

Annex 12 EIA 報告書本編 (英文)



**VIETNAM RAILWAYS**  
Railway Projects Management unit

**ENVIRONMENTAL IMPACT ASSESSMENT REPORT**

**Hanoi Urban railway project**

**NGOC HOI – GIA LAM**

**(Project Investment Stage)**

**Ha Noi, 03-2012**

## TABLE OF CONTENT

<b>1. EXECUTIVE SUMMARY .....</b>	<b>10</b>
<b>2. INTRODUCTION .....</b>	<b>19</b>
2.1 PURPOSE OF THE REPORT .....	19
<b>3. PROJECT DESCRIPTION .....</b>	<b>20</b>
3.1 PROJECT BACKGROUND.....	20
3.2 PROJECT LOCATION .....	20
3.3 PROJECT CONTENTS.....	22
3.3.1 <i>Construction Scale</i> .....	22
3.3.2 <i>Railways</i> .....	22
3.3.3 <i>Stations</i> .....	22
3.3.4 <i>Bridges</i> .....	25
3.3.5 <i>Viaduct and Flyover Construction</i> .....	25
3.3.6 <i>Electrical Multiple Unit (EMU) or Locomotive works</i> .....	26
3.3.7 <i>Signal system</i> .....	27
3.3.8 <i>Power works</i> .....	27
3.3.9 <i>Plan for elevated line</i> .....	28
3.3.10 <i>Distribution line plan</i> .....	28
3.3.11 <i>Other works</i> .....	29
3.4 THE MATERIAL DEMAND AND MATERIAL MINES .....	30
3.4.1 <i>Work Amount</i> .....	30
3.4.2 <i>Material mines</i> .....	31
3.5 PROJECT PACKAGES, SCHEDULE, INVESTMENT PRICE AND CAPITAL SOURCES.....	32
<b>4. BASELINE SURVEY .....</b>	<b>37</b>
4.1 NATURAL ENVIRONMENT .....	38
4.1.1 <i>Topography and Geology</i> .....	38
4.1.2 <i>Climate</i> .....	38
4.1.3 <i>Hydrology</i> .....	42
4.1.4 <i>Water Quality</i> .....	44
4.1.5 <i>Air Quality</i> .....	49
4.1.6 <i>Noise and Vibration</i> .....	51
4.1.7 <i>Soil quality</i> .....	52
4.1.8 <i>Soil erosion and sediment</i> .....	53
4.1.9 <i>Subsidence</i> .....	54
4.1.10 <i>Protected Areas</i> .....	55
4.1.11 <i>Ecosystem</i> .....	55
4.1.12 <i>Landscape</i> .....	56
4.1.13 <i>Wastes</i> .....	57
4.2 SOCIAL ENVIRONMENT .....	58
4.2.1 <i>General Description of the Hanoi city</i> .....	58
4.2.2 <i>Thanh Tri district</i> .....	58

4.2.3 Hoang Mai district .....	62
4.2.4 Thanh Xuan district .....	66
4.2.5 Dong Da district.....	69
4.2.6 Hoan Kiem district.....	72
4.2.7 Ba Dinh district.....	77
4.2.8 Long Bien district.....	80
4.2.9 Landscape .....	84
4.2.10 Cultural/Social sensitive infrastructures.....	84
<b>5. LEGAL FRAMEWORK .....</b>	<b>85</b>
5.1 VIETNAM ENVIRONMENTAL LEGISLATION .....	85
5.1.1 The environmental laws and regulation.....	85
5.1.2 Other laws related to project construction.....	86
5.2 LEGAL DOCUMENTS AND APPROVALS FOR THE PROJECT.....	87
5.3 JBIC AND WORLD BANK ENVIRONMENTAL REGULATIONS AND STANDARDS....	87
<b>6. ANALYSIS OF ALTERNATIVES .....</b>	<b>90</b>
6.1 NO- PROJECT ALTERNATIVE.....	90
6.2 ALTERNATIVES TO RAILWAYS .....	90
6.3 ALTERNATIVES TO STATIONS.....	92
6.4 ALTERNATIVES TO FLYOVERS AND BRIDGES.....	92
6.4.1 Alternative to Flyovers.....	92
6.4.2 Alternative to Bridge.....	94
<b>7. SCOPING OF EIA AND STUDY METHODOLOGY .....</b>	<b>95</b>
7.1 SCOPING .....	95
7.2 METHODOLOGY TO CONDUCT THIS EIA .....	97
<b>8. IMPACTS &amp; MITIGATION MEASURES.....</b>	<b>99</b>
8.1 IMPACTS DURING DESIGN/PRE-CONSTRUCTION PERIOD .....	99
8.1.1 Impact on Resettlement .....	99
8.1.2 Impact on Livelihood Utilization of land and local resources .....	101
8.1.3 Impact on Existing social infrastructure and services .....	102
8.1.4 Impact on Socially vulnerable groups.....	102
8.1.5 Impact on Cultural/historical heritage .....	103
8.2 IMPACTS DURING CONSTRUCTION.....	103
8.2.1 Impact on Living and livelihood .....	103
8.2.2 Impact on Existing social infrastructure and services .....	104
8.2.3 Impact on Public Health and Infectious diseases.....	105
8.2.4 Impact on Working Environment .....	105
8.2.5 Impact on Soil erosion and Sediment.....	107
8.2.6 Impact on Hydrology .....	111
8.2.7 Global Warming .....	112
8.2.8 Impact on Air Quality.....	113
8.2.9 Impact on Water Quality.....	121
8.2.10 Subsidence .....	126
8.2.11 Waste.....	126
8.2.12 Noise and Vibration.....	129

8.2.13 Accident .....	133
8.3 IMPACTS AND MITIGATION MEASURES DURING OPERATION PERIOD .....	134
8.3.1 Impact on Public health .....	135
8.3.2 Impact on air quality .....	135
8.3.3 Impact on water quality .....	139
8.3.4 Impact on waste generation .....	146
8.3.5 Impact on Noise and Vibration .....	147
8.3.6 Impact on Accidents .....	150
<b>9. ENVIRONMENTAL MANAGEMENT PLAN .....</b>	<b>153</b>
9.1 ORGANIZATION FOR EMP .....	153
9.2 ENVIRONMENTAL MITIGATION PROGRAM .....	156
9.2.1 Mitigation measures in planning/preconstruction period .....	156
9.2.2 Mitigation measures in construction period .....	157
9.2.3 Mitigation measures in operation phase .....	161
9.3. ENVIRONMENTAL MONITORING PROGRAM .....	162
9.3.1 Air, water and soil monitoring program .....	162
9.3.2 Solid waste monitoring/management program .....	165
9.4 EMP COST .....	166
9.4.1 Budget for environmental treatment work .....	167
9.4.2 Cost of environmental inspection and monitoring .....	169
<b>10. PUBLIC CONSULTATIONS .....</b>	<b>173</b>
10.1 THE LEGAL REQUIREMENT FOR PUBLIC CONSULTATION .....	173
10.2 THE PURPOSES OF PUBLIC CONSULTATION .....	173
10.3 THE METHOD OF PUBLIC CONSULTATION ACTION .....	173
10.4 RESULTS OF PUBLIC CONSULTATIONS .....	174
<b>11. RECOMMENDATION TO VNR AND RPMU ON REVISING EIA REPORTS ...</b>	<b>181</b>
<b>REFERENCES .....</b>	<b>182</b>
<b>ANNEX A METHODOLOGY FOR NATURAL ENVIRONMENT COMPONENT ANALYSIS .....</b>	<b>183</b>
<b>PARAMETER .....</b>	<b>184</b>
<b>ANNEX B NOISE AND VIBRATION RESULTS .....</b>	<b>188</b>
<b>ANNEX C ENVIRONMENTAL PARAMETER ANALYSIS COST .....</b>	<b>194</b>
<b>ANNEX D PUBLIC CONSULTATION MINUTES OF MEETINGS .....</b>	<b>199</b>
<b>ANNEX E REPORT OF PUBLIC CONSULTATION .....</b>	<b>235</b>

## LIST OF TABLE

<b>Table 1.1 Summary of impacts and mitigations for planning, construction and operation periods.....</b>	<b>14</b>
<b>Table 3.1 List of districts and communes/wards in the project.....</b>	<b>20</b>
<b>Table 3.2 List of stations constructed in phase 1 and phase 2a.....</b>	<b>22</b>
<b>Table 3.3 Summary of work amount and material demand.....</b>	<b>30</b>
<b>Table 3.4 Bidding plan, schedule, price.....</b>	<b>33</b>
<b>Table 3.5 Overall schedule of Phase I and Phase II.....</b>	<b>36</b>
<b>Table 4.1 Characteristic of climate in Ha Noi weather station (1956-2006).....</b>	<b>39</b>
<b>Table 4.2 The velocity (m/s) and wind direction in Hanoi city (1957-2006).....</b>	<b>42</b>
<b>Table 4.3 Hanoi Rivers and canals.....</b>	<b>42</b>
<b>Table 4.4 Results of surface water monitoring at NM1-MN5 in the morning.....</b>	<b>45</b>
<b>Table 4.5 Results of surface water monitoring at NM1-MN5 in the afternoon.....</b>	<b>46</b>
<b>Table 4.6 Results of underground water monitoring at NN1 and NN2.....</b>	<b>48</b>
<b>Table 4.7 Results of underground water monitoring at NN1 and NN4.....</b>	<b>49</b>
<b>Table 4.8 Results of microclimate condition at Project area.....</b>	<b>50</b>
<b>Table 4.9 Results of air quality in the project area.....</b>	<b>50</b>
<b>Table 4.10 The average noise results of 7 locations.....</b>	<b>51</b>
<b>Table 4.11 The average vibration results of 7 locations.....</b>	<b>52</b>
<b>Table 4.12 Results of soil analysis.....</b>	<b>53</b>
<b>Table 4.13 Estimating bridge buttress erosion at Hong River.....</b>	<b>54</b>
<b>Table 4.14 Collection and classification of socio - economic norms of Thanh Tri district.....</b>	<b>59</b>
<b>Table 4.15 The land acquisition area and other affected facilities in Thanh Tri District.....</b>	<b>59</b>
<b>Table 4.16 The socio-economic situation in the Project area of Thanh Tri district.....</b>	<b>61</b>
<b>Table 4.17 Public health situation of Thanh Tri District.....</b>	<b>61</b>
<b>Table 4.18 Education and hygiene condition of Thanh Tri district.....</b>	<b>61</b>
<b>Table 4.19 Public works and infrastructure in the Project area of Thanh Tri district....</b>	<b>62</b>
<b>Table 4.20 Collection and classification of socio - economic norms of Hoang Mai district.....</b>	<b>62</b>
<b>Table 4.21 The land acquisition area and other affected facilities in Hoang Mai District.....</b>	<b>63</b>
<b>Table 4.22 The socio-economic situation in the Project area of Hoang Mai.....</b>	<b>64</b>
<b>Table 4.23 Public health situation in the project area of Hoang Mai district.....</b>	<b>65</b>
<b>Table 4.24 Education and hygiene condition in the project area of Hoang Mai district.....</b>	<b>65</b>
<b>Table 4.25 Public works and infrastructure in the Project area of Hoang Mai district..</b>	<b>66</b>
<b>Table 4.26 Collection and classification of socio - economic norms of Thanh Xuan district.....</b>	<b>66</b>
<b>Table 4.27 Land acquisition area and other affected facilities in Thanh Xuan District.....</b>	<b>67</b>

<b>Table 4.28 Collection table of socio-economic situation in the Project area of Thanh Xuan.....</b>	<b>67</b>
<b>Table 4.29 Public health situation of the project are of Thanh Xuan District.....</b>	<b>68</b>
<b>Table 4.30 Education and of Thanh Xuan district.....</b>	<b>68</b>
<b>Table 4.31 Public works and infrastructure in the Project area of Thanh Xuan district</b>	<b>69</b>
<b>Table 4.32 Population composition of the project area in Dong Da district .....</b>	<b>69</b>
<b>Table 4.33 Land acquisition area and affected infrastrucutes in the project area in Dong Da District.....</b>	<b>70</b>
<b>Table 4.34 The socio-economic situation in the Project area of Dong Da .....</b>	<b>71</b>
<b>Table 4.35 Public health situation in the project area of Dong Da district.....</b>	<b>71</b>
<b>Table 4.36 Education condition of the project area in Dong Da district.....</b>	<b>72</b>
<b>Table 4.37 Public works and infrastructure in the Project area of Dong Da district .....</b>	<b>72</b>
<b>Table 4.38 Collection and classification of socio - economic norms of Hoan Kiem district.....</b>	<b>73</b>
<b>Table 4.39 The land acquisition area and affected facilities of the project area in Hoan Kiem District.....</b>	<b>74</b>
<b>Table 4.40 Collection table of socio-economic situation in the Project area of Hoan Kiem.....</b>	<b>75</b>
<b>Table 4.41 The Public health situation of the project area in Hoan Kiem district.....</b>	<b>75</b>
<b>Table 4.42 The education data of the project area in Hoan Kiem district.....</b>	<b>76</b>
<b>Table 4.43 Public works and infrastructure in the Project area of Hoan Kiem district..</b>	<b>77</b>
<b>Table 4.44 The Population composition of the project area in Ba Dinh district .....</b>	<b>77</b>
<b>Table 4.45 The land acquisition area and affected facilities of the project area in Ba Dinh District.....</b>	<b>78</b>
<b>Table 4.46 The socio-economic data in the Project area of Ba Dinh District.....</b>	<b>78</b>
<b>Table 4.47 Public health situation of Ba Dinh District .....</b>	<b>79</b>
<b>Table 4.48 Education condition of Ba Dinh district .....</b>	<b>79</b>
<b>Table 4.49 The public works and infrastructures in the Project area of Ba Dinh district .....</b>	<b>80</b>
<b>Table 4.50 The population composition of the project area in Long Bien district.....</b>	<b>80</b>
<b>Table 4.51 The land acquisition area and affected facilities of the project area in Long Bien District.....</b>	<b>81</b>
<b>Table 4.52 The socio-economic situation in the Project area of Long Bien District.....</b>	<b>82</b>
<b>Table 4.53 Public health situation of Long Bien District .....</b>	<b>82</b>
<b>Table 4.54 The education condition of the project area in Long Bien district .....</b>	<b>83</b>
<b>Table 4.55 Public works and infrastructure in the Project area of Long Bien district... </b>	<b>83</b>
<b>Table 4.56 The Cultural/Social sensitive infrastructures along the railways .....</b>	<b>84</b>
<b>Table 5.1 Environmental Protection Law and associated documents .....</b>	<b>85</b>
<b>Table 5.2 Comparison of Environmental Assessment between Vietnam regulations, JICA and World Bank.....</b>	<b>88</b>



<b>Table 6.1 Comparison of number of removed households and land acquisition of 4 railway options.....</b>	<b>92</b>
<b>Table 7.1 Environmental impact matrix.....</b>	<b>95</b>
<b>Table 8.1 Time comparison of moving vehicles .....</b>	<b>99</b>
<b>Table 8.2 The resettlement households and people in the whole project.....</b>	<b>100</b>
<b>Table 8.3 Compensative coefficient for high buildings with many households.....</b>	<b>101</b>
<b>Table 8.4 Estimating bridge buttress erosion at Hong river .....</b>	<b>108</b>
<b>Table 8.5 Fuel consumption level of construction equipment.....</b>	<b>112</b>
<b>Table 8.6 Air pollutants load in bridge construction process.....</b>	<b>113</b>
<b>Table 8.7 Truck flow during ground clearance .....</b>	<b>114</b>
<b>Table 8.8 Emission of pollutants from a lorry during 1000km distance.....</b>	<b>114</b>
<b>Table 8.9 The pollution load of air pollutants for one hour.....</b>	<b>114</b>
<b>Table 8.10 Pollution load with truck.....</b>	<b>115</b>
<b>Table 8.11 Estimated pollution load during construction phase 1 and 2.....</b>	<b>116</b>
<b>Table 8.12 Affected groups by Air contamination .....</b>	<b>117</b>
<b>The Metrological data for calculation of total solid particulate (TSP) or dust are presented in Table 8.13 .....</b>	<b>117</b>
<b>Table 8.13 Metrological data for calculation .....</b>	<b>118</b>
<b>Table 8.14 Data for dust distribution calculation for phase 1 .....</b>	<b>118</b>
<b>Table 8.15 Data for calculation of dust distribution for phase 2.....</b>	<b>119</b>
<b>Table 8.16 Pollutants load in domestic waste water of 1and 100 persons per day.....</b>	<b>124</b>
<b>Table 8.17 Concentration of pollutants in construction wastewater.....</b>	<b>124</b>
<b>Table 8.18 Noise level from construction equipment, machines.....</b>	<b>129</b>
<b>Table 8.19 Calculated noise level from construction equipment, machines (dBA).....</b>	<b>130</b>
<b>Table 8.20 Calculated noise level from bridge construction equipment (dBA) .....</b>	<b>130</b>
<b>Table 8.21 Vibration from bridge construction equipment (dBA).....</b>	<b>133</b>
<b>Table 8.22 Sources of air pollution from the locomotive and coach repairing factories .....</b>	<b>135</b>
<b>Table 8.23 The number of railroad cars until 2030.....</b>	<b>136</b>
<b>Table 8.24 Load and concentration of pollutants in domestic waste water at Gia Lam station.....</b>	<b>140</b>
<b>Table 8.25 Number of passengers in the national stations.....</b>	<b>140</b>
<b>Table 8.26 Pollutant load and the total amount of waste water volume for year 2020 and 2030 in Ngoc Hoi and Giap Bat stations.....</b>	<b>141</b>
<b>Table 8.27 Pollutant load and the total amount of waste water volume for year 2020 and 2030 in Ha Noi and Gia Lam Station.....</b>	<b>141</b>
<b>Table 8.28 Concentration of pollutants in productive wastewater .....</b>	<b>143</b>
<b>Table 8.29 Quality and Component of domestic waste water (after treatment).....</b>	<b>144</b>
<b>Table 8.30 Noise level at elevated section in operation period.....</b>	<b>148</b>
<b>Table 8.31 Estimative result of vibration during operation phase.....</b>	<b>149</b>

<b>Table 9.1 Roles and responsibilities of the organizations in environmental management when implementing the project HURC1.....</b>	<b>155</b>
<b>Table 9.2 Mitigations measures implementation/supervision responsibility during planning period.....</b>	<b>156</b>
<b>Table 9.3 Mitigations measures and implementation/supervision responsibility during construction phase.....</b>	<b>158</b>
<b>Table 9.4 Mitigations measures and implementation/supervision responsibility during operation period.....</b>	<b>161</b>
<b>Table 9.5 The names of monitoring locations.....</b>	<b>163</b>
<b>Table 9.6 The parameters, frequency and number of monitoring location and standards.....</b>	<b>164</b>
<b>Table 9.7 Budget for environmental treatment work in the construction period.....</b>	<b>167</b>
<b>Table 9.8 Budget for environmental treatment work in the operation phase.....</b>	<b>168</b>
<b>Table 9.9 Cost of environmental supervision and monitoring.....</b>	<b>170</b>
<b>Table 9.10 Cost for monitoring.....</b>	<b>171</b>
<b>Table 10-1 Summary of Public Meetings during EIA 2008 .....</b>	<b>174</b>
<b>Table 10.2 Comments from district/ communal authorities by written communications in 2008 and 2010 .....</b>	<b>176</b>

## LIST OF FIGURE

<i>Figure 3.1 Alignment of Ha Noi City Urban Railway constructions Project Line 1 (phase 1 and phase 2a)</i> .....	21
<i>Figure 3.2 Perspective of Ngoc Hoi Station Complex</i> .....	23
<i>Figure 3.3 Perspective of new Long Bien, balanced solid rib arch</i> .....	25
<i>Figure 4.1 Monitoring locations of environmental parameters</i> .....	37
<i>Figure 4.2 Annual temperature variations in Lang Station-Hanoi</i> .....	39
<i>Figure 4.3 Annual humidity variations in Lang Station-Hanoi</i> .....	40
<i>Figure 4.4 Average number of monthly rainy days in Lang Station-Hanoi</i> .....	41
<i>Figure 4.5 Annual rainfall distribution in Lang Station-Hanoi</i> .....	41
<i>Figure 4.6 Layer profile of South and North Area of Ngoc Hoi Complex</i> .....	55
<i>Figure 6.1 Option 1a for railways</i> .....	90
<i>Figure 6.2 Option 1b for railways</i> .....	90
<i>Figure 6.3 Option 2a for railways</i> .....	91
<i>Figure 6.4 Option 2b for railways</i> .....	91
<i>Figure 8.1 The slope embankment</i> .....	110
<i>Figure 8.2 Distribute TSP (dust) in summer - phase 1</i> .....	118
<i>Figure 8.3 Distribute TSP (dust) in winter - Phase 1</i> .....	119
<i>Figure 8.4 Distribute TSP (dust) in summer –phase 2</i> .....	119
<i>Figure 8.5 Distribute TSP (dust) in winter –phase 2</i> .....	120
<i>Figure 8.6 Anaerobic septic tank design</i> .....	143
<i>Figure 8.7 Sketch of the circulatory water supply system</i> .....	145
<i>Figure 8.8 Concentrated waste water treatment system</i> .....	146
<i>Figure 8.9 Rainwater drainage system of stations and enterprises</i> .....	146
<i>8.3.4 Impact on waste generation</i> .....	147
<i>Figure 8.10 Representative cross-section of the viaduct bridge</i> .....	149
<i>Figure 9.1 Project Management Structure and Environmental Protection Responsibility</i> .....	156
<i>Figure 9.2. Solid waste classification procedures of the engine and wagon car repair enterprises</i> .....	166

## ABBREVIATION

ATP	Automatic Train Protection system
BOD <sub>5</sub>	Biological Oxygen Demand
COD	Chemical Oxygen Demand
CEPT	Center for Scientific Technology and Environmental Protection in Transport
CMS	Centralized Monitoring System
CPC	Commune People Committee
DO	Dissolve Oxygen
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMU	Electrical Multiple Unit
FFC	Fatherland Front Committee
F/S	Feasibility study
JICA	Japan International Cooperation Agency
JBIC	Japan Bank for International Cooperation
JPY	Japanese yen
HURC1	Hanoi Urban railway Construction 1
MONRE	Ministry of Natural Resource and Environment of Vietnam
RPMU	Railway Projects Management Unit;
PC	People Committee
TCD	Track Circuit for Dual gauge
TCS	Track Circuit for Single gauge
TDS	Train Detection System
TID	Traffic Information Display system
TRICC-JSC	Transport investment and construction consultant joint stock company
VNR	Vietnam Railways
VND	Dong Viet nam
WB	World Bank
WHO	World Health Organization

## 1. EXECUTIVE SUMMARY

### **Purpose of this EIA report**

This EIA report has been written based on information from the EIA report for Hanoi Elevated Railway Project Ngoc Hoi – Yen Vien section (the former name of present name “Hanoi Urban Railway Construction 1-HURC1) compiled in 2008 and the Report on Supplemental EIA in 2011, which addressed changes and adjustments of the project location and scope.

The HURC1 is divided into 3 phases. Phase 1 includes railway between Giap Bat and Gia Lam, Long Bien Bridge, Ngoc Hoi Complex and Gia Lam Station. Phase 2a includes railway section between the new Giap Bat station and new Ngoc Hoi complex. Phase 2b includes railway section between the new Gia Lam Station and Yen Vien and Yen Vien Complex. This EIA report is for phase 1 and phase 2a, which refers afterward as “Project.” The project is expecting to be financed by Yen-Loan through Japan International Cooperation Agency (JICA).

This EIA report is compiled for review by JICA. The JBIC Guidelines for Confirmation of Environmental and Social Considerations (2002) is applied to this Project. However, since JICA has issued the new Guidelines in 2010, after merging with JBIC, the new guidelines are also referred wherever appropriate.

### **Project description**

The project is located within the urban area of Ha Noi city. The elevated railway will be constructed above the existing railway on the west side of Hanoi ancient city.

The construction work will include: the construction of 17.17 km railways (11.510 km of phase 1 and 5.66 km of phase 2a); 4 national stations, that include Ngoc Hoi complex with NIT and UT passenger station, freight station, repair shops and locomotive work, signal system, power substation and telecommunication system for the construction and operation of the project; 8 intermediate stations (5 in phase 1 and 3 in phase 2a); 1 bridge over Red river, viaducts (including guide-ways); 5 flyovers. The project will also include temporary road (Ngoc Hoi-Giap Bat), construction materials, excavation of 827,482 m<sup>3</sup> of soil, 6 borrow pits (soil, rock and sand/gravel), and auxiliary structures (construction camps, operation houses, storages and disposal fields).

### **The natural and social baseline condition**

Natural conditions: The Project Area from Ngoc Hoi to Gia Lam belongs to plains of To Lich River and Red River. The soil is clay and sand. This layer extends to 30 to 40 m depth. The soil conditions at the Ngoc Hoi complex area consist of a thick soft clay layer and alternating layers of soft clay and sand. Water table is shallow, about 1 to 2 m below from ground surface.

Hanoi is in a tropical climate with monsoon and humid hot climate with heavy rain and humidity and high air temperature in summer and dry, cold and relatively low air temperature

in winter. Hanoi often suffers from water-logged due to heavy, high-intensity and prolonged rain because of low capacity of drainage system.

The air, surface and ground water, soil quality along project area is generally unpolluted (it meets Vietnamese technical standards), except some water samples taken from ponds at Ngoc Hoi station.

Regarding soil erosion, sediments, Hanoi has even the natural elevation level of the topography and dense drainage system to collect all the runoff water into the sewage channels, that the soil erosion is not a serious problem. The sediment concentration in the Red river is very high, with an annual mean value of 1000 g/m<sup>3</sup>, and annual sediment discharge of the Red River is 114 million ton, thus construction of Long Bien bridge has only little impact comparing with this baseline condition.

Subsidence can be occurred at Ngoc Hoi Complex, which lies on swamp and soft ground. Therefore, a significant ground improvement must be completed prior to construction of the Complex.

There's no protected area within and around Hanoi Urban Railway Construction Project line 1. The biodiversity, both terrestrial and aquatic ecosystem in the project area is very poor. Flora and fauna mainly include agricultural crop species and domestic animals. No rare or endangers species are found in the project area

*Social conditions.* The project area is speeded along 7 districts namely Thanh Tri, Hoang Mai, Thanh Xuan, Dong Da, Hoan Kiem, Ba Dinh and Long Bien. There are 105,561 households with 417,582 inhabitants in the project area. No ethnic minorities are in the project site.

Except Thanh Tri as rural district and Long Bien as new inner city district whose economy includes agricultural activities, the other five districts have their economy with commercial and industrial activities. Social conditions and infrastructures related to health (the number of hospital, sickbeds and medical staff) and education (the number of schools, teachers and students) transport and offices/business in all districts are quite good comparing with national standards.

### **Legal framework**

The Vietnam environmental legislation, regulations and standards applied in this project are: Legislation: Environment Protection Law, Biodiversity Law; Decrees: Decree 29/2011/ NĐ-CP, Decree 04/2009/ND- CP, Decree 117/2009/ND- CP, Decree 21/2008/ NĐ- CP, Decree, Decree 80/2006/NĐ- CP; and circulars and decision for detail implementation of laws and decrees. JBIC guidelines are also applicable to this project as well as JICA guidelines and WB policies as reference. The Vietnamese legal framework and the WB policies and JBIC guidelines are compared to confirm there is no large gap between them.

### **The project alternative**

The analysis of alternatives in terms of the project alignment, station design, bridge, flyovers and others as well as the zero option alternatives is summarized in section 6.

Alternatives to railways: There are four (4) alternatives (1a,1b, 2a, 2b). Alternative 1 saved investment cost and fitted better with future development planning. Among that alternative 1a and 1 b have the same number of removed households and land occupation, but the 1a save 1,250 billion dong for construction compare over 1b. Consequently alternative 1a has been selected for the railway alignment.

Alternatives to stations: Two options for types of station have been proposed and applied depending on specific location: 1) type of 3 story station with the average height from the ground of about 12-14m and 2) 2 story station with height of about 8-10m.

Alternatives to flyovers and bridges: Kim Lien and Nga Tu Vong flyover: Two options were proposed, but the box beam with 3 continuous spans is chosen because it does not bring much impact to the environment of the area.

Highway No.5 flyover : the option 1 heightened land road is chosen over option 2- heightened railway because it bring less significant impact and more suitable.

Ring Road No.3 flyover: The box beam DUL, 50.0 long designed for the higher part is chosen again the oval condensed pile for the lower part for its beter connection.

Red River Railway Bridge: option 2 was chosen which is 186m from the old Long Bien bridge over option 1 (with 30 m from the old Long Bien bridge) because it Avoid cutting through the old town; Do not cause great impact on the landscape and connect well to the bus system.

## **EIA scoping and methodology**

### EIA scoping

The impact factors and impacted items are presented in a matrix to identify the potential impacts during planning/preconstruction phase, construction phase and operation phase. It can be summarized as follows:

Planning phase: The land acquisition, loss of structure and crops cause significant or some adverse impacts to resettlement; living and livelihood; land use and local resources; existing social infrastructures and services; socially vulnerable groups (poor, minorities, etc.) and heritage (graves).

Construction phase: the impact factors are ground clearance; operation of vehicles and heavy equipment for construction; construction activity of station, elevated railway and others; traffic control; inflow of construction workers and establishment of construction bases. These cause some adverse impacts to living and livelihood; land use and local resources; working environment; air quality; water quality, hydrology, land erosion, noise and vibration; odor; wastes, global warming; accident; existing social infrastructures and services; public health; infectious diseases (AIDS/HIV)

Operation Phase: the presence of elevated railway, stations and other related structures could cause some adverse impact to: public health; wastes; noise and vibration; accident.

## EIA methodology

In order to conduct this EIA both the secondary and primary data on natural environment and social data were needed. The followings are methods used to obtain those data:

- Data collection: Collecting existing data and information on natural and socioeconomic conditions from literatures, database, reports, website, etc.
- Social-economic survey: This is applied in interviews to gain the comments from local authorities and people in the project area.
- Inventory and statistics method: This is to collect and process the data of hydrometeorology and socio-economy in project area.
- Site-visit survey and sampling methods: This is to determine the locations of measurement and sampling for environmental parameters that serve for analyzing and accessing the environmental quality in project area.
- Method of data analysis and process in laboratory: This is to analyze the environmental parameters that serve as baseline data and to assess the environmental impact in project area.
- Comparison Method: This is to evaluate the environmental impacts and compare with Vietnam environmental standards (TCVN and QCVN)
- Rapid assessment method: This method has been developed by World Health Organization (WHO) in order to estimate the pollution load of dust, exhaust gases and wastewater for assessment of environmental impact of the project.
- Modeling Method: This is to calculate and predict the average concentration of pollutants from the waste sources in project area.
- Matrix method: This is to build the interactive matrix between the construction activities, operation process and the impacts on the environmental aspects in order to consider many impacts at the same time.
- Method of synthetic analysis and set up the report: This is to analyze and synthesize the project impacts on the environmental natural and socio-economic components in the project area.

## **Impact and mitigation measures**

The main impacts and mitigations for three periods are summarized in Table 1.1. Some of the mitigation measures are added as recommendations to improve those provided in the existing EIA reports.



