

4.3. Concept Plans of Phase1 Station Areas

4.3.1 Bac Cau Long Bien station area (Line1-V5)

4.28 Bac Cau Long Bien Station will be only the station where is easily access to riverside of Red River. Passengers will be able to enjoy scenery of Long Bien Bridge and Red River inside the railway. Integrated with New Town development, it is expected to develop the station area where people enjoy new urban life with valuable structure of Long Bien Bridge and landscape of Red River.

Table 4.22 Demand Outlook of Bac Cau Long Bien Station Area (V5)

| | | Present | UMRT with integrated Urban Development | |
|-----------------------------------------------------|------------|---------|----------------------------------------|-------|
| | | | Without | With |
| Population of Station Area of radius 500m (persons) | Population | 4,119 | 4,800 | 4,800 |
| | Employment | 2,499 | 2,400 | 5,000 |
| | Student | 1,220 | 950 | 950 |
| Ridership (persons/day) | | - | 3,900 | 4,600 |

Source: JICA Project Team

4.29 Issues to be clarified of Bac Cau Long Bien station area are as follows:

- i) Development potential of out of dyke area (short and long -term): The station will develop over the dyke road and out of dyke area. Based on condition of Dyke Ordinance, it is prohibited to develop any types of urban facilities out of dyke. Waterfront park development has a big potential for economic and tourism development in this station area, so it is necessary to clarify development potential of out of dyke area.
- ii) Coordination with Ngoc Thuy New Town Project (short& mid-term): It is expected many residents of new town will use this station as well as Gia Lam station. It is necessary to coordinate with the plan especially for road network to enable effective accessibility to station.
- iii) Preservation and promotion of Long Bien Bridge (short& mid-term): In short-term, it is proposed to use existing railway from Yen Vien station to Nam Cau Long Bien station as a commuting Train. But after the period of UMRT operation, the commuting train will not be necessary. Since Long Bien Bridge is a national cultural heritage of Vietnam, it must be preserved. It is proposed to utilize this bridge for pedestrian for sightseeing and tourism purpose.

Table 4.23 Project List of Bac Cau Long Bien Station Area (V5)

| Project | | | Scale | | Construction Cost (000US\$) | Implementation Body | Financial Resource | |
|------------------------------------|----------|-----------------------------------------------------------------|--------|-----|-----------------------------|---------------------|-----------------------|-----------------------|
| A Minimum development till opening | SF-IM-1 | East intermodal facility | 2,500 | m2 | 135 | 5,894 | VNR/HPC ¹⁾ | VNR/HPC ¹⁾ |
| | SF-SE-1* | Station entrance space | 675 | m2 | 36 | | VNR/HPC ¹⁾ | VNR/HPC ¹⁾ |
| | SF-PD-2* | Pedestrian deck | 180 | m2 | 468 | | VNR/HPC ¹⁾ | VNR/HPC ¹⁾ |
| | SF-EV-1* | Elevator | 2 | No. | 200 | | VNR | VNR |
| | SF-BS-1 | Bus stop | 1 | No. | 5 | | TRAMOC | HPC |
| | RD-NR-1 | Development of new road ²⁾ | 900 | m | 1,530 | | HDOT | HPC |
| | RD-MA-1 | Improvement of main access road | 3,200 | m | 3,520 | | HDOT | HPC |
| B Short-term (opening~3years) | SF-PD-1 | Pedestrian mall and waterfront park | 23,000 | m2 | 1,242 | 3,926 | MONRE | HPC |
| | RD-SW-1 | Improvement of sidewalk | 3,350 | m | 905 | | HDOT | HPC |
| | RD-SW-2 | Improvement of sidewalk | 2,700 | m | 729 | | HDOT | HPC |
| | SF-WR-1 | Pedestrian walkway of Long Bien Bridge ³⁾ | 1,500 | m | 1,050 | | HPC | HPC |
| C Medium-term (3~5years) | ND-1 | Ngoc Thuy New Town development (Phase1) (planned) ⁴⁾ | | | | Private | Private | |
| D Long-term (5~10 years) | ND-2 | Ngoc Thuy New Town development (Phase2) (planned) ⁴⁾ | | | | Private | Private | |
| | UR-1 | Redevelopment of factory area | | | | Private | Private | |

Source: JICA Project Team

Minimum projects with * are prioritized to develop together with station facilities, since land acquisition is not so difficult.

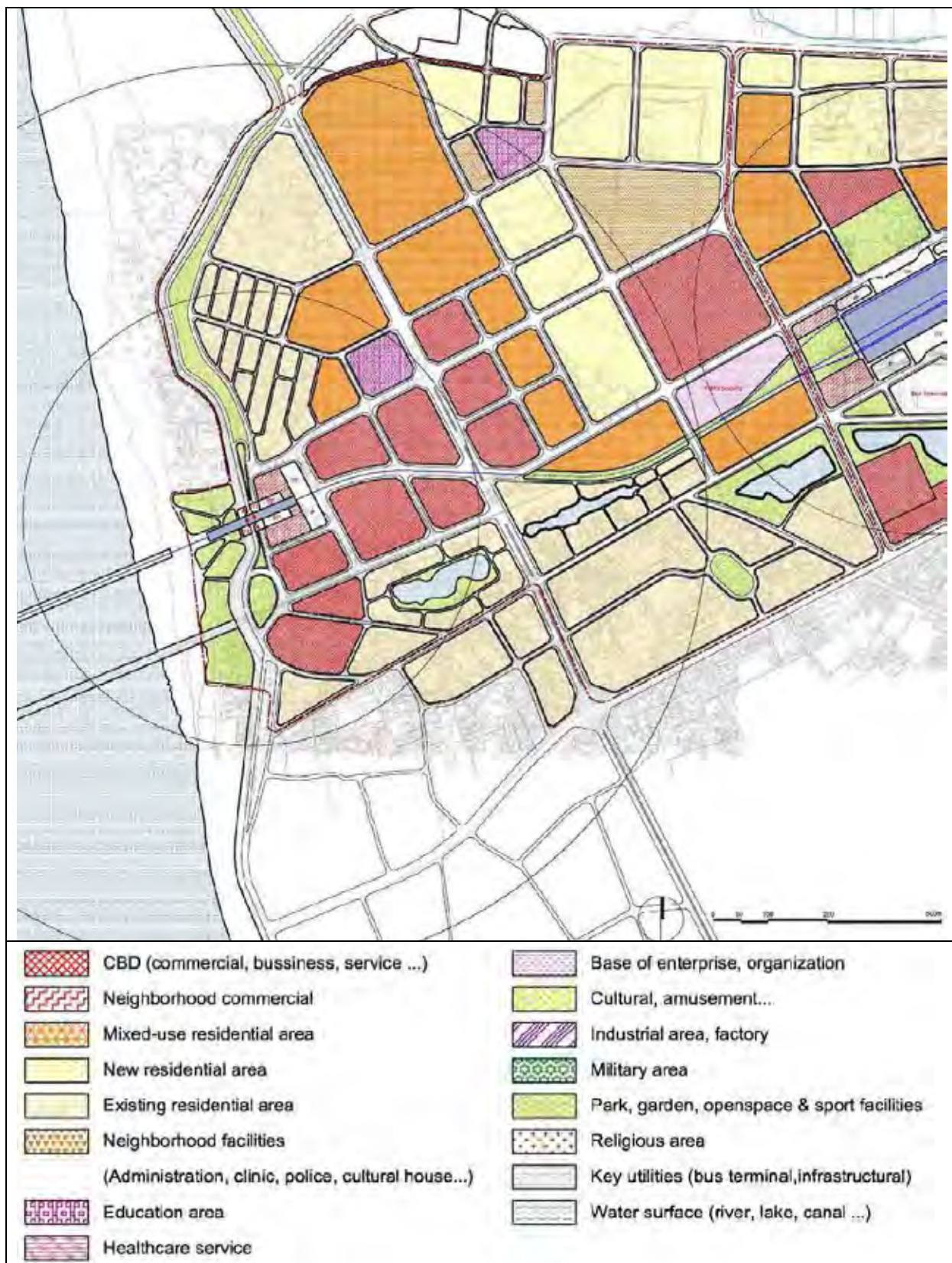
1) It has not been discussed and agreed between VNR and HPC which will be an implementation body and a financial resource for ITF development. JICA Project Team recommends VNR will develop ITF as a station related facility development.

2) It is proposed new road under viaduct will be developed with UMRT railway development.

3) It is proposed Long Bien Bridge will be preserved as a pedestrian walkway for sightseeing and tourism purpose after UMRT development.

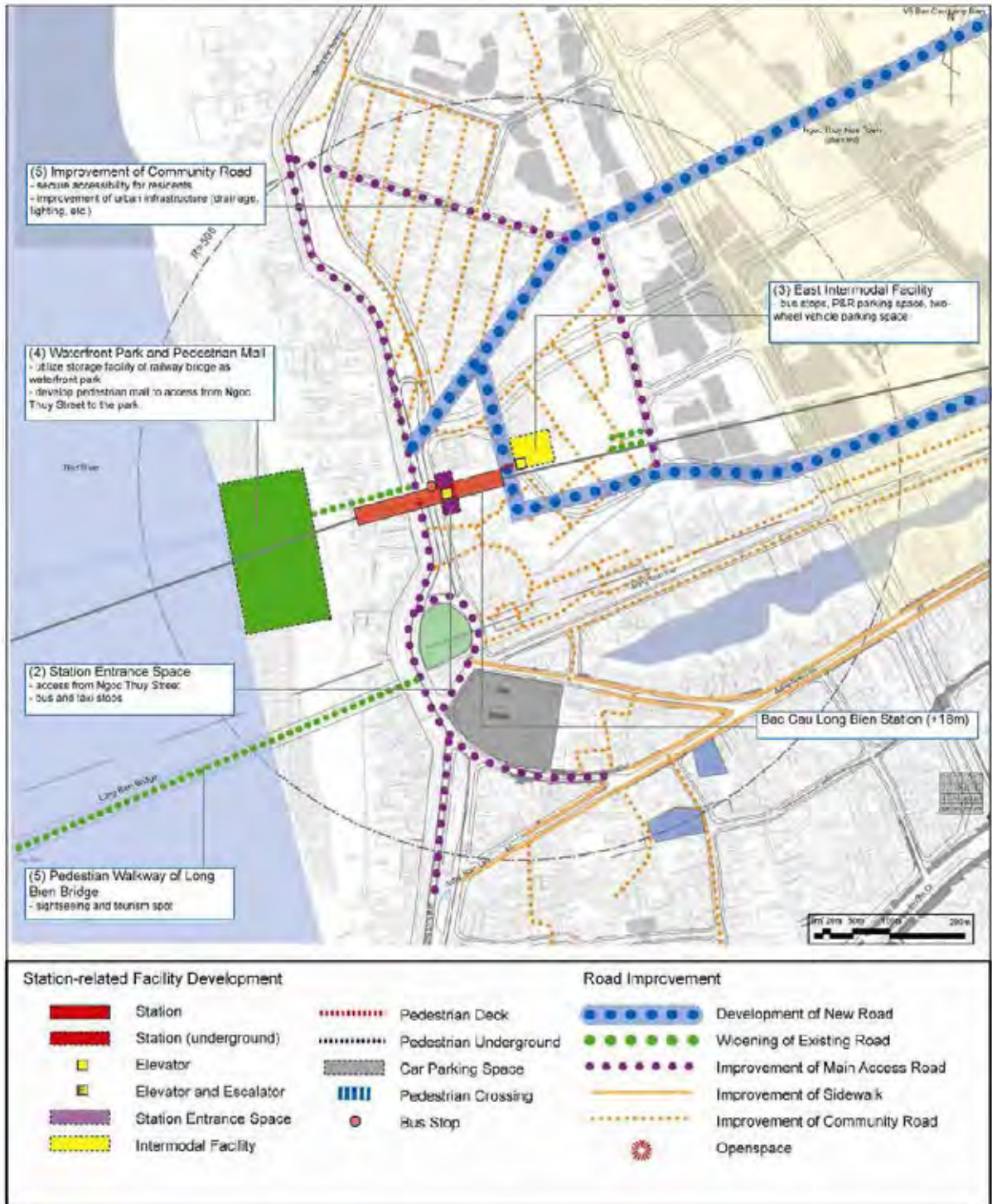
4) It is necessary to consult with HAUPA, District PC and developer to adjust road network, landuse, phasing of new town area.

Figure 4.20 Long-term Concept Plan of Bac Cau Long Bien Station Area (V5)



Source: JICA Project Team

Figure 4.21 Short-term Concept Plan of Bac Cau Long Bien Station Area (V5)



Source: JICA Project Team

4.3.2 Phung Hung station area (Line1-V7)

4.30 Phung Hung Station will be the central station of Ancient Quarter, as well as center of surrounding stations of Hang Dau, Nam Cau Long Bien and Hoan Kiem Lake. Under the station and railway, Phung Hung Street will be served as an outer trunk road of Ancient Quarter, and commercial facilities will be developed along the street. Together with these stations, this station area will create pedestrian friendly commercial area in harmony with modern function and traditional values.

Table 4.24 Demand Outlook of Phung Hung Station Area (V7)

| | | Present | UMRT with integrated Urban Development | |
|-----------------------------------------------------|------------|---------|----------------------------------------|--------|
| | | | Without | With |
| Population of Station Area of radius 500m (persons) | Population | 34,704 | 25,200 | 25,200 |
| | Employment | 20,853 | 32,000 | 35,600 |
| | Student | 5,371 | 4,100 | 4,100 |
| Ridership (persons/day) | | - | 7,800 | 7,410 |

Source: JICA Project Team

4.31 Issues to be clarified of Phung Hung station area are as follows:

- i) Development of trunk road of Phung Hung Street (short-term): To improve Phung Hung Street as an outer road of the Ancient Quarter, it is recommended to utilize the space under the viaduct for traffic purpose. It is necessary coordinate with VNR and Hanoi City.
- ii) Urban redevelopment of Army Library for Station Entrance Space development (long-term): As proposed, to develop station entrance to west side, it is necessary to redevelop urban blocks along Ly Nam De Street. Though many mid-rise housings and apartments as well as Army-related facilities are clustered in this block, it is necessary to identify a suitable location to develop a station entrance.

Table 4.25 Project List of Phung Hung Station Area (V7)

| Project | | | Scale | | Construction Cost (000US\$) | Implementation Body | Financial Resource | |
|------------------------------------|---------------------------------------------|-------------------------------|-------|-----|-----------------------------|---------------------|-----------------------|-----------------------|
| A Minimum development till opening | SF-SE-1* | Station Entrance Space | 875 | m2 | 70 | 1,610 | VNR/HPC ¹⁾ | VNR/HPC ¹⁾ |
| | SF-PD-1* | Pedestrian Deck | 300 | m2 | 780 | | VNR/HPC ¹⁾ | VNR/HPC ¹⁾ |
| | SF-EV-1* | Elevator | 3 | No | 300 | | VNR | VNR |
| | SF-BS-1 | Bus Stop | 5 | No | 25 | | TRAMOC | HPC |
| | SF-PC-1 | Pedestrian Crossing | 1 | No | 10 | | HDOT | HPC |
| | SF-PC-2 | | 1 | No | 10 | | HDOT | HPC |
| | SF-PC-3 | | 1 | No | 10 | | HDOT | HPC |
| | SF-PC-4 | | 1 | No | 10 | | HDOT | HPC |
| | SF-PC-5 | | 1 | No | 10 | | HDOT | HPC |
| RD-WR-1* | Widening of Phung Hung Street ²⁾ | 550 | m | 385 | HDOT | HPC | | |
| B Short-term (opening~3years) | RD-SW-1 | Improvement of Sidewalks | 1,350 | m | 365 | 1,080 | HDOT | HPC |
| | RD-SW-2 | | 1,780 | m | 481 | | HDOT | HPC |
| | RD-CR-1 | Improvement of Community Road | 560 | m | 235 | | HDOT | HPC |

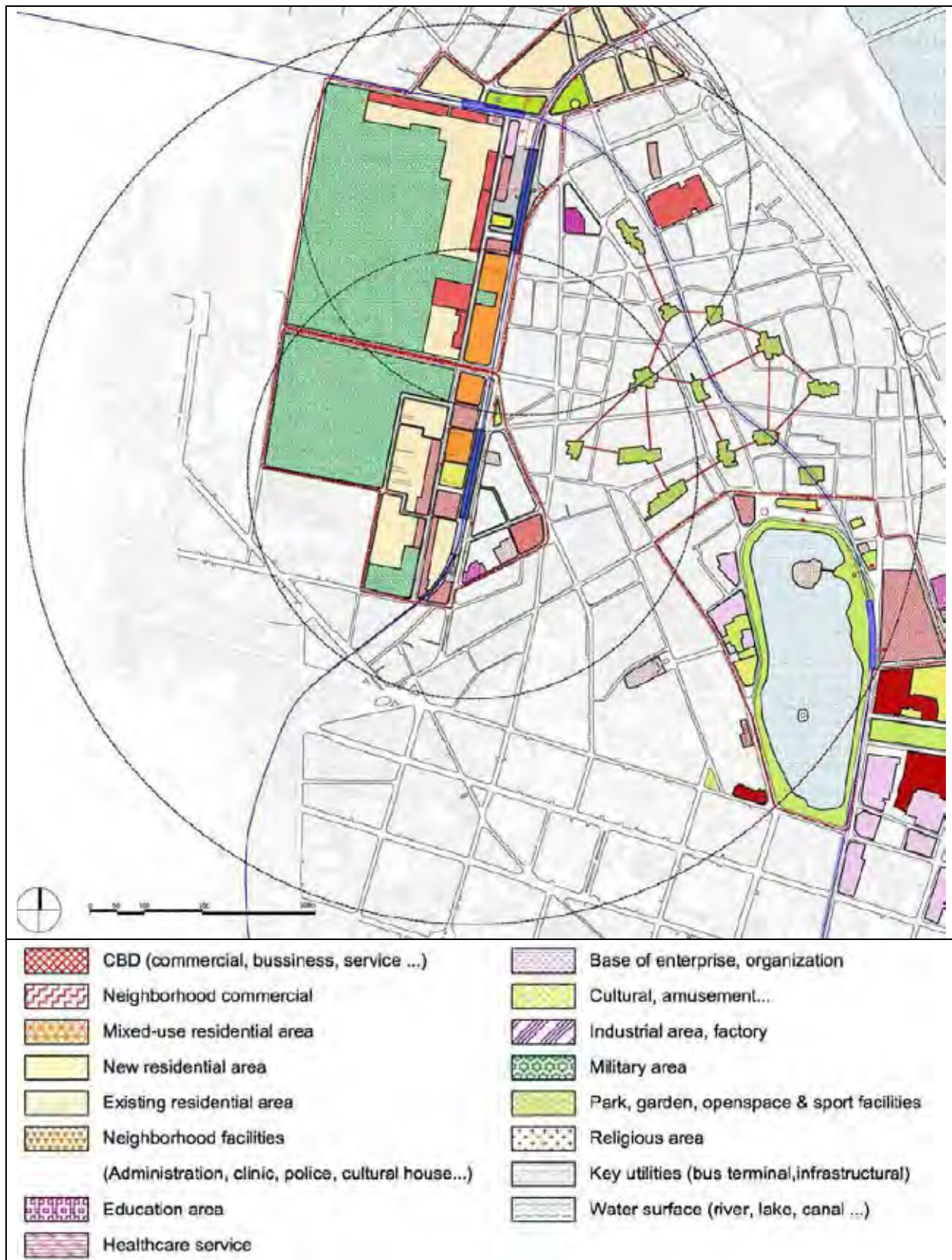
Source: JICA Project Team

Minimum projects with * are prioritized to develop together with station facilities, since land acquisition is not so difficult.

1) It has not been discussed and agreed between VNR and HPC which will be an implementation body and a financial resource for station entrance space development. JICA Project Team recommends VNR will develop it as a station related facility development.

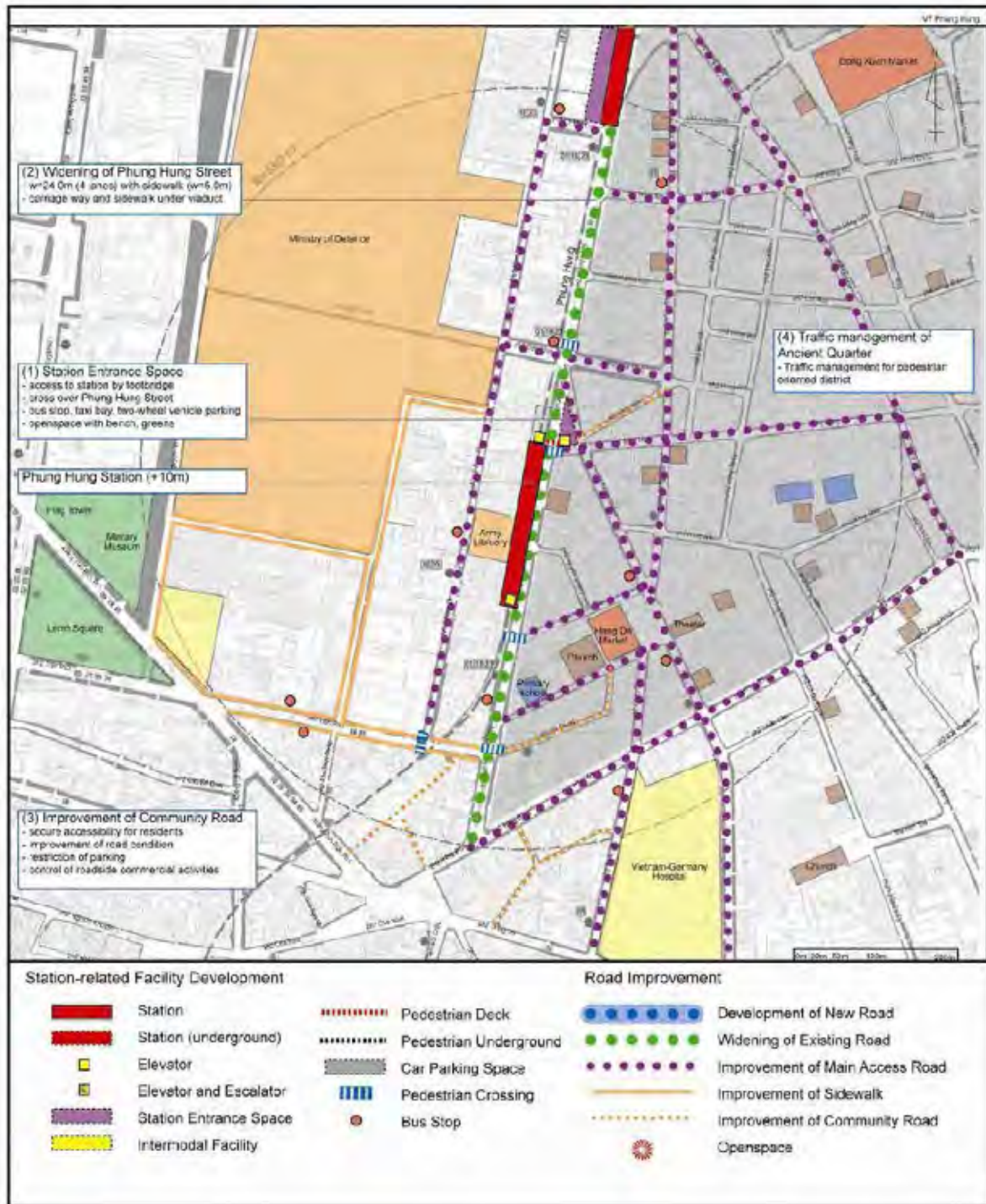
2) It is proposed Phung Hung Street will be widened within the width of ROW with UMRT railway development

Figure 4.22 Long-term Concept Plan of Phung Hung Station Area (V7)



Source: JICA Project Team

Figure 4.23 Short-term Concept Plan of Phung Hung Station Area (V7)



Source: JICA Project Team

4.3.3 B.V. Bach Mai station area (Line1-V10)

4.32 To develop this area as a “Medical and Educational District of Hanoi”, Bach Mai Station area development has a significant role to connect medical and traditional residential area of west and high-class educational and modern commercial area of east into integrated new urban area. It is expected station area development will create opportunities for patients to go out and around, and for university students to promote various entrepreneurship activities as well as welfare activities.

