Environmental Assessment Report

Initial Environmental Examination
Project Number: 40080
May 2014

VIE: Strengthening Sustainable Urban Transport for Ha Noi Metro Line 3 Project

Prepared by the Ha Noi People's Committee for the Asian Development Bank

NOTE

In this report, "$" refers to US dollars.

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Acronyms and Abbreviations

ADB	Asian Development Bank
AFC	Automatic Fare Collection
AP	Affected Persons
AFD	*Agence Francaise de Developpement*
AH	Affected Households
ASIF	Activity-Share-Intensity-Fuel Framework
BAU	Business as Usual
CEMP	Contractor's Environmental Management Plan
CGRO	Commune Grievance Redress Officer
CPC	Commune People's Committee
CTF	Clean Technology Fund
DAPM	Dept of Architecture and Planning Management (DAPM)
DD	Detailed Design
DDIS	Detailed Design and Implementation Supervision
DGTPE	Direction General du Tresor et del a Politique Economique *Directorate General of Treasury and Economic Policy (of the French Ministry of Economy, Finance and Industry)*
DMF	Design and Monitoring Framework
DoC	Department of Construction (Hanoi)
DoNRE	Department of Natural Resources and Environment
DPC	District People's Committee
DoT	Department of Transport (Hanoi)
E &M	Electrical and Mechanical
EFFECT	Energy Forecasting Framework and Emissions Consensus Tool
EA	Executing Agency
EARF	Environmental Assessment and Review Framework
EMP	Environmental Management Plan
EMS	Environmental Management Staff
FFEM	*Fond Francaise pour L'Environment Mondial*
FS	Feasibility Study
GEF	Global Environment Facility
GHG	Green House Gas
GoV	Government of Vietnam
HAIDEP	Hanoi Integrated Development and Environment Program
HAPI	Hanoi Agency for Planning and Investment
HPC	Hanoi People's Committee
HUTDP	Hanoi Urban Transport Development Project (WB)
IMV	*Institut du Metiers des Villes (HPC/Region Ile de France)*
IEE	Initial Environmental Examination
IA	Implementing Agency
JICA	Japan International Cooperation Agency
KfW	Kreditanstalt für Wiederaufbau *German Development Bank*
MoT	Ministry of Transport
MRB	Hanoi Metropolitan Rail Transport Project Board
MRT	Mass Rapid Transit
NPP	Note de Presentation de Project
O&M	Operations and Maintenance
PAI	*Program d'Assistance Institutionelle*
PAUIE	*Program d'Assistance Urbain, Infrastructure et Environment*
PDO	Project Description Outline (GoV Term)
PIC	Project Implementation Consultant
PMU	Project Management Unit

PPC	Provincial People's Committee
PPIAF	Public Private Infrastructure Advisory Facility
PPTA	Project Preparation Technical Assistance
PSP	Private Sector Participation
PTA	Public Transport Authority
PIU	Project Implementation Unit
REA	Rapid Environmental Assessment
ROW	Right of Way
RP	Resettlement Plan
RACE	Rapid Assessment of City (Carbon) Emissions
RRP	Report and Recommendations of the President
SAPI	Special Assistance for Project Implementation (JICA)
SBV	State Bank of Vietnam
SOE	State Owned Enterprise
SPS	ADB's Safeguard Policy Statement (2009)
STI	Sustainable Transport Initiative (ADB)
SYSTRA	French Consultant (PIC for UMRT 3)
TEEMP	Transport Emissions Evaluation Model for Projects
TRAMOC	Traffic Management and Operations Centre
UMRT	Urban Mass Rapid Transit
UMRT 3	Hanoi Urban Mass Transit Line 3
VNR	Vietnam Railways
VNRA	Vietnam Railway Administration (MoT)
WPC	Ward People's Committee
WB	World Bank

Executive Summary

1. The proposed project is the construction of urban transport facilities along the 12.5-kilometer of Ha Noi Metro Line 3, primarily at the twelve (12) planned stations, together with the services and the necessary policy and regulatory measures that will encourage public transport usage. Proposed structures will be sited within the administrative areas identified below.

Project Location

Station Number	Station Name	Commune	District
Elevated			
1	Nhon	Xuan Phuong & Minh Khai Commune	TuLiem
2	Minh Khai	Minh Khai	TuLiem
3	PhuDien	PhuDien	TuLiem
4	CauDien	PhuDien-CauDien Town	TuLiem
5	Le DucTho	Mai DichWard	CauGiay
6	National University	DichVong Ward	CauGiay
7	Chua Ha	DichVong Ward - DichVongHau	CauGiay
Underground			
8	CauGiay	Ngoc Khanh Ward	Ba Dinh
9	Ngoc Khanh	Ngoc Khanh Ward	Ba Dinh
10	Cat Linh	Cat Linh Ward	Dong Da
11	Van Mieu	Van Mieu Ward	Dong Da
12	Ga Ha Noi	Cua Nam Ward	HoanKiem

2. The Project is to be financed by ADB for US$10 million, the Clean Technology Fund (CTF) for US$ 49 million and Government of Vietnam for US$ 6 million.

3. The Hanoi Department of Transport is the Implementing Agency (IA) for the Project, and Hanoi's Transport Management and Operation Center (TRAMOC) has been designated as the focal point.

4. Based on the ADB's Safeguard Policy Statement (SPS 2009), this project is categorized as Category B for it will not cause significant negative impacts on the environment. Correspondingly, this document or the Initial Environmental Examination (IEE) was prepared in compliance with the requirements of the SPS which is also in line with the Vietnam Laws on environmental protection and other relevant regulations.

5. Brief result of the initial environmental evaluation undertaken for each phase of the project are presented as follows:

   - Construction phase: As assessed, construction activities will result to traffic congestion, increased dust concentration, noise level, vibration, generation of wastes, possible damage to communication facilities, drainage lines, power and water connections, removal of structures and small to medium growth trees within the project corridor, obstructions on the passageway of various establishments, residences and increased pollution load to nearby lakes and river.
   - Operation phase: The implementation of the Project is expected to cause positive environmental impacts to air quality as it will lead to lower emissions, mainly due to the increase of passengers to the Metro lines thereby reducing the amount of vehicle traffic and emissions on the road city. This will also cause a positive impact on the health of those who live and work near the project corridor. As the project also intends to improve facilities for walking and cycling to stations further reduction in operational noise levels is anticipated..

6. Information on the physic-chemical, biological characteristics of the environment including the social concerns and recommendations were collected. Applicable secondary data were taken from the recent

studies conducted on similar projects while the primary information were generated through field visits, interviews, public consultations and focus group discussions. Findings of the study team were also incorporated in this IEE.

7. Air Quality: There are reports that ambient air quality is deteriorating partly due to the use of dirty fuel and the increasing number of motorized vehicles, building construction…. Industries, on the other hand, are among the stationary sources of air pollution in Vietnam.

8. Results of air quality assessment from 2006 to 2010 in Hanoi City (Status of Environment 2006-2010 period, Hanoi DONRE) shows that the TSP level in Stations 4 and 5 fluctuates significantly from 2006 to 2010, almost twice of its standard value. Data in 2010, however, was within the limit for TSP.

9. Similarly, findings on the air quality monitoring conducted by the Center for Environmental Protection in Transport in 2007 reflects that NO2 concentration has been exceeded within Stations 1, 9 and 10. For 2008 monitoring, NO2 was within the standard value.

10. Noise: Based on the results of noise monitoring from 2006-2010, increased in noise level in Hanoi City is attributed to transport movements, construction activities, industries and daily socio-economic activities. Increase in noise levels occurred both on daytime and night time. Typical daytime noise levels in residential areas are 75 –85 dB (A) and can reach 85 – 90 dB(A) in the vicinity of major road corridors (Mai Dich Flyover, Nguyen Chi Thanh- La Thanh Dyke).

11. Noise monitoring results in 16 locations along major roads in Ha Noi in 2006 indicate that the average noise levels during the daytime vary from 64.4 - 80.5 db(A) and during the evening from 67.3 – 73.0 db(A). Most locations had noise levels exceeding the maximum QCVN 26:2010/BTNMT for mixed development areas (the most noise tolerant category) during daytime and night time.

12. Surface Water Quality: Nhue River takes water from the Red River through Lien Mac sluice. To Lich river discharges regularly down to Nhue River with average flow 11-17 m3/s, maximum flow 30 m3/s.

13. Surface water in Ha Noi like Nhue River and To Lich River which are near Station 4 and Station 8, respectively, are polluted by discharges of untreated wastewater and disposal of solid waste. Industrial wastewater discharges, including discharges from hospitals, are some of the major sources of water pollution.

14. Water quality monitoring in four (4) main rivers and lakes in Ha Noi indicates poor and worsening water quality. Concentrations of BOD, COD, Heavy Metals and Coliforms in To Lich, Set Lu and Nhue Rivers typically exceed TCVN criteria by three to four times, DO levels are low, levels of Suspended Solids increased significantly (150 to 300 mg/l), and Ammonia (NH4+) content is up to 20 times higher than the allowable levels. During dry season, pollutant load is higher than in the wet season. Sediment loads, on the other hand are higher in the wet season. Most of the lakes in Ha Noi are seriously polluted with high BOD (15 to 45 mg/l), suspended solids (100 to 150 mg/l) and low DO levels (0.5 to 2.0 mg/l).

15. Based on 2005 data, both Nhue and To Lich Rivers exceeded the BOD, COD, Phosphates (PO43) and Fe.

16. Sampling of river bed sediments in the To Lich and Nhue Rivers, particularly in the vicinity of industrial zones indicates presence of cadmium, chromium, copper, nickel, lead and zinc.

17. Trees are found in Station 9. There are no protected areas within the vicinity of the project area.

18. Common environmental concerns raised during the consultations are the noise, dust, vibration, obstruction on access, traffic, generation of wastes and its disposal, duration and timing of construction schedule and flooding.

19. During Public Consultations, it has been emphasized that mitigation measures will be implemented in every stage of the project. The Environmental Management Plan (EMP) as included in this IEE will be incorporated in the Tender Document for the project. The Detailed Design and Implementation Supervision Consultant with the DOT-TRAMOC's Project Management Unit will perform periodic monitoring to check if the mitigation measures provided in the EMP are appropriately implemented.

20. The IEE established that the Project will not cause significant adverse environmental. The IEE includes an EMP which details the requirements for mitigation, monitoring, reporting and capacity building. As mentioned above, The EMP will be included in the bidding documents and contracts for civil works thereby making implementation of the EMP a legal requirement. The bid documents will state that the Contractor will be responsible for the implementation of the requirements of the EMP through his own Construction Environmental Management Plan (CEMP) which will adopt all of the conditions of the EMP. This ensures that all potential bidders are aware of the environmental requirements of the Project and its associated environmental costs.

A. INTRODUCTION

A. INTRODUCTION

A.1 PROJECT BACKGROUND

1. The Government of Viet Nam (GOV) requested the Asian Development Bank to fund the Strengthening Sustainable Urban Transport for Ha Noi Metro Line 3 Project to develop an integrated public transport system in five districts of Ha Noi that will support effective utilization of Ha Noi metro Line 3 (Nhon to Ha Noi Station). Improved public transport will facilitate public transport connectivity and greatly enhance access in five districts (Ba Dinh, CauGiay, Dong Da, HoanKiem, TuLiem) of Ha Noi, as well as support the Ha Noi Urban Transport Master Plan (HUTMP) objective of increasing ridership on public transport to over 40% of demand and reducing dependency on vehicle ownership.

2. The Objective of the Project is to ensure integration of public transport occurs in five districtsalongMetro Line 3 through the implementation of a series of innovative and energy efficient urban transportsolutions in the Ha Noi Metro Rail System Line 3 (Metro Line 3)project corridor. The expected outcomes of the Project dueto the implementation of these energy efficient urban transport solutions in conjunction with the Metro Line 3 will be enhanced quality of public transport systems in Ha Noi that will result to reduction in emissions.

3. The project is to ultimately construct urban transport facilities, and implement services and measures along the 12.5-kilometer alignment of Ha Noi Metro Line 3, primarily at the twelve (12) planned stations. Metro Line 3 is expected to be operational within the next six to seven years with funding from ADB under Loan 2741 approved in March 2011, the European Investment Bank (EIB), AgenceFrançaise de Développement(AFD) and Direction Générale du Trésor (DGT).

A.2 NEED FOR THE PROJECT

4. The Government of Viet Nam is implementing or planning major urban transport infrastructure investments intended to induce a substantive modal shift from private vehicles to public transport modes. Currently four metro lines are being prepared in Ha Noi and three lines are being prepared in Ho Chi Minh City, with all expected to be operating by 2020. Ha Noi is at an early stage of transport urbanization, having moved from heavy usage of bicycles to motorcycles in the last 10 years and now increasingly cars. Private vehicles dominate urban transportation, with motorcycles being the most prevalent means at about 80% share.

5. Continued increasing car ownership, together with significant increase in number of motorcycles, has resulted in severe congestion during peak hours with poor urban environment and road safety. The situation is expected to worsen if current transport growth trend of 9% continues and more motorbike owners convert to cars. The existing public transport system consists of a poor and badly integrated bus network that is not really competitive with private transport modes, although under an ongoing World Bank loan is expected to improve the bus system by 2016. Traffic planning and parking management is weak and inadequate to effectively control traffic and demand. Importantly, there is no policy and regulatory measures to discourage private transport modes and the inadequate public transport system cannot attract people using private vehicles.

6. The Project will provide infrastructure for improving accessibility to Metro Line 3 stations, implement feeder bus links, a public transport management system, integrated multi-modal stations with "park and ride" facilities, as well as a comprehensive parking plan for the city. The project components, public transport services and other facilities will be designed to incorporate gender sensitive features that will complement similar measures under the Metro Line 3 project. In addition, any policy and regulatory measures developed will be fully inclusive. The proposed project management and institutional capacity building measures for Metro line 3, together with expected policy and regulatory reforms, will also help achieve an improved public transport system and reduce GHG emissions.

A.3 PURPOSE OF THE IEE AND METHODOLOGY

7. The conduct of environmental assessment is an important component of the project in order to lessen its negative impacts on land, air, water and most importantly to the people. A detailed screening and analysis of all environmental parameters, field investigations, stakeholder consultations and review of reports on similar project were undertaken.

8. Based on the ADB's Safeguard Policy Statement (SPS 2009), this project is categorized as Category B for it will not cause significant negative impacts on the environment. Correspondingly, this document or the Initial Environmental Examination (IEE) was prepared in compliance with the requirements of the SPS which is also in line with the Vietnam Laws on environmental protection and other relevant regulations.

B. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

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B.1 LEGAL FRAMEWORK FOR ENVIRONMENTAL MANAGEMENT

9. The Vietnamese legal framework for environmental management continues to evolve. This section introduces the nation's relevant environmental policies.

(i) Law on the Protection of the Environment (LEP) was enacted in 2005. The LEP:

- Identifies the responsibilities of the state centre, provinces, organizations andindividuals to prevent and remedy environmental deterioration and pollutionand carry out specified environmental protection functions;
- Provides for the development of environmental standards and submission ofenvironmental impact assessment reports on new and existing facilities;
- Provides the responsible parties to pay compensation for environmentaldamage;
- Establishes the right of individuals and organizations to petition forenforcement of environmental regulations;
- Calls for civil and criminal penalties for violations; and,
- Encourages international environmental co-operation.

(ii) Decree No. 80/2006/NS – CP promulgated on 09/08/2006 guides implementationof the LEP.

(iii)Decree No. 29/2011/ND-CP, February, dated 18 April 2011 on strategic environmental assessment (SEA), environmental impact assessment (EIA) and environment protection commitment

(iv)Decree 21/2008/ND-CP, February, 28, 2008, amending and supplementing a number of articles of the Government's Decree 80/ND-CP of August 9, 2006; detailing and guiding the implementation of a number of articles of the Law on Environmental Protection.

(v) Circular No. 26/2011/TT-BTNMT1 guiding in detail numbers of articles of Decree No. 29/2011/ND-CP, on strategic environmental assessment, environmental impact assessment and environmental protection commitment. The Circular No 26/2011/BTNMT replaced Circular No 05/2008/tt-BTNMT ON September, 2, 2011.

10. To supplement the above key policies, there are a large range of decisions, regulations and standards that may also apply to the Project. These are:

(i) Sectoral Standards 22TCN 242-98, dated 27/3/1998 of the Ministry ofCommunication and Transport on EIA procedures during the preparation offeasibility studies and for design and construction of transportation projects.

(ii) Decision No: 48/2008/QD-TTg, issued on 03/04/2008 by the Prime Minister, regarding Common General Guidelines on Feasibility Study Preparation for ODA Projects.

(iii) Decision 16/2008/QD-BTNMT, December 31, 2008, of the Ministry of Natural Resources and Environment on promulgating the National Technical Standard Regulations for the Environment. This Decision enclosed 8 National Technical Standard Regulations for the Environment as follows:

- QCVN 08:2008/BTNMT: National technical regulation on surface water quality.
- QCVN 09:2008/BTNMT: National technical regulation on ground water quality.
- QCVN 14:2008/BTNMT: National technical regulation on domestic wastewater.
- QCVN 15:2008/BTNMT: National technical regulation on pesticide residues in soils.
- QCVN 05 : 2009/BTNMT : National technical regulation on ambient air quality
- QCVN 26:2010/BTNMT : National Technical Regulation on Noise
- QCVN 27:2010/BTNMT: National Technical Regulation on Vibration

(iv) Public Health Protection Law No. 21-LCT/HĐNN8 approved by NationalAssembly of Socialist Republic of Vietnam on 30th June 1989 and took effectfrom 11th July 1989;

(v) Cultural Heritage Law on No. 28/2001/QH10 approved by National Assemblyof Socialist Republic of Vietnam on 29th June 2001 and took effect from 1stJanuary 2002;

(vi) Construction Law No. 16/2003/QH approved by National Assembly ofSocialist Republic of Vietnam on 26th November 2003;

(vii) Decision No. 13/2003/QH11 approved by National Assembly of SocialistRepublic of Vietnam on 26th November 2003 and took effect from 1st July2004;

(viii) Government's Decree No.16/2005/ND-CP dated 07th February 2005 onproject construction and investment management;

(ix) Decision No.13/2006/QĐ-BTNMT dated 8th September 2006 regardingpromulgation of regulations on organization and operation of AppraisalCouncil of strategic EIA report, Appraisal Council of EIA report

(x) Government's Decree No.112/NĐ-CP dated 29th September 2006 regardingamendments and additions to some articles of Decree No. 16/ND-CP onproject construction and investment management;

(xi) Decision No 23/2006/QĐ-BTNMT dated 26th December 2006 issued byMinister of Natural Resources and Environment on promulgating list of toxicwaste;

(xii) MONRE's Circular No. 12/2006/TT-BTNMT dated 26th December 2006guiding conditions for practicing, and procedures for setting up dossiers,registration, professional practice licensing and toxic waste managementcode;

(xiii) Government's Decree No. 59/2007/ND-CP dated 9th April 2007 on solidwaste management;

(xiv)Decree No. 81/2007/ND-CP dated 23rd May 2007 regarding regulations onorganization of environmental department at state-owned companiesandenterprises;

(xv) Circular No 10/2007/TT-BTNMT dated 22nd October 2007 regardingguidance on quality insurance and control in environmental monitoring;

(xvi) Decree No 174/2007/ND-CP dated 29th November 2007 on environmentalprotection fee of for solid waste;

(xvii) Decision No. 27/2004/QĐ - BXD dated 09th November 2004 issued byMinister of Construction regarding promulgation on Vietnamese ConstructionStandard TCXDVN 320:2004 "Dumping of toxic wastes – Design standard".

(xxv) Decision No. 3733/2002/QĐ-BYT dated 10th October 2002 issued by HeathCare Department on application of 21 standards on labour sanitation

11. Other project related approvals are listed below:

(i) Decision 108/1998/QD-TTg dated 20/06/1998 of the Premier on adjustmentof the Ha Noi Master Plan to 2020.

(ii) Decision 60/2002/QD-TTg dated 13/05/2002 of the Premier on the approvalof Ha Noi Social-economic Development Master Plan in 2001-2010 period.

(iii) Decision 206/2004/QD-TTg dated 10/12/2004 of the Prime Ministerapproving the Vietnam Transportation Strategy to 2020.

(iv) Decision 2707/QD-UB dated 23/4/2002 of the Ha Noi People's Committee onthe preparation of Pre-feasibility study report (now the Investment report).

(v) Decision 6329/QD-UB dated 28/09/2004 of the Ha Noi People's Committeeapproving the Cost estimate for investment preparation of the Ha NoiUrbanPilot Railway Line Project.

(vi) Decision 3891/QD-UB dated 08/06/2005 of the Ha Noi People's Committeeapproving on the supplemented investment preparation of the Ha NoiUrbanPilot Railway Line Project.

(vii) Document No. 67/TTg-CN dated 12/01/2006 of the Prime Minister approvingthe Pre-feasibility Study of the Ha Noi Urban Pilot Railway Line Project, and allowing Ha Noi People's Committee to prepare the Feasibility Study (ProjectInvestment and Construction).

(viii) Decision 909/QD-UB dated 20/02/2006 of the Ha Noi People's Committee approving the task for investment preparation of feasibility report for the HaNoi Urban Pilot Railway: Nhon-Ha Noi Railway Station Line.

(ix) Document No. 622/TTg-Cn dated 24/04/2006 of the Premier on the "Ha NoiUrban Pilot Railway: Nhon-Ha Noi Railway Station Line

B.2 ADMINISTRATIVE FRAMEWORK FOR ENVIRONMENTAL MANAGEMENT

12. For the Project, the administrative framework relevant to environment are as follows:

(i) Ministry of Natural Resources and Environment (MONRE). MONRE was established by Prime Ministerial Decision on November11, 2002. The Ministryincludes four (4) vice-ministers, 16 departments, one (1) newspaper and one (1) magazine.

(ii) Environmental Impact Assessment and Appraisal Department under MONREthrough Decree 91/2002/ND-CP. The Department's function includes: To appraise environmental impact assessment reports of projects and of businessand production establishments; and to issue environmental standards.

(iii) Department of Natural Resources and Environment (DONRE) it is responsible inensuring environmental protection, monitoring and implementation of the Project.

B.3 ADB ENVIRONMENTAL REQUIREMENTS

13. ADB's Safeguard Policy Statement 2009 (ADB SPS) is used as guide in the environment categorization of a project.Based on the ADB SPS, the proposed project is classified as category B for which an initial environmental examination (IEE) is required. This categorization means that the potential adverse environmental impacts of the project are less adverse than those of category A projects. Such impacts are also site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects.

C. DESCRIPTION OF PROJECT

C. PROJECT DESCRIPTION

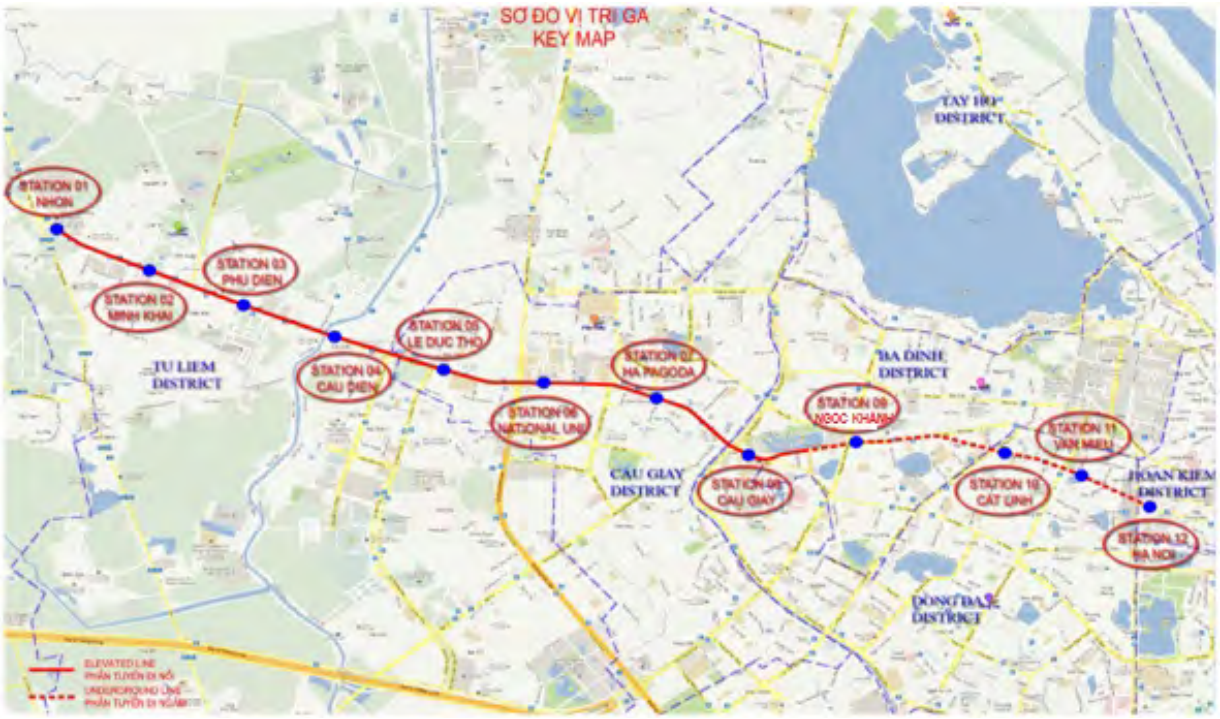
C.1 PROJECT LOCATION

14. The proposed project is the construction of urban transport facilities along the 12.5-kilometer of Ha Noi Metro Line 3, primarily at the twelve (12) planned stations, together with the services and the necessary policy and regulatory measures that will encourage public transport usage. Proposed structures will be sited within the administrative areas identified below.Metro Line 3 is depicted in Figure C.1.

Table C.1: Project Location

Station Number	Station Name	Commune	District
Elevated			
1	Nhon	Xuan Phuong & Minh Khai	TuLiem
2	Minh Khai	Minh Khai	Tu Liem
3	Phu Dien	Phu Dien	Tu Liem
4	Cau Dien	Phu Dien-Cau Dien Town	Tu Liem
5	Le DucTho	Mai Dich Ward	Cau Giay
6	National University	Dich Vong Ward	Cau Giay
7	Chua Ha	Dich Vong Ward – Dich Vong Hau	Cau Giay
8	Cau Giay	Ngoc Khanh Ward	Ba Dinh
Underground			
9	Ngoc Khanh (*referred to as Kim Ma station in the Ha Noi Metro Line 3 EIA*)	Ngoc Khanh Ward	Ba Dinh
10	Cat Linh	Cat Linh Ward	Dong Da
11	Van Mieu	Van Mieu Ward	Dong Da
12	Ga Ha Noi	Cua Nam Ward	Hoan Kiem

Figure C.1: Hanoi Metro Line 3



C.2 PROJECT COMPONENTS

15. The project lay-outs for the Metro stations are provided in **Appendix 1**. The overall Project consists of three components as follows:

- Station Accessibility Measures - for improved accessibility in and around Metro Line 3 stations
- Public Transport Measures - integrated and innovative public transport services and measuresconnecting to Metro Line 3 stations
- Transformational Policies and Regulatory Measures - support for transformational policies andregulatory measures to encourage modal shift to public transportation modes

C.2.1 Station Accessibility Measures

16. The project perimeter extends beyond the approved right of way for Metro Line 3 to include the following two distinct areas for planning, design and implementation of sustainable transport measures:

    a) Areas within 500 metres of the station, which was considered to be the limit of the catchment area from which people would walk to the station. The following improvements within the 500 Metres Catchment:

        - ***Pavement Improvement***
          Resurfacing
          Rehabilitation
        - ***Lighting***
          Provision of street lighting to an appropriate standard
        - ***Drainage Improvement***
          Minor works for clearing and repairs
          More major repair works

    b) Areas within 100 metres of the limits of the station, which are referred to as the "Station Realm"

17. The proposed station accessibility improvement measures within each of the Station Realm except transport Interchange[1] based on concept and preliminary designs are summarized in Table C.2.

Table C.2 Detail Components at Each Station

Station 1 – Nhon	Detail
Foot paths and Road Crossings	
Sidewalk renovation within 100m with distinctive paving tiles (m^2)	6,285
Tiling for the Visually Impaired (m)	300
Guard Rails (m)	80
Lighting Poles (nos)	8
Floodlight luminaire beneath the station structure (nos)	24
Parking	
Car and motorcycle parking restrictions on pedestrian routes within 100m	Yes
Park and ride spaces for motor cycle (nos)	375
Transport and Public Transport Facilities	
Bus stops/shelters (nos), Routes No 29, 70, 73	2
Bus Terminus, Routes No 20 (Cau Giay) and 32	Adjacent Terminal
Taxi Stands/Pick Up/Drop Off areas (nos)	2
Xe-om Parking/pick up/drop off areas (nos)	2
Station Amenities (In addition to facilities provided in MRT Station)	
Public Information Display (nos)	2
CCTV cameras (nos)	4

[1] Station 8 Cau Giay and Station 9- Ngoc Khanh are treated separately hereinafter

Police booth (nos)	1
Street andTraffic Management	
Junction Channelisation	4-arm
Traffic Signals	8 New signals

Station 2 - Minh Khai	Detail
Foot paths and Road Crossings	
Sidewalk renovation within 100m with distinctive paving tiles (m^2)	6,250
Tiling for the Visually Impaired (m)	300
Guard Rails (m)	45
Lighting Poles (nos)	6
Floodlight luminaire beneath the station structure (nos)	24
Parking	
Car and motorcycle parking restrictions on pedestrian routes within 100m	yes
Park and ride spaces for motor cycle (nos)	185
Transport and Public Transport Facilities	
Bus stops/shelters (nos), Routes No 20, 29, 32, 70, 73	2
Taxi Stands/Pick Up/Drop Off areas (nos)	2
Xe-om Parking/pick up/drop off areas (nos)	4
Station Amenities (In addition to facilities provided in MRT Station)	
Public Information Display (nos)	2
CCTV cameras (nos)	2
Street andTraffic Management	
Junction Channelisation	Widen 3-arm
Traffic Signals	without signal

Station 3 - Phu Dien	Detail
Foot paths and Road Crossings	
Sidewalk renovation within 100m with distinctive paving tiles (m^2)	7,960
Tiling for the Visually Impaired (m)	420
Guard Rails (m)	106
Lighting Poles (nos)	6
Floodlight luminaire beneath the station structure (nos)	24
Parking	
Car and motorcycle parking restrictions on pedestrian routes within 100m	yes
Park and ride spaces for motor cycle (nos)	180
Transport and Public Transport Facilities	
Bus stops/shelters (nos), Routes No 5, 20, 29, 32, 70, 73	2
Taxi Stands/Pick Up/Drop Off areas (nos)	2
Xe-om Parking/pick up/drop off areas (nos)	2
Station Amenities (In addition to facilities provided in MRT Station)	
Public Information Display (nos)	2
CCTV cameras (nos)	4
Street andTraffic Management	
Junction Channelisation	Widen 3-arm

Traffic Signals	without signal

Station 4 - Cau Dien	Detail
Foot paths and Road Crossings	
Sidewalk renovation within 100m with distinctive paving tiles (m^2)	6,100
Tiling for the Visually Impaired (m)	350
Guard Rails (m)	93
Lighting Poles (nos)	6
Floodlight luminaire beneath the station structure (nos)	24
Parking	
Car and motorcycle parking restrictions on pedestrian routes within 100m	yes
Park and ride spaces for motor cycle (nos)	245
Transport and Public Transport Facilities	
Bus stops/shelters (nos), Routes No 5, 13, 20, 29, 32, 70, 73	2
Taxi Stands/Pick Up/Drop Off areas (nos)	2
Xe-om Parking/pick up/drop off areas (nos)	4
Station Amenities (In addition to facilities provided in MRT Station)	
Public Information Display (nos)	2
CCTV cameras (nos)	4
Street andTraffic Management	
Junction Channelisation	4-arm
Traffic Signals	8 New signals

Station 5 - Le Duc Tho	Detail
Foot paths and Road Crossings	
Sidewalk renovation within 100m with distinctive paving tiles (m^2)	13,800
Tiling for the Visually Impaired (m)	967
Guard Rails (m)	78
Lighting Poles (nos)	8
Floodlight luminaire beneath the station structure (nos)	24
Parking	
Car and motorcycle parking restrictions on pedestrian routes within 100m	yes
Park and ride spaces for motor cycle (nos)	225
Transport and Public Transport Facilities	
Bus stops/shelters (nos), Routes No 5, 13, 20,29, 32, 49, 57, 70, 73	4
Taxi Stands/Pick Up/Drop Off areas (nos)	4
Xe-om Parking/pick up/drop off areas (nos)	2
Station Amenities (In addition to facilities provided in MRT Station)	
Public Information Display (nos)	2
CCTV cameras (nos)	4
Police booth (nos)	1
Street andTraffic Management	
Le Duc Tho Junction Channelisation	4-arm
Traffic Signals	Add 4 signals
Road No.32 & side road (Ho Tung Mau & Mai Dich)	Keep 3-arm

	without signal
Road No.32 & side road (Tap the Thuong Mai)	Keep 3-arm without signal

Station 6 - National University	Detail
Foot paths and Road Crossings	
Sidewalk renovation within 100m with distinctive paving tiles (m^2)	4,080
Tiling for the Visually Impaired (m)	200
Guard Rails (m)	118
Lighting Poles (nos)	8
Floodlight luminaire beneath the station structure (nos)	24
Parking	
Car and motorcycle parking restrictions on pedestrian routes within 100m	yes
Park and ride spaces for motor cycle (nos)	340
Transport and Public Transport Facilities	
Bus stops/shelters (nos), Routes No 16, 20,26, 27, 28, 32, 34, 39, 49, 70	6
Taxi Stands/Pick Up/Drop Off areas (nos)	2
Xe-om Parking/pick up/drop off areas (nos)	1
Station Amenities (In addition to facilities provided in MRT Station)	
Public Information Display (nos)	2
CCTV cameras (nos)	5
Police booth (nos)	1
Street andTraffic Management	
Junction Channelisation	Roundabout with signal
Traffic Signals	Add 2 signals

Station 7 - Chua Ha	Detail
Foot paths and Road Crossings	
Extend concourse level walkways across adjacent main road junctions (m)	162
Sidewalk renovation within 100m with distinctive paving tiles (m^2)	4060
Tiling for the Visually Impaired (m)	50
Guard Rails (m)	45
Lighting Poles (nos)	8
Floodlight luminaire beneath the station structure (nos)	24
Parking	
Car and motorcycle parking restrictions on pedestrian routes within 100m	yes
Park and ride spaces for motor cycle (nos)	210
Transport and Public Transport Facilities	
Bus stops/shelters (nos), Routes No 16, 20,26, 27, 28, 32, 34, 39, 49, 70	4
Taxi Stands/Pick Up/Drop Off areas (nos)	2
Xe-om Parking/pick up/drop off areas (nos)	2
Station Amenities (In addition to facilities provided in MRT Station)	
Public Information Display (nos)	2
CCTV cameras (nos)	9

Police booth (nos)	1
Street andTraffic Management	
Junction Channelisation	4-arm
Traffic Signals	8 New signals
Road No.32 & side road (Dich Vong)	Keep 3-arm without signal
Road No.32 & side road (Chua Ha)	3-arm; 8 New signals

Station 10 - Cat Linh	Detail
Foot paths and Road Crossings	
Extend concourse level walkways across adjacent main road junctions (m)	120
Sidewalk renovation within 100m with distinctive paving tiles (m^2)	7857
Tiling for the Visually Impaired (m)	217
Guard Rails (m)	156
Lighting Poles (nos)	18
Parking	
Car and motorcycle parking restrictions on pedestrian routes within 100m	yes
Park and ride spaces for motor cycle (nos)	195
Transport and Public Transport Facilities	
Bus stops/shelters (nos), Routes No 23, 25, 38 (nos)	6
Taxi Stands/Pick Up/Drop Off areas (nos)	2
Xe-om Parking/pick up/drop off areas (nos)	5
Station Amenities (In addition to facilities provided in MRT Station)	
Public Information Display (nos)	10
CCTV cameras (nos)	10
Police booth (nos)	1
Street andTraffic Management	
Junction Channelisation	Widen
Traffic Signals	Add 12 signals

Station 11 - Van Mieu	Detail
Foot paths and Road Crossings	
Sidewalk renovation within 100m with distinctive paving tiles (m^2)	5,765
Tiling for the Visually Impaired (m)	500
Guard Rails (m)	90
Lighting Poles (nos)	9
Parking	
Car and motorcycle parking restrictions on pedestrian routes within 100m	yes
Park and ride spaces for motor cycle (nos)	170
Transport and Public Transport Facilities	
Bus stops/shelters (nos), Routes No 23, 25, 38	4
Taxi Stands/Pick Up/Drop Off areas (nos)	2
Xe-om Parking/pick up/drop off areas (nos)	2
Station Amenities (In addition to facilities provided in MRT Station)	
Public Information Display (nos)	2

CCTV cameras (nos)	2
Police booth (nos)	1
Street andTraffic Management	
Quoc Tu Giam & Ngo Si Liem Junction Channelisation	4-arm
Traffic Signals	8 New signals
Van Mieu & Quoc Tu Giam	Keep 3-arm without signal

Station 12 - Hanoi RW Station	Detail
Foot paths and Road Crossings	
Extend concourse level walkways across adjacent main road junctions (m)	60
Sidewalk renovation within 100m with distinctive paving tiles (m^2)	5615
Tiling for the Visually Impaired (m)	400
Guard Rails (m)	85
Lighting Poles (nos)	14
Parking	
Car and motorcycle parking restrictions on pedestrian routes within 100m	yes
Park and ride spaces for motor cycle (nos)	90
Transport and Public Transport Facilities	
Bus stops/shelters (nos), Routes No 1, 3, 11, 32, 41, 49	5
Taxi Stands/Pick Up/Drop Off areas (nos)	2
Xe-om Parking/pick up/drop off areas (nos)	2
Station Amenities (In addition to facilities provided in MRT Station)	
Public Information Display (nos)	5
CCTV cameras (nos)	9
Police booth (nos)	1
Street andTraffic Management	
Junction Channelisation	Keep 3-arm
Traffic Signals	without signal

Station 8- Cau Gia

18. An interchange will be provided at Station 8 to integrate the access ways to metro concourse with bus terminals, taxi stations, parking areas, and other public and private modes of transport. Four different options were considered for Station 8 (Cau Giay).

Four Different Options Considered for Station 8 (Cau Giay).

i. **Option 1**: To give priority to the traffic flow on Ring Road 1, with the number of lanes on Ring Road 1 on CauGiay section unchanged at four lanes in each direction (i.e. eight lanes total for two directions). Buses running from Hoang Cau to CauGiay will turn right to Kim Ma Street. Bus stops / interchange routes are re-located at entrance of UTC and Thu Le Park. Interchange passengers between bus-metro-bus will use the footbridge connecting the station concourse and passageway. (Figure C.2)

ii. **Option 2**: Passenger transit priority between Bus-Bus. To arrange two bus stations in both directions in the middle of CauGiay Road. This transit facilitates passengers to interchange directly between bus routes more convenient, without having to pass through Metro stations. Buses operating on Ring Road 1 will go straight and approach bus shelter by a separated lane to narrow a number of lanes on Ring Road 1.

iii. **Option 3A**: This option has the shorter walking distance for bus-bus transfer. Bus-bus transfer takes place right under the station. No change to Ring Road 1 is required. However this option has to arrange an opposite-direction (contra flow) bus lane under an elevated CauGiay Street which creates traffic conflict points at CauGiay intersection. CauGiay intersection therefore will be rearranged to a signalized junction.

iv. **Option 3B** :This option has been developed to incorporate comments by ADB in the workshop on 18September 2013. This option is similar to Option 3A except two key differences:i) Bus stop 2 on Ring Road 1 (RR1) in 3A has to be relocated to the upper level of CauGiay Street and ii) a new traffic signal is required at CauGiay and Buoi Street. This option has the shortest walking distance for bus-bus transfer among all four options. However, the level of comfort and safety in bus-metro transfer is lowest among all four options. Specifically, passengers have to cross the road, then follow footbridge to reach to the concourse level for Metro. In case RR1 is not completed before the opening of MRT Line 3, Option 3B without Ring Road 1 was also prepared as a temporary solution.

19. Of the four options (1, 2, 3A and 3B) above, Option 1 was selected and has been examined in this report. Detail of Option 1 follow.

"On Street Vehicle" Facilities (Cau Giay)

20. Bus stops: There are 7 locations for bus stop to be provided at directions to ensure that the bus routes can pick-up/drop-off conveniently. At Cau Giay street, there are 3 bus stops for each direction to serve for 10 bus routes including 38, 49, 55, 70, 07, 09, 24, 26, 27 and 28. One bus stop on Lang Street serves only for route 35. The passengers from / to two catchment areas as UTC and Thu Le Zoo who can access easily bus routes as well as Metro stations via footbridges at Cau Giay street.

21. At each bus stop, a built-up shelter with 1,5 x 8m will provide a waiting area for passengers. Seats and electric information system to inform schedule and real time of related bus routes will be provided at each shelter.

22. Car parking: According to the demand forecast, Cau Giay station needs to have a parking lot for nearly 300 cars in 2038. However, with limitation of parking layout in the area, the project does not propose to provide parking areas surrounding the station area. A number of future car parking lots will be provided in the basement of TOD areas around the station.

23. Land is proposed to use under Ring Road 2 flyover at Cau Giay intersection in the future for the car parking lots which are considered, however MVA proposes that the land should not be used with the following reasons:

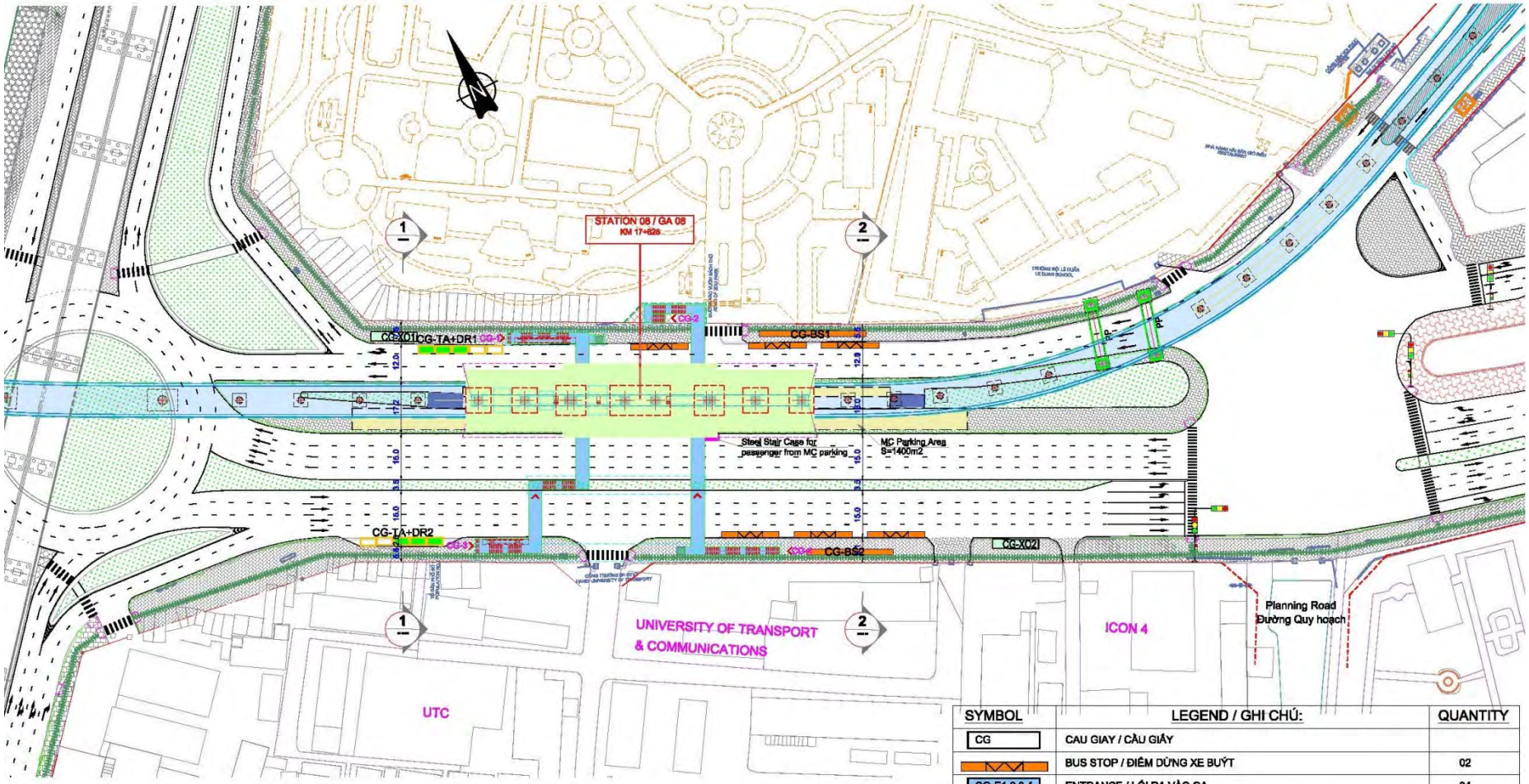
    - Total of the provided parking lots is not significant.
    - The cars entry/exit at this area will have to cross traffic flow and conflict with other vehicles and cause congestion near Cau Giay intersection.
    - Parking will occupy a part of walking and green area, unsafe for pedestrians crossing the road under the flyover.

24. Bicycle and motorcycle parking: According to the demand forecast, the parking demand for two wheeled vehicles including bicycle and motorcycle is about 1,400 vehicles/day. To meet this parking demand, all space beneath the station concourse will be used to provide a parking. The parking will be designed with an area of 2,000m2 at the median and between bridge supporting piles under the station concourse.

25. The parking for bicycle is also designed with a dedicated charging area for electric bicycles. The parking will be arranged in a private area with surrounded fence. A security/automatic ticket checking station using a card will be provided at entrance and exist of parking area. The area for each parking space meets the standard of 1x2.5m, the parking lots will be perpendicularly arranged or diagonally in 30 degrees.

26. To reduce the accessibility distance for passengers to park their vehicles at Metro station, it is expected to build a steel staircase connecting a two-wheeled parking to a footbridge, connecting directly to the station concourse. The design of staircase is considered to not affect the clearance of the beneath road and ensures safety/aesthetics for passengers' park & ride to Metro.

Figure C.2: Cau Giay Station Layout proposed by MVA



27. Taxi-stand/drop-off area: There are five taxi-stand/drop-off/pick-up areas at each side of the station. Parking spaces are located near the staircase, to facilitate passenger access easy and not obstruct traffic. The number of parked taxis waiting for passengers at this point will be limited in the time of day. The taxi operators will provide taxi as required by manoeuvring the waiting taxi parked in the surrounding area. The drop-off parking spaces also provided for motorcycles, taxis and cars. Stop/drop-off time stipulated average of 0.5-1 minutes.

28. Xe-om waiting area: It is expected to have two xe-om waiting areas in the front of the Vehicle

29. Registry Centre and near the roundabout of the outer fence of Thu Le Zoo. There are 5-10 xeom designated waiting spaces are provided, with road markings, entry/exit at these xe-om waiting spaces are specifically stipulated. The xe-om drivers are organized into associations/groups with uniform wear and specific regulations. There are regulations for managing traffic violations.

Pedestrian Accessibility (Cau Giay)

a) Sidewalk improvement

30. MVA conducted an access way survey around Cau Giay station on June 2013 . The results show that the quality of sidewalks is either in moderate or poor condition, almost sidewalks use for long time with some of the damaged / flaking-out sidewalk sections requiring rebuilding.

