc.) | -              | -               | -          | -    | -         | -         | -      | -        | -            | -             | -       | -         | -        | -        | -         | -           |
| 18                                | Flora, Fauna and Biodiversity                            | -              | -               | -          | -    | -         | -         | B      | B        | A            | -             | -       | B         | -        | -        | -         | -           |
| 19                                | Meteorology  | -              | -               | -          | -    | -         | -         | -      | -        | -            | -             | -       | -         | -        | -        | -         | -           |
| 20                                | Landscape  | C              | C               | -          | -    | -         | -         | B      | B        | B            | -             | -       | -         | -        | -        | -         | -           |
| 21                                | Global Warming   | -              | -               | -          | -    | -         | -         | -      | -        | -            | -             | -       | -         | -        | -        | -         | -           |
| <b>Pollution</b>                  |  |                |                 |            |      |           |           |        |          |              |               |         |           |          |          |           |             |
| 22                                | Air Pollution  | B              | B               | B          | B    | B         | B         | A      | A        | A            | A             | A       | B         | B        | B        | B         | B           |
| 23                                | Water Pollution  | B              | B               | B          | B    | A         | A         | A      | A        | A            | A             | A       | A         | B        | A        | A         | B           |
| 24                                | Soil Contamination                                       | B              | B               | B          | B    | B         | B         | A      | A        | A            | A             | A       | A         | B        | A        | A         | B           |
| 25                                | Waste (including waste soil)                             | B              | B               | B          | A    | A         | A         | A      | A        | A            | A             | A       | A         | A        | A        | A         | B           |
| 26                                | Noise and Vibration                                      | B              | -               | -          | B    | B         | B         | B      | B        | B            | B             | B       | B         | B        | B        | B         | B           |
| 27                                | Ground Subsidence  | -              | -               | -          | B    | A         | A         | A      | A        | A            | A             | A       | B         | B        | A        | A         | B           |
| 28                                | Offensive Odor   | -              | -               | -          | -    | -         | -         | -      | -        | -            | -             | -       | -         | -        | -        | -         | -           |
| 29                                | Bottom sediment  | -              | -               | -          | -    | -         | -         | -      | -        | -            | -             | -       | -         | -        | -        | -         | -           |
| 30                                | Accidents, traffic congestion                            | A              | -               | -          | A    | A         | A         | A      | A        | A            | A             | A       | B         | A        | A        | A         | A           |
| 31                                | Radio wave interference                                  | B              | -               | -          | -    | -         | -         | -      | -        | -            | -             | -       | -         | -        | -        | -         | -           |
| 32                                | Sunshine shading   | B              | -               | -          | -    | -         | -         | -      | -        | -            | -             | -       | -         | -        | -        | -         | -           |

Note A: serious negative impact is expected; B: negative impact is expected to some extent; C: extent of impact is unknown, further study is needed; -: limited impact/negligible impact