**Table 1.1 Summary of impacts and mitigations for planning, construction and operation periods**

<b><i>Impacted Items/Impact</i></b>	<b><i>Mitigations measures</i></b>
<b>Planning period</b>	
<p><u>Resettlement:</u> Resettlement of about 2325 households. About 123ha of land is acquired.</p>	<ul style="list-style-type: none"> <li>· General Land Acquisition Plan in accordance with the Vietnamese law and regulations.</li> <li>· Commit all principle and regulation of the State of Vietnam, the People Committee of Hanoi as well as policy on land revetment and resettlement of residents who are affected by space taking process.</li> <li>· Provide fully financial expense for removing constructions as presented at the Chapter IV.</li> <li>· RAP should be prepared and implemented in accordance with the JBIC guidelines (2002), JICA guidelines (2010), WB safeguard policies and the Vietnamese law and regulations.</li> </ul>
<p><u>Living and Livelihood</u> Affected households' living and livelihood may be affected.</p> <p><u>Socially vulnerable groups</u> Affected households may include socially vulnerable groups</p>	<ul style="list-style-type: none"> <li>· Compensate for material damage in accordance with the Decree 197/2004/ND-CP of the Prime Minister and Decision 26/2005/QD-UB of the People Committee of the Hanoi City.</li> <li>· RAP prepared in accordance with the JBIC guidelines (2002), JICA guidelines (2010), WB safeguard policies and the Vietnamese law and regulations will include the rehabilitation program for affected households.</li> <li>· Residents who are losing their job will be retrained in order to find jobs that are suitable to their knowledge, ability.</li> <li>· To priorities recruiting people who are facing difficulties or job-less to work for this project.</li> <li>· Compensate material damage relating to farm produce and construction on the garden, farming area.</li> <li>· Prepare plans for assisting families with socially vulnerable group. Provide them financial and labor resources to move to new places and constructing new living places.</li> </ul>
<p><u>Utilization of land and local resources:</u> Land acquisition will affect the land use</p> <p><u>Existing social infrastructure and services</u> Utility lines need to be relocated</p>	<ul style="list-style-type: none"> <li>· Compensation in accordance with the Vietnamese law and regulations.</li> <li>· To compensate material damage relating to farm produce and construction on the garden, farming area</li> <li>· Compensation for the unharvest crop plants and livestock:</li> <li>· The houses and facilities of households and individuals shall be compensated equal to the new construction value of a house</li> <li>· The compensation will be paid based on the replacement cost.</li> <li>· Describe plan for relocation of utilities.</li> <li>· Provide suitable location for market, and public infrastructures to make convenience for local people</li> </ul>
<p><u>Cultural/historical heritage</u> 650 Graves need to be relocated</p>	<ul style="list-style-type: none"> <li>· The design of components like national station, urban station, overpass, bridges took architectural aspects as well as avoiding cultural/historical heritage sites into consideration so as the least impacts will be made.</li> <li>· Describe existing and on-going plan for the relocation</li> <li>· Provide financial support and suitable location for relocation of graves</li> </ul>
<b>Construction phase</b>	
<u>Living and livelihood and Existing</u>	<ul style="list-style-type: none"> <li>· Detailed traffic control</li> </ul>

<p><u>social infrastructure and services</u></p> <p>Construction activities, traffic controls around the construction site may affect local economic activities and affect the access to hospitals and schools. Construction activities may affect the utility services</p>	<ul style="list-style-type: none"> <li>· Cooperation with police and other authorities.</li> <li>· Large material storage should not be in the area of streets. Not to operate excavators, bulldozer, roller, pile-driving machine at night.</li> <li>· Construct a fence around the construction area, to provide stores for storing machines and necessary facilities; to build sentry-boxes and have security guards on duty all day (24/24h).</li> <li>· Check safety design measures in the initial report and final report of the feasibility study project.</li> <li>· Affected business should be properly assisted through the RAP implementation in accordance with the JBIC guidelines (2002), JICA guidelines (2010), WB safeguard policies and the Vietnamese law and regulations.</li> <li>· Provide suitable access to households living in the surrounding area</li> </ul>
<p><u>Public Health Infectious diseases ; Working Environment</u></p> <p>Inflow of workers may affect public health.</p>	<ul style="list-style-type: none"> <li>· Education on healthy living style.</li> <li>· Waste and waste water at the camp should be properly controlled. -Workers will be provided with accommodation with proper living condition</li> <li>· Risk prevention and safety measures to be taken for dangerous activities</li> <li>· Workers should receive education on personal hygiene and STD.</li> <li>· Health awareness including HIV/AIDS awareness program should be implemented</li> <li>· Compliance to Vietnamese labor code and other regulations to maintain the working place safe and healthy.</li> <li>· General safety measures for the construction works, such as provision of safety equipment, safety procedures, should be implemented.</li> <li>· To accommodate the needs of the workforce, the contractor should provide suitable housing, adequate supplies of potable water, and toilet and bathing facilities within the housing area. Onsite facilities for preparing food need to be provided, or food service contracted.</li> </ul>
<p><u>Land erosion and Hydrology</u></p> <ul style="list-style-type: none"> <li>· During construction of the bridge, the following may occur:</li> <li>· Increased sedimentation</li> <li>· Slope instability</li> <li>· Interference in the river flow.</li> </ul>	<ul style="list-style-type: none"> <li>· Minimize impacts by design and construction process.</li> <li>· Implement soil erosion and control measures at susceptible locations</li> <li>· Proper grading practices and water diversion structures</li> <li>· Maintain vegetation cover or apply concrete for slope embankment, etc.</li> <li>· Avoid construction of structure during flooding season.</li> <li>· Maintain vegetation cover for slope embankment.</li> <li>· Temporary drainage to prevent flooding</li> <li>· Occupying dyke for the working platform shall not exceed 1/3 of the flow section</li> <li>· Installation of rock or stabilization structures</li> <li>-The construction bridge's pile/abutment will be one by one so the impact on hydrology will be minimized</li> </ul>
<p><u>Air Quality and Global Warming</u></p> <p>Emission from vehicles and heavy machinery; Dust, emission from vehicles and heavy machinery, ground clearance, construction activities,</p>	<ul style="list-style-type: none"> <li>· Not to use too old vehicles and equipment to transport materials and use for construction.</li> <li>· Maintain regularly construction trucks and equipment to minimize exhausted gases</li> <li>· Implement technical measures to mitigate the pollution</li> <li>· Set up a plan of periodic inspection, maintenance, replacement or renovation of production plants and equipment on time to prevent pollutants and toxic substances from leaking out to the environment</li> </ul>
<p><u>Water Quality-Sediment</u></p> <p>Leak or spillage of water</p>	<ul style="list-style-type: none"> <li>· Location of mobilizing and placing construction equipment should be arranged far from the flow</li> </ul>

<p>pollutants, flowing of waste water into surface or ground water, run-off</p> <p>Alluvium, suspended solid could be built up at river bed during construction of bridge</p>	<ul style="list-style-type: none"> <li>· A temporary water guiding system around the construction area of bridge abutment and culverts will be provided to prevent the flood situation</li> <li>· Elevations of placing petrol tanks shall be higher than the flood water level</li> <li>· Prevent from penetrating concrete mortar, oil-bearing waste into the flow along with waste management, enough measures are in place, such as prevention of spillage or leak of oil, fuel, lubricant, location of equipment, waste water management, mudguard, etc.</li> <li>· Vegetation recovery shall be done soon in the vegetation lost areas.</li> <li>· The bridge piles in the river shall be constructed in dry season and the abutments at the two ends of the riversides shall be reinforced to prevent erosion..</li> </ul>
<p><u>Wastes</u></p> <p>Wastes from ground clearance, construction site and camp, and construction activities</p>	<ul style="list-style-type: none"> <li>· To minimize wastes produced in construction</li> <li>· Debris substances like broken brick, superfluous sand and soil which can be utilized for the leveling.</li> <li>· Waste can be recycled or reused</li> <li>· The domestic solid waste produced at the project area shall be collected and stored in proper bins.</li> </ul>
<p><u>Noise and Vibration</u> Noise and vibration nuisance to surrounding communities.</p>	<ul style="list-style-type: none"> <li>· Compliance with the Vietnamese regulations.</li> <li>· Control time and activities.</li> <li>· Use of equipment of low level noise.</li> <li>· Setting up fixed machine far from residence or sensitive areas.</li> <li>· Avoid using noise/vibration generating equipment at the same time.</li> <li>· Anti-noise walls, when necessary.</li> </ul>
<p><u>Accident</u> Accidents caused by not properly organized traffic.</p> <p>Accident during operation of heavy machinery, handling hazardous subsistence, etc. The project site is in the flood prone area.</p>	<ul style="list-style-type: none"> <li>· Detailed traffic control and accident prevention measures</li> <li>· Measures in case of flooding are mentioned.</li> <li>· Cooperation with police and other authorities.</li> <li>· All vehicles to be properly maintained and operated in accordance with road laws.</li> <li>· All loads to be properly secured to avoid possible dropping or leakages.</li> <li>· Drivers to be punished if ignore safety requirements.</li> </ul>
<p><b>Operation phase</b></p>	
<p>Public Health/</p> <p>Many passages will gather at station, creating solid waste, wastewater and infectious diseases</p>	<ul style="list-style-type: none"> <li>· Management of waste sources: dust, solid waste and wastewater.</li> <li>· Construction of the treatment plant, planting more trees, removes pollutants</li> <li>· Place waste bin at station and regularly empty them</li> <li>· Keep public toilet clean</li> <li>· Provide water for hand washing and hygienic purposes</li> </ul>
<p><u>Air pollution</u> Emission of air pollutants from locomotive, coach repairing factories.</p> <p>Emission from traffic around stations.</p> <p>Pollution inside stations.</p>	<p>For repair factories, measures are, such as:</p> <ul style="list-style-type: none"> <li>· Technical measures will be applied.</li> <li>· Tree planting</li> <li>· Regular maintenance of machines and equipment, etc.</li> <li>· Road surface around station areas will be paved.</li> </ul> <p>Proper ventilation and air conditioning system to limit pollution inside stations.</p>
<p><u>Water quality and Waste</u></p> <p>Waste water/waste from stations and locomotive, coach repairing factories.</p> <p>Industrial waste water from</p>	<ul style="list-style-type: none"> <li>· Waste water treatment for different types for waste water is in place.</li> <li>· Drainages on the route, station and enterprises are in place.</li> <li>· Proper waste management (separation and collection) is in place.</li> </ul>

<p>operation of locomotive, coach repairing factories. Overflowing of rain water.</p>	
<p><u>Noise and Vibration</u> Noise and vibration from operation of the elevated railway. Noise and vibration from operation of locomotive, coach repairing factories</p>	<p>For the elevated railways, measures are:</p> <ul style="list-style-type: none"> <li>· Mitigation by design.</li> <li>· Anti-noise walls</li> </ul> <p>For repairing factories:</p> <ul style="list-style-type: none"> <li>· Anti-noise buffers at the leg of fan and compressor,</li> <li>· Proper setting and maintenance of machines.</li> <li>· Installing silencer and vibration-proof rubber, etc.</li> <li>· The operation of urban railways should conform with proper procedures and maintenance to ensure noise level within limits</li> <li>- Noise barrier should be placed at construction site near/next to Trung Truc school to reduce noise impacting the school activities</li> <li>- Noise not to exceed 55dBA at boundary of any residential area between 2100 - 0600hrs and 70 dBA between 2100 and 0600hrs.</li> </ul>
<p><u>Accident</u> Railway accident Fire, lightning, power lines</p>	<ul style="list-style-type: none"> <li>· Accident prevention measures such as installation of signal system, information system, dispersed current system, fire prevention measures, etc., are in place.</li> <li>· Proper maintenance of vehicles</li> <li>· Installation of speed limits and railroad signage</li> <li>· Proper maintenance or railroad and repair, as required</li> </ul>

## **Environmental Management plan**

### Organization for EMP

The EMP involves multiple organizations and responsibilities shared among the Railways Project Management Unit (RPMU), the Environmental unit under RPMU, the Supervision Consultant, Construction Contractor and Sub consultant. RPMU has overall responsibility for the project activities as well as environmental management issues. The Environmental Unit under RPMU is responsible to ensure all proposed terms of environmental protection in the technical standards to be included in the contracts of the project, review environmental monitoring reports and conduct environmental inspection throughout the process of project implementation. Construction monitoring consultants is responsible to ensure the full implementation of environmental protection methods by the contractors; Constructor is to implement all environmental mitigation measures during construction period and Sub-constructor carries out environmental monitoring.

Organizational structure and responsibilities for implementing EMP during operation of the elevated railway must be determined along with decisions on the operation and management organizational structure of the railway itself.

### Environmental mitigation program

The mitigation measures presented in section 8 from existing EIAs are summarized. In addition, the new recommendations are also included such as for resettlement issues or other environmental quality aspects

### Environmental monitoring program

Environmental monitoring program is conducted in 3 periods: pre-construction period (baseline environment); throughout construction process and operation period (during first 03 years).

The monitoring program will be conducted for air and vibration at 13 locations, for noise at 14 locations, for surface water quality at 10 locations, for ground water quality at 7 locations and for soil quality at 7 locations.

The cost for treatment work in construction period is 22,464,934,000, for operation period is 35,648,303,000. The cost for environmental inspection and monitoring is 14,990,000 VND

### **Public consultation**

The public consultation is required by Vietnamese law, JBIC/JICA guidelines and World Bank Environmental and Social Safeguards Policies. The key purposes of public consultation are (i) inform about the project objective, scope and alignment of railways, bridges, and location of stations; (ii) to inform the key environmental impacts and mitigation measures and (iii) to discuss and get feedbacks from local government and residents. During the public consultation, the environmental impacts and respective mitigation measures are presented either by official letter send to local authority like PCs and FFCs or in the meeting with affected people. The result of public consultation in 2008 was compiled in the Report of Public Consultation by RPMU and its consultant.

The public consultation by official letter to local authorities has been conducted by RPMU twice in 2007 and 2010 as a supplement. Consultations in written communication were made in almost all of wards and communes.

Meetings were held later in various localities within 6 districts of Hoang Mai, Dong Da, Hoan Kiem, Long Bien, Thanh Tri and Ba Dinh, Hanoi city from 18th October 2007 to 19th April 2008 in accordance with JBIC guidelines. Total 14 wards with 324 stakeholders (out of which, 238 are affected people) were consulted in 2008, 12 wards were consulted in 2010 written communications only.

The main summary of people opinions are: (i) People agree and wish the project would be implemented soon; (ii) More detailed information about the project area, land acquisition, clearance boundary, relocation of affected households as well as policies of land clearance and resettlement within the project area should be provided (iii) Environmental impacts during construction (air, noise, vibration, transportation, etc.) should be dealt properly with strong commitment by the Project Owner and other stakeholders in the implementation of mitigation measures and corrective actions and (iv) The resettlement area should be ensured with the conditions for the daily activities for resettled people (electricity, water, transportation etc. )

## 2. INTRODUCTION

### 2.1 PURPOSE OF THE REPORT

The Hanoi Urban Railway Construction Project Line 1 (HURC1) is divided into 3 phases. Phase 1 includes railway between Giap Bat and Gia Lam, Long Bien Bridge, Ngoc Hoi Complex and Gia Lam Station. Phase 2a includes railway section between the new Giap Bat station and new Ngoc complex. Phase 2b includes railway section between the new Gia Lam Station and Yen Vien and Yen Vien Complex. This EIA report covers phase 1 and phase 2a, which refers afterward as the “Project.” The project is expecting to be financed by Yen-Loan through Japanese International Cooperation Agency (JICA).

This EIA report is compiled to provide the information on environmental and social considerations on HURC 1 covering Phase 1 and Phase 2a, to be reviewed by JICA as appraisal process for Yen loan. The data and information in this EIA report are based on the two existing documents, namely the EIA report for Hanoi Elevated Railway Project Ngoc Hoi – Yen Vien section. (Note: the name of the project was later changed to HURC1) compiled in 2008 and the Report on Supplemental EIA in 2011.

The EIA report in 2008 was approved by MONRE in the same year. However, since the EIA approval was effective only for 3 years and the current project could not meet this requirement, the supplemental EIA was conducted in 2011 to update baseline information and to cover changes in the project design between 2008 and 2011. According to the Circular 05/2008/TT-BTNMT dated 8 Dec 2008, the Supplemental EIA report should be made focuses on changes of project design (location and scope).

According to the Vietnamese latest legal framework on environmental protection sector (Decree 29/2011/ND-CP dated 18 April 2011 and Circular 26/2011/TT-BTNMT dated 18 July 2011), an EIA report should be made for separate phases (1, 2a and 2B) based on each detailed design report. For this project, the approval entity (competent authority) will be the Ministry of Transport – Environmental Department.

The JBIC guidelines for Environmental and Social Considerations (2002) is applied to the project, however, since as JICA issued the new JICA guidelines in 2010, after merging with JBIC, the new guidelines along with World Bank policies are referred wherever appropriate.

### 3. PROJECT DESCRIPTION

#### 3.1 PROJECT BACKGROUND

The Capital Hanoi is expanding greatly, especially with the recent merging with Ha Tay Province (2008). Its increasing population, huge travel demand and habit of using individual vehicles are exercising huge pressures on the existing infrastructure. The project “Hanoi Urban railway construction project” has been developed with the objectives of the project are to improve urban traffic situation of Hanoi Capital and enhance deployment capacity of national transportation.

The Project owner is Vietnam Railways and its representative, Railway Projects Management Unit (RPMU). The project is expected to be funded by JICA.

#### 3.2 PROJECT LOCATION

The project is located within the urban area of Ha Noi city. The overall length of the project is 17.17 km railways km and it transverses 7 districts and 26 wards/communes of Ha Noi. The list of districts and communes/wards in the project is presented in Table 3.1

**Table 3.1 List of districts and communes/wards in the project**

No	District	Wards/ Communes
1	Thanh Tri	Lien Ninh
		Vinh Quynh
		Van Dien
		Ngoc Hoi
2	Hoang Mai	Hoang Liet
		ThinhLiet
		Giap Bat
		Dinh Cong
3	ThanhXuan	Phuong Liet
4	Dong Da	Phuong Mai
		Phuong Lien
		TrungPhung
		Van Mieu
		Kham Thien
5	HoanKiem	Dong Xuan
		Cua Nam
		Hang Bong
		Cua Dong
		Hang Ma
		Nguyen Trung Truc
6	Ba Dinh	PhucXa
		Dien Bien
7	Long Bien	Ngoc Thuy
		Ngoc Lam
		Gia Thuy
		Thuong Thanh
<b>Total</b>	<b>7</b>	<b>26</b>

(Source: JKT, 2011, Supplemental EIA)

The present project, which includes phase I and phase II a, is divided into 2 segments: Ngoc Hoi – Ha Noi central station and Ha Noi central station – Yen Vien.

The segment Ngoc Hoi-Hanoi is of 14.71 km long starting from Ngoc Hoi station at Thanh Tri District, northward crossing Hoang Mai, Thanh Xuan, Dong Da to Ha Noi Central Station (Km 0+00)

The segment from Ha Noi- Gia Lam is 6.79 km long starting from Central Station in Hoan Kiem District, crossing Ba Dinh District, Long Bien District to the end point (Gia Lam Station) located in Long Bien District (Gia Lam Town).



**Figure 3.1 Alignment of Ha Noi City Urban Railway constructions Project Line 1 (phase 1 and phase 2a)**

Source: Hanoi Urban Railway Construction Line 1 (Phase 1 and phase 2a) - Engineering consultant JKT. Note: Red Line: Phase 1; Pink Line: Phase 2a



### 3.3 PROJECT CONTENTS

#### 3.3.1 Construction Scale

The construction work will include: the construction of railways, stations, bridges, locomotive work, viaducts (including guide-ways). The project will also include a power substation, which is located in Ngoc Hoi station, to be built for the construction and operation of the project, temporary road (Ngoc Hoi-Giap Bat), construction material, or borrow pits (soil, rock and sand/gravel), auxiliary structures (construction camps, operation houses, storages and disposal fields).

#### 3.3.2 Railways

The alignment of the project from Ngoc Hoi to Gia Lam basically has a corridor that follows the existing national railway. Safety corridor is 3m to each side, which is calculated from the edge of the building.

The construction of railways is phased into several segments. The elevated railways also follow the existing route except for the segment at new Long Bien Bridge that is going to be constructed at a distance of 186 m from the old Long Bien Bridge. The following sections will be constructed

- Phase 1: section from Giap Bat station (Km5+360) to Gia Lam station (Km6+150). Total length 11.510 Km
- Phase 2a: section Giap Bat station (Km5+360) to Ngoc Hoi station (Km11+018). Total length 5.66 Km

#### 3.3.3 Stations

Four national stations (Ngoc Hoi Station Complex, Giap Bat station, Ha Noi Station and Gia Lam Station) and five intermediate stations (Phuong Liet, Bach Mai, Thong Nhat park, Long Bien Nam and Long Bien Bac), will be built in Phase 1.

Phase 2a includes construction of three intermediate stations (Vinh Quynh, Van Dien, Hoang Liet)

The list of stations to be built in phase 1 and phase 2a is presented in Table 3.2

**Table 3.2 List of stations constructed in phase 1 and phase 2a**

No	Name	Type / Category	Phasing	Remark
1	Ngoc Hoi Station	National station	1	Inside complex
2	Giap Bat Station	National station	1	
3	Ha Noi Station	National station	1	
4	Gia Lam Station	National station	1	
5	Cong Vien Thong Nhat Station	intermediate station	1	
6	Bach Mai Hospital Station	intermediate station	1	
7	Phuong Liet Station	intermediate station	1	
8	South Long Bien Station	intermediate station	1	
9	North Long Bien Station	intermediate station	1	
10	Van Dien Station	intermediate station	2a	
11	Hoang Liet Station	intermediate station	2a	
12	Vinh Quynh Station	intermediate station	2a	

(Source: JKT, 2011, Supplemental EIA)

### **3.3.3.1 Ngoc Hoi complex**

Ngoc Hoi Station Complex (see Figure 3.2) is proposed to be built on an area of 114 ha. The north boundary is ring road 3.5 (previously ring road 4), the east boundary is the 6 lanes inter-area route. There are 3 temporary tracks of 1000mm gauge. There are 207 tracks of which 67 for 1000mm gauge , 44 tracks of 1435mm gauge and 66 dual gauge tracks.

- **NIT and UT Passenger Station**

The Ngoc Hoi Station will be a two story building with the ground floor at grade to suit the railway track and platform elevations. The second floor will support the main passenger concourse and access to platform. Also on the second floor are the station office, ticket booths and shops. A station plaza and parking lots will be located at the front and either side of the station.

This station is positioned on a line extended from the existing main road in the industrial zone.

The proposed structure of the station is a steel frame with concrete slabs supported on concrete pile foundations.

- **Freight Station**

The Ngoc Hoi Freight Station will be the main cargo collecting station to the south of Ha Noi. The freight station includes a three storey head office building, two cargo work platforms with shed roofs and one gantry crane area for container cargo loading and unloading. Thirteen lanes of siding track for marshalling of the freight trains are also included.

- **Repair Shops**

The Ngoc Hoi Complex has four major repair shops, for national train passenger cars, national train locomotives, freight cars and urban train cars.

These shops are located separately within the Ngoc Hoi Complex.



**Figure 3.2 Perspective of Ngoc Hoi Station Complex**

*(Source: JKT, 2011, Supplemental EIA)*

### **3.3.3.2 Giap Bat Station**

The new Station will be a three- story building with the ground floor at the same level as the surrounding street. This floor will be used mainly as a parking lot or/and road. The second story holds the station facility area including station plaza, ticket booth, station offices and shops. The third story provides platform access to the trains. Before starting construction of new station, a temporary station shall be established at existing Giap Bat Station. The temporary station is equipped 2 platforms with 4 tracks, and 4 tracks for siding. Most of the existing station facilities will be reused for the temporary station. This temporary station acts as the northern terminus for national trains from the south during construction of the elevated guide way from Giap Bat to Gia Lam.

### **3.3.3.3 Ha Noi Station**

The new Hanoi Station will be a three-story building with the ground floor at the same level as the surrounding street. This floor will be used mainly as a parking lot or/and road. The second story holds the station facility area including station plaza, ticket booth, station offices and shops. The third story provides platform access to the trains.

There will be 5 double tracks to be built in Ha Noi Station.

### **3.3.3.4 Gia Lam Station**

Gia Lam station is an intermediate station with 3 operational directions of which the main function is to receive local passenger trains. Besides, there are also sidings to Duc Giang petrol storehouse and Gia Lam train depot gauge 1435mm and 1000mm. There are 46 tracks in which 19 tracks are gauge 1000mm and 27 tracks are dual gauge.

### **3.3.3.5 Intermediate stations**

There are 8 intermediate stations on the route. Intermediate stations are typically 210m in length and are three story structures with an at-grade entrance level, a second level concourse floor and a third level platform floor. The urban platforms are arranged outside of double tracks.

Thong Nhat Park Station is located on the west side of Le Duan Street between chainage Km1+295 and Km1+505, across from Thong Nhat Park. The station overhangs Le Duan Street on its east side. This station is planned as a connection station with HURP Line 2.

- Bach Mai Hospital Station is located next to Highway No.1 in front of Bach Mai Hospital; chainage is Km2+195 and Km2+405.
- Phuong Liet Station is located next to of Highway No.1 between chainage from Km3+095 to Km3+305.
- South Long Bien Station located adjacent to the dike on the west side of the Red River between chainage Km1+900 and Km2+110.
- North Long Bien Station is located above Ngoc Thuy Street on the east side the Red River between chainage Km4+193 and Km4+403.
- Hoang Liet Station is located next to Highway No.1 between chainage Km6+925 and Km7+135
- Van Dien Station is located within the existing Van Dien Station site between chainage Km8+543 and Km8+753.

- Vinh Quynh Station is located in the farmland on the alignment of the existing west ring line between chainage Km9+995 and Km10+205.

### 3.3.4 Bridges

#### 3.3.4.1. Red River Railway Bridge

The new railway bridge over Red River is approximately 186m upstream from existing Long Bien Bridge. It locates between Km2+501 and Km4+310 towards the North, the overall length is approximately 1,809 m.

***The bridge is designed with three span continuous girders, which are the same with the existing bridge. Navigation clearance is designed with 11.8m width and 16m high.***



**Figure 3.3 Perspective of new Long Bien, balanced solid rib arch**

(Source: JKT, 2011, Supplemental EIA)

### 3.3.5 Viaduct and Flyover Construction

#### 3.3.5.1 Viaduct

- New viaducts mainly follow the current Vietnam railway route from the south of Vinh Quynh to the Northern point. From Ngoc Hoi to Gia Lam, the viaducts start from Km11+030 to Km 0+000 (Hanoi station) and from Km 0+ 000 to Km 2+501. There are 8 viaducts built at 8 intermediate stations

Design plan:

- **Super-structure:** one box girder will be forced for both of upper railway sides. The girder structure only is suitable for constructing elevate station with adjacent at two sides.
- **Sub structure**
  - ✓ Foundation structure: Typically, foundations for the viaduct will be constructed using bored, cast-in-place concrete piles. Depending on the soils characteristics and each column location, piles will be bored using either the rotary drilling method (with or without bentonite slurry) for non-cohesive soils or the earth drilling method with a rotary bucket for cohesive soils.

✓ Pier structure: Piers for viaduct will consist of oval, round or square reinforced concrete columns as selected for architectural reasons. Depending on the shape of the pier, a crosshead may be required at the top of the column.

### **3.3.5.2 Flyovers**

The flyovers will be constructed in intersection with existing inner streets and highways. There will be 5 flyovers: Kim Lien Flyover, Nga Tu Vong Flyover, Ring Road No.3 Flyover, Van Dien Flyover and Highway No.5 Flyover.

Design plan:

- Super structure: A single 60m span steel bow truss with a cast-in-place concrete deck is planned for this location.
- Sub structure: The abutments for the bridge are planned as pile supported cast-in-place concrete cantilever retaining walls.

### **3.3.6 Electrical Multiple Unit (EMU) or Locomotive works**

Upon features of the project, this area shall be constructed firstly to set a premise for removing Ha Noi and Giap Bat stations. Ngoc Hoi Station Complex includes locomotive repair works of national railways, including:

- Ngoc Hoi Locomotive Enterprise has functions to repair, apply locomotives managed itself, including: head office, main workshop, material store, final adjustment shop, inspection/checking workshop, hazardous store, turntable, workshop office, engine test shop, plain bearing/battery shop, shunting locomotive shed, substation, boiler/ compressor room, truck garage, fuel tank, fire water tank, fire water pump house, rain water tank, rain water pump house, garbage collection site, guard house; car parking; motorbike parking. Total area : 43,737 m<sup>2</sup>

- Ngoc Hoi passenger car enterprise has functions to repair, apply passenger cars managed itself, including: head office, main workshop, workshop office, train crew/ inspection office, inspection/ cleaning shop, food processing/ laundry shop, final adjustment shop, mechanical shop/material store, engine test shop, unscheduled repair shop, hazardous store, fire water tank, fire water pump house, substation, boiler/compressor house, shunting locomotive, truck garage, train washing machine, fuel tank, rain water tank, rain water pump house, weather proof testing yard, garbage collection site, guard house; car parking. Total area: 40,760 m<sup>2</sup>

- Ngoc Hoi freight enterprise has functions to repair, apply freight cars managed itself, including: freight station, warehouse a, warehouse b, transfer machine garage; master platform office, truck platform weighing machine, forwarder building, fuel tank, fuel station office, fire water tank, fire water pump house, truck garage, switch operator house, substation, rain water tank, rain water pump house, garbage collection site, guard house, car parking, motorbike parking, forwarder car parking, vertical platform, transship area, normal goods area 1, normal goods area 2, bulk cargo space (inland container depot), container crane. Total area: 28,767m<sup>2</sup>

- Ngoc Hoi urban train enterprise adjust and repair all urban trains operated on Ngoc Hoi – Yen Vien section, including: head office, main workshop, final adjustment, daily check/washing shop, weather-proof test yard, workshop office, iron/carpenter/damper& air-valve shop, mechanical shop/material store, hazardous store, substation, boiler/compressor house, shunting locomotive shed, fire water tank, fire water pump house, fuel tank, truck garage, rain water tank, rain water pump house, garbage collection site, guard house; car parking; motorbike parking. Total area: 45,518 m<sup>2</sup>

### 3.3.7 Signal system

Signaling systems provide train control and protection. They are vital means for assuring safe and punctual railway conveyance. The signaling system for the HURCP Line 1 project will be installed in two phases. The signaling subsystems to be installed in Phase I will be designed with a view to harmonizing the whole system, including the subsystems to be installed in Phase II (A & B), in order to ensure seamless integration amongst the various subsystems.

The signaling system for the HURCP Line 1 project will also adopt the following subsystems:

- Automatic Train Protection system (ATP). ATP is a system for preventing train accidents. It prevents trains from passing red signals or exceeding speed restrictions.
- Traffic Information Display system (TID). TID is a system for displaying the current status of train operations for the operation office and platform office at stations, the UT depot, freight depot, and the maintenance depots concerned.
- Centralized Monitoring System (CMS). CMS is a system for monitoring the operating condition of equipment on a continuous basis and collecting data periodically to track the equipment failure tendency. It will report failure data with audible warning to the OCC and maintenance depot, and will automatically gather measurement data from the equipment that has failed.
- Train Detection System (TDS). TDS is a system for detecting the presence of trains on tracks, which will be classified into two type of TCD (Track Circuit for Dual gauge) and TCS (Track Circuit for Single gauge).

### 3.3.8 Power works

110 kV Transmission line will use high-voltage underground cable to convey electric power from EVN network to 110 kV SS in Ngoc Hoi Complex. The whole transmission line will go parallel and inside the ROW of the new railway line from Van Dien Station to Ngoc Hoi Complex.

Two newly build single poles type of N122-29C will replace two existing steel towers No. 59 and No. 60 to provide the connection points for the 110 kV underground cable lines. Two newly support structures for supporting cable terminals will be build inside the SS in Ngoc Hoi Complex (design of these support structures is included in SS Detail Design).

Cable terminal boxes (110kV 1x1200mm<sup>2</sup>) and lightning protection valves (ZnO 110kV) will be installed at the connection points on pole No. 59 and No. 60 and at the bus-bars in the terminal supporting structures in Ngoc Hoi SS.

New 110 kV transmission line will be built in combination with the removing the existing work includes:

- Cable line 1: from the pole No. 59 to pole No. 60 with the length of 377 m.
- Cable line 2 and Cable line 3: from the pole No. 59 and the pole No. 60 to SS in Ngoc Hoi Complex with the length of 2929 m.

The total length of cable line is 3306 m.

The wires used for power connecting at the connection points will be the type of AC185mm<sup>2</sup> which is the same type of the wires used in 175-176 E1.3 Mai Dong to E1.4 Ha Dong 110 kV line. So the calculation of the wires is neglected.

### **3.3.9 Plan for elevated line**

#### **3.3.9.1 Conditions on equipment**

This line shall be electrified as a ring road with total length of 23.85km (includes 2b phase), here a train shall run through 16 stations within 50 minutes. Elevated line is a structure type whose functions could be remained between the lowest air temperature and the highest air temperature surrounding Ha Noi area. The elevated line and its auxiliary equipment must have enough structure strength to sustain maximum wind speed of 40m/s. Supposed wind speed is 30m/s when controlling train running with wind, structure of the elevated line must be enough to make charge in condition of wind speed up to 30m/s.

#### **3.3.9.2 Equipment of elevated line**

- Height of the route
- + Minimum height of contact line of 4.5m
- + Standard height of contact line of 5.0 to 5.3m
- + Height of pressure part above level crossing of 6.0 to 6.5m
- + Height of line equal to high voltage line of 5.8 to 6.3m
- + Height of elevated line above car ground of 6.0m

The above-mentioned data are for reference and shall be final through inspection of static limits without electrification in the future.

- Composition of elevated line

The elevated line has compositions including power supply line with supply circuit and intake lever, and comes into two systems, power supply system to supply current to the elevated line through power supply line and suspended power supply system, execution expenses of the elevated line is higher about 10% because of using bronze wires for suspended line and high strength. However, in all system with many advantages such as reduction of number of lines leading to decrease of maintenance work and leak out of power shall be divided to decrease parallel circuit, therefore, system of elevated power supply line shall be applied. Scale of elevated line

Scale of newly installed elevated line shall be suspended above estimated train exploitation apartment and estimated railways including both railways in tramcar store and control/repair railways.

#### **3.3.10 Distribution line plan**

From distribution transformer station placed at the first/the third sub-station, the power shall be supplied to signal equipment between Ngoc Hoi and Gia Lam by parralel distribution system with 6kv, one-phase, 2 circuits. Load limit for signal equipment and interlocking equipment in platform of each station, rail circuit between station, signal equipment and running safety equipment as level crossing protection. Lighting system in station area and platform shall take from lighting power source and be a power supply source to power equipment for check, and normal power source is supplied from distribution line of electricity department and is not under distributin plan. This will promote stability of transportation by using power taking from power source of source head (system 110kv) because of not enough power for operation of safety equipment when the source system as infrastructure equipment is not enough, hence it may exploit train but not influenced by local power breakdown.

### **3.3.10.1. Chart of equipment**

For high voltage distribution line, each direction shall be installed 2 circuits from the first and the third sub-stations, and high voltage distribution and control panel are included in transformer equipment. Among the first and the third sub-stations, power transmission from the first sub-station is normal and reverse transmission from the third sub-station if the first sub-station is suspended. In this case, equipment must have enough capacity to expand transmission from the first sub-station to Ngoc Hoi. Distribution transformer station is installed for 2 circuits for each signal installation, supplies mutual backup function by moving equipment over low voltage side. For high voltage distribution line, it shall install high voltage levers outside Giap Bat Railway Station to Ngoc Hoi Railway Station and outside Gia Lam Railway Station to Yen Vien Railway Station, and may limit power supply to the section between Giap Bat Railway Station and Gia Lam Railway Station.

### **3.3.11 Other works**

#### **3.3.11.1 Transport operation center**

To strengthen transport output and ensure running safety on the elevated rail line through Ha Noi, Ngoc Hoi –Gia Lam Section, apart from setting up advanced, modern technical solutions to contribute capacity increase through apartment area and increase of running density, collection of news relating to running and operation situation supervision of signal equipment system and control of running concentratedly as well as settlement of precise equipment obstacle, in time, the project shall invest to install a new CTC.

#### **3.3.11.2 Automatic booking and control system**

Because features of Ngoc Hoi –Gia Lam elevated rail line as combined exploitation between national railways and inner city railway, therefore ticket booking system of the route also has particular features. With stations with long distance and inside passengers, apart from the inside ticket system, long distance ticket system must be used to facilitate management. To keep two systems from mutual conflicts at once obstructing passengers and damaging railway branch, it must have fully research booking form and ticket collect form appropriately.