31. Sidewalk improvements include either upgrading the existing sidewalk pavement or new construction using large granite slabs. Specifications for the granite pavement are for slabs of 40x40cm should of 140 MPa compressive strength following TCVN 6883-2001 standards

32. Post and chain bollards are proposed to be installed at the kerb side of the sidewalks along the main roads (except for the sections with zebra road markings for pedestrians) to guide pedestrians to the formal road crossings.

b) Alleyways

33. There are a few alleys that connect directly to the station area in 250m radius of Cau Giay station. These alleys include access to UTC, Vietnam Registry Vehicle Testing Center, ICON4 and Thu Le Zoo. The surface of these alleys is either concrete or asphalt concrete of relatively good quality in general.The main recommendations are:

- Replacement of sidewalk pavement in the intersection area to Cau Giay Street
- Improvement of road markings, signs, lights, curb drop, fence; and.
- Supplement with road hump/speed table to slow vehicles for pedestrian crossing safety.

c) Green trees and landscape

34. The green trees around the station area are designed in accordance with the street design and urban square road standard 20-TCN-104-83andtechnicalregulationsontree planting by the Ministry of Construction and Hanoi City. On the sidewalk of Cau Giay street. Replace and supplement the type of trees to be a specific road with Bang Lang trees.

d) Lighting

35. Ring Road 1 section through Cau Giay is an arterial road Class 1. The lighting system is defined in accordance with TCXD 259 -2001 Standard

36. Street lighting system will be added in the median strip and on the sidewalk at the area surrounding the station and two sides of Cau Giay street. The lighting poles are arranged in two sides from sidewalk edge by 0.7m with an average distance by 30m and lighting angle is 20 degrees from horizontal, the lighting height is 11m.

37. On the lighting pole shaft including steel arms D = 400 for sidewalk lighting, the lighting height for installation is 4.5 m. To enhance lighting, the light phase pole on the steel pole used with 14m in length at intersections.

38. Lighting system for pedestrians will be added at the new sidewalk sections in the area access to the station. The light poles are arranged in two sides from sidewalk edge with average distance of 7 -10m. It is needed to enhance lighting with large capacity bulbs serving for pedestrians at the sidewalk sections near to the station.

39. The beneath station concourse structure, two 12-bulb chains 400W are arranged under the station structure to illuminate the two-wheeled parking area and services. The power is expected from the station's electrical system.

40. Along the footbridge, two fluorescent bulb chains with high capacity 2x36m and 3.6m in height are arranged against the lighting floor for pedestrians. The bulb interval is 3.5m.

Traffic Management Measures (Cau Giay)

a) Traffic flow survey

41. Traffic forecast data at intersections surrounding Cau Giay station are collected and supplemented on the following sources:

- Hanoi Urban Transport Development Project Feasibility Study, prepared by MVA. Traffic counts carried out in June 2005.
- Hanoi Urban Transport Development Project Detail Designs, prepared by EGIS/BCEOM. Traffic counts carried out in May 2009.
- TA7894-VIE, prepared by TED.Co. Ltd for EGIS. Traffic counts carried out in February 2013.

42. The traffic count shows that traffic flow at Cau Giay street is about 7,000 vehicles/peak hours on the straight movement from Cau Giay to Voi Phuc intersections and return. The serving level is evaluated at Level of service D and E. The minimum traffic flow in this area is the direction from Buoi to roundabout approximate 1,000 vehicles/peak hours.

43. MVA conducted the additional O-D survey at all directions of the intersection in August 2013. The results incorporated into the traffic demand forecast in 2038, traffic flow model at intersections is conducted to check the proposed traffic divergence options.

b) Traffic Demand Forecast

44. According to the consultant's estimates, in 2018, the total entering traffic to Cau Giay intersection will be 19,000 pcu, the total entering traffic to Voi Phuc intersection is 13,000 pcu.

c) Comprehensive traffic divergence

45. Based on the traffic forecast data, the traffic management scenario analysed by simulation software. Four traffic flow management and divergence options have been proposed and analysed the advantages and the disadvantages in the Interim Report. Option 1 is selected to design traffic management in the Base Design.

46. This option is organized according to priority direction for vehicles on Ring Road 1, ensuring cross-sectional scale and number of lanes along routes. Kim Ma street, section from Voi Phuc to Cau Giay remains the current one-way. La Thanh street is arranged in two ways for motorcycles, one way is from Nguyen Chi Thanh to Voi Phuc for cars

d) Bus circulation

47. Buses from direction Cau Giay to Voi Phuc will approach the bus shelter in front UTC. With this option, the buses will run together with other vehicles and not have private lane.

48. Buses running from La Thanh and Hoang Cau to Cau Giay will turn right at Voi Phuc intersection running beneath Metro Line 3 and access the bus stop in front of Thu Le Park. The other vehicles from direction of La Thanh and Hoang Cau streets will be not allowed to turn right on the upper road to avoid conflict with the bus routes operating in this area.

e) Return the surface of Ring Road 1 following the planning

49. After removing the existing bus station, Ring Road 1 will be returned and expanded, according to the planning. The total of road width is 50m including the pavement width by 2 x 15,5m with 4 lanes each direction. The median strip of 3m is used for trees and provided the supporting piles for footbridge. Cross gradient of pavement is 2% at the existing curb edge. The existing drainage system with D1000 diameter will drain directly the outlet to To Lich River.

f) Cau Giay intersection

50. Currently, the construction progress of Ring Road 2 speeds up under the direction of the Hanoi People's Committee. According to the Hanoi Urban Development Management Unit, 4 of 6 packages of this project are under construction by October 2013. Therefore, it is ensured that Ring Road 2 section through Cau Giay will be completed before 2018. It assumes that when Metro Line 3 comes into operation, Cau Giay intersection is constructed completely with 4-lane flyover and expanded sections on Lang and Buoi streets.

51. The option for arrangement of traffic signals at Cau Giay intersection has been designed and conducted to review by traffic software. However, this option has two main disadvantages as follows:

- Bridge piles of elevated Metro Line 3 section on middle lane at intersection cause unsafely for vehicles.
- Local congestion still occurs on the stopping position at Xuan Thuy -Cau Giay intersection. The service level is only Level E for straight movement to Cau Giay intersection.

52. Based on the above analysis, Cau Giay intersection is still a flyover intersection and the beneath is a self-regulation roundabout with a radius of R 30m island. Ring Road 2 flyover piers and elevated metro line will be located within the roundabout. The service level of intersection reaches at Level D for all directions.

g) Voi Phuc intersection

53. Voi Phuc intersection becomes a four-leg intersection with traffic signals (excluding the southern planned road). La Thanh Street will be re-arranged to a one-way street, from Voi Phuc to Hoang Cau. Two-phase signal system is installed for intersection. The right-turning direction for vehicles from Kim Ma to Cau Giay will be prioritized for free flow on Kim Ma Street. One left-turning queuing lane will be added for the left-turning movement from Ring Road 1 to Kim Ma Street.

h) Temporary traffic management when without Ring Road 1 and Metro Line 3 in operation

54. Traffic management scenario for the area surrounding Cau Giay station in 2018 without Ring Road 1 has been reviewed. All infrastructure systems for accessing to the area surrounding the station such as pavement, sidewalks, bus stops, taxi, drop-off/pick-up areas, parking area are proposed to build. Some main changes for the completed traffic management option are as follows:

- Cau Giay roundabout is still a flyover intersection, the beneath is a self-regulated roundabout with a radius of R 30m island.
- Voi Phuc intersection becomes a three leg intersection without traffic signals. La Thanh Street will be remained to a two-way street for motorcycles, one way for the direction from Voi Phuc to Hoang Cau.
- Two ways on Ring Road 1 to Voi Phuc -Cau Giay use temporarily two-wheeled parking for Metro passengers. This area uses only temporary road makings and fences to localize parking area and return plan when Ring Road 1 comes into operation. The permanent buildings are not allowed in this area.

j) Traffic Management and Arrangement

55. Within 100 -200m around the station, it proposes that the signs are installed to ban all vehicles stopping on the streets except the defined pick-up/drop-off areas. Traffic signal system for pedestrians to cross the street will also be provided at the high-traffic volume, without subway or footbridge. Sign system and road markings will be added along the roads within 500m -1km around the accesses to the station including Buoi, Cau Giay, Kim Ma, Xuan Thuy and La Thanh. A CCTV System (CCTV) will be installed on all the sidewalks in the station realm

Intermodal Interchange Design (Cau Giay)

a) Public transport interchange

56. In this option, the passengers are able to directly connect from bus station to station concourse via footbridge. The passengers interchanging between two opposite bus stops will go through the ticketing uncontrolled area at the lobby.

57. The footbridge connecting metro-bus is designed with natural ventilation and shade of 4m in width. Two escalators are installed at the entrance of Thu Le Park and UTC to provide better service for pedestrians.

58. Bicycle and motorcycle parking are provided under the station concourse will connect directly to the concourse by the steel staircase.

59. Walkways to be used for interchange from bus station to footbridge will also be designed with canopies. The canopy is designed with a steel structure with 3 -5m in width and 3m in height. The shade walkways area is also proposed from the taxi-stand/drop-off areas to the bottom of footbridge.

b) Station Integration Service

60. The service system is integrated at the station within 100m around the station along the walkway at the concourse includes:

- CCTV camera system, CCVT
- Signs, electronic signs for pedestrians and disables

Development Area Concept Surrounding the Cau Giay Station (TOD)

61. Currently, the planning in the north of station including Thu Le Park and Le Duan team school has been approved with the structure as green parks and schools, therefore the main proposals of this section will focus on the south of station. The available areas in the south of station consist of a two-wheeled parking for UTC and some buildings, vehicle registry center, Icon 4 building, the households living near Lang -Cau Giay.

62. The proposed TOD areas and subway/footbridge are only for reference and not under the scope of this project. If TOD areas, subway/footbridge are built, passengers access to the station will be convenient and safe, however, the construction of TOD areas, subway/footbridge will depend on the detailed urban planning around the station and the regional development policies in the future.

- Future proposal is to build a multi-storey parking in combination with service areas in two-wheeled parking in UTC. This parking will further supplement parking spaces for UTC students as well as resolve parking demand for Metro station. Future staircase will connect directly with this parking. The service floors connecting directly with the footbridge into the station concourse will increase benefits for investors as well as provide services for Metro passengers.
- Future proposal is to build a commercial center at Lang -Cau Giay streets connecting with the station by an extended pedestrian footbridge. This center consists of several storeys and some basements for parking, provides commercial services and parking to attract passengers to Metro.
- Future proposal is to build additionally two subways in Lang and Buoi streets and one
- footbridge at Voi Phuc intersection to facilitate passenger accessibility

Station 9- Ngoc Khanh

63. The triangular area surrounding Station S9 - Ngoc Khanh is the focus area for locating a multi-modal interchange centre between Metro Line 3 – Bus as well as the future Metro Line 5. This area has potential for commercial development. Key question was raised about what and how to utilize the potential of this area to serve the need for supporting station access as well as the commercial potential: Should the development be underground or at grade? MVA addressed this question by considering technical consideration and key comments made by public agencies with two proposed concept options for Ngọc Khanh station in the draft concept report - an underground option and at grade option. Comments received during the workshop presentation of both options (underground and at-grade options) on 18 September 2013 indicated that these two options can be considered as the two complementary phases in the development of Ngoc Khanh station. However Phase 2, (Underground Option - future development) is not part of the project and only at-grade option is examined herein (Figure C.3)

"On-Street Vehicle" Facilities (Ngoc Khanh)

64. Bus stop: The bus stops are provided at street level for all bus directions to ensure that the bus routes could drop off/pick up conveniently. Bus stops are located on Kim Ma Street for bus routes no. 09, 12, 28, 38, 50 and 70.

65. Three new proposed feeder bus routes no. NK1, NK2, and NK3 and routes no. 07, 24, 25, 26, 27, 28 and 55 will be provided with two bus stops on Dao Tan extension. The bus terminal routes will not pick up passengers at these stops but run to the next bus interchange station and pick up there. In addition, another bus stop will be provided at the opposite side for bus route no. 25 and one stop is expected to arrange on Lieu Giai road for routes no. 09 and 70.

66. At each bus stop, shelters will provide at waiting areas for passengers. Each bus stop will be installed seats and electronic passenger information system to provide arrival time and relevant bus routes. The size of shelters is different for each parking slot. Typical sizes are presented in the figure below:

67. Car parking: Due to site limitation, the entire Phase 1 site will be prioritized for bus parking and two-wheeled vehicles parking. Car parking will not be provided in Phase 1. In the future, the basement is under construction that would provide a significant parking space for car. In additional, some car parkings will be provided in TOD basements surrounding the station in the future.

68. Motorcycle parking: According to the demand forecast, number of two-wheeled parking spaces required for Metro passengers is approximately 1000 spaces in 2038. Almost triangle area will be arranged to motorcycle and bicycle parking.

69. The total area of the parking would be approximately 2,200 sqm, with a capacity of 600 vehicles. When Phase 2 of the triangle area is under construction, number of two-wheeled parking spaces is expected to arrange in the underground part of the triangle area.

70. Parking entrance / exit located on Lieu Giaistreet where traffic volume is low in order to minimize traffic conflicts. Parking is located in a separate area, surrounded by fences. A security station / automatic ticketing collection are provided at the entrance of the parking. Each parking space meets the standard 1x2.5m, with the parking spaces arranged perpendicularly or diagonally in 30 degrees.

71. Bicycle parking: Bicycle parking area is arranged in the same area with motorcycle parking on the ground. Bicycle parking is designed with a dedicated charging area for electric bicycles for emergency.

72. Taxi stand – Drop/off area: There are two proposed taxi stands -drop-off/pick-up areas around the station. The first area is located on the median strip, near the end of triangular wedge. The second area is proposed in front of Daewoo Hotel on Dao Tan Street. At the first location, passengers can easily access from the station entrance by sidewalk with a distance of about 50m. At the second location, passengers will cross the road by subway; the distance from the station to the taxi stand is over- 100m.

73. The sidewalks connecting from taxi stand / drop-off area to the station entrance will be sheltered.

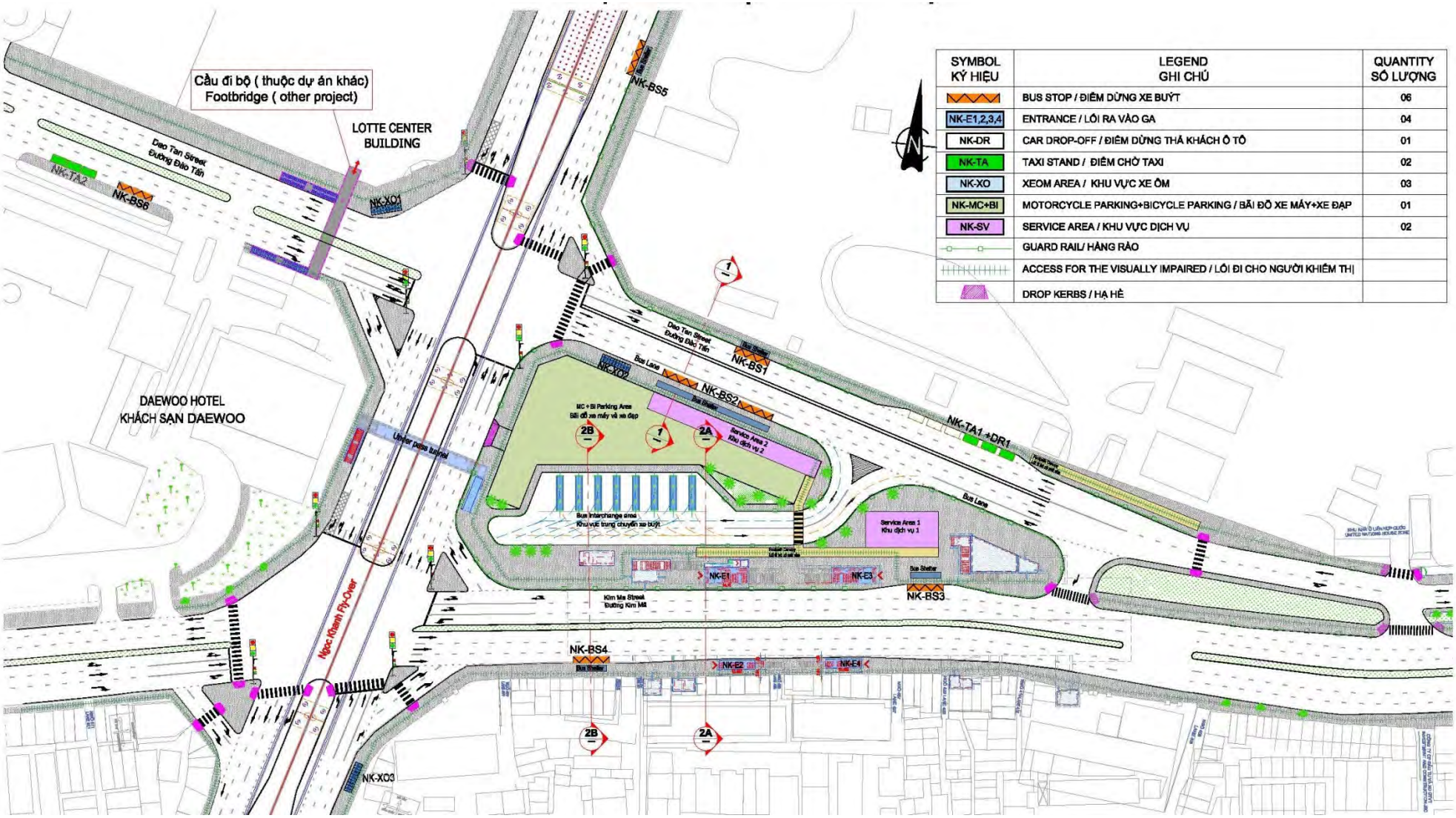
74. Xe-om waiting area: Three xe-om waiting areas are provided in the front of Russian Cultural Centre (at the corner of Kim Ma -Nguyen Chi Thanh) and in front of the vehicle maintenance centre (at the corner of Dao Tan extension – Lieu Giai) and near Lotte Center sidewalk. At each location there will be 5-10 xe-om designated waiting spaces provided, with road markings. The xe-om drivers are organized into associations/groups with uniformed wear and specific regulations. There are regulations for managing traffic violations. (Figure C.3)

Pedestrian Accessibility (Ngoc Khanh)

a) Sidewalk Accessibility Improvements

75. MVA conducted an accessibility survey around Ngoc Khanh station in Jun ne 2013 . The results showed that the sidewalk quality is generally at an average condition, with some narrow sections along Kim Ma Street in poor quality. Sidewalk improvements include either upgrading the existing sidewalk pavement by using large granite slabs or replacing by a completely new structure. 40x40cmgranite slabs are designed to ensure hardness, brightness with 140 MPa compressive strength following TCVN 6883-2001 standards. Along the curb of the accessibility sidewalk section, it is proposed to construct steel fences or iron pillars (except pedestrians' crossings) to lead passengers to compulsory road crossing locations.

Figure C.3: Ngoc Khanh Station Layout proposed by MVA



b) Alleyways Improvement

76. In a 250m radius of Ngoc Khanh station, there are several alleys approaching from the residential neighborhoods along Kim Ma Street from Alley 371 to Alley 499. The key features of these alleys are narrow with widths from 2.5-4.5m, the levels of the alleys are around 0.5-1m lower than Kim Ma street. Most of the alleys' surface is finished by cement concretes; the quality has deteriorated, much occupied by business. The main proposed solutions for these alleys are:

77. • Replace existing surface with new concrete within 400m catchment, and install drainage if necessary;
    - Remove obstructions to clear sidewalks for pedestrians;
    - Immediately adjacent to Kim Ma Street, repave the alleys to the same level as the nearby sidewalk level;
    - Improve road markings, signage, lighting, and install drop kerbs and railings;
    - Install speed humps to reduce the speed of vehicles to ensure safety for pedestrians.

c) Landscape and trees

78. Trees around the station area are designed according to the street design standard and norms, urban square street 20-TCN 104-83 and technical regulations on tree planting by the Ministry of Construction as well as Hanoi City. Trees are arranged around the station area to achieve the following objectives:
    - Improve landscape around the Metro station, creating friendly space for passengers;
    - Reduce noise level, clean the air and reduce heat radiation;
    - Enhance Traffic Safety (planting trees in the median strip).

79. On the Kim Ma, Dao Tan extension sidewalk: Replace and plant additional typical trees in the street, which is Lagerstroemia. In the green area of the triangle: mostly low pruned shrub, leaf colour and some low trees such as hibiscus, Tai Tuong, Long Live, Ngau, Palm, Co Tong, five-colour Daisy, Bach Thien Huong, balm-mint, azure, etc. The trees are planted in blocks with free layouts creating vivid, flexible landscapes.

80. The median on Kim Ma street: planting combinations of ornamental plants, shrubs and colour leaf trees etc. which are organized into different levels with areca, tai tuong, hibiscus, ngautron, palm and low colour leaf trees with bamboo grass background making the overall green space. Trees organized along the road in order to guide for vehicle direction and create a microclimate.

d) Lighting

81. The lighting system on Kim Ma street section passing through the station will be added on the median and sidewalks on both sides of the main road. The light poles are arranged either sidewalks0.7m away from the curbs with an average distance of 25 -30m, the light angle bias is 20 degrees from horizon, the light height of 11m. The light pole is equipped by straight steel and spherical lights D = 400 installed at the height of 4.5m. At intersections, to enhance the lighting, steel poles with 14mheight are used.

82. On Dao Tan road extension, lighting is arranged at both sides: 11m single round steel columns are arranged, located on sidewalks 0.7m away from the curbs. On each column, mounting IP66 large light with SON-T250W ball with an average distance of 33m/column.

83. Lighting system for pedestrians will be added in the newly constructed sidewalks around the triangle area and stations access areas. The columns placed on the sidewalk are fitted with one low lighting branch with 400 PMMA plastic spheres, fitting with 125W capacity mercury balls. At the bus interchange and parkings, large capacity lights are enhanced to serve pedestrians.

84. Besides the station, the lighting system will be allocated additionally at both sides of sidewalks 0.7 m away from the curb with a twisted pipe D=80. Across street section will be placed inside a steel tube D=75. Lighting system wire will be 2x2.5mm2 PCV. Power will be supplied from dedicated power control chamber through automatic or semi-automatic control devices. Operational modes will be in accordance with the general regulations of the city.

Traffic Management Measures (Ngoc Khanh)

a) Traffic flow survey

85. The car counting at Ngoc Khanh was conducted for TA7894 project by Ted.Co.Ltdin March 2013. However, the traffic results on some directions are not sufficient that calculating all traffic flows in all directions could not be completed.

86. MVA conducted additional OD surveys in all directions of the intersections in August 2013.. The results have been integrated into the traffic forecast for 2038, vehicles flow model at intersections was conducted to check the proposed traffic circulation options.

b) Traffic demand forecast

87. According to the estimate, the total volume of vehicles through Daewoo intersection will reach about 9100 pcu in 2018 with the downtrend volume in Kim Ma – CauGiay direction but uptrend in Lieu Giai - Nguyen Chi Thanh direction. Volume of vehicles passing through Dao Tan – Lieu Giai intersection is about 7400 pcu, 30% more than 2013.

c) Traffic circulation

88. The study of traffic circulation around Ngoc Khanh intersection aims to achieve the following objectives:

- Resolve the traffic conflicts at Daewoo, Dao Tan, Kim Ma intersections. Traffic flow move well in all directions. Minimum service level is at D.
- Facilitate best approaching vehicles to the station areas, especially the bus routes approaching the triangular parking area and bus terminal.

89. The study results showed that the main directions should be the same as the current status, the changes will focus on the reorganization of traffic lights and expansion of travel capacity on the roads around the station area.

90. To facilitate buses to access shelters and bus terminals, the flows of vehicles and buses will be prioritized to move in the clockwise direction around the Ngoc Khanh triangle area. Bus lanes will be built for buses to turn right to access to the triangle area from Dao Tan extension. Bus Routes No. 9 and 70 will go to the pick-up point on Lieu Giaistreet then take U-turn back to Dao Tan Street.

91. As calculated, the lowest traffic volume at this intersection is the turning-left direction from Thu Le to Lieu Giai, therefore Lieu Giai street section outside the triangle area will be proposed for the entrance/exit to/from the two-wheel parking.

92. To increase the capacity of Kim Ma street section prior to Daewoo intersection (the outside the triangle area and the Metro station entrance), Kim Ma street pavement will be widened 1.3m to the station structural safety boundary.

d) Daewoo intersection

93. Daewoo intersection is organized into a 4-phases signalized intersection. According to the forecast, traffic volume will increase in Nguyen Chi Thanh-Lieu Giai direction but there would be downtrend on Kim Ma Street when having Metro Line 3. Since the distance between the two signalized intersections is too short, the traffic light cycle between two intersections will be studied optimally to reduce the length of waiting cars on Lieu Giai street.

e) Dao Tan – Lieu Giai intersection

94. Dao Tan -Lieu Giai intersection is currently a 4-phases signalized intersection, the largest traffic volume on Dao Tan street is more 1700pcu 2 lanes with small width and usually congested with long queue at the intersection during peak hours / bothdirections. Because Dao Tan extension hascurrently only.

95. When the Metro Line 3 comes into operation in 2018, Dao Tan -Lieu Giai Intersection traffic volume is estimated to o increase by about 30% with 2300 vehicles/hour/both directions. To meet this traffic volume e, the need of expanding Dao Tan extension is m mandatory to increase capacity and reduce the queuing length at the intersection.

96. Dao Tan / Lieu Giai intersection is proposed to keep a 4-phrase signalized intersection to facilitate station accessibility without conflicting with the other vehicles

f) Kim Ma – Van Bao intersection

97. Van Bao -Dao Tan intersection is currently a self-adjustment T-junction (due to closing of Kim Ma median trip). During peak hours, the traffic flow volume at Nui Truc -Dao Tan direction is relatively large and often conflicts with the right-turn flow from Kim Ma to Van Bao.

98. Installed traffic light at the intersection has been studied, however, there is not enough space for queuing on Kim Ma street as well as the street level difference between Kim Ma and Van Bao streets, therefore this solution is not recommended. Major proposal for this intersection is to install a turn-right banned sign on Kim Ma street to Van Bao street as well as a go-straight banned sign from Bao Van to Kim Ma during peak hours. Vehicles accessing to Van Baostreet must turn to Dao Tan extension from Nui Truc intersection.

g) Dao Tan extension

99. As analysed, in response to a large number of vehicles going straight towards Van Bao – Dao Tan, Dao Tan Street extension is proposed to expand according to Right of Way with 2 lanes in each direction. The total width of 29m including north sidewalk will be widened to 4.5 meters, pavement will extend from 11.4 m to 18.5 m toward the current parking. Direction from Dao Tan to Van Bao complements a separate 3.5 m-wide lane for buses, this bus lane will facilitate for buses to access bus shelters and bus stops easily and not conflict with other vehicles.

h) Traffic measures along the accessing roads

100. In the radius of 200m around the station, there is a recommendation to install no-parking signs on the street except at the prescribed pick-up/drop-off points.

101. Signalized systems for pedestrians will also be provided at the high traffic volume locations but they are not provided at subways or footbridges.

102. A system of signs and road markings will be added along the streets within 500m-1km on accessing roads around the station including Lieu Giai, Dao Tan, Doi Can, Ngoc Khanh, and Kim Ma.

103. Surveillance Camera System (CCTV) will be installed on all the street accesses to station area. Monitoring and reporting system will be done for:

- Ensuring footpaths accessible, safe and convenient for pedestrians and other vulnerable groups like the elderly, people with disabilities, intellectual impairment;
- Monitoring compliance and controlling the use of sidewalks for pedestrians and other vehicles such as cars and motorcycles which park illegally around the station area;
- Controlling encroachment by shops, cafes, restaurants and street vendors on the accessing roads;
- Monitoring the traffic situation on the road, congestion resolving to ensure the smooth accessibility by vehicles.

104. Kiosks for police / security will be built on the Kim Ma and Dao Tan extension sidewalk to protect the works as well as the management security around the station area

Intermodal Transfer Design (Ngoc Khanh)

a) Bus terminal

105. The bus terminal is located in the triangle area including eight parking spaces, where will be used for 7 expected bus routes termining at Ngoc Khanh including 07,24,55,26, NK1, NK2, NK3.

106. Buses terminating here will access the station by separate bus lanes from Dao Tan extension, go backward into parking spaces and go out on Dao Tan street. Those buses finishing their trips stay at the terminal for 10-15 minutes, drivers are arranged to rest in the Services area. Bus-Metro passengers will interchange here at bus stop BS2.

107. A big electronic sign will be installed outside the station to inform the bus routes locations, bus schedule and travel schedule.

b) Services Area

108. There are two service areas designed to provide the comfort for passengers in the triangle area. The service areas are connected together by a system of sheltered walkways. Service areas are built with 1-storey, brick structure, and light materials roof. Structures are built in the open space with concourse entrance and large windows, airy and spacious. Within the service area, two restrooms are provided with an area of 36 sqm. Seating chairs are installed at the concourse area with air conditioning, fans, electric display system notifying the schedule of bus routes and Metro. The drivers resting area is equipped with air condition, desks, and medical cabinets in case of emergency. ATMs and travel guide signs are installed in many locations in order to provide convenient services to passengers.

c) Interchange

109. Passengers who park their motorcycles and bikes at the parking would access to the Metro entrances as well as the bus interchange on the ground. A roof system is designed to connect the service areas with Metro entrances to facilitate interchange for passengers.

110. Seven terminal bus routes will pick up Metro passengers at the interchange station located in the triangle area. Passengers who take the other bus routes will board the buses at the bus stops nearby the station. Passengers using the Metro and other vehicles would easily transit within short walking distance of maximum 100m. The system of lifts, drop-curbs, electronic information is provided at all accesses for the disabled.

C.2.2 Public Transport Components

111. The proposed public transport componetsare as follows:

a. New Demonstration Buses: About 52 units of new demonstration buses with low emissions and innovative technology will be provided through the project. The buses are intended as pilots for the type of bus thayHa NoiPC should then require operators to acquire in future – and to be based on a "clean diesel" EURO IV specification. The detailed specification for the buses will be developed as one of the tasks for the detailed design of the component.

b. ITS on Buses: The equipment considered includes:
   - Fleet management/automatic vehicle location (AVL) system for operations control and schedule adherence
   - Real time passenger information displays inside the buses
   - Smart card ticketing equipment for the integrated ticketing system
   - Associated communications equipment

c. Operations Control IT Hardware and Software: Information systems software and hardware for the Bus Operations Centre to manage the buses on street, and for the generation of real time passenger information. (This assumes that a building already exists that holds an Operations Centre).

d. Bus Stops between stations –These will include real time passenger information plus stops on station feeder routes. This is for the creation of "quality bus stops" including seats, lighting, weather protection for passengers and equipment for delivery of real time passenger information, signs and lines/improved surfacing for buses, similar to the bus stops provided within the metro station realms. The "quality bus stops" will be provided at stations as part of the accessibility improvement measures and will include additional bus stops mid way between the stations.

e. Other corridor improvements: These will include:

   - Bus Priority to create bus lanes, and to give buses priority at traffic signals. Hanoi only has 3.5 km of bus lanes. The Prime Ministers Decision (Article 3) has specifically endorsed the strategy of giving buses priority on the roads. An expanded bus fleet will increase bus flows on the main corridors, justifying the installation of more bus lanes.
   - Improved "mid block" pedestrian crossings (footbridges if necessary)

C.2.3 Transformational Policies and Regulatory Measures

112. This component includes various Technical Assistance contracts aimed at possible changes to policies and regulatory measures (or possible new policies and regulatory measures) to support the station accessibility and PT measures and achieve the project goals by encouraging useage of public transport, limiting use of private vehicles, limiting emissions and developing a smart ticketing system.

C.3 CIVIL WORKS

113. The station accessibility measures consist of the following civil works sub-components with associatedequipment:

a) Transport Interchanges: Major works (prepare and remove the site, construct the access works, transport management items, replacement/enlargement of pavement, lighting system and E&M system, landscape and green trees system, bridge, removing underground works, equipment) encompassing the station realm of two stations at:

- Station 8 - CauGiay: Transport Interchange including services and facilities.
- Station 9 - Ngoc Khanh: Transport Interchange including services and facilities

b) Extension of 3.80 m wide 2.70 m high underground passageways: Works generally within the Station Realm to link withother proposed metro lines across adjacent intersections and/or into adjacent development at:

- Station 9 - Ngoc Khanh : prepare and remove the site, construct the access works, transport management items, replacement/enlargement of pavement, lighting system and e&m system, landscape and green trees system, subway, removing underground works, equipment. There are two key crossing locations with direct access to the station area.
  i. A pedestrian subway is proposed in front of Daewoo Hotel crossing Lieu Giai Street
  ii. A second pedestrian subway is proposed under Dao Tan extension road when Metro Line 5 is constructed to facilitate interchange between the two metro lines.
- Station 10 Cat Linh with Line 2A and BRT Line 1: total 120 m of subway from underground Metrostation to Elevated Line 2A metro station grounds, branching out to Giang Vo Street and to the northern corners of the Intersection.
- Station 12 - Ga Hanoi with Line 1 and the VNR Station: 60 m of Subway from underground Metrostation to in Front of Railway station

c) Construction/Extension of 2.7 m wide pedestrian walkways: Works generally within the Station Realm for the extension of elevated walkways across adjacent intersections or into adjacent development at:

- Station 6 - National University: a gangway from Metro station to Indochina Plaza
- Station 7 - Chua Ha: Elevated gangway underneath metro structure from Metro across Pho Tran Danh Ninh with T-Junction and two single stairway units; connecting Gangway structure to Discovery Towers.

d) Construction of 4.0 m wide footbridges: Works generally within the realm of Station 8 Cau Giay including four footbridges to connect from the entrance of UTC and Thu Le Zoo and to station concourse. Two footbridges at Thu Le remain unchanged design of Systra, two footbridges at UTC have been changed by MVA for their staircase locations suitable for changes of site plan beneath the station. The foot bridges have the following basic parameters:

e) Other Accessibility Improvement Measures within 100 meters of the Stations, with associated equipment. The works are mainly small scale civil works including not limited to the following:

- Curbs and Sidewalk renovation with higher quality pavement and distinctive design tiles.
- Tiling for the visually impaired
- Horizontal Marking for Motorcycle/Bicycle parking areas
- Pedestrian Crossing at Street Level /drop curbs
- Guard Rails
- Pedestrian Signs, Taxi, Xe-om signs
- All new Bus Shelters
- Traffic Management (Signal Control)
- Police Booths
- Enhancement of street lighting under elevated metro station and at road crossings.
- CCTV cameras for pedestrian traffic monitoring at entrances/exits to the metro station,
- Busstops, taxi and xe-om stands.
- Passenger Information Displays

114. During construction phase, open spaces are necessary where the construction camps can be located to accommodate facilities such as motorpool, materials storage facility, temporary living quarters, toilet and bathroom for workers, temporary/permanent drainage, power and water connections. Thename of the communes where these areas can be found is presented in Table C.3.

Table C.3 Potential Locations for Construction Camps

Location	District	Commune/Ward	Stations which can use such site
Location 1	TuLiem	Xuan Phuong	Station 1, 2
Location 2	TuLiem	PhuDien	Station 3, 4
Location 3	CauGiay	Mai Dich (left side)	Station 5
Location 4	CauGiay	Mai Dich (right side)	Station 5
Location 5	CauGiay	DichVong	Station 6
Location 6	CauGiay	DichVong	Station 7
Location 7	CauGiay	DichVong	Station 8
Location 8	CauGiay	DichVongHau	Station 9
Location 9	Ba Dinh	Ngoc Khanh	Station 8,
Other areas (large side walk or hire buildings construction sites)		Cat Linh, Van Mieu, Van Chuong, Cua Nam	Station 10,11,12

115. Potential locations for the construction camps are shown in Figure C.4.

116. For steady source of power needed in the construction works and operation of camps, coordination with the office in charge under the DPCwillbe undertaken. A standby generator set can also be provided as back-up during power failure in the area.

117. Source of water for the project specifically for Stations 1,8 and 9 which will involve construction of transport interchanges, will be extracted from the ground with permission from the Environmental Management Division of DPC.

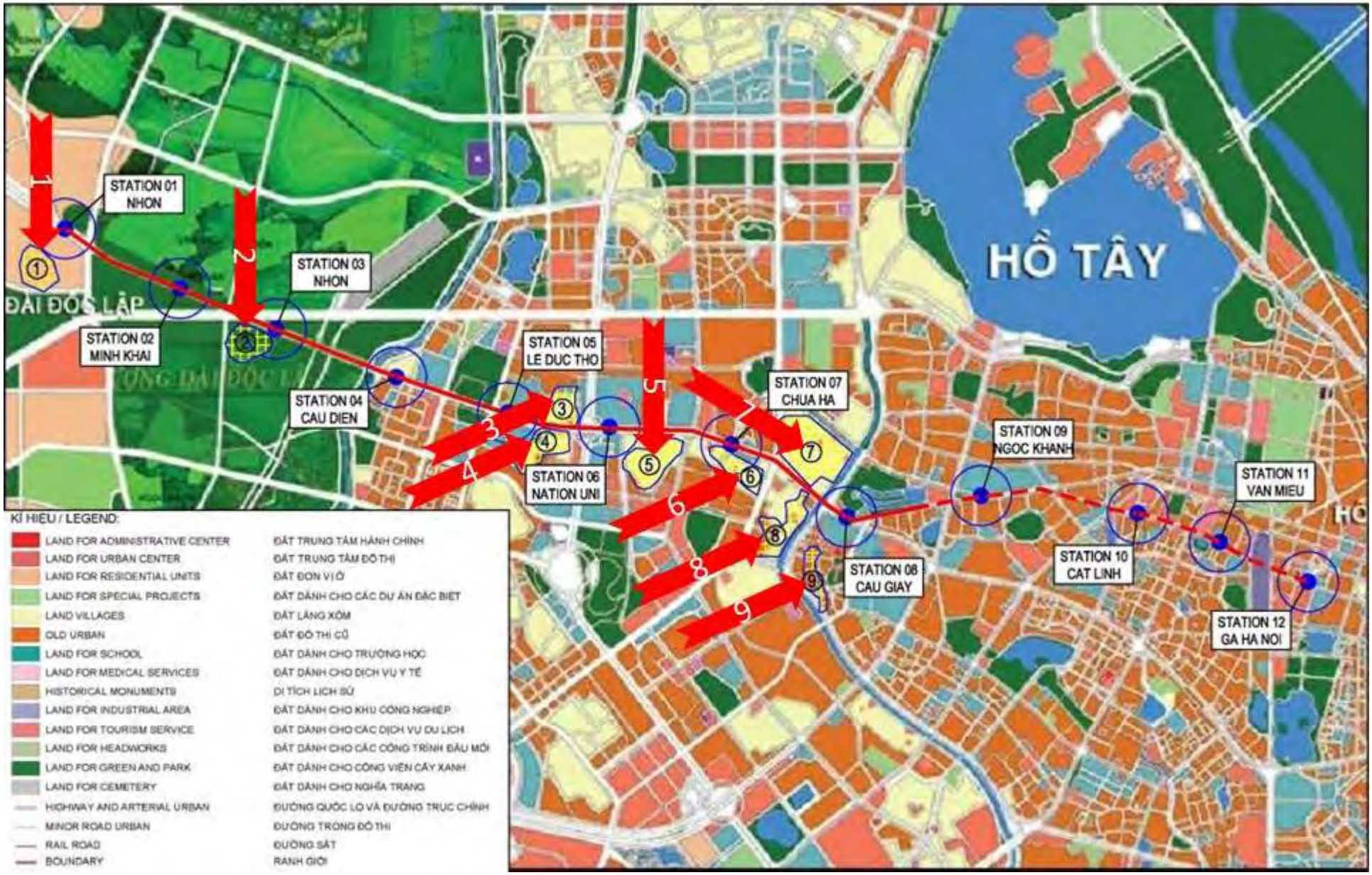
118. Considering the size of the project, the use of ready-mixed concrete will be more economical. Putting up a new batching plant also requires a larger area and will cause negative environmental impacts.

119. Other support systems for environmental protection will need extra space. Construction wastes will be generated from clearing works, excavation, concreting, formworks, equipment maintenance and other construction-related activities. Management of wastes need space, like segregation area for recyclable materials and residual wastes.Recyclable wastes can re-used or be sold to interested parties. Disposal of residual wastes, on the other hand, shall be coordinated with the DPC.

C.4 PROJECT IMPLEMENTATION SCHEDULE

120. The construction of the works under the Strengthening Sustainable Urban Transport for Hanoi Metro Line 3 Project will be tied in with the main Metro Construction Project as construction will be undertaken by the MRT3 project contractor. Metro Line 3 is expected to be constructed from 2013-2017 and the line will be operational by end of 2018. The construction schedule of the works under the Strengthening Sustainable Urban Transport for Hanoi Metro Line 3 Project will be tied in with the main Metro Construction Project and are expectedto complete over the October 2016 - December 2018 period.

Figure C.4: Potenial Locations of Construction Camps



D. DESCRIPTION OF THE ENVIRONMENT

D. DESCRIPTION OF THE ENVIRONMENT

D.1 PHYSICAL ENVIRONMENT

D.1.1 Topography, Geology and Soil

121. Ha Noi is located near the centre of the Red River Delta and is characterized by low-lyingplain with average surface elevation of 7 to 8 m, with the highest elevation of approximately 10 m and lowest elevation of approximately 5 m.

122. The city of Ha Noi is located to the southwest side of the Red River. The surface iscovered by a complex sequence of alluvial delta deposits. Table D.1 contains an overview of the geological strata in Ha Noi. The sequence is from new to old.

Table D.1: Overview of Geological Settings in Ha Noi (excluding Ha Tay Province)

Formation	Description	Approximate Thickness (m)	Hydrogeology
	Holocene		
Thai Binh 3 – 4	Alluvial clay, clayey silt	5 – 6	Aquitard
Thai Binh 1 – 2	Loose to medium dense alluvial sand and silty sand	6 – 15	Unconfined aquifer recharged by surface water infiltration. Only supplies small scale wells. Low to medium permeability.
Hai Hung 2 – 3	Marine clay, silty clay	6 – 15	Low permeability
Hai Hung 1	Lacustrine – swamp silty clay	2 – 4	
	Pleistocene		
VinhPhuc 4	Unknown	-	Low permeability Note: (Not present in Ha Noi)
VinhPhuc 3	Complex alluvial and lacustrine silty clay	7 – 12	
VinhPhuc 2	Alluvial clayey/silty sand with gravel lenses	15 – 30	Primary aquifer for municipal water supply in Ha Noi. Recharged mainly by Red River in the upstream where the formations directly expose to the surface. Highly permeable
VinhPhuc 1	Alluvial sand gravel and cobbles with some clayey silt thin layers	30 - > 50	
Ha Noi	Alluvial cobble and gravel with lenses and thin layers of silty sand and occasional stiff sand clay, known to be up to 65m thick in Ha Noi	2 - > 50	
	Lệ Chi	35 - 70	Bedrock, low to medium permeability

D.1.2 Climate

123. Hanoi Capital has a tropical monsoon climate. Two main seasons can be distinguished: the dry season from October to April, which is cold and dry, and the rainy season from May to September, which is hot and rainy. The average temperature fluctuates during the year; from 17.1 to 29.9°C. Temperature difference between the highest and lowest months is therefore 12.8°C.

124. The mean annual rainfall (from 1890-2011) is 1680 mm. Total rain days in a year are between 114 days. The average humidity in Hanoi is 78-79 %, the highest being 85.0% in the rainy season and the lowest 68.0% in the dry months. Mean annual evaporation is 810 mm. The average number of sunshine hours over the year is around 1250 hours.

125. Monsoon direction in the summer season (from May to October) is southeast and in the winter season (from November to April) is northeast. Average monthly wind speed is 1.3 to 2.0 m/s. The most powerful wind speed is about 15-19 m/s which often occurs with thunderstorms. Summary of climate data of the project area is presented in Table D.2

Table D.2: Climate Data of the Project Area

Indicators	Annual Average Lang (Hanoi)
Temperature ^{0}C	24.2
Number of hours sunshine (hours)	1250
Rainfall (mm)	1680
Relative humidity (%)	83
Evaporation (mm)	810

Source:Hydro- Meteorological Data Center (HMDC)

D.1.3 Flooding and Climate Change

Flooding

126. Minor flooding events are common in Ha Noi after heavy rain. Flooding is caused by the low elevation of the land, the poor condition of drainage and storm water infrastructure, which becomes overloaded in rain events greater than 100 mm/hr, and the changing land use patterns, which have resulted in many low-lying undeveloped areas that previously formed retarding basins or flood channels being used for urban development. Minor and localized flood events occur throughout the rainy season but are most common in July and August.

127. Major flood events are relatively rare and are caused predominantly by elevated flows in the Red River. Ha Noi is protected from such floods by Hong river' dyke system of length of 2,700 km. The last major flood event in Ha Noi was in 1971 when flood levels reached + 14.31 m and caused substantial damage and loss of life. Since then authorities have developed contingency plans for major flood which involve the release of flood waters from the Red River into less populous areas to the north-west of Ha Noi. Flood modeling indicates that any future major flood events that reach Ha Noi could be significantly more damaging than the 1971 event as the flood channel has narrowed over time due to the silt build-up in the river. Major flood events are most likely to occur during July and August.

128. Torrential and persistent rainfall over six days from 30 October to 4 November has caused widespread flooding in various parts of the North and the Central provinces of Vietnam. Cities and provinces badly affected by flood waters include Lang Son, Thai Nguyen, BacGiang, PhuTho, VinhPhuc, Ha Noi, Hoa Binh, Ninh Binh, ThanhHoa, Nghe An, Ha Tinh, BacNinh, Hung Yen, Hai Duong, Ha Nam, Nam Dinh and Quang Binh.

129. According to government information, 85 have been reported dead so far. During the six days, rainfall in the plain areas and the midlands of the Northern provinces reached between 100mm and 300mm, particularly in some areas where rainfall was more than 350mm. This includes Ha Noi (700 mm), Hoa Binh (547mm), VinhPhuc (425mm), and Lang Son (610 mm). In Hanoi as well, thousands of families have had no access to clean water for this period as flooding has caused power outages, and stopped water pumps. In response, the local authorities have been distributing clean water to those affected. Also within the city, many badly flooded areas have been without electricity for almost a week.Many areas within Hanoi are submerged up to two meters. Between 3 and 10 November, up to 140 schools in several districts, including the ChuongMy and My Duc districts, located in theoutskirts of Hanoi remain closed.

Climate Change

130. Climate change is expected to alter the current runoff and rainfall regimes. MONRE has estimated increased mean annual temperature for Viet Nam from climate model simulations under a range of emissions scenarios. The Summary Report on Impacts of Climate Change to Water Resources and Measures to Respond (2010), published by The Vietnam Institute of Meteorology, Hydrology and Environment, gives an initial assessment of potential impacts of climate change in Red River –Thai Binh River Delta in the future, including the Project Area, compared to baseline data for the period of 1980-1999. The main features of these projections (using a moderate emission scenario), are as follows:

- Length of the salinity intrusion of rivers would increase from 3 km to 9 km in 2100;
- Peak flood discharge upstream with a return period of 100 years would be increased 8 %-10% in 2050 & 11-25 % in 2100;
- Annual average temperature would increase by 2 ^{o}C in 2050 and 3 ^{0}C in 2100.

131. Temperature rise would make engines to consume more fuel, while cooling and ventilation requirement would also be more costly to transportation sector.

- Average rainfall to increase from 2.86 -2.94% in 2040-2059; and 5.19-5.68 % in 2080-2099.