Table 4.26 Demand Outlook of B.V. Bach Mai Station Area (V10)

| | | Present | UMRT with integrated Urban Development | |
|-----------------------------------------------------|------------|---------|----------------------------------------|--------|
| | | | Without | With |
| Population of Station Area of radius 500m (persons) | Population | 24,044 | 19,100 | 19,100 |
| | Employment | 10,224 | 13,700 | 14,400 |
| | Student | 24,078 | 12,600 | 12,600 |
| Ridership (persons/day) | | - | 12,800 | 7,500 |

Source: JICA Project Team

4.33 Issues to be clarified of B.V. Bach Mai station area are as follows:

- i) Development of access road inside urban facility sites (short-term): Since most of station area within 500m are occupied by hospitals and universities, it is proposed to develop access roads inside these sites for safe and short access to station. It is necessary to coordinate with urban facility owners.
- ii) Urban redevelopment of urban facilities (long-term): Urban redevelopment projects should be integrated with station area development. To strengthen socio-economic impacts, station function should be improved gradually.

Table 4.27 Project List of B.V. Bach Mai Station Area (V10)

| Project | | | Scale | | Construction Cost (000US\$) | | Implementat ion Body | Financial Resource |
|------------------------------------|----------|---------------------------------------------------------------|-------|----|-----------------------------|------------------|-----------------------|-----------------------|
| A Minimum development till opening | SF-SE-1 | Station Entrance Space | 1,000 | m2 | 80 | 3,276 | VNR/HPC ¹⁾ | VNR/HPC ¹⁾ |
| | SF-SE-2* | Station Entrance Space inside Bach Mai Hospital ²⁾ | 1,200 | m2 | 96 | | VNR/HPC ¹⁾ | VNR/HPC ¹⁾ |
| | SF-PD-1* | Pedestrian Deck | 240 | m2 | 624 | | VNR/HPC ¹⁾ | VNR/HPC ¹⁾ |
| | SF-PD-2* | Pedestrian Deck | 210 | m2 | 546 | | VNR/HPC ¹⁾ | VNR/HPC ¹⁾ |
| | SF-EV-1* | Elevator | 5 | No | 500 | | VNR | VNR |
| | SF-BS-1 | Bus Stop | 8 | No | 40 | | TRAMOC | HPC |
| | RD-WR-1* | Widening of Giai Phong Street ³⁾ | 1,200 | m | 840 | | HDOT | HPC |
| | RD-MA-1 | Improvement of Main Access Road | 500 | m | 550 | | HDOT | HPC |
| B Short-term (opening~3years) | RD-SW-1 | Improvement of Sidewalks | 8,000 | m | 2,160 | 2,160 | HDOT | HPC |
| D Long-term (5~10 years) | UR-1 | Redevelopment of Bach Mai Hospital | - | | | Hospital/Private | Private | |

Source: JICA Project Team

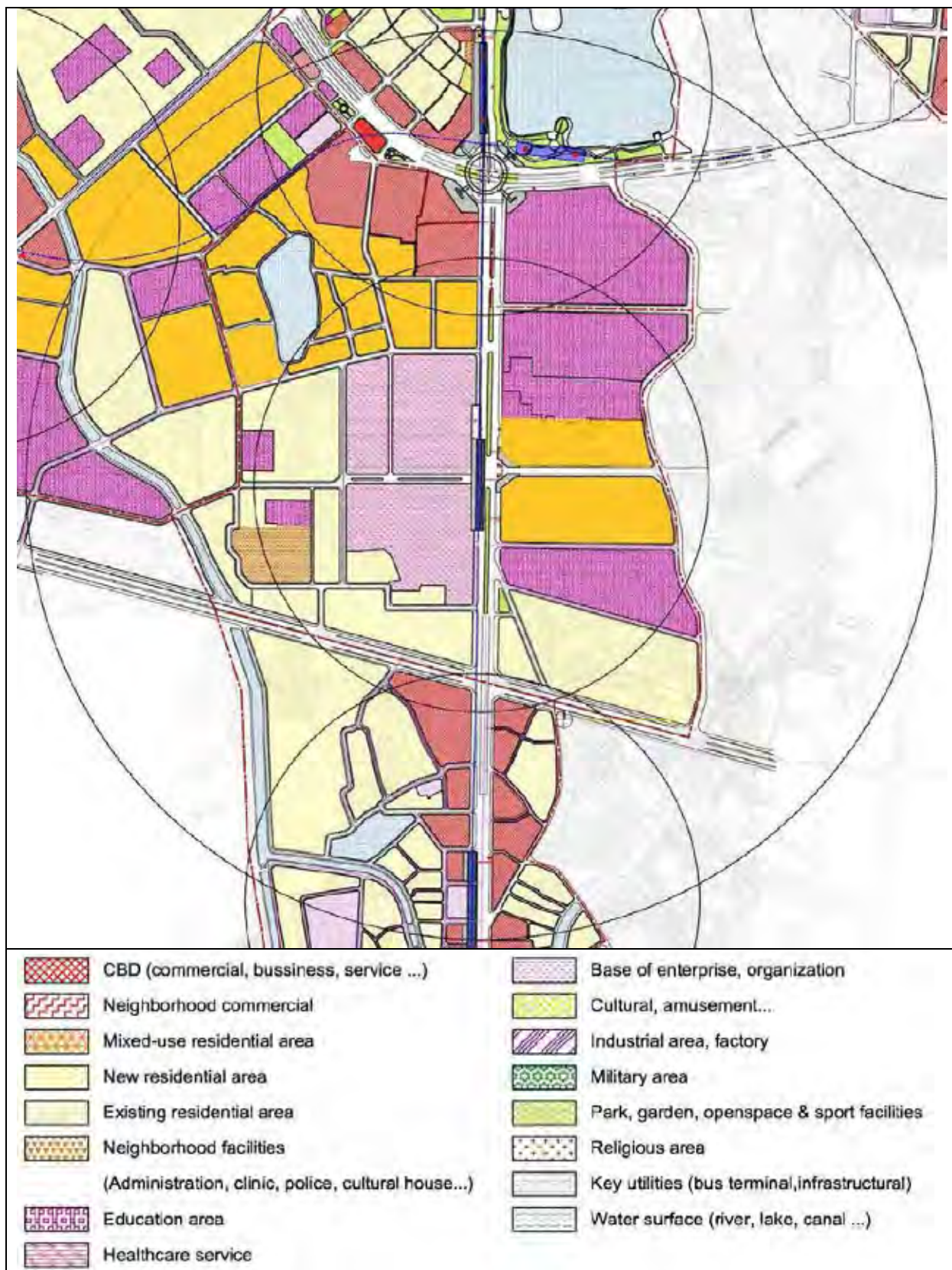
Minimum projects with * are prioritized to develop together with station facilities, since land acquisition is not so difficult.

1) It has not been discussed and agreed between VNR and HPC which will be an implementation body and a financial resource for station entrance space development. JICA Project Team recommends VNR will develop it as a station related facility development.

2) It is proposed to use entrance space of Bach Mai Hospital as a station entrance space. It is necessary to coordinate with Bach Mai Hospital.

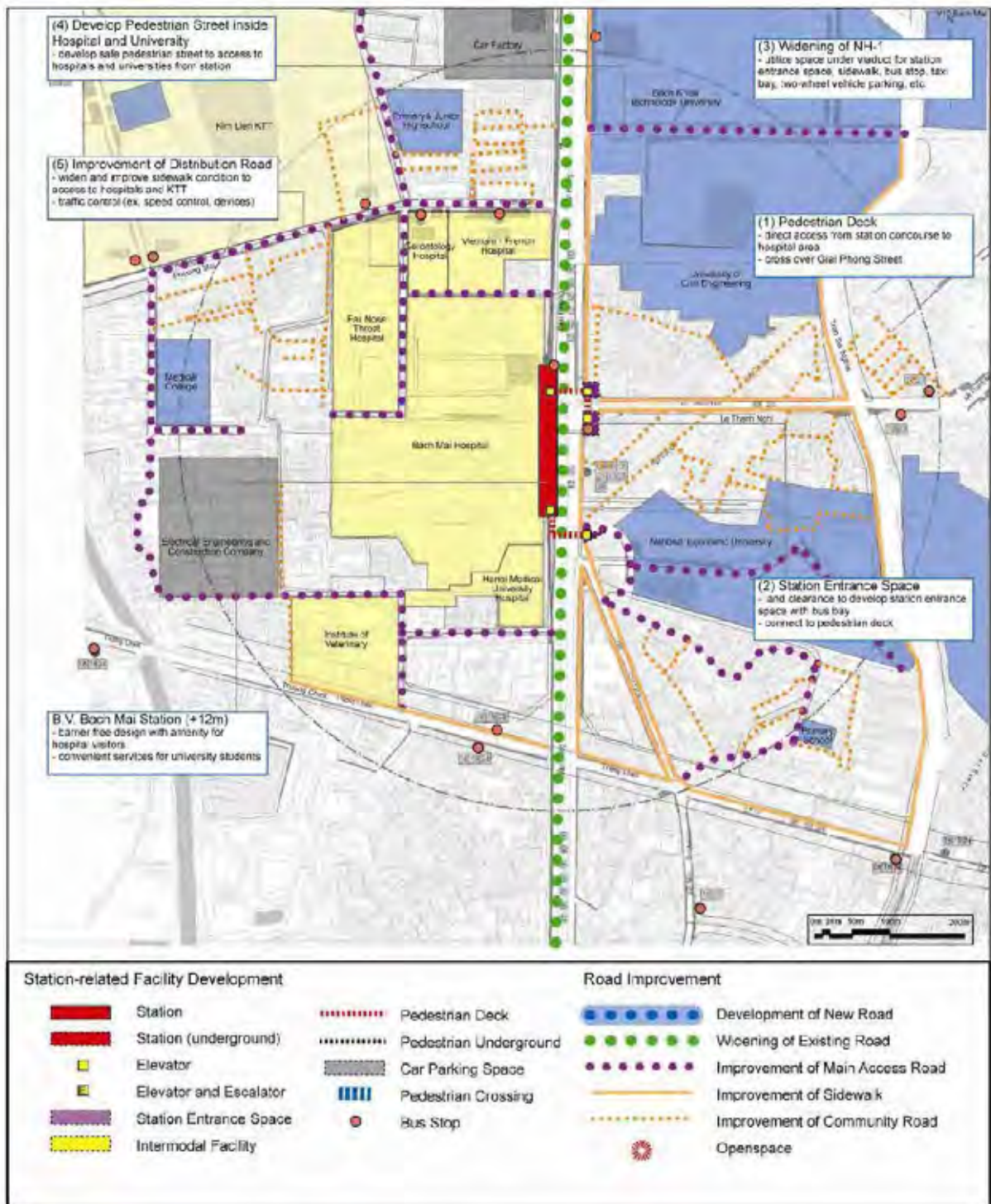
3) It is proposed to widen NH-1 under viaduct within ROW. Space under viaduct will be used for entrance space, parking space, etc. near station.

Figure 4.24 Long-term Concept Plan of B.V. Bach Mai Station Area (V10)



Source: JICA Project Team

Figure 4.25 Short-term Concept Plan of B.V. Bach Mai Station Area (V10)



Source: JICA Project Team

4.3.4 Phuong Liet station area (Line1-V11)

4.34 Though not much specific urban facilities will be developed in this station area, commercial and public facilities will be developed along NH-1 to support daily social and economic activities for residents around the station area. It is necessary to improve accessibility of residential areas to connect to station, and connect the area of south of river.

Table 4.28 Demand Outlook of Phuong Liet Station Area (V11)

| | | Present | UMRT with integrated Urban Development | |
|-----------------------------------------------------|------------|---------|----------------------------------------|--------|
| | | | Without | With |
| Population of Station Area of radius 500m (persons) | Population | 21,999 | 21,200 | 21,200 |
| | Employment | 9,239 | 9,600 | 11,000 |
| | Student | 7,633 | 8,100 | 8,100 |
| Ridership (persons/day) | | - | 100 | 4,200 |

Source: JICA Project Team

4.35 Issues to be clarified of Phuong Liet station area are not specified.

Table 4.29 Project List of Phuong Liet Station Area (V11)

| Project | | | Scale | | Construction Cost (000US\$) | Implementation Body | Financial Resource | |
|------------------------------------|---------------------------------|---------------------------------------------|-------|-------|-----------------------------|---------------------|-----------------------|-----------------------|
| A Minimum development till opening | SF-SE-1* | Station Entrance Space | 400 | m2 | 32 | 4,922 | VNR/HPC ¹⁾ | VNR/HPC ¹⁾ |
| | SF-PD-1* | Pedestrian Deck | 400 | m2 | 1,040 | | VNR/HPC ¹⁾ | VNR/HPC ¹⁾ |
| | SF-EV-1* | Elevator | 2 | No | 200 | | VNR | VNR |
| | SF-BS-1 | Bus Stop | 6 | No | 30 | | TRAMOC | HPC |
| | SF-PC-1 | Pedestrian Crossing | 1 | No | 10 | | HDOT | HPC |
| | SF-PC-2 | Pedestrian Crossing | 1 | No | 10 | | HDOT | HPC |
| | SF-PC-3 | Pedestrian Crossing | 1 | No | 10 | | HDOT | HPC |
| | RD-WR-1 | Widening of Giai Phong Street ²⁾ | 1,200 | m | 840 | | HDOT | HPC |
| RD-MA-1 | Improvement of Main Access Road | 2,500 | m | 2,750 | HDOT | HPC | | |
| B Short-term (opening~3years) | RD-SW-1 | Improvement of Sidewalk | 8,000 | m | 2,160 | 2,160 | HDOT | HPC |

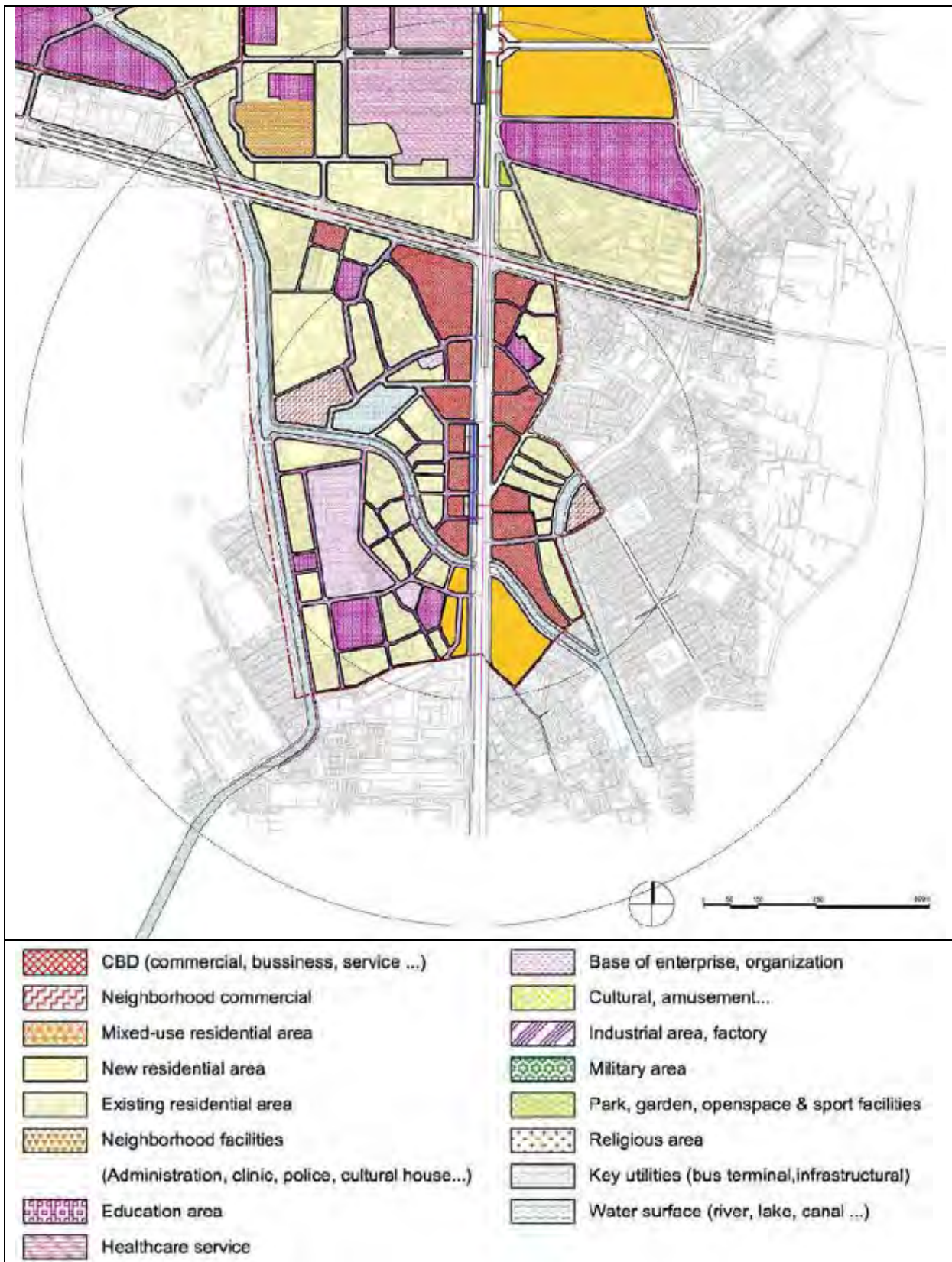
Source: JICA Project Team

Minimum projects with * are prioritized to develop together with station facilities, since land acquisition is not so difficult.

1) It has not been discussed and agreed between VNR and HPC which will be an implementation body and a financial resource for station entrance space development. JICA Project Team recommends VNR will develop it as a station related facility development.

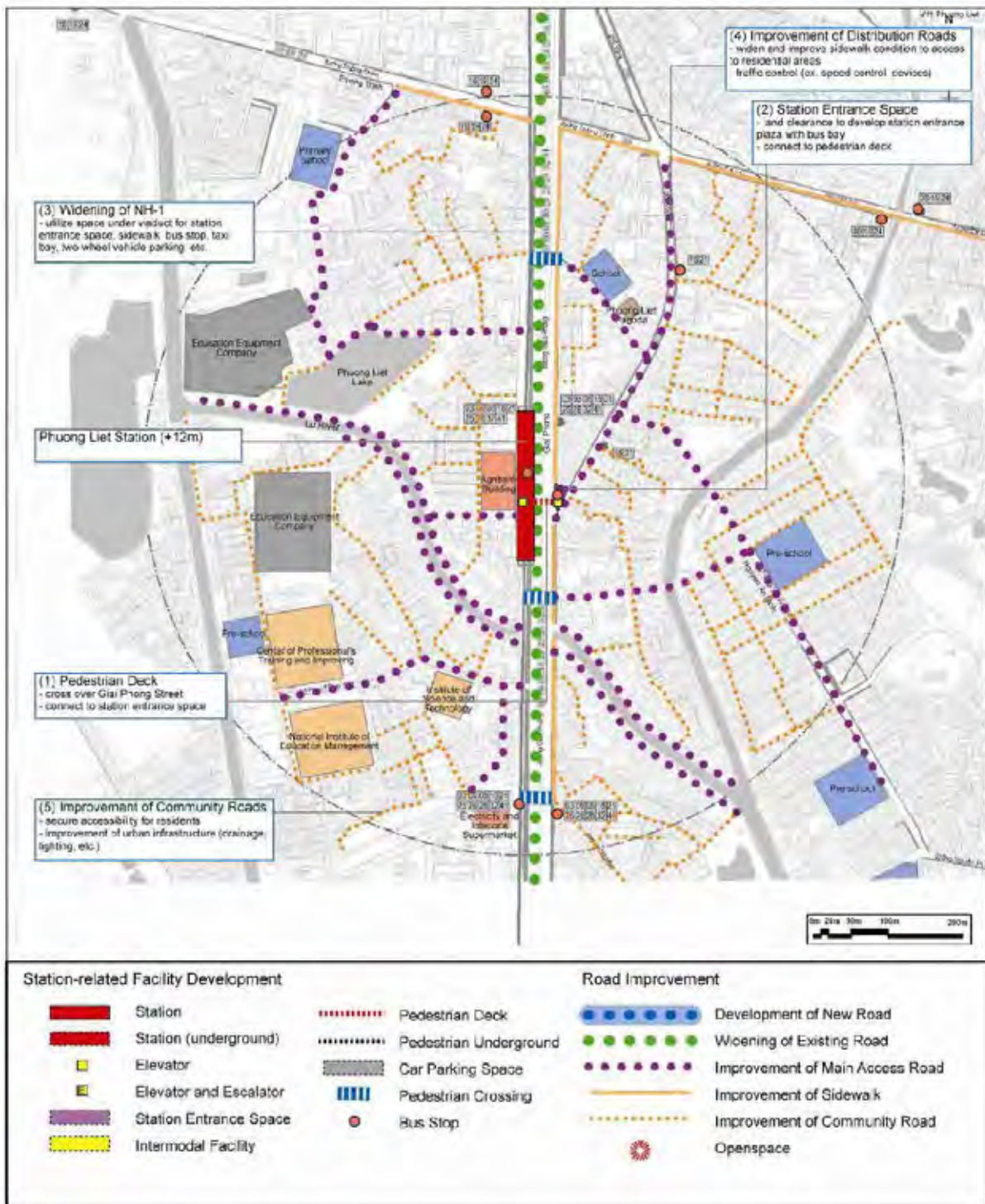
2) It is proposed to widen NH-1 under viaduct within ROW. Space under viaduct will be used for entrance space, parking space, etc. near station.