In design phase of Ngoc Hoi –Gia Lam Elevated Rail Line, estimation is to commonly use ticket system of pilot tramcar lines of Ha Noi for inside passengers. For stations meeting long distance railway passengers, apart from the above-mentioned inside ticket system, there is also a ticket booking system for long distance passengers.

#### **3.3.11.3 Automatic escalator and elevator**

- *Automatic escalator:* Automatic escalator is used for passengers up and down between stairs in the station and has functions of evacuation in emergency cases.
- *Elevator:* Elevators shall be installed at stations to transport the disabled and equipment in the stations.
- *Air-conditioning:* Stations on the ground as well as on elevated must be equipped central air-conditioning system, but independent air-conditioning systems must be equipped at booking rooms and other technical equipment rooms.
- *Fire protection and fighting equipment:* Architecture of station must ensure entrance approaching all the ins and outs of the station to serve firefighting so that no part of the station is out of approaching capacity of firefighting means. At appropriate locations it must have fire equipment, arrangement of water cocks for firefighting separating with living water, at the same time living water may be used for fire trucks in any circumstances. Fire protection and fighting equipment must comply with general regulations on fire protection.



### 3.3.11.4 Telecommunication system

As part of the Hanoi City Urban Railway Construction Project Line 1, the telecommunication system in Ngoc hoi complex and in the section between Giap Bat and Gia Lam are required to be upgraded with new and advanced equipment.

- The planned section consists of 4 NIT stations, 5UT stations, workshops, stabling yards, and depots.
- The telecommunication system shall support the functions of the rail way system to maintain safe, convenient, efficient, and reliable operation.
- Furthermore, it is necessary to design the telecommunication system suitable for not only the use of new urban railway but also the improvement projects in progress, as well as the consistency with existing telecommunication facilities.

## 3.4 THE MATERIAL DEMAND AND MATERIAL MINES

### 3.4.1 Work Amount

Based on EIA 2011 report, the amount of material required for construction activities are as follows (Table 3.3)

**Table 3.3 Summary of work amount and material demand**

No	Items	Unit	Volume
1	Bored pile	piece	3,266
2	Excavation	m <sup>3</sup>	827,482
3	Concrete	m <sup>3</sup>	466,557
4	Form work	m <sup>2</sup>	294,997
5	Rail	m	95,962
6	Sub-ballast	m <sup>3</sup>	79,400
7	Wall	m <sup>3</sup>	6,300
8	Dual Gauge	m	13,400
9	Cable trough	m	3,200
10	Steel support	ton	1,900
11	Box girder	m <sup>3</sup>	14,705
12	I beam girder	m <sup>3</sup>	15,975
13	Through plate girder	ton	5,100
14	Steel-pipe sheet pile	piece	384
15	Sheet pile	sheet	752
16	Concrete girder	m	240
17	Embankment	m <sup>3</sup>	35,000
18	Backfill	m <sup>3</sup>	15,140
19	Approach road	m <sup>3</sup>	9,284
20	Truss bridge	ton	560

(Source: JKT, 2011, Supplemental EIA)

### **3.4.2 Material mines**

#### **3.4.2.1 Borrow pit Number 1 (Tien Xuan Borrow pit)**

- Location: Borrow pit which belongs to Go Me hamlet, Tien Xuan commune, Thach That district, Hanoi, is 53km far from Ngoc Hoi station.
- Reserve: The width of borrow pit is about 200m, the thickness is about 500m, the depth is 10m, reserve is about 1.000.000m<sup>3</sup>.
- Exploitation and transport conditions: Occurrence is far from Ngoc Hoi station about 53km, next to small country way so excavation and transport condition is convenient.

#### **3.4.2.2 Borrow pit No2 (Mat Rong borrow pit)**

- Location: Borrow pit which belongs to Mat Rong hill, Dong Xuan commune, Thach That district, Hanoi, is 52km far from Ngoc Hoi station.
- Reserve: The width of borrow pit is about 200m, the thickness is about 500m, the depth is 10m, reserve is about 600.000m<sup>3</sup>.
- Exploitation and transport conditions: Presently, the occurrence is being exploited at small scale. The transport road from the occurrence to the provincial road allows only pick-up trucks. Therefore, if transport by heavy vehicles is required, an approximate 0.7km-long service road to the occurrence must be prepared.

#### **3.4.2.3 Rock pit No.1 (Phu Ly rock pit)**

- Location: Phu Ly rock pit is exploited by Phu Ly Stone One-member Limited Liability Company under Vietnam Railways. The rock pit consists of rock pit A and rock pit B located at Thanh Thuy commune, Thanh Liem district, Ha Nam province. The rock pit is about 55km from Ngoc Hoi station, according to the railway chainage.
- Reserve: The total reserve of rock pit A and B is estimated at 4,000,000m<sup>3</sup>. Currently, the exploitation area of the pit is being expanded, and its reserve will be increased accordingly. The reserve at the processing zone is estimated at approximately 60,000 m<sup>3</sup>.
- Exploitation and transport conditions: Rock is mainly exploited at rock pit B and then transported to the processing zone. Process line is constantly improved, and exploitation area is always increased to meet customers' demand. The exploitation yield reaches 400,000m<sup>3</sup>/year. The processing yield reaches 300,000m<sup>3</sup> per year. The transport system of this pit includes both railroad and road transport. However, the pit is mainly exploited for railway facilities, thus the railroad transport conditions are very convenient.

#### **3.4.2.4 Rock pit No. 2 (Dong Mo rock pit)**

- Location: Dong Mo rock pit is being exploited by Dong Mo Rock Company, under Vietnam Railways. The rock pit is at Quang Lang commune, Chi Lang district, Lang Son province. The rock pit is approximate 123km away from Ngoc Hoi station according to railway chainage.
- Reserve: the total quarry quantity is approximately about 12.000.000m<sup>3</sup>. Exploitation area is being extended to meet the customer's demand timely. At the processing area, quantity is approximated of 30.000 m<sup>3</sup>.
- Exploitation and transport conditions: The quarry is managed and exploited by Dong Mo Rock Company, under Vietnam Railways. Exploitation capacity is 300.000m<sup>3</sup>/year. Processing capacity is 250.000m<sup>3</sup>/year. Transport system of the quarry includes railway and roadway. However, rock pit is exploited mainly to serve railway works; transport by railway is very convenient.

#### **3.4.2.5 Sand pit No. 1 (Van Phuc sand pit)**

- Location: Pit is at Van Phuc commune, Thanh Tri district, Ha Noi City. This sand pit is 11 km from Ngoc Hoi station.
- Reserve: At survey duration, pit is 500m long, 200m wide and 4m thick, quantity is approximated of 400.000m<sup>3</sup>. Quantity of the pit varies according seasonable water level of Red River. However, quantity of pit is always supplemented with sand pumping and suction along river bank and then gathered to the pit.
- Exploitation and transport conditions: Thinh An Company exploits sand along the Red River and at the river isthmuses. Therefore, the agreement with this company must be made prior to the exploitation so that detailed exploitation planning can be made. The transport road is very convenient because the sand pit is an alluvial ground on the river and also a storage area is to the right bank of the Red River. In addition, Thinh An joint-stock company has all vehicles to transport sand to construction site.

#### **3.4.2.6 Sand pit No.2 (Hong Van sand pit)**

- Location: The sand pit is situated at Hong Van commune, Thuong Tin district, Hanoi city). The sand pit is about 15km from Ngoc Hoi station.
- Reserve: The reserve of this sand pit always fluctuates since it is only used as storage area. The reserve during this investigation is estimated at about 30,000m<sup>3</sup>. However, it is constantly increased.
- Exploitation and transport conditions: The sand pit is exploited by Dong Hang Private Enterprise. This enterprise has different exploitation and transport capacity for two types of sand. The sand for sub grading is taken from alluvial grounds on the Red River bank or sand isthmuses at the Red River bed. The sand for construction is transported from Lo River to storage array pumped from the Red River bed at a capacity of 100,000m<sup>3</sup>/month. The sand for construction is transported from Lo river to storage area at a capacity of 30,000m<sup>3</sup>/month). The transport distance from the storage area to Ngoc Hoi station is only around 15km. Sand is transported on big road, thus the transport is very convenient.

### **3.5 PROJECT PACKAGES, SCHEDULE, INVESTMENT PRICE AND CAPITAL SOURCES**

The total price for phase 1 and phase 2 a (estimated): 231.2 JPY billions, equal 52.9 VND billions (*source Supplementary EIA 2011*), including:

- Phase 1: 165.5 JPY billions, equal 42,600 VND billions;
- Phase 2a: 40 JPY billions, equal 10,300 VND billions;

The bidding plan, schedule, price and capital sources of the Project are presented in Table 3.4

**Table 3.4 Bidding plan, schedule, price**











No.	Package Group	Coding No.	Package Name	Package Price (Billion Yen)	Commencement of Bidding	Contract Duration (months)	Scope of Works
1	Ngoc Hoi Station Complex	HURC1-101	Ground Preparation & Soil Improvement	5.2	01/2012	29	General Excavation / Filling / Grading / Back Filling / Soft Soil Improvement / Drainage
		HURC1- 102	External Civil & Architectural Works	2.0	01/2012	24	Flyover / Drainage / Irrigation Channel / Connection Road & Facilities
		HURC1- 103	Civil & Architectural Works (Depot & Station)	20.7	04/2013	45	General & Structural Excavation / Station & Depot Structure / Maintenance Road / Drainage / Electric Power Distribution Systems / Foundation of Depot Equipment / Depot building services (E&M)
		HURC1- 104	Installation of Track & Temporary Train Operation	9.0	01/2012	41	Temporary & Permanent Track Work / Temporary Train Operation System
		HURC1- 105	Power Supply	4.3	05/2012	30	Sub-station / Incoming 110kV underground Cable / Incoming 22kV
		HURC1- 106	Depot Equipment & Facilities	19.6	05/2012	56	Supply & Installation of Maintenance Equipment for UT, DL, PC, FC, FY (Ngoc Hoi, Gia Lam)
2	Construction of Civil & Elevated Railway Structures	HURC1- 201	Ngoc Hoi - Van Dien	5.4	10/2013	26	Site Clearing / General & Structural Excavation / Foundation / RC Substructure & Box Culvert / Station Structure / Drainage / Appurtenant work
		HURC1- 202	Van Dien - Giap Bat	7.3	10/2013	26	
		HURC1-203	Track Installation: Ngoc Hoi - Giap Bat	0.9	12/2013	28	Supply & Installation of Track
		HURC1- 204	Giap Bat Station	8.1	07/2013	33	General & Structural Excavation / Foundation / RC Substructure & Box Culvert / Station
		HURC1- 205	Giap Bat - Bach Mai	5.5	10/2013	28	



No.	Package Group	Coding No.	Package Name	Package Price (Billion Yen)	Commencement of Bidding	Contract Duration (months)	Scope of Works
		HURC1-206	Bach Mai - Hanoi	5.8	10/2013	28	Structure / Maintenance & Service Road / Drainage
		HURC1-207	Hanoi Station	15.7	07/2013	42	
		HURC1-208	Hanoi - Red River Railway Bridge	8.5	10/2013	30	
		HURC1-209	Red River Railway Bridge - Gia Lam Station	4.6	10/2013	28	
		HURC1-210	Gia Lam Station	7.4	07/2013	42	
		HURC1-211	Gia Lam Depot	4.5	05/2012	28	Site Clearing / General & Structural Excavation / Foundation / Depot Structure
		HURC1-212	Track Installation: Giap Bat - Gia Lam	5.1	12/2013	28	Procurement & Installation of Track
		HURC1-213	Gia Lam - Cau Duong	7.1	01/2017	28	Site Clearing / General & Structural Excavation / Foundation / RC & Box Culvert / Station Structure / Drainage
		HURC1-214	Cau Duong - Yen Vien	7.3	10/2017	28	
		HURC-1215	Track Installation: Gia Lam - Yen Vien	2.4	05/2017	26	Procurement & Installation of Track
3	Construction of railway Bridge over Red River	HURC1-301	Construction of New Long Bien Bridge	13.9	01/2012	48	Site Clearing / General & Structural Excavation / Substructure / Steel Bridge
4	Procurement & Installation of Goods & Equipment for Signaling, Telecommunication, Electrification & Electric Power	HURC1-401	Signaling, Telecommunication, Electrification & Electric Power Supply System	4.8	02/2014	46	Signaling, Telecommunication / Electrification / Electric Power Supply & Distribution / OCC / SCADA / Passenger Information System Installation
		HURC1-402	Station Equipment & Facilities	1.3	02/2014	24	Supply & Installation of Station Equipment & Facilities

No.	Package Group	Coding No.	Package Name	Package Price (Billion Yen)	Commencement of Bidding	Contract Duration (months)	Scope of Works
		HURC1-403	Automatic Fare Collection System	1.4	02/2014	24	Supply & Installation of Automatic Fare Collection Installation
		HURC1-404	Signaling, Telecommunication, Electrification & Electric Power Supply System	19.1	02/2014	46	Signaling, Telecommunication / Electrification / Electric Power Supply & Distribution / OCC / SCADA / Passenger Information System Installation
		HURC1-405	Station Equipment & Facilities	3.7	02/2014	24	Supply & Installation of Station Equipment & Facilities
		HURC1-406	Automatic Fare Collection System	3.6	02/2014	24	Supply & Installation of Automatic Fare Collection Installation
		HURC1-407	Signaling, Telecommunication, Electrification & Electric Power Supply System	4.8	05/2017	32	Signaling, Telecommunication / Electrification / Electric Power Supply & Distribution / OCC / SCADA / Passenger Information System Installation
		HURC1-408	Station Equipment & Facilities	0.9	05/2017	24	Supply & Installation of Station Equipment & Facilities
		HURC1-409	Automatic Fare Collection System	1.2	05/2017	24	Supply & Installation of Automatic Fare Collection Installation
5	Procurement of Electric Multiple Units (EMU)	HURC1-501	Procurement of Electric Multiple Units (EMU) Phase I	20.1	02/2014	46	Supply of EMUs

(Source: JKT, 2011, Supplemental EIA)

**Table 3.5 Overall schedule of Phase I and Phase II**

No	Items	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1	Detailed design											
2	Bidding Assistance											
3	Land Acquisition											
4	Construction Phase I											
5	Construction Phase II											
6	Complete and Operation Phase I											
7	Complete and Operation Phase II											

Legend:  Phase I;  Phase II

(Source: JKT, 2011, Supplemental EIA)

#### 4. BASELINE SURVEY

The information and data on air quality, noise, vibration, surface water quality, underground water quality, soil quality and socioeconomic conditions in affected districts are updated in the supplement EIA report in 2011 (The field data collection and sampling were carried out in April 2010. See Annex A for the detailed methodology.). The sampling points are indicated in Figure 4.1, therefore the latest information and data are used as baseline data in this chapter wherever applicable. For other items, such as topography, geology, climatic conditions, hydrology, the information and data in the EIA report in 2008 are used, since the conditions of these items are not changed or influenced drastically by changes in human activities in the areas in the last three years.



**Figure 4.1 Monitoring locations of environmental parameters**

(Source: CEPT, 2008.EIA)



## **4.1 NATURAL ENVIRONMENT**

### **4.1.1 Topography and Geology**

Hanoi is divided into 2 topographical zones: plain and midland of North Vietnam. Most of the plain lies are on both sides of Red River and its tributaries (Duong River, Day River, etc.). Midland region comprises Soc Son district and a part of Dong Anh district, an extension of the plain of Tam Dao Mountain, its height is 7-10m or sometimes even hundreds of meters above the sea level. It makes Hanoi topography having an inclination in the direction North - South (from Soc Son - Dong Anh to Thanh Tri) and from West to East. The natural stream flow of rivers in the city also reflects this character clearly.

Hanoi has one mountain chain named Soc Son (Soc Mountain) which is an extension of Tam Dao mountain bloc, with the highest mountain top is 308m. Soc Mountain locates on Phu Linh commune, Soc Son district. Besides Soc Mountain, there are some other hills and mountains appeared in plains such as Sai Mountain (Thuy Lam commune, Dong Anh district), Phuc Tuong Mountain (Co Bi commune, Gia Lam district), Bach Thao region has Nung Mountain or Long Do or Khan Mountain (Botanical Garden in Hanoi center which contribute to the standing position of ancient Thang Long).

The Project Area from Ngoc Hoi to Gia Lam belongs to plains of To Lich River and Red River. Hanoi has 920.97 km<sup>2</sup> area, taking 0.28% all Vietnam territory, and a flat terrain with +5.20m natural soil level over sea-water level. There are two different terrains: plain terrain taking a large part of city area and a small part of mountainous and hill terrain.

Hanoi territory almost lies in a depression area since Trias era (Tam Diep era), covered by new sediments, mainly Red river alluvium. Hanoi may be divided into 2 areas. First, the ancient alluvium on most of this area, on Red river left side and in the left of National Road 1. Second, the new alluvium on Hanoi outskirts South, mainly in Gia Lam, Thanh Tri, and Tu Liem, with a weaker soil bed created from Red river alluvium.

In the whole area of the project, a boring survey was executed up to maximum 65m depth. According to the results of the investigation, all of the soil obtained by boring are belonged to Alluvium. The soil is clay and sand. This layer extends to 30 to 40 m depth. The soil conditions at the Ngoc Hoi complex area consist of a thick soft clay layer and alternating layers of soft clay and sand. Water table is shallow, about 1 to 2 m below from ground surface.

### **4.1.2 Climate**

According to data from Hydrology meteorology data Center and 2006 Statistic Annual of Hanoi Statistic Grand Department, Northern plains climate in general and of Hanoi in particular area of tropical climate with monsoon and humid hot climate with heavy rain and humidity and high air temperature in summer and dry cold and relatively low air temperature in winter. Meteorological Observation data in Hanoi stations in 1956-2006 is presented in Table 4.1

**Table 4.1 Characteristic of climate in Ha Noi weather station (1956-2006)**

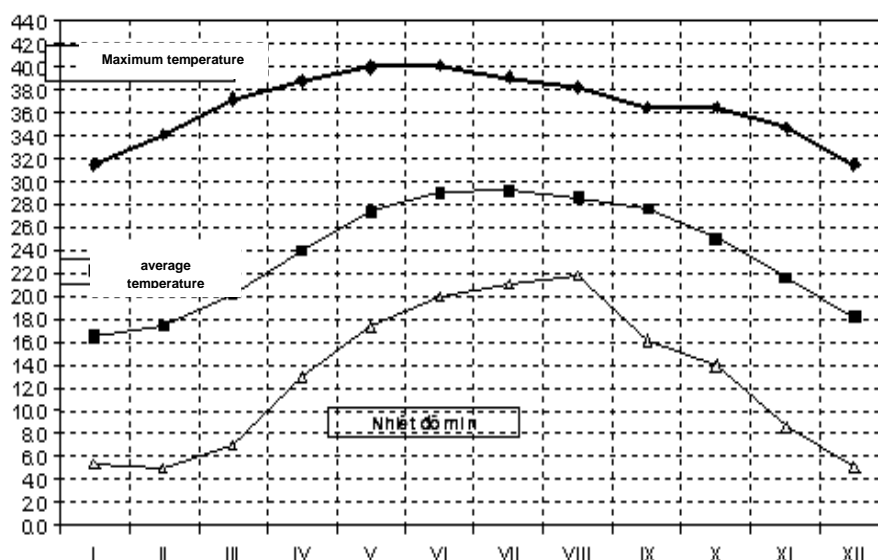
Parameters	Characteristic	i	ii	iii	iv	V	vi	vii	viii	ix	x	xi	xii	Year
Rain fall	Average (mm)	20.0	27.6	47.1	94.3	189.2	252.0	266.7	298.2	225.9	134.3	64.4	18.2	1637.7
	Number of rainfall days	10	12	16	14	15	15	16	16	13	10	7	6	149
Temperature	A <sub>average</sub> (0 c)	16.5	17.4	20.2	24.0	27.4	29.0	29.2	28.6	27.5	25.0	21.6	18.2	23.7
	T <sub>max</sub> (0 c)	31.5	34.1	37.2	38.8	40.0	40.1	39.1	38.2	36.5	35.5	34.7	31.5	40.1
	T <sub>min</sub> (0 c)	5.4	5.0	7.0	12.9	17.3	20.0	21.0	21.8	16.1	13.9	8.5	5.1	5.0
Humidity	H <sub>average</sub> (%)	81	83	86	86	82	81	82	84	82	80	78	78	82
	H <sub>min</sub> (%)	17	18	23	35	23	37	40	43	28	24	17	25	17
Sunny	Sh (h)	73.0	48.8	47.2	91.0	180.2	167.9	189.7	171.0	172.9	163.6	138.6	121.5	1562.0
Vaporizing	V (mm)	69.6	57.4	57.2	65.6	95.8	98.2	98.4	82.6	86.4	96.7	88.0	83.0	978.9
Wind	W <sub>tb</sub> (m/s)	2.0	2.2	2.1	2.2	2.2	1.9	1.9	1.7	1.6	1.7	1.7	1.8	1.9
	W <sub>max</sub> (m/s)	18	15	15	20	30	28	34	31	28	19	22	18	34
	Windy direction	EN	EN	N EN	W	WS	W WS	N	EN	E EN	EN	EN	EN	N

(Source: CEPT, 2008, EIA)

#### 4.1.2.1 Temperature

Annual average temperature in Hanoi is 23.7°C. However with monsoon circulation mechanism creates 2 distinct seasons:

- Summer from May to October, with average temperature from 25°C to 29.2°C in Hanoi (29.2°C in July and 25°C in October). Absolute and highest temperature in Hanoi reaches 40.1°C.
- Winter from November to April with average temperature from 16.5°C to 24°C in Hanoi and absolute and lowest temperature is 5°C. The Annual temperature variation is illustrated in Figure 4.2



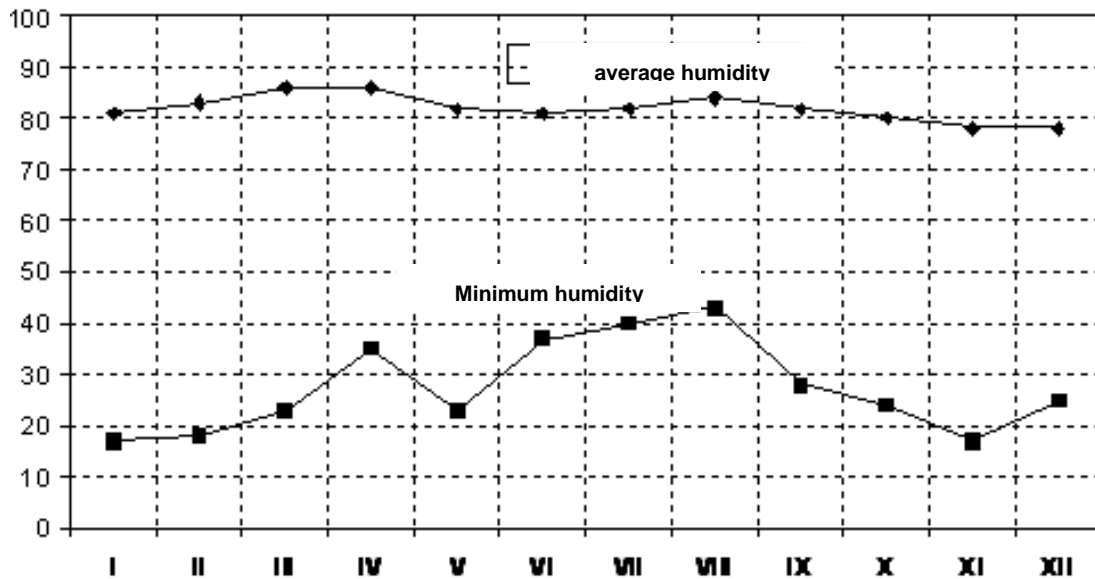
**Figure 4.2 Annual temperature variations in Lang Station-Hanoi**

(Source: CEPT, 2008, EIA)

#### 4.1.2.2 Humidity

Average annual air humidity in Hanoi is 82% (Figure 4.3). Relative dryness occurs at summer end to early winter (November - December) with 78% in Hanoi. In March and April,

drizzle causes humidity and average monthly humidity is at peak with 86% and daily humidity amplitude is only 20-30%. Humidity is relatively high, averagely 82-84% in Hanoi in mid-rainy season.



**Figure 4.3 Annual humidity variations in Lang Station-Hanoi**

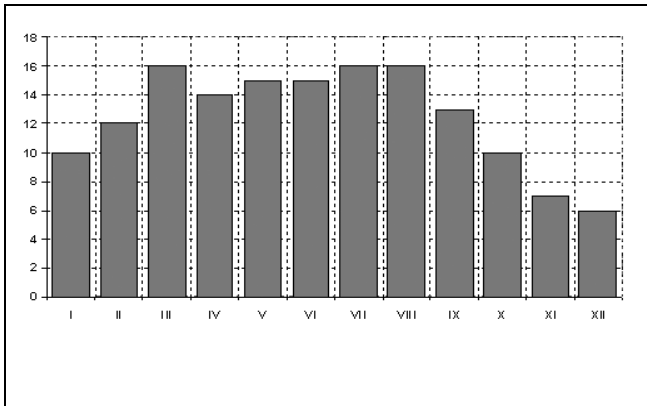
(Source: CEPT, 2008, EIA)

#### 4.1.2.3 Rainfall

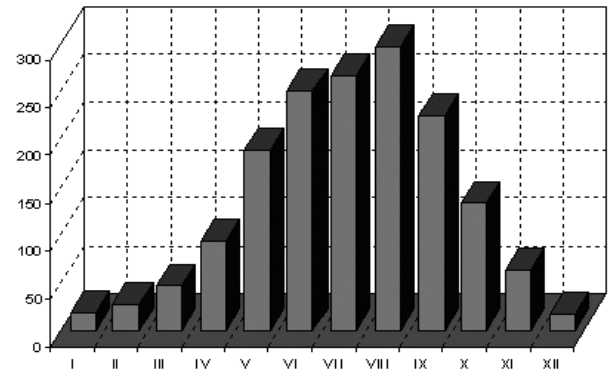
Rainfall in Hanoi is lightly higher than some surrounding areas with annual average rainfall around 1637.7mm. Due to urban terrain influence, city inner has higher rainfall compared to that in the outskirts. The heaviest rainfall in Hanoi was 2536.0mm (1994). The lowest rainfall was 1033.1mm (1988), i.e 2.5 - 2.6 times lowest rainfall. The yearly average rainy days are 149. March, July and August have the highest rainy days (16 days), November and December have the lowest rainy days (8-6 days, respectively) (see Figure 4.3). Months with drizzle (February - April) and early months and these in mid rainy season (May - August) have highest number of rainy days (14 - 16 days). In December, rainy days averagely count 5 - 6 (Figure 4.4). Rainfall in a year largely varies with two seasons:

- From May to October, the rainfall is 1366.3mm, accounting for 83.4% - 85.2% of total annual rainfalls. Rainfall in June, July and August reached 816.9mm, taking up to 49.9 - 51% of total annual rainfall. The average heaviest rainfall in August was 298.2 mm. The monthly highest rainfall in Hanoi reaches 756.7mm. The highest rainfall in a day was 394.9mm (10 November 1984). The highest rainfall in 24 hours in Hanoi reached 536.5mm (November 1984). The highest hourly rainfall was 114.9mm (at 5:00 of 15 July 1999).
- From November to April, the total average rainfall in Hanoi is 271.4mm, accounting for 16.6% of total annual rainfall. Average rainfall in lowest rainy months is 65.8mm. Average monthly rainfall in Hanoi is only 18.2mm, taking 1.1 - 1.3% total annual rainfall.

The Annual rainfall distribution in Hanoi is presented in Figure 4.5.



**Figure 4.4 Average number of monthly rainy days in Lang Station-Hanoi**



**Figure 4.5 Annual rainfall distribution in Lang Station-Hanoi**

(Source: CEPT, 2008, EIA)

#### **4.1.2.4 Evaporation**

Annual average evaporation in Hanoi counts 978.9mm. Highest evaporation occurs in Summer and Winter beginning (May - December). Monthly average evaporation in Hanoi is 82.6 - 98.2 mm. The lowest evaporation occurs in January to April; monthly average evaporation in Hanoi is 57.2 - 69.2 mm. The highest evaporation appears in June and July with averagely 98.2 - 110.1 mm.

#### **4.1.2.5 Sunny hours**

Annual average sunny hours in Hanoi count 1562.0 hours. During summer (May-October) the sunny hours in a month count to 163.6 -189.7. In winter, monthly average sunny hour's counts to 47.2 - 138.6, thus sunny hours are only averagely 47.2 - 54.2 in a month. Drizzle occurs in February and March.

#### **4.1.2.6 Fog**

Foggy days in Hanoi are relatively few, only averagely 10.2 days in a year, and occur mostly in December and January (2.0 - 2.8 days). There is no fog from June to August.

#### **4.1.2.7 Wind velocity**

Annual average wind velocity in Hanoi is 1.9m/s. Monthly average wind velocity significantly varies (1.6 m/s - 2.2 m/s), with 2.1 - 2.2 m/s from January to May, and 1.6 - 1.9 m/s from June to December. The highest wind velocity observed in Hanoi was 34 m/s from the North (8 July 1956). There is no direct or not high impact from stormy wind as Hanoi is relatively far from the sea.

Observation data in many years show that storm often appears in rainy season (May to September), only at 5st-6st level, rarely at 8st-9stlevel. The highest stormy wind velocity is also within 8-15 m/s, rarely up to 20-22 m/s. The wind velocity and wind direction during 1957-2006is shown in Table 4.2

**Table 4.2 The velocity (m/s) and wind direction in Hanoi city (1957-2006)**

Month Direction	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
North	-	-	-	-	-	-	-	-	8.12	11.60	10.43	8.22	5.22- 6.73
North East	21.75	21.7	14.99	8.15	6.72	4.92		6.15	8.8	11.50	15.14	16.46	11.76
East	-	-	-	-	-	-	-	-	-	-	-	-	5.22- 6.73
South East	17.15	23.05	29.77	35.68	34.06	26.95		18.2	12.96	12.18	11.34	13.29	21.91
South	-	-	-	-	-	-	-	-	-	-	-	-	-
South West	-	-	-	-	-	-	-	-	-	-	-	-	-
West	-	-	-	-	-	-	-	-	-	-	-	-	-
North West	-	-	-	-	-	-	-	6.75	10.59	10.02	6.93	-	5.22- 6.73

(Source: CEPT, 2008, EIA)

### 4.1.3 Hydrology

#### 4.1.3.1 River system

Hanoi River and lake system belongs to Red river and Thai Binh River system. The natural rivers mainly include Red, Duong, Ca Lo, Cau (Hanoi segment). The man-made rivers include Nhue, To Lich, Kim Nguu, Lu and Set. Key characteristics of some natural and man-made rivers in inner Hanoi are shown in Table 4.3

**Table 4.3 Hanoi Rivers and canals**

River name	Length (km)	Width (m)	Depth (m)	Coefficient of winding
To Lich River	13.7	30 - 40	3 - 4	
Lu River	5.8	20 - 30	2 - 4	
Set River	6.7	20 - 30	3 - 4	
Kim Nguu River	10.8	20 - 30	3 - 4	
Nhue River	29.0			1.53
Duong River	25.0	300 - 450	4 - 6	1.25
Hong River	34.5	1000 - 1500	4 - 10	2.86

(Source: CEPT, 2008, EIA)

#### 4.1.3.2 Red river hydrological characteristics

Hanoi area and Red river hydrological regime belong to plain hydrological regime. The flow is annually divided into two distinct seasons: flood-season and spent-season. Data collected in 1956-2002 show the followings:

- Annual flow in many years is 2650 m<sup>3</sup>/s, corresponding to total annual flow as 83.5 billions m<sup>3</sup>. Its highest average is 3464 m<sup>3</sup>/s (1971) while its lowest one is 1960 m<sup>3</sup>/s (1989).

Flood season extends from June to October, taking 72.7% total annual flow where highest flow occurs in 3 months - July to September taking 52.4% total annual flow (highest flow occurs in August, taking 19.9% total annual flow).

- The highest flow as 21,000 m<sup>3</sup>/s (20 August 1971), the highest flow speed was 2.8m/s (21 August 1971). Spent season extends from November to May, taking 27.3% of total annual flow. The lowest flow in January to March takes 8.7% total annual flow while that in March takes 2.7% total annual flow 350 m<sup>3</sup>/s - (9 May 1960).
- Annual average turbidity (sand mud concentration) is 779g/m<sup>3</sup>, in flood season is 958 g/m<sup>3</sup>. The highest monthly turbidity - in August - is 1131 g/m<sup>3</sup> and the highest turbidity is 12,500 g/m<sup>3</sup> (12 October 1986). An average turbidity in spent season is 316 g/m<sup>3</sup> and average lowest monthly turbidity is 143 g/m<sup>3</sup> in March. The lowest turbidity was 3.7 g/m<sup>3</sup> (6 April 1977).
- Average annual alluvium flow (sand mud flow) is 2081 kg/s (total average annual alluvium = 65.6 million tons). Average alluvium flow in flood season is 4457 kg/s, taking 89.2% total annual average alluvium. The highest monthly average alluvium flow is 7177 kg/s (August), while the highest alluvium flow is 97,500 kg/s (12 October 1986). An average alluvium flow in spent season is 384 kg/s, taking 10.8% total annual alluvium. The lowest average monthly alluvium flow is 123 kg/s in March, while the lowest alluvium flow was 2.69 kg/s (6 April 1977).
- The annual highest flood peak at Hanoi station often occurs in August with 53.4% frequency and 30.0% in July. The highest water level was 1397 cm (22 August 1971) and the lowest one often appears in February (30.0%), April (29.0%) and March (17.0%). The lowest water level was 157 cm (27 March 1956).