132. Project area located in 5 districts :TuLiem, CauGiay, Ba Dinh, Dong Da, HoanKiem in Hanoi City, in which some areas in low-lying land are facing with increased occurrence of floods and challenges in seeking for drainage solutions as a result of floods from rivers This requires thorough assessment and more costs for the construction and design of car parks / service centres (for option 2) and it is necessary that mitigation measures are taken.

- Average dry season rainfall would decrease from 1.0-1.25% in 2040-2059 and by 1.72-2.80% in 2080-2099.
- Annual average rainy season rainfall would increase from 3.5-3.7% in 2040-2059; 6.2-6.8% in 2080-2099.

133. Most of the increase in average annual rainfall predicted by models is expected to occur in the already wet months of the year, with only a minor increase over the dry season. The result would be that the seasonal variation in river flows would increase, with a greater variation in runoff at the seasonal scale. The frequency of dry season water shortages may also increase, because of higher dry season evaporation rates. These climate changes will influence both dry season flow and flood flow of the Project area, and need to be taken into account in urban drainage planning.

134. During social survey, the opinion of the people regarding the occurrence of flooding was also taken. As presented in Tables D.3 & D.4

Table D.3: Frequency of the Occurrence of Flooding Based on Social Survey

Frequency of the Occurrence of Flooding	Number of occurences
2012	3
2011	2
2010	1-2
Others	Heavy flooded situation /inundation in whole Hanoi City in 2008 with total rainfall 563.2 mm from 19 h, Oct 30 to 19 h, Nov, 2 , 2008 (Report from Hanoi Sewerge and Drainage Limited Company)

Table D.4 Possible Causes of Flooding Based on Social Survey

Possible Causes of Flooding	Yes/No
No drainage	
Clogged/Poor drainage	**x**
Rivers overflow due to heavy rain	**x**
Others	Building development without planning Poor sewage and drainage system, improving of this system not properly Areas of regulation lakes were encroched

D.1.4 Air Quality

135. There are reports that ambient air quality is deteriorating partly due to the use of dirty fuel and the increasing number of motorized vehicles. Industries, on the other hand, are among the stationary sources of air pollution in Vietnam. Results of air quality assessment from 2006 to 2010 in Hanoi City shows that the TSP level in Stations 4 and 5 fluctuates significantly from 2006 to 2010, exceedance ranges from130% to 240% of its standard value. Similarly, findings on the air quality monitoring conducted by the Center for Environmental Protection in Transport in 2007 reflects that NO2 concentration has been exceeded from120% to 145% within Stations 9 and 10.

Table D.5: Results of Dust Monitoring in the Project Area (2006-2010)
at CauDien (near Station 4) My Dinh (near Station 5)
Unit µg/m^3

Monitoring Location	2006	2007	2008	2009	2010	VN Standard QCVN 05:2009/BTNMT (1hr criteria)
CauDien(near Station 4)	270	250	150	160	165	300
My Dinh(near Station 5)	480	340	200	720	100	

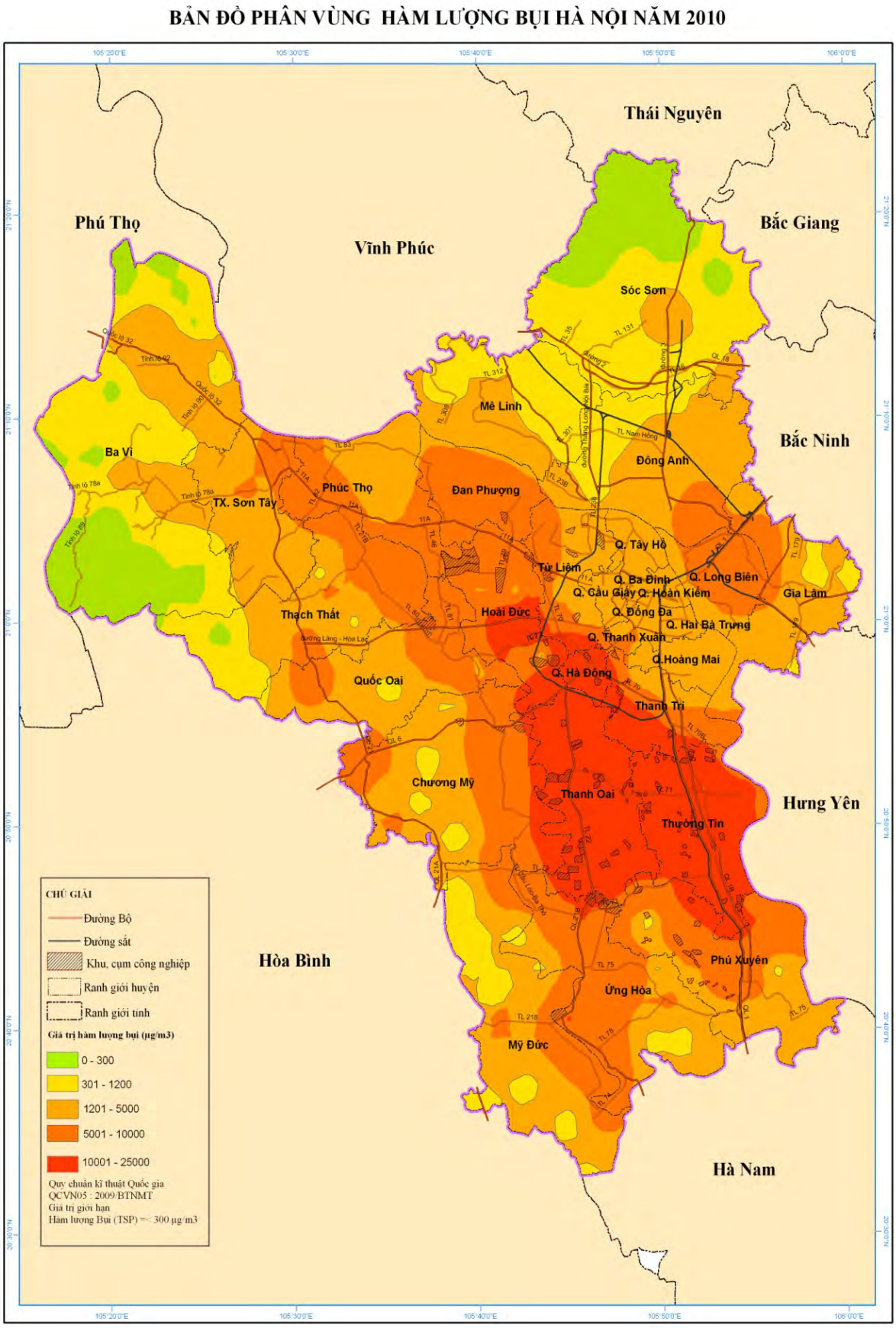
Source: Annual Report on the Status of the Environment , 2006-2010 –Hanoi DONRE

Table D.6: Results of Air Quality Monitoring in the Project Area

Sample	Monitoring Location	Land Use	TSP (µg/m3)		CO (µg/m3)		SO2 (µg/m3)		NO2 (µg/m3)		Hydrocarbon (µg/m3)	
			2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
KK01	Western boundary of depot	Agricultural / residential	111		450		150		70		180	
KK02	Opposite University of Industry in forecourt of small restaurant	Commercial / residential	150	188	720	476	220	241	**240***	129	300	296
KK03	Along NR 32 5m from road boundary at residence	Commercial / residential	124		660		160		150		260	
KK04	At intersection of NR 32 and national railway	Commercial / residential	159		690		200		120		280	
KK05	Intersection with Le Duc Tho Road	Industrial / residential	154		540		200		90		150	
KK06	Ha Noi National University near intersection with 3rd Ring Road	Education facility	71		600		190		110		270	
KK07	Near CauGiay Post Office on CauGiay Street	Commercial	215		680		200		120		170	
KK08	Daewoo Hotel on NW corner of intersection Lieu Giai / Kim Ma	Commercial	68		910		270		**290***		140	
KK09	Intersection Cat Linh / Ton Duc Thang near Horison Hotel	Commercial / residential	105		270		260		**290***		220	
KK10	Gate of Ha Noi Railway Station in Tran Quy Cap	Commercial residential	75	114	650	802	170	299	140	134	310	367
QCVN 05:2009/BTNMT (1hr criteria)			**300**		**30,000**		**350**		**200**		-	
QCVN 06:2009/BTNMT (1hr criteria)											**5,000**	

Source: CEPT, 2007&2008 * exceeds the standard value)

Figure D.1 Map on Dust Level in Hanoi 2010



136. Based on the results of noise monitoring from 2006-2010 in Hanoi City, increased in noise level has been attributed to transport movements, construction activities, industries and daily socio-economic activities. Noise levels went upanytime of the day and night. Typical daytime noise levels in residential areas are 75 –85 dB(A) and can reach 85 – 90 dB(A) in the vicinity of major road corridors (Mai Dich Flyover, Nguyen Chi Thanh- La Thanh Dyke). This has been exceeded from 110% to 130% of its standard value.

137. Noise monitoring results at 16 locations on major roads in Ha Noi in 2006 indicate thataverage noise levels during the daytime vary from 64.4 - 80.5 db(A) and during the eveningfrom 67.3 – 73.0 db(A). Most locations had noise levels exceeding the maximum QCVN 26:2010/BTNMT for mixed development areas (the most noise tolerant category) during daytime and night time.

Table D.7 Noise Monitoring in the Project Area (dB(A)) (2007&2008)

	Sample	Land Use	Monitoring Period	Leq dB(A)		LA max dB(A)		L50 dB(A)		QCVN 26: 2010/BTNMT dB(A)
				2007	**2008**	**2007**	**2008**	**2007**	**2008**	
N01	Western boundary of depot	Predominantly residential	Daytime (6h-21h)	75.0	68.1	91.2	82.1	65.0	65.4	70
			Evening (21h-6 h)	72.4	62.6	89.0	77.3	63.1	59.7	55
N02	Opposite University of Industry in forecourt of small restaurant	Education facility	Daytime	77.2		93.2		71.4		55
			Evening	69.3		79.4		66.1		45
N03	Along NR32 5m from road boundary at residence	Residential with some small scale commercial	Daytime	78.3		95.4		72.4		70
			Evening	73.9		84.6		69.6		55
N04	Intersection of NR 32 and National Railway	Residential with some small scale commercial	Daytime	74.9		92.3		69.1		70
			Evening	70.2		86.2		63.8		55
N05	Intersection with Le Duc Tho Road	Residential, small scale industrial	Daytime	73.8		93.2		64.9		70
			Evening	69.5		85.3		64.3		55
N06	Ha Noi National University near 3rd Ring Road	Educational	Daytime	71.2		83.9		70.2		55
			Evening	66.1		72.9		65.1		45
N07	Near CauGiay Post Office on CauGiay Street	Commercial	Daytime	74.5		86.2		71.3		70
			Evening	69.9		80.7		65.4		55
N08	Daewoo Hotel on NW corner of intersection Lieu	Hotel / residential	Daytime	73.8		85.3		70.6		70
			Evening	69.3		81.3		65.8		55
N09	Intersection Cat Linh / Ton Duc Thang near Horison Hotel	Residential with some small scale commercial	Daytime	73.3		84.6		70.9		70
			Evening	70.7		80.8		68.2		55
N10	Gate of Ha Noi Railway Station in Tran Quy Cap	Residential with some small scale commercial	Daytime	70.1	70.9	80.6	82.4	67.0	69.6	70
			Evening	67.2	68.0	77.5	78.9	63.4	66.0	55

Source: CEPT, 2007& 2008

Table D.8 Results of Noise in the Project Area (2006-2010)
at Mai Dich Flyover (near Station 4) & My Dinh (near Station 5)

Monitoring Location	2006	2007	2008	2009	2010	QCVN 26: 2010/BTNMT dB(A)
CauGiay-Buoi-Lang Crossroad (close Station 8)	N/A	77	80	82	83	70
Mai Dich Flyover (near Station 5)	N/A	86	85	88	85	

Source: Report on Status on Existing Environment, 2006-2010 – Hanoi DONRE

D.1.5 Surface Water

River System

138. The river network in Ha Noi is characterized by five main rivers (Nhue River, To Lich River and its tributaries the Lu, Kim Ngu and Set Rivers). The lower section of To Lich River receives all of the city's wastewater before discharging it into Nhue River via the ThanhLiet sluice. There are also numerous natural and artificial lakes (118 in total) and a large number of artificial canals and streams (25 in total). These canals are: 3 -10 m wide, 1.5 - 2.5 m deep, and 18.1km in length. Table D.9 summarizes characteristics of the main rivers in HaNoi area.

- Nhue River: takes water from the Red River through Lien Mac sluice, supplies water for Dan Hoai irrigation system, drains waste water for Hanoi city, Ha Dong town, and joins with Day River at Phu Ly town. The length of river is 74 km, thecatchment area is 1,070km2. To Lich river discharges regularly in to Nhue river with average flow 11-17 m3/s, maximum flow 30 m3/s

Table D.9 - Features of Ha Noi River Network

River Name	Length (km)	Depth (m)	Catchment Area (km^2)	Max Flow (m3/s)	Other Features
Nhue	74	Max. 5.6	57.9	No data	Main receiving body for wastewater; flows controlled by sluice gates; modified natural formation with some riparian vegetation
To Lich	13.5	2 – 3	77.5	30	Receives waste from 15 discharge points; total of 150,000 m3/day; concrete formation with little riparian vegetation
Kim Ngu	11.9	2 – 4	17.3	15	Receives waste from 14 discharge points, total of 120,000 m3/day
Lu	5.8	2 – 3	10.2	6	Receives 50,000 m3/day discharge
Set	6.7	3 - 4	7.1	8	Receives 65,000 m3/day discharge

- Four of main inner drained rivers in Hanoi:
  - To Lich river: length is 14.6 km, average wide: 40-45 m, depth 3-4 m, start from Buoi sewer, run through area of TuLiem, Thanh Tri districts, ThanhLiet Dam and discharge in to Nhue river. Downstream of To Lich river is received water from Lu, Kim Nguurivers, collected whole waste water of Hanoi City.
  - Set river: length is 6.7 km, wide 10-30 m, depth 3-4 m, start from Ba Trieu sewer at Bay Mau Lake, then discharges to Kim Nguu at GiapNhi.
  - Kim Ngu river: length is 11.9 km, wide 20-30 m, depth 2-4 m, start from outlet of Lo Duc sewer, receives Set river water at GiapNhi and joins with To Lich at ThanhLiet.
  - Lu river: length is 5.8 km, average wide: 30 m, depth 2-3 m, receives water from Trinh Hoai Duc, Trang sewers (Kham Thien), flow through TrungTu, Truong Chinh roads and discharges to To Lich river

D.2 SURFACE WATER QUALITY

139. Surface water in Ha Noi is polluted by discharges of untreated wastewater and disposal of solid waste. Industrial wastewater discharges, including discharges from hospitals, are one of the major sources of pollution. In 2003 it was estimated that 260,000 m3/day of industrial wastewater was discharged to water bodies within Ha Noi. Of this, only approximately 6.2% had undergone some form of treatment.

140. Water quality monitoring in four main rivers and lakes in Ha Noi indicates poor andworsening water quality. Concentrations of BOD, COD, heavy metals and coliforms in To Lich, Set, Lu and Nhue Rivers typically exceed QCVN 24: 2009-Class B criteria by 2-3 times for rivers and 2.0-5.5 times for lakes (COD of HoanKiem lake reach 165 mg/l), DO levels are low, levels of suspended solids are highly elevated (150 to 170 mg/l); and the ammonia (NH4+) content is up to 5.0-6.0 times for rivers and 2.0-12.0 times higher than permitted levels. The dry season pollutant loads are higher than in the wet season; however, sediment loads are higher in the wet season. Most of the lakes in Ha Noi are seriously polluted with high BOD (15 to 44 mg/l), suspended solids (100 to 150 mg/l) and low DO levels (0.5 to 2.0 mg/l).

141. Based on 2005 data, both Nhue and To Lich Rivers exceeded the BOD, COD, Phosphates (PO43-)) and Fe.Water quality monitoring in drainage canals (Hao Nam, Cong Vi, TrungKinh, and ThuyKhe canals showed that the water is heavily polluted by organics, oils and microorganisms. The levels of BOD5 and COD exceedsQCVN 24: 2009by 1.6 to 2.7 times; the oil levels are 5 to 7 times higher than QCVN criteria; coliform levels exceed QCVN criteria by 75 to 210 times; and elevated levels of suspended solids (SS) and Fe are present.

142. Sampling of river bed sediments in the To Lich and Nhue Rivers, particularly in the vicinity ofindustrial zones indicate presence of cadmium, chromium, copper, nickel, lead and zinc.

Table D.10 - Result of Water quality monitoring of Inner drained rivers and Nhueriver in Hanoi -2010

Rivers	**BOD_5** mg/l	**COD** mg/l	**NH_4^+** mg/l
Starting point of To Lich river	100	190	48
Ending point of To Lich river	110	185	50
Starting point of Kim Nguu river	140	260	60
Ending point of Kim Nguu river	115	225	58
QCVN 24: 2009 (A)	30	50	5
QCVN 24: 2009 (B)	50	100	10

Table D.11 - Result of Water quality monitoring of lakes in Hanoi - 2009

Lakes	District	**BOD_5** (mg/l)	**COD** (mg/l)	**NH_4^+**(mg/l)	**$NO3^-$** (mg/l)
Thu Le	Ba Dinh	18	20	1.0	2.0
Ngoc Khanh	Ba Dinh	30	75	6.0	3.0
Giang Vo	Ba Dinh	30	70	4.0	5.0
HoanKiem	HoanKiem	42	165	1.0	1.9
QCVN 08: 2008 (A1)		4	10	0.1	0.1
QCVN 08: 2008 (B1)		15	30	0.5	0.3

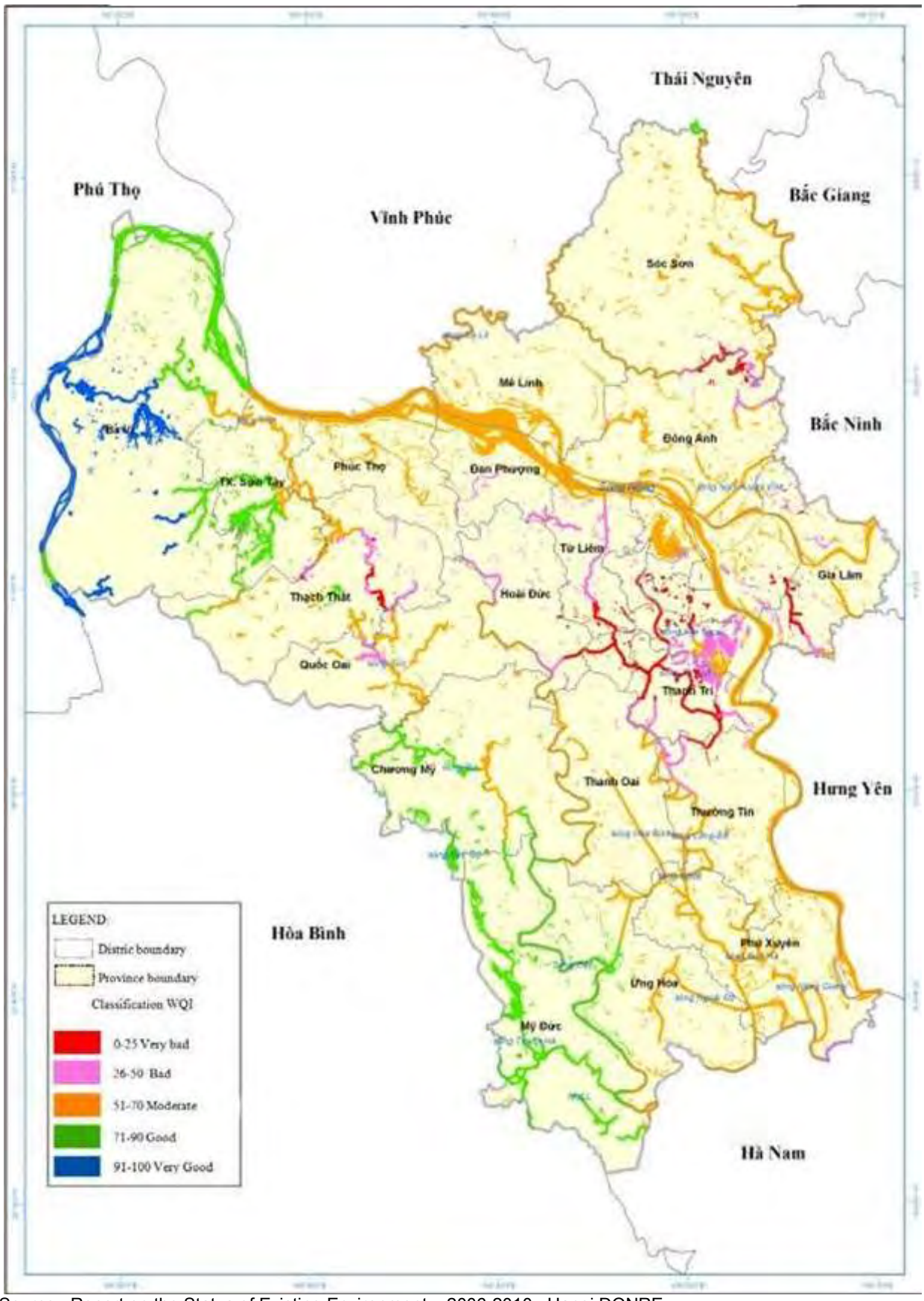
Table D.12 - Result of Water quality monitoring of Inner drained rivers and Nhue river in Hanoi - Nov 2005

No.	River	Location	Province	Temp °C	pH -	SS mg/l	Turb NTU	E.Cond mS/cm	TDS mg/l	DO mg/l	BOD_5 mg/l	COD mg/l	NH_4^+ mg/l	NO_3^- mg/l	NO_2^- mg/l	PO_4^{3-} mg/l	Sal ‰	Cl^- mg/l	Total Fe mg/l
1	To Lich	Nghia Do	Hanoi	25.6	7.4	26.40		7.2400		0.55	**80.0***	**112.2***	31.200	0.100	0.014	**6.120***	0.4	58.10	1.089
2	Lu	Lu river	Hanoi	23.8	7.2	11.42	17.303	0.8375	536.2	1.09	**105.0***	**158.6***	39.681	1.448	0.020	**1.126***	0.4	60.35	0.535
3	Kim Nguu	Mai Dong	Hanoi	25.5	7.0	39.60		7.9400		0.60	**190.0***	**256.6***	37.800	0.190	0.015	**9.420***	0.5	40.80	**2.040***
4	Set	Set bridge	Hanoi	24.5	7.0	12.68	48.163	0.9282	595.1	0.87	**110.0***	**172.6***	26.632	1.789	**0.059***	**1.274***	0.4	127.80	0.984
5	Kim Nguu	TuuLiet	Hanoi	23.5	7.5	58.00		8.1400		0.80	**55.0***	**81.2***	29.000	0.170	0.023	**8.020***	0.5	58.70	**1.587***
6	To Lich	ThanhLiet Dam	Hanoi	23.4	7.6	10.68	13.012	0.8711	556.9	1.10	**98.0***	**142.2***	36.330	2.781	0.023	**0.997***	0.4	65.68	0.746
7	Nhue	Lien Mac	TuLiem-Hanoi	24.6	7.9	**142.8***		1.7800		**6.30***	2.2	2.5	0.600	0.110	0.024	**0.180***	0.1	9.40	**1.540***
8	Nhue	CauDien	TuLiem-Hanoi		7.4	**169***	380			**5.6***	5.0	18.6		7.4	**0.08***				
9	Nhue	Co Nhue	TuLiem-Hanoi		6.9	**173***				**5.4***	18.1	**60.3***		3.87	0.03				
	QCVN 08: 2008 -B1				5.5-9.0	50				>4.0	15	30	0.5	10	0.04	0.02		600	1.5
	QCVN 08: 2008-B2				5.5-9.0	100				>2.0	25	50	1.0	15	0.05	0.02		Not application	2.0

Source: Geography Institute, Environmental Monitoring Network & Environmental Monitoring Results for Nhue-Day River Basin, Nov -2005

* exceeds the standard value

Figure D.2: Map on Water Quality Zoning according to WQI – Hanoi 2010



Source: Report on the Status of Existing Environment , 2006-2010 –Hanoi DONRE

D.2.1 Groundwater

Groundwater Availability and Use

143. In Ha Noi, most of the groundwater is contained in two Quaternary aquifers, the upperaquifer (part of the Holocene Thai Vinh Formation) and the lower aquifer (Lower VinhPhuc and Ha Noi formations of Pleistocene). The upper aquifer consists of a series of non-continuous silty fine to medium sand lenses and thin layers of low to medium permeability. The aquifer is unconfined or semi-confined. The average thickness of the aquifer is 9.2 m in the north and 13.3 m in the southern part of the Red River Delta. The permeability of the aquifer is 20 to 800 m2/day. The source of groundwater of the upper aquifer is mainly from direct surface infiltration, including precipitation and surface water bodies. Due to its relatively low transmissibility and limited water-bearing capacity, the upper aquifer is only used for small-scale water supply. The upper aquifer does not exist along the project alignment.

144. The lower aquifer is separated from the upper aquifer by a Pleistocene clay layer.Where the upper aquifer is absent, the Pleistocene clay layer is combined with Recent claydeposits to form a top confining layer. The depth to the top of the confined aquifer increases56 from north to south in Ha Noi. The top of the aquifer is at depth of about 12 to 40 m bgs, and the bottom of the aquifer is about 45 to 90 m deep. The permeability of this aquifer ranges from 200 to 1,600 m2/day. Direct surface recharge is not likely to be the groundwater source of the lower aquifer in Ha Noi because the thick top confining layer forms a barrier for surface percolation. The main source of the groundwater in the lower aquifer is through recharge in the outcrop area where the aquifer formation is directly exposed to the surface. The recharge area is upstream in the headwaters of the Red River Delta where the top clay layer pinches out. The groundwater moves laterally downstream to Ha Noi. The lower aquifer has been used as the main water supply for Ha Noi since 1909.

145. In the past decade groundwater of the lower aquifer has been over-pumped, mainly as amunicipal water supply. As a result, depression of the groundwater table has occurred in most of Ha Noi City The three well fields that the metro rail system traverses all have a water level more than 20 m deep, and yet declining at a rate of 0.4 to 0.7 m/year 2009). The water demand is expected to rise with an increase in population.

146. Groundwater reserve is abundant with potential reserve about 5,914,000m3/ day, mainly has been the principal source for water supply in Ha Noi and surrounding. The estimated total extraction rate of groundwater in Ha Noi is about 800,000 m3/day, including municipal, industrial, and private domestic wells. Most of the water supply comes from the highly permeable lower aquifer. Only small portion of the water comes from the upper aquifer because of its limited water-bearing capacity and relatively poor water quality. There are 9 municipal well fields in Ha Noi and producing about 500,000 m3/day of water in total. There are 3 municipal well fields located near the project site: Mai Dich, Ngoc Ha, and Ngo Sy Lien well fields. Among them, the Mai Dich and Ngo Sy Lien well fields exist under the project alignment and may receive some impact from the project. In 2008, the average extraction rates for Mai Dich, Ngoc Ha, and Ngo Sy Lien well fields were 56,000 m3/day; 40,000 m3/day; and 51,200 m3/day, respectively (NDWRPI, 2009).

147. The Ngo Sy Lien Plant is located to the west of Ha Noi Railway Station. The underground section of the project line runs across the well field. The well field contains a network of 17 wells; four of them are located right next to the project line (1 on Nui Truc, 1 on GiangVo and 2 on QuocTuGiam). The well field extracts water from the lower aquifer with an average rate of 51,200 m3/day in 2008. The wells are 70 to 90 m deep and pump at a rate ofabout 40 m bgs. In 2008, the steady-state water level was over 20 m deep, and 23 to 33 m deep when pumping. Since 1998, the groundwater level has declined more than 4 m. After, 2007, the water level is estimated to drop at a rate of more than 0.7 m/year (NDWRPI, 2009).

148. According to the geological logs of the water wells, the thickness of the lower aquifer inthe Ngo Sy Lien Well field varies from 60 m to more than 80 m due to bedrock relief Because of the existence of the confining layer, the lower aquifer does not receiverecharge directly from surface anywhere near the well field. Most of the water comesfromlateral movement from upstream, some from infiltration from the top and bottom confining strata.

149. The pressure depression in the aquifer caused by groundwater pumping induces recharge from the confining strata and the upper aquifer. But because of the low permeability of the confining layer, the induced recharge rate is very limited. The evidence for this is demonstrated by the large hydraulic head difference between the upper and the lower aquifers.

150. The Mai Dich well field contains 21 wells distributed around Ring Road 3 near theNational University. In 2008, the average pumping rate of the well field is about 56,000 m3/day. Since 1998, the groundwater table has dropped for more than 6 m, and continues to drop at a rate of more than 0.6 m/year (NDWRPI, 2009). The current groundwater table is estimated at about 29 m bgs.

Groundwater Quality in the Project Area

151. The existing groundwater quality data for the project area indicates that the type ofpollution is similar to the regional problem. Among the examined constituents, As, Fe, Mn,NO3-, and coliforms were found that frequently exceed the drinking water standards(HRB/SYSTRA, 2008; ADB, 2007; CEPT, 2009; NDWRPI, 2009). High As, Fe, and Mnlevelswere found in both the upper and lower aquifers. It is believed that the source of theconstituents is natural. Generally, the upper aquifer possesses higher concentration levels ofNO3- and coliforms. Both are indications of human pollution. The higher pollution levels of the upper aquifer are because it receives more polluted surface recharge than the lower aquifer.

152. Because the thick confining layer forms a barrier to the surface pollution, it will take much longer for any surface pollution to reach the lower aquifer. However, some low level pollutants were detected in the lower aquifer. It is common that poorly constructed wells and poorly sealed abandoned wells provide direct conduits for pollution to reach the lower aquifer in a relatively short time.

153. Water samples from the boreholes located on the project line were also analysedforconstituents of engineering concern, i.e. chloride (Cl-) and sulfate (SO4 2-) for their corrosioncapacities. Results indicate that the groundwater quality will have no or minimum negativeeffect on the structural materials (USCo, 2008).

Table D.13 - Groundwater pollution of Holocen aquifer (qh) in dry and rainy season – The south Area of Red River (includedThanhXuan, Dong Da, Hai Ba Trung, Thanh Tri and apart of TuLiem)

Season	NH_4^+ mg/l		NO_3^- mg/l		NO_2^- mg/l		PO_4^{3-} mg/l		As mg/l
	Annual Average	2010	Annual Average	2010	Annual Average	2010	Annual Average	2010	2010
Dry season	9.39	12.53	3.15	1.74	0.16	0.038	0.8	1.05	0.004
Rainy season	12.95	12.92	2.14	1.59	0.091	0.06	0.9	1.11	0.042
QCVN 09:2008/BTNMT	0.1		15		10		3.5		0.05

Source: Center for Natural Resources & Environment Measures and analysis –Hanoi DONRE, 2011

Table D.14 - Groundwater pollution of Pleistosen aquifer (qp) in dry and rainy season – The southarea of Red River (included ThanhXuan, Dong Da, Hai Ba Trung, Thanh Tri and apart of TuLiem)

Season	NH_4^+ mg/l		NO_3^- mg/l		NO_2^- mg/l		PO_4^{3-} mg/l		As mg/l
	Annual Average	2010	Annual Average	2010	Annual Average	2010	Annual Average	2010	2010
Dry season	5.21	5.86	2.61	1.00	0.13	0.03	0.55	0.53	0.049
Rainy season	6.21	6.83	2.5	1.55	0.04	0.04	0.65	0.75	0.038
QCVN 09:2008/BTNMT	0.1		15		10		3.5		0.05

Source: Center for Natural Resources & Environment Measures and analysis –Hanoi DONRE, 2011

D.2.2 Soil Quality

Soil Quality in Ha Noi

154. Soil quality in Ha Noi is influenced by historic and current land uses. Areas that are or have been subject to agricultural or industrial activities have the potential to be contaminated with heavy metals, pesticides, fuels/oils and a range of other chemicals. Areas that have been filled also have the potential for contamination depending on the source of the fill material.

155. The results of soil monitoring data (Table D.15) in Hanoi suburban areas show that soil quality was contaminated symbolically by heavy metals as Cd, As, Cr, Cu, Zn, Ni, Pbvà Hg, etc.)

Table D.15 - Soil Monitoring Results in Hanoi Suburban Areas

Districts	Cu mg/l	Zn mg/l	Pb mg/l
Gia Lam	65	100	50
TuLiem	55	70	60
Thanh Tri	65	160	70
QCVN 03: 2008/BTNMT	50	200	70

Source: University of Agriculture, 2008

Soil Quality in Project Area

156. Data on soil quality in the project area is limited (Table D.16). Monitoring focused on heavy metals and no monitoring of pesticides or other contaminants was carried out. No data are available on historic land use at monitoring sites; current land use is indicated in Table D.16. No data are provided on the depth of monitoring samples. The monitoring data are compared to the criteria contained in QCVN 03/2008 - Heavy metal standards in soils.

Table D.16 - Soil Monitoring Results in the Project Area

Parameters	Unit	Analysis results				QCVN 03:2008/BTNMT		
		D01 Depot site - agricultural land	D02 Adjacent to NR32 - vacant land	D03 Opp. Mai Dich Cemetery – agricultural land	D04 Temple of Literature – public space	Agricultural land	Land for residential and public space	Land for trading and services areas
Cu	mg/kg	54.6	31.2	28.9	32.8	50	70	100
Zn	mg/kg	205	79.1	75.1	44.0	200	200	300
Cd	mg/kg	0.35	0.45	0.62	0.35	2	5	5
Pb	mg/kg	26	34	30	18	70	120	200
Co	mg/kg	2.3	2.8	1.8	2.3	-	-	-
Total organics	%	1.50	1.59	3.36	1.29	-		-

Source: CEPT, 2007.

157. The results of soil monitoring data in the project area show that at all sampled locations, soil quality was within criteria contained in QCVN 03: 2008/BTNMT, except for soils from the Depot location-near station 1 where Cu and Zn level exceeds permitted levels for agricultural land use.

D.3 BIOLOGICAL ENVIRONMENT

D.3.1 Forest and Vegetation and Terrestrial Ecology

Forest

158. Natural forest area is only in suburban areas, mainly in old Ha Tay Province (this province is merged in to Hanoi since August 2008, about 4,426.2 ha (in 2007). Natural forest are mainly wood forest, rocky mountain forest, which are protected strictly according to special use forest

Table D.17 - Natural Forest Types in Old Ha Tay Province

Type of forest	Areas (ha)	Forest function classification (ha)		
		Special use	Protective Forest	Productive Forest
1. Wood forest	1715.7	960.4	722.1	33.2
2. Bamboo forest	79.9		79.9	
3.Rocky mountain forest	2630.6	2.630.6		

Source DONRE, 2008

Terrestrial Ecology in Hanoi

159. According to Ha Noi DONRE (State of Environment in Hanoi -2006-2010 period) , there are approximately 528 terrestrial flora species in Old Ha Noi (before extended). Artificially planted communities include industrial and agricultural crops, ornamental plants and street trees which provide shade and amenity (50 species). Terrestrial fauna in Ha Noi reportedly includes 40 mammal species, 103 bird species, 24 reptile species and 14 amphibian species, and 595 insects. Most mammal and bird species are concentrated in vegetated areas of the suburban Soc Son district to the north of the city centre and few species are found in more densely developed urban areas.

Terrestrial Ecology in the Project Area

160. Terrestrial ecology values in the project area are very low due to the urban nature of theenvironment and the high level of disturbance. Flora in the project area is limited to scatteredroadside and garden trees of various exotic and endemic species and agricultural land use atthe depot site (vegetables, flowers and fruit trees). Flora in the project area has no biodiversity value but in some locations, such as Kim Ma and GiangVo streets, trees along roadsides and in the median are large and mature specimens that have value in terms of landscaping, shade and visual amenity. The gardens surrounding the Temple of Literature also contain numerous mature trees with amenity and cultural value.

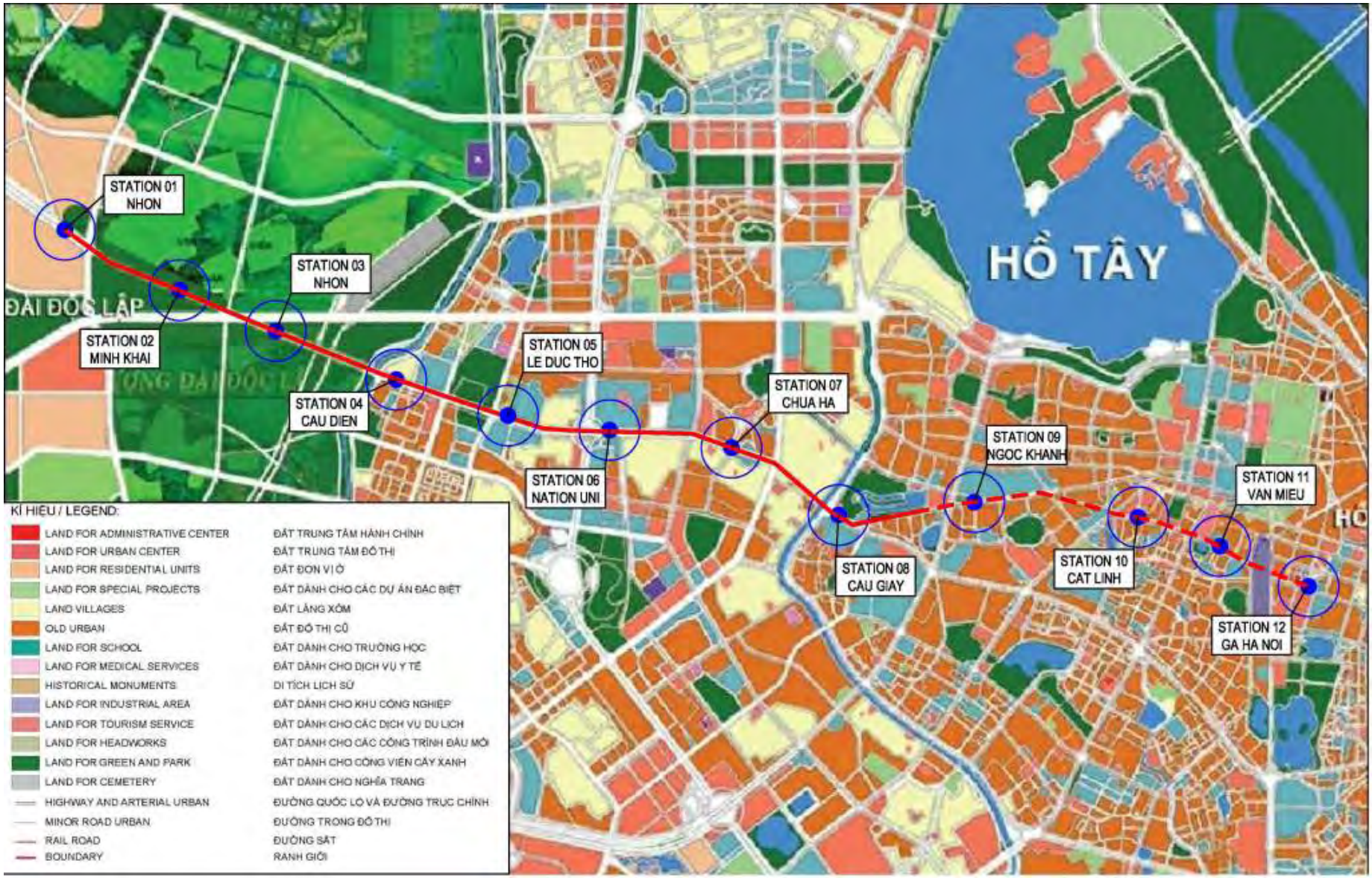
161. Fauna in the project area is limited to domestic animals, several species of birds adapted to the urban environment and vermin such as rats and mice, and a large number of captive animals kept in the Thu Le Zoo on Kim Ma. No non-captive, endangered species are expected to be found in the project area.

D.3.2 Aquatic Ecology

In Hanoi

162. According to “Status of Environment in Hanoi City 2006-2010” from Hanoi DONRE, aquatic flora communities of Ha Noi there are 35 high level flora species, 476 low level flora species and 42 benthic fauna species. Most of these species are found in West Lake and in small wetland areas in the southern suburban district of Thanh Tri. West Lake contains the highest density of high level species (Macrophyta), water fern and alga (such as Euglenophyta, Pyrropphyta, Chlorophyta, Dinophyta, Cryptophyta, and Xanthophyta).

Figure D.3: Land Cover Map



163. Most fish species are found in the Red River particularly in Dong Anh suburban district (Total 118 species) and in West Lake (55 species).

In The Project Area

164. Aquatic ecology values in the project are low due to the poor water quality in the rivers,lakes and canals. Aquatic flora is comprised of algae, water ferns and other exotic species. Aquatic fauna species are limited to benthic organisms, insects, worms, shrimps, and mollusks. No endangered species are expected to be found in the project area.

D.3.3 Protected areas

165. There are no protected areas in or in the vicinity of the project area. There are two Protected Areas within in Hanoi City, these are:

- Ba Vi National Park is center of Mount Ba Vi, a mountain situated about 50 km west of Hanoi. The mountain rises steeply out of a plain that rarely exceeds 30 m in elevation.
- Huong Son Cultural and Historical Site lies 60 km south of Hanoi, in My Duc district, Ha Tay province. The cultural and historical site is centered on Chua Huong Tich, the Perfume Pagoda.

166. The importance of these areas and their geographical relationship with the projectare is described below (Table D.18) . All are remote from the project site.

Table D.18 - Protected Areas in Extended Hanoi City

Location	Distance from project area boundary	Characteristic of biodiversity
Ba Vi National Park		
Ba Vi National Park: is center of Mount Ba Vi, a mountain situated about 50 km west of Hanoi.	About 50 - 55 km to the west of the Project (from Nhon to Ga Hanoi)	Ba Vi National Park, natural forest which mainly lies at elevation above 600 m. The types of natural forest at Ba Vi are lowland evergreen forest, lower montane evergreen forest and lower montane mixed coniferous and broadleaf forest. In 1998, the national park supported 4,701 ha of forest, comprising 1,710 ha of natural forest and 2,991 ha of plantation forest. The plantation forest is still, however, in the early stages of development, with only small trees present According to the investment plan (Anon. 1991), Ba Vi supports 812 species of vascular plant, 44 mammal species, 114 bird species, 15 reptile species and nine amphibian species. Due to relentless human encroachment into the forest at Ba Vi, however, the diversity and abundance of large mammals and birds are now low. Indeed, several species are believed to have become locally extinct
Huong Son Cultural and Historical Site		
Huong Son Cultural and Historical Site: lies 60 km south of Hanoi, in My Duc district, Ha Tay province. The cultural and historical site is centred on Chua Huong Tich, the Perfume Pagoda.	About 50 – 52 km to the South of the project (from Nhon to Ga Hanoi)	The cultural and historical site supports 1,723 ha of limestone forest. A total of 350 species of plants have been recorded at Huong Son, including several that are listed in the Red Data Book of Vietnam, such as Fraxinuschinensis and Dalbergiatonkinensis. There is little information available about the importance of Huong Son for animal conservation. However, the site was confirmed to support a small population of the globally critically endangered Delacour's Leaf Monkey Trachypithecusdelacouri during a survey in 2000 (Nadler et al. in prep.). The cultural values, specifically the religious values, of Huong Son are the main reasons for the its designation as a cultural and historical site. Chua Huong Tich, the Perfume Pagoda, is a popular destination for pilgrims and other domestic and foreign visitors.

Source: birdlifeindochina.org/birdlife/

D.4 HUMAN AND SOCIO-ECONOMIC CONDITIONS

D.4.1 Population

167. According to the population census 2011, the population of Ha Noi City (including HaTay Province) was 6,779,300 persons with a population density of 2,037 persons/km 2. The population of the nine inner urban districts was 2,321,900 and the population density 12,902 persons/km 2.

168. The population of the five (5) districts covered by the project area in 2011 was 1,454,600 persons and population density 12,969 persons/km 2.

Table D.19 - Population of Districts in the Project Area in 2011

Administrative units	Population (persons)			Natural area (km2)	Population density (person/km2)
	Male	Female	Total		
HoanKiem District	72,700	77,300	150,000	5.29	28,355
Dong Da District	184,100	199,800	383,900	9.96	38,544
Ba Dinh District	111,700	122,100	233,800	9.25	25,276
CauGiay District	118,200	122,400	240,600	12.03	20,000
TuLiem District	228,700	217,600	446,300	75.63	5,901
Total	715,400	739,200	1,454,600	112.16	12,969

Source: Hanoi Statistical Yearbook 2011

D.4.2 Ethnic Minorities

169. There are 33 Ethnic Groups in Hanoi, such as : Muong, Nung, Tay, Dao, Ba Na, Bru-Van Kieu, Bo Y, Cham, San Chay, Co Ho, Co Tu, Co Lao, E De, GiaRai, Giay, Hoa, Mong, Khang, La Chi, Lao, Lo Lo, Lu, Ngai, Kho Me, Kho Mu, San Diu, Ta Oi, Tho, XinhMun, Xo Dang, Cong, Pa Then.

170. Ethnic Minority population in Hanoi is about 58,000, occupy 0.9 % of total population of Hanoi (including Old Ha Tay Province). Biggest numbers of ethnic minority peoples isMuong group with 44,360, Tay group with 5,087 , Chinese Group with 4,185 , Dao group with 2,112, Nung group with 1,380, Thai group with 695, remains is other groups.

171. Ethnic Minority Peoples live in 29 districts, towns in Hanoi, mainly are Muong, Dao groups. Ba Vi District with biggest ethnic peoples: 24,131 peoples; Thach That District 10,111 people; QuocOai District 5,451 peoples, My Duc 4,292 peoples, CauGiay 2,483 people; Dong Da 1,507 peoples, HoamKiem 1,382 peoples, Ba Dinh 1,205 peoples, Chuong My 897 peoples, remaining peoples live in other districts.

D.4.3 Poverty and Disabled People By District

172. The poverty rate in Ha Noi (measured by the percentage of poor households) under the National Poverty Criteria decreased from 4.13% in 2003 to 3.1% in 2006. This rate is lower than the national urban average of 13.74%, Red River Delta at 18.48% and the national average at 23.17%.

173. Social Surveys which also include gathering of information on disabled people in five districts were undertaken in 31January2013 and the findings are tabulated below.People may be disabled by physical, intellectual or sensory impairment, medical conditions or mental illness. Such impairments, conditions or illnesses may be permanent or transitory in nature.

Table D.20 - Poverty and Disabled People By District

District	Total Poor Households*	Total Households in District	Percentage of Poverty	Total Poor Female Headed-Household	Total Number of Disabled People
TuLiem	1731	89399	1.9	1148	3523
CauGiay	149	46665	0.3	129	1058
Dong Da	687	86134	0.7	334	1370
Ba Dinh	783	63714	1.2	257	1003
HoanKiem	392	46900	0.8	217	1323

Note : *Poverty Level is VND750,000 per month

Source: Social Surveys done in each District through 31January2013

D.4.4 Economic Structure

174. In 2008-2011, the economy of Hanoi City grew at an average rate of 10-11%, higher than the national average growth of 7.5-8.0% during the same period. In 2011, the service sector made the highest contribution to production 52.6 %. The industry sector was second with 41.8%, and the agricultural sector contributed only 5.6 %. (Table D.21).