Figure 4.26 Long-term Concept Plan of Phuong Liet Station Area (V11)



Source: JICA Project Team

Figure 4.27 Short-term Concept Plan of Phuong Liet Station Area (V11)



Source: JICA Project Team

4.3.5 Ngoc Hoi station area (Line1-V16)

4.36 As a new center of south of Hanoi City, Ngoc Hoi Station area will be urbanized in combination with industrial, commercial and residential functions. Residents and workers from suburban areas will enjoy working and living in a same district.

Table 4.30 Demand Outlook for Ngoc Hoi Station Area (V16)

| | | Present | UMRT with integrated Urban Development | |
|-----------------------------------------------------|------------|---------|----------------------------------------|--------|
| | | | Without | With |
| Population of Station Area of radius 500m (persons) | Population | 176 | 2,200 | 4,500 |
| | Employment | 538 | 2,700 | 5,900 |
| | Student | 308 | 588 | 1,200 |
| Ridership (persons/day) | | - | 29,600 | 34,200 |

Source: JICA Project Team

4.37 Issues to be clarified of Ngoc Hoi station area are as follows:

- i) Reservation land for VNR-related facilities (minimum& short-term): In east side of the station, it is necessary to define necessary land for VNR for operation and maintenance of railways. In addition, landuse of remained area need to be clarified if it is utilized for logistic purpose.
- ii) Conversion of landuse of industrial zone (short& mid-term): To develop the land of industrial zone as a mixed residential area with small industries, it is necessary to convert landuse.

Table 4.31 Project List of Ngoc Hoi Station Area (V16)

| Project | | | Scale | | Construction Cost (000US\$) | | Implementa tion Body | Financial Resource |
|------------------------------------|----------|-----------------------------------------------------------------------------------------------|--------|----|-----------------------------|-------|-----------------------|-----------------------|
| A Minimum development till opening | SF-IM-1* | East Intermodal Facility | 14,000 | m2 | 756 | 1,421 | VNR/HPC ¹⁾ | VNR/HPC ¹⁾ |
| | SF-BS-1 | Bus Stop | 1 | No | 5 | | TRAMOC | HPC |
| | RD-NR-1* | Development of New Road | 300 | m | 660 | | HDOT | HPC |
| | UR-1* | Development of VNR railway yard (planned) ²⁾ | - | - | - | | VNR | VNR |
| B Short-term (opening~3years) | RD-SW-1 | Improvement of Sidewalks | 1,000 | m | 270 | 270 | HDOT | HPC |
| C Medium-term (3~5years) | UR-2 | Development of residential and light-industry mixed use area on east of station ³⁾ | - | | | | Private | Private |
| | UR-3 | Development of industrial zone on west of station ²⁾ | | | | | Private | Private |

Source: JICA Project Team

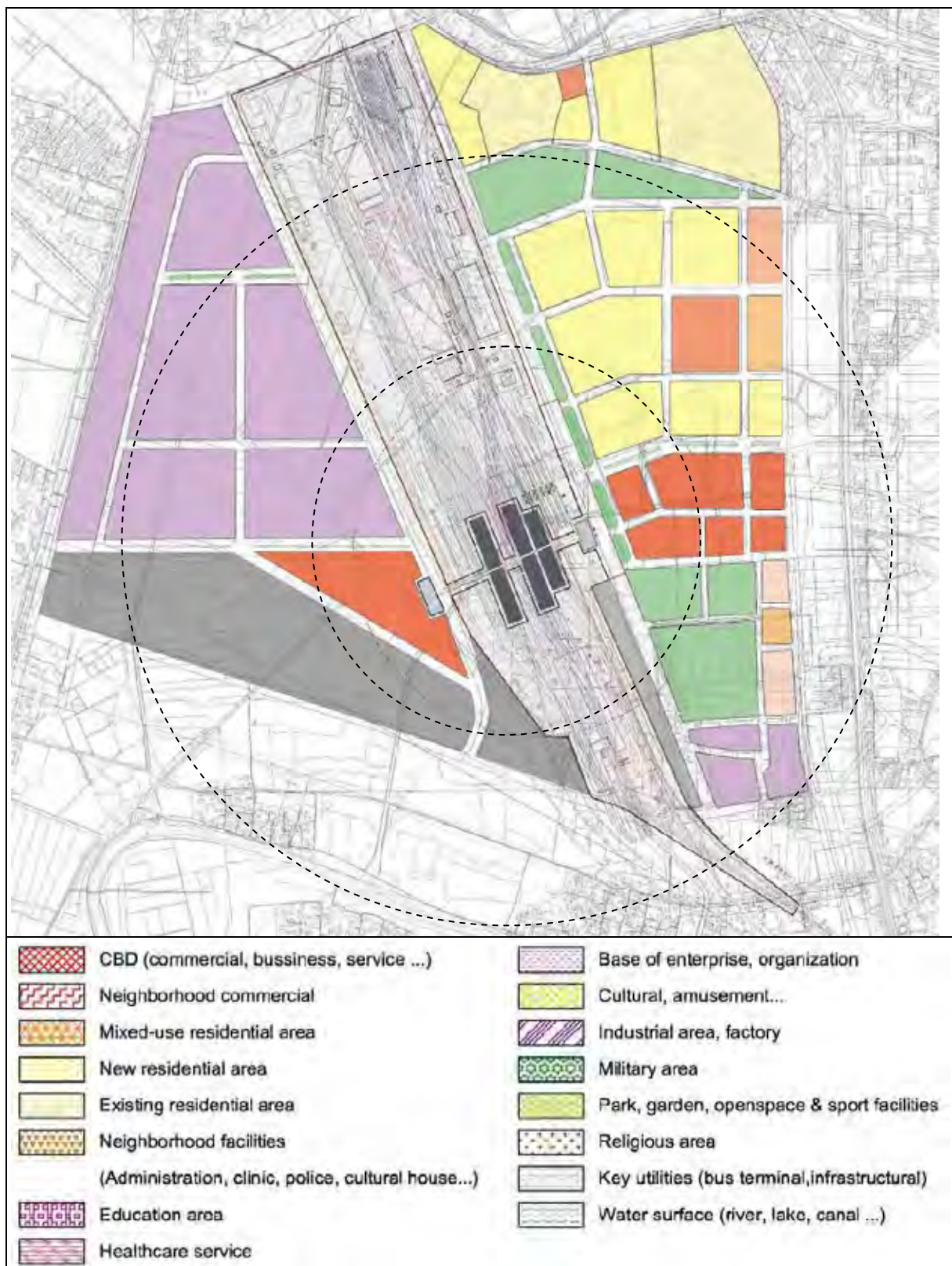
Minimum projects with * are prioritized to develop together with station facilities, since land acquisition is not so difficult.

1) It has not been discussed and agreed between VNR and HPC which will be an implementation body and a financial resource for ITF development. JICA Project Team recommends VNR will develop ITF as a station related facility development.

2) It is planned by VNR. It is necessary to adjust District Plan to develop VNR railway yard for operation and related industrial zone to support railway related activities.

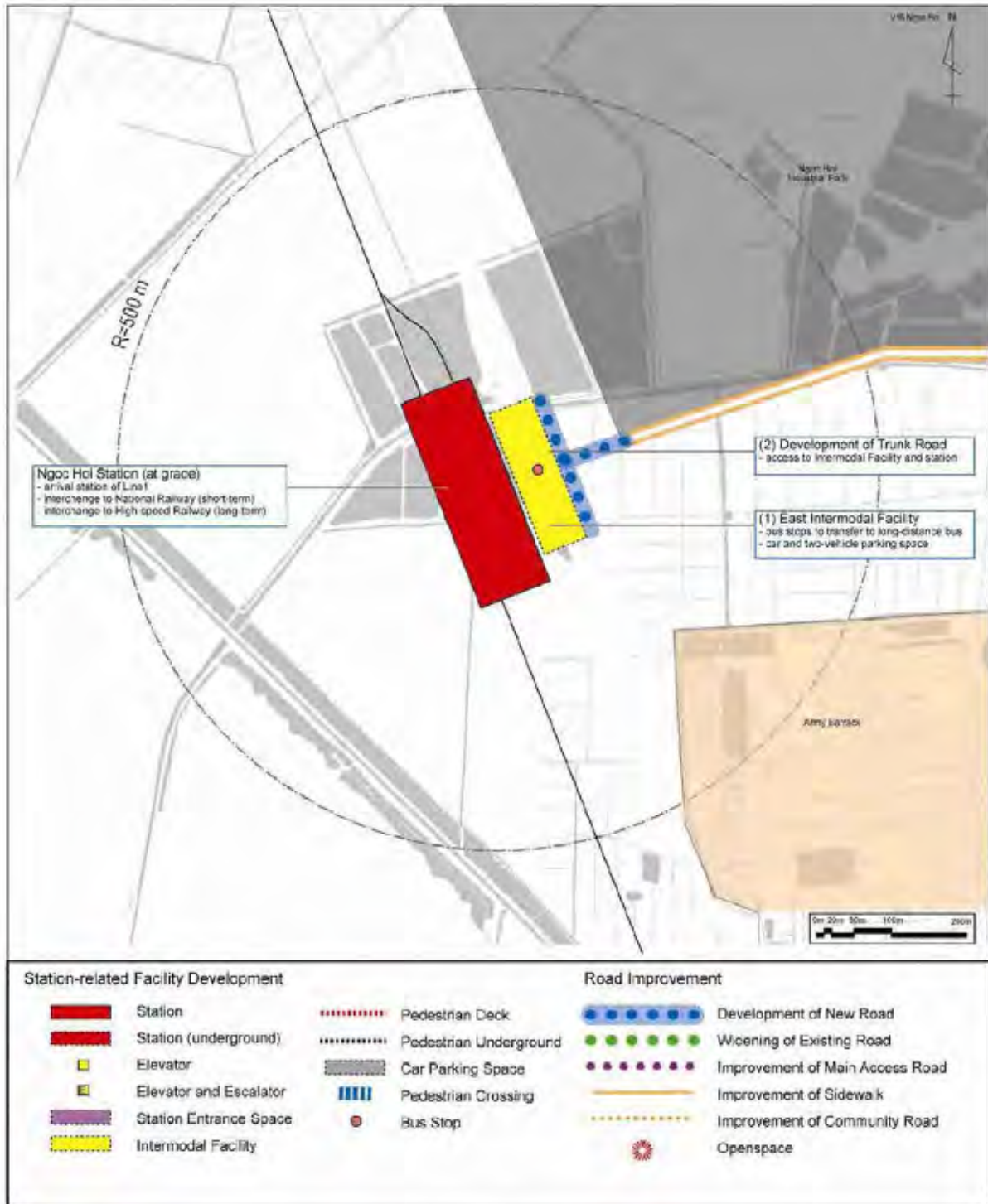
3) It is necessary to coordinate with HAUPA to adjust District Plan to convert landuse of Ngoc Hoi Industrial Zone from industry to mixed use.

Figure 4.28 Long-term Concept Plan of Ngoc Hoi Station Area (V16)



Source: JICA Project Team

Figure 4.29 Short-term Concept Plan of Ngoc Hoi Station Area (V16)



Source: JICA Project Team

4.3.6 Nam Thang Long station area (Line2-C1)

4.38 Nam Thang Long station area development will be integrated with CIPUTRA new town development, and will provide modern urban services for new town residents. There are existing residential areas which will not be integrated with new town projects of CIPUTRA and Ngoai Giao Doan, so it is necessary to improve accessibility to station and living condition in future.

Table 4.32 Demand Outlook for Nam Thang Long Station Area (C1)

| | | Present | UMRT with integrated Urban Development | |
|-----------------------------------------------------|------------|---------|----------------------------------------|--------|
| | | | Without | With |
| Population of Station Area of radius 500m (persons) | Population | 1,998 | 5,100 | 5,100 |
| | Employment | 1,263 | 1,300 | 1,300 |
| | Student | 830 | 1,000 | 1,000 |
| Ridership (persons/day) | | - | 39,480 | 83,790 |

Source: JICA Project Team

4.39 Issue to be clarified of Nam Thang Long station area is as follows:

- i) Coordination with CIPTRA New Town Project (short-term): Though basic road network and landuse have already designated, it is recommended to coordinate with CIPTRA project to maximize utilization of UMRT station and railway as well as socio-economic development around the station.

Table 4.33 Project List of Nam Thang Long Station Area (C1)

| Project | | | Scale | | Construction Cost (000US\$) | Implementation Body | Financial Resource | |
|------------------------------------|----------|--------------------------------------------------------------------|-------|-----|-----------------------------|---------------------|-----------------------|-------------------|
| A Minimum development till opening | SF-IM-1 | North Intermodal Facility | 3,450 | m2 | 186 | 5,052 | HPC | HPC |
| | SF-IM-2 | South Intermodal Facility | 1,400 | m2 | 76 | | HPC | HPC |
| | SF-PD-1* | Pedestrian deck to connect to south intermodal facility | 1,500 | m2 | 3,900 | | HRB/HPC ¹⁾ | HPC ¹⁾ |
| | SF-EV-1* | Elevator | 4 | No. | 400 | | HRB | HPC |
| | SF-ES-1* | Escalator | 1 | No. | 300 | | HRB | HPC |
| | SF-BS-1 | Bus Stop | 5 | No. | 25 | | TRAMOC | HPC |
| | RD-MA-1 | Improvement of Main Access Road | 150 | m | 165 | | HDOT | HPC |
| B Short-term (opening~3years) | RD-NR-1 | Development of New Road | 340 | m | 748 | 2,134 | HDOT | HPC |
| | RD-WR-1 | Widening of Existing Road | 900 | m | 630 | | HDOT | HPC |
| | RD-SW-1 | Improvement of Sidewalk | 2,800 | m | 756 | | HDOT | HPC |
| | UR-1 | CIPUTRA New Town development (ongoing) ²⁾ | - | - | - | | Private | Private |
| C Medium-term (3~5years) | UR-2 | Ngoai Giao Doan new urban area development (planned) ³⁾ | - | - | - | - | Private | Private |

Source: JICA Project Team

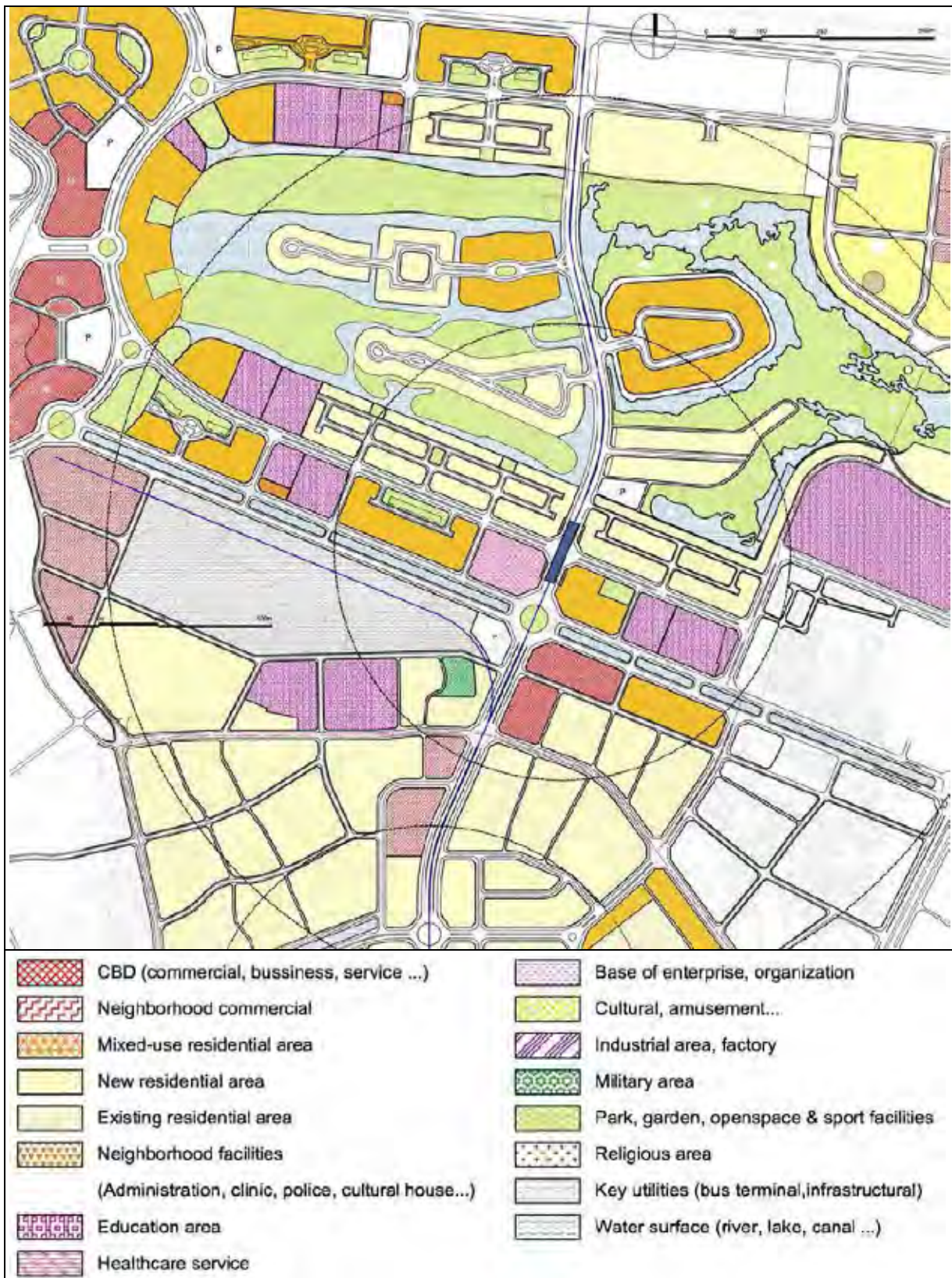
Minimum projects with * are prioritized to develop together with station facilities, since land acquisition is not so difficult.

1) JICA Project Team recommends HRB or HPC will develop station related facilities together with UMRT station development.

2) CIPUTRA New Town is under construction (300ha, 50,000population).

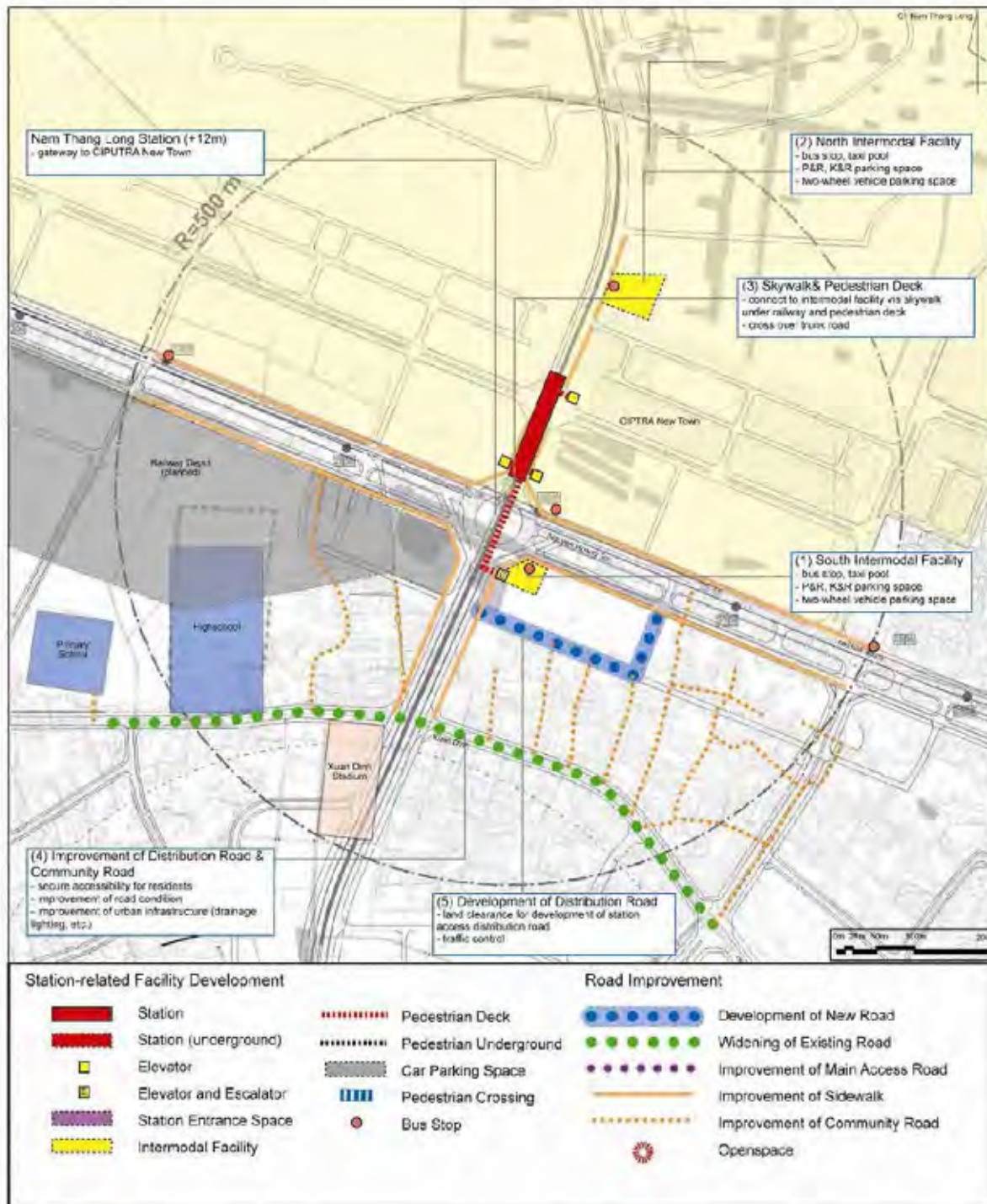
3) Ngoai Giao Doan new urban area is planned to be a diplomatic town with residential area.

Figure 4.30 Long-term Concept Plan of Nam Thang Long Station Area (C1)



Source: JICA Project Team

Figure 4.31 Short-term Concept Plan of Nam Thang Long Station Area (C1)



Source: JICA Project Team

4.3.7 Ngoai Giao Doan station area (Line2-C2)

4.40 Ngoai Giao Doan station area development will be integrated with new diplomatic town development. Though this station will be located between Nam Thang Long Station and Tay Ho Tay Station, which are expected high demand passengers of new towns, it is necessary to provide necessary urban functions for commercial and business purposes. As a symbol of diplomatic town, integration with park will be significant.