#### *Effect of Hoa Binh reservoir regulation on Red river flow regime in Hanoi area*

Hoa Binh reservoir on Da river is a very big one with around 9 billions m<sup>3</sup> capacity, which tasks are to generate electric power and Fidget against flood for Red river downstream. The reservoir was built in early 70s and completed in 1986 and began to operate for regulation. In first years (1986-1994) as it was in accumulation stage, its regulation effect on downstream flow regime was not quite clear and stable. Since 1995, Hoa Binh reservoir has stably operated and obviously impacted on downstream flow, of which, Hanoi Red river segment. The reservoir regulation does not virtually effect on annual flow, however significantly impacts on flow distribution in the months of a year. In flood season, the reservoir should retain high water quantity to reduce flood for downstream and supplement water in dry season for power generation, irrigation and river way circulation improvement. In 1995-2002, (stable operation) flow in dry season gradually changes compared to that in 1956-1994 (unstable operation). Comparison shows that in dry season (November - April) average flow increases by 13% (1210 m<sup>3</sup>/s) and average water level ups by 12 cm (344 cm and 322 cm). In 3 most spent months (February to April) average flow increases by 39 cm (315 cm and 276 cm). In most spent month (March) average flow increases up to 44% (1131 m<sup>3</sup>/s and 786 m<sup>3</sup>/s) and average water level ups to 45 cm (308 cm and 263 cm). Average most spent flow also increases by 17% (703 m<sup>3</sup>/s and 600 m<sup>3</sup>/s) and average lowest water level also ups to 44 cm (248 cm and 204 cm). Most spent flow increases over 54% (540m<sup>3</sup>/s and 350 m<sup>3</sup>/s) and lowest water level increases over 43 cm (200 cm and 157 cm).

However, in recent years, due to heavy drought, water level in the reservoir lowers but has to supply water for generation and irrigation. Therefore, Red river level downs to very low level, causing difficulties for water use for industries, mostly for agriculture.

#### **4.1.3.3 Nhue river hydrological characteristics**

The Nhue River begins at Lien Mac - Thuy Phuong commune - Tu Liem district - Hanoi - crossing Hanoi West area then encountering Day River at Phu Ly - Ha Nam province. It has 74 km length with high changes in flow - 41 m<sup>3</sup>/s in the dry season and 150 m<sup>3</sup>/s in flood season - and highest water level up to 5.6 m in 1985.

#### **4.1.3.4 Hydrological characteristics of small rivers, canals and drainage ponds and lakes in Hanoi**

Hanoi inner main drainage river system includes To Lich, Kim Nguu, Lu and Set rivers which link each other and discharge into Nhue River at Thanh Liet and Hoa Binh dams. Now, they drain city rainwater and waste water - not merely rivers by definition - Their total length counts around 37 km, with 4-5 m at upstream with small slope, filled bed by mud and waste, flow speed often decreases. Total flow of these rivers is around 70 m<sup>3</sup>/s.

Besides, there are around 25 drain canals with 3-10 m width, 1.5 - 2.5 m depth, 3.5 - 4.5 m bottom level, receiving all rainwater and waste water from sewers of habitats and industrial plants.

Hanoi center area also includes over 100 natural and artificial ponds and lakes. Some artificial ponds and lakes receive water from river and canal network to create part of waste recovery and drainage regulation system.

Water quality in some rivers such as Kim Nguu, To Lich, Lu, Set, etc. and lakes such as Van Chuong, Tho Quan, Kim Lien, Hai Ba Trung, Quoc Tu Giam is heavily polluted up to 5-20 times allowed standard, with high ammoniac phosphate and suspension solids concentration and big quantity of mud, waste and decomposed organic substances. In many cases, there are stink odors.

#### **4.1.3.5 Flood, water-logged in Hanoi City**

Water-logged occurs generally in Hanoi area and along-streets due to heavy, high-intensity and prolonged rain which excess drainage capacity of sewage system (culvert, river, pumping-station, canal, etc.). Water logged level and time depend on rainfall and rain time. Normally, rainfall is 30-40mm, lasts in 1-2 hours and many impasses will be flooded up to 20-40 cm in hours.

Besides, other causes due to poor management such as area expansion (including filling back ponds and lakes and creating construction planes), increase of construction density regardless inadequate drainage system, lack of maintenance of sewage system, etc.

### **4.1.4 Water Quality**

#### **4.1.3.1 Surface water quality**

In order to assess water quality at the project area to serve as baseline data before construction start, water samples were taken from water sources (ponds and small lakes) along the project areas to analyze water parameters. The detail water survey is described below:

Sample location: 05 locations

NM1: Ngoc Hoi 1 station complex (pond)

NM2: Ngoc Hoi 2 station complex (pond)

NM3: Ngoc Hoi 3 station complex (pond)

NM4: Ba Mau Lake

NM5: Long Bien (Upstream)- Red river

Water samples are kept in temperature below 4°C. The samples are appropriately stored and analyzed depending on parameters. Parameters as pH, temperature, DO, conductivity, turbidity were measured in the field. Other parameters were analyzed in the laboratory.

The analyzed values of parameters are compared with QCVN 08:2008/BTNMT, which includes 4 types of water quality level: A1 is for domestic water supply source; A2 type is for the purpose of water supply source with application of appropriate treatment technology; preservation of aquatic plants, or items type uses such as B1 and B2; B1 is applied surface water quality for irrigation and transportation and B2 is for transportation water and other purposes with low water quality requirements

B1 type is chosen for comparison because the water bodies where samples were taken are used for irrigation purposes only.

The monitoring results in the morning and afternoon are presented in Table 4.4 and 4.5

**Table 4.4 Results of surface water monitoring at NM1-MN5 in the morning**

No.	Parameters	Unit	NM1	NM2	NM3	NM4	NM5	QCVN 08:2008/BTNMT Type B1
1	pH	-	7.8	7.9	7.9	8.2	<b>10.3</b>	5.5 - 9
2	Temp.	°C	20.7	22.3	23.5	23.6	14.0	-
3	Turbidity	NTU	573	547	193	154	0.18	-
4	EC	mS	105	84	91	120	0.03	-
5	TSS	mg/l	<b>243</b>	<b>255</b>	<b>53</b>	<b>74</b>	<b>7.4</b>	50
6	DO	mg/l	4.0	3.6	4.9	<b>2.6</b>	<b>0.38</b>	>_4
7	BOD5	mg/l	<b>15.8</b>	<b>18,4</b>	8.6	8.1	0.32	15
8	COD	mg/l	18.0	26.5	13.7	15.0	KPHD	30
9	PO4 <sup>3-</sup>	mg/l	0.21	0.25	0.17	0.25	0.027	0.3
10	NO2 <sup>-</sup>	mg/l	0,023	0.023	0.023	0.034	KPHD	0.04
11	NO3 <sup>-</sup>	mg/l	2.4	4.1	2.7	4.1	0.028	10
12	Cu	mg/l	0.28	0.19	0.31	0.38	0.5	0.5
13	Zn	mg/l	0.42	0.72	0.64	0.52	KPHD	1.5
14	Cd	mg/l	KPHD	KPHD	KPHD	KPHD	6.2.1 0 <sup>3</sup>	0.01
15	Pb	mg/l	0.022	0.028	0.037	0.025	0.027	0.05
16	Hg	mg/l	KPHD	KPHD	KPHD	KPHD	KPHD	0.001
17	As	mg/l	0.027	0.022	0.028	0.032	0.028	0.05
18	Fe	mg/l	0.7	0.84	1.2	0.92	0.5	1.5
19	Oil& grease	mg/l	KPHD	KPHD	KPHD	KPHD	KPHD	0.1
20	Coliform	MPN/100 ml	5.1 .10 <sup>3</sup>	6.7.1 03	7.0. 10 <sup>3</sup>	6.4 10 <sup>3</sup>	6.21 0 <sup>3</sup>	7500

Note: KPHD: undetected

(Source: JKT, 2011, Supplemental EIA)



**Table 4.5 Results of surface water monitoring at NM1-MN5 in the afternoon**

No.	Parameters	Unit	N1	NM2	NM3	NM4	NM5	QCVN 08:2008/BTNM T
								Type B1
1	pH	-	7.6	7.3	8.2	8.4	7.5	5.5 - 9
2	Temp.	°C	23.5	20.7	23.3	23.4	24.5	-
3	Turbidity	NTU	565	543	174	160	94	-
4	EC	mS	108	72	102	94	148	-
5	TSS	mg/l	<b>265</b>	<b>282</b>	<b>46</b>	<b>72</b>	27.5	50
6	DO	mg/l	<b>3.5</b>	<b>3.2</b>	4.7	<b>2.7</b>	5.6	>_4
7	BOD5	mg/l	<b>17.0</b>	<b>24.5</b>	7.9	8.9	13.0	15
8	COD	mg/l	20.3	<b>33.9</b>	12.4	15.8	17.3	30
9	PO4 <sup>3-</sup>	mg/l	0.24	0.27	0.25	0.24	0.17	0.3
10	NO2 <sup>-</sup>	mg/l	0,017	0.027	0.017	0.037	0.027	0.04
11	NO3 <sup>-</sup>	mg/l	3.8	3.5	2.5	4.8	6.8	10
12	Cu	mg/l	0.19	0.25	0.29	0.25	0.42	0.5
13	Zn	mg/l	0.37	0.83	0.57	0.67	0.30	1.5
14	Cd	mg/l	KPHD	KPHD	KPHD	KPHD	KPHD	0.01
15	Pb	mg/l	0.031	0.024	0.045	0.034	0.021	0.05
16	Hg	mg/l	KPHD	KPH	KPHD	KPHD	KPHD	0.001
17	As	mg/l	0.024	0.027	0.032	0.03	0.022	0.05
18	Fe	mg/l	1.2	0.92	1.5	1.4	0.6	1.5
19	Oil & grease	mg/l	KPHD	KPHD	KPHD	KPHD	KPHD	0.1
20	Coliform	MPN/100 ml	6.0. 10 <sup>3</sup>	6.2. 103	6.4. 10 <sup>3</sup>	6.2. 10 <sup>3</sup>	6.4.1 03	7500

(Source: JKT, 2011, Supplemental EIA)

The values excess standards are in bold. It can be seen that the water quality in the project area is relatively good. Almost all parameters meet standards except values TSS, BOD5, COD of some samples.

Sample NM1 and MN2 gave the worse results compare with that of other samples because the water was taken from ponds next to residential areas

#### **4.1.3.2 Ground water characteristics and quality**

- Ground water characteristics

Hanoi has a precious and big ground water resource which is always supplemented, of good quality and protected by anti-pollution coverage strata.

Ground water in Hanoi is conveniently and geographically distributed for exploitation, except for Dong Anh and Soc Son where exploitable water is unevenly distributed. In some areas, such as in Hanoi south, Gia Lam and Dong Anh districts, underground water contains iron, manganese and arsenic high content.

In the project area, ground water sources are described as follows:

- *Ngoc Hoi- Hanoi segment*

This area contains 2 aquifers Q<sub>h</sub> and Q<sub>p</sub> separated each other by a discontinuous water-separating bed however with enough coherent and mutual hydraulic relation even in case of availability of a clay and mud separating bed.

- Q<sub>h</sub> aquifer is sited near ground surface from 0 - 0.5m depth and with thickness carrying within 0 - 15.5m. This is easy to be contemned generally due to ground surface activities.

- Q<sub>p</sub> has an enough highly varying thickness. It is the main object of water supply.

Water measuring shows that underground water level appears at 1 layer bottom and is conserved in almost strata from the 2 layer. Main water supply source for underground water comes from surface water and penetrated rainwater. Underground water level is stable, at 3.5m from ground surface.

- *Hanoi-Gia Lam segment*

Underground water level in this area locates at 0.2m - 1.0 m depth. Chemical analysis of underground water for reinforced concrete corrosion in construction in accordance with TCVN 3994-1985 (VN standard) shows that it has weak aggressive corrosion for concrete.

• Ground water quality

The ground water quality was measured at 4 locations along the project area (source EIA 2011), that are:

NN1: Residential area nearby Ngoc Hoi industry zone 1

NN2: Residential area nearby Ngoc Hoi industry zone 2

NN3: Residential area Kham Thien Street

NN4: Residential area nearby Gia Lam station.

At each locations 3 samples (named A, B, C) were taken from 3 random wells.

The results of underground water monitoring of 4 locations are presented in Table 4.6 and Table 4.7 .

**Table 4.6 Results of underground water monitoring at NN1 and NN2**

No.	Parameters	Unit	NN1			NN2			QCVN 09:2008/BT NMT
			A	B	C	A	B	C	
1	Temp	°C	22.1	22,8	22,3	20.1	20.8	21.3	-
2	pH	-	7.4	6,8	6,8	7.4	7.6	7.2	<b>5.5 – 8.5</b>
3	Colour	Pt-Co	5.8	6,4	5,7	7.1	5.7	6.8	-
4	Hardness	mg/l	152.5	151.5	152.0	156.5	161.7	162.0	<b>500</b>
5	Total solid	mg/l	385	426	450	267	296	325	<b>1500</b>
6	SO <sub>4</sub> <sup>2-</sup>	mg/l	178	165	163	163	160	157	<b>400</b>
7	NO <sub>3</sub> <sup>-</sup>	mg/l	4.0	3.5	4.7	5.2	6.5	4.8	<b>15</b>
8	NO <sub>2</sub> <sup>-</sup>	mg/l	0.2	0.4	0.7	0.4	0.2	0.5	<b>1.0</b>
9	Cl <sup>-</sup>	mg/l	35.4	40.3	27.8	56.4	68.7	48.8	<b>250</b>
10	CN <sup>-</sup>	mg/l	KPHD	KPHD	KPHD	KPHD	KPHD	KPHD	<b>0.01</b>
11	Pb	mg/l	KPHD	KPHD	KPHD	KPHD	KPHD	KPHD	<b>0.01</b>
12	Zn	mg/l	0.72	0.84	1.21	0.82	1.55	1.12	<b>3.0</b>
13	Hg	mg/l	Trace	Trace	Trace	Trace	Trace	Trace	<b>0.001</b>
14	Cu	mg/l	KPHD	KPHD	KPHD	0.22	0.74	0.18	<b>1.0</b>
15	Mn	mg/l	0.18	0.24	0.14	0.18	0.22	0.32	<b>0.5</b>
16	Fe	mg/l	2.7	2.5	2.4	4.7	3.5	3.4	<b>5</b>
17	Cd	mg/l	KPHD	KPHD	KPHD	KPHD	KPHD	KPHD	<b>0.005</b>
18	As	mg/l	Trace	Trace	Trace	Trace	Trace	Trace	<b>0.05</b>
19	Fecal coli	MPN/100ml	KPHD	KPHD	KPHD	KPHD	KPHD	KPHD	-
20	Coliform Coliform	MPN/100ml	3	5	5	2	2	2	<b>3</b>

(Source: JKT, 2011, Supplemental EIA)

**Table 4.7 Results of underground water monitoring at NN1 and NN4**

No.	Parameters	Unit	NN3			NN4			QCVN 09:2008/BT NMT
			A	B	C	A	B	C	
1	Temp	°C	20.1	20.8	21.3	19.3	20.7	20.3	-
2	pH	-	7.4	7.6	7.2	6.8	7.3	7.2	<b>5.5 – 8.5</b>
3	Colour	Pt-Co	56.5	61.7	62.0	163.7	166.8	167.0	-
4	Hardness	mg/l	8.4	4.5	9.1	8.7	10.4	11.2	<b>500</b>
5	Total solid	mg/l	267	296	325	478	353	365	<b>1500</b>
6	SO <sub>4</sub> <sup>2-</sup>	mg/l	163	160	157	145	151	147	<b>400</b>
7	NO <sub>3</sub> <sup>-</sup>	mg/l	5.2	6.5	4.8	3.3	3.5	3.0	<b>15</b>
8	NO <sub>2</sub> <sup>-</sup>	mg/l	0.7	0.6	0.7	0.8	0.5	0.4	<b>1.0</b>
9	Cl <sup>-</sup>	mg/l	47.4	48.0	57.8	45.8	36.0	46.3	<b>250</b>
10	CN <sup>-</sup>	mg/l	KPHD	KPHD	KPHD	KPHD	KPHD	KPHD	<b>0.01</b>
11	Pb	mg/l	KPHD	KPHD	KPHD	KPHD	KPHD	KPHD	<b>0.01</b>
12	Zn	mg/l	1.22	0.86	1.53	0.85	0.76	1.53	<b>3.0</b>
13	Hg	mg/l	Trace	Trace	Trace	Trace	Trace	Trace	<b>0.001</b>
14	Cu	mg/l	0.18	0.45	0.54	0.21	0.71	0.57	<b>1.0</b>
15	Mn	mg/l	0.21	0.14	0.45	0.18	0.42	0.23	<b>0.5</b>
16	Fe	mg/l	5.3	5.6	4.4	4.5	3.6	4.3	<b>5</b>
17	Cd	mg/l	KPHD	KPHD	KPHD	KPHD	KPHD	KPHD	<b>0.005</b>
18	As	mg/l	Trace	Trace	Trace	Trace	Trace	Trace	<b>0.05</b>
19	Fecal coli	MPN/100ml	KPHD	KPHD	KPHD	KPHD	KPHD	KPHD	-
20	Coliform Coliform	MPN/100ml	1	2	3	2	2	2	<b>3</b>

Note: KPHD: undetected

(Source: JKT, 2011, Supplemental EIA)

Results of the ground water monitoring show that most of parameter is lower than regulated value, except Coliform value at NN1 and Fe value at NN3 are higher than permitted value of QCVN 09:2008/BTNMT. However, it does not affect local human health, because people use tap water as a water supply source.

#### 4.1.5 Air Quality

Air environment in Hanoi overhead railways project area quality (Ngoc Hoi-Gia Lam segment) was measured by Transport Science and Technology and Environment Protection Center from 6-12 April 2010 at 7 locations (source EIA 2011)

KK1: Ngoc Hoi 1 station complex

KK2: Ngoc Hoi 2 station complex

KK3: Ngoc Hoi 3 station complex

KK4: Bach Mai station

KK5: Thong Nhat park station

KK6: Phung Hung station

KK7: Gia Lam station.

The average results of microclimate conditions of the project are shown in Table 4.8

**Table 4.8 Results of microclimate condition at Project area**

Sample	Microclimate parameters				
	Temp. (°C)	Pressure (mbar)	Wind velocity (m/s)	Humidity (%)	Wind direction
KK1	23.2	1009	0.6	86.2	NE
KK2	21.5	1009	1.8	88.9	NE
KK3	24.3	1009	1.5	86.6	NE
KK4	24.4	1007	1.4	83.2	NE
KK5	24.2	1010	1.9	82.0	NE
KK6	23.4	1009	1.9	79.1	NE
KK7	24.4	1010	1.9	89.7	NE

(Source: Center for Environmental Protection in Transport, April 2010)

In general, the environmental quality in the area is characterized of climate tropical climate. Average daily temperature during measurements time ranged from 21.5°C - 24.4°C, relative humidity from 79.1% - 89.7%, wind speeds from 0.6 m/s - 1.9 m/s, atmospheric pressure from 1007 - 1010mbar.

The results of air quality in the project area are shown in Table 4.9

**Table 4.9 Results of air quality in the project area**

No.	Location	Results				
		SPM (µg/m3)	CO (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)	HC (CmHn) (µg/m3)
1	KK1	159	1246	149	118	105
2	KK2	144	1145	148	123	96
3	KK3	134	1205	181	91	117
4	KK4	236	1347	261	173	133
5	KK5	195	1175	162	150	138
6	KK6	165	1204	191	182	125
7	KK7	185	1238	218	181	115
QCVN 052009/BTNMT (Average 1 hour/8hours)		300	30000/ 1000	350	200	-
QCVN 06-2009/BTNMT (Average 1 hour/8 hours)		-	-	-	-	5000/ 1500

(Source: Center for Environmental Protection in Transport, April 2010)

The measuring results of ambient air quality in the project area showed concentrations of parameters (NO<sub>2</sub>, SO<sub>2</sub>, CO, HC) and the concentration of SPM in all positions are lower than

the limit allowed in QCVN 05:2009/BTNMT and QCVN 06:2009/BTNMT. The reasons are that those locations are not close to some construction works and the density of trees in locations is higher compare with that in other places.

#### 4.1.6 Noise and Vibration

##### 4.1.6.1 Noise

Noise monitoring locations coincide with the location of air quality monitoring, namely: NS1, NS2, NS3, NS4, NS5, NS6, NS7

The measurement point is 12.5m from nearest track center for horizontal direction and 1.2m from the ground for vertical direction.

The noise measurement was carried out during 16 hours, the average noise results during working time (6h to 21h) and rest time (21h to 6h) are presented in Table 4.10. (The results are also found in Annex B).

**Table 4.10 The average noise results of 7 locations**

No	Time	Monitoring results					
		Leq		Lamax		L50	
		6h-21h	21h-6h	6h-21h	21h-6h	6h-21h	21h-6h
1	NS1	57.9	53.9	74.2	63.3	52.5	48.3
2	NS2	63.8	58.3	80.4	71.0	55.9	55.9
3	NS3	65.2	<b>61.3</b>	83.0	75.7	58.3	52.4
4	NS4	<b>71.5</b>	<b>63.0</b>	86.2	85.0	69.6	61.6
5	NS5	<b>71.8</b>	<b>70.8</b>	83.4	82.4	70.0	69.0
6	NS6	<b>73.5</b>	<b>72.8</b>	85.2	84.4	71.7	71.0
7	NS7	<b>72.6</b>	<b>62.4</b>	89.4	78.8	65.8	54.4
	<b>QCVN 26:2010/BTNMT Special area<sup>1</sup></b>	<b>55dBA</b>	<b>45 dBA</b>				
	<b>QCVN 26:2010/BTNMT Common area<sup>2</sup></b>	<b>70dBA</b>	<b>50dBA</b>				

(Source: Center for Environmental Protection in Transport, April 2010)

Note: <sup>1</sup>Special area is the area inside the fences of the health facilities, libraries, kindergartens, schools, churches, temples, pagodas and other areas with special regulations.

<sup>2</sup>Common areas includes: the building, the individual houses completely separated or adjacent, hotels, motels, administrative agencies.

The monitoring points were located at commons area. Thus the monitoring results were compared with standards for common area (Leq= 70dBA during period 6h-21h and Leq= 50dBA during period 21h-6h)

- The average noise levels from 6:00 to 21:00 at the locations NS1, NS2 and NS3 are lower than limit, while the values at locations NS4, NS5, NS6 and NS7 are a bit higher than limit because these locations is nearby major roads with great traffic flow.

- The average values from 21:00 to 6:00 at all locations are significantly higher than the allowable limit. This is because the values are calculated based on a measured time period of 21:00 to 22:00 when the noise level is still high.

#### 4.1.6.2 Vibration

Vibration locations coincide with the locations of air quality and noise monitoring, namely V1, V2, V3, V4, V5, V6, V7

- Measurement point is on the ground of 12.5m from the nearest track center for horizontal direction for every hour. Vibration sensor is installed at stable ground such as treaded soil, concrete, asphalt. The average results of vibration are presented in Table 4.11.(The results are also found in Annex B).

**Table 4.11 The average vibration results of 7 locations**

Time	V1 Laeg (m/s <sup>2</sup> )	V2 Laeg (m/s <sup>2</sup> )	V3 Laeg (m/s <sup>2</sup> )	V4 Laeg (m/s <sup>2</sup> )	V5 Laeg (m/s <sup>2</sup> )	V6 Laeg (m/s <sup>2</sup> )	V7 Laeg (m/s <sup>2</sup> )	QCVN 27:2010/BTNMT (Vibration acceleration - m/s <sup>2</sup> ) Common area
Average 6:00 to 21:00	0.00169	0.00649	0.00696	0.01395	0.00969	0.00909	0.01184	0.03 (70dB)
Average 21:00 to 6:00	0.00072	0.00588	0.00210	0.00546	0.00377	0.00300	0.00362	0.01 (60dB)

(Source: Based on vibration results from Center for Environmental Protection in Transport, April 2010)

The results are compared with QCVN 27:2010/BTNMT for common area, which is defined as the same as it in QCVN 26:2010/BTNMT for noise. According to the measured results, at all monitoring locations, the vibration acceleration is in the range of allowable limit of QCVN 27:2010/BTNMT for the common area. It could be explained that in the project area no construction activities and no heavy equipment were in operation, thus no vibration impact occurred.

The monitoring results for every hour from 6:00 to 22:00 for noise and vibration are presented in Annex 1

#### 4.1.7 Soil quality

The following parameters were analysed to assess soil quality and degree of soil co: pH, Total organic compound, Exchange acidity, T-N, T-P, Cl-, SO42-, Cu, Zn, Cd, Pb, Hg, Pesticides (organic chloride).

Monitoring location:

D1: Ngoc Hoi station complex 1

D2: Ngoc Hoi station complex 2

D3: Ngoc Hoi station complex 3

D4: Long Bien bridge area

Standard: QCVN 03:2008/BTNMT: National Technical Regulation on allowable limits of heavy metals in the soils.

Results of soil monitoring are shown in the table 4.12

**Table 4.12 Results of soil analysis**

No.	Parameters	Unit	Results				QCVN 03:2008/ BTNMT
			D01	D02	D03	D04	
1	pH	-	6.1	6.4	5.9	6.5	-
2	Total organic compound	%	18.1	20.5	19.8	22.5	-
3	Exchange acidity	mgdl/100g	76.4	63.5	55.7	64.6	-
4	T-N	%	0.18	0.15	0.21	0.24	-
5	T-P	%	0.14	0.17	0.16	0.21	-
6	Cl-	%	0.41	0.32	0.37	0.52	-
7	SO42-	%	0.24	0.38	0.26	0.29	-
8	Cu	mg/kg soil	42.5	34.9	47.4	36.2	50
9	Zn	mg/kg soil	108.7	100.6	98.2	146.2	200
10	Cd	mg/kg soil	0.85	0.74	0.66	0.4	2
11	Pb	mg/kg soil	0.5	0.4	0.7	1.2	70
12	Hg	mg/kg soil	0.05	0.04	0.07	Trace	-
13	Pesticides (organic chloride)	mg/kg soil	0.25	0.31	0.12	0.43	-

(Source: Center for Environmental Protection in Transport, April 2010)

The Results of soil analysis in the project area show that the soil quality is good. All heavy metal values are in range of permitted value of QCVN 03:2008/BTNMT (for agricultural soil).

#### **4.1.8 Soil erosion and sediment**

##### **4.1.8.1 Soil Erosion**

The Hanoi Urban Railway Construction project line 1 lies in the Red river plain. The plain geographic condition together with the very small slope could not cause the soil erosion in general. Even the natural elevation level of the topography could not cause the serious soil erosion. Moreover, over the whole area, there exists the drainage system to collect all the runoff water into the sewage channels network which play role of soil erosion protection and prevention (in agricultural land, there exists the irrigation system to play the same role).

Referring to data from EIA 2008, erosion problem at bridge piles is considered as entire erosion and local erosion. Erosion forecast at bridge piles of Red river between two dykes is presented in table 4.13



**Table 4.13 Estimating bridge buttress erosion at Hong River**

No.	Bridge buttress	Height (m)	Common erosion depth (m)	Partial erosion depth (m)	Total erosion depth (m)
1	P1	Outside left dyke			
2	P2				
3	P3				
4	P4	22.35	0.24	5.19	5.43
5	P5	15.35	0.24	7.11	7.35
6	P6	16.91	0.24	6.57	6.81
7	P7	19.89	0.57	5.38	5.95
8	P8	20.80	0.57	5.25	5.82
9	P9	23.20	0.57	2.53	3.10
10	P10	Outside right dyke			
11	P11				
12	P12				
13	P13				

(Source: JKT, 2011, Supplemental EIA)

#### **4.1.8.2 Sediment**

When water flow is narrowed by bridge buildings, river water is raised at higher level compared with natural water surface line and is at a far distance from front of bridge. Phenomenon of water slowing down to upper section of affected areas and water rapidly rising at piece near bridge erodes areas near bridge. At lower land of bridge, speed of water lowering following water flow reduces capacity of carrying alluvium and river-bed will be built up.

Because geology of the line lies in low stable land of organic mud pocket and sediment, depression is at high risk. It can harm seriously to surrounding buildings.

#### **4.1.9 Subsidence**

Hanoi lies on the center of Red river downstream triangular plain, slightly deviated on North East, which apex is Viet Tri. Geologically, Red river downstream plains lay in a depression area. As quaternary coat layer of this depression is very thick, and studying geological constitution faces many difficulties.

In respect of tectonics, Hanoi is a quaternary deflected zone developed on a non-homogenous foundation formed by ante-cam-bri to Neogene sediments covered by quaternary strata. According to recent physical studies, thickness of this quaternary stratum at deflection center may reach 200m. There are 100m deep drill-holes in Hanoi however these did not perform across this cover.

Bridge piles construction can affect surrounding buildings. Land depression of some centimes can crack surrounding works and deform walls. In reality, to access land depression is difficult. Thus, methods to prevent land depression will be carried out by technical measures which are subjective to reality and observation activities to define impact level.

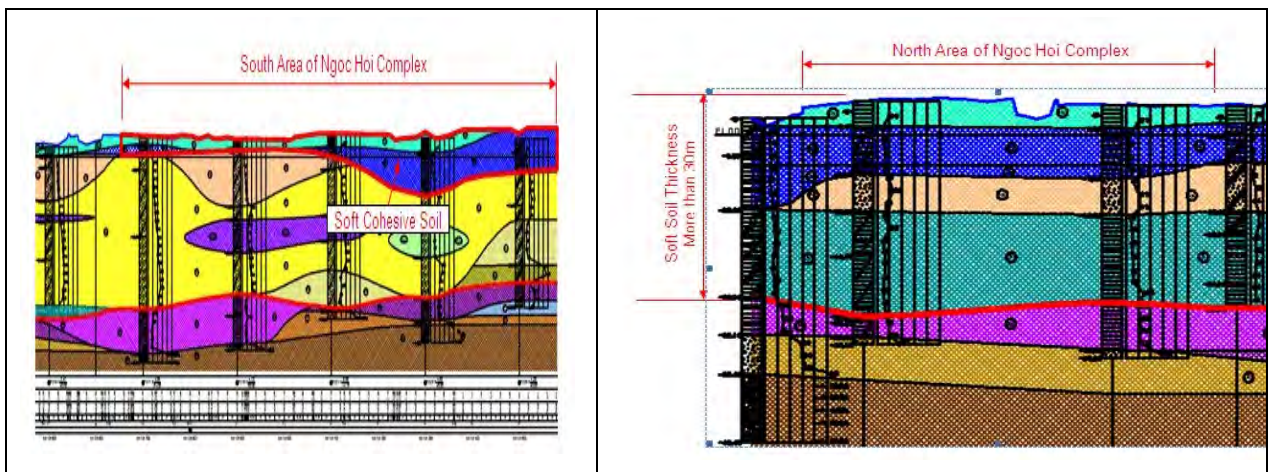
Regarding subsidence in the project area, a soft soil measure has been conducted for Ngoc Hoi Complex by JKT team in November 2011. The Ngoc Hoi Complex site lies on swamp and

soft ground. Therefore, a significant ground improvement as a soft soil measure method must be completed prior to mobilization of the contractor selected for the construction of the depot facilities. In addition, the construction of various Ngoc Hoi Complex facilities and structures will cause further local differential settlements, which must be strictly limited to acceptable levels.

Settlement analysis is conducted on 156 points in total at intervals of approximately every 100m in the direction of south and north covering whole objective area.

According to the settlement analysis results for filling work on the original ground up to the planned level with no measures, the settlement amount is estimated more than 1.5m in the north of Ngoc Hoi Complex, and approximately 50cm in the south. In addition, the residual settlement amount after finish of filling work is estimated more than the allowable settlement amount due to the slow settlement speed (Figure 4.6).

As a result, it is judged that settlement measures are needed for most of the objective area.



**Figure 4.6 Layer profile of South and North Area of Ngoc Hoi Complex**

(Source: CEPT, 2008, EIA)

#### **4.1.10 Protected Areas**

There's no protected area within 2 km both directions as well as at the area of Hanoi Urban Railway Construction Project line 1.

#### **4.1.11 Ecosystem**

##### **4.1.11.1 Biodiversity resource**

The project is located through the densely populated and busiest part of Hanoi and it is most unlikely to find any endangered or rare animal or plant species. Generally, biodiversity in the project area is very poor in respect of quantity and composition. Ecosystem in the area bears specificities of plains agricultural ecosystem which is strongly impacted by man's activities including cultivation land and rural population in the outskirts.

##### **4.1.11.2 Terrestrial ecosystem**

###### **a. Flora**

Natural vegetation cover is almost debilitated by man's strong action. Endemic tropical plants virtually disappear and are replaced by other plants such as food plants, industrial plants, fruit-trees and industry-material plants, etc. Green area is reduced for other economic and livelihood activities. Some existing typical plants in the area include:

- Plants in residential area: mainly existing in rural area, poor in composition and category, slowly developed and mainly drought-resistant plants. These are classified into food plant, fruit-tree, etc.

- Crop vegetation: less changed in composition and species, mainly food-plant, vegetables of North Delta.

#### **b. Fauna**

Animal resources in the project area are very poor, mainly including domestic animals. The local livestock is less developed due to insufficient vegetation resource in the dry season.

Micro fauna and meso-fauna also are studied for soil environment evaluation. The results of the study show existence of 15 species of worm, 18 species of flea and much of pets and insects. Soil worms live in high-humidity soil with prosperous organic content and food as decomposed plants. This group effects as supplementing organic substances to and enrich soil.

In farming land, species live in concentrated population or separately with element and number subject to each type of soil and each species. Separately living species trend to decrease subject to following soils: garden soil, soil for cereals and non-cultivating land. For planting soil with use of chemical fertilizers and pesticides, density and number of insects are substantially smaller than in non-chemical used soil.

#### **4.1.11.3 Aquatic ecosystem**

Like terrestrial ecosystem, aquatic ecosystem has North Delta characteristics:

- Plants: 32 species are determined, among which moss, water-weed, alga prevail with 12 families. In small ponds and lakes, particularly in household pond, alga and moss strongly develop, showing existence of high content of organic substances.
- Animals: 12 species of 5 specific groups are determined, among which *Cliprinniformes* prevail with 7 species, living in sweet water environment and widely distributed in North Vietnam provinces. Density distribution and number of species depend on water characteristics. Cultured fishes include popularly Indian mud carp, local mud carp, carp, etc. and river fishes - barracuda, mud carp, carp, etc.
  - Fish: 11 species among that more than a half are cultured in ponds and lakes. Natural fishes are only seen in rivers and canals.
  - Number and density distribution in fish-pond are higher and more diverse compared to those in canal and river. There are fewer Vertebral animals, particularly floating animals are diverse and abundant, of which *Rotatoria* with 8 families 24 species, *Cladocera* with 3 families 8 species, *Copepoda* 1 family 4 species.
  - Insects: 4 species
  - Bottom animals: 13 species - shrimp, crab, nail, oyster and mussel.