Table D.21 -- Structure of the Economic Sector in Hanoi City

Sector	2008	2009	2010	2011
- Agriculture, forest and fishery	6.6	6.2	5.8	5.6
- Industry and construction	41.2	41.5	41.7	41.8
- Services	52.2	52.3	52.5	52.6

Source: HSourceHanoi Statistical Yearbook 2011

D.4.5 Employment

175. According to Hanoi Statistical Yearbook 2011, total labour in state sector in Hanoi (by Vietnam Standard Industrial Classification 2007) was 593,042 persons in 2011, in which number of female labour was 248,867; occupied 42%. Number of labors working in education & training sector is highest with 20.9%, in construction sector is second highest with 19.7%

Table D.22 - Status of Employment in main sectors

	Number of person	
Status of employment (labour in state sector)	2010	2011
Total	597,495	593,042
Agriculture--Forest-Fishery	5,473	5,528
Manufacturing Industry	67,000	58,635
Construction	117,551	116,684
Education &Training	122,830	123,745
Health & Social work	30,459	30,828

Source: *Hanoi Statistical Yearbook 2011*

176. GDP per capita of Hanoi in 2011 stood at 2,014 USD , more than 1.47 times the National average of 1,407 USD

D.4.6 Public Health

177. Medical care centers include general and specialized hospitals located in the areas of Bach Mai, Tran Khanh Du, Trang Thi, Quan Su, DichVong and other locations. New specialized hospitals will be exclusively constructed in the districts of Gia Lam, Soc Son and other locations.

178. Ha Noi is the country's second most populous city, and is a densely populated urbanizedcentre with a range of public health issues including communicable diseases (such as diarrhea, respiratory infections, etc.) and health and safety issues relating to the urban lifestyle (respiratory diseases, traffic accidents) and rapid socio-economic development (such as HIV/AIDS, cancer, obesity, diabetes, mental health diseases etc). Respiratory diseases such as chronic bronchitis, emphysema, and asthma occur throughout the city. Such diseases are aggravated by air pollutants; especially fine particulate matter generated by traffic movements. Anecdotal evidence suggests such diseases are more prevalent close to major road corridors.

179. According to statistical datas from Ministry of Health, respiratory diseases occupied highest rate in recent years for whole Provinces in Vietnam that main reason is increase of air pollution The results indicated 4.1% of lung disease, 3.8 % of sore throat, 3.1 % of bronchitis in 100,000 peoples, in which respiratory disease rate of Hanoi is higher than in Ho Chi Minh City.

180. In 2004, Ha Noi experienced 47,151 reported incidents of diarrhoea, cholera, anddysentery; 540 incidents of dengue fever and 220 incidents of hepatitis. These diseases areindicators of poor sanitation and water supply conditions.

Table D.23 -- Water- Borne Disease in the Project Area Based on Social Survey

Water-Borne Disease in the Project Area	Percentage (%)
1) Diarrhea	
2) Dysentery	
3) Dengue Fever	
4) Malaria	
5) Other Disease	
Total Number of Respondents	

181. In 2012, number of people living with HIV in whole Hanoi City is 20,243, with AIDS is 5261, and number of deaths is 3793. Among 29 districts of Hanoi, number of HIV cases in Dong Da District is highest with 2321 cases, in Thach That District is lowest with 74 cases

Table D.24 - Number of people living with HIV in The Project Districts

District	Number of people living with HIV
TuLiem	956
CauGiay	682
Ba Dinh	1824
Dong Da	2321
HoanKiem	1160
Total	6943

182. According to the Hanoi Statistical Year Book 2011, the proportion of communes/wards by district having a medical station is 100% and there are 55 hospitals (including Central State Hospitals), and 577 commune/ward medical stations in the whole Hanoi City. In general, the quality of medical examination and treatment, also of medical equipment and material facilities is improved, some Central State Hospitals are invested by modern equipments.

D.4.7 Land Uses and Facilities

183. Based on Land use status of five districts (Tu Liem, Cau Giay, Ba Dinh, Dong Da, Hoan Kiem) of the project area estimate, 17.1 % of the project area is used for commercial purposes. Other uses are institutional, residential, agricultural, industrial and special uses (e.g. pagoda, temple, cemetery, historical sites). Result of site survey which is used as reference in the design of urban transport measures are tabulated below:

Table D.25 - Land Uses in the Immediate Surroundings and Catchmentof the Metro Line 3

Station	Land Use
S-1	
Immediate surroundings (Station realm)	There is a University to the north of the Station i.e. *University of Industry.*
Immediate catchment (500m)	The Metro Line 3 Depot is to the NW of the station – about 400 metres away. There are undeveloped green areas to the north and south, as well as low density organic urban development. There is some more formal and newer urban development at the SW edge of the catchment south of NR32.
S-2	
Immediate surroundings (Station realm)	On the south, commercial/industrial buildings. On the north open land still seemingly in agricultural use to the NW, and low rise organic urban development to the NE.
Immediate catchment (500m)	To the south, a mix of commercial/industrial development (75%) and some green areas (25%). To the north a mix of low rise organic urban development (50%) and green areas (50%).
S-3	
Immediate surroundings (Station realm)	To the north, commercial/industrial buildings to a distance of 200m from NR 32 To the south, some new commercial frontage development on NR 32. Beyond that, open land but with a local road layout under construction as a precursor to urban development.
Immediate catchment (500m)	To the north, (in the area west of the Ring Rail Line) open land beyond the commercial/industrial buildings mentioned above. (But beyond that there are further areas of both new and organic urban development). East of the Ring Rail Line the area is already developed. To the south, and west of the Ring Rail Line, (beyond the immediate surroundings) an area undergoing urban development for a mix of commercial/industrial development. To the east of the Rail Line, an area of undeveloped land between the rail line, NR 32 and urban development.
S-4	
Immediate surroundings (Station realm)	There is low to medium rise (up to 6 storeys) mixed use urban development in the whole station realm, fronting the widened NR 32.
Immediate catchment (500m)	Most of the catchment is already urbanised, with a mixture of (i) low rise organic development (ii) older more formal development and (iii) more recent commercial/industrial development. The only undeveloped areas are towards of the 500m catchment.
S-5	
Immediate surroundings (Station realm)	Shopping Complex on the north side of the street but set back about 100m from station. Vietnam Dancing College (north side of road) and Vietnam Commercial University (south side) just to the east.
Immediate catchment (500m)	Generally built up east of Le Duc Tho Street. Little current development in 500mx500m blocks west of Le Duc Tho Street and NW and SW of station.
S-6	
Immediate surroundings (Station realm)	The recently built Indochina Plaza shopping complex is on the south side of the street. A campus of the National University is on the north side.
Immediate catchment (500m)	Generally built up, but some open areas (a) South of Indochina Plaza (b) North of National University and (c) Daewoo Bus Storage Yard on Duong XuanThuy.

	Road/footpath network needs surveying to identify access routes to station and their quality RR3 severs the area west of RR3 from the station – about 25% of the total catchment.
S-7	
Immediate surroundings (Station realm)	Station is in middle of 4 lane dual carriageway road with shopping and other commercial activities on either side. New development underway on north side of station site (see comment above). Frontage development of much of the rest of CauGiay looks to have potential for redevelopment at greater height and density
Immediate catchment (500m)	Dense development with few existing roads, except in the NW Quadrant. So pedestrian routes will need to be surveyed
S-8	
Immediate surroundings (Station realm)	Hanoi Zoo to the north, The University of Transport and Communications (UTC) to south, with the Vietnam Registry vehicle testing centre and the new ICON 4 office tower to the east of UTC. At the eastern end of Bus Interchange is large at grade road junction. To west is RR2 and So ToLich canal.
Immediate catchment (500m)	The immediate catchment is largely dense urban development, with the exception of the NE quadrant which contains the Hanoi Zoo and the Thu Le Lake.
S-9	
Immediate surroundings (Station realm)	Large car park/vehicle testing station immediately to the north of the station Hotel (Daewoo) and office complex on opposite north-west corner of intersection with some car parking High rise commercial development (VIT Corporation) on opposite south west corner of intersection Area immediately to the south of the station is low rise mixed use dense urban development
Immediate catchment (500m)	Area is fully developed, with mixed use development including schools, but with some areas of open space. Major new Lotte office complex under construction in NW quadrant, north of Daewoo Hotel. Area south of station is older dense mixed use development.
S-10	
Immediate surroundings (Station realm)	Major hotel on north (Pullman) surrounded by hotel car parks. School on south side. New three storey commercial development proposed around the terminus of Line 2A – with Line 2A on 3rd floor. (HUPI are working on the detailed plan). Remainder of realm has dense mixed use inner urban development.
Immediate catchment (500m)	Generally dense mixed use inner urban development, with some high rise buildings. Kim Ma bus terminal 250 metres to the north (Future terminus of BRT Line 1) Major sports stadium at edge of north east quadrant Small lake to south on Line 2A alignment
S-11	
Immediate surroundings (Station realm)	The street is a quiet mixed use commercial street with government offices on the north side. At the western end of the realm is the Temple of Literature and the small Dang San lake
Immediate catchment (500m)	Dense mixed use development with a high portion of residential. VNR Ga Hanoi rail yard occupies about 5% of the catchment
S-12	
Immediate surroundings (Station realm)	Two new office buildings on south side station. Otherwise in general dense mixed use inner urban development
Immediate catchment (500m)	In general dense mixed use inner urban development in the area to the east of VNR Ga Ha Noi rail yards and Pho Le Duan

Source: Metro Line 3 Stations Concept Report, Egis International, 2012

D.4.8 Road Network in the Project Area

184. The project traverses a number of major roads which are part of the major east-west road corridor from the city center to the western semi-urban areas. The corridor is used by high volumes of commuter, industrial and other traffic. The project also intersects a number of major north-south routes in the Ha Noi urban area. Road network in the project area is presented in Table D.26

Table D.26 - Road Network

Station	Road Network
S-1	Only major roads are (i) NR 32 which runs E-W and has recently been widened, although some works are still to be completed. (ii) Provincial Route 70 which is narrow, and runs NW-SE and crosses NR 32 to the west of the station
S-2	East west NR 32 recently widened to 2x4 lanes with central reserve. Other main road is newly built Van Tien Dung which runs north from a point approx 400m east of the station. Local access roads to new commercial industrial area to south of station.
S-3	Current East west NR 32 recently widened to 2x4 lanes with central reserve. This widening does not appear to have been completed at the proposed junction with a new arterial road (see below). Local access roads to commercial industrial area to north of station. This includes one access road in middle of station realm, the other just to the west of it.
S4	East west NR 32 with 2x4 lanes and a central reserve. The overall cross section appears to e narrower than west of the river (to be checked). Limited local access roads to areas north and south of NR32.
S5	Only major roads are Duong Ho Tung Mau and Le Duc Tho Street, recently extended north of Duong Ho Tung Mau.
S6	(i) E-W NR 32 Duong XuanThuy. N-S RR3: (ii) Interchange with RR3 Flyover - NW quadrant of Interchange not yet completed. No provision for E-W pedestrian movement through the interchange.
S7	Proposed: The MRT Line 3 Master Plan shows a number of planned roads. Site inspection shows evidence of land that is underdeveloped in these locations. No information has been obtained to date on the proposed implementation schedule.
S8	The station site is on CauGiay street. The westbound carriageway is at a higher level than the eastbound carriageway and the bus interchange. It has 3 lanes for westbound traffic. At the lower (adjacent to the bus interchange) there are 2 x 2 lane carriageways for eastbound traffic. The inner 2 lane carriageway also acts as an access road for adjacent property. At the eastern end of the bus interchange is an at grade junction between CauGiay/Kim Ma/La Thanh streets which has a small roundabout.
S9	(i) Pho Kim Ma, Duong Nguyen Chi Thanh/Duong Lieu Giau, and Pho Dao Tan (which starts at this intersection) are all arterial roads in the Hanoi Road Network. (ii) There is a two way service road on the north side of Pho Kim Ma east of the station, (which is effectively the continuation of Pho Dao Tan) up to Pho Nui Truc (iii) The other principal roads in the catchment (Pho Ngoc Khanh and Pho Van Phuc) are suitable for buses.
S10	Reasonable network of major roads, with some local roads
S11	There are a number of narrow roads immediately to the north of the station, and only alleys to the south. This means there are low traffic flows along Pho QuocTu Gam past the station. The main traffic flow is along the one way southbound Pho Van Mieu to the west of the station, and then on the one way westbound section of Pho QuocTu Gam south of the Temple of Literature.
S12	There is a N-S one way system around the station. Pho Le Duan is one way southbound and Phu Yet Kieu one way northbound.

Source: Stations Concept Report, Egis International, 2012

D.4.9 Educational Facilities

185. According to the Hanoi Statistical Year Book 2011, there are 80 Colleges and Universities; 50 Technical vocational schools; 586 Lower secondary schools, 689 Primary schools; 857 Kindergarten in whole Hanoi City.List of Universities &Schools in the Project Area in Table D.27

TableD.27 - List of Universities & Schools in the Project Area

Location	Establishment	Distance to Metro (m)
TayTuu commune (TuLiem District)	University of Industry	30
Minh Khai commune (TuLiem District)	Communication and Transport Technical School	30
	Minh Khai High School	50
	Minh Khai Secondary School	150
	Minh Khai Primary School	150
PhuDien commune (TuLiem District)	Hydro-metrological Centre	400
	University of Commerce	15
	University of Stage and Cinema	15
Mai Dich Ward	Dance Institute	15m
(CauGiay District)	Ha Noi Commercial College	300
	Mai Dich Secondary School	200
	Mai Dich Primary School	200
	Vietnam National University	15
DichVong Ward (CauGiay District)	Academy of Journalism and Communication	15
	Nguyen Tat Thanh High School	15
	TuLiem Vocational Training Centre	100
	DichVong Secondary School	100
QuanHoa ward (CauGiay District)	Ha Noi Pedagogical College	300
	Ha Noi Electronics College	350
	CauGiay High School	100
	Hoaai Kindergarten	200
Yen Hoa Ward (CauGiay District)	Yen Hoa Secondary School	400
Lang Thuong ward (Dong Da District)	University of Communication and Transportation	60
	Le Duan School	20
Kima Ward (Ba Dinh District)	Pham Hong Thai High School	200
	International School	200
	RMIT International University	15
Ngoc Khanh (Ba Dinh District)	Ngoc Khanh High School	150
	Phan Chu Trinh High School	150
	People-sponsored Phuong Dong University	200
	Ngoc Khanh Kindergarten	100
Giang Vo Ward (Ba Dinh District)	Ha Noi-Amsterdam High School	10
	LyceeFrancaisAlexandreYersin	10
	TuoiHoa Kindergarten	50
Cat Linh ward (Dong Da District)	Cat Linh Secondary School	15
	Nguyen Trai High School	150
	Medical Facilities	
Mai Dich Ward (CauGiay District)	Thang Long Hospital	15
	Traditional Medicine Hospital	200
	19 – 8 Hospital (Ministry of Police)	200
Yen Hoa Ward (CauGiay District)	Yen Hoa Clinic	250
Ngoc Khanh (Ba Dinh District)	Ha Noi Obstetrical Hospital	250
	Swedish Children's Hospital	250
Kim Ma Ward (Ba Dinh District)	Ha Noi Family Medical Practice Clinic	10
Van Chuong Ward (Dong Da District)	Trang An Hospital	130
Tran Hung Dao W. (HoanKiem District)	Ha Noi Heart Hospital	15

Source IEE, 2007 & site surveys

D.4.10 Public Services and Utilities (excluding Ha Tay Province)

186. Access to Water Supply: In Ha Noi, 62% of households have access to piped water from water companies. Of the five districts traversed by the project, the suburban district of TuLiem has the lowest coverage of piped water supply of 36%. The remaining urban districts have good coverage of 97% to 99%

187. Drainage and Wastewater Discharge System: The drainage system of Ha Noi consists of natural systems, such as urban rivers and lakes, and artificial drainage canals, culverts, sewers and pumping stations. The system functions both to prevent frequent inundations in urban areas and for wastewater disposal system. About 43.6% of households are connected to the urban sewerage system, 40.0% to on-site sanitation facilities (septic tanks) which are emptied by municipal services and 16.5% have no access to sewage treatment. As of 2010, only two wastewater treatment sites (Truc Bach and Kim Lien) exist in Ha Noi, serving only 1.2% of the population, meaning that most wastewater is discharged directly into local water bodies. Number of communes having drainage wastewater system is 258 among 401 communes of whole Hanoi, occupy 64.3% of the whole Hanoi

188. Solid Waste Collection: Around 95% of households in Ha Noi are served by a public waste collection service. The existing landfill Nam Son site is expected to reach its capacity earlier than the planned closure date of 2020 due to increased waste generation. All of the five districts traversed by the project have good waste collection coverage 100%. Number of communes having solid waste collection team is 382 among 411 communes, occupy 95.2% of whole Hanoi.

189. Electricity and Telecommunications: 100% of households in five districts traversed by the project have electricity supply (HoanKiem, Dong Da, Ba Dinh and CauGiay, TuLiem),. Telephone services cover 100 % of households in the four urban districts, and about 85% in TuLiem district.

D.4.11 Historical & Cultural Heritage/Pagodas/Temples

A number of pagodas, temples and cemetery are located along Hanoi Metro Line 3 and these are designed to ensure that they are not encroached upon by construction activities. They are listed in Table D.28 below.

Table D.28 - Pagodas, Temples, Situated Close the Project Areas

Pagoda/Temple	District	Commune / Ward	Station close to Pagoda/Temple	Distance* from Metro
Dong Co Temple	TuLiem	Minh Khai	Station 2 –Minh Khai	50 – 60 m
DinhQuan Pagoda	TuLiem	Minh Khai	Station 2 –Minh Khai	250 m
DinhQuan Temple	TuLiem	Minh Khai	Station 2 –Minh Khai	500 m
Mai DichCemetary	CauGiay	Mai Dich	Station 5-Le Duc Tho	500 m
Chua Ha Pagoda	CauGiay	DichVong	Station 7- Ha Pagoda	200 m
QuanHoa Pagoda	CauGiay	QuanHoa	Station 7- Ha Pagoda	350 m
VoiPhuc Temple	Ba Dinh	Kim Ma	Between Station 8 CauGiay& 9 Kim Ma	500 m s of two stations
Cat Linh Pagoda	Dong Da	Cat Linh	Station 9 –Cat Linh	70 m
Temple of Litearature and Van Lake (*)	Dong Da	Van Mieu	Station 11-Van Mieu	20 -30 m
Pho Giac Pagoda	Dong Da	QuocTuGiam	Station 11-Van Mieu	40 m

Note: Distance estimated from Google map & Administration Maps of Hanoi , scale 1: 00,000
(*) indicates that the item was identified by the Department of Culture and Information (DCI) as an important relic requiring protection in correspondence 210/QLDT dated 15 June 2007

190. The Temple of Literature is the most significant heritage item in the project area. Thisitem has been identified by the GOV as an item of national significance and was declared aWorld Heritage site in 2010. The Temple of Literature Complex is located on a 5 hectare site on QuocTuGiam.

191. The site was the first university in Viet Nam and comprises Van Mieu (Temple ofLiterature) and QuocTuGiam (Imperial College). Van Mieu was constructed circa 1073 andQuocTuGiam was constructed circa 1076. Van Mieu is positioned towards the south andincludes five zones which are divided by partial walls. Important features within the complexinclude Than QuangTinh Lake which is surrounded by steles recording the names of students,DaiBsi and E-lauCung houses and a large cast bell. The physical and interpretive connection with Van Lake on the southern side of the Temple of Literature is an important characteristic of this item.

192. There is a relatively high probability that as yet undiscovered archaeological relicsarelocated outside the fenced boundaries of the site and possibly in other parts of the project area. Discussions with the Ha Noi DCI indicate that in the past the site extended past its current boundaries and as such, the extent of the actual heritage zone may intrude into the rail alignment corridor. Based on the results of archaeological excavations undertake in the northern part of the site in 2000, archaeological relics are considered most likely to be located at a depth of 5 to 6 m.

E. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

E. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Forword

193. Potential effects of the project on the environment are assessed by considering the current condition of the project location, the project design and layout, the construction methods involved and the operation of the additional measures geared towards the enhancement of the benefits from the use of the Metro Line. To illustrate the degree of impacts, the following descriptions are used.

- Not significant (D1) =No impact from the project activity
- Minorimpact (D2) = Low probability of occurrence and low magnitude of adverseimpact occurring on the environment.
- Moderate impact (D3) = Moderate probability of occurrence and moderate magnitude of adverseimpact occurring on the environment.
- Major impact (D4) =Highprobability of occurrence and high magnitude of adverseimpact occurring on the environment.
- (+) =Beneficial impact

E.1 PRE-CONSTRUCTION PHASE

194. ***Disruption of utilities/services (D2)***. During site preparation, removal or relocation of utilities may be necessary. To minimize disruption of services to communities, the following measures will be implemented by the Contractor:

a) Water supply pipelines, power supply, communication lines, drainage and other utilities that will be affected by construction will be relocated before construction works commence so that interruption of services will be minimized.
b) Provision will be made to preserve the operation of current facilities in sufficient quantity and in agreement with the local community.
c) Relocation will be undertaken in coordination with the utility company and local authorities.
d) Affected households and establishments will be notified well in advance of any disruption.
e) Replacement structures (e.g., drainage) will be constructed prior to the removal of the existing structure.

E.2 CONSTRUCTION PHASE

195. ***Loss of trees (D2)***. No special status flora have been identified within the vicinity of the Project that maybe adversely affected. Within the area of different stations, however, there are trees along the road and adjacent areas that may need to be cut. In the vicinity of Station 8 and 9, there are about 150 trees. The actual number of trees to be cut will be determined during detailed design. The Contractor will undertake the following measure to address tree cutting requirements of the Project:

a) Prepare a Tree Cutting/Removal and Balling/Replanting Plan to be approved by relevant government authority responsible for management of parks and roadside trees. The plan will adhere to the following principles:

- Minimal tree cutting/removal: Where possible, protect existing trees during road widening and improvement works, removing only those that are necessary based on the Project design. Undertake tree ball, whenever possible.
- Sound timing:As much as possible. remove trees in early spring in order to ensure no nesting birds are disturbed.
- Replacement: For every one tree removed, replant at least one in suitable city locations after construction. The selection of species, location and period of planting will be carried out in consultation with the relevant government authority.

- Monitoring and Maintenance: Implement a tree and vegetation monitoring and maintenance plan to ensure high survival rate.

b) Obtain tree cutting approval from the relevant government agency.
c) Ensure that tree cutting is limited to areas that are necessary based on the project design and as approved by the relevant Government agency.

196. ***Impacts due to Dust and Gaseous Emissions (D3).***Construction work will be generally intermittent and not permanent in a specific site, the works will most likely move along the Project corridor as work progresses on the MRT stations and as such air quality impacts will be moderate but short term in specific locations. Air quality is however likely to be degraded on a short term localized basis by a range of operational activities including such as: (i) exhaust emissions from the operation of construction machinery; (ii) Potential open burning of waste materials, emissions from concrete batch plants, casting yards and generators at the stations; (iii) dust generated from haul roads, exposed soils and material stock piles. The dust may impact upon roadside businesses and residents, and may cause some degree of respiratory stress for nearby residents; and (iv) additional vehicle emissions, including particulate matter, CO, SO_2, NO_x from movements and operation of construction vehicles which are predominantly diesel fuelled, that will occur during construction at the stations. Emissionsare nuisance to people who live adjacent to the site, business operators, students, workers and commuters. Dust can also affect aesthetics. The Contractor will be required to undertake the following measures:

a) Formulate and implement a dust abatement program to minimize dust emission at the construction sites and roads affected by the Project.
b) Locate concrete batching plants, asphalt plants, crushing plants, materials and spoil stockpiles and other dust sources at least 300 meters away from inhabited areas and other sensitive receptors (schools, hospital, etc.)
c) Install appropriate air pollution control equipment and other suitable control measures to minimize dust emission, to avoid nuisance and health risks to surrounding communities
d) Maintain construction equipment and vehicles to ensure national QCVN emission standards are met.
e) Position any stationary emission sources (e.g., portable diesel generators, compressors, etc.) as far as is practical from sensitive receptors;
f) Undertake regular water spraying on roads, work areas and other construction-related facilities near or within populated areas and other sensitive receptors
g) Ensure that material stockpiles will be located in sheltered areas and will be covered with tarpaulins or other such suitable covering to prevent material becoming airborne.
h) Regularly water stockpiles and spoil areas to minimize dust generation.
i) Install temporary fencing or barriers around particularly dusty activities in vicinity of sensitive receivers
j) Prohibit use of equipment and vehicles that emit visible smoke in excess of acceptable limits.
k) Provide trucks transporting construction materials with covers to prevent spills and dust emission.
l) Impose speed limits for project vehicles to minimize dust emission along populated areas and other sensitive receptors.
m) Prohibit burning of all types of waste generated at the construction sites, workers' camps, and other project-related facilities and activities.
n) Regularly clean roads used by construction traffic to remove mud, cement, etc.
o) Ensure that areas within the project area where there is heavy movement of project vehicles are provided with hard standing and kept clear of loose surface material.
p) Ensure that cement and other fine-grained materials that are delivered in bulk are stored in closed containers.
q) Undertake wheel washing in active construction sites so that haul/delivery trucks can be cleaned of mud and dirt as they exit the work area.

197. ***Impacts due to Noise and Vibration (D3).*** Noise during the construction works will mostly come from the operation of construction equipment. Typical noise signatures of the different equipment for different construction activities are presented below.

Table E.1: Typical Noise Signatures of Construction Equipment

Site Clearing		Excavation and Earth Moving		Structure Construction	
Equipment	Noise Level	Equipment	Noise Level	Equipment	Noise Level
Bulldozer	80	Bulldozer	80	Pneumatic drill	81-98
Front end loader	72-80	Backhoe	72-93	Crane	75-77
Dump Truck	83-94	Dump Truck	83-94	Welding Machine	71-82
Grading and compacting		Jack Hammer	80-93	Concrete Mixer	74-88
Grader	80-93	Landscaping and Clean Up		Concrete Pump	81-84
Roller	73-75	Bulldozer	80	Concrete Vibrator	76
Paving		Excavator	72	Air Compressor	74-87
Paver	86-88	Truck	83-94	Bulldozer	80
Truck	83-94	Paver	86-88	Cement and Dump trucks	83-94
Tamper	74-77				

Source: Package 4 of the Technical Assistance program funded by the Fond Français pour L'Environnement Mondial (FFEM) to Support the urban and environmental integration of the Hanoi Pilot Light Metro Line 3 from Nhon to Hanoi Train Station, EIA Stations 8 & 9 - MVA February 2014.

198. The noise levels are dependent on the model and the maintenance status of the equipment. Construction noise can be a nuisance to residents living in proximity to the construction areas. Noise attenuation based on the doubling distance rule shows that residents living next to the road will occasionally be exposed to high noise levels if no mitigation measures are implemented.However, these noise levels from project interventions are unlikely to exceed those associated with construction of Metro Line 3 which will be the main source of noise and vibration impacts during the construction period. There are several schools and health clinics located along the route which are classified as noise sensitive receptors and as such these receptors should be protected from excessive noise levels where practical. The vibration impact can be caused by operations at construction site related to pedestrian tunnels and foundations for footbridges. However, since the project will be implemented at the same time as Metro Line 3, noise and vibration impacts from the project will be very small compared with those generated by the construction of Metro Line 3.

199. Some people including workers will be exposed to this nuisance contributed by the project, however, this is considered moderateand temporary.The Contractor will coordinate with the ward leaders or concerned authorities regarding the schedule of construction activities. Necessary adjustment in the schedule of works should be done to lessen and shorten the exposure of affected people on noise as well as vibration particularly on sensitive areas and places where important events are being held. Specific mitigation measures to be implemented by the contractors are as follows:

a) Provide prior notification to the community and local officials on the schedule of construction activities.
b) Maintain in good working order all exhaust systems.
c) Whenever possible, completely enclose noisy equipment to reduce noise levels.
d) Position any stationary equipment that produces high noise levels (e.g., portable diesel generators, compressors, etc.) as far as is practical from receptors (e.g., houses, medical facilities, schools, pagodas, etc.)
e) Construction traffic routes to be defined in cooperation with local communities and traffic police to minimize noise and nuisance.
f) When necessary, suitable noise control measures (e.g., noise barriers/walls, noise-reflective panels) will be used to reduce construction and equipment noise levels to ensure compliance with applicable QCVN noise standards.
g) Impose speed limits on construction vehicles within the construction sites and through urban areas
h) Operation of noisy equipment and construction works during night time (19:00-06:00) in populated areas and where sensitive receptors (medical facility/hospital, residential areas, etc.) are found will only be undertaken after prior notification and consultation have been carried out with affected people and local officials, and suitable noise attenuation measures are implemented.
i) In project areas near schools, undertake consultations with school official regarding construction schedules to ensure that disruption to school activities are avoided or minimized.
j) Restrict use of vibrating rollers and operation of heavy equipment near vibration sensitive structures.

200. Generation of domestic wastes and construction wastes(D2). Domestic wastes will be generated from camps or living quarters. If not properly managed, it will affect public health. Usual disposable food containers used by construction workers are plastic wrappers, Styrofoam boxes including glass bottles may pile up and serve as breeding grounds for disease-carrying organisms like mosquitoes, houseflies, cockroaches and mouse. Such trashes can clog the drainage system and may cause localized flooding. Contractor should ensure that sufficient garbage containers are provided in construction camps and at work sites and be emptied daily, the waste being disposed of in an approved landfill or location, and every camp and work site should be cleaned up before moving to new sites. Mitigation measures to be implemented by the Contractor are as follows:

a) Provide garbage bins and facilities within the project site for temporary storage of construction waste and domestic solid waste.
b) Separate solid waste into hazardous, non-hazardous and reusable waste streams and store these temporarily on site prior to final disposal, in secure facilities with weatherproof flooring and roofing, security fencing and access control and drainage systems.
c) Ensure that wastes are not haphazardly dumped within the project site and adjacent areas.
d) Undertake regular collection and disposal of wastes to sites approved by local authorities.
e) Prohibit burning of wastes.

201. Impacts due to disposal of excavation spoils and removed pavement materials (D3).Construction of pedestrian subways, footbridges, sidewalk improvements and other improvement works will generate spoils such as excavated soil and removed pavement materials. Damage to the environment will most likely arise if suitable disposal sites for such materials are not identified prior to commencement of site works. The contractor may resort to indiscriminate dumping of spoils that could pollute water courses and damage productive land. To avoid such impacts, the Contractor will implement the following measures:

a) Before commencement of excavation works and removal of existing pavements, obtain the DDIS's approval of disposal sites. Such sites will meet the following criteria:
    i. Located at least 50 m from watercourses
    ii. Will not cause sedimentation or obstruction of the flow in watercourses
    iii. Will not cause damage to productive areas
b) Obtain any required agreements, approval or permits from local authorities and land owners for the disposal sites.
c) Construction wasteswill be immediately transported to approved waste disposal sites to avoid nuisance and minimize adverse impacts to the environment.

202. Hazardous materials releases (D2). The most severe water quality impact would be from bitumen, diesel fuel or used oil. These substances are toxic to living organisms.Asbestos containing materials maybe present within properties that will be demolished. Poor management of these materials, including disposal, can have serious impacts to the health of workers and residents.TheContractor will undertake the following measures to avoid or mitigate adverse environmental and health impacts:

a) Prepare a Spill Management Plan (including measures to be taken and equipment to be used) to ensure adequate cleanup of any spills.
b) Train relevant construction personnel in handling of fuels/hazardous substances and spill control procedures.
c) Provide maintenance shops, fuel and oil depot with impermeable flooring and drainage leading to an oil-water separator or sump where oily wash water and sludge can be collected for proper disposal.
d) Undertake regular maintenance of oil-water separators/sumps to ensure efficiency.
e) Carry out refueling and servicing of equipment only in areas adequately equipped to avoid leaks and spills.
f) Limit quantities of chemicals, hazardous substances and fuel on site at any time, and ensure these materials are stored on site in above-ground storage tanks, within an enclosed and covered area that has an impervious floor and impervious surrounding bund, with a capacity at least 120% of the total capacity of the storage capacity.
g) Locate storage areas away from water-courses, flood-prone areas, workers' camps, populated areas and other sensitive sites.
h) Collect contaminated refuse and dispose of through recyclers/authorized waste handlers and dispose of it in authorized waste facilities
i) Ensure availability of spill cleanup materials specifically designed for petroleum products and other hazardous substances where such materials are being stored and used.

j) In case of spills and leaks, immediately implement suitable measures to prevent hazardous materials from spreading. Remove and properly dispose spilled and contaminated materials to avoid further pollution of the environment.
k) Ensure all storage containers are in good condition with proper labeling.
l) Regularly check containers for leakage and undertake necessary repair or replacement.
m) Prohibit discharge of oil-contaminated water into the environment.
n) Store waste oil, used lubricant and other hazardous wastes in tightly sealed and properly labelled containers to avoid contamination of soil and water resources.
o) Ensure that the transport and off-site disposal of hazardous wastes complies with applicable laws and regulations, or is in compliance with internationally accepted good practice in the absence of relevant laws and regulations.
p) Ensure that the restoration of temporary work sites includes removal and treatment or proper disposal of contaminated soils.
q) For bitumen transport, ensure the use vehicles are approved by local authorities for the transport of bitumen and are also in accordance with the bitumen supplier's recommendations for such transport.
r) Ensure that truck drivers are familiar with the safe loading and unloading procedures for the bitumen products, including emergency procedures in the event of spillage.
s) Ensure that trucks are provided with tools and materials for handling spills.
t) Regarding asbestos containing materials, the Contractor will follow the 'Guide to Deal with Asbestos in Buildings' prepared by the Vietnamese Health and Safety Executive and reproduced herewith as Appendix 8.

203. Impacts on water quality (D3). Discharge of untreated wastewater from workers' camps, construction works and facilities could cause pollution of receiving bodies of water. Contractor will undertake the following measures to avoid or minimize impacts to water quality:
a) Prior to operation of concrete batching plants, construct settling/retention ponds with sufficient specifications/capacity for treatment of wastewater.
b) Properly operate and maintain settling/retention ponds to reduce the concentration of total suspended solids and alkalinity to acceptable levels based on QCVN standards.
c) Provide hygienic toilets at workers' camps.
d) Divert storm water flows away from cleared areas.
e) Provide sediment control structures at all earthwork construction areas.
f) Provide sedimentation control structures adjacent to watercourses within the construction area.
g) Restrict the area cleared of vegetation for construction to the minimum required for immediate works.
h) Divert storm water flows away from cleared areas.
i) Properly store construction materials and stockpiles so that these do notblock, erode, or creep onto water channels.
j) Ensure that all wastewater emanating from project-related activities and facilities are treated consistent with national regulations.

204. Impacts due to operation of borrow pits and quarries (D2). The Contractor will undertake the following measures to avoid or minimize adverse environmental impacts due to operation of quarries and borrow pits:
a) Provide the DDIS with adequate information regarding quarries and borrow pits, including commercial sources that will be used for the project, and the environmental mitigation measures to be instituted in those locations. The information will include locations, scale of operations, method of transport of materials, and schedule of use relative to the overall construction schedule.
b) Only licensed quarries and crushers will be used or the contractor will obtain its own licenses
c) Borrow pits will be covered by required government permits or approvals
d) Borrow pits and quarries will not be located within 300 meters of any urban area, protected area or sensitive receptor
e) Topsoil will be saved for rehabilitation during closure of the quarries and borrow pits,
f) Quarries and borrow pits will be provided with drainage and sediment flow controls
g) Upon completion of extraction activities, quarries and borrow pits will be dewatered, fences and warning signs will be installed, as appropriate to avoid impacts to public health and safety
h) Borrow pits and quarries will be left in a tidy state with stable side slopes and proper drainage

205. Flooding (D1).As the area where Stations 10,11 and 12 are located become flooded on rainy season and to avoid localized flooding throughout the construction sites, the Contractor will implemented the following:

a) Provide and maintain temporary drainage to prevent local flooding and waterlogging.
b) Remove temporary drainage works and reinstate the affected area.
c) Ensure watercourses are not obstructed or, if obstruction is unavoidable, provide alternative temporary or permanent channels of sufficient capacity to avoid flow restriction.
d) Regularly inspect and maintain all drainage channels to ensure that continue to function as required.

206. Traffic congestion (D3). Traffic congestion could be aggravated particularly in busy areas during construction of the project, more so, if equipment are illegally parked and construction materials are piled on roadways such as at Station 6-National University, Station 8 CauGiay, Station 10 Cat Linh, etc. Impacts to transportation relate primarily to road users, within the vicinity of the Project Stations. The main impacts resulting from Project works will be potential road closure, diversions and some temporary blocking of access routes.The contractor will implement the following measures to address impacts to traffic flow:

a) Prepare and, after approval of the DDIS, implement, a Traffic Management Plan for the construction areas and for communities affected by construction.The Plan will be designed to ensure that traffic congestion due to construction activities and movement of construction vehicles, trucks transporting excavation spoils and other construction wastes, haulage trucks, and equipment is avoided or minimized particularly during peak hours in the morning (6:30-8:00 AM) and evening (4:30- 7:00 PM). The plan will be prepared in consultation with local traffic officials and People's Committees at the district and commune levels. The Plan will identify traffic diversion and management, transport mode for spoils disposal, define routes for construction traffic from materials storage/parking areas to construction site and from construction site to waste disposal locations, traffic schedules, traffic arrangements showing all detours/lane diversions, modifications to signaling at intersections, necessary barricades, warning/advisory signs, road signs, lighting, and other provisions to ensure that adequate and safe access is provided to motorists in the affected areas.
b) Closely coordinate with local authorities for any closure of roads or rerouting of vehicular traffic, if required.
c) Provide advance notification to the community regarding changes to public transport facilities or routes.
d) As much as possible, allow one side of the road to be open to two-way traffic.
e) Provide road signs indicating the lane is closed 500 m before the worksite.
f) As much as possible, schedule delivery of construction materials and equipment as well as transport of spoils during non-peak hours.
g) Ensure access in areas to be closed temporarily by provision of temporary bypass roads.
h) Schedule construction activitiesto take into account local events such as festivities, processions, parades, etc. to minimize disruption.

207. Occupational health and safety risks (D3).Due to its nature, the construction industry is considered to be one of the most hazardous industries where a number of potentially hazardous operations and materials are used. Intensive use of heavy construction machinery, tools, and materials poses risk of physical hazards such as noise and vibration, dust, handling heavy materials and equipment, falling objects, work on slippery surfaces, fire hazards, chemical hazards, toxic fumes and vapors etc.The following measures will be implemented by the Contractor to avoid or minimize health and safety risks:
a) Prepare and implement an Occupational Health and Safety Plan consistent with international standards (e.g., the World Bank Group's Environment, Health and Safety Guidelines of 2007) and Labor Code of Vietnam. The Plan shall address health and safety hazards associated with working in confined space and compressed air, etc., working at heights, electrocution, excavations, establishment and operation of construction/worker's camps, use of heavy equipment, transport of materials and other hazards associated with various construction activities.
b) Prepare and implement an Emergency Response Plan to prevent, mitigate, respond to and recover from emergency events that could occur due to project activities such as accidents, fire, and other crises.
c) Appoint an environment, health and safety manager to look after implementation of required environmental mitigation measures, and to ensure that health and safety precautions are strictly implemented for the protection of workers and the general public in the vicinity of construction areas.
d) Provide personnel with appropriate safety equipment such as safety boots, helmets, gloves, protective clothes, welding helmets, dust masks, goggles, ear protection, safety line, fall prevention measures, etc, broadly referred to as personal protective equipment (PPE). and ensure that these are properly used as required.

e) Conduct orientation for construction workers regarding health and safety measures, emergency response in case of accidents, fire, etc., and prevention of HIV/AIDS and other diseases
f) Provide stable footpaths/access with adequate strength guardrails and scaffolding at elevated work sites.
g) Provide first aid facilities that are readily accessible to workers.
h) Provide fire-fighting equipment at the work areas, as appropriate, and at construction camps.
i) Provide adequate drainage in workers camp.
j) Provide adequate, clean and well-ventilated housing, with separate sleeping quarters for male and female workers, at the workers'/construction camps.
k) Provide a reliable supply of potable water and water for washing and bathing purposes at the workers' camps.
l) Provide separate hygienic sanitation facilities and bathing areas with sufficient water supply for male and female workers
m) Ensure proper collection and disposal of solid wastes within the workers'/construction camps consistent with local regulations.
n) Provide fencing of adequate strength around excavation sites greater than 2 m deep.
o) Prohibit workers from entering work sites without the appropriate PPE.
p) Ensure reversing signals are installed on all construction vehicles.
q) Implement fall prevention and protection measures for heights greater than 2 m, falling into operating machinery or through an opening in a work surface.
r) Ensure that objects cannot fall onto people, vehicles, and properties in adjoining areas.
s) Implement fall prevention and protection measures whenever a worker is exposed to the hazard of falling more than two meters, falling into operating machinery or through an opening in a work surface. Based on a casespecific basis, fall prevention/protection measures may include installation of guardrails with mid-rails and toe boards at the edge of any fall hazard area, proper use of ladders and scaffolds by trained employees, use of fall prevention devices, including safety belt and lanyard travel limiting devices to prevent access to fall hazard, fall protection devices such as full body harnesses, etc.
t) Provide sufficient lighting in the tunnel areas to enable safe equipment operation.
u) Provide emergency lighting system of adequate intensity that is automatically activated upon failure of the principal artificial light source to ensure safe equipment operation, safe shut-down, evacuation, etc.
v) Ensure that sufficient fresh air is supplied at confined work spaces such as the tunnel
w) Provide confined spaces (e.g., tunnel) with safety measures for venting, monitoring, and rescue operations.

208. Public safety hazards (D2). The most significant potential impacts to public health and safety will occur during the excavation and construction works associated with the Metro Line 3 itself. Construction works associated with the Project will be fairly minor in comparison, but may still pose potential impacts due to the fact works will occur on the densely populated surface where most interaction with humans will occur.The Contractor will implement the following measures to avoid or minimize public safety hazards due to construction activies:

a) Implement precautions to ensure that objects (e.g., equipment, tool, debris, precast sections, etc.) do not fall onto or hit people, vehicle, and properties in adjoining areas.
b) Provide warning signs at the periphery of the construction site.
c) Educate drivers on safe driving practices to avoid accidents and to prevent spill of hazardous substances and other construction materials during transport.
d) Employ flag persons to control traffic at the station sites for safety reasons when construction equipment is entering or leaving the work area.
e) Install barriers to keep pedestrians away from hazardous areas such as constructions sites and excavation sites.
f) Designate security personnel to restrict public access to construction sites.
g) Strictly impose speed limits on construction vehicles along residential areas and where other sensitive receptors such as schools, pagodas and other populated areas located.
h) Provide adequate lighting at night within and in the vicinity of construction sites.
i) Provide security personnel in hazardous areas to restrict public access.
j) If necessary, provide safe passageways for pedestrians crossing the construction site and for people whose access has been disrupted due to construction woks.

209. Damage to properties and community facilities (D2). Transport of materials and spoils, operation of construction equipment and various construction activities may damage community utilities.The contractor shall implement the following measures to address this impact:

a) Immediately repair and/or compensate for any damage caused by construction works and activities to existing communities and their property and facilities
b) Maintain access roads used for transport of construction materials and other construction-related activities are maintained to ensure that they remain in at least in their pre-project condition for the duration of the project.

210. Potential damage to archaeological and cultural artefacts. There is a possibility that “chance finds” may be discovered during excavation in the project area. To avoid impacts to such resources, the Contractor will implement the following:

a) Cease operations on a road section where artifacts or archaeological finds are discovered and immediately inform the DDIS
b) The DDIS to notify UTPMU, who will notify the relevant Government agency (e.g., Ministry of Information and Culture) to obtain advice regarding the next steps.
c) Work to recommence only after the relevant Government agency has provided official notification accordingly.

E.3 OPERATION PHASE

211. Air Quality (+). The Project intends to increase ridership on Metro Line 3 and introduce the use of low carbon transport measures to the stations. The implementation of the Project is expected to cause positive environmental impacts as it will lead to lower emissions, mainly the increase of passengers to the Metro lines and thereby reducing the amount of vehicle traffic and emissions on the road city.Accordingly, there should be no increase in air pollution as a result of the Project. This will also cause a positive impact on the health of those who live and work near the project corridor.

212. Noise (+).In general, the Project intends to increase ridership on Metro Line 3, in the short term this may decrease the numbers of vehicles within the Metro Line 3 corridor which will have beneficial noise impacts. The project also intends to improve facilities for walking and cycling to stations which will further reduce operational noise levels. More bus routes may become operational once the Metro Line 3 is operational and this should further reduce the number of motorcycles on the dense residential areas. In the longer term, traffic volumes may start to increase again, and accordingly noise levels. But this will not be a direct result of the Project actions, but more of an indirect impact resulting from induced growth brought about mainly by further developments in the area.

F. ANALYSIS OF ALTERNATIVES

F. ANALYSIS OF ALTERNATIVES

213. Scenarios considered in the analysis of alternatives for the project are “With the project”” and “Without the project”. Hanoi Metro Line 3 Project is expected to meet the following objectives:

- Satisfy the increasing traffic demand from short to long term along the east –west corridor.
- Begin to establish a new collective transport mode for the future modern cities in Vietnam
- Contribute to the movement from private to public transport
- Reduce traffic congestion
- Improve road safety
- Improve environmental condition
- Introduce public transport service into Hanoi City Center

214. To augment its efficiency, additional urban transport measures are designed with focus on the following:

- Effective integration of public transport occurs in the five districts of Hanoi along Metro Line 3. Modal share of travel in Ha Noi urban areas by public transport is targeted to be 40~50% by the year 2025, compared with only around 10% today and the development of an urban rail network will be the backbone to achieve this target.
- Specific energy-efficient, “low carbon” urban transport solutions in the Metro Line 3 corridor.
- Effectuation of these energy-efficient urban transport solutions which, when coupled with the Metro Line 3 Project, will lead to significant welfare benefits, reductions in greenhouse gas (GHG) and other emissions in Hanoi.

215. Measures such as formation of new policies and regulations, management and institutional capacity building will also help achieve an improved public transport system and reduce GHG emissions. There are three (3) options considered and studied for the project.

a) Option 1 deals with metro station enhancements, improved pedestrian infrastructure such as pedestrian priorities at signals and enhanced infrastructure to/from stations, traffic management measures at junctions proximate to stations, restrictions on parking especially on footpaths, and review of commercial development opportunities.

   It also covers plan for routing and rationalization of public transport routes; a program for public transport fleet renewal to promote low-emission vehicles; bus feeder services to Metro stations; multimodal interchange(s) and “Park and Ride” facilities;

   For the interchanges (transfer) stations comprising Ga Hanoi, Cat Linh, Kim Ma and CauGiay, connections will focus mainly upon pedestrian and bicycle linkages from neighborhoods within 500 meters of the station footprint. Bus routings include new shuttle routes to serve each Metro Line 3 station. Order of modal priorities for provision of accessibility accommodations and amenities:

   i) Pedestrians
   ii) Buses
   iii) Motorcycles
   iv) Bicycles
   v) Xe-om
   vi) Taxis
   vii) Private cars

   Option 1 avoids any land acquisition for the enhancement of modal accessibility or in connecting different modes. It provides accessibility measures in the “station realm” – that is up to 100 meters from the physical works of the station box . It also provides measures in the 500-meter “catchment area” of the station – this is generally considered to be the limit of the distance people are prepared to walk to a Metro station.

b) For Options 2 and 3, some land acquisition and even displacement will take place. In going from Option 2 to Option 3, the approach was basically “more of the same” in the way of connections to major generators, current or future TOD (approved or potential candidate), and more station-to-station linkages. For example, if Option 2 only provides for a subway connection for passengers moving between one underground and one elevated Metro station, Option 3 may add an elevated connection for the additional ease of transferring patrons.

216. Option 1 will be applied to Stations 2,3,4,5,6,7,10,11 and 12 while Option 2 is preferred for Stations 1,8 and 9. Option 3 is under consideration, however, will be implemented in the future. Table F.1 summarizes the rapid assessment done on the two (2) scenarios in terms of environmental, social and economic aspects of the project.