Table 4.34 Demand Outlook for Ngoai Giao Doan Station Area (C2)

| | | Present | UMRT with integrated Urban Development | |
|-----------------------------------------------------|------------|---------|----------------------------------------|--------|
| | | | Without | With |
| Population of Station Area of radius 500m (persons) | Population | 410 | 6,600 | 6,600 |
| | Employment | 306 | 41,600 | 45,700 |
| | Student | 191 | 1,300 | 1,300 |
| Ridership (persons/day) | | - | 3,890 | 8,440 |

Source: JICA Project Team

4.41 Issue to be clarified of Ngoai Giao Doan station area is as follows:

- i) Coordination with Ngoai Giao Doan Diplomatic Town Development Project (short-term): Though basic road network and landuse have already designated, it is recommended to coordinate with Ngoai Giao Doan project to maximize utilization of UMRT station and railway as well as socio-economic development around the station.

Table 4.35 Project List of Ngoai Giao Doan Station Area (C2)

| Project | | | Scale | | Construction Cost (000US\$) | Implementation Body | Financial Resource | |
|------------------------------------|----------|--------------------------------------------------------------------|-------|-----|-----------------------------|---------------------|-----------------------|-------------------|
| A Minimum development till opening | SF-SE-1* | Station Entrance Space | 4,900 | m2 | 392 | 5,852 | HRB/HPC ¹⁾ | HPC ¹⁾ |
| | SF-RD-1* | Pedestrian Deck | 400 | m2 | 1,040 | | HRB/HPC ¹⁾ | HPC ¹⁾ |
| | SF-RD-2* | Pedestrian Deck | 400 | m2 | 1,040 | | HRB/HPC ¹⁾ | HPC ¹⁾ |
| | SF-EV-1* | Elevator | 4 | No. | 400 | | HRB | HPC |
| | SF-BS-1 | Bus Stop | 2 | No. | 10 | | TRAMOC | HPC |
| | RD-MA-1 | Improvement of Main Access Road | 2,700 | m | 2,970 | | HDOT | HPC |
| B Short-term (opening~3years) | RD-WR-1 | Widening of Xuan Dinh Street | 590 | m | 413 | 1,091 | HDOT | HPC |
| | RD-SW-1 | Improvement of Sidewalk | 2,510 | m | 678 | | HDOT | HPC |
| C Medium-term (3~5years) | UR-1 | Ngoai Giao Doan new urban area development (planned) ²⁾ | - | - | - | - | Private | Private |

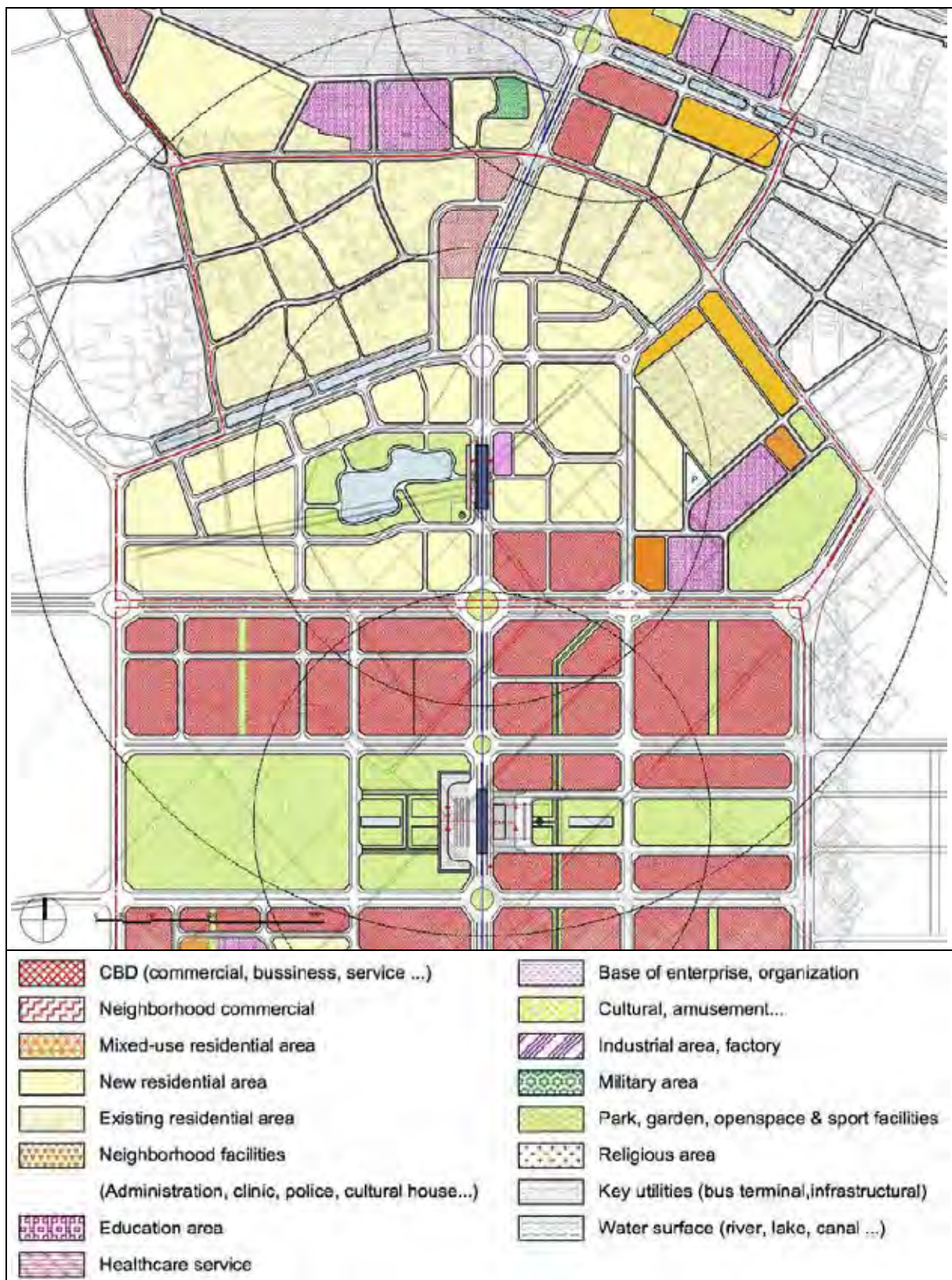
Source: JICA Project Team

Minimum projects with * are prioritized to develop together with station facilities, since land acquisition is not so difficult.

1) JICA Project Team recommends HRB or HPC will develop station related facilities together with UMRT station development.

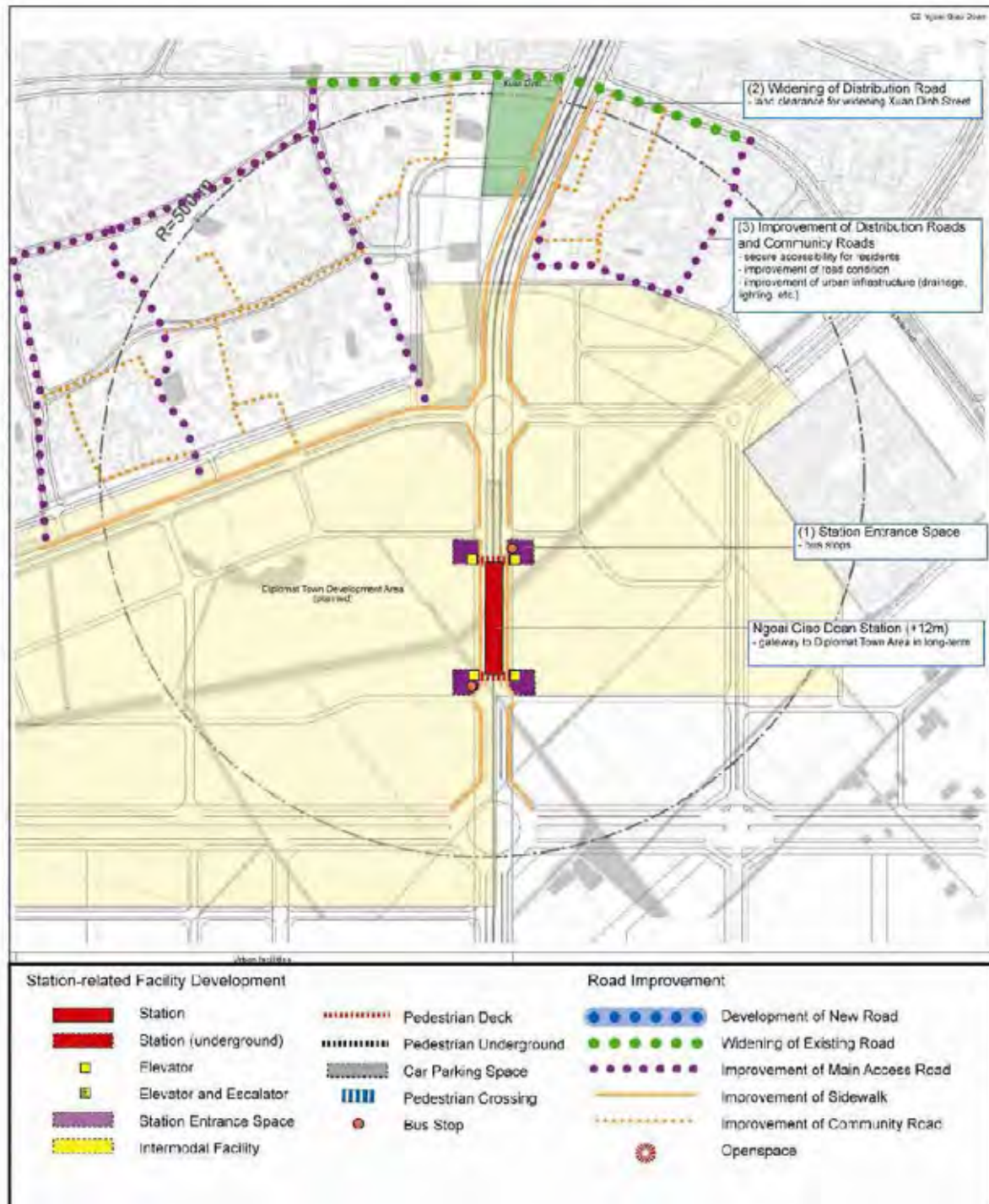
2) Ngoai Giao Doan new urban area is planned to be a diplomatic town with residential area.

Figure 4.32 Long-term Concept Plan of Ngoai Giao Doan Station Area (C2)



Source: JICA Project Team

Figure 4.33 Short-term Concept Plan of Ngoai Giao Doan Station Area (C2)



Source: JICA Project Team

4.3.8 Buoi station area (Line2-C4)

4.42 Buoi Station subway station will be located under Huong Quoc Viet Street, in front of Vietnam Science & Technique Institute of north and Institute of Defense of south. This area is a clustered area of educational and cultural facilities to the north-west of the city. As a center of clustered institutes, educational facilities, the station area will be promoted with advanced urban services. This station will be also a gateway to Nghia Du Park and Museum of Ethnology. Cultural and environmental townscape harmonized with educational and science facilities will be promoted for station area development.

Table 4.36 Demand Outlook for Buoi Station Area (C4)

| | | Present | UMRT with integrated Urban Development | |
|-----------------------------------------------------|------------|---------|----------------------------------------|--------|
| | | | Without | With |
| Population of Station Area of radius 500m (persons) | Population | 11,542 | 13,300 | 13,300 |
| | Employment | 4,554 | 7,400 | 7,700 |
| | Student | 2,765 | 4,400 | 4,400 |
| Ridership (persons/day) | | - | 11,890 | 21,660 |

Source: JICA Project Team

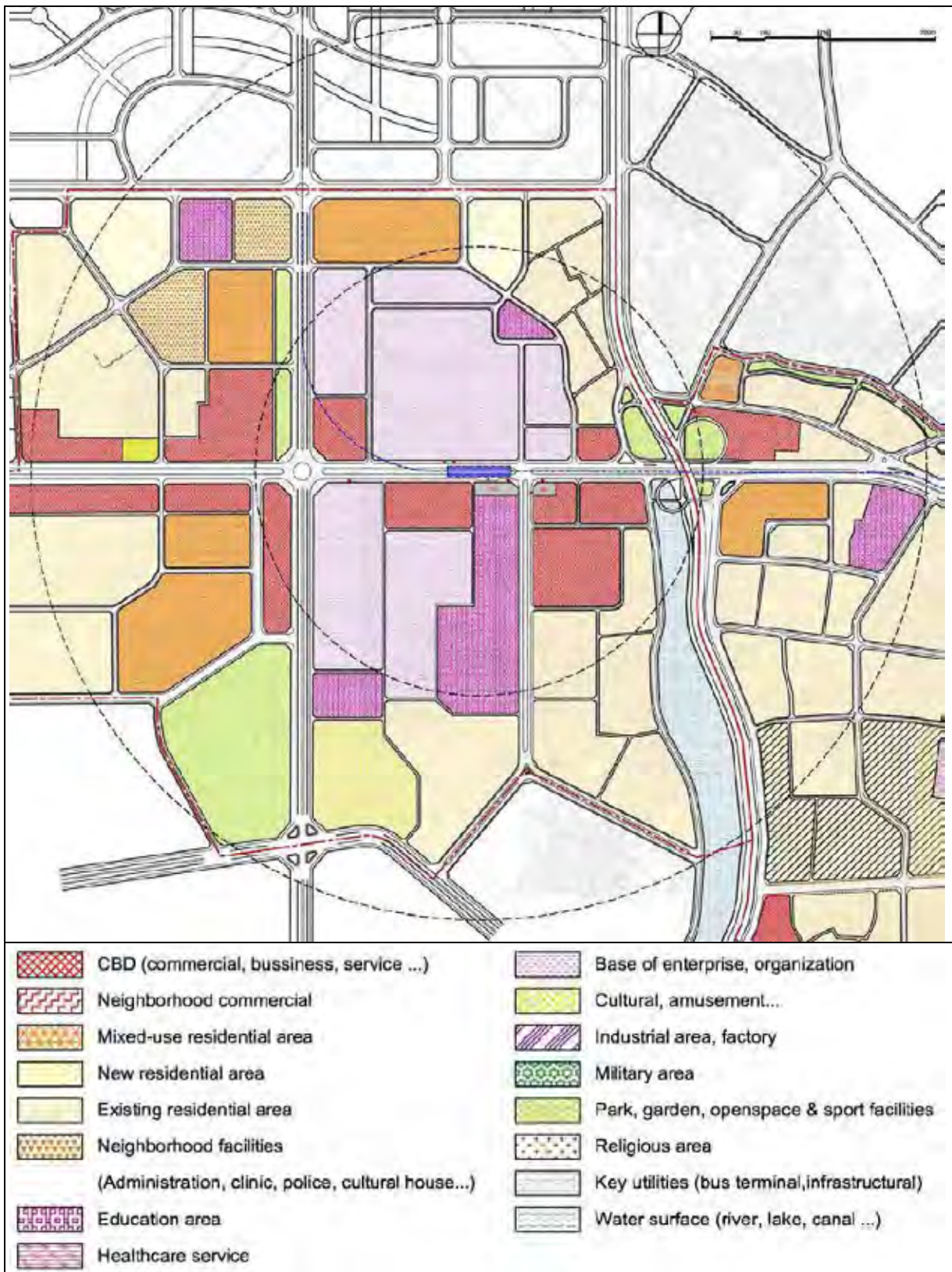
4.43 Issue to be clarified of Buoi Station is not specified.

Table 4.37 Project List of Buoi Station Area (C4)

| Project | | | Scale | | Construction Cost (000US\$) | | Implementation Body | Financial Resource |
|------------------------------------|----------|---------------------------------|-------|-----|-----------------------------|-------|---------------------|--------------------|
| A Minimum development till opening | SF-PU-1* | Pedestrian Underground | 800 | m2 | 4,800 | 7,120 | HRB | HPC |
| | SF-EV-1* | Elevator | 4 | No. | 400 | | HRB | HPC |
| | SF-BS-1 | Bus Stop | 2 | No. | 10 | | TRAMOC | HPC |
| | SF-PC-1 | Pedestrian Crossing | 1 | No. | 10 | | HDOT | HPC |
| | SF-PC-2 | Pedestrian Crossing | 1 | No. | 10 | | HDOT | HPC |
| | SF-PC-3 | Pedestrian Crossing | 1 | No. | 10 | | HDOT | HPC |
| | SF-PC-4 | Pedestrian Crossing | 1 | No. | 10 | | HDOT | HPC |
| | RD-MA-1 | Improvement of Main Access Road | 1,700 | m | 1,870 | HDOT | HPC | |
| B Short-term (opening~3years) | RD-SW-1 | Improvement of Sidewalk | 3,070 | m | 829 | 829 | HDOT | HPC |

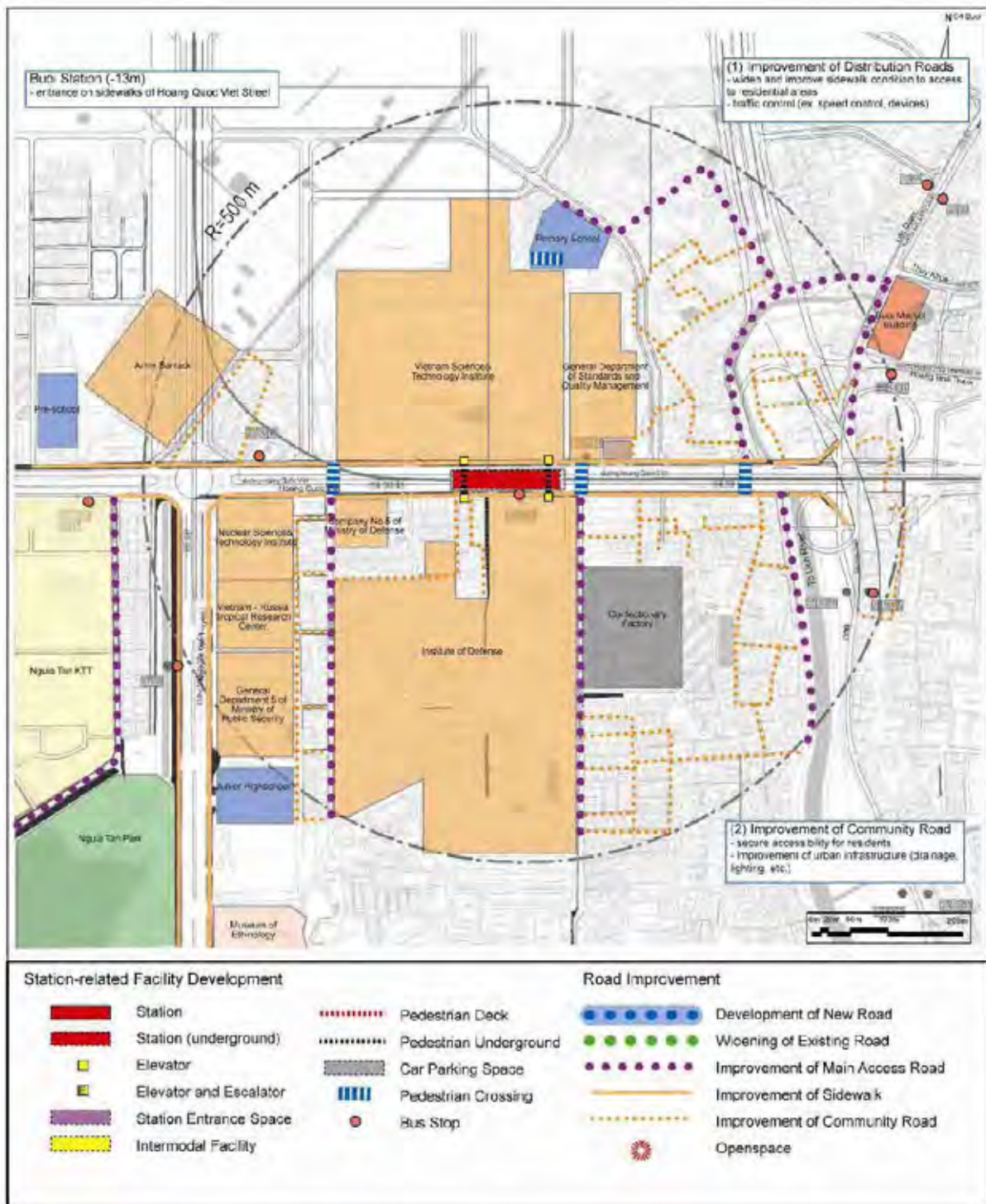
Source: JICA Project Team

Figure 4.34 Long-term Concept Plan of Buoi Station Area (C4)



Source: JICA Project Team

Figure 4.35 Short-term Concept Plan of Buo Station Area (C4)



Source: JICA Project Team

4.3.9 Bach Thao station area (Line2-C6)

4.44 Bach Thao Station will be located along Thuy Khue Street, in front of Vietnam Women's Union building. On the south-east of the station, Botanical Garden, Ministry of Agriculture and Rural Development and Ho Chi Minh Museum are located. There will be a gateway for sightseeing and recreation to West Lake and Bach Thao Botanical Park to enjoy urban nature of Hanoi City. Environmental-friendly atmosphere around the station will promote UMRT utilization of this station area.

Table 4.38 Demand Outlook for Bach Thao Station Area (C6)

| | | Present | UMRT with integrated Urban Development | |
|-----------------------------------------------------|------------|---------|----------------------------------------|--------|
| | | | Without | With |
| Population of Station Area of radius 500m (persons) | Population | 12,925 | 17,900 | 17,900 |
| | Employment | 7,329 | 6,900 | 7,000 |
| | Student | 5,362 | 4,500 | 4,500 |
| Ridership (persons/day) | | - | 5,970 | 11,680 |

Source: JICA Project Team

4.45 Issues to be clarified of Bach Thao station area are as follows:

- i) Alignment of widening trunk roads of Hoang Hoa Tham Street and Thuy Khue Street (short-term): Since this station will be developed under Thuy Khue Street, it is necessary to clarify road alignment for detailed planning of station-related facility especially entrance. As proposed, if eastern part of Hoang Hoa Tham Street in front of the park will be designated as a distribution road, intersection plan between two roads should be designed.
- ii) Accessibility inside of Bach Thao Park (short-term): Since Ngoc Ha Street is narrow and not safe for pedestrian, it is proposed to develop an access road inside of the park for public.