#### **4.1.12 Landscape**

The train line goes along the Gam Cau Street and Phung Hung streets that are on the border of an ancient quarter. Thus, landscape of Hanoi ancient quarter has not been affected.

In the part of line 1, the line is elevated right on the old railway, which has no esthete either. The new elevated line would give better view for the project sections

#### 4.1.13 Wastes

##### 4.1.13.1 Solid waste in Ngoc Hoi area

According to EIA 2008, the solid waste amount Ngoc Hoi area was determined by family household types as following:

- In villages: 0.65kg/person/day-night
- In office area: 0.30kg/per day-night.

The wet weight is around 0.22 ton/m<sup>3</sup>

Total waste quantity in studies area is estimated around 33 m<sup>3</sup>/day. However, only 7.02 m<sup>3</sup>/day was collected by handcart.

Waste composition and characteristics in the studied area represent typical waste of Hanoi outskirt area, which contains about 50-60% organic waste, high moisture content and high natural weight (batteries, metals and pesticide.42 - 0.45 ton/m<sup>3</sup>). The solid waste also includes high ratio of broken brick, soil and stone from construction waste and some hazardous waste like batteries, pesticides etc. The composition of solid waste was:

Organics	50.3% weight
Paper, carton	2.7% weight
Wood	6.3% weight
Plastic, rubber, leather	0.7% weight
Oyster, nail shell etc, etc.	1.0% weight
Glass	7.7% weight
Gravel, broken brick	7.4% weight
Metal	1.0% weight
Mixed waste <10mm	22.6% weight

Accommodation waste with 50% average water content

Average calorificity: around 860 Kcal/kg

- *Market waste volume and composition*

There is a big market in Ngoc Hoi area. Total waste volume collected from markets is around 3.5 - 8 m<sup>3</sup>/day-night. Waste composition is similar to that of domestic waste.

- *Road waste mass and composition*

This includes:

- Waste from corrosion and worn substances from road surface and wheel rubber.
- Paper and cigarette, dog dung and similar things
- Leaves and branches

Waste from road wiping is estimated up to 2.5 - 5.8 m<sup>3</sup>/day-night, mainly 10% - 15% organics and 85 - 90% minerals. There is a small amount of waste from construction and industries in the area. Construction waste produces another important source of waste used for filling back ponds and lakes.

##### 4.1.13.2 Environmental sanitation

There are 3 types of household toilets in the studied area, that are dry 2-compartment and 1-compartment toilets (65%) and toilets with septic tank (35%). Human manure is estimated as 0.45 kg/pers./day-night or 0.5 l/pers./day-night. The sanitation remains a serious problem in

Hanoi outskirts. Construction/domestic and industrial waste are not collected and transported as required but being discharged into ponds and lakes or retained in waste bins several days. This produces stink odor attracting fleas, mosquitos and pests and affected human health.

## **4.2 SOCIAL ENVIRONMENT**

The entire route of phase 1 and phase 2a from Ngoc Hoi- Yen Vien belongs to Hanoi and goes through the following districts from south to north directions: Thanh Tri, Hoang Mai, Thanh Xuan, Dong Da, Hoan Kiem, Ba Dinh, Long Bien and Gia Lam.

### **4.2.1 General Description of the Hanoi city**

#### **4.2.1.1 Population**

According to Hanoi statistical Yearbook 2010, the population of Hanoi is 66,179,000 people in which the urban population is 28,165 thousand people, the rural population is 38,014 thousand people.

The average population density of Hanoi is 2009 people/km<sup>2</sup>. Population density is the highest in Dong Da district up to 38,153 people/km<sup>2</sup>, while in the suburban districts such as Soc Son, Ba Vi, Thach That, My Duc, density less than 1,000 persons/km<sup>2</sup>.

Residents of Hanoi and Ha Tay mainly Kinh, count for 98.73% of the population, the Muong and Tay occupied 0.76% and 0.23% respectively.

#### **4.2.1.2 Land use**

Total land area of Hanoi is 332,889 ha. Of which: 188,601.1 ha of agriculture, forestry and aquaculture land, non-agricultural land is 13,947.4 ha, 9,340.5 ha for unused land.

#### **4.2.1.3 Economic activities and indexes**

In 2010, GDP growth in the city reached 11.04%. Total revenue of state budget reached about 100,000 billion dongs. Gross output of industry (at price 1994) reached 108,205 billion dongs. Gross output of agriculture, forestry, fishery (at price of 1994) reached 8,089.0 billion.

#### **4.2.1.4 Social infrastructures and conditions**

##### Health care

Total of hospital Ha Noi is 55 hospitals, of which: 15,509 bed; 5,386 doctors; 2,584 assistant to doctor; 5,617 nurse and 1,042 pharmacists

##### Education

In 2011-2012 school year, Hanoi has 2,434 schools (71 schools increased compared to last year, mainly non-public schools), of which 546 cases to national standards, achieving 24.8% and 60 cases compared with last year; with 46,251 classes, 1,573,611 students and 82,855 teachers at all educational levels, fields of study. Average grade pupils per 10,000 inhabitants were 1.519,6 pupils.

### **4.2.2 Thanh Tri district**

Ha Noi urban railway Line 1 runs through the wards of Lien Ninh, Vinh Quynh, Van Dien, Ngoc Hoi in Thanh Tri district.

#### **4.2.2.1 Population**

Average population of Thanh Tri district was 2,021,000 people

Population composition of the project area in Thanh Tri district is presented in the Table 4.14

**Table 4.14 Collection and classification of socio - economic norms of Thanh Tri district**

Ward/ Commune	Total population /Number of households	Population growth rate (%)	Malnourished children rate (%)	Number of female households	Number of agricultural households	Number of non-agricultural households	Number of employees working for industrial establishment
Lien Ninh	12367/352	1.26	13.1	-	2706	846	3612
Vinh Quynh	20459/5120	1.5	16	-	1130	3390	180
Van Dien	16226/3565	0.2	5.6	-	-	-	-
Ngoc Hoi	9943/2567	2.16	14.8	135	673	1894	3577
<b>Total</b>	<b>58995/11604</b>	<b>5.12</b>	<b>49.5</b>	<b>135</b>	<b>4509</b>	<b>6130</b>	<b>7369</b>

(Source: JKT, 2011, Supplemental EIA)

Thanh Tri district's population is mainly ethnic Kinh

#### 4.2.2.2 Land use

Natural land of Thanh Tri district is 6,292.7 ha, of which: 3,462.9ha of agricultural, forestry and aquaculture land, non-agricultural land is 2,798.5 ha, unused land is 31.3 ha for.

Land management, construction order, urban management, environment management was concerned strongly and there are some achievements: land statistics, land planning and using to 2020, land using plan to 2015. Checking the activities of land using for projects with state-granted, leasing land and shifted land use.

The land acquisition area and other facilities affected by the Project in Thanh Tri District is presented in Table 4.15

**Table 4.15 The land acquisition area and other affected facilities in Thanh Tri District**

	Item	Unit	Quantity		
			Vinh Quynh commune	Ngoc Hoi commune	Lien Ninh commune
<b>A</b>	<b>Land</b>	m <sup>2</sup>	26180	610871	415133
1	Existing		0	0	0
2	Newly granted	m <sup>2</sup>	26180	610871	415133
-	Residential land in communes	m <sup>2</sup>	0	6308	4620
-	Garden land for planting	m <sup>2</sup>	0	947	0
-	Lake and pond surface	m <sup>2</sup>	3394	35965	38319
-	Agricultural land	m <sup>2</sup>	22768	532805	348469
-	Public land	m <sup>2</sup>	0	343	1235
-	Planned land in Ngoc Hoi station	m <sup>2</sup>	0	24219	22490
-	Grave yard	m <sup>2</sup>	0	10284	0
<b>B</b>	<b>House</b>				
-	4 <sup>th</sup> grade house	house/m2	0/0	32/1435	2/63
-	1floored house	house/m2	0/0	12/641	35/1515
-	2floored house	house/m2	0/0	6/400	7/1181
-	3floored house	house/m2	0/0	3/204	3/419
<b>C</b>	<b>Works on land</b>				
1	Farm products	m <sup>2</sup>	22768	557024	370959
2	Trees	tree	0	363	231
3	Agricultural products	m <sup>2</sup>	3394	35965	38319

	Item	Unit	Quantity		
			Vinh Quynh commune	Ngoc Hoi commune	Lien Ninh commune
<b>D</b>	<b>Grave</b>		0	500	150
-	Stone grave	yard	0	300	140
-	Soil grave	yard	0	200	10
<b>E</b>	<b>Technical infrastructure</b>				
1	Electrification	m	0	60	0
2	Telecommunication cable (inter-provincial fiber cable, culvert)	m	0	0	210

(Source: TRICC-JSC, 2008. Land acquisition plan, HURC1, line1 –phase 1)

#### **4.2.2.3 Economic activities and indexes**

Agricultural and aquaculture products were strongly developed in this District. The total planting area was 4,645 ha, in which, for rice was 2,918 ha, the annual mean productivity reached 4,930 kg/ha, reduced by 310 kg/ha, the output was estimated to be 14,306 ton. The vegetable area was 1,286 ha, the mean productivity reached 22,650 kg/ha, 29,128 ton of product. The livestock and poultry grew well with 218,000 poultries, 2,044 bulls and cows, 24,934 pigs. The fish culturing model at 04 communes developed well. The total area of aqua product culturing reached 831 ha, 3.071 ton of products. Agriculture product value grew well.

The agricultural productive value per hectare reached 69.8 million VND, increased by 8.2 million VND/ha in comparison with value in 2008.

Industrial production was maintained and grown well: Work-ship with enterprises to solve the difficulties in economic downturn period, implementing the support policy for the enterprises. There are 1,159 small-handicraft households, 231 running enterprises. The total industrial product value reached 627,196 million VND, increased by 17,5% year on year.

Trade – service prospered: There are 559 enterprises operating in trade and service, increased by 1.5 times in comparison with year 2008.

Total budget revenue in 2009 was estimated equal to 433 billion 641 million VND, reach 220% in comparison with the estimation from the City's requirement, increased by 85.3% in comparison with year 2008. In which, value from land-using tendering reached 292 billion 557 million VND, equal to 292.6% of the City's requirement, increased by 201.6% year on year.

The trade-service product value in 2009 reached 207,413 million VND, increased by 19% year on year. In 2009, the number of Projects that must be implemented was 203 with the total capital of 360 billion 918 million VND. The completed volume was about 381.88 billion VND, reached 105.8% of planning; 355 billion 468 million VND was disbursed, reached 98.5% of planning.

Average income per capital was about 12.3 million VND/person/year, increased by 700,000 VND/person/year in comparison with 2008, and reached 105.7% of planning.

The summary of the socio-economic situation in the Project area of Thanh Tri district is presented in Table 4.16

**Table 4.16 The socio-economic situation in the Project area of Thanh Tri district**

Ward/ Commune	Norm	Total income from agriculture (Percentage) (VND mil/%)	Total income from agriculture (Percentage) (VND mil/%)	Total income from commerce (Percentage) (VND mil/%)	Average Income (VND mil)	Number of poor houses
Lien Ninh		16400 (16%)	55100 (53.5%)	31700 (30.5%)	0.834	30
Vinh Quynh		31442 (32.2%)	38400 (39.3%)	27792 (28.5%)	0.740	-
Van Dien		-/-	-/-	3252 (100%)	1.1	21
Ngoc Hoi		12370/ (84.6%)	42000 (80%)	31000 (82%)	0.84	140

(Source: JKT, 2011, Supplemental EIA)

#### 4.2.2.4 Social infrastructures and conditions

Health care Health - Family planning was concerned seriously. Disease prevention planning was carried out in time with the Food Safety and Hygiene certifications. The expanded immunity injection program was implemented well. The Public health situation of Thanh Tri District is presented in Table 4.17

**Table 4.17 Public health situation of Thanh Tri District**

Ward/ Commune	Number of medical establishments/sickbed	Medical staff	Number of people getting infection disease	Number of people getting chronic disease	Number of people getting occupational disease
Lien Ninh	1/5	7	4	19	-
Vinh Quynh	1		6	10	0
Van Dien	1/7	7	8	200	0
Ngoc Hoi	13/-	8	5	3	7

(Source: JKT, 2011, Supplemental EIA)

The social target groups were taken care very well. Houses of gratitude were built and repaired, saving books were given to the target groups. The “Fund of Gratitude” was motivated and achieved good results. Rice allowance was given on-time in cooperation with the Red Cross, helping jobless people find jobs through projects and the 1st job introduction session.

Education. Education and training activities achieved significant results. Education universalizing was implemented well (Table 4.18).

**Table 4.18 Education and hygiene condition of Thanh Tri district**

District	Ward/ Commune	Rate of children to be school age (%)	Number of nursery schools	Number of HS, CL, UN	Number of teachers and pupils	Number of teachers and students
Thanh Tri	Lien Ninh	92	2	1 HS/2CL	38/544	20/3000
	Vinh Quynh	100	1	0	50/957	0
	Van Dien	100	2	1 HS	30/1100	-
	Ngoc Hoi	100	1	-	-	-

(Source: JKT, 2011, Supplemental EIA)



## Social structures

The general planning and rural residential planning were published. The lighting system was improved and constructed. The natural resource, hygiene, environment management was well implemented. Fresh water was also provided. The “Unity for a cultural life” movement was widely implemented and achieved some results. 10 cultural houses were built. The 7th Sport Games opening anniversary was successfully organized. There were no complicated points of culture and religion. The social infrastructure of Thanh Tri District is presented in Table 4.19

**Table 4.19 Public works and infrastructure in the Project area of Thanh Tri district**

Norm Ward/ Commune	Number of Office/ Factory/ Hospital/ Market/ Pagoda, temple, church/Grav eyard	Number of Nursery/ Primary school/ Secondary school/High school (school)	Road situation: Soil road/ Gradation road/ Concrete road (%)	Road situation: Asphalt road/ Brick road/ Others (%)	Drainage system: Soil canal/ Concrete canal/ Flood situation/ Dyke situation (%)	Number of households using: Energy/Tap water/Drilling wall water/Deep wall water/ other water source
Lien Ninh	-/2/1/2/10/5	4	4.3/30.1/65.6	0/30.1/0	-/-/-	100%/100%/0/0/0
Vinh Quynh	21/-/1/1/8/-	1/1/1/0	29.6/10/45.2	7.2/8/-	-/-	5.120/2.150/2.280/690/-
Van Dien	37/-/2/1/-/1	6	0/0/50	49.8/0.2/0	0/100%/0/0	100%/100%/0/0/0
Ngoc Hoi	-/50/2/2/4/4	1/1/1/0	10/0/30	9.5/60.5/0	100%/0/có/-	2567/2062/434/71/0

(Source: JKT, 2011, Supplemental EIA)

### **4.2.3 Hoang Mai district**

Ha Noi urban railway Line 1 runs through the wards of Hoang Liet, Thinh Liet, Giap Bat and Dinh Cong in Hoang Mai district.

#### **4.2.3.1 Population**

Average population of Hoang Mai district was 3,441,000 people

The Population composition of the project area in Hoang Mai district are presented in the Table 4.20. Hoang Mai district's population is mainly ethnic Kinh

**Table 4.20 Collection and classification of socio - economic norms of Hoang Mai district**

Ward/ Commune	Total population/ Number of households	Population growth rate (%)	Malnourish ed children rate (%)	Number of female householders	Number of agricultural households	Number of non- agricultural households	Number of employees working for industrial establishment
Hoang Liet	28743/9281	0.1	>10	3018	252	-	-
Thinh Liet	30442/9003	1.1	6.8	-	980	-	-
Giap Bat	16034/4097	1.2	1.18	-	-	-	-
Dinh Cong	44788/11918	-	-	-	-	-	-
<b>Total</b>	<b>120007/34299</b>	<b>2.4</b>	<b>7.98</b>	<b>3018</b>	<b>1232</b>	<b>0</b>	<b>0</b>

(Source: JKT, 2011, Supplemental EIA)

#### 4.2.3.2 Land use

Natural land of Hoang Mai district is 4,032.4 ha, from which: 1,215.7ha of agriculture, forestry and aquaculture land, non-agricultural land is 2,771.6 ha and 45.1 ha is unused land.

Now district land-use and urban development planning is basically completed and submitted to City People's Committee for approval. Land management and construction order are specially paid attention and under conduct of district party committee people's committee. Functional bodies have taken over land-use and property certificates from Hai Ba Trung district and are coordinating with District people's committee for delivery to households. 3,779 land-use plus adjacent pond and garden land certificates are delivered; (2,295 ones by district and 1,475 ones by city) also 124 construction and housing improvement permits are delivered. 463 land-use certificates are paid by holders. Land-use right and house property transfer certificates also are resolved.

The land acquisition area and other affected facilities caused by the HURC1 Project in Hoang Mai District is presented in Table 4.21

**Table 4.21 The land acquisition area and other affected facilities in Hoang Mai District**

	Item	Unit	Quantity	
			Ward Hoàng Liệt	Ward Thịnh Liệt
<b>A</b>	<b>Land</b>	m <sup>2</sup>	6251	117350.70
<b>1</b>	<b>Existing</b>	m <sup>2</sup>	1439	104125.11
<b>2</b>	<b>Newly granted</b>	m <sup>2</sup>	4812	13225.6
-	Residential land	m <sup>2</sup>	3573	847.44
-	Public land	m <sup>2</sup>	1239	12378.16
<b>B</b>	<b>House</b>			
-	4 <sup>th</sup> grade house	house /m <sup>2</sup>	0/0	10/920.9
-	1floored house	house /m <sup>2</sup>	18/620	3/360
-	2floored house	house /m <sup>2</sup>	13/424	5/179
-	3floored house	house /m <sup>2</sup>		3/118
<b>C</b>	<b>Works on land</b>			
-	<b>Trees</b>	tree	166	42
<b>C</b>	<b>Technical</b>			
-	Water supply	m	0	32
-	Water discharge	m	0	410
-	Electrification	m	0	146
-	Telecommunication cable(inter-provincial fiber cable, culvert)	m	0	1230

(Source: TRICC-JSC, 2008. Land acquisition plan, HURC1, line1 –phase 1)

#### 4.2.3.3 Economic activities and indexes

Since the last past years, Hoang Mai district has developed strongly in many aspects, especially the high development of economy with the average ratio of 17.47% annually.

The economic structure is shifted in the right way, the ratio of industry – small handicraft, trade – service has been increased. The production value of industry – small handicraft reached from 653.6 billion VND (2004) to 1,338 billion VND (2008); the production value of trade – service reached from 455.6 billion VND (2004) to 875.8 billion VND (2008).

Especially during the first 9 months in 2009, the total production value in the ward had reached 9,909.9 billion VND, increased by 12.3 % year-on-year; in which, the production value of industry - small handicraft – construction reached 5,688.4 billion VND, increased by 12.3%; the production value of trade – service reached 4,164.1 billion VND, increased by 14.8%.

Nowadays, there are more than 4,562 processing and trading companies, in which, there are 31 state-owned companies, 4,151 non-state-owned companies, 16 foreign-invested companies, and some other types of companies. There are many traditional craft villages in Hoang Mai district with many specific foods and other special products.

Total production value in 9 months is estimated up to 770,887 billion VND, equal to 75% annual plan, 15.9% up compared to same that of same period in previous year, of which: industry/handicraft/construction obtain 376,386 billion VND, equal to 74.3% annual plan, and 18.1% up compared to the same period; trade tourism and services obtain 329,557 billion VND equal to 75.1% annual plan; and up 161%, Agriculture and Fishery obtain 66.994 billion VND equal to 77.5% annual plan, up 3.6%. District economic structure continues to strive to increase industry-construction-trade and service proportion and gradually decrease agricultural proportion. In 9 months, 729 individual households are delivered business registration certificate and 46 cooperatives obtain the same or business change registration.

Private industrial production grows up better and evenly with 18/20 industries values increased. Quick urbanization in the district actively effects on trade and service scale with 4,597 units involved in trade-service with 10,635 laborers.

Agricultural production gains good results, with farmer assistance policies-investment, change of plant seed and animal strain, application of scientific-technical progress. City People's Committee allows the district to cooperative with some businesses to set up project on landscape improvement and exploitation of alluvia land beyond Red river dyke Husbandry though affected by bird flu, now, is gradually rehabilitated with estimated 16.91 billion VND value. The plants with high productive and economically effective features are focused to grow, such as flowering in Vinh Tuy commune, safety vegetable and plants in Linh Nam, Tran Phu communes. One cultivated hectare in the district is estimated to obtain 75 million VND. The socio-economic situation in the Project area of Hoang Mai is presented in Table 4.22

**Table 4.22 The socio-economic situation in the Project area of Hoang Mai**

Norm Ward/ Commune	Total income from agriculture (Percentage) (VND mil/%)	Total income from agriculture (Percentage) (VND mil/%)	Total income from commerce (Percentage) (VND mil/%)	Average Income (VND mil)	Number of poor houses
Hoang Liet	5000/8	-	-	-	23
Thinh Liet	2000/2.62	35800/46.95	38440/50.43	1.2/7/-	16
Giap Bat	-/-	6.501/133	1000/14	1/1.5/0.650	21
Dinh Cong	-/-	-/-	-/-	-/-/-	-

(Source: JKT, 2011, Supplemental EIA)

#### 4.2.3.4 Social infrastructures and condition

##### Health care

There are 3 clinics and 14 regional medical centers and other preventive healthcare groups and reproductive health care groups in the District. The Public health situation of project area in Hoang Mai district is presented in Table 4.23

**Table 4.23 Public health situation in the project area of Hoang Mai district**

Ward/ Commune	Number of medical establishments/sickbed	Medical staff	Number of people getting infection disease	Number of people getting chronic disease	Number of people getting occupational disease
Hoang Liet	1/8	9	-	-	-
Thinh Liet	1/6	12	130	27	0
Giap Bat	12/-	8	15	-	-
Dinh Cong	-	-	-	-	-

(Source: JKT, 2011, Supplemental EIA)

##### Education

There are 28 kindergartens, 17 primary schools, 16 secondary schools in this district. The vocational school system has been strongly developed. The Education and hygiene condition in the project area of Hoang Mai district is presented in Table 4.24

**Table 4.24 Education and hygiene condition in the project area of Hoang Mai district**

Ward/ Commune	Rate of children to be school age (%)	Number of nursery schools	Number of HS, CL, UN	Number of teachers and pupils	Number of teachers and students
Phuc Xa	5	1	0	65/-	20/-
Dien Bien	-	4	-	-	-

(Source: JKT, 2011, Supplemental EIA)

##### Social infrastructure

Hoang Mai district is one of the important traffic nodes of Ha Noi city with 2 big stations: Giap Bat railway station and South Bus Station. There is Hong River waterway transport connecting Hoang Mai district with the Northern, Western and Southern provinces; there are important traffic roads crossing 1A, 1B National Highway, Ring Road 3, Thanh Tri Bridge...

Many new constructions and improvements for people's living and social needs such as traffic road, lighting, clean water, school, etc. have been constructed: 11 powers and rural clean water projects were formally handed over to Hoang Mai district. Table 4.25 presents the Public works and infrastructure in the Project area of Hoang Mai district

**Table 4.25 Public works and infrastructure in the Project area of Hoang Mai district**

Norm Ward/ Commune	Number of Office/ Factory/ Hospital/ Market/Pago da, temple, church/ Graveyard	Number of Nursery/ Primary school/Seconda ry school/High school (school)	Road situation: Soil road/ Gradatio n road/ Concrete road (%)	Road situation: Asphalt road/ Brick road/ Others (%)	Drainage system: Soil canal/ Concrete canal/ Flood situation/ Dyke situation (%)	Number of households using: Energy/Tap water/Drilling wall water/Deep wall water/ other water source
Hoang Liet	21/-/1/1/5/-	1/1/-	-	-	25/75/có/-	9281/75%/-/-/25%
Thinh Liet	-	1	5/0/95	0/0/0	70/30/có/0	100%/8900/20/10/0
Giap Bat	19/0/1/0/1/0/-	4	0/0/0	100/0/0	300m/0/có/-	100%/100%/0/0/0
Dinh Cong	2/0/2/2/7/-	3	10/0.5/75	0.5/0.5/-	-/-/-	100%/40%/60%/0/0

(Source: JKT, 2011, Supplemental EIA)

#### 4.2.4 Thanh Xuan district

##### 4.2.4.1 Population

Average population of Thanh Xuan district was 2,326,000 people in 2010

The Population composition of the project area in Thanh Xuan district are presented in the Table 4.26

**Table 4.26 Collection and classification of socio - economic norms of Thanh Xuan district**

Ward/ Commune	Total population/ Number of households	Population growth rate (%)	Malnourished children rate (%)	Number of female householde rs	Number of agricultural households	Number of non- agricultural households	Number of employees working for industrial establishment
Phuong Liet	23844/6552	0,02	8,84	-	-	-	-

(Source: JKT, 2011, Supplemental EIA)

Thanh Xuan district's population is mainly ethnic Kinh

##### 4.2.4.2 Land use

Natural land of Thanh Xuan district is 903.3 ha, from which: 52.2ha of agriculture, forestry and aquaculture land, non-agriculture land is 848.8 ha and unused land is 5.3 ha.

The Land acquisition area and other affected facilities caused by the Project in Thanh Xuan District is presented in Table 4.27

**Table 4.27 Land acquisition area and other affected facilities in Thanh Xuan District**

	Item	Unit	Quantity
			Phuong Liet Ward
<b>A</b>	<b>Land</b>	m <sup>2</sup>	25906.88
<b>1</b>	<b>Existing</b>	m <sup>2</sup>	7000
<b>2</b>	<b>Newly granted</b>	m <sup>2</sup>	18906.88
-	Residential land	m <sup>2</sup>	2625
-	Public land	m <sup>2</sup>	16281.88
<b>B</b>	<b>House</b>		
-	1floored house	house/ m <sup>2</sup>	16/480
-	2floored house	house/ m <sup>2</sup>	18/1350
-	4floored house	house/ m <sup>2</sup>	10/1000
<b>C</b>	<b>Works on land</b>		0
-	Trees	tree	131
<b>D</b>	<b>Technical infrastructure</b>		
-	Water supply	m	473
-	Water discharge	m	1320
-	Electrification	m	1144
-	Telecommunication cable(inter-provincial fiber cable, culvert)	m	1479

(Source: TRICC-JSC, 2008. Land acquisition plan, HURC1, line1 –phase 1)

#### **4.2.4.3 Economic activities and indexes**

In this period, Thanh Xuan District Party has set out six key tasks and major solutions. They have focused on improving and maintaining economic growth, boosting production and business, increasing the percentage of services especially high quality services, improving people's lives, constructing urban infrastructure. As a result, industrial production value has increased from 12 to 13 percent, service value has increased from 14 to 15 percent, budget revenues has exceeded from 3 to 5 percent planned revenues every year.

In 2010, the area economy continued to grow, production value of non-state organizations reached 1182 billion and 833 million dong which is 95% higher than the one of 2009 and which is 12% higher than the planned one. Many businesses have expanded market; apply science and technology to business. Workers had stable jobs, incomes were improved...The Table 4.28 presents the socio-economic situation in the Project area of Thanh Xuan

**Table 4.28 Collection table of socio-economic situation in the Project area of Thanh Xuan**

Norm Ward/ Commune	Total income from agriculture (Percentage) (VND mil/%)	Total income from agriculture (Percentage) (VND mil/%)	Total income from commerce (Percentage) (VND mil/%)	Average Income (VND mil)	Number of poor houses
Phuong Liet	-/-	-/-	-/-	700/-/500	6

(Source: JKT, 2011, Supplemental EIA)

#### 4.2.4.4 Social infrastructures and condition

##### Health care

Thanh Xuan Polyclinic hospital with the area of 15.457m<sup>2</sup> has been built in Khuong Dinh Ward. The Public health situation of the project are of Thahh Xuan District is presented in Table 4.29

**Table 4.29 Public health situation of the project are of Thanh Xuan District**

Ward/ Commune	Number of medical establishments/sickbed	Medical staff	Number of people getting infection disease	Number of people getting chronic disease	Number of people getting occupational disease
Phuong Liet	1/-	8	8	-	-

(Source: JKT, 2011, Supplemental EIA)

##### Education

The education situation in the project area in Hoang Mai District is presented in Table 4.30

**Table 4.30 Education and of Thanh Xuan district**

Ward/ Commune	Rate of children to be school age (%)	Number of nursery schools	Number of HS, CL, UN	Number of teachers and pupils	Number of teachers and students
Phuong Liet	100	1	0	-	-

(Source: JKT, 2011, Supplemental EIA)

##### Social infrastructures

In period 2005-2010, in addition to maintaining high growth rate, exceeding planned budget revenues, constructing urban infrastructure, etc. The District has made a plain change in the fields of construction, clearance. Ring road 3 has been finally constructed after a difficulty in clearance for 8 years.

In the period 2005-2010, the District has raised 343.4 billion to deploy 335 new construction projects, to renovate and upgrade roads, drainage, schools, clinics, cultural and historic monuments, and offices. Besides using State budget for construction, Thanh Xuan has promoted the socialization of investment. With socialized capital, the District has developed a series of projects such as:, Nhan Chinh Private Kindergarten, Ha Dinh commercial and service center, Vuong Thua Vu Road – Ring road 3. The Public works and infrastructure in the project area of Thanh Xuan district is presented in Table 4.31

**Table 4.31 Public works and infrastructure in the Project area of Thanh Xuan district**

Norm Ward/ Commune	Number of Office/ Factory/ Hospital/ Market/ Pagoda, temple, church/ Graveyard	Number of Nursery/Primary school/ Secondary school/High school (school)	Road situation: Soil road/ Gradation road/ Concrete road (%)	Road situation: Asphalt road/ Brick road/ Others (%)	Drainage system: Soil canal/ Concrete canal/ Flood situation/ Dyke situation (%)	Number of households using: Energy/Tap water/Drilling wall water/Deep wall water/ other water source
Phuong Liet	-/3/1/0/1	1/1/1/0	-	100/0/0	0/100/average /no	-

(Source: JKT, 2011, Supplemental EIA)

#### 4.2.5 Dong Da district

##### 4.2.5.1 Population

Average population of Dong Da district was 3,765,000 people

Population composition of the project area in Dong Da district are presented in the Table 4.32.

**Table 4.32 Population composition of the project area in Dong Da district**

Ward/ Commune	Total population/ Number of households	Population growth rate (%)	Malnourished children rate (%)	Number of female householders	Number of agricultural households	Number of non-agricultural households	Number of employees working for industrial establishment
Phuong Mai	22000/5500	-	-	-	0	0	0
Phuong Lien	15459/4199	2	5	2150	0	80	200
Trung Phung	16232/4109	13.83	10.1	6500	0	1500	0
Van Mieu	13069/3061	0.075	8.7	715	0	-	-
Kham Thien	12000/2600	2.5	0.3	-	0	2600	-
<b>Total</b>	<b>78760/19469</b>	<b>18.405</b>	<b>24.1</b>	<b>9365</b>	<b>0</b>	<b>4180</b>	<b>200</b>

(Source: JKT, 2011, Supplemental EIA)

Đông Đa district's population is mainly ethnic Kinh

##### 4.2.5.2 Land use

Natural land of Dong Da district is 995.8 ha, from which: 24.8 ha of agricultural, forestry and aquaculture land, non-agricultural land is 970.5 ha, and 0.5 ha is unused land.

Land acquisition area and affected infrastructures in the project area in Dong Da District is presented in Table 4.33



**Table 4.33 Land acquisition area and affected infrastructures in the project area in Dong Da District**

	Item	Unit	Quantity				
			Phuong Mai	Phuong Lien	Trung Phung	Kham Thien	Van Mieu
<b>A</b>	<b>Land</b>	m <sup>2</sup>	20916	13659	5231	9093	3291
<b>1</b>	<b>Existing</b>	m <sup>2</sup>	5500	3405	1510	5261	950
<b>2</b>	<b>Newly granted</b>	m <sup>2</sup>	15416	10254	3721	3832	2341
-	Residential land in the city	m <sup>2</sup>	2484	3919	2305	3457	358.5
-	Public land	m <sup>2</sup>	12932	6335	1416	375	1982.5
<b>B</b>	<b>House</b>						
-	1floored house	house/m <sup>2</sup>	27/497	10/407	26/1840.2	11/1125	8/130.9
-	2floored house	house/m <sup>2</sup>	7/100	13/443	27/1174	33/1080	7/127
-	3floored house	house/m <sup>2</sup>	20/236	23/638	7/404	22/941	3/100
-	4 floored house	house/m <sup>2</sup>	-	-	14/490	-	-
<b>C</b>	<b>Works on land</b>						
-	Trees	tree	124	196	175	173	91
<b>D</b>	<b>Technical infrastructure</b>						
-	Water supply	m	758	10	215	84	48
-	Water discharge	m	994	695	275	25	15
-	Electrification	m	249	190	18	38	20
-	Telecommunication cable(inter-provincial fiber cable, culvert)	m	1515	0	0	17	33
-	Telephone cable(inter-provincial fiber cable, culvert)	m	1245	733	342	0	0
-	Traffic signal cable	m	120	289	0	0	0

(Source: TRICC-JSC, 2008. Land acquisition plan, HURC1, line1 –phase 1)

#### **4.2.5.3 Economic activities and indexes**

In 2010, the production value of non-stated companies reached 1889 billion VND, increased by 11.09% yearly; 15 of 22 economic branches with production value increased by more than 10%, especially food processing and products from metal.

The total state budget revenue reached 2,307 billion VND, equal to 167.9% of annual plan and increased by 84.8% in comparison with year 2009.

The district budget reached 509.9 billion VND, equal to 94.4% of pre-estimation, supplementary expenses for ward budget reached 80 billion VND, reached 100% of pre-estimation, ward budget reached 109.1 billion VND, reached 98% of pre-estimation.