Table F.1:Assessment of Alternatives

Options	Components		
	Environmental	**Social**	**Economics**
With the project	CHG emission level is expected to decrease. esthetics will improve Improved traffic circulation	Quality of public transport systems will improve. Reduced average travel time along Metro line 3 corridor Number of traffic accidents is expected to decrease Flooded situation will be avoided by using Metro line Footpaths clear of all obstructions, hence, reduce accidents Health effects particularly on respiratory system will be lessened	Significant increase on the modal share of public transport in Ha Noi Boost growth in Viet Nam and regional economies Reduced cost / economic loss owing to time lost in traffic and fuel consumption Having from the cost on importation of fuel
Without the Project	Increase in vehicle emissions Climate change/ flooding	Increase in traffic congestion' Health impacts due to air pollution; Increase in accidents; Reduction in quality of life; Reduction in efficiency of other affected transport modes Flooding /inundation in rainy season at Station 10,11,12 areas, so both motorcycles, walk peoples to be flooded frequently during heavy rain As a form of personalized mobility, the motorcycle is difficult to replace in Vietnam, and any restriction on use will have political and social consequences. Though without controls, unconstrained growth in motorcycle ownership and use will negate public transport benefits gained at enormous expense.	Increase in economic loss owing to time lost in traffic Slow economic growth

217. Based on the rapid assessment made, "with the project" scenario is the preferred option. Hanoi Metro Line 3 is a huge investmentof the Government of Vietnam and could be seen that its usage cannot be maximized if the project will not be implemented in parallel with the main line. Expected economic returns, social benefits and reduction in GHG Emissions will not be realized. In the overall, it will bring significant delay in meeting the target set on the 2020 Ha Noi Urban Transport Masterplan (HUTM).

G. INFORMATION DISCLOSURE CONSULTATION, AND PARTICIPATION

G. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

G.1 CONSULTATION AND PARTICIPATION PROCESS

218. Public Consultations and Participation Process during the Project Preparation Stage took place both formally and informally.

219. Reconnaissance surveys of the project sites involved on-site discussions with districtand town commune/wardofficials.Informationon the physical, biological resources, social-economic environment, opportunities and constraints relevant to the project wereelicited.

220. Public Consultation meetings with stakeholders and representatives from Hanoi DOT/TRAMOC, DPCs, CPCs/Ward PCs, Hanoi DONRE and five (5) DONREs at district level of five (5) districts, the Division of Urban Management of five (5) districts and the Women's Union Organization were undertaken to inform them about the proposed project and at the same time get their views about the plans. The findings are vital in the preparation of the IEE Report.

G.2 CONSULTATION MEETINGS

G.2.1 Public Consultation Meetings

221. The Five Public Consultation Meetings for Environment and Resettlement were carried out in five districts: TuLiem, CauGiay, Ba Dinh, Dong Da, HoanKiem in Hanoi City from 14 to 24 January 2013 . Participants were representatives from Hanoi DOT/TRAMOC, DPCs, CPCs/Ward PCs, Hanoi DONRE, DONREs at district level, the Division of Urban Management of 5 districts, Women's Union Organization, and representatives from households in communes/wards affected by the project.

222. Including women, 30-70 participants per district or a total of 220 people attended the five (5) public consultations. Out of the 220 people, 164 are male and 56 are female. The following informationwere presented during the meeting:

- Project objectives
- Project locations, design& cost estimates
- GoV& ADB environmental policies & procedures
- Project environmental category as per ADB & GOV policies
- Environmental issues in the project area
- Potential environmental impacts caused by Project & Proposed mitigation measures

G.2.2 Focus Group Discussions

223. Focus group discusions (FGD) were carried out to inform women, the disabled, students and communities about the project, its location, proposed options, obtain feedbacks on issues,get consensus on the option selection.A total of 118 people attended the following five meetings:

a) Gender Stakeholder Meeting at HoanKiemon 5 February 2013
b) Gender Stakeholder Meeting at TuLiemon 6 February 2013
c) Community Meeting with the Disabled (at Stations 5, 7,8 &9) on 25 February 2013
d) Community Focus Group Meeting for Dong Da District (Station 8,10,11) held on 27 February 2013
e) University Focus Group Meeting for CauGiay District (Station 6) on 27 February 2013.

G.2.3 Informal Interviews on Specific Envonmental Issues

224. Informal interviews were conducted in areas where the stations will be constructed. As noise and dust are expected during construction, it is important to know the observation of the people on the current situation in the project area relative to noise and dust. General perception of the people is reflected in Table G-1 thru G-3.

Table G-1 Air Quality and Noise

Pollutant/Level	None	Minimal	Moderate	Significant
Noise			X	X (during peak hours: from 16.30 – 18.30 in Station 6 Ha Noi National University near 3rd Ring Road & Station 7-Cau Giay)
Dust			X (Stations 10,11,12)	X (Stations 1 -9)

225. While the magnitude of dust as perceived reaches the significant level in most stations and noise which is significant to only two stations , it is important to know where these air pollutants come from. Table G.2 provides the primary sources of air pollutants in the project area.

Table G-2 Air Pollution Sources

Pollutant/Source	Transportation	Industry	Agriculture (burning of waste, livestock)	Others
Noise	X	X		Construction activities, big building construction, trade/business services
Dust	X	X		Construction activities, big building construction

226. Relative to travelling from respective commune to Hanoi City Center,three concerns were elicited from the people interviewed As shown in Table G.3 majority of therespondents considered air pollution as the topmost concern, followed by risk of accident and loss of time in traffic.

Table G-3 Environment-related impacts in travelling from communes to Hanoi City Center

Environment-related impacts in travelling from communes to Hanoi City Center	Number of persons	Percentage (%)
1 – Loss of time in traffic	20	16.6
2 – Air pollution	110	91.7
3 – Risk of accident	45	37.5
4 – Other problems	10	8.3
Total Number of Respondents interviewed	120*	

Note : 10 persons were interviewed for one station

G.3 GENERAL COMMENTS FROM PARTICIPANTS OF ALL DISTRICTS

Comments on Options Selected	How the comments will be addressed/ have been addressed
• The Project efforts to organize "public consultation" is highly appreciated as this help local people understand the project content and express their views so as to ensure effective implementation of the project;	Series of public consultations had been conducted. Issues were clarified and the people were informed that mitigation measures were included in the plans e.g. Social Development Plan, Resettlement Action Plan and Environmental Management Plan.
• Agree with the concept design of the Consultant on guardrail, parking areas and facilities for the Metro passengers.	Considered in the project plan.
• It's recommended to make use of the existing parking areas around the location of the station. Bus stops and taxi stops should not be arranged within the station's area but should be arranged outside of the station's area.	Considered in the project plan.
• The Consultant's drawings should be more specific, and analyze clearly advantages and disadvantages of each option. So that local people have basis to give comments on the option to be selected.	Drawings were improved.

Comments on Environmental Impacts & Mitigation Measures	Recommended Actions
• Agree with mitigation measures recommended by the project environmental consultant	Mitigation measures have been included in the EMP.
• Environmental impacts are unavoidable; however, considering common benefit then these impacts are acceptable	Mitigation measures have been included in the EMP.
• It is requested to avoid the land clearance as much as possible, and when the station comes to construction including the construction of exit and entrance, need to avoid impacts on the business, households and enterprises. In case of additional land take, the compensation should be done properly & satisfactory so as not to cause disadvantages for the households within the area.	A Resettlement Plan was prepared in consultation with the affected parties.
• Temporary road to access the shops, business services, should be provided by Contractor	Mitigation measure have been included in the EMP.
• Construction time should be widely announced beforehand	Mitigation measure have been included in the EMP.
• Traffic jam during construction should be considered carefully as traffic volumes in all stations areas is big and population density is high. So that the contractor is requested to prepare and execute a Transportation Management Plan for the construction period, to mitigate traffic jams and public inconveniences	A Traffic Management Plan will be implemented during the project implementation.
• Construction time should be avoided during peak hours morning : 6.30-8.00 am, evening : 4.30- 7.00 pm as traffic jam always occur in these time, especially construction time should be done during the night for station 10 as two schools (about total	Mitigation measure have been included in the EMP.

2500 pupils) located closely to the station	
• Dust and noises must be mitigated during construction	Mitigation measure have been included in the EMP.
• Regular watering during construction to avoid dust pollution	Mitigation measure have been included in the EMP.
• All construction materials waste must be immediately transported to waste disposal site	Mitigation measure have been included in the EMP.
• Provide temporary rain water drains in the site to avoid flooded /inundation situation in the project area, especially for station 10,11,12 where often occur heavy inundation during rainy season (from June to September) with 0.2-0.5 m in depth, inundated time is about 8-12 hours	Mitigation measure have been included in the EMP.
• Contractors need to ensure fire safety	Mitigation measure have been included in the EMP.
• Construction time should be ensured to meet target schedule	Mitigation measure have been included in the EMP.
• Recovery of ground surfaces in the project area after construction as before construction	Mitigation measure have been included in the EMP.

G.4 CONCLUSION

227. There is an agreement on the implementation of proposed measures that will strengthen sustainable urban transport for Hanoi Metro Line 3 Project

228. Consensus is achieved on environmental and social impacts and mitigation measures recommended for the Project.

229. All comments from participants and stakeholders will be considered fully in the mitigation plan ofthe Environmental Assessment and Basic Design. Details of the consultations conducted are presented in Appendix 4 " Public Consultation Reports

H. GRIEVANCE REDRESS MECHANISM

H. GRIEVANCE REDRESS MECHANISM

H.1 PURPOSE OF THE MECHANISM

230. The grievance redress mechanism is intended for persons seeking satisfactory resolution to their complaints on the environmental performance of the project. The mechanism will ensure that:

(i) the basic rights and interests of every person affected by poor environmental performance of the project are protected; and
(ii) their concerns arising from the poor environmental performance of the project during the conduct of pre-construction, construction and operation activities are addressed in an effective and timely manner.

H.2 ACCESS TO THE MECHANISM

231. Any person who has a complaint regarding the environmental performance of the project during pre-construction, construction or operating phases shall have access to the grievance redress mechanism described in the following section. The project, through the Environmental Management Staff (EMS/TRAMOC) shall ensure that:

(i) the affected people will be appropriately informed about the GRM;
(ii) the GRM will be publicly disclosed and posted in the offices of all affected communes/wards and in strategic places of the project's area of influence before start of site works;
(iii) the GRM isreadily accessible to all segments of the affected people to address their concerns and complaints promptly at no costs and without retribution; and
(iv) theGRM will not impede access to the country's judicial or administrative remedies.

H.3 GRIEVANCE REDRESS MECHANISM PROCEDURE

232. Managing grievances involves a step-by-step process. It requires assigning responsibilities and specifying timelines for prompt responses / actions to grievances to avoid prolonging the misery of affected persons / households (APs/AHs). Grievances raised relating to environmental impacts are critical to the health and well-being of affected persons. Hence, timelines for responses are critical.

233. The Environmental Management Staff (EMS/UTPMU) for the project will provide the Commune/Ward Peoples Committee (CPC/WPC) in each commune/ward within the project area with standard Complaint Forms (Appendix 7) to be made available to all potentially-affected households. Each CPC/WCP will appoint a Commune Grievance Redress Officer (CGRO) to deal with complaints arising as a result of the project. Households or groups of households wishing to complain about the effects of construction works or other operations on their property, production systems, economic well-being, spiritual life, quality of surface and ground water, quality of air, health, safety, welfare, or any other assets essential to their lives, shall make their complaint using these Complaint Forms.

234. The Progress of Grievance Investigation and Resolution will follow the following steps:

Step 1: If a concern arises during construction, the affected person will submit a written or oral complaint to the contractor directly (the contractor's environment health and safety officer or any onsite construction personnel).EMS/TRAMOC should be informed immediately about the complaint. It should be fully aware of the progress of the grievance especially if it is an EMP-related complaint. It could also provide the technical support to CGRO when necessary. Whenever possible, the contractor will resolve the issue directly with the affected person. The contractor will give a clear reply withintwo working days. If successful, the contractor will inform the PMU (TRAMOC) accordingly.

Step 2: If no appropriate solution can be found, the contractor should forward the complaint to the PMU (TRAMOC) within five (5) working days. The complainants will submit their complaints to the Commune Grievance Redress Officer (CGRO) of their local CPC/WCP

Step 3: Within five (5) working days , the CGRO will investigate the complaint. If it is judged by them to be valid, the Complaint Form will be forwarded to the EMS/TRAMOC

Step 4: Within five (5) working days from the date the complaint is received, the EMS/TRAMOC and CGRO will organize meetings to discuss how to resolve this matter. All meetings will be recorded, and copies of the minutes of meetings will be provided to APs./Ahs;

Step 5: The EMS/TRAMOC shall take such mitigation measures as are agreed in meetings by EMS and CGRO within five (5) working days , or some other period acceptable to the parties referred to in Step 4. When the complaint has been resolved, the meeting minute needs to be signed by the Complainant / Head of Household, CGRO, EMS and annotated at each stage of the process by EMS/TRAMOC with copies to be sent to Hanoi DONRE (Environmental Management Hanoi /PPC (as executing agency);

Step 6: Follow step 4, In case no understanding or amicable solution is reached, the APs/ AHs can submit the complaints to the District People's Committee (DPC) after unsatisfied meetings (within 15 days only). The APs/AHs must lodge the complaint within 60days of registering the original complaint and must produce documents with copies of the appeal that support his/her claim. The DPC will provide a decision within ten (10) workingdays of receiving the appeal.

Step 7: If the AP/AH is not satisfied with the decision, or in the absence of any response from DPC, the AP/AH can appeal to the Provincial People's Committee (PPC). The PPC will review and issue a decision on the appeal within ten (10) workingdays from the day it is received

Step 8: If the AP/AH is still not satisfied with the decision of PPC or in the absence of any response within the stipulated time, the AP as a last resort may submit his/her case to the court, whose decision will be final.

I. ENVIRONMENTAL MANAGEMENT PLAN

I. ENVIRONMENTAL MANAGEMENT PLAN

235. The Environmental Management Plan (EMP) gives guidance on how to mitigate the environmental concerns identified in connection with this project. The EMP deals with mitigation and monitoringmeasures to be taken during Project implementation to avoid, reduce, and mitigate adverse environmental impacts.

I.1 RESPONSIBILITIES FOR EMP IMPLEMENTATION

Table I.1: EMP implementation responsibilities by key donors, project implementers, and agencies

Organization	EMP Responsibility
Ha Noi People's Committee (HPC)	• Executing agency with overall responsibility for the Project • Ensure that sufficient funds are available to properly implement the EMP • Ensure that EMP provisions are implemented for the entire Project regardless of financing source. • Ensure that Project implementation complies with the GOV and ADB's environmental policy principles and requirements
Urban Transport Project Management Unit (UTPMU) of the Department of Transport	• Project implementing agency with overall responsibility for project construction and operation including environmental performance • Allocation of adequate financial and human resources to fulfil environmental commitments during project construction and operation • Establish a grievance redress mechanism as described in the IEE • Designate an environmental management officer (EMO) to oversee implementation of the EMP • Ensure that tender and contract documents include the EMP • Undertake monitoring of the implementation of the EMP (mitigation and monitoring measures) with assistance from the detailed design and implementation supervision consultant (DDIS) • Submit semi-annual monitoring reports on EMP implementation to ADB

Table I.1: EMP implementation responsibilities by key donors, project implementers, and agencies (cont'd))

Organization	EMP Responsibility
Detailed Design and Implementation Supervision Consultant (DDIS)	• Engage a qualified and experienced environment specialist to carry-out DDIS tasks that are related to EMP implementation (mitigation, monitorin, reporting, capacity building/training of UTPMU) • Assist UTPMU in ensuring that the EMP is included in the bid and contract documents for civil works • Assist UTPMU in EMP compliance monitoring and reporting • Undertake environmental management training for UTPMU staff • Undertake environmental effects monitoring during pre-construction and construction phases for depot, viaduct and tunnel components • Monitor the environmental performance of contractors in terms of implementation of mitigation measures for pre-construction and construction phase as specified in the EMP • Monitor over-all implementation of various EMP provisions during pre-construction and construction phases • Review and approve the Contractor's environmental management plan (CEMP) before start of site works. • Ensure that the CEMP is fully consistent with the project EMP specified in the IEE and that all required mitigation measures are included. • As part of day-to-day project supervision, ensure proper implementation of environmental mitigating measures specified in the EMP • Undertake monthly site visits to undertake detailed monitoring of the contractor's environmental performance based on the EMP provisions • Prepare semi-annual environmental monitoring reports on EMP implementation based on the findings of the monthly monitoring activities. The report will be submitted to ADB through UTPMU.
Contractor	• Appoint and environment, health and safety officer to oversee timely and proper implementation of mitigation and monitoring measures specified in the EMP and the CEMP • Prior to start of site works, prepare CEMP consistent with the EMP requirements. Submit the CEMP to the DDIS for approval. • Implement and provide sufficient funding and human resources for proper and timely implementation of required mitigation measures in the EMP for pre-construction and construction phases

I.2 MITIGATION

Table I.2: Environmental Mitigation Measures

Environmental Issues/Potential Environmental Impact	Proposed Mitigation Measure or Enhancement Measure	Mitigation Cost	Responsibility	
			Implementation	Supervision/ Monitoring
Pre-construction/Prior to start of Site Works				
1) Improper implementation of the Project EMP.	a. Contractor to engage an Environment, Health and Safety Officer who will oversee proper implementation of construction-related aspects of the project Environmental Management Plan and Contractor;'sEMP (CEMP). b. Prior to commencement of site works, prepare a CEMP based on the project EMP with details of staff, resources, environmental mitigation measures to be implemented required in the EMP, implementation schedules, locations as well as monitoring and reporting procedures. The CEMP will also include the following plans (see further guidance/mitigation measures under specific items in this EMP) : (i) Tree Cutting/Removal and Balling/Replanting Plan (ii) Traffic Management Plan (iii) Dust abatement program (iv) Solid waste management plan (v) Spoils disposal plan for excavated soil and removed pavement (vi) Spill Management Plan (vii) Occupational Health and Safety Plan (viii)Emergency Response Plan c. Submit the CEMPto DDIS for review and approval before start of site works.	Part of contractors' bid cost	Contractor	UTPMU, DDIS
2) Lack of consultation with affected people during project implementation	Stakeholders' consultations will be carried out before start of site works and will be continued throughout the construction phase on an area by area basis to resolve any potential problems. These will be done by the contractor andUTPMU to: (i) inform affected people on the location and schedule of various construction activities (ii) determine concerns of affected people related to such activities, (iii) ensure that appropriate mitigation measures will be implemented to address construction-related environmental issues raised by the affected people.	Part of contractors' bid cost	Contractor, UTPMU	UTPMU, DDIS
3) Complaints due to project-related	Prior to commencement of site works, UTPMU, DDIS and the contractor will undertake the following in consultation with local people and local officials:	Part of contractors'	Contractor, UTPMU, DDIS	UTPMU, DDIS

Environmental Issues/Potential Environmental Impact	Proposed Mitigation Measure or Enhancement Measure	Mitigation Cost	Responsibility	
			Implementation	Supervision/ Monitoring
impacts	a. establish a Grievance Redress Mechanism (GRM) as described in the project's Initial Environmental Examination (IEE) b. publicize the existence of the GRM through public awareness campaigns, billboards, public notifications, etc. c. ensure that the names and contact numbers of representatives of the contractor, the DDIS, and UTPMU are placed on notice boards at the construction sites.	bid cost and Project cost		
4) Disruption of utilities/services	a. Water supply pipelines, power supply, communication lines, drainage and other utilities that will be affected by construction will be relocated before construction works commence so that interruption of services will be minimized. b. Provision will be made to preserve the operation of current facilities in sufficient quantity and in agreement with the local community. c. Relocation will be undertaken in coordination with the utility company and local authorities. d. Affected households and establishments will be notified well in advance of any disruption. e. Replacement structures (e.g., drainage) will be constructed prior to the removal of the existing structure.	Part of contractors' bid cost and Project cost	Contractor	UTPMU, DDIS
5) Improper disposal of excavation spoils and removed pavement	Before commencement of excavation works and removal of pavement, obtain the DDIS's approval of the disposal sites. Such sites will meet the following criteria: a. Located at least 50 m from watercourses b. Will not cause sedimentation or obstruction of the flow in watercourses c. Will not cause damage to productive areas	Part of contractors' bid cost and Project cost	Contractor	UTPMU, DDIS
	Before commencement of excavation works and removal of pavement, undertake inspection and approval of the contractor's disposal sites to ensure that the above EMP criteria (a to c) for such sites are met.	Part of DDIS cost	DDIS	UTPMU
Construction Phase				
6) Tree cutting within the road ROW	a. Obtain tree cutting approval from the relevant government agency b. Prepare and implement a Tree Cutting/Removal and Balling/Replanting Plan to be approved by relevant government authority responsible for management of parks and roadside trees. The plan will adhere to the following principles: (i) Minimal tree cutting/removal: Where possible, protect existing trees	Part of Project cost	Contractor	UTPMU, DDIS

Environmental Issues/Potential Environmental Impact	Proposed Mitigation Measure or Enhancement Measure	Mitigation Cost	Responsibility	
			Implementation	Supervision/ Monitoring
	during road widening and improvement works, removing only those that are necessary based on the Project design. Undertake tree ball, whenever possible. (ii) Sound timing: As much as possible. remove trees in early spring in order to ensure no nesting birds are disturbed. (iii) Replacement: For every one tree removed, replant at least one in suitable city locations after construction. The selection of species, location and period of planting will be carried out in consultation with the relevant government authority. (iv) Monitoring and Maintenance: Implement a tree and vegetation monitoring and maintenance plan to ensure high survival rate. c. Ensure that tree cutting is limited to areas that are necessary based on the project design and as approved by the relevant Government agency.			
7) Impacts due to Dust and Gaseous Emissions	a. Formulateand implement a dust abatement program to minimize dust emission at the construction sites and roads affected by the Project. b. Locate concrete batching plants, asphalt plants, crushing plants, materials and spoil stockpiles and other dust sources at least 300 meters away from inhabited areas and other sensitive receptors (schools, hospital, etc.) c. Install appropriate air pollution control equipment and other suitable control measures to minimize dust emission, to avoid nuisance and health risks to surrounding communities d. Maintain construction equipment and vehicles to ensure national QCVN emission standards are met. e. Position any stationary emission sources (e.g., portable diesel generators, compressors, etc.) as far as is practical from sensitive receptors; f. Undertake regular water spraying on roads, work areas and other construction-related facilities near or within populated areas and other sensitive receptors g. Ensure that material stockpiles will be located in sheltered areas and will be covered with tarpaulins or other such suitable covering to prevent material becoming airborne. h. Regularly water stockpiles and spoil areas to minimize dust generation. i. Install temporary fencing or barriers around particularly dusty	Part of contractors' bid cost	Contractor	UTPMU, DDIS

Environmental Issues/Potential Environmental Impact	Proposed Mitigation Measure or Enhancement Measure	Mitigation Cost	Responsibility	
			Implementation	Supervision/ Monitoring
	activities in vicinity of sensitive receivers j. Prohibit use of equipment and vehicles that emit visible smoke in excess of acceptable limits. k. Provide trucks transporting construction materials with covers to prevent spills and dust emission. l. Impose speed limits for project vehicles to minimize dust emission along populated areas and other sensitive receptors. m. Prohibit burning of all types of waste generated at the construction sites, workers' camps, and other project-related facilities and activities. n. Regularly clean roads used by construction traffic to remove mud, cement, etc. o. Ensure that areas within the project area where there is heavy movement of project vehicles are provided with hard standing and kept clear of loose surface material. p. Ensure that cement and other fine-grained materials that are delivered in bulk are stored in closed containers. q. Undertake wheel washing in active construction sites so that haul/delivery trucks can be cleaned of mud and dirt as they exit the work area.			
8) Impacts due to Noise and Vibration	a. Provide prior notification to the community and local officials on the schedule of construction activities. b. Maintain in good working order all exhaust systems. c. Whenever possible, completely enclose noisy equipment to reduce noise levels. d. Position any stationary equipment that produces high noise levels (e.g., portable diesel generators, compressors, etc.) as far as is practical from receptors (e.g., houses, medical facilities, schools, pagodas, etc.) e. Construction traffic routes to be defined in cooperation with local communities and traffic police to minimize noise and nuisance. f. When necessary, suitable noise control measures (e.g., noise barriers/walls, noise-reflective panels) will be used to reduce construction and equipment noise levels to ensure compliance with applicable QCVN noise standards. g. Impose speed limits on construction vehicles within the construction sites and through urban areas h. Operation of noisy equipment and construction works during night time (19:00-06:00) in populated areas and where sensitive receptors	Part of contractors' bid cost	Contractor	UTPMU, DDIS

Environmental Issues/Potential Environmental Impact	Proposed Mitigation Measure or Enhancement Measure	Mitigation Cost	Responsibility	
			Implementation	Supervision/ Monitoring
	(medical facility/hospital, residential areas, etc.) are found will only be undertaken after prior notification and consultation have been carried out with affected people and local officials, and suitable noise attenuation measures are implemented. i. In project areas near schools, undertake consultations with school official regarding construction schedules to ensure that disruption to school activities are avoided or minimized. j. Restrict use of vibrating rollers and operation of heavy equipment near vibration sensitive structures.			
9) Generation of domestic wastes and construction wastes	a. Provide garbage bins and facilities within the project site for temporary storage of construction waste and domestic solid waste. b. Separate solid waste into hazardous, non-hazardous and reusable waste streams and store these temporarily on site prior to final disposal, in secure facilities with weatherproof flooring and roofing, security fencing and access control and drainage systems. c. Ensure that wastes are not haphazardly dumped within the project site and adjacent areas. d. Undertake regular collection and disposal of wastes to sites approved by local authorities. e. Prohibit burning of wastes.	Part of contractors' bid cost	Contractor	UTPMU, DDIS
10) Impacts due to disposal of excavation spoils and removed pavement materials	a. Ensure that excavation spoils and removed pavement materials are disposed to sites approved by the DDIS. In particular, such sites should meet the following criteria: (i) Located at least 50 m from watercourses (ii) Will not cause sedimentation or obstruction of the flow in watercourses (iii) Will not cause damage to productive areas b. Obtain any required agreements, approval or permits from local authorities and land owners for the disposal sites. c. Construction wastes will be immediately transported to approved waste disposal sites to avoid nuisance and minimize adverse impacts to the environment.	Part of contractors' bid cost	Contractor	UTPMU, DDIS
11) Hazardous materials releases	a. Strictly implement the approved Spill Management Plan to ensure adequate cleanup of any spills. b. Train relevant construction personnel in handling of fuels/hazardous substances and spill control procedures. c. Provide maintenance shops, fuel and oil depot with impermeable flooring	Part of contractors' bid cost	Contractor	UTPMU, DDIS

Environmental Issues/Potential Environmental Impact	Proposed Mitigation Measure or Enhancement Measure	Mitigation Cost	Responsibility	
			Implementation	Supervision/ Monitoring
	and drainage leading to an oil-water separator or sump where oily wash water and sludge can be collected for proper disposal. d. Undertake regular maintenance of oil-water separators/sumps to ensure efficiency. e. Carry out refueling and servicing of equipment only in areas adequately equipped to avoid leaks and spills. f. Limit quantities of chemicals, hazardous substances and fuel on site at any time, and ensure these materials are stored on site in above-ground storage tanks, within an enclosed and covered area that has an impervious floor and impervious surrounding bund, with a capacity at least 120% of the total capacity of the storage capacity. g. Locate storage areas away from water-courses, flood-prone areas, workers' camps, populated areas and other sensitive sites. h. Collect contaminated refuse and dispose of through recyclers/authorized waste handlers and dispose of it in authorized waste facilities i. Ensure availability of spill cleanup materials specifically designed for petroleum products and other hazardous substances where such materials are being stored and used. j. In case of spills and leaks, immediately implement suitable measures to prevent hazardous materials from spreading. Remove and properly dispose spilled and contaminated materials to avoid further pollution of the environment. k. Ensure all storage containers are in good condition with proper labeling. l. Regularly check containers for leakage and undertake necessary repair or replacement. m. Prohibit discharge of oil-contaminated water into the environment. n. Store waste oil, used lubricant and other hazardous wastes in tightly sealed and properly labelled containers to avoid contamination of soil and water resources. o. Ensure that the transport and off-site disposal of hazardous wastes complies with applicable laws and regulations, or is in compliance with internationally accepted good practice in the absence of relevant laws and regulations. p. Ensure that the restoration of temporary work sites includes removal and treatment or proper disposal of contaminated soils. q. For bitumen transport, ensure the use vehicles are approved by local authorities for the transport of bitumen and are also in accordance with the			

Environmental Issues/Potential Environmental Impact	Proposed Mitigation Measure or Enhancement Measure	Mitigation Cost	Responsibility	
			Implementation	Supervision/ Monitoring
	bitumen supplier's recommendations for such transport. r. Ensure that truck drivers are familiar with the safe loading and unloading procedures for the bitumen products, including emergency procedures in the event of spillage. s. Ensure that trucks are provided with tools and materials for handling spills. t. Contaminated soil (based on results of soil sampling) at excavation sites (such as the petrol station to be demolished at Station 9) will be collected, transported and disposed consistent with national regulations. u. Regarding asbestos containing materials, the Contractor will follow the 'Guide to Deal with Asbestos in Buildings' prepared by the Vietnamese Health and Safety Executive attached as Appendix 8			
12) Impacts on water quality	a. Prior to operation of concrete batching plants, construct settling/retention ponds with sufficient specifications/capacity for treatment of wastewater. b. Properly operate and maintain settling/retention ponds to reduce the concentration of total suspended solids and alkalinity to acceptable levels based on QCVN standards. c. Provide hygienic toilets at workers' camps. d. Divert storm water flows away from cleared areas. e. Provide sediment control structures at all earthwork construction areas. f. Provide sedimentation control structures adjacent to watercourses within the construction area. g. Restrict the area cleared of vegetation for construction to the minimum required for immediate works. h. Divert storm water flows away from cleared areas. i. Properly store construction materials and stockpiles so that these do notblock, erode, or creep onto water channels. j. Ensure that all wastewater emanating from project-related activities and facilities are treated consistent with national regulations.	Part of contractors' bid cost	Contractor	UTPMU, DDIS
13) Impacts due to operation of borrow pits and quarries	a. Provide the DDIS with adequate information regarding quarries and borrow pits, including commercial sources that will be used for the project, and the environmental mitigation measures to be instituted in those locations. The information will include locations, scale of operations, method of transport of materials, and schedule of use relative to the overall construction schedule. b. Only licensed quarries and crushers will be used or the contractor will	Part of contractors' bid cost	Contractor	CSC and MOC/PW

Environmental Issues/Potential Environmental Impact	Proposed Mitigation Measure or Enhancement Measure	Mitigation Cost	Responsibility	
			Implementation	Supervision/ Monitoring
	obtain its own licenses c. Borrow pits will be covered by required government permits or approvals d. Borrow pits and quarries will not be located within 300 meters of any urban area, protected area or sensitive receptor e. Topsoil will be saved for rehabilitation during closure of the quarries and borrow pits, f. Quarries and borrow pits will be provided with drainage and sediment flow controls g. Upon completion of extraction activities, quarries and borrow pits will be dewatered, fences and warning signs will be installed, as appropriate to avoid impacts to public health and safety h. Borrow pits and quarries will be left in a tidy state with stable side slopes and proper drainage			
14) Flooding	a. Provide and maintain temporary drainage to prevent local flooding and waterlogging. b. Remove temporary drainage works and reinstate the affected area. c. Ensure watercourses are not obstructed or, if obstruction is unavoidable, provide alternative temporary or permanent channels of sufficient capacity to avoid flow restriction. d. Regularly inspect and maintain all drainage channels to ensure that continue to function as required.	Part of contractors' bid cost	Contractor	UTPMU, DDIS
15) Traffic congestion	a. Prepare and, after approval of the DDIS, implement, a Traffic Management Plan for the construction areas and for communities affected by construction.The Plan will be designed to ensure that traffic congestion due to construction activities and movement of construction vehicles, trucks transporting excavation spoils and other construction wastes, haulage trucks, and equipment is avoided or minimized particularly during peak hours in the morning (6:30-8:00 AM) and evening (4:30- 7:00 PM). The plan will be prepared in consultation with local traffic officials and People's Committees at the district and commune levels. The Plan will identify traffic diversion and management, transport mode for spoils disposal, define routes for construction traffic from materials storage/parking areas to construction site and from construction site to waste disposal locations, traffic schedules, traffic arrangements showing all detours/lane diversions, modifications to signaling at intersections, necessary barricades, warning/advisory signs, road signs, lighting, and other provisions to ensure that adequate and safe access is provided to motorists in the affected areas.	Part of contractors' bid cost	Contractor	UTPMU, DDIS

Environmental Issues/Potential Environmental Impact	Proposed Mitigation Measure or Enhancement Measure	Mitigation Cost	Responsibility	
			Implementation	Supervision/ Monitoring
	b. Closely coordinate with local authorities for any closure of roads or rerouting of vehicular traffic, if required. c. Provide advance notification to the community regarding changes to public transport facilities or routes. d. As much as possible, allow one side of the road to be open to two-way traffic. e. Provide road signs indicating the lane is closed 500 m before the worksite. f. As much as possible, schedule delivery of construction materials and equipment as well as transport of spoils during non-peak hours. g. Ensure access in areas to be closed temporarily by provision of temporary bypass roads. h. Schedule construction activitiesto take into account local events such as festivities, processions, parades, etc. to minimize disruption.			
16) Occupational health and safety risks	a. Prepare and implement an Occupational Health and Safety Plan consistent with international standards (e.g., the World Bank Group's Environment, Health and Safety Guidelines of 2007) and Labor Code of Vietnam. The Plan shall address health and safety hazards associated with working in confined space and compressed air, etc., working at heights, electrocution, excavations, establishment and operation of construction/worker's camps, use of heavy equipment, transport of materials and other hazards associated with various construction activities. b. Prepare and implement an Emergency Response Plan to prevent, mitigate, respond to and recover from emergency events that could occur due to project activities such as accidents, fire, and other crises. c. Appoint an environment, health and safety manager to look after implementation of required environmental mitigation measures, and to ensure that health and safety precautions are strictly implemented for the protection of workers and the general public in the vicinity of construction areas. d. Provide personnel with appropriate safety equipment such as safety boots, helmets, gloves, protective clothes, welding helmets, dust masks, goggles, ear protection, safety line, fall prevention measures, etc, broadly referred to as personal protective equipment (PPE). and ensure that these are properly used as required. e. Conduct orientation for construction workers regarding health and safety measures, emergency response in case of accidents, fire, etc., and	Part of contractors' bid cost	Contractor	UTPMU, DDIS

Environmental Issues/Potential Environmental Impact	Proposed Mitigation Measure or Enhancement Measure	Mitigation Cost	Responsibility	
			Implementation	Supervision/ Monitoring
	prevention of HIV/AIDS and other diseases f. Provide stable footpaths/access with adequate strength guardrails and scaffolding at elevated work sites. g. Provide first aid facilities that are readily accessible to workers. h. Provide fire-fighting equipment at the work areas, as appropriate, and at construction camps. i. Provide adequate drainage in workers camp. j. Provide adequate, clean and well-ventilated housing, with separate sleeping quarters for male and female workers, at the workers'/construction camps. k. Provide a reliable supply of potable water and water for washing and bathing purposes at the workers' camps. l. Provide separate hygienic sanitation facilities and bathing areas with sufficient water supply for male and female workers m. Ensure proper collection and disposal of solid wastes within the workers'/construction camps consistent with local regulations. n. Provide fencing of adequate strength around excavation sites greater than 2 m deep. o. Prohibit workers from entering work sites without the appropriate PPE. p. Ensure reversing signals are installed on all construction vehicles. q. Implement fall prevention and protection measures for heights greater than 2 m, falling into operating machinery or through an opening in a work surface. r. Ensure that objects cannot fall onto people, vehicles, and properties in adjoining areas. s. Implement fall prevention and protection measures whenever a worker is exposed to the hazard of falling more than two meters, falling into operating machinery or through an opening in a work surface. Based on a casespecific basis, fall prevention/protection measures may include installation of guardrails with mid-rails and toe boards at the edge of any fall hazard area, proper use of ladders and scaffolds by trained employees, use of fall prevention devices, including safety belt and lanyard travel limiting devices to prevent access to fall hazard, fall protection devices such as full body harnesses, etc. t. Provide sufficient lighting in the tunnel areas to enable safe equipment operation. u. Provide emergency lighting system of adequate intensity that is			

Environmental Issues/Potential Environmental Impact	Proposed Mitigation Measure or Enhancement Measure	Mitigation Cost	Responsibility	
			Implementation	Supervision/ Monitoring
	automatically activated upon failure of the principal artificial light source to ensure safe equipment operation, safe shut-down, evacuation, etc. v. Ensure that sufficient fresh air is supplied at confined work spaces such as the tunnel w. Provide confined spaces (e.g., tunnel) with safety measures for venting, monitoring, and rescue operations.			
17) Public safety hazards	a. Implement precautions to ensure that objects (e.g., equipment, tool, debris, precast sections, etc.) do not fall onto or hit people, vehicle, and properties in adjoining areas. b. Provide warning signs at the periphery of the construction site. c. Educate drivers on safe driving practices to avoid accidents and to prevent spill of hazardous substances and other construction materials during transport. d. Employ flag persons to control traffic at the station sites for safety reasons when construction equipment is entering or leaving the work area. e. Install barriers to keep pedestrians away from hazardous areas such as constructions sites and excavation sites. f. Designate security personnel to restrict public access to construction sites. g. Strictly impose speed limits on construction vehicles along residential areas and where other sensitive receptors such as schools, pagodas and other populated areas located. h. Provide adequate lighting at night within and in the vicinity of construction sites. i. Provide security personnel in hazardous areas to restrict public access. j. If necessary, provide safe passageways for pedestrians crossing the construction site and for people whose access has been disrupted due to construction woks.	Part of contractors' bid cost	Contractor	UTPMU, DDIS
18) Damage to properties and community facilities	a. Immediately repair and/or compensate for any damage caused by construction works and activities to existing communities and their property and facilities b. Maintain access roads used for transport of construction materials and other construction-related activities are maintained to ensure that they remain in at least in their pre-project condition for the duration of the project.	Part of contractors' bid cost	Contractor	UTPMU, DDIS
19) Potential damage to archaeological and	a. Cease operations on a road section where artifacts or archaeological finds are discovered and immediately inform the DDIS b. The DDIS to notify UTPMU, who will notify the relevant Government	Part of contractors' bid cost	Contractor	UTPMU, DDIS

Environmental Issues/Potential Environmental Impact	Proposed Mitigation Measure or Enhancement Measure	Mitigation Cost	Responsibility	
			Implementation	Supervision/ Monitoring
cultural artefacts	agency (e.g., Ministry of Information and Culture) to obtain advice regarding the next steps. c. Work to recommence only after the relevant Government agency has provided official notification accordingly.			
20) Improper closure of construction sites	During demobilization, the contractor will remove all wastes from the construction sites and construction-related areas, and will undertake restoration of disturbed sites.	Part of contractors' bid cost	Contractor	UTPMU, DDIS
21) Need for implementation of additional environmental mitigation measures	Implement corrective and/or additional measures to avoid, mitigate or compensate for adverse environmental impacts due to construction works and other project-related activities	Part of contractors' bid cost	Contractor	UTPMU, DDIS

I.3 MONITORING

Table I.3: Environmental Monitoring Measures

Aspects/Parameters to be Monitored and Applicable Standards	**Means of Monitoring**	**Schedule/Frequency**	**Location**	**Estimated Cost of Monitoring**	**Responsible to Undertake Monitoring**
Pre-construction					
Implementation of pre-construction phase environmental mitigation measures specified in IEE Section E	Confirm that all required measures have been complied with by the contractor by checking required documentation (CEMP); interview with local communities (on stakeholders' consultations and GRM); site visit (on relocation of facilities and identification of spoils disposal sites); and meeting with environment, health and safety officer.	Prior to start of site works	Throughout the project site and project-related facilities	Part of DDIS cost	UTPMU, DDIS

Aspects/Parameters to be Monitored and Applicable Standards	Means of Monitoring	Schedule/Frequency	Location	Estimated Cost of Monitoring	Responsible to Undertake Monitoring
Construction					
Implementation of construction phase environmental mitigation measures specified in IEE Section E	Site visits throughout the project site and project-related facilities (workers' camps, batching plants, disposal site, etc.), interviews with local residents, affected persons and officials, review/check of required documentation	Monthly (on a regular basis),random checks as part of day-to-day project supervision and to validate complaints	Throughout the project site and project-related facilities		UTPMU, DDIS
Air quality: Total suspended particulate (TSP), CO, NO_2 and SO_2compared to applicable QCVN standards	Field sampling at each station location	Once, before start of site works Quarterly throughout construction In response to complaints	At each station near receptors Two (2) sampling points each at Stations 1 to 12	24,024.00 (70 USD/ 1 sample)	DDIS
Noise in dB(A) compared to applicable QCVN standards	Noise measurement	Once, before start of site works Quarterly throughout construction In response to complaints	Same location for air quality sampling	1,404.00 ($4.5/1 sample)	DDIS
Water quality of surface water	Sampling analysis	Once, before start of site works Quarterly throughout construction In response to complaints	At Near Station 8 (Thu Le Lake)	1,950.00 ($75 /1 sample)	DDIS
Water quality of ground water	Sampling analysis	Once, before start of site works Quarterly throughout construction In response to complaints	At 2wells near Stations 1,8,9	3,900.00 ($50/1sample)	DDIS
Soil quality: total petroleum hydrocarbons (TPH); and benzene, toluene, ethylbenzene, and xylene	Field sampling	Once, immediately upon commencement of excavation works at Station 9 (location of	Two (2) sampling points at Station 9 (location of petrol station to be demolished)	2,080.00 ($80 /sample)	DDIS

Aspects/Parameters to be Monitored and Applicable Standards	Means of Monitoring	Schedule/Frequency	Location	Estimated Cost of Monitoring	Responsible to Undertake Monitoring
(BTEX) compared to Dutch Intervention Values (DIV)		petrol station to be demolished) Quarterly throughout construction In response to complaints			

UTPMU: Urban Transport Project Management Unit
DDIS: Detailed Design and Implentation Supervision Consultant

I.4 REPORTING

236. Following are the report preparation and submission requirements regarding EMP implementation:

a) Monthly environmental monitoring reports on environmental performance of contractors: from DDIS to UTPMU
b) Semi-annual reports compiling the results of:
   (i) environmental effects monitoring (air quality, noise and soil quality)
   (ii) environmental performance monitoring (compliance with environmental mitigation measures specified in the Project EMP and CEMP): from UTPMU (prepared with assistance from DDIS) to ADB

237. The semi-annual environmental monitoring reports will be disclosed on ADB's website upon receipt from UTPMU. Attached as Appendix 9 is the recommended outline of the report.

I.5 MONITORING COST

Table I.4: Total Environmental Monitoring Cost for the Project

Item	Item Name/Description Environmental Safeguards	Total Quantity and Unit			
Price No.	Description of Items	Unit	Quantity	Unit Cost US$/mo.	Amount (US$)
A	EnvironmentSpecialist (included in DDIS Contract)	Monthly	24	1,000	24,000
				Total A	$24,000
B	Materials				
	Consumables for Reporting Monitoring/Transportation	Monthly	24	500	12,000
	Routine Periodic Monitoring (air/noise/soil) to be done by a subcontractor (Appendix 6)				41, 678 41,678.00
				Total B	$63, 678

I.6 CAPACITY BUILDING

238. The DDIS will undertake an environmental management capacity building program for UTPMU staff, District/Commune Officers and contractors and staff on enhancement of environmental awareness;Governmnet environmental requirements and laws;basic Steps on environmental assessment, management and monitoring. The training course will be three (3) days long in six (6) batches and the number of participants for each batch/session will not be more than 30 persons. The training program will be carried out in UTPMU Office and in five (5) districts during project implementation.

239. Required experts and staff with their corresponding inputs are provided in Table I.5

Table I.5: Details of Proposed Experts/Staff

Experts/Staff	No	Input (Man Months)
A. Key Professional Staff		
1. Environmental Specialist/Team Leader	1	2
2. Environmental Specialist	1	2
B. Administrative Staff		
1. Secretary	1	2
2. Computer Operator	1	2

240. The environmental specialists, one of which will also act as the Team Leader or Focal Person must have a minimum of 10 years experiences in environmental management training and preferably with experience on rail infrastructure projects. The specialists must possess a relevant degree preferably Masters in Civil Engineering or Masters in Environmental Studies.

241. The specialists should have extensive capacity building programs and knowledge intraining module preparation. The Team Leader will be directly involved with the management and coordination of planning, programming, implementing, and monitoring activities of training organization and be conversant with training management system, delivery methodologies, evaluation techniques and project related training.

242. The total budget estimate for the training program is presented in Table I.6.

Table I.6: Budget Estimate for Capacity Building

Item	Unit	Quantity	Unit Cost (Million VND)	Total Cost (Million VND)
A. Remuneration				
i Key Professional Staff				
Team Leader/Environmental Specialist	Training	6	2	12.0
Environmental Specialist	Training	6	2	12.0
ii Administrative Staff				
Secretary	Training	6	0.8	4.8
Computer Operator	Training	6	0.8	4.8
			Sub Total A	33.6
B. Training Costs				
i. Local Transport[1]	Day	18	1.5	27.0
iii Venue and training expenses	Day	18	2	36.0
iv Trainee Allowance	person	180	1.2	216.0
			Sub Total B	279.0
C. Training Module Preparation and Production	person	180	0.4	72.0
D. Environmental Equipment (air, noise, water)				
E. Contingency (10% of subtotal, A+B+C+D)	LS		1	38.6
Grand Total (A+B+C+D)			VND	423.2
Equivalent US$ (1 US$ =20,800 VND)			US$	20,350.0

J. CONCLUSION

J. CONCLUSION

243. The project objective is to ensure integrated public transport in five districts along the Metro Line 3 by building a series of creative transport interventions and changes, enhancing the quality of the public transport system and increasing the modal share of public transport in HaNoi. Therefore, the public transport system is expected to contribute to reduction in emissions as well as reductionin travel time along the Metro Line 3 corridor.

244. The IEE established that the Project will not cause significant adverse environmental. The IEE includes an EMP which details the requirements for mitigation, monitoring, reporting and capacity building. The EMP will be included in the bidding documents and contracts for civil works thereby making implementation of the EMP a legal requirement. The bid documents will state that the Contractor will be responsible for the implementation of the requirements of the EMP through his own Construction Environmental Management Plan (CEMP) which will adopt all of the conditions of the EMP. This ensures that all potential bidders are aware of the environmental requirements of the Project and its associated environmental costs.