Table 4.39 Project List of Bach Thao Station Area (C6)

| Project | | | Scale | | Construction Cost (000US\$) | | Implementat ion Body | Financial Resource |
|------------------------------------|----------|---------------------------------------------------------------------------|-----------------|----|-----------------------------|---------|-----------------------|--------------------|
| A Minimum development till opening | SF-SE-1* | Station Entrance Space | 1,100 | m2 | 88 | 3,996 | HRB/HPC ¹⁾ | HPC ¹⁾ |
| | SF-EV-1* | Elevator | 3 | No | 300 | | HRB | HPC |
| | SF-BS-1 | Bus Stop | 4 | No | 20 | | TRAMOC | HPC |
| | SF-PC-1 | Pedestrian Crossing | 1 | No | 10 | | HDOT | HPC |
| | SF-PC-2 | Pedestrian Crossing | 1 | No | 10 | | HDOT | HPC |
| | RD-WR-1 | Widening of Existing Road | 100 | m | 70 | | HDOT | HPC |
| | RD-MA-1 | Improvement of Main Access Road inside Bach Thao Garden ²⁾ | 480 | m | 528 | | HDOT | HPC |
| | RD-MA-2 | Improvement of Main Access Road | 2,700 | m | 2,970 | | HDOT | HPC |
| B Short-term (opening~3years) | RD-SW-1 | Improvement of sidewalk | 1,660 | m | 448 | 448 | HDOT | HPC |
| C Medium-term (3~5years) | UR-1 | Redevelopment for commercial and business district on east of the station | To be estimated | | | Private | Private | |
| D Long-term (5~10 years) | RD-WR-2 | Widening of Ngoc Ha Street ³⁾ | | | | HDOT | HPC | |

Source: JICA Project Team

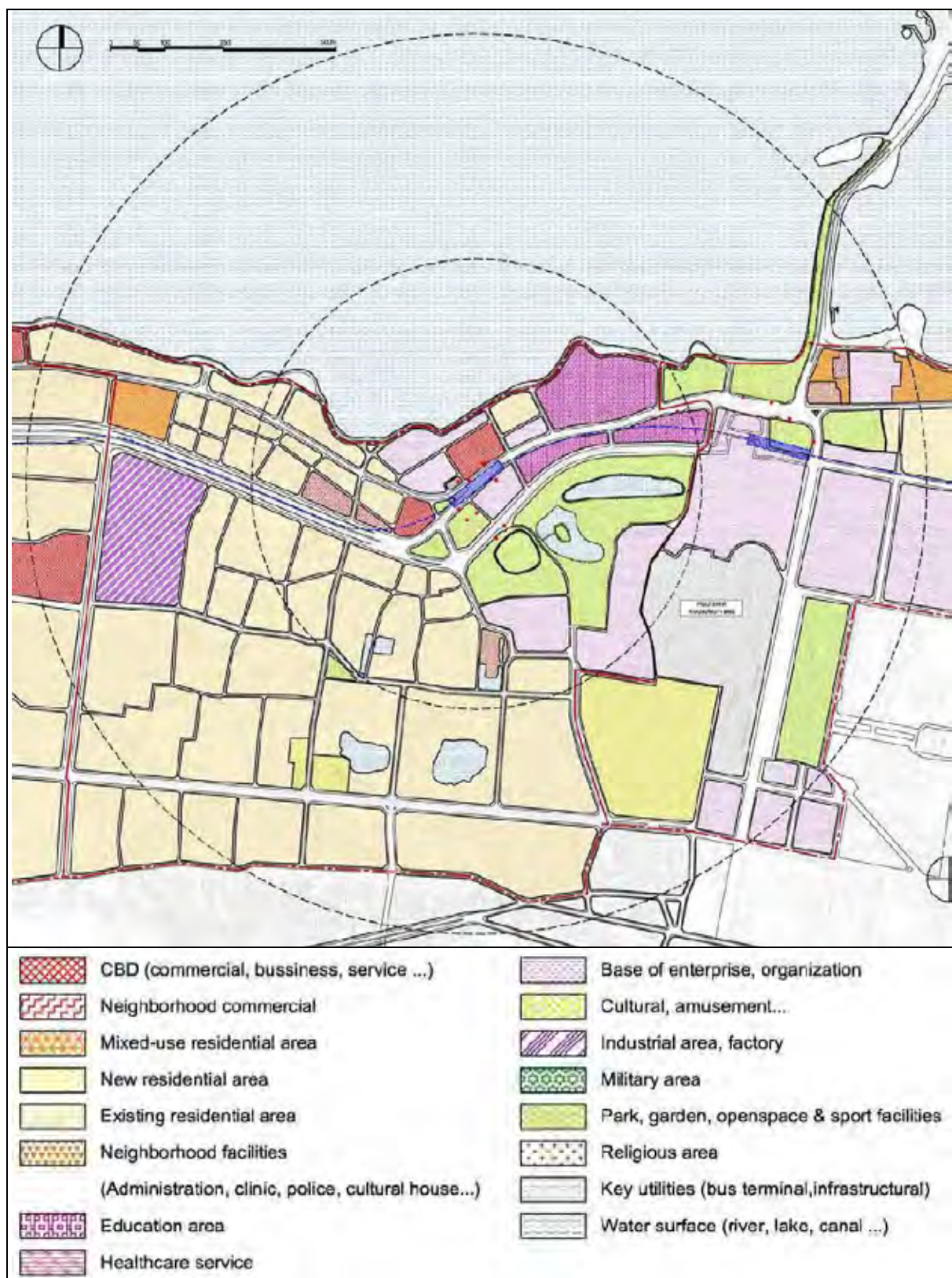
Minimum projects with * are prioritized to develop together with station facilities, since land acquisition is not so difficult.

1) JICA Project Team recommends HRB or HPC will develop station related facilities together with UMRT station development.

2) It is necessary to coordinate with management body of Bach Thao Garden to develop access road to station for public.

3) It is necessary to coordinate with HAUPA/ HDOT to adjust road alignment.

Figure 4.36 Long-term Concept Plan of Bach Thao Station Area (C6)



Source: JICA Project Team

Figure 4.37 Short-term Concept Plan of Bach Thao Station Area (C6)



Source: JICA Project Team

4.3.10 Ho Tay station area (Line2-C7)

4.46 Ho Tay Station will be located in front of Government Offices and near to the President House. This area is political and military area of Hanoi City, including Central Communist Party Committee, many embassies, Ministry of Defense and other ministries. In addition, there are many historical tourism areas such as Thang Long Citadel, Ho Chi Minh Mausoleum, Ba Dinh Square, Ho Chi Minh Museum, etc. This station will be a gateway to political center in south as well as recreational center of West Lake in north. In addition, sports and educational facilities and famous temples are located, so station users will be diversified for various purposes.

Table 4.40 Demand Outlook for Ho Tay Station Area (C7)

| | | Present | UMRT with integrated Urban Development | |
|-----------------------------------------------------|------------|---------|----------------------------------------|--------|
| | | | Without | With |
| Population of Station Area of radius 500m (persons) | Population | 10,286 | 13,500 | 13,500 |
| | Employment | 8,445 | 9,000 | 9,500 |
| | Student | 4,199 | 4,000 | 4,000 |
| Ridership (persons/day) | | - | 11,000 | 12,000 |

Source: JICA Project Team

4.47 Issues to be clarified of Ho Tay station area are as follows:

- i) Coordination with new Government Office development plan for security and accessibility (short-term): The park above the station is a part of Government Office development plan. It is necessary to coordinate how to defend security and safety of political area.

Table 4.41 Project List of Ho Tay Station Area (C7)

| Project | | | Scale | | Construction Cost (000US\$) | Implementation Body | Financial Resource | |
|------------------------------------|----------|-----------------------------------------------------------------------|-----------------|-----|-----------------------------|---------------------|-----------------------|-------------------|
| A Minimum development till opening | SF-SE-1* | Station Entrance Space ²⁾ | 1,000 | m2 | 80 | 9,238 | HRB/HPC ¹⁾ | HPC ¹⁾ |
| | SF-PU-1* | Pedestrian Underground | 900 | m2 | 5,400 | | HRB | HPC |
| | SF-EV-1* | Elevator | 3 | No. | 300 | | HRB | HPC |
| | SF-BS-1 | Bus Stop | 8 | No. | 40 | | TRAMOC | HPC |
| | SF-PC-1 | Pedestrian Crossing | 1 | No. | 10 | | HDOT | HPC |
| | SF-PC-2 | Pedestrian Crossing | 1 | No. | 10 | | HDOT | HPC |
| | SF-PC-3 | Pedestrian Crossing | 1 | No. | 10 | | HDOT | HPC |
| | RD-NR-1 | Development of New Road ³⁾ | 100 | m | 220 | | HDOT | HPC |
| | RD-MA-1 | Improvement of Main Access Road | 2,880 | m | 3,168 | | HDOT | HPC |
| B Short-term (opening~3years) | RD-SW-1 | Improvement of sidewalk | 2,100 | m | 567 | 567 | HDOT | HPC |
| C Medium-term (3~5years) | UR-1 | Government Office and park renovation project (planned) ²⁾ | To be estimated | | | | HPC | HPC |

Source: JICA Project Team

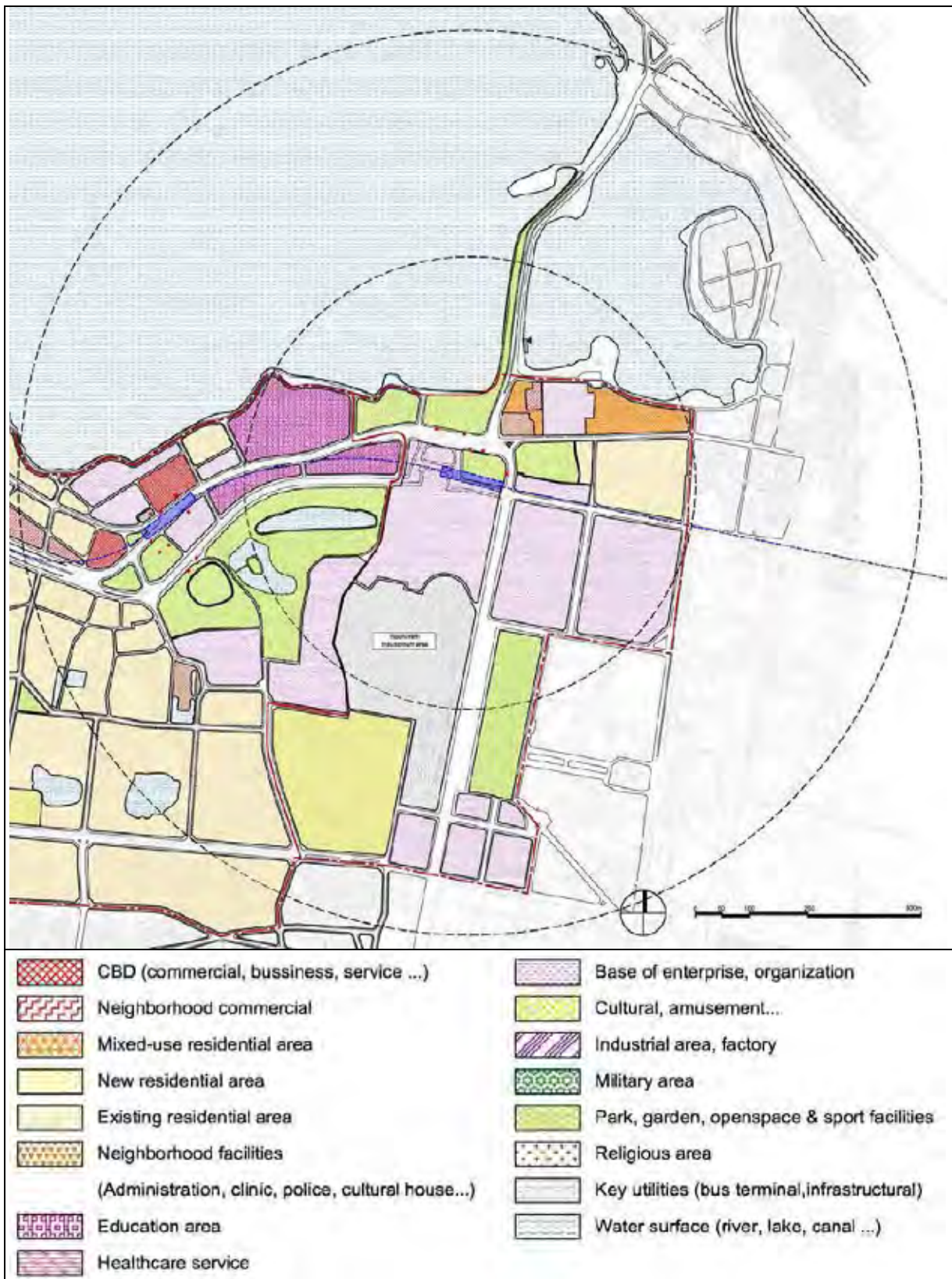
Minimum projects with * are prioritized to develop together with station facilities, since land acquisition is not so difficult.

1) JICA Project Team recommends HRB or HPC will develop station related facilities together with UMRT station development.

2) It is necessary to coordinate with HPC to adjust location of station entrances, which will be located inside a park of Government Office.

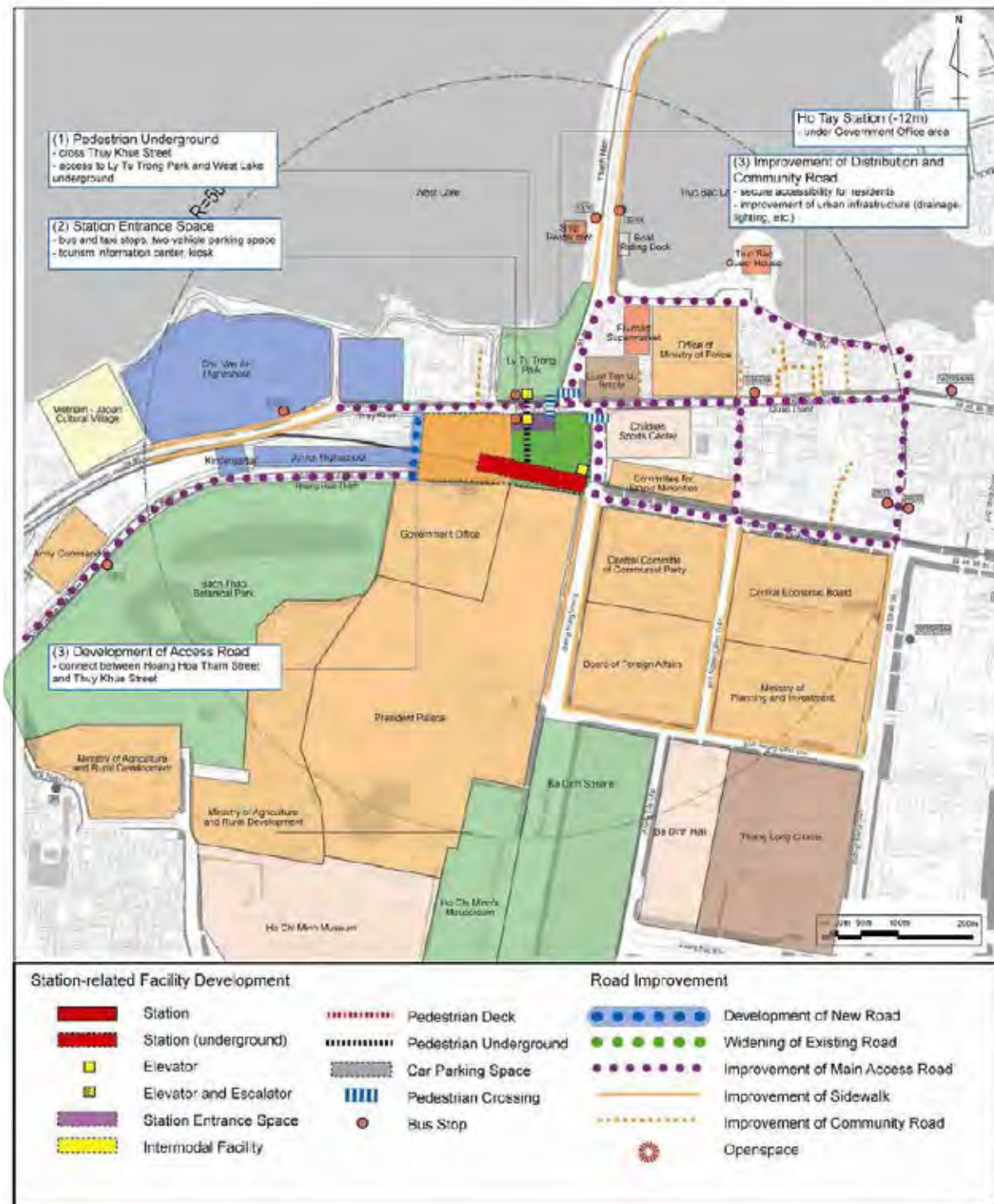
3) It is necessary to coordinate with HAUPA/ HDOT to adjust road alignment.

Figure 4.38 Long-term Concept Plan of Ho Tay Station Area (C7)



Source: JICA Project Team

Figure 4.39 Short-term Concept Plan of Ho Tay Station Area (C7)



Source: JICA Project Team

4.3.11 Hoan Kiem Lake station area (Line2-C9)

4.48 Hoan Kiem Lake Station will be located in the heart of Hanoi City as well as the Ancient Quarter. Hoan Kiem Lake and Ngoc Son temple are one of the most popular places for Hanoi citizens and tourists. This area is a south gate to the Ancient Quarter, and Bo Ho Bus Terminal is located on the north of Hoan Kiem Lake. The concept of this station is “a southern gateway of Ancient Quarter with natural and traditional values”, where is located in front of Hoan Kiem Lake, Ngoc Son Temple and Ba Kieu Temple. This station will attract not only Hanoi citizens, but also domestic and international tourists. In addition, this station area will be a pedestrian oriented district of Ancient Quarter and Hoan Kiem Lake area.

Table 4.42 Demand Outlook for Hoan Kiem Lake Station Area (C9)

| | | Present | UMRT with integrated Urban Development | |
|-----------------------------------------------------|------------|---------|----------------------------------------|--------|
| | | | Without | With |
| Population of Station Area of radius 500m (persons) | Population | 23,516 | 16,200 | 16,200 |
| | Employment | 29,039 | 38,700 | 40,600 |
| | Student | 7,474 | 5,500 | 5,500 |
| Ridership (persons/day) | | - | 3,310 | 6,170 |

Source: JICA Project Team

4.49 Issues to be clarified of Hoan Kiem Lake station area are as follows:

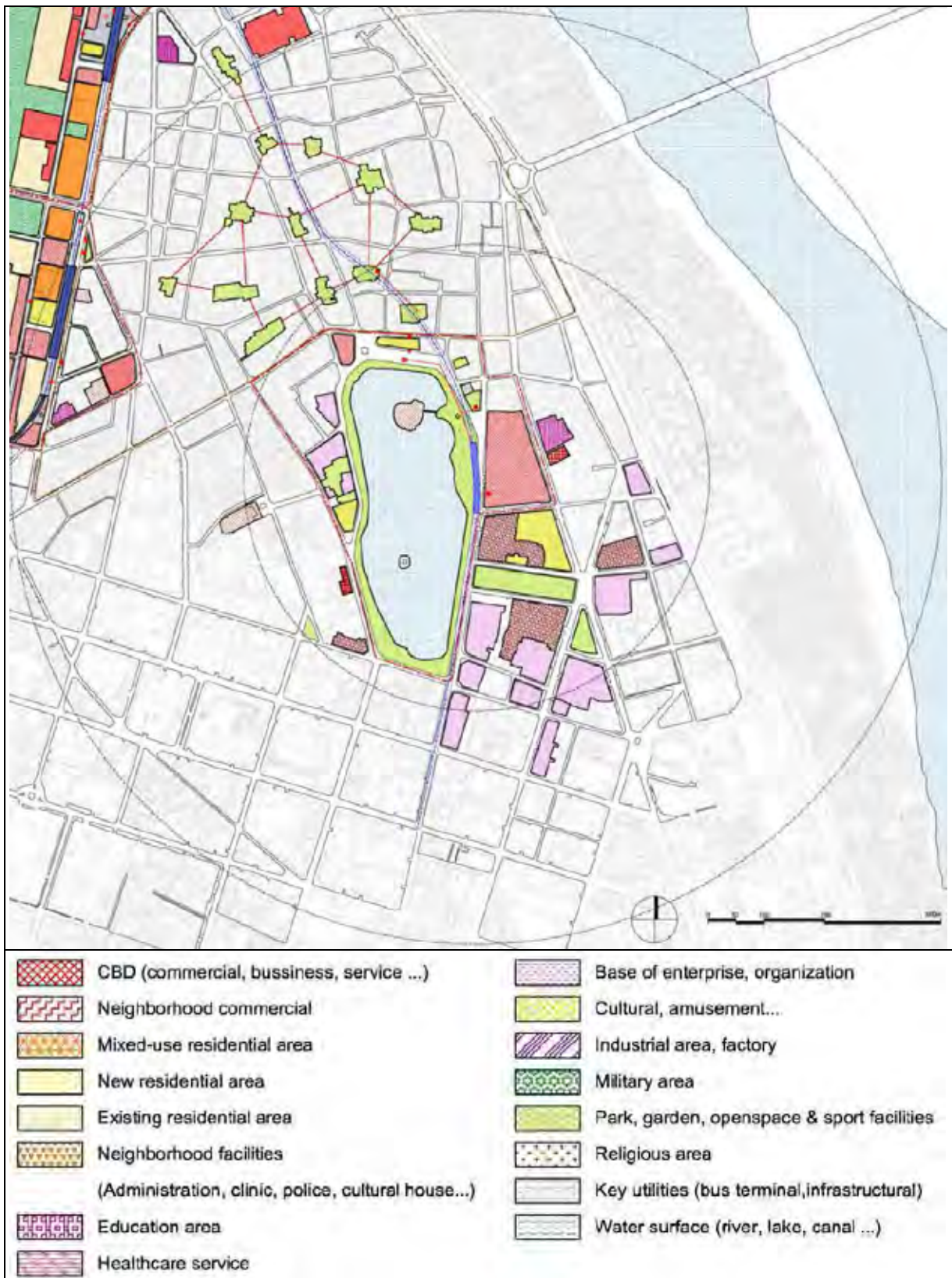
- i) Mitigation of negative impacts on cultural and natural properties (short to long term): There are many properties of Hanoi City such as Ngoc Son Temple, Hoan Kiem Lake and the Ancient Quarter. It is proposed not to develop many facilities around them, but to concentrate on urban development of Hanoi Electricity Company. It is necessary to consult with stakeholders how and where to develop a subway station and entrances.
- ii) Urban redevelopment of Hanoi Power Company (medium-term): It is proposed to clarify if there is a potential for relocation of Hanoi Power Company and utilization the vacant land for commercial and public purposes.
- iii) Urban redevelopment of Ancient Quarter/ underground network development (long-term): Though there is a regulation to control urban development of AQ, it is proposed to review and find out measures to harmonize urban development and preservation. Underground development is one of the solutions to preserve physical condition and to utilize a limited land effectively.