- Private production value in 2006, 6 first months is estimated as VND201,274 million, 118.61% up compared to 2005/same period. The socio-economic situation in the Project area of Dong Da District is presented in Table 4.34

**Table 4.34 The socio-economic situation in the Project area of Dong Da**

Norm Ward/ Commune	Total income from agriculture (Percentage) (VND mil/%)	Total income from agriculture (Percentage) (VND mil/%)	Total income from commerce (Percentage) (VND mil/%)	Average Income (VND mil)	Number of poor houses
Phuong Mai	-/-	-/-	-/-	-/-/-	-
Phuong Lien	0/0	-/-	-/-	2/5/1	100
Trung Phung	-/-	-/-	500/49	2/5/0.45	53
Van Mieu	-/-	-/-	1294/62.6	1.5/8.9/0.730	36
Kham Thien	-/-	-/-	-/-	-/-/-	27

(Source: JKT, 2011, Supplemental EIA)

#### **4.2.5.4 Social infrastructures and condition**

##### Health care

In 2010, disease was better controlled in comparison with 2009 year. Expanded immunization program was well implemented.

Environmental sanitary, food hygiene and safety was strictly monitored. Disinfection for markets, chemical spray for dengue prevention at 8 key wards have been implemented. The public health survey in the project area in Dong Da District is presented in Table 4.35

**Table 4.35 Public health situation in the project area of Dong Da district**

Ward/ Commune	Number of medical establishments/sickbed	Medical staff	Number of people getting infection disease	Number of people getting chronic disease	Number of people getting occupational disease
Phuong Mai	-	-	-	-	-
Phuong Lien	1/-	-	5	10	-
Trung Phung	1/5/	6	250	700	500
Van Mieu	2	-	5	225	-
Kham Thien	2/5/	-	-	-	-

(Source: JKT, 2011, Supplemental EIA)

##### Education

The District has completed 2009-2010 school-year target, ensured the comprehensive education and achieved many excellent criteria. The education condition of the project area in Dong Da street is presented in Table 4.36.

**Table 4.36 Education condition of the project area in Dong Da district**

Ward/ Commune	Rate of children to be school age (%)	Number of nursery schools	Number of High school, Colleagues, University	Number of teachers and pupils	Number of teachers and students
Phuong Mai	100	0	1 Primary School/1 High school/1 Colleagues	-	-
Phuong Lien	99	-	-	-	0
Trung Phung	95	1	0	0	0
Van Mieu	100	2	0	-	-
Kham Thien	-	1	0	-	-

(Source: JKT, 2011, Supplemental EIA)

### Social Infrastructures

In 2011, basically completed some items: road, water drainage and lighting for Dong Tac road project; 24 road/alley improvements projects completed and put into operation.

Gradually maintain the traffic separation nodes to secure traffic safety and order at key traffic nodes. In comparison with 2009, traffic separation activity has been developed, many methods have been applied and helped improve the awareness of the passengers. The public works and infrastructure in the project area of Dong Da district is presented in Table 4.37

**Table 4.37 Public works and infrastructure in the Project area of Dong Da district**

Norm Ward/ Commune	Number of Office/Factory/Hospital/Market/Pagoda, temple, church/Graveyard	Number of Nursery/Primary school/Secondary school/High school (school)	Road situation: Soil road/Gradation road/Concrete road (%)	Road situation: Asphalt road/ Brick road/ Others (%)	Drainage system: Soil canal/ Concrete canal/ Flood situation/ Dyke situation (%)	Number of households using: Energy/Tap water/Drilling wall water/Deep wall water/ other water source
Phuong Mai	60/-/1/0/-	3	0/0/30	70/0/0	0/0/yes/-	100%/100%/0/0/0
Phuong Lien	17/0/1/2/4/-	-/1/-/-	0/0/50	50/0/0	0/100/yes/0	4000/4000/10/0/0
Trung Phung	3/0/1/0/-/1	1/1/1/0	0/0/100%	0/0/0	100%/0/20%/-	4109/4109/0/0/0
Van Mieu	-/1/4/1/6/-	3	0/0/25	75/0/0	0/100%/yes/0	100%/100%/0/0/0
Kham Thien	11/1/1/2/-	1	0/0/0	95/0/5	0/0/-/0	2600/2600/3/0/-

(Source: JKT, 2011, Supplemental EIA)

## **4.2.6 Hoan Kiem district**

### **4.2.6.1 Population**

Average population of Hoan Kiem district was 1,485,000 people. There are 18 administrative agencies in Hoan Kiem district with relatively crowded population. The people in working age in Hoan Kiem district are equal to 67% of the population, of which, 60% are able to work. Most of them are intellectual labor, thus, it is convenient to develop socio-economic condition for the district. However, this figure is still quite small in comparison with the industrialization and modernization requirements of the city.

Population composition of the project area in Hoan Kiem district is presented in the Table 4.38

**Table 4.38 Collection and classification of socio - economic norms of Hoan Kiem district**

Ward/ Commune	Total population/ Number of households	Population growth rate (%)	Malnourished children rate (%)	Number of female householders	Number of agricultural households	Number of non-agricultural households	Number of employees working for industrial establishment
Dong Xuan	8537/2257	-	-	-	-	-	-
Cua Nam	8827/2363	-	-	892	0	2360	-
Hang Bong	5852/1741	0.1	2	985	0	1741	0
Cua Dong	7049/1973	-	-	-	-	-	-
Hang Ma							
Nguyen Trung Truc	8870/2250	-	0.3	-	-	-	-
<b>Total</b>	<b>39135/10584</b>	<b>0.1</b>	<b>2.3</b>	<b>1877</b>	<b>0</b>	<b>4101</b>	<b>0</b>

(Source: JKT, 2011, Supplemental EIA)

Among total 171,735 peoples in the project area, 105,910 are in labor-age, of which 102,961 may work, taking 59.95% population - a higher ratio compared to that of the whole city, where many grey substances are available in favor of district socio-economic development.

However there are 7.443 unemployed, of which 80% are not trained. Higher education takes 12%; secondary education, 5% and certified technical worker, 3%.

Therefore, basic solutions are needed to limit unemployment, which if not resolved, shall lead to difficulties in livelihood and social complications. In another hand, socio-economic development depends on efficient exploitation and use of resources, in which, labor resource take a significant role.

Hoàn Kiếm district's population is mainly ethnic Kinh

#### **4.2.6.2 Land use**

Natural land of Hoan Kiem district is 528.8 ha, from which:15.3 ha of agricultural, forestry and aquaculture land, non-agricultural land is 512.7 ha, unused land is 0.8 ha.

With only 528.7 ha on city total 8,430 ha area (6.27%) Hoan Kiem is the narrowest district among Hanoi districts. However, thanks to geographic location, each inch of soil has a highest value in the city. Hoan Kiem has only 15.31 ha of agricultural land in Phuc Tan quarter (2.89%). This a floating bank in Red River without a fixed area and only usable in dry season. On this area, short-term vegetables and cereals are exploited by Long Bien district farmers. City land has great changes, particularly shifting from habitat land of household to public land such as Embassies, Ambassador's residence, transaction office, etc. This means a positive trend in district land-use structure. There are only 0.799 ha not put into use, in which:

- 0.398 ha bank land along the river of Chuong Duong quarter
- 0.4 ha Long Bien bridge corridor of Phuc Tan quarter
- 0.001 ha of Hang Gai quarter

Not used land in Hoan Kiem district is virtually in significant, in which, 0.398 ha of Chuong Duong quarter in flood exit corridor - so unexplainable, and only 0.4 ha + 0.001 ha of Phuc Tan and Hang Gai may be exploited as construction land. This reflects district enough good land-use capability. However there are difficulties for development of socio-economic projects needing land-use.

Hoan Kiem includes 21.26% natural waters area i.e. Red river water surface area. This area has high value in respect of environment landscape which however is not exploited up to now. If government measures for Red river rectification will be realized, Red river water surface area could be exploited for Hoan Kiem and Hanoi socio-economic development.

The land acquisition area and affected facilities of the project area in Hoan Kiem District are presented in Table 4.39

**Table 4.39 The land acquisition area and affected facilities of the project area in Hoan Kiem District**

	Item	Unit	Quantity				
			Cua Nam Ward	Hang Bong Ward	Cua Dong Ward	Hang Ma Ward	Dong Xuan Ward
A	Land	m <sup>2</sup>	5715.6	2424.8	9511	9439.4	9904.8
1	Existing	m <sup>2</sup>	1650	700	2125	2725	1950
2	Newly granted	m <sup>2</sup>	4065.6	1724.8	7386	6714.4	7954.8
-	Residential land in the	m <sup>2</sup>	3026	1378	2284	1277.4	4549
-	Public land	m <sup>2</sup>	1039	346.4	5102	5086	3406
-	Corporate land	m <sup>2</sup>	-	-	-	351	-
B	House						
-	4th grade house	house/m <sup>2</sup>	-	-	-	15/861	-
-	1 floored house	house/m <sup>2</sup>	6/117	12/325.2	39/839.8	7/147	11/406
-	2 floored house	house/m <sup>2</sup>	3/26	12/343.1	36/1151.7	3/74	23/808
-	3 floored house	house/m <sup>2</sup>	4/57	6/192	-	4/260	29/1076
-	4 floored house	house/m <sup>2</sup>	-	-	1/36.9	8/348	-
C	Works on land						
-	Trees	tree	151	69	114	37	227
D	Technical infrastructure						
-	Water supply	m	12	0	18	41	97
-	Water discharge	m	0	18	380	26	0
-	Electrification	m	20	0	117	570	54
-	Telecommunication cable (inter-provincial fiber cable, culvert)	m	36	0	285	180	440

(Source: TRICC-JSC, 2008. Land acquisition plan, HURC1, line1 –phase 1)

#### **4.2.6.3 Economic activities and indexes**

Hoan Kiem district is in the center of Ha Noi city. There are many advantages in market expansion as well as expanding cooperation. Economy - culture and tourism are able to be promoted here. The geographical condition here is the advantage for commodity and service market; the diversified market is easy to be expanded, even essential goods, luxury goods as well as service, tourism market.

Hoan Kiem district is trying to increase by 10%/year for average producing value growth speed.

Particularly in 2010, the average production value per capita increased more than 3 times in comparison with year 2000. Trade reached 33,067 billion VND, accounting for 63.28%; service reached 14,819 billion VND, accounting for 26.4%; tourism reached 2,468 billion

VND, accounting for 4.72%; industry reached 2,033 billion VND, accounting for 3.89%; construction reached 868 billion VND, accounting for 1.66%.

The socio-economic situation in the Project area of Hoan Kiem District is presented in Table 4.40

**Table 4.40 Collection table of socio-economic situation in the Project area of Hoan Kiem**

Norm Ward/ Commune	Total income from agriculture (Percentage) (VND mil/%)	Total income from agriculture (Percentage) (VND mil/%)	Total income from commerce (Percentage) (VND mil/%)	Average Income (VND mil)	Number of poor houses
Dong Xuan	-/-	-/-	-/-	-/-/-	-
Cua Nam	-/-	-/-	-/-	-/-/-	17
Hang Bong	0/0	3850/30	9058/70	1/3/1	39
Cua Dong	-/-	-/-	-/-	-/-/-	-
Hang Ma					
Nguyen Trung Truc	-/-	-/-	-/-	0.57/-/-	50

(Source: JKT, 2011, Supplemental EIA)

#### 4.2.6.4 Social infrastructures and conditions

##### Health care

The Public health situation of the project area in Hoan Kiem district is presented in Table 4.41

**Table 4.41 The Public health situation of the project area in Hoan Kiem district**

Ward/ Commune	Number of medical establishments/sickbed	Medical staff	Number of people getting infection disease	Number of people getting chronic disease	Number of people getting occupational disease
Dong Xuan	1/-	5	-	-	-
Cua Nam	1/3	8	0	-	-
Hang Bong	-	-	35	115	70
Cua Dong	1/2	6	-	-	-
Hang Ma					
Nguyen Trung Truc	1/6	10	-	-	-

(Source: JKT, 2011, Supplemental EIA)

## Education

The education data of the project area in Hoan Kiem district is presented in Table 4.42

**Table 4.42 The education data of the project area in Hoan Kiem district**

Ward/ Commune	Rate of children to be school age (%)	Number of nursery schools	Number of High school, colleges, University	Number of teachers and pupils	Number of teachers and students
Dong Xuan	100	1	-	-	-
Cua Nam	100	1	-	-	-
Hang Bong	100	1	-	-	-
Cua Dong	-	-	-	-	-
Hang Ma					
Nguyen Trung Truc	-	4	1 Primary School/1 High school	-	-

(Source: JKT, 2011, Supplemental EIA)

## Social infrastructures

Hoan Kiem is a historical land with 165 relics, of which 27 ones classified with famous sites such as Ngoc Son Temple, Quan Su Pagoda, Le King Statue and Temples worshipping Profession Ancestors such as Dinh Lo Ren, Dinh Hang Giay. This cultural and historical relic and revolutionary relic ensemble is a great concern of City Authorities and creates district strong and powerful cultural tourist resource, attracting travelers and visitors particularly foreign ones.

Hoan Kiem ancient quarter contains Hanoi cultural-historical-architectural legacies. National cultural identity is an important advantageous position and its preservation will more create strength for country development.

Traditional and professional village name is retained in streets and each street likely the name of a professional one: Hang Bac (jewelry) Hang Manh (curtain) Hang Thiec (tinsmith). These once lonely developed and became Hanoi traditions and elites. However together with market economy, much of them also disappear due to many reasons such as cheap wage, lack of consumption market, investment fund. Hoan Kiem Culinary culture is largely well-known with endemic products such as La Vong fish pie, Bat Dan Pho (noodle soup) Ly Quoc Su Pho, Ta Hien dumpling, traditional dishes which are favorite ones for not only Hanoi people but foreign travelers, and Tong Duy Tan street is firstly selected as Vietnamese culinary street and becoming an attractive tourist product.

It may be said that Hoan Kiem is not only capital cultural center but with a system of theatres, cinemas, cultural houses and museums, particularly in which the great city theatre where take place all capital great cultural activities.

The Public works and infrastructure in the Project area of Hoan Kiem district are presented in Table 4.43

**Table 4.43 Public works and infrastructure in the Project area of Hoan Kiem district**

Norm Ward/ Commune	Number of Office/ Factory/ Hospital/ Market/ Pagoda, temple, church/ Graveyard	Number of Nursery/ Primary school/ Secondary school/High school (school)	Road situation: Soil road/ Gradation road/ Concrete road (%)	Road situation: Asphalt road/ Brick road/ Others (%)	Drainage system: Soil canal/ Concrete canal/ Flood situation/ Dyke situation (%)	Number of households using: Energy/Tap water/Drilling wall water/Deep wall water/ other water source
Dong Xuan	-/-/1/4/-	-/-/-	0/0/0	100%/0/0	0/100%/-/-	2257/2257/0/0/0
Cua Nam	62/-/4/1/6/-	2	0/0/0	100%/0/0	-/-/-	100%/100%/0/0/0
Hang Bong	40/06/0/2/-	3	0	100/-/-	-/-/no/no	1741/1741/-/-/-
Cua Dong	5/1/1/1/1/-	1/-/-	-/-/-	-/-/-	-/-/-	100%/100%/0/0/0
Hang Ma						
Nguyen Trung Truc	-/-/0/13/-	-/-/-	0/0/0	100/0/0	-/-/-	100%/100%/0/0/0

(Source: JKT, 2011, Supplemental EIA)

#### 4.2.7 Ba Dinh district

##### 4.2.7.1 Population

The average population of Ba Dinh district is 2,275,000 people

The population composition of the project area in Ba Dinh district is presented in the Table 4.44.

**Table 4.44 The Population composition of the project area in Ba Dinh district**

Ward/ Commune	Total population/ Number of households	Population growth rate (%)	Malnourished children rate (%)	Number of female householders	Number of agricultural households	Number of non-agricultural households	Number of employees working for industrial establishment
Phuc Xa	840/210	-	-	680	5	60	-
Dien Bien	13280/2780	-	-	-	-	-	-
<b>Total</b>	<b>14120/2990</b>	<b>0</b>	<b>0</b>	<b>680</b>	<b>5</b>	<b>60</b>	<b>0</b>

(Source: JKT, 2011, Supplemental EIA)

Ba Dinh district's population is mainly ethnic Kinh

##### 4.2.7.2 Land use

Natural land of Ba Dinh district is 924.9 ha, from which: 3.5 ha of agricultural, forestry and aquaculture land, non-agricultural land is 916.4 ha, and unused land is 5.0 ha.

The land acquisition area and affected facilities of the project area in Ba Dinh District are presented in Table 4.45



**Table 4.45 The land acquisition area and affected facilities of the project area in Ba Dinh District**

	Item	Unit	Quantity	
			Dien Bien Phu Ward	Phuc Xa Ward
A	Land	m <sup>2</sup>	4330	4849.6
1	Existing		1250	0
2	Newly granted		3080	4849
-	Residential land in the	m <sup>2</sup>	2214	3117
-	Garden land for planting	m <sup>2</sup>	0	1732
-	Public land	m <sup>2</sup>	866	0
B	House			
-	4th grade house	house/m <sup>2</sup>	0/0	1/62
-	1 floored house	house/m <sup>2</sup>	9/489	9/294
-	2 floored house	house/m <sup>2</sup>	16/515	-
-	3 floored house	house/m <sup>2</sup>	2/72	-
-	4 floored house	house/m <sup>2</sup>	5/226	-
C	Works on land			
-	Trees	tree	111	242
D	Technical infrastructure			
-	Telecommunication cable (inter-provincial fiber cable, culvert)	m	36	60
-	Traffic signal cable	m	20	0

(Source: TRICC-JSC, 2008. Land acquisition plan, HURC1, line1 –phase 1)

#### 4.2.7.3 Economic activities and indexes

During the first 9 months in 2010, the total state budget reached 1,654 billion VND, equal to 98% planned. In which, the budget from the district reached 989 billion VND, equal to 94% planned (non-state revenue reached 477 billion VND, equal to 89% planned. Budget expenses ensured the economic, cultural and social targets, military security and irregular mission of the district.

Strengthening market inspection and control; preventing trafficking, counterfeit goods, low-quality goods; concentrating on goods with price fluctuations; inspecting the observance of the provisions of the city about bicycle, motorbike and car parking fee.

The socio-economic data in the Project area of Ba Dinh District is presented in Table 4.46

**Table 4.46 The socio-economic data in the Project area of Ba Dinh District**

Norm Ward/ Commune	Total income from agriculture (Percentage) (VND mil/%)	Total income from agriculture (Percentage) (VND mil/%)	Total income from commerce (Percentage) (VND mil/%)	Average Income (VND mil)	Number of poor houses
Phuc Xa	-/-	-/-	150000/90	1.5/2.0/0.8	10
Dien Bien	-/-	-/-	-/-	0.570/-/-	-

(Source: JKT, 2011, Supplemental EIA)

#### 4.2.7.4 Social infrastructures and conditions

##### Health care

In terms of medical care, the People's Committee of each ward has carried out well disease prevention and fighting, such as diarrhea, dengue fever, A/H1N1 flu. 13 wards have been achieved national standard for medical care. The ratio of malnourished children reduced to 7.6%. Private pharmacies and food stuff safety are managed more strictly.

Families under preferential treatment and the poor and vulnerable people are taken care of. Family planning is well concerned. 18 residential groups and 55 individuals have been honored for their activities in family planning.

The Public health situation in the project area of Ba Dinh District is presented in Table 4.47

**Table 4.47 Public health situation of Ba Dinh District**

Ward/ Commune	Number of medical establishments/sickbed	Medical staff	Number of people getting infection disease	Number of people getting chronic disease	Number of people getting occupational disease
Phuc Xa	-	-	0	0	0
Dien Bien	1/5	4	-	-	-

(Source: JKT, 2011, Supplemental EIA)

##### Education

Education is also concerned carefully. The recruitment for each school level is directed well and achieves good results.

The education condition of the project area in Ba Dinh district is presented in Table 4.48

**Table 4.48 Education condition of Ba Dinh district**

Ward/ Commune	Rate of children to be school age (%)	Number of nursery schools	Number of High school, colleges, University	Number of teachers and pupils	Number of teachers and students
Phuc Xa	5	1	0	65/-	20/-
Dien Bien	-	4	-	-	-

(Source: JKT, 2011, Supplemental EIA)

##### Social Infrastructures

Basic construction investment achieves positive changes yearly: implementation of Decree No 113/NĐ-CP of the Government about the Investment Inspection and Assessment, Resolution No 19- NQ/QU of District's Standing Committee about construction investment. The disbursement result according to 2010 plan was 42.829/86.585 billion VND, equal to 49.46% planning.

The public works and infrastructures in the Project area of Ba Dinh district are presented in Table 4.49

**Table 4.49 The public works and infrastructures in the Project area of Ba Dinh district**

Norm Ward/ Commune	Number of Office/ Factory/ Hospital/ Market/ Pagoda, temple, church/ Graveyard	Number of Nursery /Primary school/ Secondary school/High school (school)	Road situation: Soil road/ Gradation road/ Concrete road (%)	Road situation: Asphalt road/ Brick road/ Others (%)	Drainage system: Soil canal/ Concrete canal/ Flood situation/ Dyke situation (%)	Number of households using: Energy/Tap water/Drilling wall water/Deep wall water/ other water source
Phuc Xa	1/0/0/1/0/0	1/0/0/0	-/-/0.5	15/-/-	-/-/No/beton	210/210/-/-/-
Dien Bien	-/-/1/-/1/-	4/1/-/-	0/0/0	100/0/0	0/0/Có/0	100%/100%/0/0/0

(Source: JKT, 2011, Supplemental EIA)

#### 4.2.8 Long Bien district

##### 4.2.8.1 Population

Average population of Long Bien district was 2,335,000 people

- Population, family and children apparatus is consolidated and health equipment is invested for newly established health station for taking initiative in epidemic protection, deal with needs of consultation and cure. Gratuity health examination is organized for 22,600 over 59-age and 100 VND millions are paid for drugs free-charge supplied to 80-year elderlies.

- Population workers are consolidated from district to grass root level, with organization of world population and Family day - 11/7 - in all quarters, strengthen reproductive health care and family planning. As a result, fertility ratio in 9 months is 9.94% - 2.06 down -, third birth ratio - 3.83 -, 1.41% up and malt-nutritious children ratio - 13.51 -, 0.39% down compared to 2005 same period.

- Summer activities and month action plan for children are recapitulated with 110 VND million budget supplies and 561 VND millions mobilized from street population groups. 2331 child/round suffering difficulties have gift in 1/6 world youngster day and Fall Holiday equivalent to 95,228,000VND.

The population composition of the project area in Long Bien district is presented in the Table 4.50

**Table 4.50 The population composition of the project area in Long Bien district**

Ward/ Commune	Total population/ Number of households	Population growth rate (%)	Malnourished children rate (%)	Number of female householders	Number of agricultural households	Number of non- agricultural households	Number of employees working for industrial establishment
Ngoc Thuy							
Ngoc Lam	21704/5798	1,62	9,2	3118	0	-	-
Gia Thuy	12074/2992	27.77	9.1	1435	124	2868	0
Thuong Thanh	21659/5379	1.17	8.4	-	464	4915	-
Duc Giang	26284/5894	-	8	-	-	-	-
<b>Total</b>	<b>81721/20063</b>	<b>28.94</b>	<b>25.5</b>	<b>4553</b>	<b>588</b>	<b>7783</b>	<b>0</b>

(Source: JKT, 2011, Supplemental EIA)

Long Bien district's population is mainly ethnic Kinh

#### 4.2.8.2 Land use

Natural land of Long Bien district is 5,993.0 ha. Of which: 1,852.2 ha of agriculture, forestry and aquaculture land, Non-agriculture land is 4,004.6 ha, 136.2 ha for unused land.

The land acquisition area and affected facilities of the project area in Long Bien District are presented in Table 4.51

**Table 4.51 The land acquisition area and affected facilities of the project area in Long Bien District**

	Item	Unit	Quantity			
			Ngoc Lam	Ngoc Thuy	Thuong Thanh	Gia Thuy
A	Land	m <sup>2</sup>	22366	90616	75000	73091
1	Existing		10878	0	0	36148
2	Newly granted		11488	90616	75000	36943
-	Residential land in	m <sup>2</sup>	11487	10500	37000	31707
-	Lake and pond	m <sup>2</sup>	0	0	38000	2191
-	Agricultural land	m <sup>2</sup>	0	59702	0	0
-	Public land	m <sup>2</sup>		20414	869	3045
B	House					
-	1 floored house	house/ m <sup>2</sup>	101/3631	73/1942	95/3585	145/23867
-	2 floored house	house/ m <sup>2</sup>	20/775	29/977	9/431	38/2405
-	3 floored house	house/ m <sup>2</sup>	19/819	7/236	3/174	6/633
-	4-5 floored house	house/ m <sup>2</sup>	5/282	1/40	1/54	-
C	Works on land					
-	Trees	tree	569	290	483	555
D	Technical infrastructure					
-	Water supply	m	1344	829	274	1326
-	Telecommunication cable (inter-provincial fiber cable, culvert)	m	565	325	490	204

(Source: TRICC-JSC, 2008. Land acquisition plan, HURC1, line1 –phase 1)

#### 4.2.8.3 Economic activities and indexes

Main economic industries production value is estimated up to 491.638 VND billion, taking 86.44% plan, or at present price 565.772 VND billion, taking 86.7%. Agricultural production continues to decrease as many farming lands should be recovered for building urban areas and public constructions (less 442 ha).

Industrial production keeps on growing with annual mean productivity reaches 18.2%. Many enterprises have actively overcome difficulties, strengthened investment, renewed equipment and technology and produced quality goods with high competitive ability. Production value of economic elements according to Law on Businesses continues obtain high growth: 26.7% for joint stock companies and 16.2% for limited companies.

Trading and service developed strongly, increasing service quality. Annual average growth rate reached 24.2%. Now there are more than 2,000 enterprises and 11,000 households working on service and trading. Total goods and service turnover increase by 1.8%, 1.6% for hotel and restaurant, and 1.4% for service, compared to previous month. Total goods circulation level in 9 first months and service in same period turnover are estimated to

increase by 15.2%, in which 15.5% for retail sale, 15.6% for trade, 10.5% for hotel and restaurant and 7.4% for service.

Agricultural production is concentrated following the trend of ecological urban agriculture. Agricultural production value increased 5.5% per year. Some safety vegetable and fruit plant models have been applied in cooperation with service development, creating a new way in agricultural production. Agricultural production value obtains 42.675billionsVND, taking plan 72.6%, in which, 24.277 billion VND for farming and 18.398 billion VND for husbandry. If currently priced, agricultural production value obtains 65.772 billion VND, taking plan 91.3%, of which 36.051 billion VND for farming and 29.721 billion VND for husbandry.

Livestock trends to decrease particularly pig. Total pig pack over 2-month age is over 20,000 in year-beginning, now, around 16,000. This decrease is due to rapid urbanization and fodder price increase total cattle counts 1,600.

State budget revenue keeps on surpassing the planning criteria with annual average growth of 21%. Budget expense management for regular expenses and development investment is getting stricter. Basic budget expenses meet the requirement for regular and irregular political tasks of the district. Annually, 5,810 jobless people have found jobs.

The socio-economic situation in the Project area of Long Bien District is presented in Table 4.52

**Table 4.52 The socio-economic situation in the Project area of Long Bien District**

Ward/ Commune	Norm	Total income from agriculture (Percentage) (VND mil/%)	Total income from agriculture (Percentage) (VND mil/%)	Total income from commerce (Percentage) (VND mil/%)	Average Income (VND mil)	Number of poor houses
Ngoc Thuy						
Ngoc Lam		-/-	-/-	-/-	-/-	-
Gia Thuy		-/-	-/-	-/-	2.57/0.8	11
Thuong Thanh		19742/15.14	55765/42.77	54876/42.09	-/-	38

(Source: JKT, 2011, Supplemental EIA)

#### **4.2.8.4 Social infrastructures and conditions**

##### Health care

Health and medical care are implemented well. Preventive medical is focused. Veterinary epidemiology control, food stuff hygiene and safety are strictly concerned.

Public health situation of Long Bien District is presented in Table 4.53

**Table 4.53 Public health situation of Long Bien District**

Ward/ Commune	Number of medical establishments/sickbed	Medical staff	Number of people getting infection disease	Number of people getting chronic disease	Number of people getting occupational disease
Ngoc Thuy					
Ngoc Lam	-	-	-	-	-
Gia Thuy	1/11	7	18	673	0
Thuong Thanh	1/-	8	-	-	-
Duc Giang	--		-	-	-

(Source: revised from EIA supplementary report, JKT, 2011)

## Education

Education – training target is developed following trend of standardization, socialization. From 2005 to 2010, there have been 26 national – qualified schools built. Job training and vocational guidance are concentrated.

The education condition of the project area in Long Bien district is presented in Table 4.54

**Table 4.54 The education condition of the project area in Long Bien district**

Ward/ Commune	Rate of children to be school age (%)	Number of nursery schools	Number of high school, Collage, University	Number of teachers and pupils	Number of teachers and students
Ngoc Thuy					
Ngoc Lam	-	-	-	-	-
Gia Thuy	100	2	0	0	0
Thuong Thanh	100	3	0	0	0
Duc Giang	100	03	1 C1/2 C2	-	-

(Source: JKT, 2011, Supplemental EIA)

## Social Infrastructures

Planning is strongly implemented. The urban infrastructure system is invested, handling problems and motivating local economy. Urban construction order management is strictly implemented. The ratio of licensed projects surpasses the planned criteria.

Urban order and landscape keeping sees good changes. Environment protection, traffic safety and flood control and prevention are well concerned. The projects of socializing environmental hygiene are effectively implemented. Many environmental problems have been treated effectively, the awareness of the people also increased.

The Public works and infrastructures in the project area of Long Bien district are presented in Table 4.55

**Table 4.55 Public works and infrastructure in the Project area of Long Bien district**

Norm Ward/ Commune	Number of Office/ Factory/ Hospital/ Market/ Pagoda, temple, church/ Graveyard	Number of Nursery/ Primary school/ Secondary school/High school (school)	Road situation: Soil road/ Gradation road/ Concrete road (%)	Road situation: Asphalt road/ Brick road/ Others (%)	Drainage system: Soil canal/ Concrete canal/ Flood situation/ Dyke situation (%)	Number of households using: Energy/Tap water/ Drilling wall water/ Deep wall water/ other water source
Ngoc Thuy						
Ngoc Lam	49/0/2/2/-/-	5/1/1/1/1	0/-/20	80/-/-	0/100%/-/-	5798/5798/0/0/0
Gia Thuy	8/1/1/1/1	4	0/0/70	30/0/0	10/90/yes/no/yes	2992/2942/50/0/0
Thuong Thanh	0/0/0/0/0/0	3/0/0/0	0/0/100	0/0/	100/0/ yes /-	1331/1316/15/0/0
Duc Giang	300/-/1/2/-/-	7	-	-	-	5894/4715/-/-/-

(Source: JKT, 2011, Supplemental EIA)

#### 4.2.9 Landscape

The great concern about landscape is distortion of Ancient quarter of Hanoi. However, after careful checking between the ancient quarter border (scope mentioned in Decision 45/1999/QĐ-UB) and HURC1 project area, especially focusing on the appendices with the list of all included streets, it's clear that HURC1 project phase 1 is not inside the border. The line goes along Gam Cau street (elevated) and Phung Hung street (elevated).

#### 4.2.10 Cultural/Social sensitive infrastructures

There are many social and cultural sensitive sites along the proposed project, that are presented in Table 4.56

**Table 4.56 The Cultural/Social sensitive infrastructures along the railways**

No	Name	Distance from proposed railways/direction (Ngoc Hoi-Gia Lam)	Location
1	Linh Tu pagoda	60 m/ West	Phap Van - Thanh Tri district.
2	Bach Mai Hospital	50 m/ West	Hai Ba Trung district
3	Institute of Land planning surveys	30 m/ East	Hai Ba Trung district
4	Phung Hung Funeral	25 m/ East	Hoan Kiem district.
5	Central Military Court	20 m/ West	Hoan Kiem district.
6	Military Library	2 m/ West	Hoan Kiem district.
7	Hoa Mi Kindergarten	24 m/East	Hoan Kiem district.
8	Nguyen Trung Truc Primary school	10m/ East	Hoan Kiem district

(Source: JKT, 2011, Supplemental EIA)

These sensitive works do not need to be relocated but are along the route of the project. Therefore, in the course of construction, it is necessary to apply the mitigation measures for noise, air and water pollution to avoid negative impacts.

The distance between the line and Nguyen Trung Truc School is very close (about 10m). It is also noteworthy issues during construction process.

## 5. LEGAL FRAMEWORK

This section presents legislation and supporting documentation that the project will have to comply with. As the project seeks funding from JICA, their requirements on environmental and social safeguards also apply and they are summarized in this section. In addition, presented are legal documents and approvals by Vietnamese relevant authorities for this Project.