APPENDICES

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APPENDICES

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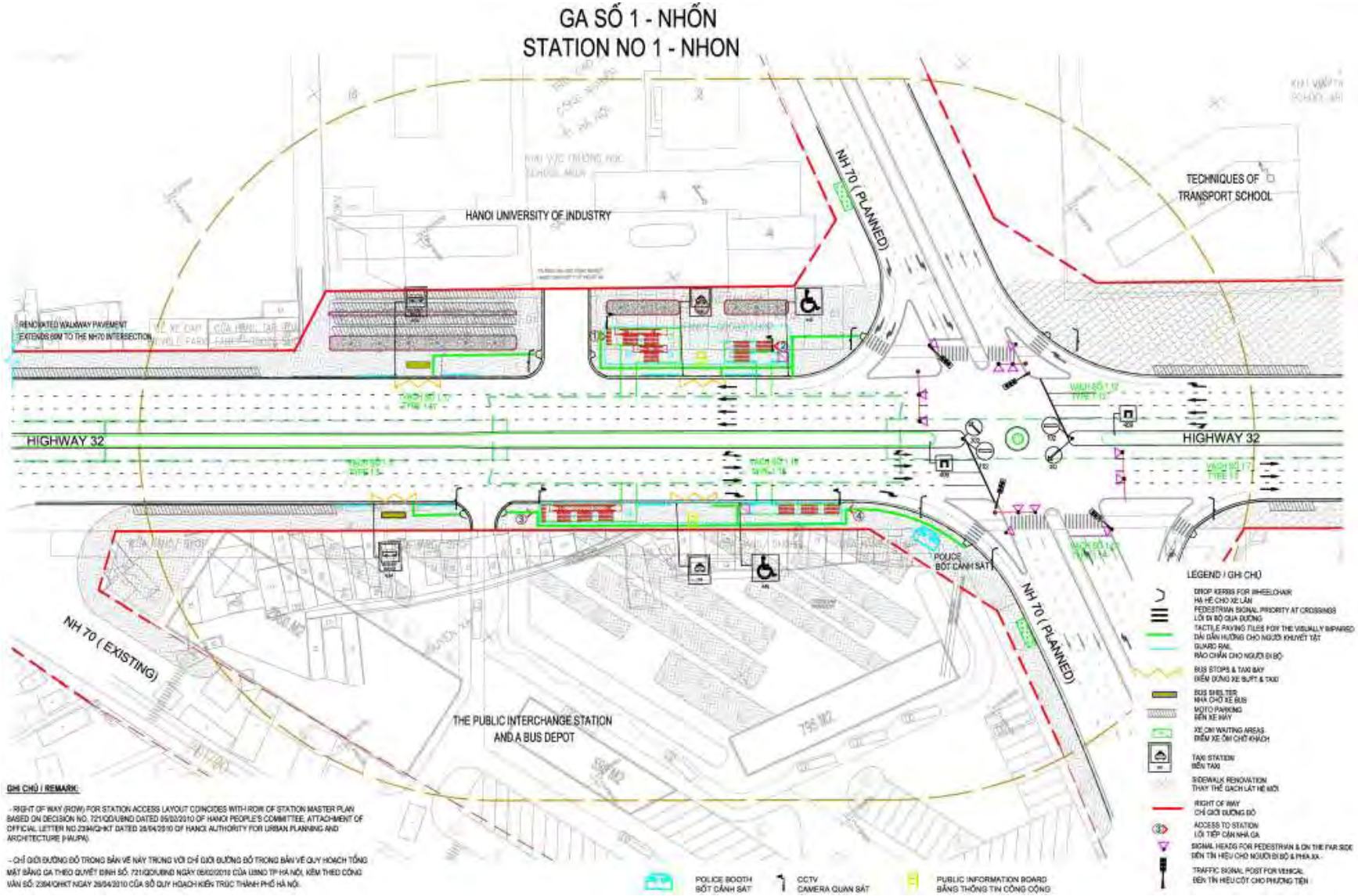
Appendix 1
PROJECT LAYOUT


GA SỐ 1 - NHỔN
STATION NO 1 - NHON
HANOI UNIVERSITY OF INDUSTRY
TECHNIQUES OF TRANSPORT SCHOOL
NH 70 (PLANNED)
HIGHWAY 32
HIGHWAY 32
RENOVATED WALKWAY PAVEMENT EXTENDS 60M TO THE NH70 INTERSECTION
POLICE BỐT CẢNH SÁT
NH 70 (EXISTING)
NH 70 (PLANNED)
THE PUBLIC INTERCHANGE STATION AND A BUS DEPOT
LEGEND / GHI CHÚ
DROP KERBS FOR WHEELCHAIR
HÈ CHO XE LĂN
PEDESTRIAN SIGNAL PRIORITY AT CROSSINGS
LỐI ĐI BỘ QUA ĐƯỜNG
TACTILE PAVING TILES FOR THE VISUALLY IMPAIRED
DẢI DẪN HƯỚNG CHO NGƯỜI KHUYẾT TẬT
GUARD RAIL
RÀO CHẮN CHO NGƯỜI ĐI BỘ
BUS STOPS & TAXI BAY
ĐIỂM DỪNG XE BUÝT & TAXI
BUS SHELTER
NHÀ CHỜ XE BUS
MOTO PARKING
BÃI XE MÁY
XE ÔM WAITING AREAS
ĐIỂM XE ÔM CHỜ KHÁCH
TAXI STATION
BẾN TAXI
SIDEWALK RENOVATION
THAY THẾ GẠCH LÁT HÈ MỚI
RIGHT OF WAY
CHỈ GIỚI ĐƯỜNG ĐỎ
ACCESS TO STATION
LỐI TIẾP CẬN NHÀ GA
SIGNAL HEADS FOR PEDESTRIAN & ON THE FAR SIDE
ĐÈN TÍN HIỆU CHO NGƯỜI ĐI BỘ & PHÍA XA
TRAFFIC SIGNAL POST FOR VEHICAL
ĐÈN TÍN HIỆU CỘT CHO PHƯƠNG TIỆN
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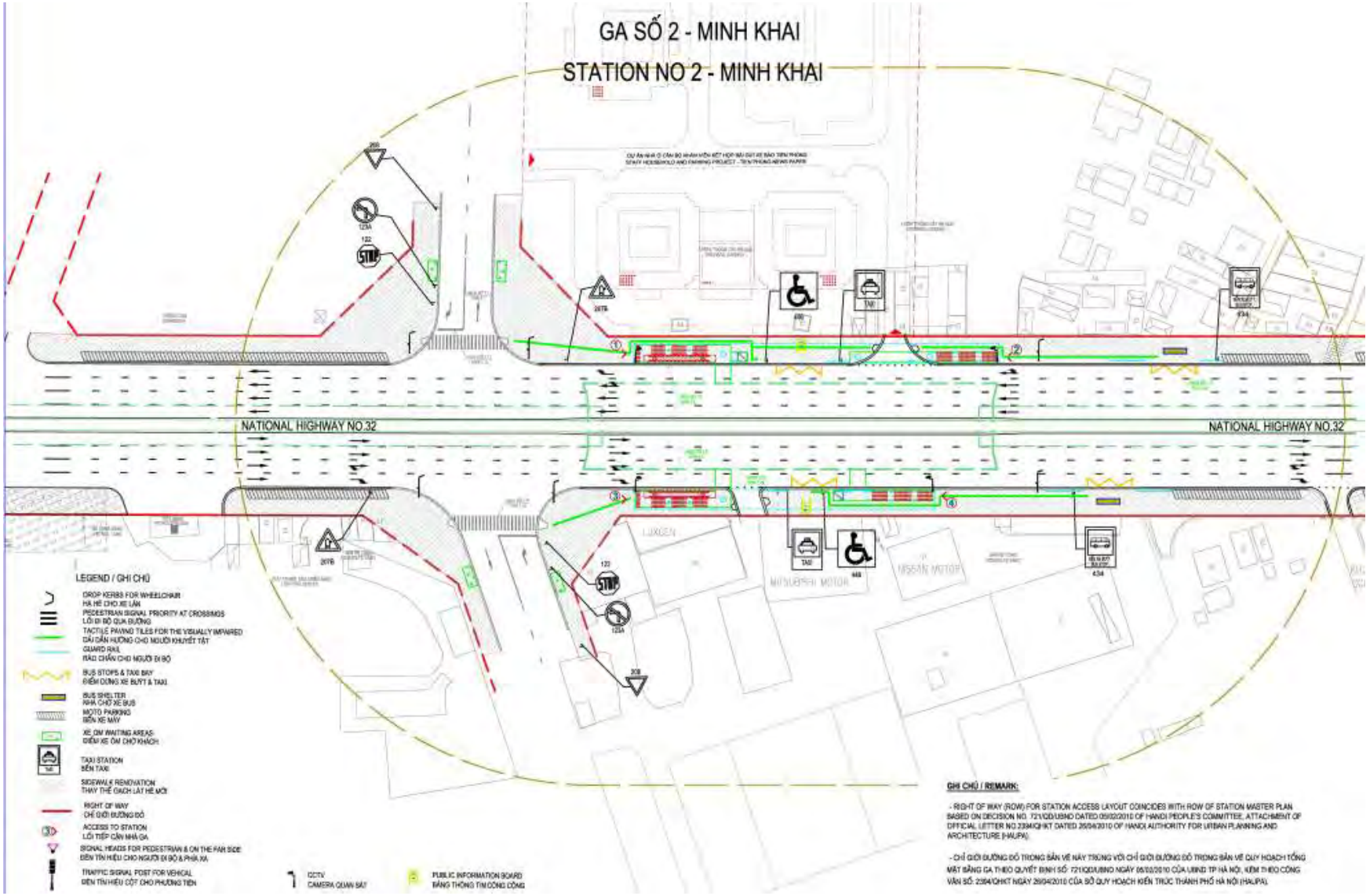
POLICE BOOTH
BỐT CẢNH SÁT
CCTV
CAMERA QUAN SÁT
PUBLIC INFORMATION BOARD
BẢNG THÔNG TIN CÔNG CỘNG


GA SỐ 2 - MINH KHAI
STATION NO 2 - MINH KHAI
NATIONAL HIGHWAY NO.32
NATIONAL HIGHWAY NO.32
LEGEND / GHI CHÚ
DROP KERBS FOR WHEELCHAIR
HÀ HÈ CHO XE LĂN
PEDESTRIAN SIGNAL PRIORITY AT CROSSINGS
LỐI ĐI BỘ QUA ĐƯỜNG
TACTILE PAVING TILES FOR THE VISUALLY IMPAIRED
DẢI DẪN HƯỚNG CHO NGƯỜI KHUYẾT TẬT
GUARD RAIL
RÀO CHẮN CHO NGƯỜI ĐI BỘ
BUS STOPS & TAXI BAY
ĐIỂM DỪNG XE BUYT & TAXI
BUS SHELTER
NHÀ CHỜ XE BUS
MOTO PARKING
BÃI XE MÁY
XE ÔM WAITING AREAS
ĐIỂM XE ÔM CHỜ KHÁCH
TAXI STATION
BẾN TAXI
SIDEWALK RENOVATION
THAY THẾ GẠCH LÁT HÈ MỚI
RIGHT OF WAY
CHỈ GIỚI ĐƯỜNG ĐỎ
ACCESS TO STATION
LỐI TIẾP CẬN NHÀ GA
SIGNAL HEADS FOR PEDESTRIAN & ON THE FAR SIDE
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TRAFFIC SIGNAL POST FOR VEHICAL
ĐÈN TÍN HIỆU CỘT CHO PHƯƠNG TIỆN
CCTV
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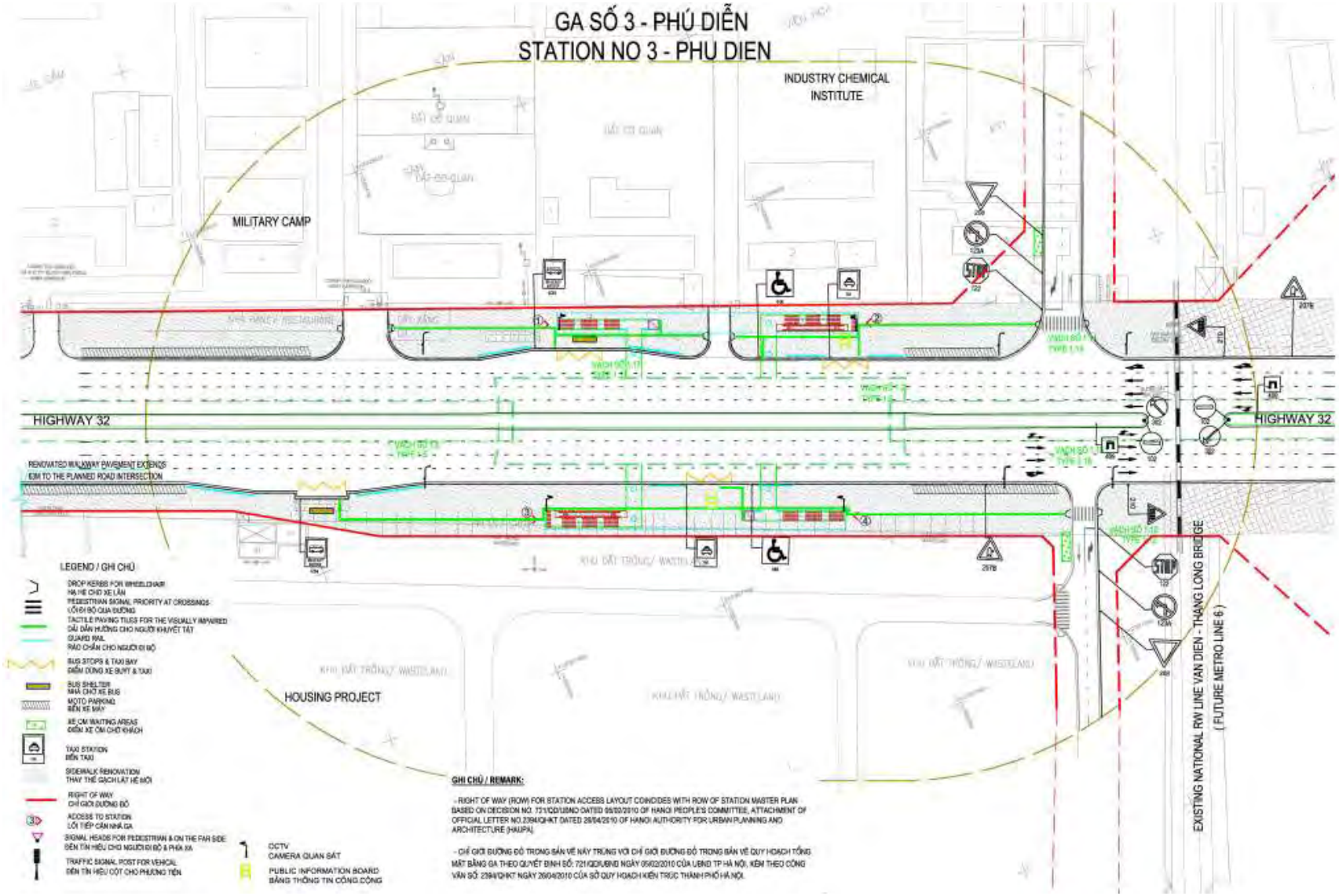
GA SỐ 3 - PHÚ DIỄN
STATION NO 3 - PHU DIEN
INDUSTRY CHEMICAL INSTITUTE
MILITARY CAMP
HIGHWAY 32
HIGHWAY 32
RENOVATED RAILWAY PAVEMENT EXTENDS 63M TO THE PLANNED ROAD INTERSECTION
HOUSING PROJECT
EXISTING NATIONAL RW LINE VAN DIEN - THANG LONG BRIDGE
(FUTURE METRO LINE 6)
LEGEND / GHI CHÚ
DROP KERBS FOR WHEELCHAIR
HÀ HÈ CHO XE LĂN
PEDESTRIAN SIGNAL PRIORITY AT CROSSINGS
LỐI ĐI BỘ QUA ĐƯỜNG
TACTILE PAVING TILES FOR THE VISUALLY IMPAIRED
DẤU DẪN HƯỚNG CHO NGƯỜI KHUYẾT TẬT
GUARD RAIL
RÀO CHẮN CHO NGƯỜI ĐI BỘ
BUS STOPS & TAXI BAY
ĐIỂM DỪNG XE BUÝT & TAXI
BUS SHELTER
NHÀ CHỜ XE BUS
MOTO PARKING
BÃI XE MÁY
XE ÔM WAITING AREAS
ĐIỂM XE ÔM CHỜ KHÁCH
TAXI STATION
BẾN TAXI
SIDEWALK RENOVATION
THAY THẾ GẠCH LÁT HÈ MỚI
RIGHT OF WAY
CHỈ GIỚI ĐƯỜNG ĐỎ
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LỐI TIẾP CẬN NHÀ GA
SIGNAL HEADS FOR PEDESTRIAN & ON THE FAR SIDE
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TRAFFIC SIGNAL POST FOR VEHICAL
ĐÈN TÍN HIỆU CỘT CHO PHƯƠNG TIỆN
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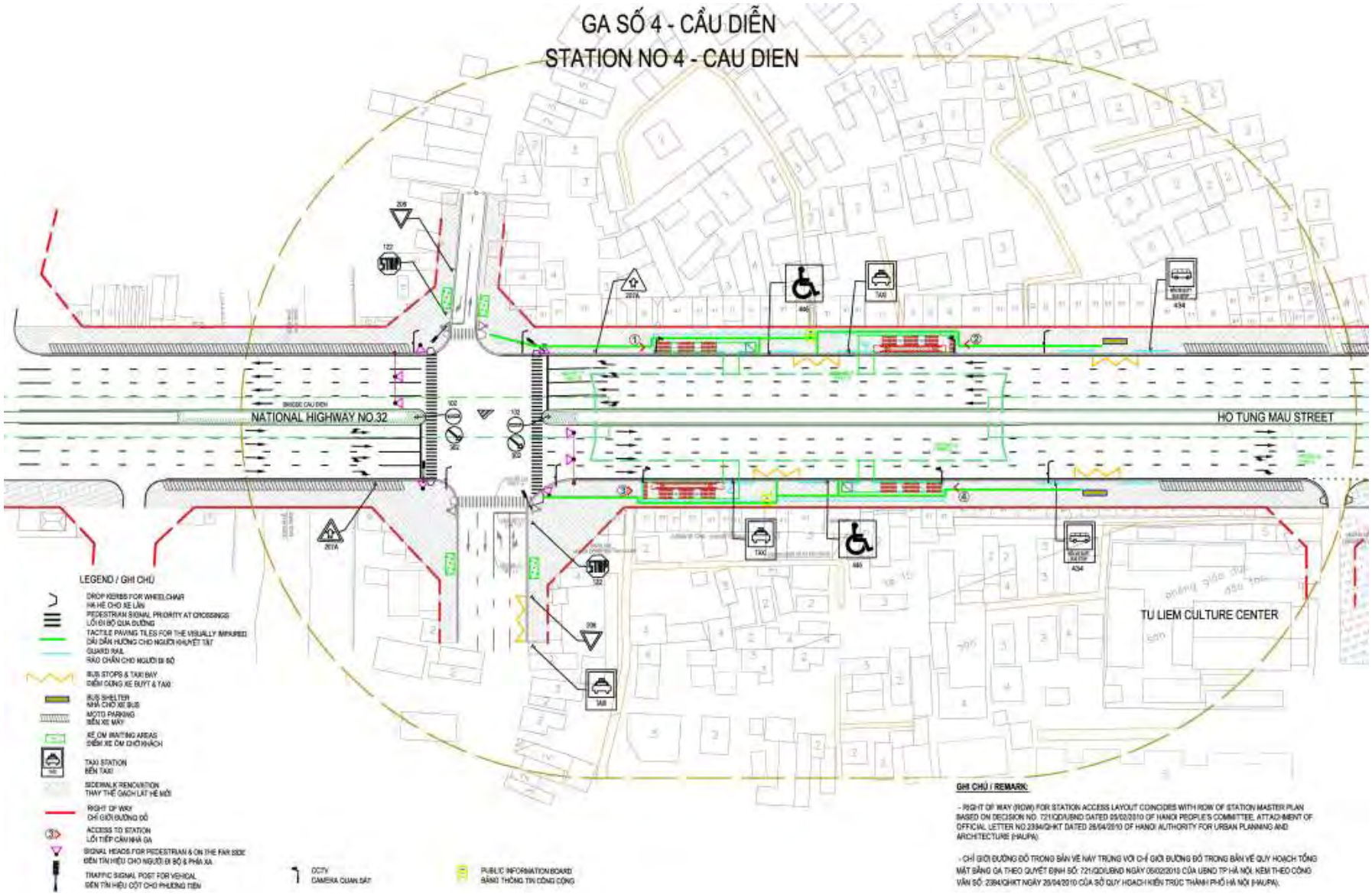
GA SỐ 4 - CẦU DIỄN
STATION NO 4 - CAU DIEN
NATIONAL HIGHWAY NO.32
HO TUNG MAU STREET
TU LIEM CULTURE CENTER
LEGEND / GHI CHÚ
DROP KERBS FOR WHEELCHAIR
HÈ CHO XE LĂN
PEDESTRIAN SIGNAL PRIORITY AT CROSSINGS
LỐI ĐI BỘ QUA ĐƯỜNG
TACTILE PAVING TILES FOR THE VISUALLY IMPAIRED
DẤU DẪN HƯỚNG CHO NGƯỜI KHUYẾT TẬT
GUARD RAIL
RÀO CHẮN CHO NGƯỜI ĐI BỘ
BUS STOPS & TAXI BAY
ĐIỂM DỪNG XE BUYT & TAXI
BUS SHELTER
NHÀ CHỜ XE BUS
MOTO PARKING
BÃI XE MÁY
KE ON WAITING AREAS
ĐIỂM XE ÔM CHỜ KHÁCH
TAXI STATION
BẾN TAXI
SIDEWALK REINDARTION
THAY THẾ GẠCH LÁT HÈ MỚI
RIGHT OF WAY
CHỈ GIỚI ĐƯỜNG ĐỎ
ACCESS TO STATION
LỐI TIẾP CẬN NHÀ GA
SIGNAL HEADS FOR PEDESTRIAN & ON THE FAR SIDE
ĐÈN TÍN HIỆU CHO NGƯỜI ĐI BỘ & PHÍA XA
TRAFFIC SIGNAL POST FOR VEHICAL
ĐÈN TÍN HIỆU CỘT CHO PHƯƠNG TIỆN
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CAMERA GIÁM SÁT
PUBLIC INFORMATION BOARD
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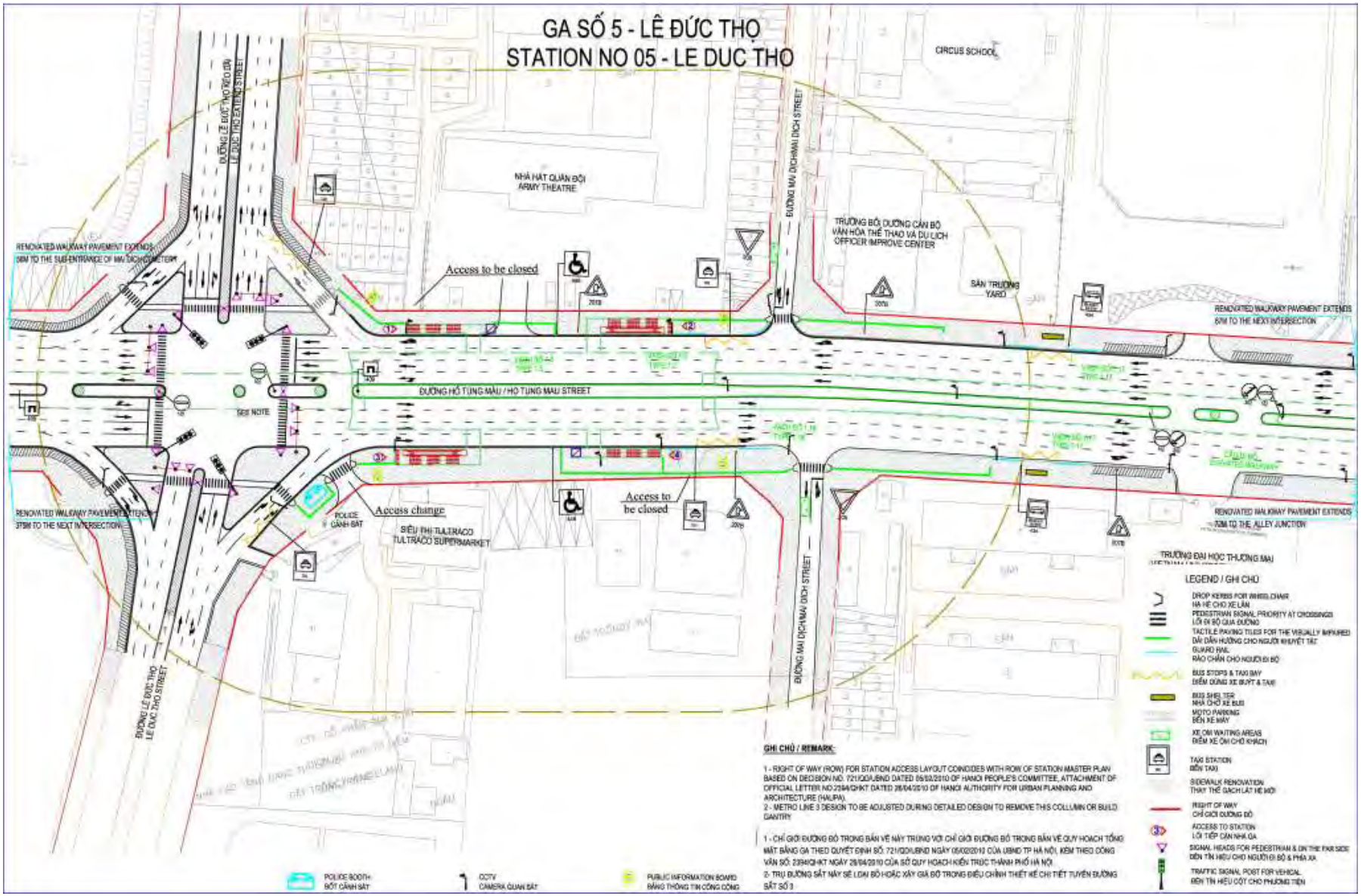
GA SỐ 5 - LÊ ĐỨC THỌ
STATION NO 05 - LE DUC THO
CIRCUS SCHOOL
NHÀ HÁT QUÂN ĐỘI
ARMY THEATRE
ĐƯỜNG MAI DỊCH/MAI DICH STREET
TRƯỜNG BỒI DƯỠNG CÁN BỘ VĂN HÓA THỂ THAO VÀ DU LỊCH
OFFICER IMPROVE CENTER
SÂN TRƯỜNG
YARD
RENOVATED WALKWAY PAVEMENT EXTENDS
68M TO THE SUB-ENTRANCE OF MAI DICH CEMETERY
ĐƯỜNG LÊ ĐỨC THỌ KÉO DÀI
LE DUC THO EXTENDING STREET
Access to be closed
RENOVATED WALKWAY PAVEMENT EXTENDS
60M TO THE NEXT INTERSECTION
ĐƯỜNG HỒ TÙNG MẬU / HO TUNG MAU STREET
SEE NOTE
RENOVATED WALKWAY PAVEMENT EXTENDS
375M TO THE NEXT INTERSECTION
POLICE BOOTH
CẢNH SÁT
Access change
SIÊU THỊ TULTRACO
TULTRACO SUPERMARKET
Access to be closed
RENOVATED WALKWAY PAVEMENT EXTENDS
70M TO THE ALLEY JUNCTION
TRƯỜNG ĐẠI HỌC THƯƠNG MẠI
ĐƯỜNG LÊ ĐỨC THỌ
LE DUC THO STREET
ĐƯỜNG MAI DỊCH/MAI DICH STREET
LEGEND / GHI CHÚ
DROP KERBS FOR WHEELCHAIR
HÀ HÈ CHO XE LĂN
PEDESTRIAN SIGNAL PRIORITY AT CROSSINGS
LỐI ĐI BỘ QUA ĐƯỜNG
TACTILE PAVING TILES FOR THE VISUALLY IMPAIRED
DẢI DẪN HƯỚNG CHO NGƯỜI KHUYẾT TẬT
GUARD RAIL
RÀO CHẮN CHO NGƯỜI ĐI BỘ
BUS STOPS & TAXI BAY
ĐIỂM DỪNG XE BUÝT & TAXI
BUS SHELTER
NHÀ CHỜ XE BUS
MOTO PARKING
BÃI XE MÁY
XE ÔM WAITING AREAS
ĐIỂM XE ÔM CHỜ KHÁCH
TAXI STATION
BẾN TAXI
SIDEWALK RENOVATION
THAY THẾ GẠCH LÁT HÈ MỚI
RIGHT OF WAY
CHỈ GIỚI ĐƯỜNG ĐỎ
ACCESS TO STATION
LỐI TIẾP CẬN NHÀ GA
SIGNAL HEADS FOR PEDESTRIAN & ON THE FAR SIDE
ĐÈN TÍN HIỆU CHO NGƯỜI ĐI BỘ & PHÍA XA
TRAFFIC SIGNAL POST FOR VEHICAL
ĐÈN TÍN HIỆU CỘT CHO PHƯƠNG TIỆN
GHI CHÚ / REMARK:
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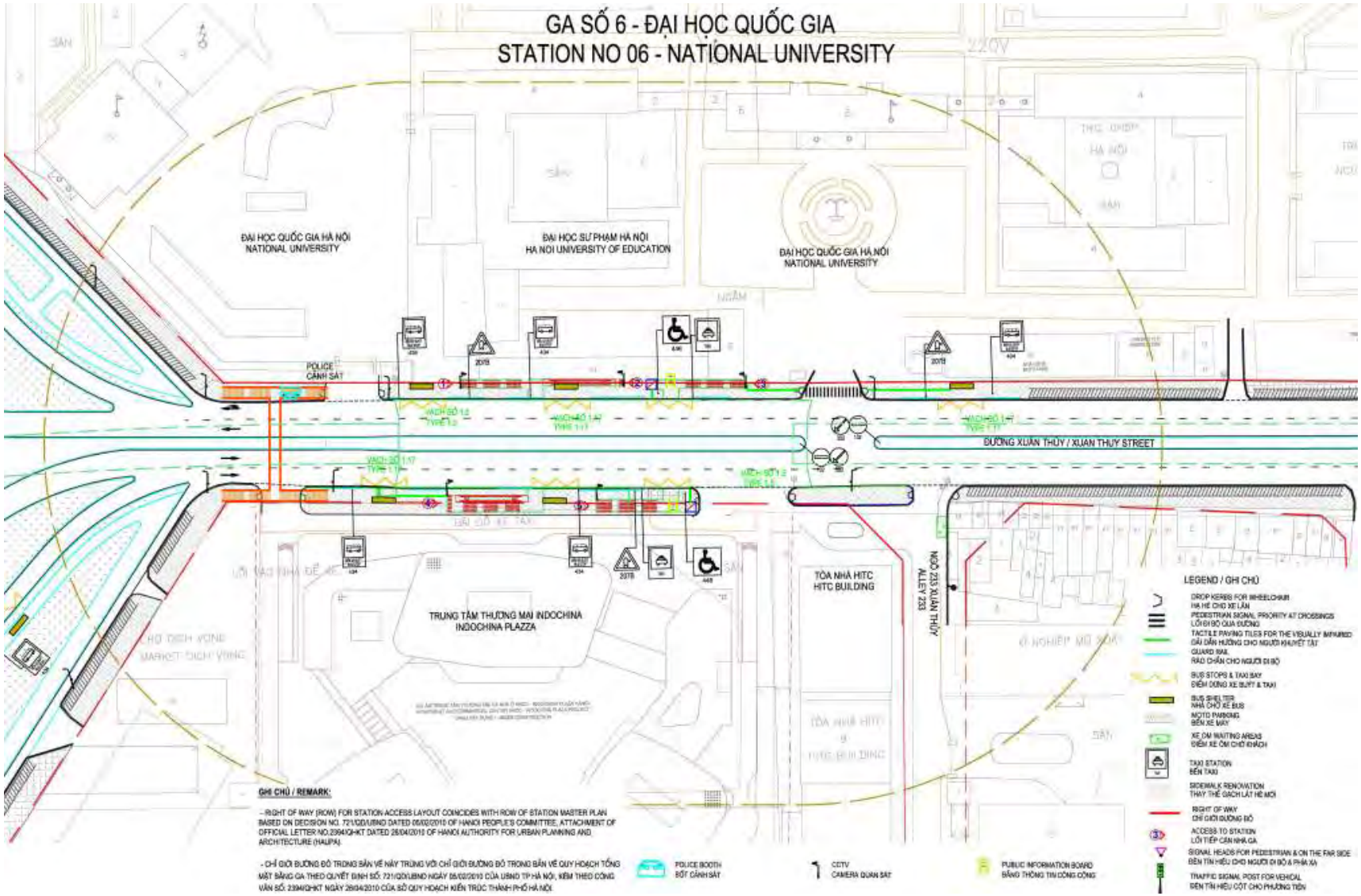
2 - METRO LINE 3 DESIGN TO BE ADJUSTED DURING DETAILED DESIGN TO REMOVE THIS COLLUMN OR BUILD GANTRY
1 - CHỈ GIỚI ĐƯỜNG ĐỎ TRONG BẢN VẼ NÀY TRÙNG VỚI CHỈ GIỚI ĐƯỜNG ĐỎ TRONG BẢN VẼ QUY HOẠCH TỔNG MẶT BẰNG GA THEO QUYẾT ĐỊNH SỐ: 721/QD/UBND NGÀY 05/02/2010 CỦA UBND TP HÀ NỘI, KÈM THEO CÔNG VĂN SỐ: 2394/QHKT NGÀY 26/04/2010 CỦA SỞ QUY HOẠCH KIẾN TRÚC THÀNH PHỐ HÀ NỘI.
2- TRỤ ĐƯỜNG SẮT NÀY SẼ LOẠI BỎ HOẶC XÂY GIÁ ĐỠ TRONG ĐIỀU CHỈNH THIẾT KẾ CHI TIẾT TUYẾN ĐƯỜNG SẮT SỐ 3
POLICE BOOTH
BỐT CẢNH SÁT
CCTV
CAMERA QUAN SÁT
PUBLIC INFORMATION BOARD
BẢNG THÔNG TIN CÔNG CỘNG


GA SỐ 6 - ĐẠI HỌC QUỐC GIA
STATION NO 06 - NATIONAL UNIVERSITY
ĐẠI HỌC QUỐC GIA HÀ NỘI
NATIONAL UNIVERSITY
ĐẠI HỌC SƯ PHẠM HÀ NỘI
HA NOI UNIVERSITY OF EDUCATION
ĐẠI HỌC QUỐC GIA HÀ NỘI
NATIONAL UNIVERSITY
POLICE
CẢNH SÁT
ĐƯỜNG XUÂN THỦY / XUAN THUY STREET
TRUNG TÂM THƯƠNG MẠI INDOCHINA
INDOCHINA PLAZZA
TÒA NHÀ HITC
HITC BUILDING
NGÕ 233 XUÂN THỦY
ALLEY 233
LEGEND / GHI CHÚ
GHI CHÚ / REMARK:
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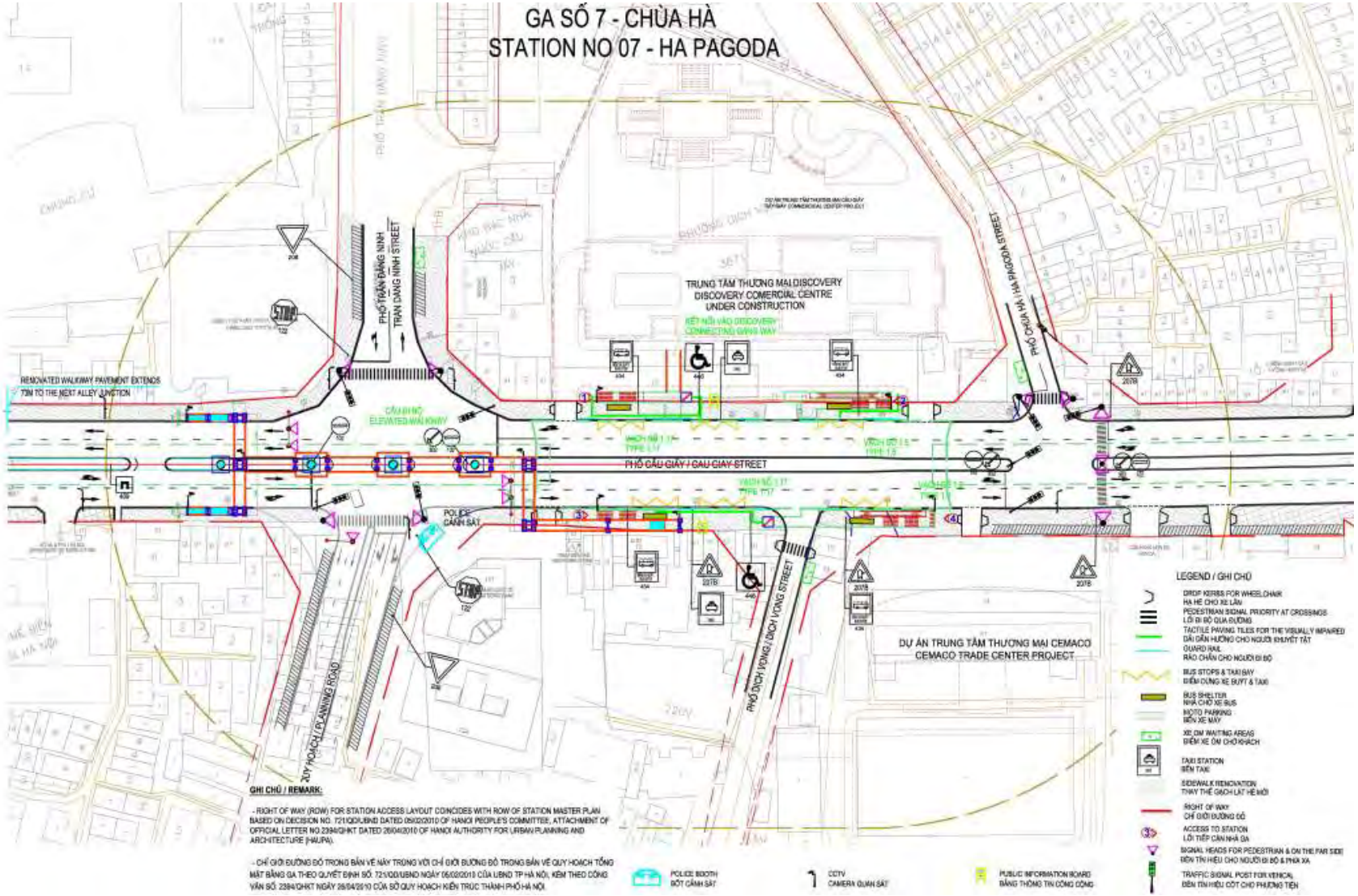
POLICE BOOTH
BỐT CẢNH SÁT
CCTV
CAMERA QUAN SÁT
PUBLIC INFORMATION BOARD
BẢNG THÔNG TIN CÔNG CỘNG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STATION NO 07 - HA PAGODA
TRUNG TÂM THƯƠNG MẠI DISCOVERY
DISCOVERY COMERCIAL CENTRE
UNDER CONSTRUCTION
PHỐ TRẦN ĐĂNG NINH
TRẦN ĐĂNG NINH STREET
PHỐ CHÙA HÀ / HA PAGODA STREET
RENOVATED WALKWAY PAVEMENT EXTENDS
73M TO THE NEXT ALLEY JUNCTION
CẦU BỘ HÀNH
ELEVATED WALKWAY
PHỐ CẦU GIẤY / CAU GIAY STREET
POLICE
CẢNH SÁT
PHỐ DỊCH VỌNG / DICH VONG STREET
DỰ ÁN TRUNG TÂM THƯƠNG MẠI CEMACO
CEMACO TRADE CENTER PROJECT
QUY HOẠCH / PLANNING ROAD
GHI CHÚ / REMARK:
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CCTV
CAMERA GIÁM SÁT
PUBLIC INFORMATION BOARD
BẢNG THÔNG TIN CÔNG CỘNG
LEGEND / GHI CHÚ
DROP KERBS FOR WHEELCHAIR
HÀ HỆ CHO XE LĂN
PEDESTRIAN SIGNAL PRIORITY AT CROSSINGS
LỐI ĐI BỘ QUA ĐƯỜNG
TACTILE PAVING TILES FOR THE VISUALLY IMPAIRED
DẢI DẪN HƯỚNG CHO NGƯỜI KHUYẾT TẬT
GUARD RAIL
RÀO CHẮN CHO NGƯỜI ĐI BỘ
BUS STOPS & TAXI BAY
ĐIỂM DỪNG XE BUYT & TAXI
BUS SHELTER
NHÀ CHỜ XE BUS
MOTO PARKING
BÃI XE MÁY
XE OM WAITING AREAS
ĐIỂM XE ÔM CHỜ KHÁCH
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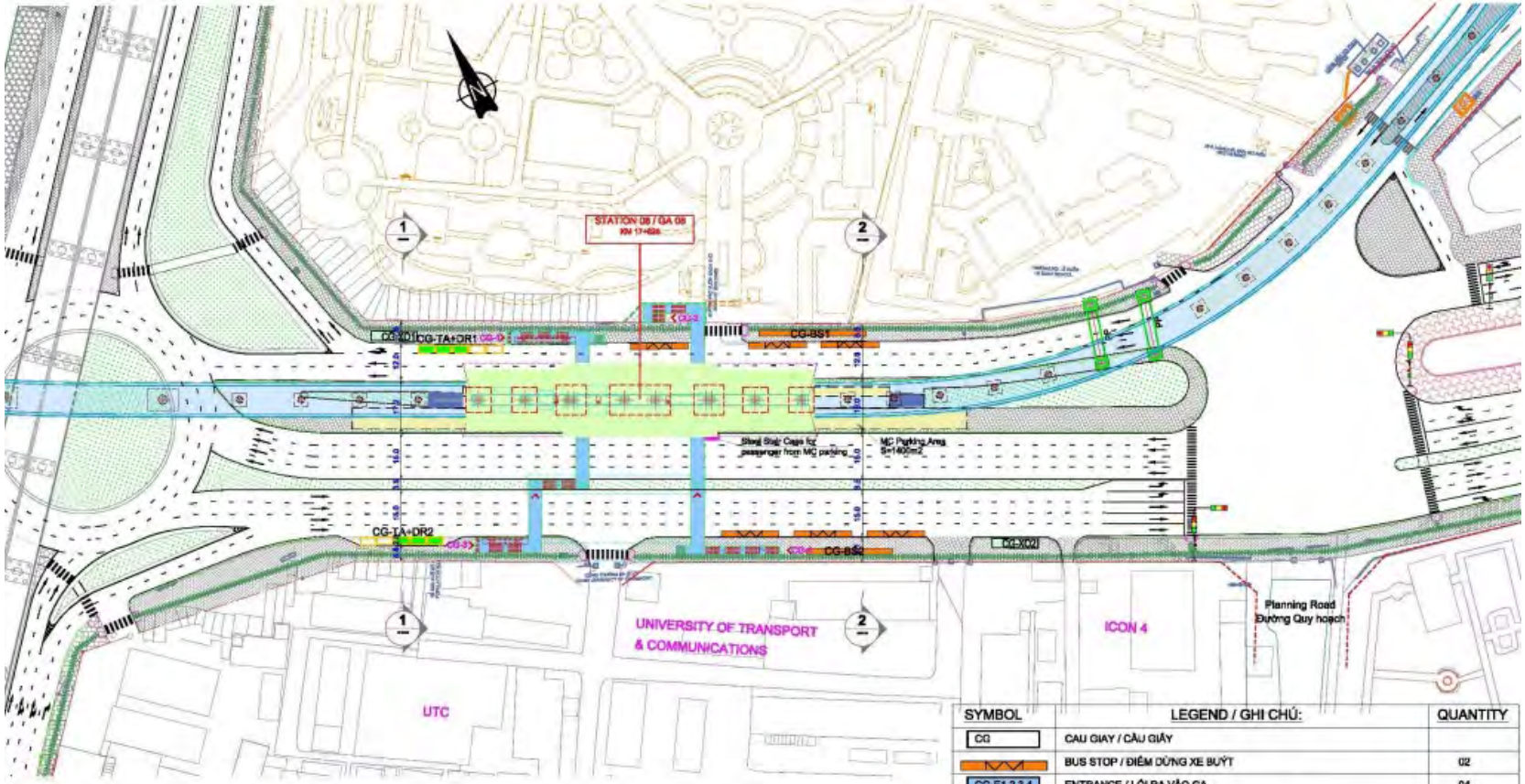
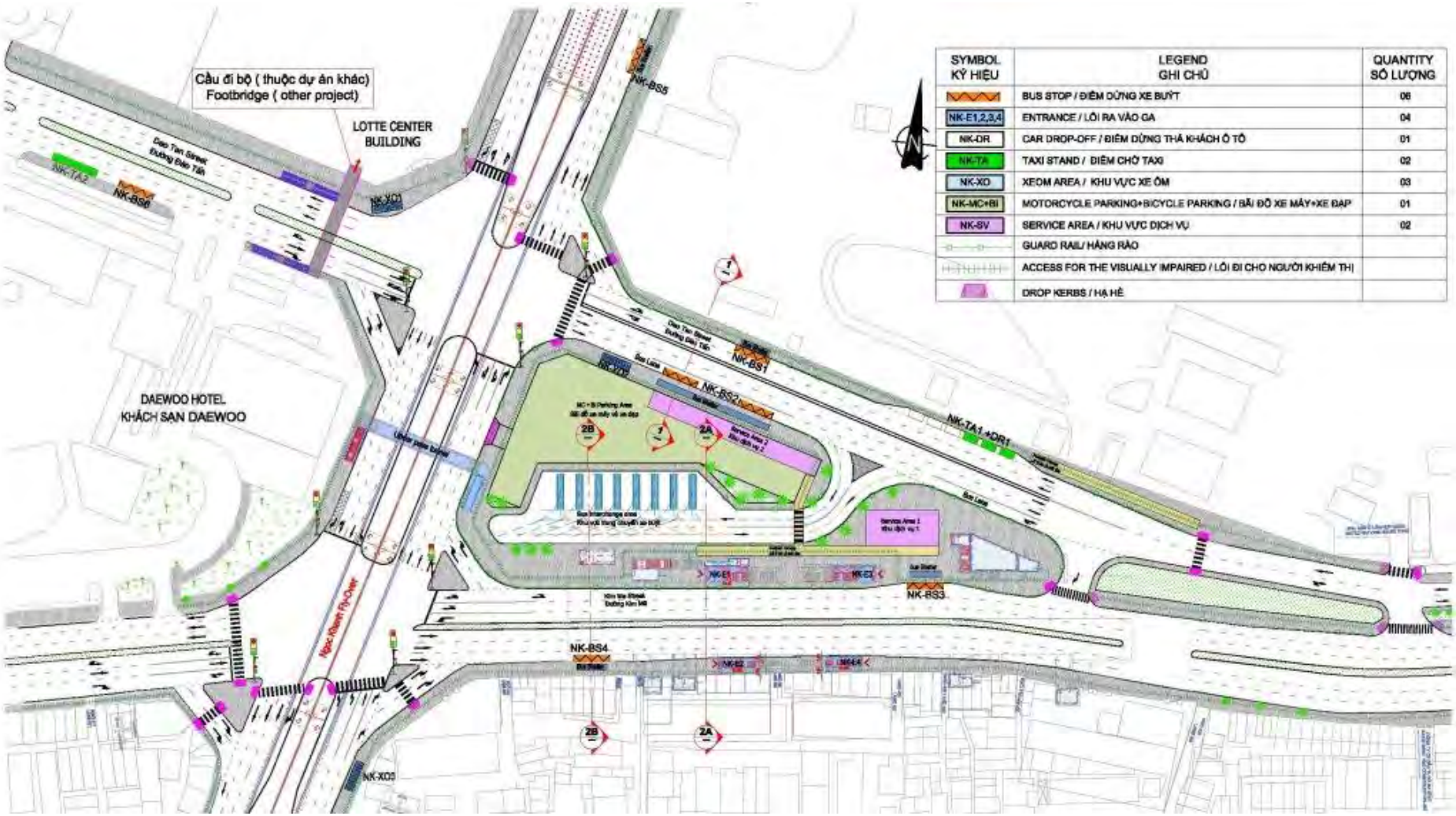
TRAFFIC SIGNAL POST FOR VEHICAL
ĐÈN TÍN HIỆU CỘT CHO PHƯƠNG TIỆN