Table 4.43 Project List of Hoan Kiem Lake Station Area (C9)

| Project | | | Scale | | Construction Cost (000US\$) | | Implementation Body | Financial Resource |
|------------------------------------|----------|--------------------------------------------|--------|-----|-----------------------------|-------|---------------------|--------------------|
| A Minimum development till opening | SF-EV-1* | Elevator | 2 | No. | 200 | 860 | HRB | HPC |
| | SF-ES-1* | Escalator | 2 | No. | 600 | | HRB | HPC |
| | SF-BS-1 | Bus stop | 12 | No. | 60 | | TRAMOC | HPC |
| B Short-term (opening~3years) | SF-SE-1 | Improvement of Bo Ho Bus Terminal | 1,400 | m2 | 112 | 3,456 | TRAMOC | HPC |
| | SF-PD-1 | Footbridge to cross Tran Quang Khai Street | 150 | m2 | 390 | | HDOT | HPC |
| | SF-PD-2 | Footbridge to cross Tran Quang Khai Street | 180 | m2 | 468 | | HDOT | HPC |
| | SF-OS-1 | Openspace | 7,500 | m2 | 405 | | HDOT | HPC |
| | SF-OS-2 | Openspace | 600 | m2 | 32 | | HDOT | HPC |
| | RD-SW-1 | Improvement of sidewalk | 7,200 | m | 1,944 | | HDOT | HPC |
| | RD-CR-1 | Improvement of community road | 250 | m | 105 | | HDOT | HPC |
| C Medium-term (3~5years) | RD-CR-2 | Improvement of community road inside AQ | 15,900 | m | To be estimated | | HDOT | HPC |
| | UR-1 | Redevelopment of Electric Company area | 2.2 | ha | | | HPC/ Private | Private |

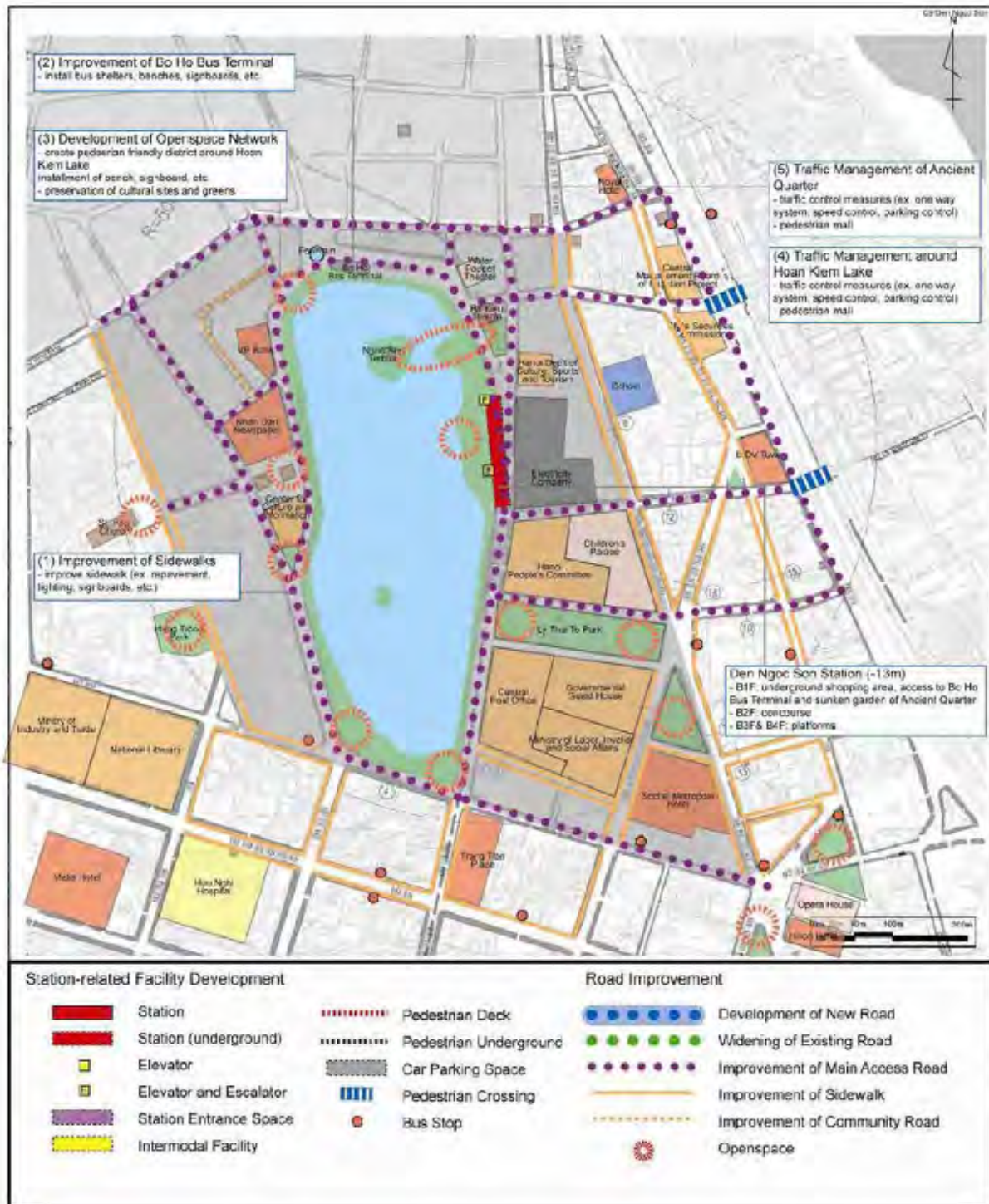
Source: JICA Project Team

Figure 4.40 Long-term Concept Plan of Hoan Kiem Lake Station Area (C9)



Source: JICA Project Team

Figure 4.41 Short-term Concept Plan of Hoan Kiem Lake Station Area (C9)



Source: JICA Project Team

4.4. Concept Plans of Phase2 Station Areas

4.4.1 Yen Vien station area (Line1-V1)

4.50 Yen Vien Station is the end-point of Phase2 of Line1. Yen Vien is isolated from urban center of Long Bien District because of Duong River. Most of the landuse is agricultural, except for residential area east side of railway along Ha Huy Tap Street. Few public and commercial facilities are not existed in this area. Yen Vien station and its station area is expected to play an important role in formulating one of urban sub-centers in the eastern part of Hanoi suburban area utilizing factory, existing villages and agricultural lands in adjacent area of the station for strengthening socio-economic capacity.

Table 4.44 Demand Outlook of Yen Vien Station Area (V1)

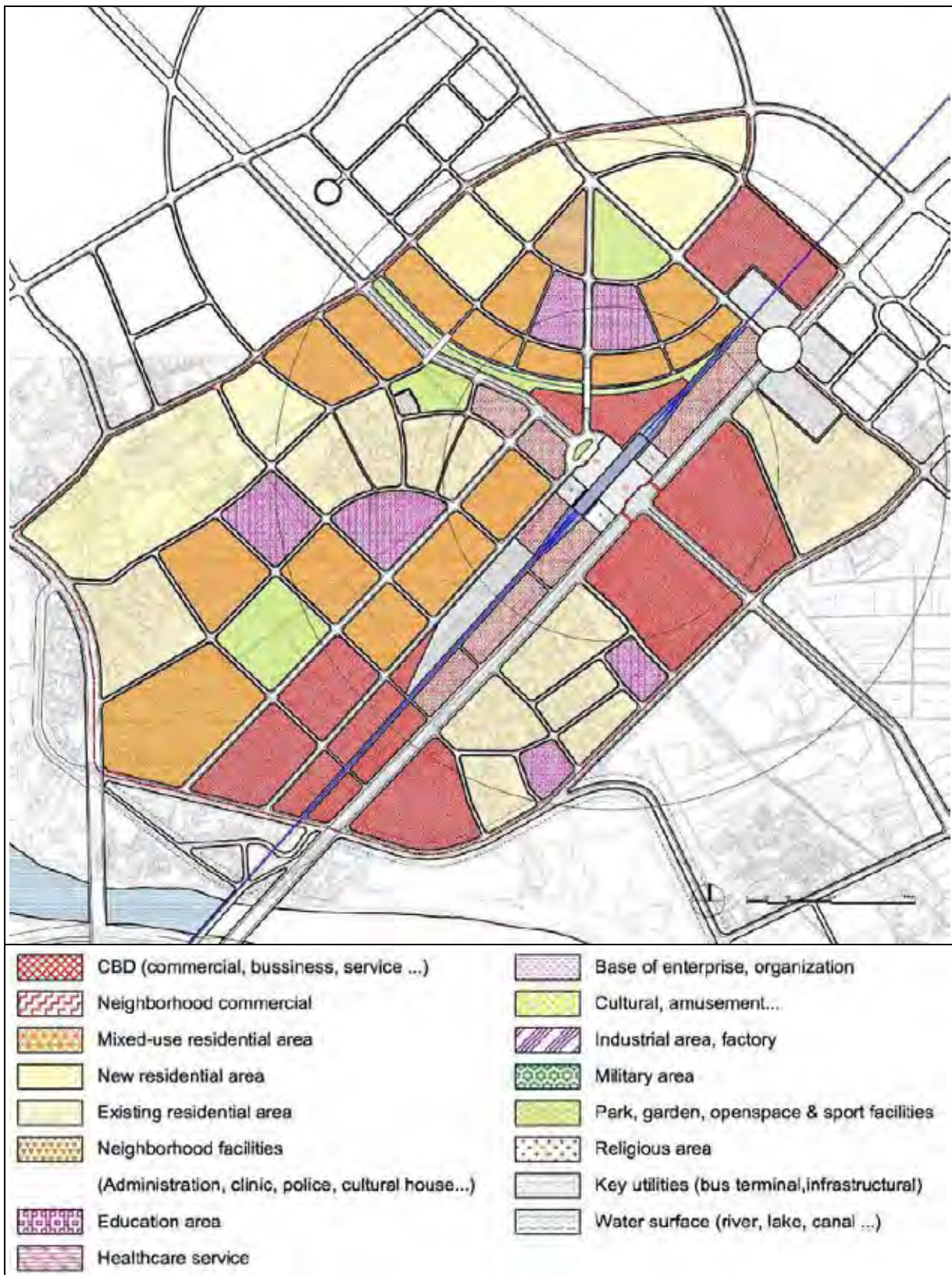
| | | Present | UMRT with integrated Urban Development | |
|-----------------------------------------------------|------------|---------|----------------------------------------|--------|
| | | | Without | With |
| Population of Station Area of radius 500m (persons) | Population | 3,980 | 7,000 | 16,000 |
| | Employment | 3,878 | 8,000 | 14,400 |
| | Student | 1,865 | 2,000 | 4,500 |
| Ridership (persons/day) | | - | 32,530 | 37,000 |

Source: JICA Project Team

4.51 Issues to be clarified of Yen Vien station area are as follows:

- i) Coordination with road development to cross over railway (mid and long-term): At present, there are few roads to cross railway. It is necessary to plan location, structure (ex. flyover, tunnel) and width, in terms of appropriate station area development.
- ii) Location of Ring-Railway: Existing railway is located in front of station location. In terms of integrated station area development, planned Ring-Railway to go to Lao Cai will be located some more north, where will not segmentise station area.

Figure 4.42 Long-term Concept Plan of Yen Vien Station Area (V1)



Source: JICA Project Team

4.4.2 Cau Duong station area (Line1-V2)

4.52 Cau Duong Station will be located near to the ramp of NH-1 and the bridge of Duong River. Along with the railway, small factories are located. On the east side of the ramp, big factories of light industry are clustered. To support daily transport activities of residents in new towns and existing settlement, station area will be developed along NH-1. In future, city trunk road will be developed and an integrated transport network with railway and roads will be formulated.

Table 4.45 Demand Outlook of Cau Duong Station Area (V2)

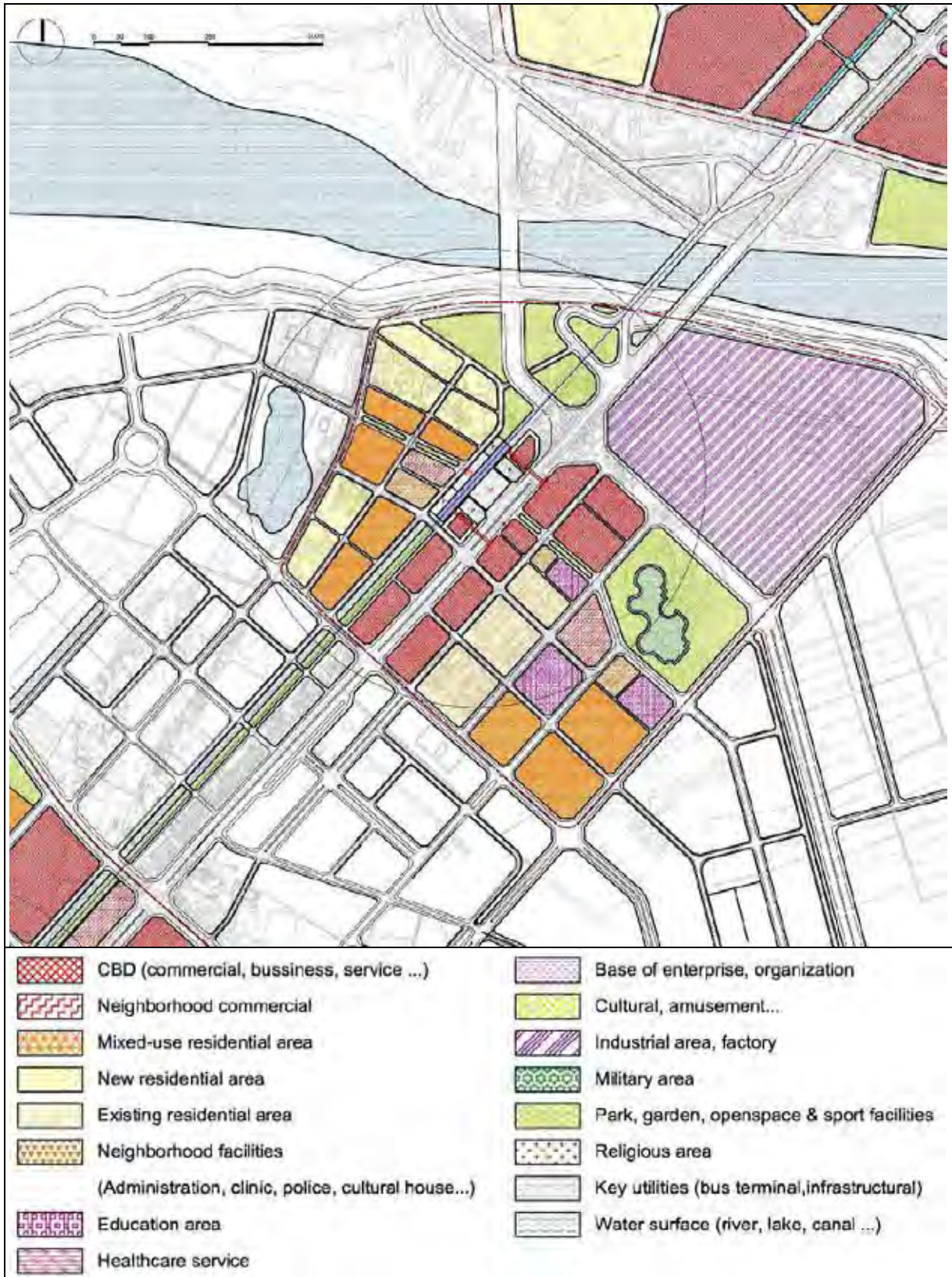
| | | Present | UMRT with integrated Urban Development | |
|-----------------------------------------------------|------------|---------|----------------------------------------|--------|
| | | | Without | With |
| Population of Station Area of radius 500m (persons) | Population | 3,127 | 7,400 | 7,900 |
| | Employment | 2,226 | 5,800 | 6,800 |
| | Student | 774 | 1,200 | 1,300 |
| Ridership (persons/day) | | - | 32,900 | 37,400 |

Source: JICA Project Team

4.53 Issues to be clarified of Cau Duong station area are as follows:

- i) Improvement of accessibility from NH-1 to station (short-term): There are existing built-up area between NH-1 and station. To improve accessibility to station, it is proposed to develop an access road and ITF in short-term. Land Readjustment project can be implemented to develop ITF.
- ii) Location of planned city trunk road and intersection (long-term): The city trunk road is planned in north of station. Since the intersection is near to station, it is necessary to adjust its alignment to cross the railway smoothly.

Figure 4.43 Long-term Concept Plan of Cau Duong Station Area (V2)



Source: JICA Project Team

4.4.3 Duc Giang station area (Line1-V3)

4.54 Industries and factories, of petro, steel, and electricity, etc. are clustered on the west side of railway. Duc Giang Street is an arterial road to connect to this industrial area from NH-1. Nearly half of residents in Duc Giang Commune are engaged of industry sector. Station area development will convert from mono-landuse of industries into mixed-landuse. Commercial and residential development around station and along NH-1 will contribute both employees and residents attractive and convenient working and living condition. Industrial factory area will be converted to environmental friendly industries to harmonize residential areas.

Table 4.46 Demand Outlook of Duc Giang Station Area (V3)

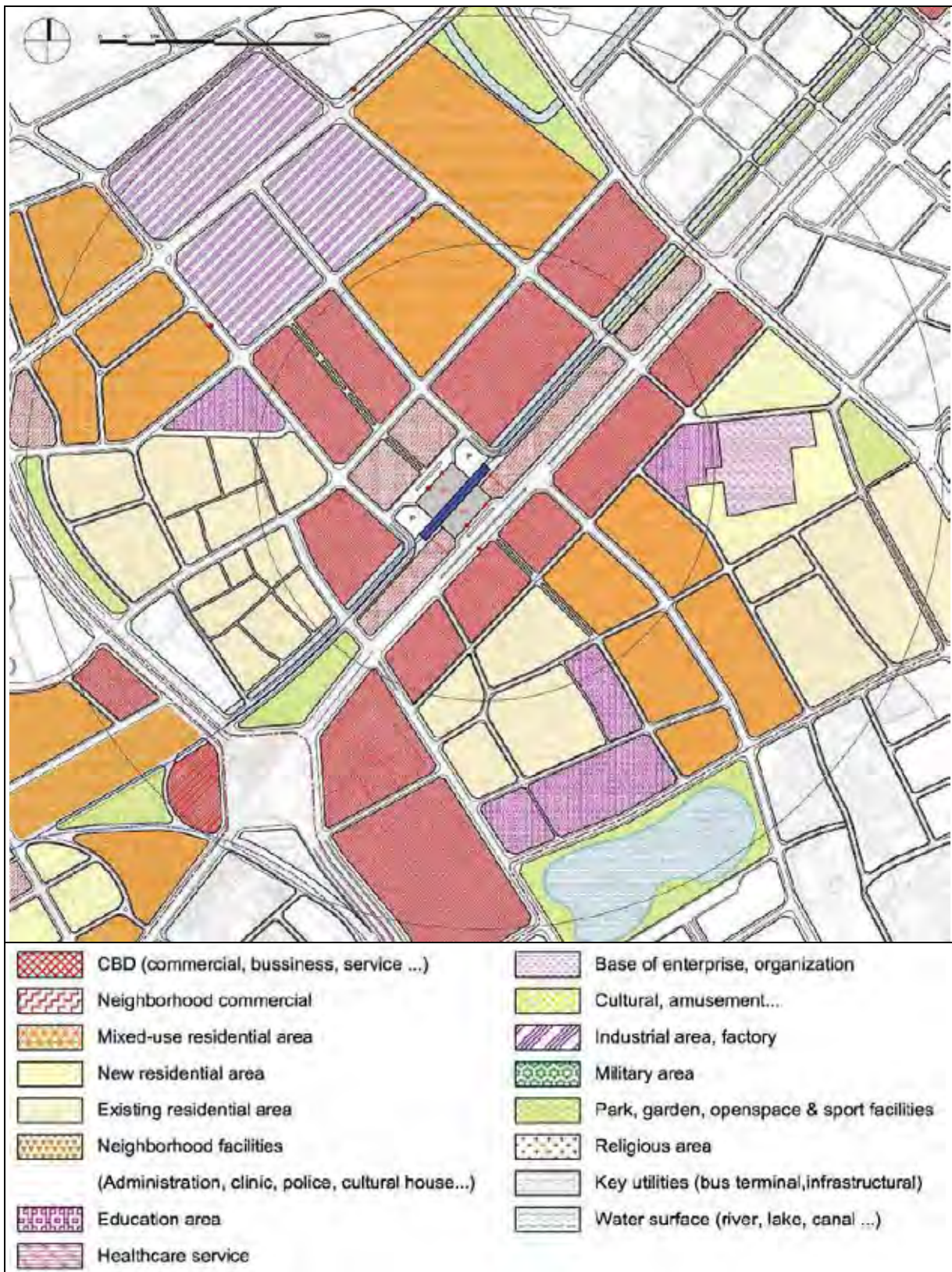
| | | Present | UMRT with integrated Urban Development | |
|-----------------------------------------------------|------------|---------|----------------------------------------|--------|
| | | | Without | With |
| Population of Station Area of radius 500m (persons) | Population | 8,805 | 8,400 | 8,900 |
| | Employment | 2,599 | 4,500 | 9,000 |
| | Student | 770 | 978 | 1,000 |
| Ridership (persons/day) | | - | 7,500 | 10,900 |

Source: JICA Project Team

4.55 Issue to be clarified of Duc Giang station area is as follows:

- i) Improvement of accessibility from NH-1 to station (short-term): There are existing built-up area between NH-1 and station. To improve accessibility to station, it is proposed to develop an access road and ITF in short-term. Land Readjustment project can be implemented to develop ITF.

Figure 4.44 Long-term Concept Plan of Duc Giang Station Area (V3)



Source: JICA Project Team

4.4.4 Hoang Liet station area (Line1-V13)

4.56 Hoang Liet Station will be located between Yen So Park, Linh Dam Lake. There are many factories on the east side of NH-1, but few commercial and public facilities are located at present. Hoang Liet Station will be a center facility of new towns. In integration with road network development, station area will be developed to serve for new town residents, visitors to park, and employees. The landuse of station area will be converted from industrial and agricultural into commercial and residential in future. With a new bus terminal, a public transport network will be formulated as one of transport hubs of south of Hanoi.