### 5.1 VIETNAM ENVIRONMENTAL LEGISLATION

#### 5.1.1 The environmental laws and regulation

Environmental impact assessment and management in Vietnam is addressed by the Environment Protection Law No. 52/2005/QH11 adopted on 29th November 2005 which became effective from 1st July 2006. The body of Vietnam environmental legislation is growing extensively with many other supporting documents as follows:

**Table 5.1 Environmental Protection Law and associated documents**

Laws	Description
Environment Protection Law 52/2005/QH11 Date issued:29/11/2005	Regulates environmental protection activities; policies, measures and resources for protection of the environment; and the rights and obligations of organizations, family households and individuals with respect to protection of the environment.
Biodiversity Law, No. 20/2008/QH12, 2009	Pursuant to the 1992 Constitution of the Socialist Republic of Vietnam, which was amended and supplemented under Resolution 51/2001/QH10 dated on December 25, 2001 of the 10 <sup>th</sup> National Assembly, the 10th session; this Law stipulates biodiversity conservation and sustainable development.
<b>Decrees</b>	
Decree 29/2011/ NĐ- CP Date issued:18/04/2011	Regulation on the strategic environmental assessment, environmental impact assessment and environmental protection commitment. This Decree takes effect on June 5, 2011, and replaces Articles from 6 to 17 of the Government's Decree No. 80/2006/ND-CP of August 9, 2006, detailing and guiding a number of articles of the Environmental Protection Law; and Clauses from 3 to 10, Article 1 of the Government's Decree No.21/2008/ND-CP of February 28, 2008, amending and supplementing a number of articles of Decree No. 80/2006/ND-CP of August 9, 2006, detailing and guiding a number of articles of the Environmental Protection Law.
Decree 04/2009/ND- CP Date issued: 14/01 /2009	Incentives and support for environment protection activities.
Decree 117/2009/ND- CP Date issued:31 /12/2009	Regulation on sanctioning administrative violations in environmental protection
Decree 21/2008/ NĐ- CP Date issued:28/02/2008	Amending and supplementing some articles of Decree 80/2006/NĐ- CP detailing the guidelines in the implementation of Environment Protection Law.
Decree 59/2006/ND- CP Date issued:09/4/2007	Regulation on solid waste management



Decree 80/2006/NĐ- CP Date issued:09/08/2006	Detailing the guidelines in the implementation of a number of articles of the Environmental Protection Law regarding environmental standards; strategic environmental assessment; environmental impact assessment and environmental protection commitments; environmental protection in production, business and services; hazardous waste management; and disclosure of environmental information and data.
<b>Circulars</b>	<b>Description</b>
MONRE Circular No. 26/2011/TT- BTNMT Date issued:18/7/2011	Detailing the guidelines on the implementation of a number of articles of the Decree 29/2011/ NĐ-CP. Dated 18/04/2011 regarding strategic environmental assessment; environmental impact assessment and environmental protection commitments.
MONRE Circular No. 12/2011 /TTBTNMT Date issued:14/14/2011	Regulation on hazardous waste management
MONRE Circular 39/2010/TT-BTNMT Date issued:16/12/2010	National Technical Regulation on Noise (QCVN 26:2010/BTNMT) and Vibration (QCVN 27:2010/BTNMT).
MONRE Circular 25/2009/TT-BTNMT Date issued:16/11/2009	National Technical Regulation on hazardous waste threshold (QCVN 07: 2009/BTNMT), among others.
MONRE Circular No. 16/2009/TT- BTNMT Date issued:07/10/2009	National Technical Regulation on air quality (QCVN 05: 2009/BTNMT) and hazardous substance in ambient air (QCVN 06: 2009/BTNMT)
MONRE Circular 05/2008/TT-BTNMT Date issued:08/12/2008	Guiding strategic environment assessment, environmental impact assessment, and environment protection commitment.
MONRE Circular No. 04/2008/TT-BTNMT Date issued:18/09/2008	Guidance on preparation, approval or certification of environment protection proposal, checking and inspection on implementation of environment protection proposal.
<b>Decisions</b>	
MONRE Decision No. 16/2008/QĐ- BTNMT Date issued:31/12/2008	National Technical Regulation on environment regarding surface water quality (QCVN 08: 2008/BTNMT), underground water quality (QCVN 09: 2008/BTNMT, and domestic wastewater (QCVN 14: 2008/BTNMT), among others.

### 5.1.2 Other laws related to project construction

- Law on Railways no 35/2005/QH11 approved by XI on May 5 2005; became effective June 14 2005.
- Construction Law No 16/2003/QH11 on 26 November 2003 by the National Assembly
- Law on Water Resource approved by the National Assembly X, meeting 3<sup>rd</sup> on May 20, 1998; became effective January 1, 1999.
- Vietnamese Labor Code - 23 June 1994 (as amended 2 April 2002 and effective 1 January 2003). The Labor Code protects the right to work, the interests and other rights of the laborer.
- National Technical Regulation on drinking water quality. QCVN 01:2009/BYT, stipulates limits of quality criteria for water used for drinking and processing food (drinking water).

## **5.2 LEGAL DOCUMENTS AND APPROVALS FOR THE PROJECT**

The followings are documents and approvals for this project:

- Commitment No. 23/TB-VPCP dated 5/2/2004 by Government Office on opinions from Prime Minister Phan Van Khai to Hanoi Elevated Railway Project (Yen Vien - Ngoc Hoi route)
- Dispatch No. 195/CP-CN dated 12/02/2004 by Prime Minister agrees investment policies and main content of Pre-feasibility study report - Hanoi Elevated Railway Project (Yen Vien - Ngoc Hoi route).
- Communication No./VPCP-CV date 20/2/2004 by Government Office on Investment Owner to Hanoi Elevated Railway Project (Yen Vien - Ngoc Hoi route)
- Decision No. 478/QD-BGTVT dated 3/3/2004 by Minister of Transportation Ministry on accepting to plan Feasibility Study Project of Hanoi Elevated Railway Project and Railway project management unit as Investment Owner
- Decision of approving Vietnam Railway Transportation Development Master Plan until 2020 by Prime Ministry No. 06/2002/QD-TTg dated 07/01/2002.
- Hanoi Capital Transportation Development Master Plan until 2020 by TEDI implemented in 2003.
- Vietnam express railway network plan until 2020 by RICCC in 2003.
- Adjusting Hanoi Capital master plan until 2020 by Prime Minister approved at Decision No. 108/QD-TTg dated 20/06/1998.
- National Transportation development strategy of Vietnam (VITRANSS) by JICA (Japan) in July 2000.
- Studying Hanoi urban railway system by DOSRCH (Germany) in 1998-1999.
- Studying implementation program of Hanoi urban railway corridor development project by Japanese Transportation Cooperation Agency (JTCA) in 3/2001.
- Communication of summary of General Director of Vietnam Railway Cooperation at Meeting of Hanoi Elevated railway dated 6/12/2004.
- Text No. 13/TB-BGTVT dated 17/01/2005 communicating summary of Minister of Transportation Ministry at Meeting of Hanoi Elevated railway project, route Ngoi Hoi - Yen Vien.
- Notification No. 204/TB-BGTVT dated 29/04/2005 communicating summary of Minister of Transportation Ministry at Meeting of Hanoi Elevated railway project, route Ngoi Hoi - Yen Vien.
- Notification No. 29/04/2005 communication of Vice-Minister Ngo Thinh Duc at Meeting of Hanoi Elevated railway project, route Ngoi Hoi - Yen Vien.
- Vietnam Railway Corporation 2006. Mid-term report – Feasibility study report of Hanoi elevated railway project (section Ngoc Hoi-Yen Vien), Hanoi 2006.
- Studying Hanoi urban railway system by DOSRCH (Germany) in 1998-1999.
- Vietnam Railway Corporation 2006. Drawings file - Feasibility study report of Hanoi elevated railway project (section Ngoc Hoi-Yen Vien), Hanoi 2006.

## **5.3 JBIC AND WORLD BANK ENVIRONMENTAL REGULATIONS AND STANDARDS**

Social and environmental considerations are core policies by international financial institution on sustainable development projects. They are prepared in detailed and regularly updated,

such as the JBIC Guidelines for Confirmation of Environmental and Social Considerations (2002) and World Bank Environmental and Social Safeguards Policies. The objective of these policies is to prevent and mitigate undue harm to people and their environment in the development process. These policies provide guidelines to both the lenders and borrowers throughout the identification, preparation, and implementation of programs and projects. In general the guidelines are similarly strict and while World Bank policies provide more details. As per World Bank policies, the following can be applicable to the Project:

Operational Policy (OP)/ Bank Procedures (BP) 4.01 Environmental Assessment (January 1999)

OP/BP 4.11 Physical Cultural Resources (July 2006)

OP/BP 4.12 Involuntary Resettlement (December 2001)

World Bank Policy on Disclosure of Information (January 2002)

There are differences between donors requirements and Vietnamese regulations presented in the Table 5.2.

**Table 5.2 Comparison of Environmental Assessment between Vietnam regulations, JICA and World Bank**

Stage/Issue	JICA	WB	Vietnam
Screening	A, B, C, FI	A, B, C, FI	Decree 29/2011/NĐ-CP , Circular 26/2011/TT-BTNMT Based on project size and sector
EA scope and TOR	Approval to TOR required IEE for Category B Project EIA for Category A Project	Approval to TOR required EIA for both Category A and B includes cultural properties and natural habitats	Not required
EA preparation	Independent experts Client responsibility Emphasis on Alternative analysis and EMP	Independent experts Client responsibility Emphasis on Alternative analysis and EMP	Project proponent Responsibility Follow structure specified in Circular 26/2011
Public consultation	Twice for A compulsory for all Consultation with Project Affected Households (PAHs)	Twice for A, compulsory for all Consultation with PAHs	In written form with Commune People Committee (CPC) and Fatherland front (FF) When necessary, a meeting with representatives from affected organizations and communities is convened. (Timing or frequency is not specified, as it is not requirement.)
Public Consultation regarding EIA (Information disclosure)	Compulsory for all Website publication Monitoring results will be disclosed to the extent that they are made public in project proponents.	Compulsory for all, Draft in English at WB and in local languages at websites before appraisal, replaced by the final reports after clearance	CPC and FF are responsible EIA summary disclosed 5 days after EIA approval (No Website publication. No duration of disclosure is specified.) Disclosure of monitoring results is not required.

<p>EMP implementation</p>	<p>Critical Funding and staff allocated Independent Consultants for monitoring EMP implementation</p>	<p>Critical Funding and staff allocated Independent Consultants for monitoring EMP implementation</p>	<p>General requirement in approval No funding allocated Project proponent responsibility to report to DONRE</p>
-------------------------------	---	---	---

## 6. ANALYSIS OF ALTERNATIVES

### 6.1 NO- PROJECT ALTERNATIVE

If no elevated railway is built, about 2300 households could not be removed, 130 ha of land has not been occupied, no rail station, flyover and bridge would be built.

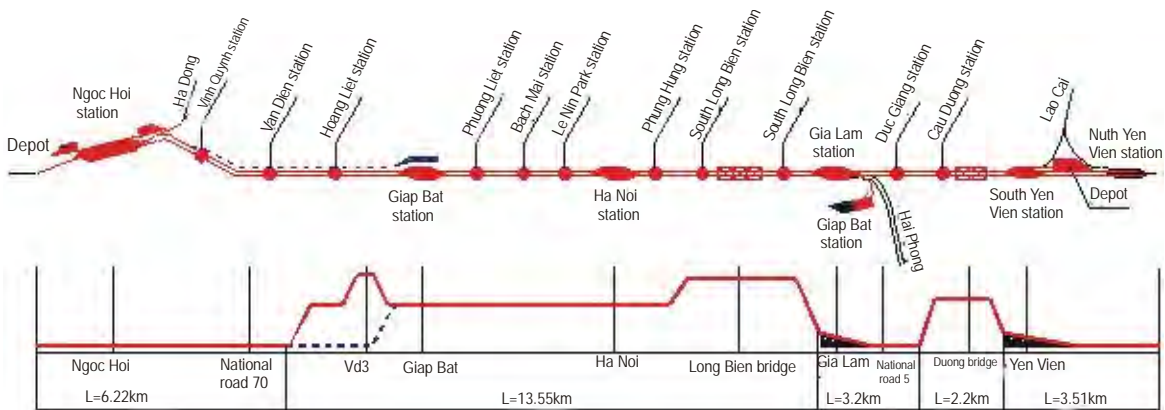
However, if no project, trains have crossed many streets in inner city making a severe traffic jam and also danger for people crossing/the living along railway. Number of private cars, motorcycles would dramatically increase, fuel- as non- renewable resources would be quickly exhausted. Many Hanoi people would need about 1-2 hours to travel from Ngoc Hoi to Gia Lam, instead of 20-30 minutes with elevated railway.

In addition, the use of cars and fuels in big amount could contribute to global warming, which causes climate change.

The project would have solved the transportation problem of Hanoi city, saving travellers' time, improving human quality of life. Thus, the project is highly recommended to be constructed

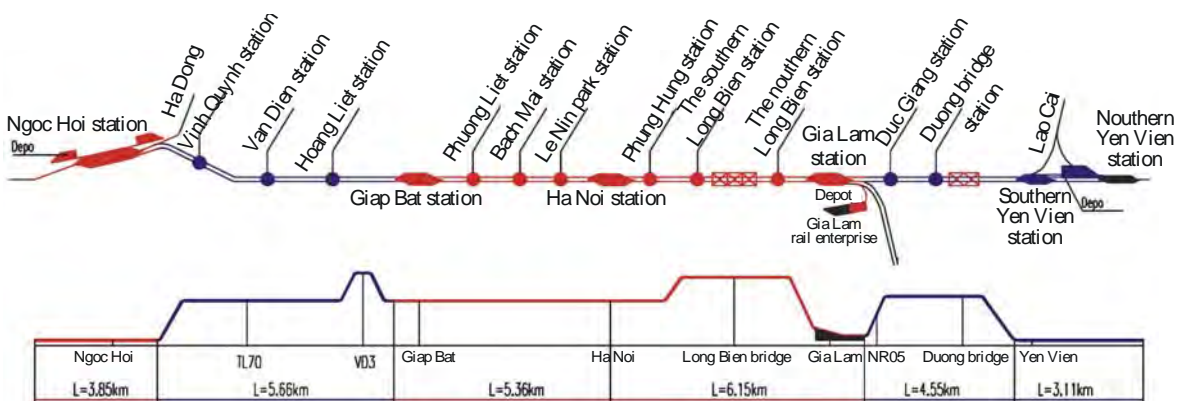
### 6.2 ALTERNATIVES TO RAILWAYS

Four alternatives to railways have been proposed and discussed for the HURC1 Project as follows:



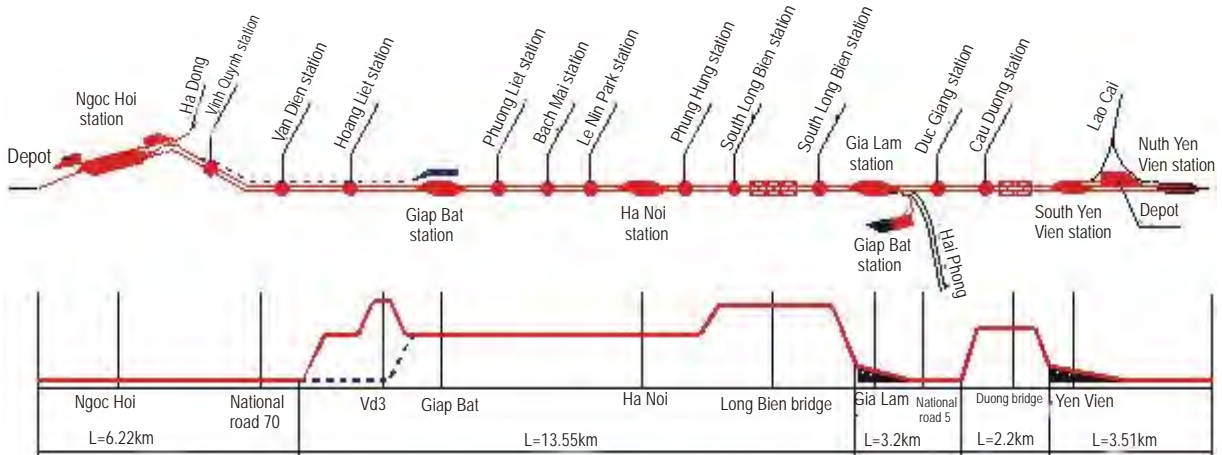
**Figure 6.1 Option 1a for railways**

(Source: CEPT, 2008, EIA)



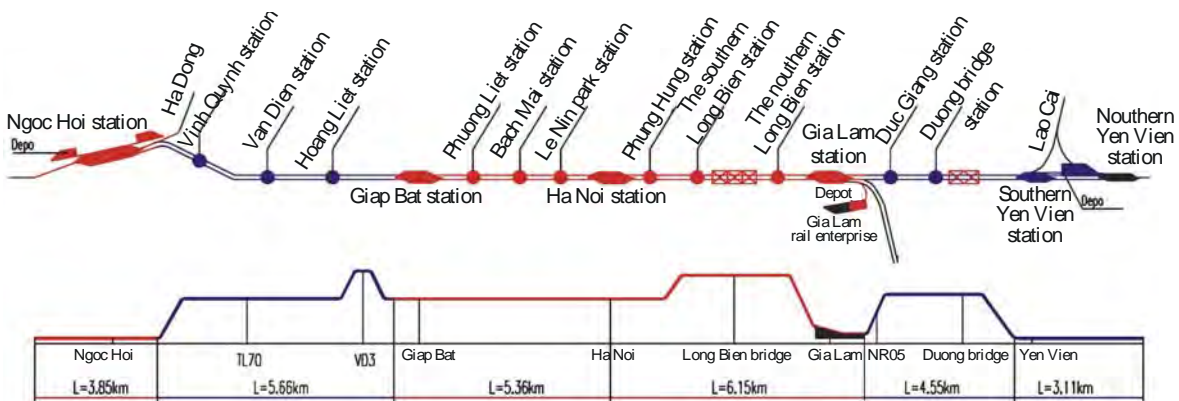
**Figure 6.2 Option 1b for railways**

(Source: CEPT, 2008, EIA)



**Figure 6.3 Option 2a for railways**

(Source: CEPT, 2008, EIA)



**Figure 6.4 Option 2b for railways**

(Source: CEPT, 2008, EIA)

Based on the analysis and evaluation of the route option affecting the environment considering both positive and negative impacts, it is concluded that:

1. Option 1a will save the investment cost. Five positions of cube intersection with the roads should be dealt with properly.
2. Option 1b is also suitable and approved in pre-feasibility study however there will be an increase of 1,250 billion dong to the investment cost for construction.
3. There have been changes in option 2a and 2b from Gia Lam to Yen Vien section comparing with option 1a and 1b.
4. Regarding resettlement issues, Table 6.1 compares number of removed households and land acquisition of 4 options as follows:

**Table 6.1 Comparison of number of removed households and land acquisition of 4 railway options**

Option	Removed Households	Land lost			Total land (ha)
		Public land (ha)	Agricultural land (ha)	Long term land tenure occupation (ha)	
1A	948	23.10	102.76	2.71	185.67
1B	948	23.10	102.76	2.71	185.67
2A	878	20.99	102.76	2.51	183.36
2B	878	20.99	102.76	2.51	183.36

(Source: CEPT, 2008, EIA)

The alternatives were discussed with the related localities when the selection of the route was being undertaken and they all selected Alternative 1 on the basis that it saved investment cost and fitted better with future development planning.

Thought alternative 1a and 1 b have the same number of removed households and land occupation, but the 1a save 1,250 billion dong for construction compare over 1b. Consequently alternative 1a has been selected for the railway alignment.

### 6.3 ALTERNATIVES TO STATIONS

The choice of station is made in considerations of economic, technical and architectural, landscape aspects with the following criteria:

- Medium scale, appropriate elevated operation of railroads and harmonious with surrounding landscape and architectures and culture features of Hanoi City.
- Minimizing the land clearance impact in combination with the option of other architectural works within the area to ensure the harmony in term of urban architecture and planning.
- Facilitating the flow of passengers in the route with suitable length, and clear division of the sections in the station.
- Making use of existing ground conditions for equipment installation to minimize the area of the stations.

Two options for types of station have been proposed and applied depending on specific location: 1) type of 3 story-stations with the average height from the ground of about 12-14m and 2) 2 story station with height of about 8-10m.

### 6.4 ALTERNATIVES TO FLYOVERS AND BRIDGES

#### 6.4.1 Alternative to Flyovers

##### *Kim Lien flyover*

Kim Lien has a intersection with the railway, high traffic intensity at Km+800 (new route). There is 2 options for this work:

+ Option 1: The box beam with 3 continuous spans designed for the higher part 50+70+50. The oval condensed pile for the lower part. After the boring piles completed, the lower part may be cast in situ or erection. The span structure will be balanced cantilever casting.

+ Option 2: The steel frame with 3 continuous spans designed for the higher part 50+70+50. The structure for the lower part and construction method is the same option 1. The higher part will be balanced cantilever erection.

Thus, in respect of architectural landscape in the area, generally, the steel frame will not cause the bad appearance but the frame is high not suitable to the landscape in the area. This will affect the land traffic at this intersection during construction due to the use of scaffolding and cranes. Accordingly, box beam of reinforced concrete DUL with continuous 3 spans is reasonable and not bring much impact to the environment of the area. Thus, the option 1 is chosen

### ***Nga Tu Vong flyover***

Nga Tu Vong is a traffic intersection with the railway, high intensity of traffic at Km2+900 (new route). There will be 2 options:

+ Option 1: The box beam with 2 continuous spans designed for the higher part 2x59.5m. The oval condensed pile for the lower part. After the boring piles completed, the lower part may be cast in situ or erection. The span structure will be balanced cantilever casting.

+ Option 2: The steel frame with 2 continuous spans designed for the higher part 2x59.5m. The structure for the lower part is the same option 1. The higher part will be balanced cantilever erection.

Thus, in respect of architectural landscape in the area, generally, the steel frame will not cause the bad appearance but the frame is high not suitable to the landscape in the area. This will affect the land traffic at this intersection during construction due to the use of scaffolding and cranes. Accordingly, box beam of reinforced concrete DUL with continuous 2 spans is reasonable and not bring much impact to the environment of the area. Thus, the option 1 is chosen

### ***Highway No.5 flyover***

Considering the future planning of Highway no.5, this route will be prolonged in Dong Tru crossing the railway at about Km6+300 (railway chainage) between Hanoi and Yen Vien. As expectation, Gia Lam station will remain the same acting as the ground station and expected to run elevated at the chainage Km8+700 in the Northern Ha Noi station and connecting ground before going to Yen Vien crossing Duong bridge. There will be 2 options:

- Option 1: land road (section crossing the intersection with the railway) will be heightened at the intersection with the railway of different level.
- Option 2: railway (including Gia Lam station) will be heightened ensuring the space crossing the land road.

In terms of technical and other aspects, the option 2 will have more significant impact on the whole route. The impact level will be much more in case of heightening the railway (including Gia Lam station). Thus, heightening the land road (option 1) will bring less significant impact and more suitable.

### ***Ring Road No.3 flyover***

According to optioning of Hanoi city in the future, ring road 3 in section Mai Dich - Phap Van will include 4 lanes of expressway and 4 urban lanes crossing the railway at Km6+459 (railway chainage) between Hanoi and Ngoc Hoi. The intersection at this position is the one of different level and the new railway, on the third floor as follows:



The box beam DUL, 50.0 long designed for the higher part . The oval condensed pile for the lower part. After the boring piles completed, the lower part may be cast in situ or erection. The span structure will be casted at site and craned by specialized crane. Therefore the box beam of 50.0m long will be built at this intersection for best connection.

#### **6.4.2 Alternative to Bridge**

##### ***Red River Railway Bridge (new Long Bien Bridge)***

According EIA 2011, there are two options for location of new Long Bien Bridge that are at 30m (OP1) and 186m (OP2) from the old Long Bien bridge.

The major advantages of OP2 comparing with OP1 are as follows:

- Avoid cutting through the old town.
- Do not cause great impact on the landscape and old Long Bien bridge, allow the easier construction.
- Connect well to the bus system because urban railway station will be built just above the Long Bien bus transfer station.
- Altitude of Gia Lam station only raised 3.3 m, while compared with OP1 it is 6m.

The major advantages of OP2 comparing with OP1 are as follows:

- Route length will be greater than OP1 approximately 214m result in increase of the construction and operation costs but not significantly.
- The area must be cleared by a little larger than OP1.
- The ability to connect with the urban railway line 2 is not as good as OP1, but differences were not significant.
- Option 2 may affect the landscape of Hang Dau garden and water tower top. These are issues that need attention in order to provide the appropriate solutions.

Overall, OP2 is more optimal than OP1, thus it has been chosen for design and construction

## 7. SCOPING OF EIA AND STUDY METHODOLOGY

### 7.1 SCOPING

This scoping matrix is to have the overview of the comprehensive project impacts. Predicted impacts on social/natural items are organized against the impact factors during different stages of the project are detailed as stated in Table 7.1 follow.

**Table 7.1 Environmental impact matrix**

	Environmental Item	Project Period	Adversed Impact Factors						Positive Impact Factors		
			Planning	Construction			Operation	Operation			
			Land acquisition, loss of structure and crops	Ground clearance	Operation of vehicles and heavy equipment for construction	Construction activity of stations, elevated railway, etc	Traffic control	Inflow of construction workers and establishment of construction bases	Presence of elevated railway stations and other related structures	Reduce car/motorbike users	Improve of economic activities
Social Environment	1 Resettlement	-A	-A	D	D	D	D	D	D	D	D
	2 Living and Livelihood	+A/-B	-B	-B	D	-B	-B	D	D	+A	+A
	3 Utilization of land and local resources	-B	-B	D	D	D	D	D	D	+A	+A
	4 Social institutions such as social capital and local decision-making institution	D	D	D	D	D	D	D	D	D	D
	5 Existing social infrastructures and services	+A/-B	-B	-B	D	-B	-B	D	D	+A	+A
	6 Socially vulnerable groups (poors, minorities, etc)	+B/-B	-B	D	D	D	D	D	D	D	+B
	7 Equality of benefits and losses	D	D	D	D	D	D	D	D	D	D
	8 Heritage (Graves, pagodas, etc.)	-B	-B	D	D	D	D	D	D	D	D
	9 Local Conflicts of Interest	D	D	D	D	D	D	D	D	D	D
	10 Water Right/Common	D	D	D	D	D	D	D	D	D	D
	11 Social Consensus	D	D	D	D	D	D	D	D	D	D
	12 Public Health	-B	D	D	D	D	D	-B	-B	D	D
	13 Infectious Diseases(AIDS/HIV)	-B	D	D	D	D	D	-B	D	D	D
	14 Working Environment	-B	D	-B	-B	-B	D	-B	D	D	D
Natural Environment	15 Topography and Geology	D	D	D	D	D	D	D	D	D	D
	16 Land Erosion	-B	D	D	D	-B	D	D	D	D	D
	17 Ground Water	D	D	D	D	D	D	D	D	D	D
	18 Hydrology	-B	D	D	D	-B	D	D	D	D	D
	19 Protected Areas	D	D	D	D	D	D	D	D	D	D
	20 Ecosystem	D	D	D	D	D	D	D	D	D	D
	21 Climate	D	D	D	D	D	D	D	D	D	D
	22 Landscape	D	D	D	D	D	D	D	D	D	D
	23 Global Warming	+B/-B	D	D	-B	D	D	D	D	+B	D
Pollution	24 Air Quality	+B/-B	D	-B	-B	D	D	D	-B	+B	D
	25 Water Quality	-B	D	D	D	-B	D	D	-B	D	D
	26 Soil Contamination	D	D	D	D	D	D	D	D	D	D
	27 Wastes	-B	D	-B	D	-B	D	D	-B	D	D
	28 Noise and Vibration	+B/-B	D	-B	-B	-B	D	D	-B	+B	D
	29 Subsidence	C	D	D	D	C	D	D	D	D	D
	30 Odor	-B	D	D	D	-B	D	D	-B	D	D
	31 Sediment	-B	D	D	D	-B	D	D	D	D	D
	32 Accident	+B/-B	D	D	-B	-B	D	D	-B	+B	D

"+/-": positive/adverse, A: Significant impact, B: Some impact, reversible and mitigatable, C: Unknown impact, D: No impact

(Source: JICA evaluation team, 2011)

In summary the adverse impacts during the periods are:

**a. During Planning phase**

- The land acquisition, loss of structure and crops cause:
  - + Significant adverse impact to resettlement
  - + Some adverse impact to living and livelihood; land use and local resources; existing social infrastructures and services; and social vulnerable group (poor, minorities, etc.), heritages (graves)

**b. Construction phase**

- Ground clearance causes:
  - + Some adverse impact to living and livelihood; land use and local resources; working environment; air quality; wastes and noise and vibration
- Operation of vehicles and heavy equipment for construction cause
  - + Some adverse impact to working environment; global warming; air quality; noise and vibration and accident
- Construction activity of station, elevated railway cause:
  - + Some adverse impact to living and livelihood; existing social infrastructures and services; working environment; land erosion; hydrology; water quality; wastes; noise and vibration; odor and accident
  - + Impact to subsidence may occur, but its nature and extent is unknown.
- Traffic control causes:
  - + Some adverse impact to living and livelihood; existing social infrastructures and services
- Inflow of construction workers and establishment of construction bases cause
  - + Some adverse impact to public health; infectious diseases (AIDS/HIV) and working environment

**c. Operation Phase**

- Presence of elevated railway, stations and other related structures impact:
  - + Some adverse impact to: public health; wastes; noise and vibration; odor; accident.

The detail mitigations will be proposed in detail in Section 8

Except that the names used for the environmental items in the existing items slightly differs from those of the checklist in the JICA guidelines, the essence of the items, characteristic of the impacts, their timing of occurrence, duration, and range, the reversibility of the impacts by application of mitigation measures are basically same between the scoping in the existing reports and in this revision. The reasons for this conclusion are as follows.

- By the existing reports, the most serious adverse impact is resettlement and land acquisition. Other impacts on land use and socioeconomic activities related to resettlement are also mentioned. It is not possible to avoid resettlement and land acquisition completely, however the other impacts can be mitigated. This evaluation is same as the result of this revision.

- By the existing reports, the impacts predicted during construction period are air pollution, water pollution, noise and vibration, odor, waste, impacts on socioeconomic activities in the proximity of construction site, impacts on surrounding communities due to the influx of workers, impacts on the river and sediment due to bridge construction activities, etc. These impacts are related to construction activities, therefore the timing of occurrence and period are within construction period and the range of impacts is limited to the immediate proximity of the construction site and other relevant work sites. These impacts can be mitigated by applying appropriate management and measures. In the scoping and descriptions of impacts in the existing reports, the names used for environmental items are slightly differed from the ones by the JICA checklist (e.g. there is no item on HIV/AIDS in the existing reports, however there is an item to describe prevention of infectious diseases in general), the essence of the items described, characteristic of the impacts, their timing of occurrence, duration, and range, the reversibility of the impacts by application of mitigation measures are basically same between the scoping in the existing reports and in this revision.
- By the existing reports, the impacts during operation period are described as air pollution, water pollution, noise and vibration, odor, waste and accidents due train service operation, passengers at stations and operation of train repairing workshops. The range, duration and reversibility of these impacts described in the existing reports are same as the revision.

## 7.2 METHODOLOGY TO CONDUCT THIS EIA

In order to conduct this EIA both the secondary and primary data on natural environment and social data are needed. The followings are methods to obtain those data

**Data collection:** such data on socioeconomic condition of the Province/District/wards/commune are obtained from the statistical government websites, official and the annual formal report of the wards/commune.

**Social-economic survey:** This is applied in interviews to gain the comments from local authorities and people in project area. Two approaches are used to obtain this kind of data, namely:

**Qualitative study:** sound interview with the ward/commune staffs (Chairman and Deputy Chairman of the ward/commune People's Committee, Chairman of the Ward/commune Fatherland Front Committee), representatives' of the residential areas and the householders to collect the data.

**Quantitative study:** survey and investigation by using the questionnaire' and direct interview with about 20% of the total impacted households.

- **Inventory and statistics method:** This is to collect and process the data of hydrometeorology and socio-economy in project area.

- **Site-visit survey and sampling methods:** This is to determine the locations of measurement and sampling for environmental parameters that serve for analyzing and accessing the environmental quality in project area.

- **Method of data analysis and process in laboratory:** This is to analyze the environmental parameters that serve as baseline data and to assess the environmental impact in project area.

The monitoring points for air quality, noise and vibration; surface and ground water; soil quality; detail monitoring procedure as well as analysis methodology are presented in Annex A

- **Comparison Method:** This is to evaluate the environmental impacts and compare with Vietnam environmental standards (TCVN and QCVN)
- **Rapid assessment method:** This method has been developed by World Health Organization (WHO) in order to estimate the pollution load of dust, exhaust gases and wastewater for assessment of environmental impact of the project.
- **Modeling Method:** This is to calculate and predict the average concentration of pollutants from the waste sources in project area.
- **Matrix method:** This is to build the interactive matrix between the construction activities, operation process and the impacts on the environmental aspects in order to consider many impacts at the same time.
- **Method of synthetic analysis and set up the report:** This is to analyze and synthesize the project impacts on the environmental natural and socio-economic components in the project area.

## 8. IMPACTS & MITIGATION MEASURES

### Positive impacts

In general, when the railway comes into operation it will bring about big benefits for city. Scenery is more beautiful, spacious, and modern. Business opportunity will be better for residents and especially it will minimize traffic jam in Hanoi which helps to travel easily; save time, fuels and reduce accidents in city.

Calculation is based on forecasting number of passengers in case of having or not having project, speed and travelling time of other transport vehicles at the same calculating line (Table 8.1):

**Table 8.1 Time comparison of moving vehicles**

Segment	Distance	<i>Motorbike</i>	<i>Car</i>	<i>Bus</i>	<i>Tram</i>
		Average speed (km/h)			
Gia Lam – Giap Bat	11.6 km	24	21	18	28.6
		Moving time (minutes)			
		29	34	39	<b>25</b>

(Source: CEPT, 2008, EIA)

### Negative Impacts

The negative impacts are mainly temporarily (except permanent land acquisition) and mitigatable. This section of the report discusses the potential impacts of the project and recommends environmental mitigating measures to address adverse environmental impacts in following project periods; (i) preconstruction, (ii) construction, and (iii) operation of the new elevated train.

The potential negative impacts described here are based on results of scoping table in Section 7. Below is a summary of potential impacts by the Project and corresponding mitigation measures written in EIA 2008 and supplementary EIA 2011 reports. The additional recommended measures have been added wherever applicable.

#### 8.1 IMPACTS DURING DESIGN/PRE-CONSTRUCTION PERIOD

The potential impacts associated with the design/preconstruction period of the project are related to the alignment of the railways and the siting of the stations and the acquisition of land for the RoW. There is also potential for the location of some stations and complex and railways to be built to affect agricultural land, houses and existing infrastructure such as irrigation and drainage canals, rivers and roads. In summary, the impact factor during this phase is:

- Land acquisition, loss of structure and crops

This factor cause impacts on the social and natural aspects, as describes follows:

##### 8.1.1 Impact on Resettlement

The acquisition of land for the project depends heavily on the decision of RoW by Ha Noi CPC. According to preliminary survey data, in agreement with the wards / communes in the county / district where the project goes through, the acquisition of land and clearance of the entire route including the construction of stations. By the present estimation, a total land area

of 123 ha will be permanently acquired. This number is affected by the acquisition of land and clearance of the entire route including the construction of stations.