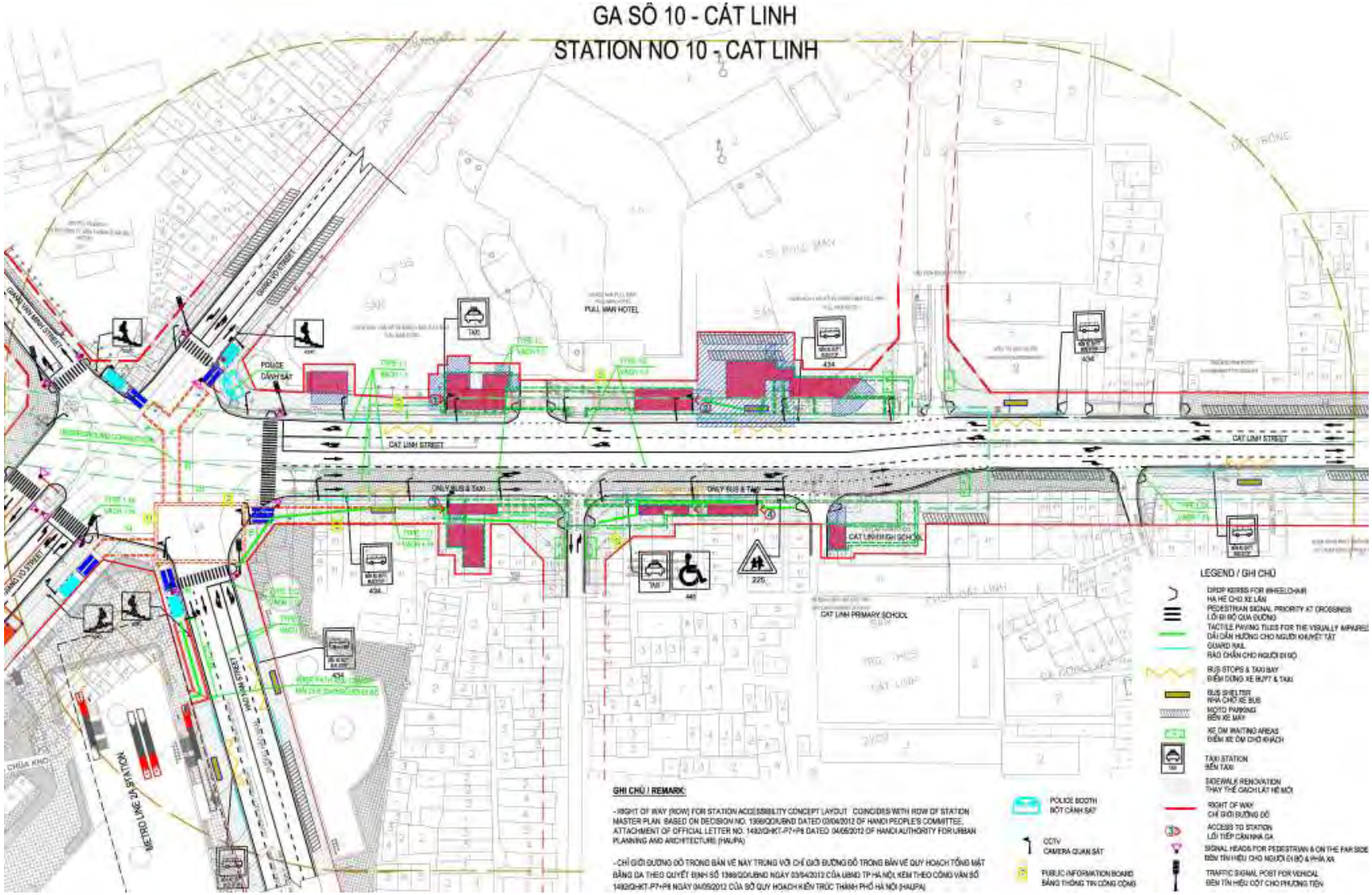
STATION 8 - CAU GIAY

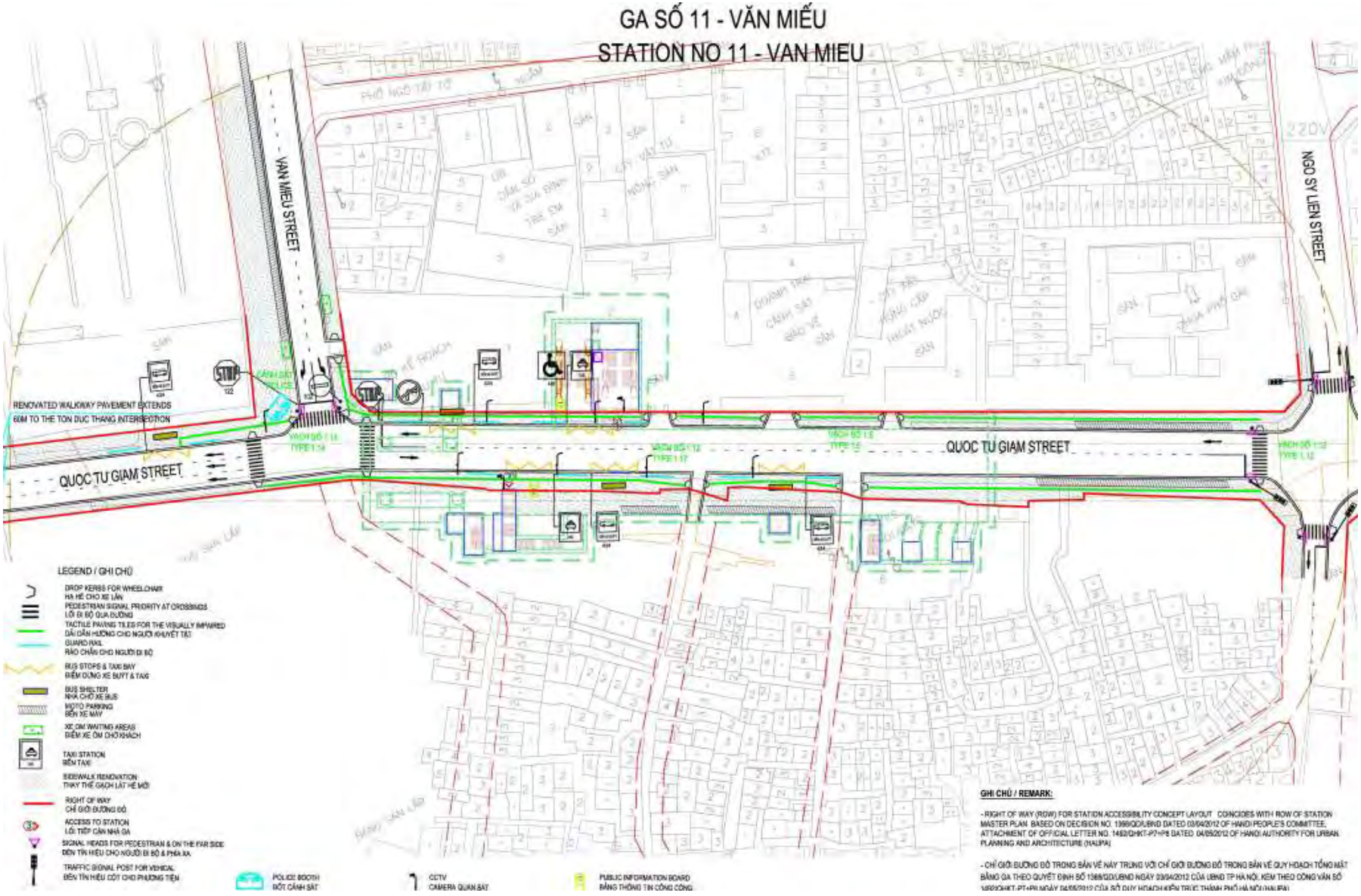


SYMBOL	LEGEND / GHI CHÚ:	QUANTITY
CG	CAU GIAY / CẦU GIẤY	
	BUS STOP / ĐIỂM DỪNG XE BUÝT	02
CG-E1,2,3,4	ENTRANCE / LỐI RA VÀO GA	04
CG-DR	CAR DROP-OFF / ĐIỂM DỪNG THẢ KHÁCH Ô TÔ	02
CG-TA	TAXI STAND / ĐIỂM CHỜ TAXI	02
CG-XO	XEOM AREA / KHU VỰC XE ÔM	02
CG-MC+BI	MOTORCYCLE PARKING+BICYCLE PARKING / BÃI ĐỖ XE MÁY+XE ĐẠP	01
CG-SV	SERVICE AREA / KHU VỰC DỊCH VỤ	00
	GUARD RAIL/ HÀNG RÀO	
	ACCESS FOR THE VISUALLY IMPAIRED / LỐI ĐI CHO NGƯỜI KHIẾM THỊ	
	DROP KERBS / HA HÈ	

STATION 9 - NGOC KHANH




GA SỐ 10 - CÁT LINH
STATION NO 10 - CAT LINH
CAT LINH STREET
ONLY BUS & TAXI
CAT LINH HIGH SCHOOL
CAT LINH PRIMARY SCHOOL
PULL MAN HOTEL
POLICE
CÁNH SÁT
METRO LINE 3 STATION
LEGEND / GHI CHÚ
GHI CHÚ / REMARK:
POLICE BOOTH
BỐT CẢNH SÁT
CCTV
CAMERA QUAN SÁT
PUBLIC INFORMATION BOARD
BẢNG THÔNG TIN CÔNG CỘNG


GA SỐ 11 - VĂN MIẾU
STATION NO 11 - VAN MIEU
VAN MIEU STREET
NGO SY LIEN STREET
QUOC TU GIAM STREET
QUOC TU GIAM STREET
RENOVATED WALKWAY PAVEMENT EXTENDS
60M TO THE TON DUC THANG INTERSECTION
LEGEND / GHI CHÚ
DROP KERBS FOR WHEELCHAIR
HA HÈ CHO XE LĂN
PEDESTRIAN SIGNAL PRIORITY AT CROSSINGS
LỐI ĐI BỘ QUA ĐƯỜNG
TACTILE PAVING TILES FOR THE VISUALLY IMPAIRED
DẢI DẪN HƯỚNG CHO NGƯỜI KHUYẾT TẬT
GUARD RAIL
RÀO CHẮN CHO NGƯỜI ĐI BỘ
BUS STOPS & TAXI BAY
ĐIỂM DỪNG XE BUYT & TAXI
BUS SHELTER
NHÀ CHỜ XE BUS
MOTO PARKING
BÃI XE MÁY
XE OM WAITING AREAS
ĐIỂM XE ÔM CHỜ KHÁCH
TAXI STATION
ĐIỂM TAXI
SIDEWALK RENOVATION
THAY THẾ GẠCH LÁT HÈ MỚI
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ACCESS TO STATION
LỐI TIẾP CẬN NHÀ GA
SIGNAL HEADS FOR PEDESTRIAN & ON THE FAR SIDE
ĐÈN TÍN HIỆU CHO NGƯỜI ĐI BỘ & PHÍA XA
TRAFFIC SIGNAL POST FOR VEHICAL
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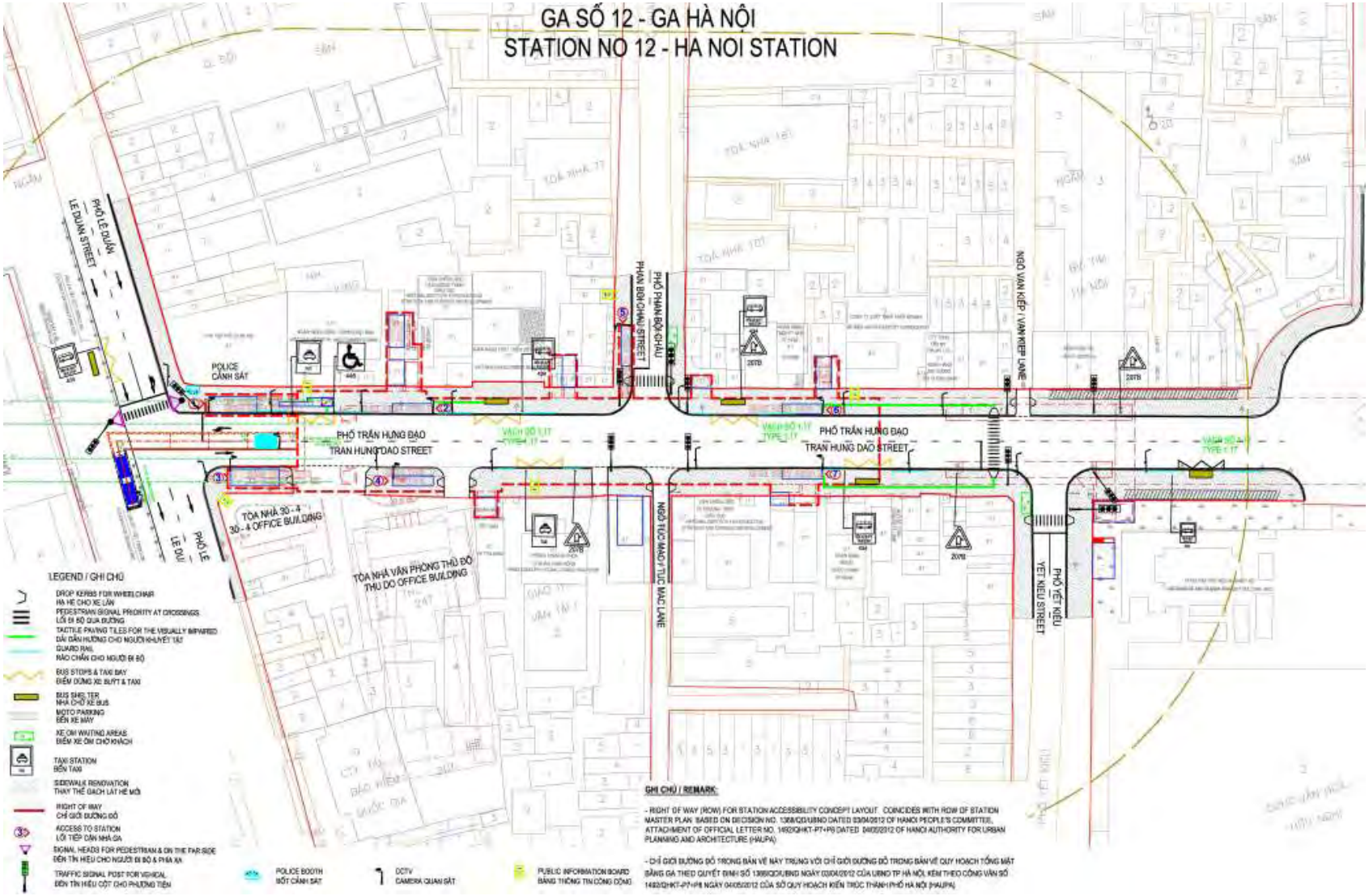
GA SỐ 12 - GA HÀ NỘI
STATION NO 12 - HA NOI STATION
PHỐ LÊ DUẨN
LE DUAN STREET
POLICE
CẢNH SÁT
PHỐ PHAN BỘI CHÂU
PHAN BOI CHAU STREET
NGÕ VĂN KIỆP / VAN KIEP LANE
PHỐ TRẦN HƯNG ĐẠO
TRAN HUNG DAO STREET
TÒA NHÀ 30 - 4
30 - 4 OFFICE BUILDING
TÒA NHÀ VĂN PHÒNG THỦ ĐÔ
THU DO OFFICE BUILDING
NGÕ TỨC MẶC / TUC MAC LANE
PHỐ YẾT KIÊU
YET KIEU STREET
LEGEND / GHI CHÚ
DROP KERBS FOR WHEELCHAIR
HA HE CHO XE LĂN
PEDESTRIAN SIGNAL PRIORITY AT CROSSINGS
LỐI ĐI BỘ QUA ĐƯỜNG
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DẢI DẪN HƯỚNG CHO NGƯỜI KHUYẾT TẬT
GUARD RAIL
RÀO CHẮN CHO NGƯỜI ĐI BỘ
BUS STOPS & TAXI BAY
ĐIỂM DỪNG XE BUÝT & TAXI
BUS SHELTER
NHÀ CHỜ XE BUS
MOTO PARKING
ĐỖ XE MÁY
XE ÔM WAITING AREAS
ĐIỂM XE ÔM CHỜ KHÁCH
TAXI STATION
BẾN TAXI
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THAY THẾ GẠCH LÁT HÈ MỚI
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Appendix 2
SITE PHOTOS

Site 1 - Nhon , TuLiem

Site 2 - Minh Khai, TuLiem

Site 3 – Phu Dien, Tu Liem

Site 4 –Cau Dien, Tu Liem

Site 5 - Le Duc Tho , CauGiay

Site 6 - National University, Cau Giay

Site 7 - Chau Ha, Cau Giay

Site 8 – Cau Giay, Ba Linh

Site 9 - Kim Ma, Ba Linh

Site 10 - Cat Linh, Dong Da

Site 11 - Van Mieu, Dong Da

Site12 - Ga Ha Noi, Hoan Kiem

Appendix 3
PHOTOS OF POTENTIAL SITES FOR CONSTRUCTION CAMPS

Location 1 - Xuan Phuong,Tu Liem

Location 2 – Phu Dien, Tu Liem (north side)

Location 2 – Phu Dien, Tu Liem (south side)

Chua Ha, Cau Giay (near S-3/S-2)

Cau Giay, Ba Dinh (Near S-4/S-5)

Ngoc Khanh (an open area used as parking of few vehicles area Near S-8)

Cat Linh, Dong Da (sidewalk in S-10)

Van Mieu, Dong Da(side walk near S-11)

Cua Nam, Hoan Kiem (near S-12)

Cua Nam, Hoan Kiem (near S-12)

Appendix 4
ENVIRONMENT CATEGORIZATION REPORT

APPENDIX 4

TA-7894 VIE:STRENGTHENING SUSTAINABLE URBAN TRANSPORT FOR HA NOI METRO LINE 3 PROJECT – 1 Integrated Metro Line 3 Station Designs

ENVIRONMENT CATEGORIZATION REPORT

First Draft: 14 December 2012

Asian Development Bank **Hanoi Department of Transport**

TA-7894 ENVIRONMENT CATEGORIZATION REPORT

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ACRONYMS

ADB	Asian Development Bank
AFC	Automatic Fare Collection
AFD	*Agence Francaise de Developpement*
ASIF	Activity-Share-Intensity-Fuel Framework
BAU	Business as Usual
CTF	Clean Technology Fund
DAPM	Dept of Architecture and Planning Management (DAPM)
DD	Detailed Design
DGTPE	Direction General du Tresor et del a Politique Economique *Directorate General of Treasury and Economic Policy* *(of the French Ministry of Economy, Finance and Industry)*
DMF	Design and Monitoring Framework
DoC	Department of Construction (Hanoi)
DoNRE	Department of Natural Resources, Environment and Land
DoT	Department of Transport (Hanoi)
E &M	Electrical and Mechanical
EFFECT	Energy Forecasting Framework and Emissions Consensus Tool
EA	Executing Agency
EARF	Environmental Assessment and Review Framework
EMP	Environmental Management Plan
FFEM	*Fond Francaise pour L'Environment Mondial*
FS	Feasibility Study
GEF	Global Environment Facility

GHG	Green House Gas
GoV	Government of Vietnam
HAIDEP	Hanoi Integrated Development and Environment Program
HAPI	Hanoi Agency for Planning and Investment
HPC	Hanoi People's Committee
HUTDP	Hanoi Urban Transport Development Project (WB)
IMV	*Institut du Metiers des Villes (HPC/Region Ile de France)*
IEE	Initial Environmental Examination
IA	Implementing Agency
JICA	Japan International Cooperation Agency
KfW	Kreditanstalt für Wiederaufbau *German Development Bank*
MoT	Ministry of Transport
MRB	Hanoi Metropolitan Rail Transport Project Board
MRT	Mass Rapid Transit
NPP	Note de Presentation de Project
O&M	Operations and Maintenance
PAI	*Program d'Assistance Institutionelle*
PAUIE	*Program d'Assistance Urbain, Infrastructure et Environment*
PDO	Project Description Outline (GoV Term)
PIC	Project Implementation Consultant
PMU	Project Management Unit
PPIAF	Public Private Infrastructure Advisory Facility
PPTA	Project Preparation Technical Assistance
PSP	Private Sector Participation

PTA	Public Transport Authority
PIU	Project Implementation Unit
REA	Rapid Environmental Assessment
ROW	Right of Way
RP	Resettlement Plan
RACE	Rapid Assessment of City (Carbon) Emissions
RRP	Report and Recommendations of the President
SAPI	Special Assistance for Project Implementation (JICA)
SBV	State Bank of Vietnam
SOE	State Owned Enterprise
SPS	ADB's Safeguard Policy Statement (2009)
STI	Sustainable Transport Initiative (ADB)
SYSTRA	French Consultant (PIC for UMRT 3)
TEEMP	Transport Emissions Evaluation Model for Projects
TRAMOC	Traffic Management and Operations Centre
UMRT	Urban Mass Rapid Transit
UMRT 3	Hanoi Urban Mass Transit Line 3
VNR	Vietnam Railways
VNRA	Vietnam Railway Administration (MoT)
WB	World Bank

ENVIRONMENT CATEGORIZATION REPORT FOR

HANOI METRO LINE 3 PROJECT

A. BACKGROUND

1. ADB has agreed to assist the Government of Viet Nam (the Government) with technical assistance (Technical Assistance) for the TA 7894-VIE: Strengthening Sustainable Urban Transport for Hanoi Metro Line 3 Project by an agreement (the Technical Assistance) between the Government and ADB on the 29th day of June 2012.

2. The Hanoi Department of Transport is the Implementing Agency (IA) for the Project, and Hanoi's Transport Management and Operation Center (TRAMOC) has been designated as the focal point. The technical assistance is being provided by a team of international and Vietnamese consultants in two phases. A team of individual consultants has been undertaking Phase 1, joined by consultants from Egis International for Phase 2 beginning 08 October 2012.

3. The objectives of the Project Preparatory Technical Assistance (PPTA) for the *Strengthening Sustainable Urban Transport for Ha Noi Metro Line 3 Project* are as follows:

- To support development of sustainable "low-carbon" urban transport measures and programs in Hanoi.
- To enhance integration of public transport – Metro with other modes for example bus – in the five affected districts of Hanoi along Metro Line 3.
- To identify energy-efficient urban transport solutions which, when coupled with the Ha Noi Metro Rail System Project (Line 3: Nhon to Ha Noi Station), will lead to significant savings in greenhouse gas (GHG) emissions.
- To focus on innovative and transformational interventions which enhance the quality of public transport systems and significantly increase the modal share of public transport in Hanoi.

4. Phase 1 or Project Concept of the PPTA involves a rapid environmental assessment of the proposed urban transport measures and the MRT Line 3 as a whole using the ADB's Rapid Environmental Assessment Checklist. Findings are consolidated in this Environmental Categorization Report.

B. PROJECT OVERVIEW

5. The project is to ultimately construct urban transport facilities, and implement services and measures along the 12.5-kilometer of Ha Noi Metro Line 3, primarily at the twelve (12) planned stations. Metro Line 3 is to be operational within the next six to seven years with funding from ADB, the European Investment Bank (EIB), Agence Française de Développement(AFD) and Direction Générale du Trésor (DGT).

6. The location of the twelve (12) stations and the proposed measures in general are as follows:

Station Number and Location		Proposed Measures for Hanoi Metro Line 3
S1 –Nhon , TuLiem	Elevated	(i) Access and parking at stations (ii) Measures for convenience and safe to use (iii) Pedestrian, bus and taxi access to stations (iv) Ticketing and fares facilities (v) Drainage/Sanitary Facilities
S2 – Minh Khai, TuLiem		
S3 – PhuDien, TuLiem		
S4 – CauDien, TuLiem		
S5 – Le DucTho , CauGiay		
S6 – National University, CauGiay		
S7 – Chau Ha, CauGiay		
S8 –CauGiay, Ba Linh		
S9 – Kim Ma, Ba Linh	Underground	
S10- Cat Linh, Dong Da		
S11- Van Mieu, Dong Da		
S12- Ga Ha Noi, HoanKiem		

7. Figure 1 illustrates the location of twelve (2) stations.

Figure 1: Hanoi Metro Line 3

Source: Feasibility Study, Systra, May 2005

C. RAPID ENVIRONMENTAL ASSESSMENT

8. The proposed project as a whole was subjected to environmental screening process using ADB's Classification System. Based on SPS 2009, a project category is evaluated by the category of its most environmentally sensitive component, including direct, indirect, cumulative, and induced impacts in the project's area of influence. The project is classified according to the following categories:

i. Category A. A proposed subproject is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works.
ii. Category B. A proposed subproject is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects.
iii. Category C. A proposed subproject is classified as category C if it is likely to have minimal or no adverse environmental impacts.

9. The environmental screening presented in Table 1 was used as basis for environment categorization.

Table 1: Screening of potential environmental impacts

Screening Questions	Yes	No	Remarks
A. PROJECT SITING IS THE PROJECT AREA ADJACENT TO OR WITHIN ANY OF THE FOLLOWING ENVIRONMENTALLY SENSITIVE AREAS?			
• CULTURAL HERITAGE SITE	**X**		Some cultural sites near the stations are: • Dong Co Temple at Minh Khai (near S-2) • Chua Ha/Ha Pagoda at Dich Vong Street, Cau Giay District (near S-7) • The Temple of Literature (Van Mieu)/Oldest University (near S-11) The project will not encroach on cultural site properties.
▪ PROTECTED AREA		X	• There are no protected areas within Metro Line 3 route.
• WETLAND		X	• There is no wetland in the project area.
• MANGROVE		X	• There is no mangrove forest in the project area.
• ESTUARINE		X	• There is no estuary within the project area.

Screening Questions	Yes	No	Remarks
• BUFFER ZONE OF PROTECTED AREA		X	• There is no buffer zone nor protected sites within the project area
• SPECIAL AREA FOR PROTECTING BIODIVERSITY		X	• There is no special area for protecting biodiversity within Metro Line 3 alignment.
B. POTENTIAL ENVIRONMENTAL IMPACTS WILL THE PROJECT CAUSE...			
• encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?		X	• No encroachment on historical/cultural sites. • No disfiguration of landscape due to embankments, cuts, fills and quarries
• encroachment on precious ecology (e.g. sensitive or protected areas)?		X	• No encroachment on precious ecology
• alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site?		X	• Hanoi Metro Line 3 will not alter the water hydrology in the project area.
• deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?		X	• .Deterioration of surface water quality due to Metro Line 3 construction is not expected.
• increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing?	X		• No asphalt will be used in the construction of the proposed project. Dust is expected as a result of site clearing works. Mitigation measures will be specified in EMP.
• risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation during project construction and operation?		X	• Use of chemical, biological and radiological hazards are not expected during construction and operation phases of the project. Personal protective equipment will be provided to workers. The EMP will specify that regular safety training should be conducted.
• noise and vibration due to blasting and other civil works?	X		• No blasting. Noise and vibration are expected but impacts will be temporary and minimal. Good construction practices to mitigate noise and vibration will be specified in the EMP.
• dislocation or involuntary resettlement of people?		X	• Planners/Design Engineers are trying to avoid dislocation or involuntary resettlement

Screening Questions	Yes	No	Remarks
			of people
• dislocation and compulsory resettlement of people living in right-of-way?		X	• Planners/Design Engineers are trying avoid dislocation and compulsory resettlement of people living in right-of-way
• disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		X	• The subprojects will not affect indigenous people nor vulnerable groups. It will be beneficial to women particularly those who will be involved in the project.
• Other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress?	X		• Construction work has potential to increase noise level and dust concentration, but the impact will be short term. Good construction practices to mitigate dust and other disturbances will be specified in EMP.
• hazardous driving conditions where construction interferes with pre-existing roads?	X		• Expected but impacts will be temporary. Contractors will be required to prepare and implement Traffic /Safety Management Plan.
• poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STI's and HIV/AIDS) from workers to local populations?	X		• Priority in labor employment will be given to local residents. Non-local workers are expected to be small in number to be housed on camps. • Contractors will be required to formulate and implement Health and Safety Program.
• creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?	X		• Breeding habitats prevention to be specified in the EMP.
• accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials?	X		• Expected during construction but impacts will be temporary. Mitigation measure to be specified in EMP. • Contractors will be required to prepare and implement Traffic /Safety Management Plan and Toxic/Hazardous Wastes Management Plan
• increased noise and air pollution resulting from traffic volume?	X		• Expected during construction but impacts will be temporary. Vehicle emission controls, providing orientation to drivers to be specified in EMP. • Traffic volume is not expected to increase significantly

Screening Questions	Yes	No	Remarks
• increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road?	X		• Enforcement of transport regulations to be specified in EMP. • Contractors will be required to prepare/implement Toxic/Hazardous Wastes Management Plan
• social conflicts if workers from other regions or countries are hired?		X	• Priority in labor employment will be given to local residents.
• large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		X	• Non-local workers are expected but minimal. Construction contractors will be required to provide a worker's camp with basic facilities (e.g. water supply and sanitation facility).
• risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		X	• No explosives and chemicals will be used for this project .
• community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning.	**X**		• Community safety risks is expected. Access to restricted areas can be controlled during construction and operation phases of the project.
C. CLIMATE CHANGE AND DISASTER RISK QUESTIONS THE FOLLOWING QUESTIONS ARE NOT FOR ENVIRONMENTAL CATEGORIZATION. THEY ARE INCLUDED IN THIS CHECKLIST TO HELP IDENTIFY POTENTIAL CLIMATE AND DISASTER RISKS.			•
• Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes	X		• Flood phenomena can be considered as climate change and disaster risk in the project vicinity, nevertheless, it can be mitigated with the provision of sufficient drainage structures and taking into account the recommendations of Climate Change Expert.
• Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability (eg., increased erosion or landslides could increase		X	• Not applicable

Screening Questions	Yes	No	Remarks
maintenance costs, permafrost melting or increased soil moisture content could affect sub0-grade). •			
• Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (eg., high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)? •		X	• Not applicable
• Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by encouraging settlement in areas that will be more affected by floods in the future, or encouraging settlement in earthquake zones)? •		X	• Not applicable

D. ENVIRONMENT CATEGORIZATION

10. Based on the rapid environmental assessment conducted, there are no sensitive areas that will be significantly affected by the project. During construction, impacts on surface water quality, occupational health and safety, noise and vibration, hazardous driving conditions, poor sanitation and solid waste disposal are expected, however, these are minimal and short term. Mitigation measures for such impacts can be formulated and implemented, hence, the overall project categorization is **Category B**.

Appendix 5
NOTES OF PUBLIC CONSULTATION

List of Stations

for Public Consultation's meeting & Gender Meetings

Date	Time	Station	Districts	Communes /wards	Meeting location - Commune	Number of participants
Public Consultation Meetings						
14 Jan 2013	14.00-17.00 hrs	Station 1: Nhon Station 2 : Minh Khai Station 3: Phu Dien Station 4: Cau Dien	Tu Liem	Cau Dien Town Minh Khai Com Phu Dien Com Xuan Phuong Com	Tu Liem DPC Meeting Room	56 (M :46; F: 10)
15 Jan 2013	15.30-17.30 hrs	Station 5: Le Duc Tho Station 6: National University Station 7 : Ha Pagoda	Cau Giay	Dich Vong W Dich Vong Hau W Mai Dich W	Cau Giay DPC Meeting Room	32 (M: 24; F: 8)
16 Jan 2013	8.30-11.00 hrs	Station 12: Hanoi Railway Station	Hoan Kiem	Cua Nam W	Hoan Kiem DPC Meeting Room	29 (M: 21; F: 8)
18 Jan 2013	14.00-17.00 hrs	Station 10: Cat Linh Station 11: Van Mieu	Dong Da	Cat Linh W Van Mieu W Van Chuong W	Dong Da DPC Meeting Room	66 (M: 43; F: 23)
24 Jan 2013	8.30-11.00 hrs	Station 8: Cau Giay Station 9: Kim Ma	Ba Dinh	Ngoc Khanh W	Ba Dinh DPC Meeting Room	37 (M: 28; F: 9)
Gender Meetings						
5 Feb 2013	19.00-21.30 hrs	Station 12: Hanoi Railway Station	Hoan Kiem	Cua Nam Ward	Cua Nam Ward PC Meeting Room	18 (M: 1; F: 17)
5 Feb 2013	8.30-11.00 hrs	Station 1: Nhon Station 2 : Minh Khai Station 3: Phu Dien Station 4: Cau Dien	Tu Liem	Cau Dien Town Minh Khai Com Phu Dien Com Xuan Phuong Com	Tu Liem DPC Meeting Room	17 (M: 0; F: 17)

1. Objectives of the Workshop

- To inform the stakeholders the Project information, findings and proposed mitigating measures as indicated in the IEE
- To receive comments from beneficiaries and affected peoples, local officials (districts and Town/Ward/Commune Levels), community leaders, NGOs/ Societies, and others
- Ensure community consensus for project implementation & information disclosure to local people with precisely

2. -Disclosed information

- Public Consultation Meetings Objective
- IEE Preparation 's Objective
- The projects' locations, designs & cost estimates
- GOV & ADB environmental policies & procedures
- Project's environmental category per ADB & GOV policies
- Main Environmental issues per the project station/ facilities locations & designs
- Main Potential environmental impacts caused by each project station
- Proposed mitigation measures
- Conclusions: Main Positive & Negative Impacts caused by the Project

3. Meeting Participants

Hanoi City:

- Representative of Hanoi Transportation Department
- Representative of Environment and Natural Resources
- Centre for Land Fund Development
- Transportation Management Operation Corporation

District Level :

Representative of

- District People Committees (Tu Liem, Cau Giay, Ba Dinh, Dong Da, Hoan Kiem DPCs)
- Urban Construction Management
- Environment & Nature Resources
- Centre for Land Fund Development
- Planning & Finance Division
- Woman Union
- Vietnamese Fatherland Front
- Labor, War Invalids & Social Welfare Division

Commune/Ward Level

Representative of

- Communes /Wards Commune People Committees (Nhon Town, Minh Khai, Phu Dien, Mai Dich Dich Vong, Ngoc Khanh, Cat Linh, Van Chuong, Van Mieu, Cua Nam 's CPC)
- Urban Construction Management
- Land Administration
- Vietnamese Fatherland Front at Commune/Ward level
- Woman Union

Communities /Organizations/ Householders affected by the Project & Residential areas

Representative of

- Business householders located along two side of Proposed Station Areas that to be affected by the project
- Universities, Schools, Buildings, Hotels, Pagodas/Temples… located along two side of Proposed Station Areas & adjacent areas that to be affected by the project Residential areas located near by Proposed Stations Areas

Total of participants for one district public consultation meeting : 30-70 peoples (included APs and Representatives of TRAMOC, Provincial Agencies, Local Authorities) and total participants for 5 District Meetings were 220 peoples

4. Meeting Agenda (each meeting)

Time Duration for presentation (minutes)	Item	Content	Responsibility
15	Egis	Registration of Participants	Egis
10	TRAMOC/DOT	- Objective of meeting & participants introduction	Mr Toan
30	Presentation of Egis Consultants	- Summary of Project Description - Description of Project Options	Mr Do Quang Dat - Senior Urban Transport Expert Mr Nguyen Minh Phuong - Structural Engineer / Architect
30	Presentation of Egis Consultants	- Objective of "Public Consultation" - Environmental Safeguard Policy of ADB & The GoV - Environmental Issues of the Project	Ms Do Thi Nham- Environmental Consultant
		Resettlement Safeguard Policy of ADB & The GoV Resettlement Issues of the Project	-Ms Khuc Thi Thanh Van- Resettlement Consultant
		Social Safeguard Policy of ADB & The GoV Social Issues of the Project	Ms Tran Thi Thanh Tuyen- Social Resettlement Consultant
10-15	Tea Break		
40-50	Discussions for locations/environmental & resettlement & social issues		All participants
15	-Summary of discussion results & participant's comments -Endorse Meeting Minute		Egis

5. General Comments from Participants of all Districts

Comments on Option Selection

- The Project efforts to organize "public consultation" is highly appreciated as this help local peoples understand the project content and express their view so as to ensure effective implementation of the project;

- Agree with the concept design of the Consultant on guardrail, parking areas and facilities for the Metro passengers.

- Most of participants support option 1 for 9 Stations : 2,3,4,5,6,,7,10,11,12; option 2 for only for 3 stations : 1, 8,9
- Only some comments support options 2 for station 2
- It's recommended to make use of the existing parking areas around the location of the station. Bus stops and taxi stops should not be arranged within the station's area but should be arranged outside of the station's area.
- The Consultant's drawings should be more specific, and analyze clearly advantages and disadvantages of each option. So that local peoples have basis to give comments on the option to be selected.

Comments on Environmental Impacts & Mitigation Measures

- Agree with mitigation measures recommended by the project environmental consultant
- Environmental impacts are unavoidable; however, considering common benefit then these impacts are acceptable
- It is requested to avoid the land clearance as much as possible, and when the station comes to construction including the construction of exit and entrance, need to avoid impacts on the business households and enterprises. In case of additional land take, the compensation should be done properly & satisfactory so as not to cause disadvantages for the households within the area.
- Temporary road to access the shops, business services, should be provided by Contractor
- Construction time should be widely announced beforehand
- Traffic jam during construction should be considered carefully as traffic volumes in all stations areas is big and population density is high. So that the contractor is requested to prepare and execute a Transportation Management Plan for the construction period, to mitigate traffic jams and public inconveniences.
- Construction time should be avoided during peak hours morning : 6.30-8.00 am, evening : 4.30-7.00 pm as traffic jam always occur in these time, especially construction time should be done during the night for station 10 as two schools (about total 2500 pupils) located closely to the station
- Dust and noises must be mitigated during construction
- Regular watering during construction to avoid dust pollution
- All construction materials waste must be immediately transported to waste disposal site
- Provide temporary rain water drains in the site to avoid flooded /inundation situation in the project area, especially for station 10,11,12 where often occur heavy inundation during rainy season (from June to September) with 0.2-0.5 m in depth, inundated time is about 8-12 hours hours
- Contractors need to ensure fire safety
- Construction time should be ensured on schedule, not last more time
- Recovery of ground surfaces in the project area after construction completion as before construction

Conclusion

- There is agreement on the construction of the Strengthening sustainable urban transport for Hanoi Metro line 3 Project
- Consensus is achieved on socio-environmental impacts and mitigation measures recommended by the Project

All comments from participants & stakeholders will be considered fully in mitigation measures of Environmental Assessment & Basis Design

Participant's Comments of each subprojects see bellow Table "Summary of Public Consultation Reports

Summary of Public Consultation Workshop Meetings /Gender Meetings/
Site Interviews & Observations at five Districts

Name of District: Tu Liem
Number of participants: 56 (M :46; F: 10)

Suggestions/ Comments (a .Assessed Potential Impacts , b .Issues Raised During Informal Interview. c .Issues Raised During Public Consultation. d Gender meeting, e. Community Focus Group, g. Disabled Group, h. Student Group))
Station 1: Nhon Name of Commune/Town/Ward: Minh Khai & Xuan Phuong Commune *Existing environmental condition* Station No 1 located on National Road No 32. Both of two road sides are small restaurants, stores, shops (computer clothes, photocopy shops, camera shops…) *The Industrial University, Korean Training Centre* are located on the left side (following direction from Nhon tu Ga Hanoi) Bus Stop : about 100 m from the south of the Station Population density around Station No1 is high There is no trees on both sides of the station Dust pollution due to vehicle actives & big traffic volume The land was previously used for production of vegetables, flowers and fruit. There are no flooded/inundation situation in this area *Environmental impacts and mitigation measures* a) Increase dust, noise Increase waste water & solid from the sites (included from construction site and workers ;) Traffic jam inconvenient travelling on the road & access to the University Affect to business services of shops, stores Affected time: mainly during construction b) Students of Industrial University agree with the project Temporary road to access the University & shops, business services should be provided by Contractor Dust and noises must be mitigated during construction c) - Agree with the concept design of the Consultant on guardrail, parking areas and facilities for the Metro passengers. As for Station 1 – Nhon, the Consultant should select Option 2 because this is the terminal station, the gateway to the west - Agree with mitigation measures recommended by the project environmental consultant *d) Gender meeting* - Contractors should limit negative impacts on air quality (dust, noise..) and water sources - Ensure quality of construction and progress of construction -The contractors should hire labour from the project communes/wards
Station 2: Minh Khai Name of Commune/Town/Ward: Minh Khai Commune *Existing environmental condition* Station No 2 located on National Road No 32. In the left side : there are some buildings & a waste land area (up to now no houses & buildings there)

Suggestions/ Comments (a .Assessed Potential Impacts , b .Issues Raised During Informal Interview. c .Issues Raised During Public Consultation. d Gender meeting, e. Community Focus Group, g. Disabled Group, h. Student Group))
In right side: mostly are car & motorcycle shop (MITSUBISHI, NISSAN Thang long), Banks No big trees on both two sides & no precious plant/trees Temple & Pagoda : no temple & pagoda around station area; some pagodas along the road are Dong Co temple and communal House about 30 m from the road Minh Khai Pagoda about 200 m Dinh Quan Pagoda about 250 m *Environmental impacts and mitigation measures* a} -Increase dust, noise - Increase waste water & solid from the sites (included from construction site and workers ;) -Traffic jam - Affect to business services of shops, stores - Affected time: mainly during construction b) - Temporary road to access the shops, business services, banks should be provided by Contractor - Dust and noises must be mitigated during construction - Parking areas and facilities for the Metro passengers should not designed in front of pagodas, temples (Dong Co temple about 30 m from the road and the temple is Historical – Cultural Vestige at National Level) c) - Station 2, option 2 may be considered because this area is still agricultural land. - For Station 2, the area 6500m2 anticipated to be the parking lot is settlement-free, suitable for land taking and applying option 2. In the first stage when budget is limited then option 1 may be carried out, but there must be plan for the option 2 in the future. - Agree with mitigation measures recommended by the project environmental consultant *d) Gender meeting* - Contractors should limit negative impacts on air quality (dust, noise..) and water sources - Ensure quality of construction and progress of construction -The contractors should hire labour from the project communes/wards
Station 3: Phu Dien Name of Commune/Town/Ward: Phu Dien Commune *Existing environmental condition* Station No 3 located on National Road No 32. In the left side : Bus Stop, Car Store (CHEVEROLET AN HUNG), Restaurants, residential area In right side: Petro Station, many Wood Furniture Stores, Material Construction Stores Only small trees and no precious plant/trees No temple & pagoda around station area *Environmental impacts and mitigation measures* a) -Increase dust, noise - Increase waste water & solid from the sites (included from construction site and workers ;) -Traffic jam - Affect to business services of shops, stores - Affected time: mainly during construction b) - Temporary road to access the Car Stores , shops, business services, should be provided by Contractor

Suggestions/ Comments (a .Assessed Potential Impacts , b .Issues Raised During Informal Interview. c .Issues Raised During Public Consultation. d Gender meeting, e. Community Focus Group, g. Disabled Group, h. Student Group))
- Dust and noises must be mitigated during construction - Construction time should be widely announced beforehand c) - Agree with the option 1 for stations 3, 4 - Agree with mitigation measures recommended by the project environmental consultant *d) Gender meeting* - Contractors should limit negative impacts on air quality (dust, noise..) and water sources - Ensure quality of construction and progress of construction -The contractors should hire labour from the project communes/wards
Station 4: Cau Dien Name of Commune/Town/Ward: Cau Dien Commune *Existing environmental condition* Station No 4 located on National Road No 32. Both of two road sides are small stores, shops, banks (clothes, Glasses, Dental Practice , KARAOKE, Viglacera Corporation …) No big trees on both two sides & no precious plant/trees Near Nhue river (Nhue River with garbage deposits and moderately turbid, muddy-fishy odor): about 50 m to the Station Temple & Pagoda: no temple & pagoda around station area *Environmental impacts and mitigation measures* a} -Increase dust, noise - Increase waste water & solid from the sites (included from construction site and workers ;) -Traffic jam - Affect to business services of shops, stores - Affect to water quality of Nhue river if waste water not to be managed properly Affected time: mainly during construction b) - Temporary road to access the shops, business services, should be provided by Contractor - Dust and noises must be mitigated during construction - Construction time should be widely announced beforehand c) - Agree with the option 1 for stations 3, 4 - Agree with mitigation measures recommended by the project environmental consultant *d) Gender meeting* - Contractors should limit negative impacts on air quality (dust, noise..) and water sources - Ensure quality of construction and progress of construction -The contractors should hire labour from the project communes/wards

Name of District: Cau Giay
Number of participants: 32 (M :24; F: 8)

Station 5: Le Duc Tho Name of Commune/Town/Ward: Mai Dich Wards *Existing environmental condition* Station No 3 located on Ho Tung Mau Road. In the left side : Mai Dich Cemetery(about 500 m to the Station) , Army Theatre on the background),

Camera shops, Glasses shops
In right side: TULTRACO Super Market, waste land area, Banks, Book Shop…)
Only some Flamboyant/ Royal Poinciana trees on the both sides and no precious plant/trees
Temple & Pagoda: no temple & pagoda around station area
Dust pollution due to vehicle actives & big traffic volume

Environmental impacts and mitigation measures
a)
-Increase dust, noise
- Increase waste water & solid from the sites (included from construction site and workers ;)
-Traffic jam
- Affect to business services of shops, stores
- inconvenient travelling on the road & access to the Mai Dich Cemetery; and access to the Army Theater
- Affected time: mainly during construction

b)
- Temporary road to access the shops, business services, should be provided by Contractor
- Dust and noises must be mitigated during construction
- Construction time should be widely announced beforehand
- Regular watering during construction to avoid dust pollution

c)
- Agree with the design solution.
-Agree with option 1. On the other hand, it's very hard to carry out land taking in Army Theater because that area belongs to national defense land. The 1200 m2 area in the South (2000m2 according to design document) currently assigned to Thang Long Company for an office project.
- Environmental impacts are unavoidable; however, considering common benefit then these impacts are acceptable. At the location of the Army Theatre, the project may cause effects on the area landscape so it is requested to pay attention to keep the aestheticism of the Army Theatre area.
- Regarding traffic intersection: Traffic must be ensured during construction process at the intersection, traffic jams should be avoided. During construction process, we will cooperate with stake holders and facilitate the Project implementation

g) Disabled Group Meeting (Stations: 5,7,8,9)

Pedestrian Environment

- Footpaths should be arranged with drop-kerb for wheelchairs

Besides the disabled, other vulnerable groups should also be protected (the older people, women with children…)
Signal system should be provided and maintained. Many signal lights have been arranged but after sometime they broke and stopped functioning.
Elevators should be provided.
There should have the count down traffic light
The access road for the Disabled should be managed strictly in order to the other people or vehicles (eg. Xeom) cannot encroach.

Pedestrian Crossing.

Grade Crossings controlled by count down Traffic Lights
Pedestrian bridges or tunnels equipped with elevators
Pedestrian tunnels with inclined ramps built to international access standards

Bus Stops

Bus-stops should be located near Metro stations for easy transit.
Distance to walk less thanor by 100m is suitable for the Disabled.
Should have a direction board in which shows clearly how to access the other means of transport such as other buses, xeom, taxi, footpath etc.

The buses should have a voice announcement about the distance for the next stop in order to the blind can know the place that they can get off.

Taxi Stations

There should have a separate taxi/car station for the Disabled and must be in good management

Subway at Station 9

It's convenient for women if other commercial centers connected to the Station. The women like to go cross the road by subway.

All connections to commercial centers, if there is, should be arranged with slopes for wheelchairs.

Other issues

Footpath for the visually impaired: Yellow color is better than red, it's easier to be seen by the visually impaired.