Table 4.47 Demand Outlook of Hoang Liet Station Area (V13)

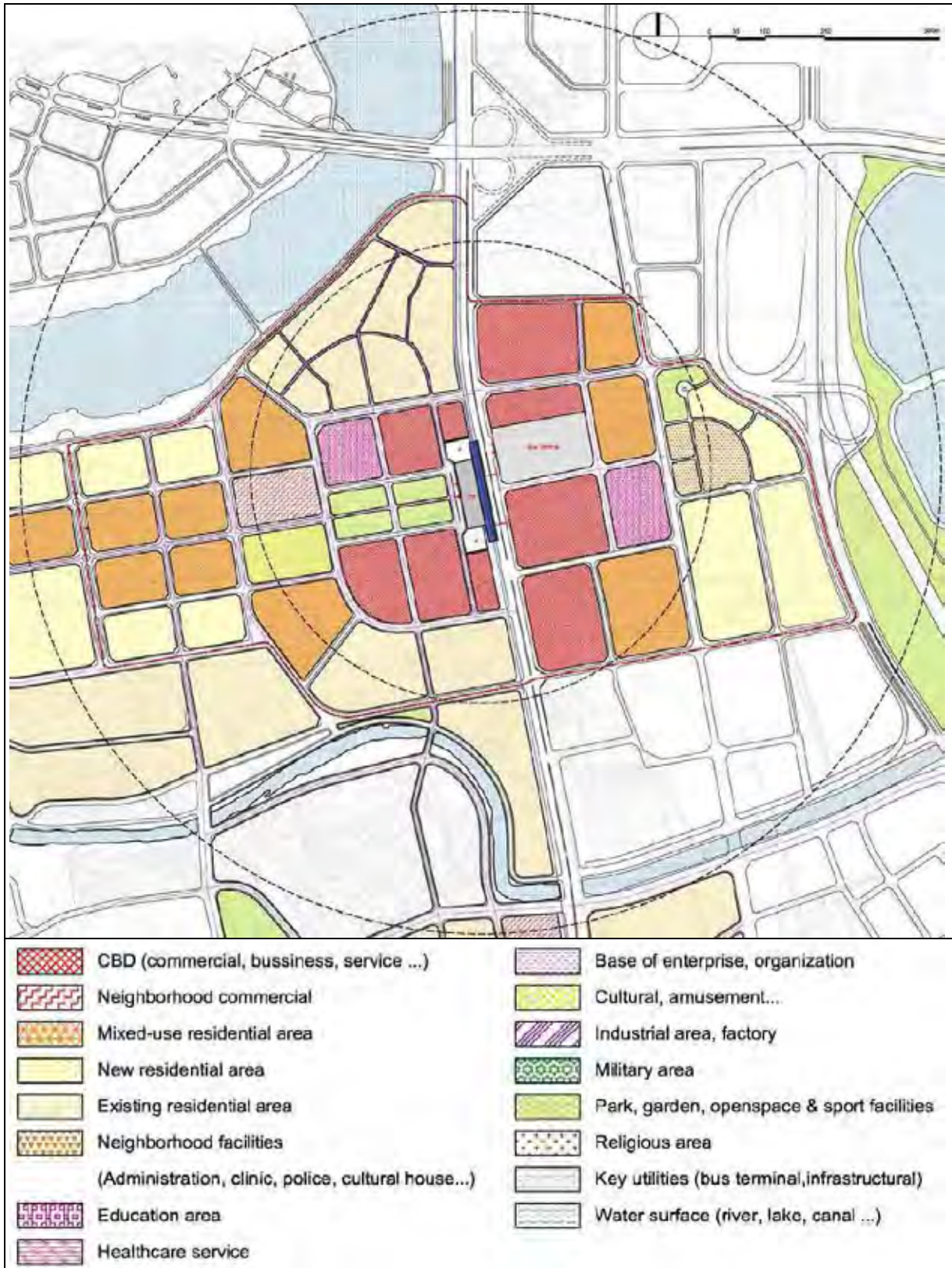
| | | Present | UMRT with integrated Urban Development | |
|-----------------------------------------------------|------------|---------|----------------------------------------|--------|
| | | | Without | With |
| Population of Station Area of radius 500m (persons) | Population | 2,659 | 8,200 | 11,200 |
| | Employment | 1,985 | 4,700 | 12,000 |
| | Student | 918 | 2,200 | 3,000 |
| Ridership (persons/day) | | - | 7,800 | 12,800 |

Source: JICA Project Team

4.57 Issue to be clarified of Hoang Liet station area is as follows:

- i) New bus terminal development (long-term): Though relocation of Giap Bat Bus Terminal has not been discussed and planned, it is proposed to develop a new bus terminal in this station area.

Figure 4.45 Long-term Concept Plan of Hoang Liet Station Area (V13)



Source: JICA Project Team

4.4.5 Van Dien station area (Line1-V14)

4.58 Van Dien Station is located along Giai Phong Street (NH-1), and small factories and shops are around it. Though the station is small at present, there are some urban facilities such as Party Committee of Thanh Tri District, Thanh Tri Hospital, Thanh Tri commercial center, etc. As a district administrative center of Thanh Tri District, station area development will contribute to public and neighboring service. After connecting Phan Trong Tuc Road extension from west to east, broader-based administrative services would be accessible for citizens living farther out.

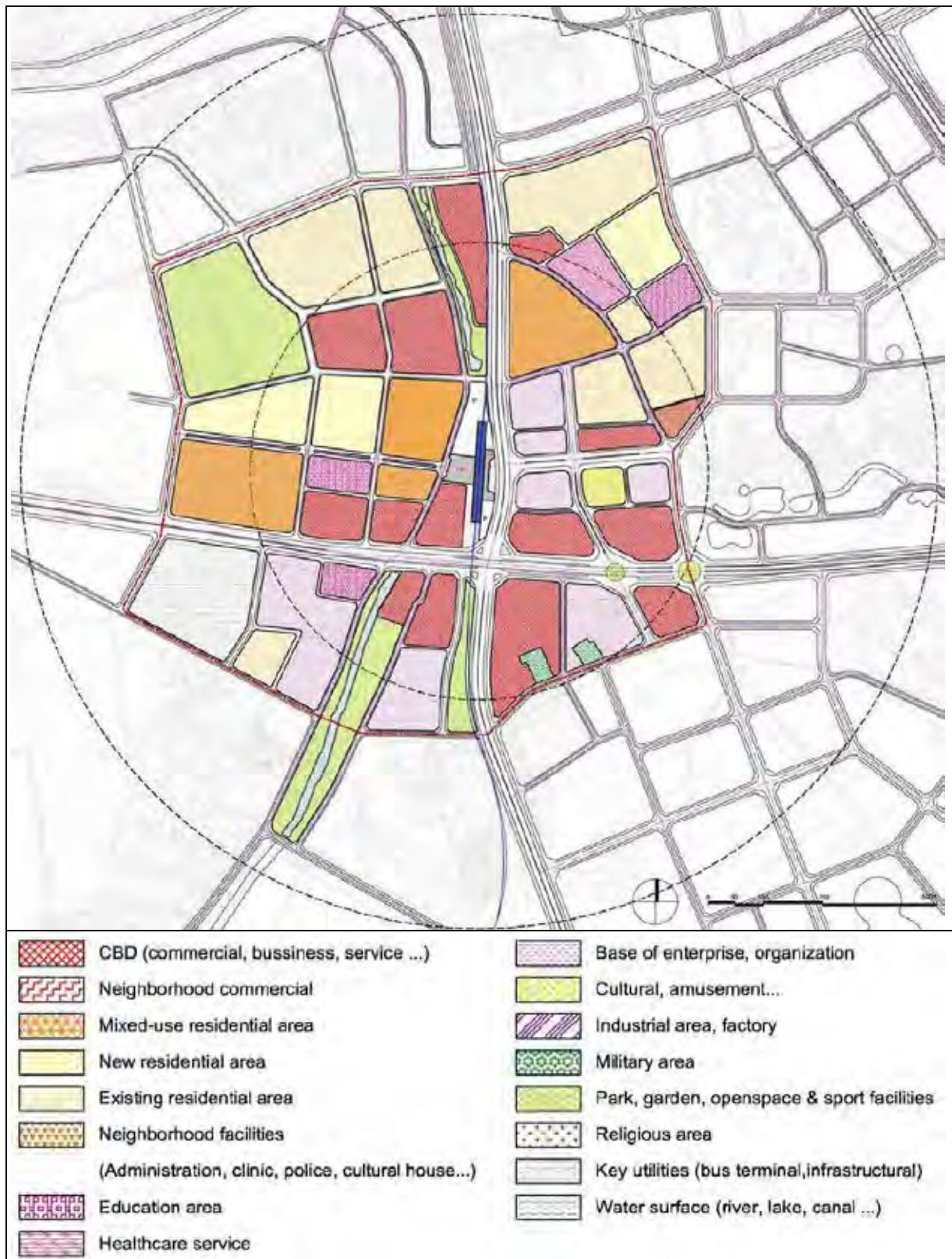
Table 4.48 Demand Outlook for Van Dien Station Area (V14)

| | | Present | UMRT with integrated Urban Development | |
|-----------------------------------------------------|------------|---------|----------------------------------------|--------|
| | | | Without | With |
| Population of Station Area of radius 500m (persons) | Population | 4,520 | 9,900 | 11,900 |
| | Employment | 2,461 | 12,700 | 15,900 |
| | Student | 839 | 2,300 | 2,800 |
| Ridership (persons/day) | | - | 8,100 | 11,300 |

Source: JICA Project Team

4.59 Issues to be clarified of Van Dien station area are not specified.

Figure 4.46 Long-term Concept Plan of Van Dien Station Area (V14)



Source: JICA Project Team

4.4.6 Vinh Quynh station area (Line1-V15)

4.60 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. 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. 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.

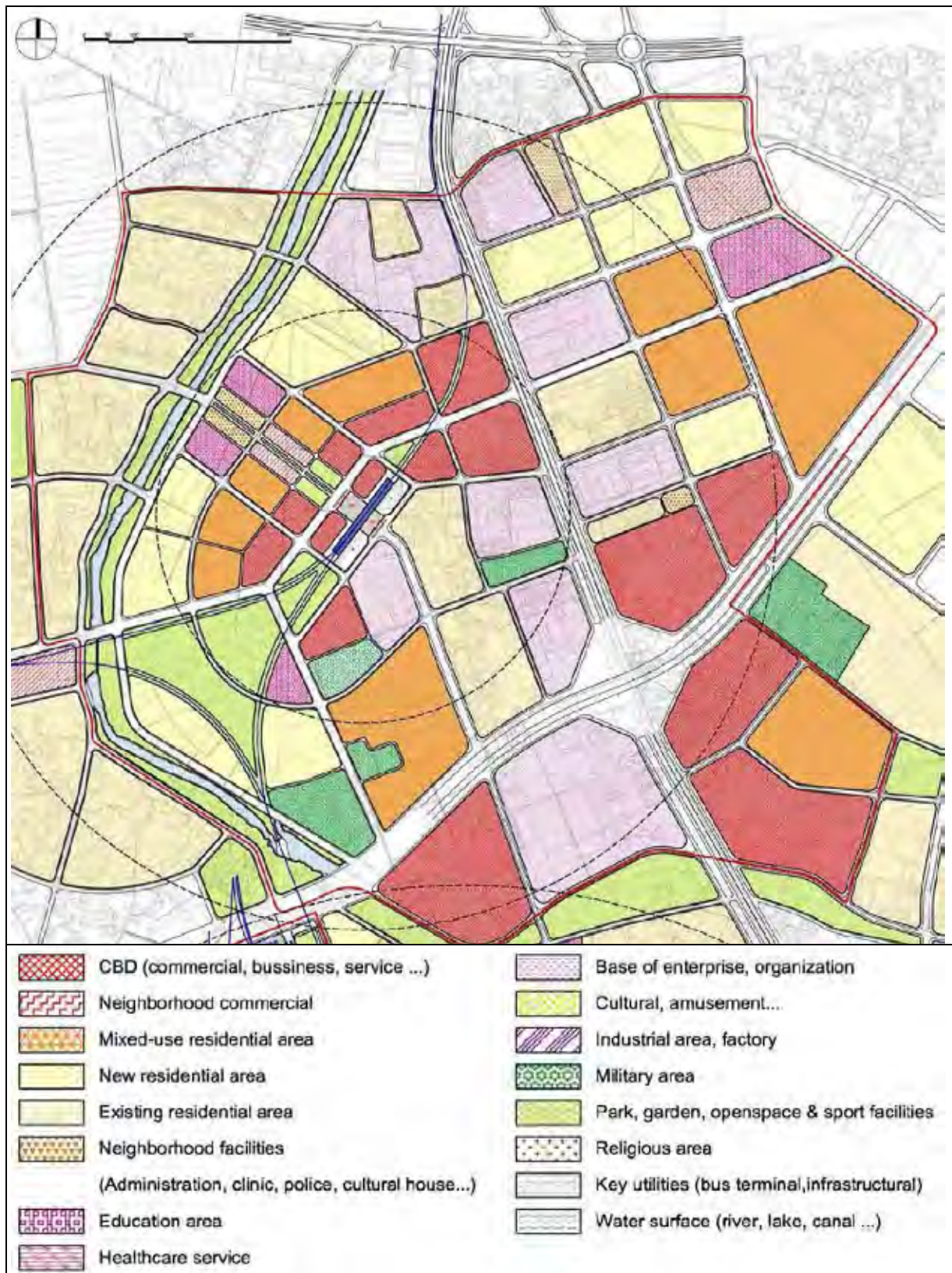
Table 4.49 Demand Outlook for Vinh Quynh Station Area (V15)

| | | 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

4.61 Issues to be clarified of Vinh Quynh station area are not specified.

Figure 4.47 Long-term Concept Plan of Vinh Quynh Station Area (V15)



Source: JICA Project Team

4.4.7 Cau Den station area (Line2-C11)

4.62 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 public apartment complex is located. Living condition of this complex has been worsened while traditional lifestyle with community is still remained. Cau Den Station Area will be developed as a new commercial center harmonized with cultural environments. 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.

Table 4.50 Demand Outlook for Cau Den Station Area (C11)

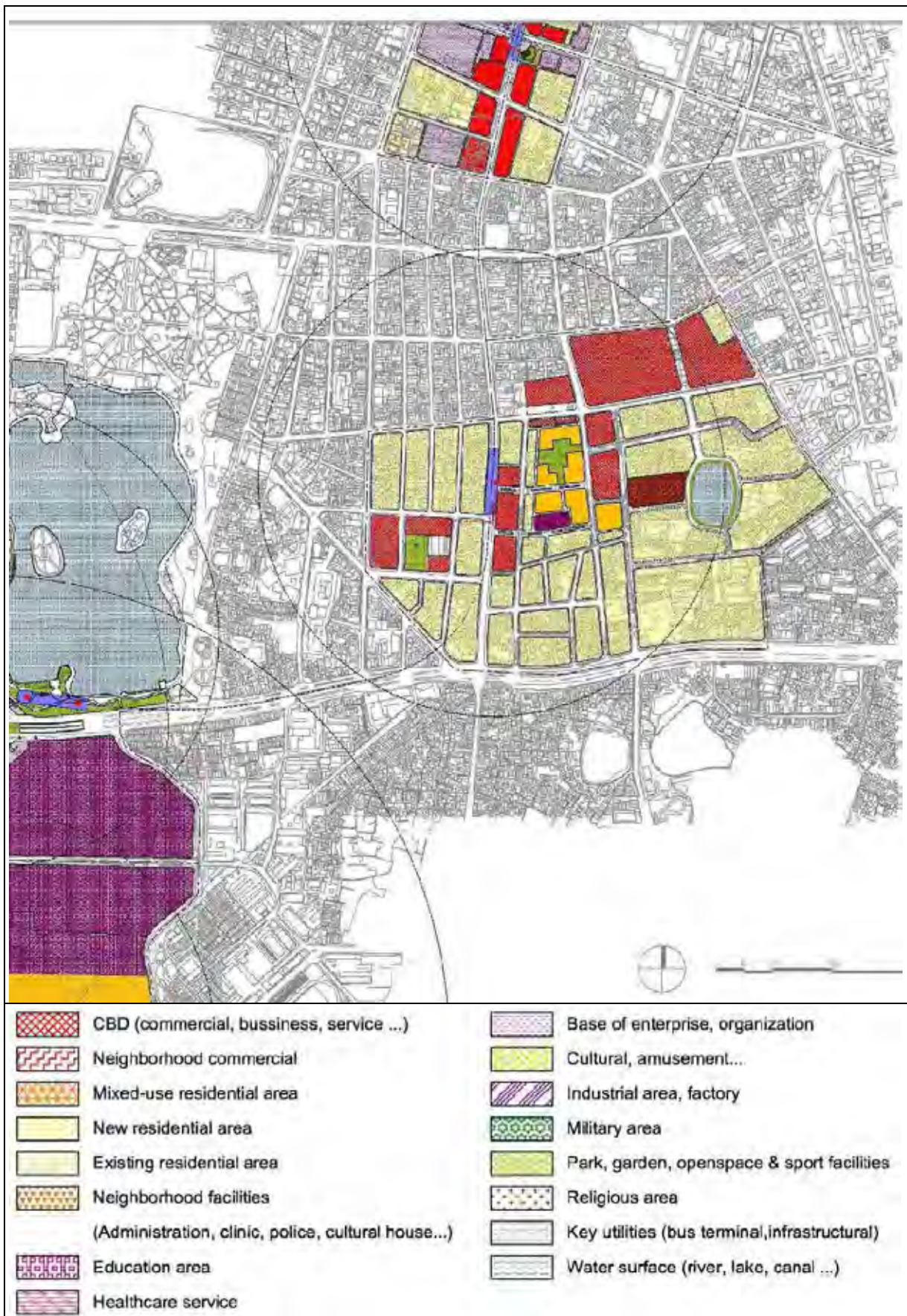
| | | Present | UMRT with integrated Urban Development | |
|-----------------------------------------------------|------------|---------|----------------------------------------|--------|
| | | | Without | With |
| Population of Station Area of radius 500m (persons) | Population | 37,260 | 27,300 | 28,800 |
| | 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

4.63 Issues to be clarified of Cau Den station area are as follows:

- i) Urban redevelopment of Nguyen Cong Tru KTT (short& mid-term): 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.

Figure 4.48 Long-term Concept Plan of Cau Den Station Area (C11)



Source: JICA Project Team

4.4.8 Kim Lien station area (Line2-C13)²

4.64 Kim Lien Station will be located inside the area of Kim Lien KTT, which urban redevelopment projects will be implemented at the same time with UMRT development. 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 peri-urban area.

Table 4.51 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 |

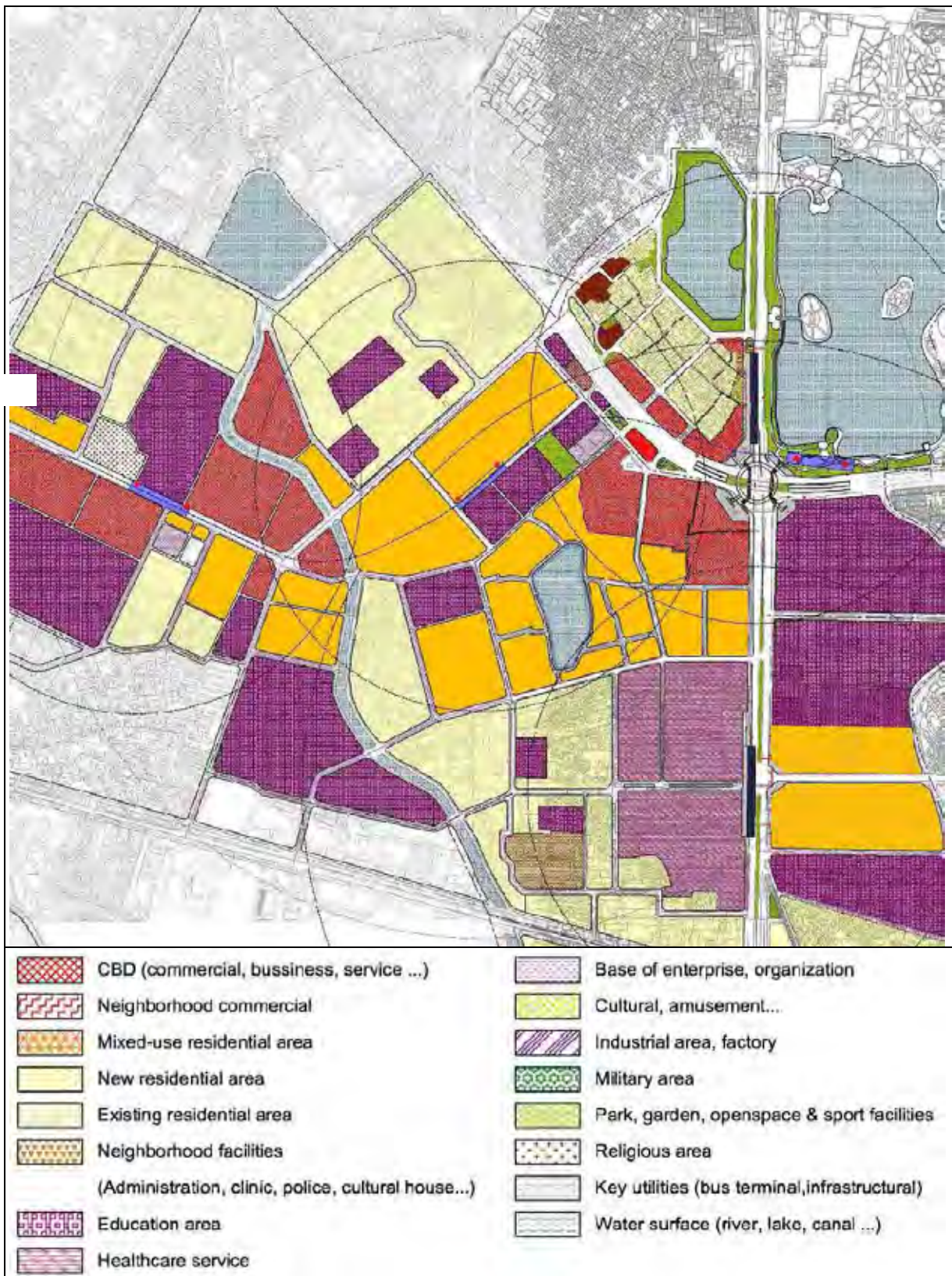
Source: JICA Project Team

4.65 Issues to be clarified of Kim Lien station area are as follows:

- i) 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.
- ii) 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.
- iii) 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.

² 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 3rd Steering Committee Meeting. S/C basically agreed with it.

Figure 4.49 Long-term Concept Plan of Kim Lien Station Area (C13)



Source: JICA Project Team

4.4.9 Chua Boc station area (Line2-C14)

4.66 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. 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.

Table 4.52 Demand Outlook of Chua Boc Station Area (C14)

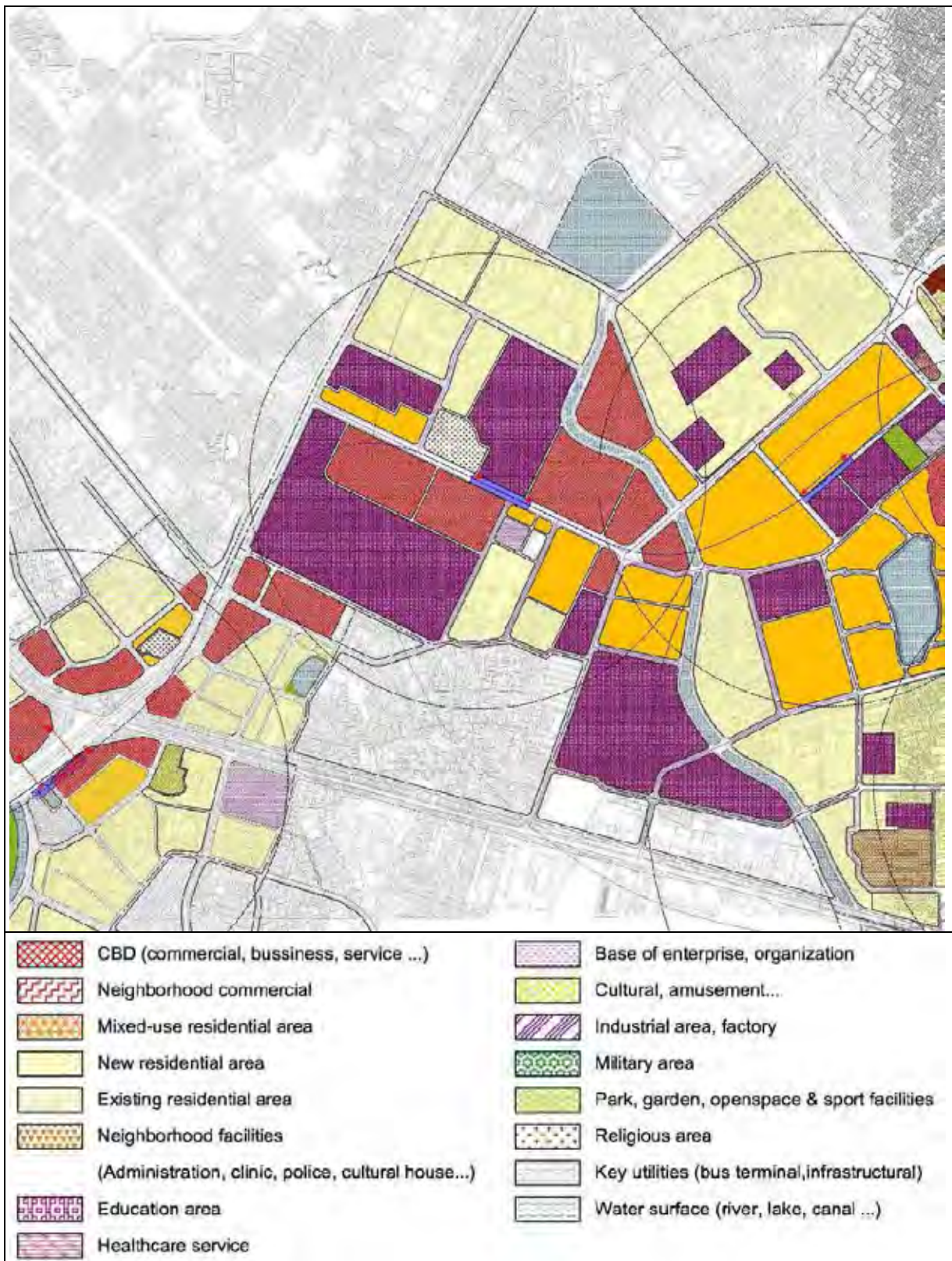
| | | Present | UMRT with integrated Urban Development | |
|-----------------------------------------------------|------------|---------|----------------------------------------|--------|
| | | | Without | With |
| Population of Station Area of radius 500m (persons) | Population | 30,189 | 27,000 | 28,200 |
| | 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

4.67 Issue to be clarified of Chua Boc station area is as follows:

- i) 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.

Figure 4.50 Long-term Concept Plan of Chua Boc Station Area (C14)



Source: JICA Project Team

4.4.10 Nga Tu So station area (Line2-C15)

4.68 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. 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.”

Table 4.53 Demand Outlook for Nga Tu So Station Area (C15)

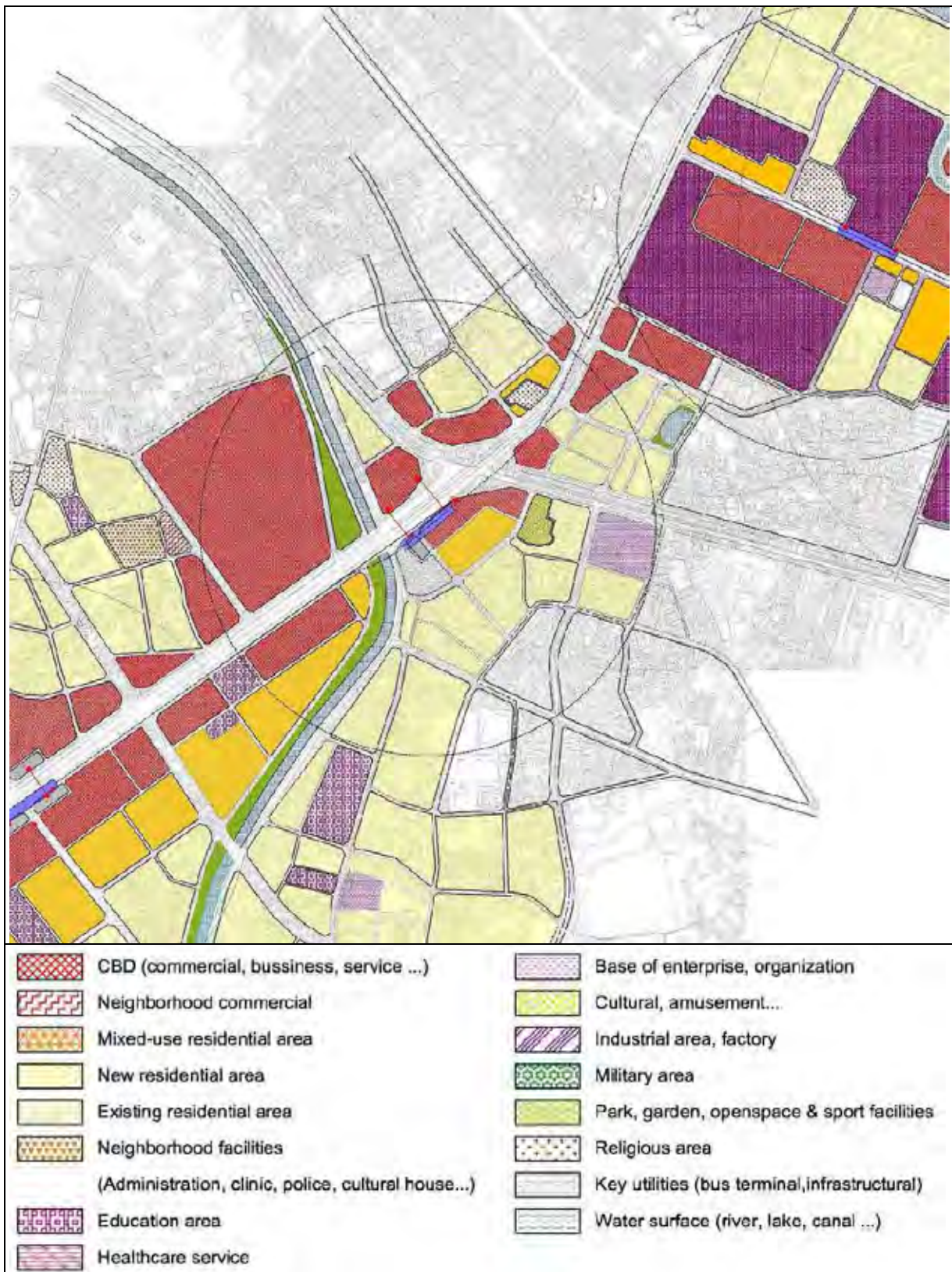
| | | Present | UMRT with integrated Urban Development | |
|-----------------------------------------------------|------------|---------|----------------------------------------|--------|
| | | | Without | With |
| Population of Station Area of radius 500m (persons) | Population | 23,022 | 17,700 | 17,700 |
| | 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

4.69 Issues to be clarified of Nga Tu So station area are as follows:

- i) 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.
- ii) 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.
- iii) 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.

Figure 4.51 Long-term Concept Plan of Nga Tu So Station Area (C15)



Source: JICA Project Team

4.5. Summary of Estimated Cost

4.70 Identified projects are categorized by implementation stages: A minimum development which must be ready when the UMRT lines are open, B: short-term of 1-3 years after opening, C: mid-term of 3-5years after opening, and D: long-term of 5-10years after opening.

4.71 Table 4.54 shows overall construction cost of short-term of Phase1 stations including A: minimum and B: short-term.

Table 4.54 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 ¹⁾ | 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 ²⁾ | 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 ²⁾ | 2,900 | 42,300 |
| V | Subtotal of Line1 ³⁾ | 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.

4.6. Summary of Issues to be Clarified

4.72 In concept plans, it is aimed to improve accessibility to stations and between stations of different lines and bus stops, and connectivity to neighboring facilities to enhance socio-economic impacts of surrounding station areas. To achieve them, there are various issues to be clarified, especially:

- i) Adjustment of station location of transfer UMRT lines
- ii) Adjustment of approved district plans and detailed plans
- iii) Adjustment of approved road alignment
- iv) Coordination with neighboring development projects (ex. new town development, urban redevelopment for commercial facilities, etc.)

4.73 Table 4.55 shows the summary of issues for each station area.

Table 4.55 Issues to be Clarified for Each Station Area

| Station area | Issues to be clarified | Period | Responsible agency |
|-------------------------------------|-----------------------------------------------------------------------------------------|------------------|-----------------------|
| V4: Gia Lam | Adjustment of approved road alignment of north | Minimum | HAUPA, HDOT |
| | Relocation of VNR property | Long-term | VNR, HPC |
| | Landuse conversion from industrial use of VNR owned land to commercial and business use | Long-term | HAUPA, VNR |
| V6: Nam Cau Long Bien& C8: Hang Dau | Adjustment of station location | Minimum | VNR, HPC |
| | Road development under/along the elevated railway | Minimum | HPC, VNR |
| | Adjustment of plans of underground parking development and water tower redevelopment | Minimum | HPC, HRB |
| | Urban redevelopment of Army related facilities | Short& mid-term | MOD, HPC, VNR |
| | Traffic management of Ancient Quarter | Long-term | HDOT |
| V8: Hanoi | Adjustment of location of Tran Hung Dao Station of Line3 | Minimum | HPC |
| | Extension of Tran Hung Dao Street to west | Short-term | HPC |
| | Preservation of architecture of existing Hanoi Station | Short-term | VNR, HPC |
| V9: C.V. Thong Nhat& C12: Bach Khoa | Connectivity with Line1 and Line2 | Short& long-term | MOT, HPC, VNR |
| | Land acquisition and relocation for urban renovation of residential area | Long-term | HPC |
| V12: Giap Bat | Disposition of VNR property | Short& long-term | VNR, HPC |
| | Possible redevelopment and relocation of Giap Bat Bus Terminal | Long-term | TRAMOC, HDOT |
| C3: Tay Ho Tay | Coordination with Tay Ho Tay Financial Center Development Plan | Short-term | HRB, HAUPA |
| | Integration with BRT station | Long-term | HPC, HRB |
| | Development of bus terminal and CAT | Long-term | HPC, TRAMOC, HDOT |
| C5: Quan Ngua | Coordination with alignment of widened Hoang Hoa Tham Street | Short-term | HRB, HDOT |
| | Adjustment of location of Line5 station | Long-term | HPC |
| C16: Thuong Dinh | Adjustment of location of Line2A and Line4 station | Short& long-term | HPC, MOT |
| | Coordination with urban redevelopment projects of existing factories | Mid& long-term | HAUPA |
| V5: Bac Cau Long Bien | Development potential of out of dyke area | Short& long-term | HPC, VNR, MARD, MONRE |
| | Coordination with Ngoc Thuy New Town Project | Short& mid-term | HAUPA, VNR |
| | Preservation and promotion of Long Bien Bridge | Short& mid-term | HPC, MOCST |
| V7: Phung Hung | Development of trunk road of Phung Hung street | Short-term | HDOT, VNR |

| | | | |
|---------------------|-----------------------------------------------------------------------------------------------|------------------|-------------------------------|
| | Urban redevelopment of Army Library for station entrance space development | Long-term | MOD, HPC, VNR |
| V10: B.V. Bach Mai | Development of access road inside urban facility sites | Short-term | HDOT, hospitals, universities |
| | Urban redevelopment of urban facilities | Long-term | Hospitals, universities |
| V11: Phuong Liet | Not specified | | |
| V16: Ngoc Hoi | Conversion of landuse of industrial zone | Short& mid-term | HAUPA |
| | Reservation land for VNR-related facilities | Short-term | VNR, HAUPA |
| C1: Nam Thang Long | Coordination with CIPTRA New Town Project | Short-term | HAUPA |
| C2: Ngoai Giao Doan | Coordination with Ngoai Giao Doan Diplomatic Town Development Project | Short-term | HAUPA |
| C4: Bui | Not specified | | |
| C6: Bach Thao | Adjustment of alignment of widening trunk roads of Hoang Hoa Tham Street and Thuy Khue Street | Short-term | HRB, HDOT |
| C7: Ho Tay | Coordination with new Governmental Office Development Plan for security and accessibility | Short-term | GOV, HPC |
| C9: Hoan Kiem Lake | Preservation of historical, cultural and natural properties | Short-term | HPC, MOCST, DOCST, HRB |
| C10: Tran Hung Dao | Adjustment of location of Line3 station | Short-term | HRB |
| Yen Vien | Coordination with road development to cross over railway | Mid& long-term | VNR, HAUPA, HDOT |
| | Location of Ring-Railway | Mid& long-term | VNR, HAUPA |
| Cau Duong | Improvement of accessibility from NH-1 to station | Short-term | VNR, HAUPA, HDOT |
| | Adjustment of location of planned city trunk road and intersection | Long-term | HDOT, HAUPA |
| Duc Giang | Improvement of accessibility from NH-1 to station | Short-term | VNR, HAUPA, HDOT |
| Hoang Liet | New bus terminal development | Long-term | TRAMOC, HDOT, HAUPA |
| Van Dien | Not specified | | |
| Vinh Quynh | Not specified | | |
| Cau Den | Urban redevelopment of Nguyen Cong Tru KTT | Mid& long-term | HAUPA |
| Kim Lien | Coordination and integration with Kim Lien KTT | Short-term | HRB, HAUPA |
| | Service facility development | Short& mid-term | HRB |
| | Adjustment of road network plan | Short& mid-term | HAUPA, HDOT, HRB |
| Chua Boc | Urban redevelopment of KTTs | Mid-term | HAUPA |
| Nga Tu So | Adjustment of station location | Short-term | HRB, HAUPA |
| | Connection to pedestrian underground of Nga Tu So intersection | Short-term | HRB, HAUPA, HDOT |
| | Coordination with urban redevelopment projects | Short& long-term | HAUPA, HRB, HAPI |

Source: JICA Project Team

5. INITIAL ENVIRONMENTAL EXAMINATION (IEE)

5.1 Results of the preliminary environmental scoping are shown in Table 5.1 and Table 5.2. Proposed projects of the concept plans and these results of environmental examination should be reviewed and revised after discussions with stakeholders, relevant agencies, etc.

Table 5.1 Results of Initial Environmental Examination of Line1 Stations

| Aspect | Station No. and Name | | | | | | | | | | | | | | | | |
|-------------------------------------------------------------|----------------------|-------------------|-------------------|-----------------|---------------------------------|-------------------------|------------------|-------------------|-------------------------|-------------------|--------------------|--------------------|--------------------|---------------------|----------------------------|---------------------------|---|
| | 1 Yen Vien | 2 Duong Cau | 3 Giang Cau | 4 Duc Lam | 5 Gia Lam Long lien | 6 Bac Cau Long | 7 Cau Hung | 8 Phung Hoi | 9 Ha Noi Thong | 10 vien Mai | 11 Bach Liet | 12 Phung Bat | 13 Giap Liet | 14 Hoang Liet | 15 Van Dien Quynh | 16 Vinh Hoi Ngoc | |
| 1. Socio-economic Environment | | | | | | | | | | | | | | | | | |
| a. Involuntary resettlement | A | B | B | A | A | A | A | A | A | B | B | B | B | B | - | B | |
| b. Local economy e.g., employment and livelihood | C | C | C | C | C | C | C | C | C | - | C | C | C | C | C | B | |
| c. Land use and use of local resources | B | C | C | B | B | C | C | C | C | - | C | C | C | C | C | B | |
| d. Split of communities | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | C | |
| e. Existing social infrastructures, services | - | - | C | C | - | A | C | C | - | C | - | - | - | - | - | - | |
| f. Poor, ethnic people | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| g. Maldistribution of benefits and damages | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | - | |
| h. Cultural heritage | - | - | - | - | - | B | C | C | - | - | - | - | - | - | - | - | |
| i. Local conflicts of interests | C | C | C | C | C | C | C | C | C | C | C | C | C | C | C | - | |
| j. Water use or water rights and rights of common | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| k. Sanitation | A | A | A | A | A | A | A | A | B | B | B | B | B | B | B | B | |
| l. Hazards (risk), infectious diseases such as HIV/AIDS | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B | B | |
| 2. Natural Environment | | | | | | | | | | | | | | | | | |
| a. Topography and geography | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| b. Groundwater | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| c. Soil erosion | - | - | - | B | - | - | - | - | - | - | - | - | - | - | - | - | |
| d. Hydrological situation | B | - | - | - | - | - | - | - | - | - | - | B | - | - | - | B | |
| e. Coastal zone (mangroves, coral reefs, tidal flats, etc.) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| f. Flora, fauna and biodiversity | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| g. Meteorology | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| h. Landscape | - | - | - | - | - | C | - | - | - | - | - | - | - | - | - | - | |
| i. Global warming | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| 3. Pollution | | | | | | | | | | | | | | | | | |
| a. Air pollution | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | B | B |
| b. Water pollution | A | A | A | A | A | A | A | A | A | A | A | A | A | A | A | B | B |
| c. Soil contamination | A | A | A | B | B | A | A | A | A | A | A | A | A | A | A | B | B |
| d. Waste (including waste soil) | A | A | A | B | B | A | A | A | A | A | A | A | A | A | A | B | B |
| e. Noise and vibration | B | B | B | B | B | B | B | B | B | A | B | B | B | B | B | B | |
| f. Ground subsidence | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| g. Offensive odor | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| h. Bottom sediment | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| i. Accidents, traffic congestion | B | B | B | B | B | B | B | A | A | A | A | A | A | A | A | B | B |
| j. Radio wave interference | B | B | B | B | B | B | B | A | B | A | B | B | B | B | B | - | - |
| k. Sunshine shading | - | B | B | - | A | A | A | A | A | A | A | B | B | B | B | - | - |

Source: JICA Project Team

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 5.2 Results of Initial Environmental Examination of Line2 Stations

| Aspect | Station No. and Name | | | | | | | | | | | | | | | |
|-------------------------------------------------------------|----------------------|---------------------|----------------------------|----------|----------------|----------------|-------------|---------------|---------------------|---------------------|---------------|-----------------|----------------|----------------|-----------------|-------------------|
| | 1 Lomb | 2 Nam Thang Doan | 3 Ngoai Giao Tay Ho Tay | 4 Bui | 5 Quan Ngua | 6 Bach Thao | 7 Ho Tay | 8 Hang Dau | 9 Hoan Kiem Lake | 10 Tran Hung Dao | 11 Cau Den | 12 Bach Khoa | 13 Kim Lien | 14 Chua Boc | 15 Nga Tu So | 16 Thuong Dinh |
| 1. Socio-economic Environment | | | | | | | | | | | | | | | | |
| a. Involuntary resettlement | B | - | - | - | B | B | B | B | - | A | C | - | - | A | A | A |
| b. Local economy e.g. employment and livelihood | C | - | - | C | C | C | C | C | C | C | C | C | C | C | C | C |
| c. Land use and use of local resources | C | C | C | C | C | C | - | C | C | C | C | C | C | C | C | C |
| d. Split of communities | B | C | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| e. Existing social infrastructures and services | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| f. Poor, ethnic people | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| g. Maldistribution of benefits and damages | C | - | - | C | C | C | C | C | C | C | C | C | C | C | C | C |
| h. Cultural heritage | - | - | - | C | - | - | C | B | C | - | - | - | - | C | C | - |
| i. Local conflicts of interests | C | - | - | C | C | C | C | C | C | C | C | C | C | C | C | C |
| j. Water use or water rights and rights of common | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| k. Sanitation | B | - | - | B | B | B | B | B | B | B | B | B | C | B | B | B |
| l. Hazards (risk), infectious diseases such as HIV/AIDS | B | C | C | B | B | B | B | B | B | B | B | B | B | B | B | B |
| 2. Natural Environment | | | | | | | | | | | | | | | | |
| a. Topography and geography | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| b. Groundwater | - | - | - | B | B | B | B | B | A | A | A | A | B | A | A | B |
| c. Soil erosion | - | - | C | B | B | B | B | B | A | A | A | A | B | B | B | B |
| d. Hydrological situation | - | - | - | - | - | - | - | - | A | - | - | B | - | - | - | - |
| e. Coastal zone (mangroves, coral reefs, tidal flats, etc.) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| f. Flora, fauna and biodiversity | - | - | - | - | - | - | B | B | A | - | - | B | - | - | - | - |
| g. Meteorology | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| h. Landscape | C | C | - | - | - | - | B | B | B | - | - | - | - | - | - | - |
| i. Global warming | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 3. Pollution | | | | | | | | | | | | | | | | |
| a. Air pollution | B | B | B | B | B | B | A | A | A | A | A | B | B | B | B | B |
| b. Water pollution | B | B | B | B | A | A | A | A | A | A | A | A | B | A | A | B |
| c. Soil contamination | B | B | B | B | B | B | A | A | A | A | A | A | B | A | A | B |
| d. Waste (including waste soil) | B | B | B | A | A | A | A | A | A | A | A | A | A | A | A | B |
| e. Noise and vibration | B | - | - | B | B | B | B | B | B | B | B | B | B | B | B | B |
| f. Ground subsidence | - | - | - | B | A | A | A | A | A | A | A | B | B | A | A | B |
| g. Offensive odor | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| h. Bottom sediment | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| i. Accidents, traffic congestion | A | - | - | A | A | A | A | A | A | A | A | B | A | A | A | A |
| j. Radio wave interference | B | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| k. Sunshine shading | B | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

Source: JICA Project Team

Note A: serious negative impact is expected;
 C: extent of impact is unknown, further study is needed;

B: negative impact is expected to some extent;
 -: limited impact/negligible impact