The Disabled should examine the design of the Stations.

The bus should stop long enough so that the disabled can get on and get off, they move too fast that the disabled may fall.

Awareness of the passengers towards the Disabled is not good in general.

Conveyors should be arranged for the disabled where necessary.

Station 6: National University

Name of Commune/Town/Ward: Dich Vong Hau Wards

Existing environmental condition

Station No 6 located on Xuan Thuy Road

In the left side: National University

In right side: Mostly Big Buildings : Indochina Plaza Hanoi, HITC building

Only some Flamboyant/ Royal Poinciana trees on the both sides and no precious plant/trees

Temple & Pagoda: no temple & pagoda around station area

Population Density : around the station is high

Traffic in this road section is heavy, especially during peak hours: morning : 6.30-8.00 am, evening : 4.30-7.00 pm

Environmental impacts and mitigation measures

a)

-Increase dust, noise

- Increase waste water & solid from the sites (included from construction site and workers ;)

-Traffic jam (significant level)

- Affect to business services of shops, stores

- *inconvenient travelling on the road & access to the Indochina Plaza, HITC, especially to The University*

- Affected time: during construction & may operation phase

b)

- Temporary road to access the National University , Education University & Indochina Bulding & other buildings should be provided by Contractor

- Dust and noises must be mitigated during construction

- Construction time should be avoided during peak hours morning : 6.30-8.00 am, evening : 4.30- 7.00 pm as traffic jam always occur in these time

c)

- Agreed with Option 1, as the resident density in this area is high, the residents around this area will walk to the station, the designation of a parking area will attract vehicles from elsewhere and cause land waste and traffic jams in the area.

- Agreed with option 1 because if option 2 is selected, resettlement must be carried out for National University and Pedagogic University. supermarket should not be placed near the university environment because it will affect the study of the students. On the other hand, currently supermarket already placed on the opposite side of the university. We sent a letter to

the City People Committee to request that the Flyover should not be constructed in this location because it's wasteful and it will block the vision causing obstruction and dangers for traffic. The flyover should be integrated with the staircase of the Station.
- The Environmental & Social & Resettlement Consultant should carry out detailed surveys on environment, sociology issues

h) Students Group Meeting (Station 6)

Design

Underground road crossing may be suitable for students
Why the waiting areas for taxi and xeom separated? They have the same function and they should be put together.
There are 2 traffic lights arranged closely next to the University's gate, the distance between the 2 traffic lights is too short, traffic jams likely take place.
Integrate the flyover with shops, toilet etc. under the station 6

Traffic Jams

The distance between stations is too short, it's likely to cause traffic jams.
The quality and quantity of bus should be improved to attract people using public transport means.
Establish a bike hiring system which dedicated for Metro's passengers so it's convenient for Metro passengers to travel to destinations around the stations.
Bus stops, waiting areas for taxi and xeom should be elevated to save the space for pedestrian.
If the Metro line is completed, what's the percentage of traffic jams reduced in Hanoi?
Put the traffic light in the position near the gate of University of Teaching

Other issues:

Plans may be changed in the future; will this project be carried out definitely?
The areas for bike parking are too small; can they meet the parking demand?
Mr. Huy proposed to combine the University's parking lot with the Metro's.
Is Metro appropriate with traveling in Hanoi?
What's the average speed of the train? How can it be faster if there are so many stations to stop?
Is the distance 12km too short for a railway route?
Can we bring freight into Metro?

Station 7: Ha Pagoda
Name of Commune/Town/Ward: Dich Vong Wards

Existing environmental condition

Station No 7 located on Cau Giay Road
In the left side: mostly Restaurants, Clothes Shops
In right side: Material Construction Store (until now), Motorcycle Stores
Only some Flamboyant/ Royal Poinciana trees on the both sides
Temple & Pagoda: Ha Pagoda (many peoples come to there for praying)about 200 m to the Station, Xom Tang Pagoda 200 m, Quan Hoa Pagoda 350 m
Traffic in this road section is heavy
Dust pollution & noise due to vehicle actives & big traffic volume

Environmental impacts and mitigation measures

a)
- Increase dust, noise
- Increase waste water & solid from the sites (included from construction site and workers ;)
-Traffic jam (significant level)
- Affect to business services of shops, stores
- *inconvenient travelling on the road & access to the Ha Pagoda*

Affected time: during construction & may operation phase

b)
- Temporary road to access the shops, business services, Restaurants should be provided by Contractor

- Dust and noises must be mitigated during construction
- Construction time should be avoided during peak time as traffic in this road section is heavy

c)

- For Station No. 7: Need to combine with commercial complexes.
- Regarding the footpath used for handicapped people, currently placed under the high voltage power lines which have not been buried underground – the Consultant should consider. Staircases, parking areas placed right in front of the households is not suitable.
-Regarding society: Arrangements are needed to ensure the safety, order and security for high rise building after connecting to stations. It's recommended to make use of the existing parking areas around the location of the station. Bus stops and taxi stops should not be arranged within the station's area but should be arranged outside of the station's area.
- It is requested to avoid the land clearance as much as possible, and when the station comes to construction including the construction of exit and entrance, need to avoid impacts on the business households and enterprises. In case of additional land take, the compensation should be made reasonably with the highest prices so as not to cause disadvantages for the households within the area.

g) Disabled Group Meeting (Stations: 5,7,8,9)
See comments from Station 5

Name of District: Ba Dinh
Number of participants: 37 (M :28; F: 9)

Station 8: Cau Giay
Name of Commune/Town/Ward: Ngoc Khanh Ward

Existing environmental condition
Station No 8 located on La Thanh Road
In the left side: Cau Giay Bus Station , Thu Le Zoo Park , Buildings
In right side: The Transportation University, ICON4 Tower
There are many big trees in Thu Le Zoo, and small trees in the both sides
Temple & Pagoda: no temple & pagoda around station area; only Voi Phuc Temple is about 300 m to the Road
Traffic in this road section is heavy
Dust pollution & noise due to vehicle actives & big traffic volume

Environmental impacts and mitigation measures
a)
- Increase dust, noise
- Increase waste water & solid from the sites (included from construction site and workers ;)
-Traffic jam (significant level)
- Affect to business services of, stores
- *inconvenient travelling on the road & access to the Transportation University, Tower, Cau Giay Bus Station, Thu Le Zoo Park*
-Some small & big trees to be affected
- Affected time: during construction & may operation phase

b)
-Temporary road to access the University of Transportation, ICON4 Tower & Thu Le Zoo , Cau Giay Bus Station should be provided by Contractor
- Dust and noises must be mitigated during construction
- Construction time should be avoided during peak time as traffic in this road section is heavy

c)
- Some participants agree with option 2, with site clearance possibility in order to ensure permanent benefits.
- Some participants agree with option 1, arrangement for parking lot is not necessary because most of passengers are pedestrians. Supermarket should not be constructed because currently there are too

many commercial centres in this area.
-Mitigation measures caused by the project presented clearly by the project environmental consultant. & We agree with these mitigation measures. However, during construction phase of old projects, contractors did not conform/ comply with mitigation measures recommended by the Consultant in IEEs/EIAs. So that, environmental supervision during construction phase should consider properly
- Consultant should pay attention to the solution to connect with the zoo to serve visitors coming to the zoo; square should be arranged for visitors to gather before coming in the zoo. The Consultant should study the design which has less effect on the landscape of the zoo.
-The Consultant should analyze clearly advantages and disadvantages in every aspect of each option. The connection solution to commercial centers should be studied carefully on the function of the plot, the selected basis should be more clear.

e)Community Focus Group (Stations 8,10,11)

Environmental issues

Cover all trucks should be carried out properly during construction to avoid dust.
Construction should be carried out continuously without delay; many projects delayed causing pollution for a long time.

Safety and security

Camera should be arranged at all entrances and exits, vendors should be banned. There must be police especially during the Opening period of the Stations and late at night.
Bus stops should be arranged a bit away from the Stations for pedestrians' safety.

Other issues:

The Stations' design approved by the city so we have no comments. But why there is no underground footpath so people don't have to walk across the road?
We care about compensation/resettlement policy
Will Department of Transport carry out the Project from the beginning to the end or will they sell the Project?
Method of construction: Does underground construction have any effects on residents' houses?
Will the ticket price suitable with normal people?
We want to know the exact boundary of the project want to know if our house will be affected by the project or not.

g) Disabled Group Meeting (Stations: 5,7,8,9)

See comments from Station 5

Station 9: Ngoc Khanh
Name of Commune/Town/Ward: Ngoc Khanh Ward

Existing environmental condition

Station No 9 located on Kim Ma Road
In the left side: DAEWOO Hotel, Ngoc Khanh Car Park, LOTE Building
In right side: mostly Shops (Flower,)Stores
The Overbridge connect two the side
Dust pollution & noise due to vehicle actives with big traffic volume and building construction

Environmental impacts and mitigation measures

a)
- Increase dust, noise
- Increase waste water & solid from the sites (included from construction site and workers ;)
-Traffic jam (significant level)
- Affect to business services of, stores

inconvenient travelling on the road & access to DAEWOO Hotel, Ngoc Khanh Car Park, LOTE Building, Overbridge

Affected time: during construction & may operation phase

b)
- Temporary road to access the flower shops, business services, should be provided by Contractor
- Dust and noises must be mitigated during construction

- Compensation policy for affected business households should be done properly & satisfactory
- Construction time should be widely announced beforehand
- All construction materials waste must be immediately transported to waste disposal site
- Contractors need to ensure fire safety
- Construction time should be ensured on schedule, not last more time

c)

- Some participants agree with option 2, with site clearance possibility in order to ensure permanent benefits. However, Ngoc Khanh Car Park should be build *New Car Park as Entrepôt Car Park only without supermarket because many supermarket in this area*
- Some participants agree with option 1, arrangement for parking lot is not necessary because most of passengers are pedestrians. Supermarket should not be constructed because currently there are too many commercial centres in this area.

-Mitigation measures caused by the project presented clearly by the project environmental consultant. & We agree with these mitigation measures. However, during construction phase of old projects, contractors did not conform/ comply with mitigation measures recommended by the Consultant in IEEs/EIAs. So that, environmental supervision during construction phase should consider properly

-The Consultant should analyze clearly advantages and disadvantages in every aspect of each option. The connection solution to commercial centers should be studied carefully on the function of the plot, the selected basis should be more clear.

g) Disabled Group Meeting (Stations: 5,7,8,9)

See comments from Station 5

Name of District: Dong Da
Number of participants: 66 (M :43; F: 23)

Station 10: Cat Linh
Name of Commune/Town/Ward: Cat Linh Ward

Existing environmental condition

Station No 10 located on Cat Linh Street

In the left side: PULMAN Hotel (Before Horision Hotel), Buildings, Supermarket, Sanitation Equipment Stores…

In right side: Cat Linh Secondary Scholl, Material Construction and Sanitation Equipment Stores…

Only some Flamboyant/ Royal Poinciana trees on the both sides

Temple & Pagoda: no temple & pagoda around station area; only Cat Linh Pagoda located in right alley of Cat Linh street, about 100 m to the station

Environmental impacts and mitigation measures

a)

-Increase dust, noise

- Increase waste water & solid from the sites (included from construction site and workers ;)

-Traffic jam (significant level)

- Affect to business services of, stores

inconvenient travelling on the road & access to PULMAN Hotel, especially Cat Linh Secondary School

Affected time: during construction & may operation phase

b)

- Temporary road to access the two schools, Buildings, Supermarket, Sanitation Equipment Store, Hotes should be provided by Contractor
- Dust and noises must be mitigated during construction
- Construction time should be widely announced beforehand
- Recovery of ground surfaces in the project area after construction completion as before construction
- This area often occur inundation in the rainy season, after heavy rain with deep 0.2-0.3 m in depth, inundated time is about 3-4 hours (interview Ms Ngan at 33 Cat Linh Street)

c)

- Agreed with the Consultant to hold this Consultation workshop, to take people's interests into account.

- Agreed & welcome with the Project. It's requested that the Consultant should change from "Resettlement and Compensation policy framework" into "Resettlement and Compensation policy and legal document updated".
-The Consultant should give suitable solution during construction to
ensure traffic in peak hours for pupils to come and leave from the school. It's proposed that construction to be carried out during night time (At school finish time : total pupils of two Schools: primary & secondary schools are about 2500 pupils and also about 2500 pupil's fathers /mothers come to collect pupils)
- The solution proposed by the Consultant is quite detailed, scientific and appropriate. However, there are always so many differences between design and construction such as: quantity arising, environmental/social impacts on people. In one case for example, the bus-stop was arranged at the waste gathering point. It's requested that construction must cooperate closely with localities to complete properly and to find solution for environmental/social impacts supervision.
- The contractors should comply with mitigation measures recommended by the project environmental consultant & described in IEE

e)Community Focus Group (Stations 8,10,11)
See comments from Station 8

Station 11: Van Mieu
Name of Commune/Town/Ward: Van Mieu & Van Chuong Wards

Existing environmental condition
Station No 11 located on Van Chuong Ward
In the left side: Temple of Literature/Oldest University, Hanoi Investment & Planning Department
In right side: mostly Small shops, Stores
Side walk /Pavement is narrow 2.0-2.5 m
There are many big trees in Van Mieu/ Oldest University, and small trees in the both sides
Temple & Pagoda: Temple of Literature about 20 m , Pho Giac Pagoda about 30 m

Environmental impacts and mitigation measures
a)
-Increase dust, noise
- Increase waste water & solid from the sites (included from construction site and workers ;)
-Traffic jam (significant level)
- Affect to business services of, stores
inconvenient travelling on the road & access to Temple of Literature/Oldest University, Hanoi Investment & Planning Department
Affected time: during construction & may operation phase
b)
- Temporary road to access the
Temple of Literature/Oldest University, Hanoi Investment & Planning Department, shops should be provided by Contractor
- Dust and noises must be mitigated during construction
- Contractors should widely announced start & ending construction time to communities
- Construction time should be ensured on schedule, not last more time
- This area often occur inundation in the rainy season, after heavy rain with deep 0.4-0.5 m in depth, inundated time is about 10-12 hours hours (interview at 35 Quoc Tu Giam & Alley 25-27, Quoc Tu Giam Street)
c)
- Agreed with the Consultant to hold this Consultation workshop, to take people's interests into account.
- Agreed & welcome with the Project. It's requested that the Consultant should change from "Resettlement and Compensation policy framework" into "Resettlement and Compensation policy and legal document updated".
- The solution proposed by the Consultant is quite detailed, scientific and appropriate. However, there are always so many differences between design and construction such as: quantity arising, environmental/social impacts on people. It's requested that construction must cooperate closely with localities to complete properly and to find solution for environmental/social impacts supervision
e)Community Focus Group (Stations 8,10,11)
See comments from Station 8

Name of District: Hoan Kiem
Number of participants: 29 (M :21; F: 8)

Station 12: Hanoi RW Station
Name of Commune/Town/Ward: Cua Nam Ward
Existing environmental condition
Station No 12 located on Tran Hung Dao Street
Both of two sides : Buildings (Capital Tower, other buildings), Banks (GP Bank, Viettin Banks..) and Hanoi Train Station is the North of the Station
There are Banian big trees very closed on the station
Temple & Pagoda: no temple & pagoda around station area
Dust pollution & noise due to vehicle actives and building construction
Environmental impacts and mitigation measures
a)
- Increase dust, noise
- Increase waste water & solid from the sites (included from construction site and workers ;)
-Traffic jam (significant level)
- Affect to business services of, stores
inconvenient travelling on the road & access to Buldings, Hanoi Train Station
Some Tree may be affected
Affected time: during construction & may operation phase
b)
- Temporary road to access the buildings, Hanoi Train Station should be provided by Contractor
- Dust and noises must be mitigated during construction
- Construction time should be widely announced beforehand
- Compensation policy for affected business households should be done properly & satisfactory
(interview Mr Chinh – Train Driver , live in this area 45 years ; Mr Duc-Motobile Taxi Driver, live in this area 44 years – in Hang Co Alley –Tran Hung Dao Street)
c)
-Basically agreed with issues presented by the Consultant
-In the Project area, there are many high buildings, current traffic flow is very high, therefore parking areas should be designed carefully, whether it's underground or on ground.
- Regarding transport connection, we need more detailed information about connection solution so to give detailed comment because the Culture Palace's feature is sometime the roads must be blocked due to special meetings, festivals…; After studying the design solution, we will report to Vietnam General Confederation of Labour (the agency in charge) for giving comments on option selection
d) Gender meeting
- Dust and noises, vibration must be mitigated during construction, especially in residential area
-The contractors must ensure sanitation during construction period, materials waste and solid waste from workers must be immediately transported to waste disposal site

6. Pictures and List of Participants in Public Consultation Meetings

Public Consultation Meeting at Tu Liem District, January 14, 2013 *for Location of Station 1,2,3,4*

Public Consultation Meeting at Cau Giay District , Jan 15, 2013 *for Location of Station 5,6,7*

Public Consultation Meeting at Ba Dinh District, Jan 24, 2013 *for Location of Station 8,9*

Public Consultation Meeting at Dong Da District , Jan 18 2013*for Location of Station 10,11*

Public Consultation Meeting at Hoan Kiem District , Jan 16 2013*for Location of Station 12*

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Project: TA No 7894 - VIE: Strengthening Sustainable Urban Transport for Hanoi Metro Line 3 Project

LIST OF PARTICIPANTS – Tu Liem District.

Seq	Name	Male/ Female	Position		Signatures
I	SỞ GIAO THÔNG VẬN TẢI				
II	SỞ TÀI NGUYÊN MÔI TRƯỜNG				
III	TRUNG TÂM PHÁT TRIỂN QUỸ ĐẤT HÀ NỘI				
IV	TRUNG TÂM QUẢN LÝ ĐIỀU HÀNH GIAO THÔNG ĐÔ THỊ				
	Phan Thế Toàn	Nam	PGĐ Trung tâm		
	Nguyễn Hữu Quang	"	P.P Khoa học Công nghệ		
V	ỦY BAN NHÂN DÂN HUYỆN				
	Nguyễn Thu Hường	Nữ	PP Quản lý đô Thị		
	Phạm Đăng Thiều	Nam	PP kinh tế		
	Lê Thị Nông	Nữ	Đài phát thanh Huyện		
	Nguyễn Thị Đào	"	VP UBND Huyện		
	Nguyễn Tuấn Anh	Nam	phòng QLĐT		
	Phạm Công Thắng	"	phó phòng TNMT		
	Đỗ Anh Tuấn	"	Trưởng phòng QLĐT		
	Nguyễn Văn Vinh	"	phó Chủ Tịch UBND		
VI	ỦY BAN NHÂN DÂN CÁC XÃ				
	Trần Mạnh Hùng	Nam	chủ tịch TT Cầu Diễn		
	Nguyễn Xuân Tiến	"	phó Bí thư Đảng ủy xã Xuân phương		
	Đỗ Công Thắng	Nữ	phó CT xã Xuân phương		
	Nguyễn Quang Diễn	M	phó chánh VP UBND Huyện		
	Nguyễn Hữu Tuyên	M	chánh VP UBND Huyện		
	Đinh Thị Cẩm Thuy	F	cán bộ Thanh tra UBND Huyện		
	Nguyễn Văn Bình	M	CV phòng QLĐT Huyện		

VII	CÁC TỔ CHỨC CÁ NHÂN BỊ ẢNH HƯỞNG VÀ CỘNG ĐỒNG DÂN CƯ			
	Phí Lệ Bích	Nam	Chủ tịch Hội phụ nữ	[signature]
	Ng Văn Lý	"	Chủ tịch Xã Minh Khai	[signature]
	Hoàng Đức Bằng	"	Phó Bí thư Đảng Cở Nguyên Xá Minh Khai	[signature]
	Nguyễn Trọng Hát	"	Trưởng Thôn Nguyên Xá Minh Khai	[signature]
	Nguyễn Trọng Bảy	"	Bí Chi Bộ Thôn Nguyên Xá Minh Khai	[signature]
	Nguyễn Khắc Đảy	"	Trưởng Cụm Dân cư Số 32 Minh Khai	[signature]

IX Vũ Vân Anh Nữ Advocated consultant team [signature]

IX Trương Quốc Toàn Nam Trợ lý giám đốc IMV [signature]

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LIST OF PARTICIPANTS - CAU GIAY DISTRICT

Seq	Name	Male/ Female	Position		Signatures
I	DOT/SỞ GIAO THÔNG VẬN TẢI				
II	DONRE/SỞ TÀI NGUYÊN MÔI TRƯỜNG				
III	HA NOI LAND FUND DEVELOPMENT CENTER/TRUNG TÂM PHÁT TRIỂN QUỸ ĐẤT HÀ NỘI				
	Trần Đình Chiến	M	Trưởng Trạm Quỹ Đất		
IV	TRAMOC/TRUNG TÂM QUẢN LÝ ĐIỀU HÀNH GIAO THÔNG ĐÔ THỊ				
	Phan Thế Toàn	M	phó giám đốc Tramoc		
	Thái Hải Linh	F	Chuyên viên Tramoc		
V	DISTRICT/ỦY BAN NHÂN DÂN QUẬN				
	Nguyễn Công Nguyên	M	MTTQ quận		
	Đỗ Minh Lam	F	Hội phụ nữ Quận		
	Trần Trọng Đỉnh	M	CT Hội cựu chiến binh Quận		
	Nguyễn Thu Hiền	F	Hội phụ nữ Quận		
Trần	~~Nguyễn~~ Việt Hà	M	phó CT UBND Quận		
	Hoàng Trung Kiên	M	Phòng TNMT		
	Nguyễn Thanh Tuyên	M	Trưởng phòng QLĐT		
	Lê Sỹ Thanh Tùng	M	CV phòng QLĐT		
	Lê Thị Thảo	F	CV VP UBND		
	Nguyễn Văn	M	CV phòng QLĐT		

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LIST OF PARTICIPANTS - CAU GIAY DISTRICT

Seq	Name	Male/ Female	Position		Signatures
I	DOT/SỞ GIAO THÔNG VẬN TẢI				
II	DONRE/SỞ TÀI NGUYÊN MÔI TRƯỜNG				
III	HA NOI LAND FUND DEVELOPMENT CENTER/TRUNG TÂM PHÁT TRIỂN QUỸ ĐẤT HÀ NỘI				
	Trần Đình Cường	M	Trung tâm Quỹ Đất		
IV	TRAMOC/TRUNG TÂM QUẢN LÝ ĐIỀU HÀNH GIAO THÔNG ĐÔ THỊ				
	Phan Thế Toàn	M	phó giám đốc Tramoc		
	Thái Bội Linh	F	Chuyên viên Tramoc		
V	DISTRICT/ỦY BAN NHÂN DÂN QUẬN				
	Nguyễn Công Nguyên	M	MTTQ quận		
	Đỗ Minh Lam	F	Hội phụ nữ Quận		
	Trần Trọng Đỉnh	M	CT Hội Cựu chiến binh Quận		
	Nguyễn Thu Hiền	F	Hội phụ nữ Quận		
Trần	~~Nguyễn~~ Việt Hà	M	phó CT UBND Quận		
	Hoàng Trung Kiên	M	Phòng TNMT		
	Nguyễn Thanh Tuyên	M	Trưởng phòng QLĐT		
	Lê Sỹ Thanh Tùng	M	cv phòng QLĐT		
	Lê Thị Thảo	F	cv VP UB		
	Nguyễn Văn	M	cv phòng QLĐT		

VI	WARDS/PHƯỜNG				
	Nguyễn Việt Hưng	M	phó CT UBND phường Địch Vọng		
	Trương Văn Chính	M	phó CT UBND phường Mai Dịch		
	Lê Văn Chi	M	CT HĐND phường Địch Vọng		
	Nguyễn Hồng Hà	F	phó bí UBND phường Địch Vọng		
	Nguyễn Thị Thảo	F	Bí thư Đảng ủy phường Mai Dịch		
	Nguyễn Thị Hay	F	CT Mặt Trận Tổ Quốc phường Mai Dịch		
	Lê Xuân Thái	M	CT HĐND phường Dịch Vọng Hậu		
VII	HOUSEHOLDERS/CỘNG ĐỒNG DÂN CƯ				
	Nguyễn Ngọc Khiêng	M	Tổ dân phố số 9 phường Dịch Vọng		
	Tạ Đăng Bình	M	Tổ dân phố số 3 phường Dịch Vọng		
	Phan Đăng Dũ	M	Tổ dân phố 4 phường Dịch Vọng		
	Nguyễn Văn Bình	M	UBND phường Dịch Vọng		
	Phan Thái Lợi	M	UBND Phường Dịch Vọng Hậu		
	Trương Thị Canh	F	Tổ dân phố 10 phường Dịch Vọng		
	Nguyễn Công Hải	M	Nhà hát Ca múa Mai Dịch		
	Nguyễn Hoàng Thắng	M	Đại Học Quốc gia HN		
	Nguyễn Quang Hồng	M	phó ban XD ĐHQG Hà Nội		
	Phùng Quang Thanh	M	phó chánh VP ĐHQG HN		
	Lý Minh	M	CVuên ĐHQG		
	Nguyễn Thanh Sơn	M	PD Tổng hợp Indochina		
VIII					
	Vũ Thị Vân Anh				

VI	WARDS/PHƯỜNG				
	Nguyễn Viết Dũng	M	Phó CT UBND phường Dịch Vọng		
	Trương Văn Chức	M	Phó CT UBND phường Mai Dịch		
	Lê Văn Chi	M	CT HĐND phường Dịch Vọng		
	Nguyễn Hồng Vân	F	Phó bí UBND phường Dịch Vọng		
	Nguyễn Thị Thảo	F	Bí thư Đảng ủy phường Mai Dịch		
	Nguyễn Thị Hằng	F	CT Hội Đồng Nhân dân phường Mai Dịch		
	Lê Xuân Chi	M	CT HĐND phường Dịch Vọng Hậu		
VII	HOUSEHOLDERS/CỘNG ĐỒNG DÂN CƯ				
	Nguyễn Ngọc Nhân	M	Tổ Dân phố số 9 phường Dịch Vọng		
	Tạ Đăng Bình	M	Tổ dân phố số 8 phường Dịch Vọng		
	Phan Đăng Đô	M	Tổ dân phố 4 phường Dịch Vọng		
	Nguyễn Văn Bình	M	UBMT phường Dịch Vọng		
	Phan Thế Kỷ	M	UBMT phường Dịch Vọng Hậu		
	Trương Thị Oanh	F	Tổ dân phố 20 phường Dịch Vọng		
	Nguyễn Công Hà	M	Nhà hát Ca Múa Nhạc Bột		
	Nguyễn Huy Thân	M	Đại Học Quốc gia HN		
	Nguyễn Quang Hưng	M	Phó ban XD ĐHQG Hà Nội		
	Phùng Quang Vinh	M	Phó chánh VP ĐHQG HN		
	Ngô Minh	M	CViên ĐHQG		
	Nguyễn Thường Sơn	M	ĐD Tòa nhà Indochina		
VIII					
	Vũ Thị Vân Anh				

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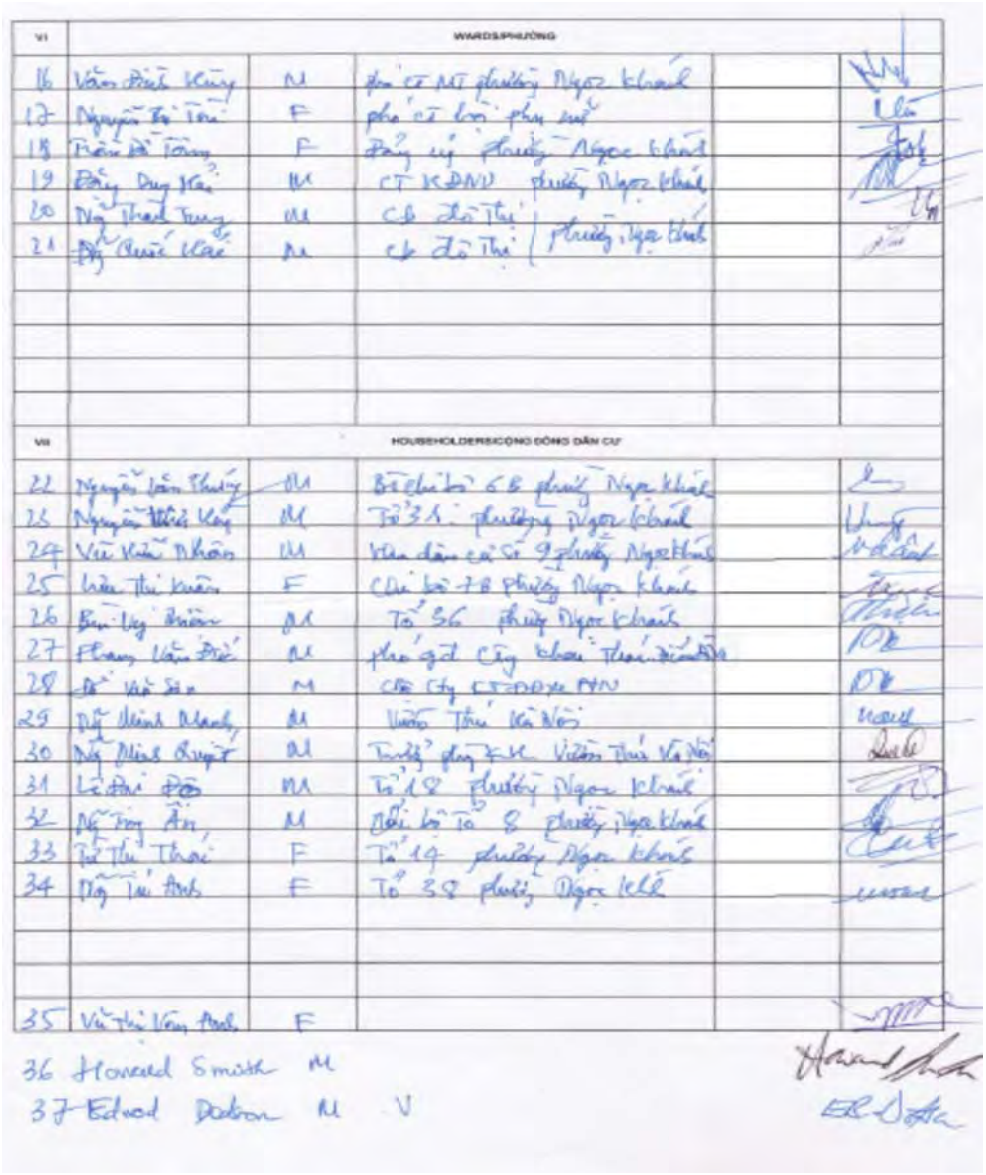
LIST OF PARTICIPANTS - Ba Dinh DISTRICT

Seq	Name	Male/ Female	Position		Signatures
I	DOT/SỞ GIAO THÔNG VẬN TẢI				
II	DONRE/SỞ TÀI NGUYÊN MÔI TRƯỜNG				
III	HA NOI LAND FUND DEVELOPMENT CENTER/TRUNG TÂM PHÁT TRIỂN QUỸ ĐẤT HÀ NỘI				
IV	TRAMOC/TRUNG TÂM QUẢN LÝ ĐIỀU HÀNH GIAO THÔNG ĐÔ THỊ				
1	Phan Thế Tùng	M	Phó giám đốc		
2	Nguyễn Hải Quang	M	Phó phòng KH công nghệ		
V	DISTRICT/ỦY BAN NHÂN DÂN QUẬN				
3	Nguyễn Minh Hằng	F	Hội phụ nữ		
4	Đào Văn Nghiệp	M	Hội cựu chiến binh		
5	Vũ Hồng Điệp	F	Chủ tịch MTTQ		
6	Nguyễn Việt Hà	M	Phòng TCKH		
7	Ngô Kiều Trung	M	CV phòng QLĐT		
8	Trần Đức Dũng	M	TP. QLĐT		
9	Bùi Thanh Bình	M	Phó phòng QLĐT		
10	Nguyễn Thị Thủy	M	CB Phòng QLĐT		
11	Lê Kim Điệp	F	Trưởng ban GPMB		
12	Nguyễn Quốc Thái	M	Ban Bồi thường GPMB		
13	Trần Chí Công	M	Phó phòng Tài chính kế hoạch		
14	Nguyễn Văn Hùng	M	Phó chánh VP UBND Quận		
15	Nguyễn Phi Long	M	Cán bộ VP UBND quận		



VI	WARDS/PHƯỜNG				
16	Vũ Đức Hùng	M	[illegible]		
17	Nguyễn Thị Tâm	F	[illegible]		
18	Trần Thị Tâm	F	[illegible]		
19	Đặng Duy Hải	M	[illegible]		
20	Nguyễn Thanh Tùng	M	[illegible]		
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23	Nguyễn Thế Vinh	M	[illegible]		
24	Vũ Văn Nhân	M	[illegible]		
25	Trần Thị Xuân	F	[illegible]		
26	Bùi Duy Thắng	M	[illegible]		
27	Phạm Văn Đức	M	[illegible]		
28	[illegible]	M	[illegible]		
29	Đỗ Minh Mạnh	M	[illegible]		
30	Đỗ Minh Quyết	M	[illegible]		
31	Lê Đại [illegible]	M	[illegible]		
32	Đỗ Tùng Ân	M	[illegible]		
33	Trần Thu Thuỷ	F	[illegible]		
34	Đặng Thị Anh	F	[illegible]		
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Project: TA No 7894 - VIE: Strengthening Sustainable Urban Transport for Hanoi Metro Line 3 Project

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	Phan Tiến Sang	M	"		
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	Lê Hải Bình	M	[illegible] ban CT MT phường Cát Linh		
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	Trần Anh Nam	M	Địa chính phường Quốc Tử Giám		
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	Vũ Hồng Thái	M	" 6C "		
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Appendix 6
COST OF ENVIRONMENTAL MONITORING

Estimated cost for Environmental Monitoring Unit : US$

Items	Unit price (US$)	Number of times/location	Number of points	Number of samples	Amount (US$)
Air quality (TSP, CO, NO2 and SO2	77	13	24	312	24,024.00
Noise	4.5	13	24	312	1,404.00
Water quality of surface water (Thu Le Lake)	75	13	2	26	1,950.00
Water quality of ground water	50	13	6	78	3,900.00
Soil	80	13	2	26	2,080.00
Labour Cost (	20	13	12	156	3,120.00
Car for travelling, handing samples	50	13	4	52	2,600.00
Writing reports	200	13			2,600.00
Total					41,678.00

Notes:

Frequency : Construction Phase 3 months / times, Operation Phase : 6 months/time

Number of times /location : 1 + 8 + 4 =12 times

- Before Construction : 1 time
- Construction Phase : total 24 months)/3 = 8 times
- Operation Phase : Total 24 months /6 = 4

Number of points to be measured & analysed :

- Air quality & noise : average 2 points/ station x 12 =24
- Surface water quality : average 2 points x 1 (only Thu Le Lake)
- Water quality of ground water 2 points /station x

Appendix 7
ASBESTOS GUIDELINES

Appendix 8 – Asbestos Guidelines

Guide to deal with Asbestos in existing building www.hsevn.com

1. Purposes

Provide guidance to the owner, manager or structures to implement the dissolution, except for a reduction of asbestos can help them manage and eliminate a asbestos is used in architectural works safely to protect the health of the people before the effects of a asbestos.

2. Things to note when using, maintaining and repairing structures

3. * Things to note when using, maintaining and repairing the structures to be applied in the case: the architecture of this building is a public building or place used to be many people at the same time, this works using equipment or materials containing asbestos.

*Mapping asbestos
- Owners of structures to investigate the equipment and materials containing asbestos oncentrations used in the mapping process and location of asbestos expression, distribution, type and extent of area it.
- The ownership structures once every three years to assess the accuracy of the maps asbestos and, when necessary, be supplemented by further investigation.

*The structures ownership have published maps have been established for asbestos manager or subtenant known, and in case of necessity to indicate warnings accompanying papers .

* The structures ownership or manager, every 6 months to assess the status of the equipment and materials containing asbestos . Where has the ability to melt or destroyed , depending on the regulations that must quickly carry out appropriate remedial measures such as a fixed surface , enclosed repair or elimination .

* In case of maintenance , repair structures with small -scale installations such as power lines repaired , the owner or manager of architectural have to give asbestos map to the repair worker. At the same time , the person in charge to do to repair the equipment or materials containing asbestos amount not to be destroyed or dispersed .

* Encourage the owner or manager of architecture are more trained on how to manage asbestos and asbestos scattered methods.

4. Things to note when conducting dissolution, elimination of asbestos in architecture works

* Things to note when dissolving, and eliminating asbestos in architecture works are applied to the architectural use of equipment or materials containing asbestos.

* The air surrounding the dissolution of the elimination of asbestos in architecture works shall not exceed 0.01 units / cc.

* To prevent the dispersal of asbestos when carrying out dissolution, elimination of asbestos in architecture works, should comply with the followings:
- Make Nm for devices or materials having asbestos prior to elimination and continuous maintenance of this warm for the rest of the process.
- Due to the use of paper (sheet) polyethylene is not likely to disappear, so the site for dissolution of asbestos removal must be completely covered and isolated.
- During the proceeding, the site for dissolution and elimination of asbestos need to maintain a negative pressure (pressure change in the sound of the audio in it).
Therefore, to maintain, it is requird to use high performance HEPA Filter in a negative pressure machine. # Filter HEPA is the high performance Filter that can get rid of 99.7% particles with 0.3µm size Need to verify the functionality of the negative pressure machine and HEPA tubes mounted in it.

In the time of the dissolution of the elimination of asbestos, it is necessary to measure the concentration of asbestos in the air around it and check if the site is enclosed or asbestos have been caught out or not. After the dissolution of asbestos elimination, to use a vacuum with hight features HEPA tube or cleaning by spraying Nm water to completely get rid of asbestos.Other notes about the dissolution and elimination of asbestos can follow the "Guidelines for the elimination of asbestos" set out by the Ministry of Labour.

* After the dissolution for asbestos removal and cleanup is complete, need to measure the concentration of asbestos at the site and check if the concentration of less than 0.01 units / cc or not.

5. Things to note about the site management where dissolution and elimination of asbestos occur

*Owners of buildings (or others) to specify who has the experience and knowledge of asbestos and the dissolution and elimination of asbestos is the supervisor of the dissolution of the elimination of asbestos (referred is the supervisor).

* The supervisor acts as follows.
- Evaluate the suitability of the plan to get rid of asbestos.
- Supervise the site if the work to get rid of asbestos has complied with environmental standards or not, and if necessary, an order to stop work and improve the site is required to prevent the dispersal of asbestos.
- In charge of compliance assessment and the degree of completion of the work plan of dissolution for asbestos removal.
- Manage and supervise the proper handling of asbestos waste.

* The supervisor must take responsibility when following problems arise.
- Generate ambient pollution problem because the supervisor is absent in the field works.
- Issues arising as waste disposal problems and not get rid of the equipment and materials containing asbestos.
- Generating pollution by asbestos after the completion of the dissolution and elimination of asbestos.
- Generate an accident due to the dispersion of asbestos pollution in the air in the surrounding area.

6. Things to note when handling asbestos waste

Asbestos waste arising upon the dissolution of the elimination of asbestos or asbestos-contaminated waste by, after having been Nm, need appropriate treatment according to the "Law on waste management" and can not be reused.

The pipe (filter) used in the negative pressure machine and the vacuum should be classified and treated as asbestos waste and not used again.

Asbestos waste after it is wrapped two times in the polyethylene must be stored in the appropriate box. When transporting asbestos waste must take action Nm for asbestos not dispersed and must be treated as measures to shield cover for car transportation of asbestos waste.

Appendix 8
GRIEVANCE INTAKE FORM

Grievance Intake Form

Name of Project

Project ____ welcomes complaints, suggestions, comments and queries regarding the project implementation and its stakeholders. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback.

Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing "(CONFIDENTIAL)" above your name.

Thank you.

Contact Information

Name		Gender	□ Male □ Female
Home Address		Age	
		Phone No.	
City/Province		Email	

Complaint/Suggestion/Comment/Question Please provide the details (who, what, where and how) of your grievance below:

How do you want us to reach you for feedback or update on your comment/grievance?

Portion to be filled in by the staff:

Date received:	
Received through:	__ In person __ mail __ email __ fax __ phone __ sms
Name of staff who receive comment/ complaint	
Position of staff:	
Type of Grievance:	
Remarks	
Signature of staff	

Update on the case:

Date:	Update

Appendix 9
MONITORING REPORT TEMPLATE

Project Semi-Annual Environmental Monitoring Report Outline

The borrower/client is required to prepare periodic monitoring reports that describe progress with implementation of the project EMP and site-specific EMP (SEMP) and compliance issues and corrective actions. A sample outline which can be adapted as necessary is provided below. Not all sections will be relevant in all cases. Ranking systems for compliance, mitigation effectiveness, etc., are indicative examples only, and can be modified as appropriate.

1. **Introduction**
   - 1.1. Report Purpose
   - 1.2. Project Implementation Progress
     - 1.2.1. On-going Site Works (description of current site works, location and target completion)
     - 1.2.2. Previous Activities (description of construction activities during the previous months: provide details of specific activities such as earthworks, vegetation clearing, spoils disposal, establishment of construction camp and other construction related facilities (e.g., concrete mixing plant, asphalt batching plant, crushing plant, etc.), establishment and operation of quarry/borrow areas, etc., including locations, schedules, dates, etc.
     - 1.2.3. Schedule of construction activities for the subsequent months (provide details similar to above)

2. **Compliance with ADB loan covenants and applicable government laws, regulations and requirements**

2.1. Status of compliance with ADB loan covenants: *provide a list of environmental loan covenants and specify level of compliance*)

2.2. Status of compliance with government environmental requirements: *provide a list of government environmental requirements (permits, etc.) for the project as well as construction-related facilities/ activities and specify level of compliance, indicate any required environmental permit/license/consent obtained to date and to be obtained (including schedule) for the project and construction related facilities/activities*

3. **Changes in project scope**

Such as change in alignment or footprint in case of horizontal infrastructure, implementation of additional Project component/s, etc. (with reference to the Project scope identified in the ADB-cleared environmental assessment report , i.e., IEE or EIA) and corresponding safeguard measures undertaken, if applicable

4. **Incorporation of Environmental Requirements into Project Contractual Arrangements**

Manner by which EMP requirements are incorporated into contractual arrangements, such as with contractors or other parties.

5. **Summary of Environmental Mitigations and Compensation Measures Implemented**

Based on EMP; may include measures related to air quality, water quality, noise quality, pollution prevention, biodiversity and natural resources, health and safety, physical cultural resources, capacity building, and others. *Provide a table/matrix showing a summary of each environmental mitigation measure specified in the EMP.*

EMP Requirement (list all mitigation measures specified in the EMP and SEMP)	*Compliance Attained (Yes, No, Partial)*	*Comment on Reasons for Partial or Non-Compliance*	*Issues for Further Action and Target Dates*
1.			
2.			
3.			
etc.			

6. Summary of Environmental Monitoring

6.1. Compliance Inspections

6.1.1. Summary of Inspection Activities

6.1.2. Mitigation Compliance[1]

6.1.3. Mitigation Effectiveness[2]

6.2. Emission/Wastewater Discharge (Source) Monitoring Program (*if relevant or required in the EMP*)

6.2.1. Summary of Monitoring

6.2.2. Results

6.2.3. Assessment[3]

---

[1] Overall compliance with mitigation implementation requirements could be described in qualitative terms or be evaluated based on a ranking system, such as the following:

1. Very Good (all required mitigations implemented)
2. Good (the majority of required mitigations implemented)
3. Fair (some mitigations implemented)
4. Poor (few mitigations implemented)
5. Very Poor (very few or no mitigations implemented)

Additional explanatory comments should be provided as necessary.

[2] Effectiveness of mitigation implementation could be described in qualitative terms or be evaluated based on a ranking system, such as the following:

1. Very Good (mitigations are fully effective)
2. Good (mitigations are generally effective)
3. Fair (mitigations are partially effective)
4. Poor (mitigations are generally ineffective)
5. Very Poor (mitigations are completely ineffective)

Additional explanatory comments should be provided as necessary.

[3] Discharge levels should be compared to the relevant discharge standards and/or performance indicators noted in the EMP. Any exceedences should be highlighted for attention and follow-up. In addition, discharge levels could be compared to baseline conditions (if baseline data is available) and described in qualitative terms or be evaluated based on a ranking system, such as the following:

1. Very Good (overall conditions are generally improved)
2. Good (conditions are maintained or slightly improved)
3. Fair (conditions are unchanged)
4. Poor (conditions are moderately degraded)
5. Very Poor (conditions are significantly degraded)

6.3. Ambient Monitoring Program, i.e., air quality, noise, water quality, etc. (*if relevant or required in the EMP*)

6.3.1. Summary of Monitoring

6.3.2. Results

6.3.3. Assessment[4]

7. Key Environmental Issues

7.1. Key Issues Identified (e.g., non-compliance to loan covenants, EMP and/or government environmental requirements, insufficient mitigation measures to address Project impacts, incidents, accidents, etc.)

7.2. Actions Taken and Corrective Action Plan (specify actions taken and corrective action plans to be implemented to address non-compliance and other identified issues. Such action plan should provide details of specific actions to be undertaken to resolve identified issues, responsible persons who will carry out such actions and timeframe/target date to carry out and complete required actions. The action plan could be presented in a tabular/matrix form (see below). Timeframe and responsibilities for reporting to ADB on the progress of implementation of corrective action plan should also be specified under this section.

Issue	*Cause*	*Required Action*	*Responsibility*	*Timing (Target Dates)*	*Description of Resolution and Timing (Actual)*
Old Issues from Previous Reports					
1.					
2.					
New Issues from this Report					
1.					
2.					

7.3. Additional Action Required

Additional explanatory comments should be provided as necessary.

[4] Ambient environmental conditions should be compared to the relevant ambient standards and/or performance indicators noted in the EMP. Any exceedences should be highlighted for attention and follow-up. In addition, ambient environmental conditions could be compared to the baseline conditions (if baseline data is available) and described in qualitative terms or be evaluated based on a ranking system, such as the following:

1. Very Good (overall conditions are generally improved)
2. Good (conditions are maintained or slightly improved)
3. Fair (conditions are unchanged)
4. Poor (conditions are moderately degraded)
5. Very Poor (conditions are significantly degraded)

Additional explanatory comments should be provided as necessary.

8. Complaints

8.1. Details of Complaint/s (Provide details of any complaints th at have been raised by the local population and other stakeholders regarding environmental performance and environmental impacts (complainant, nature of complaint, date complaint was filed, which office received the complaint, etc.)

8.2. Action Taken (Document how the complaints were addresse d or will be addressed by indicating the following:

i. names and designation of specific staff or officials within the Grievance Redress Committee, executing agency, project management unit, local government, contractor and/or supervision consultant involved in receiving, documenting, and resolving the complaint (s).

ii. specific actions taken to be taken to resolve the complaint and corresponding timeframe

9. Conclusion and Recommendation

9.1. Overall Progress of Implementation of Environmental Management Measures[5]

9.2. Problems Identified and Actions Recommended

9.3. Monitoring adjustment (recommende d monitoring modificatio ns based on monitoring experience/tre nds and stakeholders response)

Appendices

1. Site Inspection / Monitoring Reports
2. Source and Ambient Monitoring Results (Laborat ory Analysis)
3. Photographs
4. Location Map of Sampling Stations
5. Copies of Environmental Permits/Approvals
6. Filled-out Grievance Intake Forms
7. Minutes of meetings (as applicab le)
8. Other relevant information/documents

[5] Overall sector environmental management progress could be described in qualitative terms or be evaluated based on a ranking system, such as the following:

1. Very Good
2. Good
3. Fair
4. Poor
5. Very Poor

Additional explanatory comments should be provided as necessary.

Appendix 10
LIST OF REFERENCES

REFERENCES

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