The total number of houses to be relocated is about 1,688 with 2325 households (estimation). The number of graves that should be moved is 650 (all are in Thanh Tri District) . The detail of resettlement households and people are presented in Table 8.2

**Table 8.2 The resettlement households and people in the whole project**

No.	District Name	Land acquisition area (m2)	Displaced House		Affected Households/ People		Graves
		New allocation	Number (house)	Area (m2)	HH	People	
I	Thanh Tri	1,097,706	462	22,252	661	2,584	650
II	Hoang Mai	20,775	114	7,038	116	477	0
III	Thanh Xuan	2,625	44	7,180	66	396	0
IV	Dong Da	12,524	255	18,767	361	1419	0
V	Hoan Kiem	12,866	219	13,733	350	1282	0
VI	Ba Dinh	7,063	40	2,995	52	284	0
VII	Long Bien	78,128	554	39,831	719	3177	0
Total		1,231,687	1,688	111,796	2,325	9,619	650

(Source: JICA Survey Team based on the information from JKT, 2011).

The resettlement data are now still under recalculation. The data in 2011 would be updated, however those data are not officially accepted, thus this EIA report uses the data available presently.

#### Mitigation measures

- RAP should be prepared and implemented in accordance with the Vietnamese law and regulations
- The relocation and compensation will be fully implemented according to the RAP that includes the fulfillment of relevant Vietnamese regulations.

\* *Compensations, supports for agricultural lands of households, individuals:*

- Households, individuals using agricultural lands can be compensated by the State by cash subject to the value of agricultural land using right.
- For areas of gardens, living land attached ponds (living lands, ponds, gardens shall be in the same land lot mentioned in the land administration document), beside of compensations subject to the price of agricultural lands under the laws, a support of 20% more shall be applicable to living land attachments.

\* *Compensations for non-agricultural lands as living lands of households, individuals:*

- Living land users are compensated by cash subject to the value of living land using right in the areas announced by People's Committees of City annually. In case of movement, they are provided with resettlement places under provisions of Part D – Chapter II of the Decision No. 26/2005/QD-UB from Ha Noi People's Committee.

- Compensation, support expenses are added in the total compensation, support expense of the project. In case of changes of land using rights for construction conformity, organizations, households, and individuals shall make commitments on land using and work constructions with their relevant district People's Committees.

*\* Land compensations for land co-users:*

In case of land acquisition of high buildings with many households as co-users, compensations are calculated based the floor areas of flats built on the areas belonging to the using rights of organizations, households, individuals and the compensations are divided subject to the following floor coefficient (Table 8.3): Article 10 – QD No. 26/2005/QD-UB from Ha Noi People's Committee.

**Table 8.3 Compensative coefficient for high buildings with many households**

Tenement house	Coefficient				
	Floor 1	Floor 2	Floor3	Floor 4	Floor 5
2 floors	0.7	0.3			
3 floors	0.6	0.25	0.15		
4 floors	0.6	0.2	0.1	0.1	
5 floors	0.55	0.15	0.1	0.1	0.1

In case of buildings with more than 6 floors, the first floor, the second floor and floors from the third floor upward are allocated with 48%, 12%, 40% of the land using compensation respectively and it is divided averagely to floors.

*\* Compensations for lands in safety corridors in case of construction of public works with safety protection corridors:*

- When the State acquires land in safety protection corridors for constructing public works, compensations, supports are subject to the mentioned provisions.

- If the State does not acquire lands, the lands in safety corridors are compensated for their limited using capacities at the actual losses. Houses, other construction works and other assets in the safety corridors which suffer losses as results of acquisition shall be compensated at the actual losses.

- From the date of land post placement, local authorities shall inform their people of not being allowed to make new constructions, expansion or heighten their housing architectures within such defined areas.

-Provide financial expense for removing constructions

**Additional recommended measures**

- RAP should be prepared and implemented in accordance with the JBIC guidelines (2002) and the Vietnamese law and regulations while referring to JICA guidelines (2010) and WB safeguard policies.

- The relocation and compensation will be fully implemented according to the RAP that includes the fulfillment of relevant Vietnamese regulations and JBIC requirements.



### **8.1.2 Impact on Livelihood Utilization of land and local resources**

According to EIA 2008, the ground clearance task within the project is the complicated work, mainly relating to Hanoi - Van Dien station (phase 1) and Hanoi - Long Bien (phase 2a). The resettlement will affect the people affected by the project as they will have to change their residence as well as their lives. The removal will affect their access to the infrastructure such as electricity, water, medical facilities, markets and other changes in their employment. The ordinary traders such as shop-owners may have to adapt to the new residence arranged or re-purchased which will not have the same convenient conditions for their business

#### Mitigation measures

*\* Compensation for the unharvest crop plants and livestock.*

- Annual plants shall be calculated equal to output value of this crop, under the productivity of the highest crop in 3 consecutive previous years of the plants at the locality and average value at the time of land acquisition.
- Perennial plants shall be calculated equal to the existing value of the plants garden under the prices in the locality at the time of land acquisition.
- The livestock (aquaculture) which have come into harvest season at the time of land acquisition must not be compensated; if not in harvest season, they shall be compensated due to early harvest or compensated for relocation cost and damages caused by the relocation.
- To compensate material damage relating to farm produce and construction on the garden, farming area

#### Additional recommended measures

- RAP prepared in accordance with the JBIC guidelines (2002) and the Vietnamese law and regulations while referring to JICA guidelines (2010) and WB safeguard policies will include the rehabilitation program for affected households.
- The compensation will be paid based on the replacement cost.

### **8.1.3 Impact on Existing social infrastructure and services**

In case to remove from the long life residence in the city, the significant impact will happen for the people living within the project, particularly: agencies, schools, electricity, underground cable system. (CEPT, 2008 EIA).

#### Mitigation measures

Mitigation measures are not covered in the existing reports.

#### Additional recommended measures

- Develop a detail plan for relocation of utilities and disseminate the information to public.
- Provide suitable location for market, and public infrastructures to make convenience for local people

### **8.1.4 Impact on Socially vulnerable groups**

The socially vulnerable group such as lonely, old and weak persons, women head household, invalid people, orphans could live in the in disassembling old houses. Moving away could make them more difficult in finding new job, source of income (if their house is small shop) and taking more time to stabilize normal life in new place (CEPT 2008 EIA)

#### Mitigation measures.

No special mitigation measures addressed these social groups in the existing EIAs

### Additional recommended measures

- The results of census survey for RAP will be used to identify households in need of special assistance, and appropriate assistance program will be planned and included in RAP.
- Prepare plans for assisting families with socially vulnerable group. Provide them financial and labor resources to move to new places and constructing new living places.

#### **8.1.5 Impact on Cultural/historical heritage**

The large construction within an urban landscape such as Hanoi Capital will definitely have aesthetic impacts. The damage/impacts on cultural and historical may occur. 650 graves should be relocated

#### Mitigation measures.

The design of components like national station, urban station, overpass, bridges took architectural aspects as well as avoiding cultural/historical heritage sites into consideration so as the least impacts will be made.

### Additional recommended measures

Collaborate with families and relevant institutions to prepare a plan and implement the relocation of graves based on appropriate cultural and religious considerations. Provide financial support and suitable location for relocation of graves.

## **8.2 IMPACTS DURING CONSTRUCTION**

During the construction of the project, the construction activities will relate to the following project components: the elevated railway; the railway on land; the intersection works; the railway stations: national stations, urban stations; the coach and locomotive repairing factories the depot area; the viaduct, overpass; the bridges crossing over river: Long Bien, bridge; the water, electricity supply works; the information; signs and traffic control works etc.

The main source of adverse impact factors includes:

- Ground clearance
- Operation of vehicles and heavy equipment for construction
- Construction activity of stations, elevated railway, etc
- Traffic control
- Inflow of construction workers and establishment of construction bases

Those construction activities cause impacts on the social and natural aspects, as describes follows:

### **8.2.1 Impact on Living and livelihood**

The construction of elevated railway line in Hanoi, Ngoc Hoi – Gia Lam line, may reduce business capacity, earning of residents at streets, lane of people/households living at surrounding areas. The fencing surrounding project areas would block some road access to houses on the other side of railways making difficulties for people access their houses. Noise, dust, could affect health of people live near the project area.

#### Mitigation measures

- The constructor should make easy/suitable access to residential on the west side of railways, apply measures to minimize dust, noise impact.
- Large material storage should not be in the area of streets.

- Not to operate excavators, bulldozer, roller, pile-driving machine at night.
- Construct a fence around the construction area, to provide stores for storing machines and necessary facilities; to build sentry-boxes and have security guards on duty all day (24/24h). Not to permit strange persons to enter the project area.
- Coordinate with the local authority in notifying the traffic flow division on time on the local mass media in order not to cause traffic jam.

Additional recommendation measures

- Affected business should be properly assisted through the RAP implementation in accordance with the JBIC guidelines (2002), JICA guidelines (2010), WB safeguard policies and the Vietnamese law and regulations.
- Provide suitable access to households living in the surrounding area

**8.2.2 Impact on Existing social infrastructure and services**

Referring to EIA 2008, Hanoi elevated railway line construction can impact the present transport lines because of road conjunction. In this case traffic jam at construction area is natural leading to travel cost increase. Therefore, maintenance of good operation at the present roads is important.

A great number of trucks are needed to transport project raw material. High transport densities on narrow roads at project area would increase traffic jam, accidents on railway lines as well as roads near Project area.

Operation of trucks and machines will remarkably impact activities of buses, cars, motorbikes, and other vehicles during construction, especially in center of city and at key road junctions such as:

- Vong Junction,
- Kham Thien-Le Duan Junction,
- Junction between railway and Nguyen Thai Hoc road,
- Southern Long Bien bridge junction,
- South Long Bien junction,
- Junction between railway and national road No. 5

Mitigation measures

The construction is carried out in the city with big traffic density so traffic organization for the project will be designed to strengthen the traffic safety system. Proper design and arrangement is required to minimize occurrences of traffic accident or to create advantages for solving out occurrences in principles as follows:

- When the construction is carried out for piers located near the road and in case piers touch on road clearance (horizontally) or passenger way clearance, the Contractor shall firmly consolidate foundation pit wall to ensure traffic safety for means of transport and road-users.
- Design traffic organization in strict compliance with road signal regulations 22TCN-237-01.
- When designing the traffic organization, ensure that road-users will not cope with accidents because of unavailability of road signals.
- Install signal posts painted with the reflected paint at the construction areas.
- At the locations of curves  $R=R_{min}$ , the sight distance does not ensure, to provide convex spherical mirrors.

- Use plastic isothermal paint for road safety marking about 1cm in thickness to reduce speed of vehicles at the locations near schools, hospitals or at important intersections.
- To check safety design measures in the initial report and final report of the feasibility study project.
- Proper traffic organization: to construct and complete each item of work at a given moment.
- Make a plan of proper in- and out-flowing division for transporting construction materials to avoid traffic jam, especially at peak hours.
- Coordinate with traffic police divisions of districts, wards where the route runs through to divide the traffic flow as appropriate.
- Cooperate and collaborate with Hanoi Transport and Urban Public Works Services in stipulating ways of roads permissible to traffic in the project area.
- Together with the local authority, in the education work for the local people, construction workers and drivers shall strictly abide by traffic law.

The compliance of such mitigation measures will minimize traffic jam and traffic accidents in the project area. The aforesaid measures ensure that the project will be managed in due accordance with regulations of Decree No. 16/2005/ND-CP dated 07 February 02, 2005 by the Government on the management of construction investment projects.

Additional recommended measures

No recommendation

**8.2.3 Impact on Public Health and Infectious diseases**

Public health is the most concerning problem because a big labor workforce will be mobilized. In case of not ensuring workers' life, they would be affected by epidemic/ social diseases (diarrhea/HIV/AIDS) and can affect to surrounding community.

Mitigation measure.

The project will organize accommodation for laborers and ensure life conditions like camp, clean water, accommodation and etc. The workers who work outdoor in the inconvenient weather condition shall be fully provided with safety working clothing in order that the weather will not affect to their health and the environment of the surrounding residential areas and pandemic cannot occur.

Additional recommended measures

- Workers should receive education on personal hygiene and STD.
- Health awareness including HIV/AIDS awareness program should be implemented

**8.2.4 Impact on Working Environment**

Heat pollution mainly affects the health of workers at site during the hot days. High temperature will make personal physiological change such as sweat heavily as well as a significant amount of mineral salt K, Na, Ca, I, Fe and some vitamin.

High temperature will make heart work hard as well, affecting the function of kidney, central nervous system. In addition, working in hot environment, the rate of disease suffering is higher comparing with other groups for example digestion disease 15% versus 7.5%, skin disease 6.3% versus 1.6 %. Pathological troubles are often suffered by the workers working in the hot environment such as isolation, convulsion and worse is easy to be tired (CEPT, 2008 EIA)

Accidents may happen when working in heights. However, a worker safety plan may be implemented to reduce risks that include testing of structural integrity prior to proceeding with the work and the use of fall protection measures.

Besides the physical working environment, the socio-economic issues in construction period will also happen affecting local inhabitants. A large number of laborers will come to project area to work, that partly disturbs the local inhabitants' activities. The negative impacts may occur like gambling, drug addiction or land trading.

#### Mitigation measures

- Compliance to Vietnamese labor code and other regulations to maintain the working place safe and healthy.

- General safety measures for the construction works, such as provision of safety equipment, safety procedures, should be implemented.

- Increase technical and labor safety: Workers shall be well informed about technical safety regulations and reminded regularly. Rewards and penalties shall be strictly applied for compliance with safety regulations and disciplines, machines and equipment should be maintained regularly.

- The labour safety: When the construction is carried out on top, safety measures shall be taken for transporting, un/loading and installing machines and equipment and for using electric power in construction and etc.The wearing of Personal Protective Equipment (PPE) such as hard hats, safety gloves, ear protection etc. is to be strictly imposed. A Health and Safety Plan (HSP) will be prepared and implemented by the contractor. At least one trained first-aid worker is to be available at each construction site.

- Security issue at the construction area: The Employer will coordinate with the Contractors and the local authority in well-executing security in the region. The implementation of such measures will ensure in due accordance with Decision No. 25/2002/QD-UB dated 27/2/2002 by Hanoi People's Committee on "regulation on ensuring order, safety and environmental sanitation of Hanoi city

- To minimize social issues during the construction of the project, the Employer shall take the following measures:

  - +Use as many as possible a human resource of companies in Hanoi who are qualified as required by the Contractors and laborers who wish to be employed shall be employed on maximum by the Contractors.

  - + Coordinate with the local authority and relevant agencies in organizing programs (i) to educate and propagandize a sense of civil responsibility for the construction workers at the project site. (ii) To introduce customs and habits of local people with immigrant laborers to avoid regrettable misunderstanding cases between such laborers and local people.

- Workers will be provided with entrance/exit cards to the site to ensure the management work.

- Constructor should closely cooperate with the relevant local management agencies in the management of immigrant laborers residing in the area of the project.

- Workers will be provided with accommodation with proper living condition. Protective working cloths will be provided to work outside.

- Risk prevention and safety measures to be taken for dangerous activities.

### Additional recommended measures

- Compliance to Vietnamese labor code and other regulations to maintain the working place safe and healthy.
- General safety measures for the construction works, such as provision of safety equipment, safety procedures, should be implemented.
- To accommodate the needs of the workforce, the contractor should provide suitable housing, adequate supplies of potable water, and toilet and bathing facilities within the housing area. Onsite facilities for preparing food need to be provided, or food service contracted.

### **8.2.5 Impact on Soil erosion and Sediment**

During the construction of the bridge over the Red river, the bridge piles in rivers will form an artificial barriers to natural flow, low section behind bridge create water whirls to change flow direction which causes bad affects to bridge piles as well as speed up erosion at riverside wraps and impacts dike footing.

According to project, erosion problem at bridge piles is considered as entire erosion and local erosion. The calculation following 'Instruction of erode calculation' is follows:

- Entire erosion :

$$\frac{Y_2}{Y_1} = \left[ \frac{Q_2}{Q_1} \right]^{\frac{6}{7}} \left[ \frac{w_1}{w_2} \right]^{k_1}$$

Legend:

$y_s = y_2 - y_0$ : average depth of erosion, m.

$y_1$ : average depth of main river-bed at upper section of bridge, m.

$y_2$ : average depth at narrowed cutting face after erosion, m.

$y_0$ : average depth at narrowed cutting surface before erosion, m.

$Q_1$ : main river-bed output at upper section, m<sup>3</sup>/s.

$w_1$ : width of main river-bed at upper section, m.

$w_2$ : width of main narrowed river-bed, m.

$k_1$ : dependent coefficient of materials at river-bed.

+ In case of flow without IDGE carrying alluvium.

$$y_2 = \left[ \frac{0.025Q^2}{D_m^{2/3} W^2} \right]^{\frac{3}{7}}$$

Legend:

$y_s = y_2 - y_0$ : average depth of erosion, m.

$y_2$ : average depth at narrowed cutting surface after erosion, m.

$y_0$ : average depth at narrowed cutting surface before erosion, m.

$Q$ : flow output under bridge, m<sup>3</sup>/s.

$W$ : width of main narrowed river-bed, m.

$D_m$ : smallest parameter of bottom materials which do not move at narrowed cutting face.

- *Local erosion:*

Formula to calculate biggest depth of erosion at bridge piles is followings:

$$Y_s = 2,0 * K_1 * K_2 * K_3 * K_4 * a^{0,65} y_1^{0,35} Fr_1^{0,43}$$

Legend:

Y<sub>s</sub>: depth of local erosion, m.

K<sub>1</sub>: coefficient of head-piece shape, K<sub>1</sub> = 0,90 – 1,10

K<sub>2</sub>: bias angle coefficient with flow direction.

K<sub>3</sub>: river-bed condition coefficient, K<sub>3</sub> = 1,10 – 1,30

K<sub>4</sub>: dependent material coefficient at river-bed, K<sub>4</sub> = 0,70 – 1,00

a: pile width, m

Fr<sub>1</sub>: upper section Froud coefficient at bridge piles,  $Fr_1 = V/(gy_1)^{0,50}$

V: upper section flow speed at bridge piles, m/s.

Biggest local erosion at bridge piles are also calculated by Froehlic formula is as follows:

$$Y_s = 0,32 * F(a')^{0,62} * y_1^{0,47} * Fr_1^{0,22} * D_{50}^{-0,09}$$

Legend:

F: Cylinder coefficient

Erosion forecast at bridge piles of Red river between two dykes is presented in Table 8.4

**Table 8.4 Estimating bridge buttress erosion at Hong river**

No.	Bridge buttress	Height (m)	Common erosion depth (m)	Partial erosion depth (m)	Total erosion depth (m)
1	P1	Outside left dyke			
2	P2				
3	P3				
4	P4	22.35	0.24	5.19	5.43
5	P5	15.35	0.24	7.11	7.35
6	P6	16.91	0.24	6.57	6.81
7	P7	19.89	0.57	5.38	5.95
8	P8	20.80	0.57	5.25	5.82
9	P9	23.20	0.57	2.53	3.10
10	P10	Outside right dyke			
11	P11				
12	P12				
13	P13				

Sediment would be built up at water courses during construction in general and in river during bridge construction in particular. When water flow is narrowed by bridge buildings, river water is raised at higher level compared with natural water surface line and is at a far distance from front of bridge. Phenomenon of water slowing down to upper section of affected areas and water rapidly rising at piece near bridge erodes areas near bridge. At

lower land of bridge, speed of water lowering following water flow reduces capacity of carrying alluvium and river-bed will be increased due to sedimentation.

Mitigation measures (CEPT, 2008. EIA)

Mitigation measures shall be focused on designing alternatives that will minimize the potentiality of depression in the embanked slopes with reinforcement.

*Designing alternative of the work*

Due to the expansion, radius development and pile construction at two ends of the bridge, the encroachment into the walls of the river dike will result in instability of the dike surfaces. Changes in geological environment that cause landslides, include:

- Change in water pressure at holes;
- Increased slope of the dike wall;
- Increased tangential force, while decreased normal force.

To manage the possible landslide, the project shall apply general designing alternative for all the bridges on the route as follows:

- Lower the underground water level by drainage pipes.
- Reinforce the slope-foot and the dike surface by of the slopes by embankment and titling with rocks.
- Construct box ditches on the walls and at the foot of the dike (size 0,3mx0,3m) .

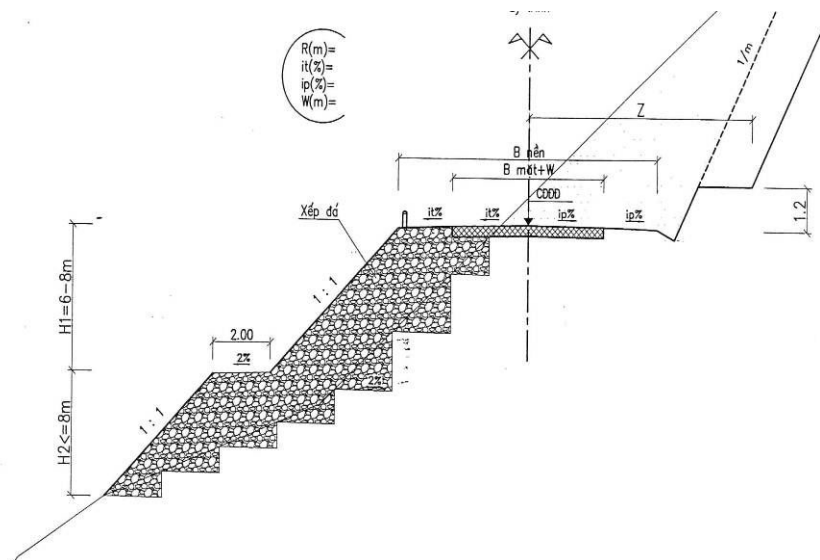
➤ *Designing special facilities*

The measures below are designed to maintain the stability of the abutments, as well as to mitigate the erosion process:

- Design of the drainage facility, top-ditch system for cutting off the overflow water. The wall shall be sloped gently with steps to limit the speed of the overflow. The dike slopes shall be reinforced with raw stones.

- Design of the slope embankment: at minus talus, the slope is designed at 1/0,75, the stone embankment is tightly wedged on the outer surface, then grouted with cement plaster M100 in a thickness of 25–30cm, if the inner is earth embankment, the outer shall be built with stones on a 10cm thick macadam buffer. In order to keep the embankment slope stable, the foot of the talus is designed to be built with raw stone and cement plaster (See Figure 8.1).





**Figure 8.1 The slope embankment**

(Source: CEPT.2008. EIA)

The erosion and alluvium during construction phase is mainly caused by peeling off vegetation coverage, damaging the earth cohesion by excavation and embankment and the rainwater overflows the materials storages. The following measures are applied to mitigate these impacts:

➤ *Control and manage alluvium flow*

- Control to prevent the redundant on the talus spill over into the water flow.
- Vegetation recovery shall be done soon in the vegetation lost areas.
- The bridge piles in the river shall be constructed in dry season and the abutments at the two ends of the riversides shall be reinforced to prevent erosion. The abutment reinforcement shall be carried out by titling raw stones from the bottom upward.

- Materials gathering points including earth, stones and sand shall be located appropriately with cover, to protect against spilling over into the water flow in rains.

During construction, occurrence of erosion at excavating and embanking areas is unavoidable. Mitigation measures are presented above. The followings are measures to mitigate the impacts of erosion and alluvium to an acceptable extent:

- The construction works shall be planned in a way that enables a minimum area of excavating or embanking surface happening during the rainy season (from May to October). In case the talus excavation or foundation embankment shall be done during rainy season or in a rain, the surface of the excavated talus shall be covered with oilpapers or other similar materials.
- The checking of the overflow of mud in the rain shall be taken extra caution. In case the mud flow exceeds the limit of control, the earthwork shall be temporarily stopped for more mitigation measures. The earthwork shall only be continued after necessary measures are applied and under the monitoring of the Supervision consultant;
- The excavated or embanked surface shall be solidly rammed and reinforced with concrete right afterwards, then with grass as designed to prevent erosion due to rains;
- The materials gathering site with a volume bigger than 20m<sup>3</sup> shall be covered with oilpaper or other similar materials during the rainy time;

- There shall not be any temporary alluvium of mud, excavated earth from the riverbed, near the pools or lake, especially for rainy season;
- Water overflow shall be prevented away from the construction site by draining it out of the construction site into the selected locations. Materials including straw entangles or geotechnical cloth shall be used as mud proof at the foot of the talus. The materials used for this purpose shall be checked and maintained every month and the alluvium mud shall be collected, especially after long-lasting rains. Mud or sandstones shall be collected and disposed at proper places, to prevent spillages under the instructions of the Supervision consultant;

➤ *Calamity Prevention*

The probability of calamity in the project site is very high. The project activity can result in more frequent occurrence of calamity and at higher intensity. Calamity prevention is the most effective mitigation measure for natural calamities. The following measures shall be applied:

- Increase technical and labor safety: Workers shall be well informed about technical safety regulations and reminded regularly. Rewards and penalties shall be strictly applied for compliance with safety regulations and disciplines, machines and equipment shall be checked for safety.

- Prevention of floods: the project site is located in the region of heavy rains; therefore, flood prevention shall be taken extra caution during the construction. The workers' camps, materials stores, power stations, parking lots... shall be located at high and dry places for prevention of floods and flood flows passing by. When flood occurs (heavy rains, water rises fast), quickly leave the place, firstly move out all fuel and oil, chemicals and then the machines and equipment. There shall be detailed plans to respond to floods, such as: prepare an advanced place for evacuating people, properties, materials and goods in case of flood. Regularly update the weather forecasts; contact emergency rescue agencies, collaborate with local authorities. The foregoing contents shall be acknowledged in the contracts with contractors and supervision consultants to assure the effectiveness of the calamity prevention and control.

*Additional recommended measures*

- Proper grading practices and water diversion structures

**8.2.6 Impact on Hydrology**

Impacts on the hydrological regime in the project site are due to interference into the natural flow which lessens the stability of banks and makes materials penetrate into the flow or prevents the flow which results in a risk of strong flood in the narrow basin.

Mitigation measure

The following measures shall be taken:

\* *Selection of design alternative*

Design alternatives have been calculated with the worst hydrological regimes. The slope is made gentle, benching and stable by protective works. The overflowed speed is minimized by means of structures having a proper drainage level elevation.

\* *Disaster prevention*

At the areas where a disaster factor is high, flood effect can occur with a high frequency and at all the locations where the flow runs across the road. Therefore, a special attention will be paid to protecting bridge abutments. At the necessary areas, abutment protection is required to avoid perpendicularly direct impact of the flow current on the bridge abutment. During the process of design and construction, further calculation shall be made for a seismic parameter to increase a safety factor for the works.

The following measures shall be taken by the Contractor under the supervision of the Construction Supervision Consultant:

- Not to excavate abutments and piers in the flood season. Items of work constructed under water shall be completed quickly to avoid a long interference in the waterways.
- The removal of herbage covering layer will not be carried out in the flood season. After constructing, such vegetation shall be reinstated by means of proper and proactive measures.
- Due to the flow at the area of constructing bridge and culvert having big velocity, dissipative materials will be placed upstream to prevent scouring for the construction area.
- Occupying dyke for the working platform shall not exceed 1/3 of the flow section. Upon the construction, the occupying dyke and temporary structures in the occupying dyke shall be completely removed.

Additional recommended measures

-The construction bridge's pile/abutment will be one by one so the impact on hydrology will be minimized

**8.2.7 Global Warming**

During bridge construction, equipment and transportation contaminate air environment. Exhaust fumes of these transport vehicles come from fuels. Fuel consumption level (diesel oil) per day is as followings (Table 8.5):

**Table 8.5 Fuel consumption level of construction equipment**

No.	Construction equipment	Unit	Fuel consumption level (kg/day)
1	Bulldozer 100CV	kg/day	48.6
2	Iron wheel Roller 15T	kg/day	46.0
3	Roller 18T	kg/day	47.0
4	Excavator 1m <sup>3</sup>	kg/day	64.4
5	Lorry 10T	kg/day	40.0

(Source: WHO, 1993)

According to WHO, burning 1 ton of diesel will eliminate tonnage of 0.05 kg CO: 2.8 kg, SO<sub>2</sub>: 12.3 kg, NO<sub>2</sub>: 0.24 kg HC and 0.94 kg of TSP dust. After clearing, banking 1m<sup>3</sup> gravelly soil, machines need average consumption of 0,37kg diesel oil. Therefore, banking and transporting of about 1.000.000m<sup>3</sup> gravelly soil needs 370 ton of diesel oil. If transport vehicles consume 49 kg/day each day, tonnage of air pollution substances is (Table 8.6):

**Table 8.6 Air pollutants load in bridge construction process**

No.	Pollutants	Pollution coefficient (kg/ton of oil)	Pollutants load (kg/day)
1	Dust TSP	0.94	17,042
2	CO	0.05	907
3	SO <sub>2</sub>	2.8	50,764
4	NO <sub>2</sub>	12.3	222,999
5	HC	0.24	4,351

The gas generated in the bridge construction activities contribute to global warming. Therefore, measures should be taken to minimize emissions.

#### Mitigation measures

- Not to use too old vehicles and equipment to transport materials and use for construction.
- Not to transport construct material exceed a vehicle' load.
- Maintain regularly construction trucks and equipment to minimize exhausted gases
- To implement technical measures to mitigate the pollution at enterprises such as calculation, adjustment of technological procedures and fuel, installation of partial exhaust gas treatment system like depositing, filtering, absorbing, adsorbing and biochemical disintegration and etc.
- To set up a plan of periodic inspection, maintenance, replacement or renovation of production plants and equipment on time to prevent pollutants and toxic substances from leaking out to the environment
- The operation and management of equipment and plants as well as technological process for the production is one measure to control air environment pollution. To strictly implement an operation regime to accurately quantify raw materials and duly comply with the technological procedures, which will reduce an amount of wastes and facilitate a strict management of source and quantity of wastes.
- Green tree measure applied to mitigate the air environment pollution (CEPT,2008. EIA)

#### Additional recommended measures

No specific recommendation. The same mitigation as air quality can be applied.

### **8.2.8 Impact on Air Quality**

#### **8.2.8.1 Air pollution during ground clearance**

Construction period starts with ground clearance activity. The work includes the house destruction, transport of debris and leveling. The air pollutant source in this period mainly is from the activities relating to transportation of materials, soil and air waste generated from the vehicles, machinery. The volume of waste materials to be transported from the Hanoi-Nha Dau- Kim Lien - Van Dien section will be 95,970m<sup>3</sup> and the volume of soil, stone to be transported from Van Dien - Vinh Quynh - Ngoc Hoi section will be 47,987m<sup>3</sup>, the total volume will be 143,957 m<sup>3</sup>.The volume of waste materials to be transported from the Hanoi-Gia Lam section will be 143,955m<sup>3</sup>

Thus the necessary quantity of lorries to transport the above volume (each lorry will transport about 18m<sup>3</sup>, using diesel fuel) out-in circulation in the project area is presents in Table 8.7

**Table 8.7 Truck flow during ground clearance**

Volume transportation (m <sup>3</sup> )	Flow (Trip/day)	Flow (Trip/year)
- Outside the city: 47,987 (section Van Dien - Vinh Quynh – Ngoc Hoi)	9	2,666
- In the city: 95,970 (section Hanoi-Nha Dau- Kim Lien - Van Dien)	18	5,332
- In the city: 143,955 (section Hanoi - Phung Hung - Long Bien bridge - Gia Lam):)	27	7,998

(Source: modified from CEPT, 2008. EIA)

Note: 1 year = 300 day

Based on WHO's estimation, the lorry using DO oil, Diesel with the loading capacity of 15 tons will emit the dust, CO, SO<sub>2</sub>, NO<sub>2</sub>, VOC pollution load as in Table 8.8

**Table 8.8 Emission of pollutants from a lorry during 1000km distance**

	Road in inner city (Kg/1000km/lorry)	Road outside the city (Kg/1000km/lorry)
Dust TSP	0.9	0.9
CO	6.0	2.9
SO <sub>2</sub>	4.29 S	4.15 S
VOC	2.6	0.8
NO <sub>2</sub>	1.18	1.44

Based on turns of lorries per hour. The pollution load of air pollutants for one hour were calculated in Table 8.9

**Table 8.9 The pollution load of air pollutants for one hour**

Pollutants	Load kg/1000 km.h or kg/km.h (Outside the city, section Van Dien - Vinh Quynh – Ngoc Hoi) (2 turns per hour)	Load kg/1000 km.h or kg/km.h (In the city, section Hanoi - Nha Dau - Kim Lien - Van Dien) (3 turns per hour)	Load kg/1000 km.h or kg/km.h In the city (section Hanoi - Phung Hung - Long Bien bridge - Gia Lam): (4 turns per hour)
Dust TSP	$E_{\text{dust}} = 2 \times 0.9 = 1.8$ or 0.0018	$E_{\text{dust}} = 3 \times 0.9 = 2.7$ or 0.0027	$E_{\text{dust}} = 4 \times 0.9 = 3.6$ or 0.0036
CO	$E_{\text{CO}} = 2 \times 2.9 = 5.8$ or 0.0058	$E_{\text{CO}} = 3 \times 6.0 = 18.0$ or 0.0180	$E_{\text{CO}} = 4 \times 6.0 = 24.0$ or 0.0240
SO <sub>2</sub>	$E_{\text{SO}_2} = 2 \times 4.15\text{S} = 8.3\text{S}$ or 0.0083	$E_{\text{SO}_2} = 3 \times 4.29\text{S} = 12.87\text{S}$ or 0.0129 S	$E_{\text{SO}_2} = 4 \times 4.29\text{S} = 17.16\text{S}$ or 0.0172 S
VOC	$E_{\text{VOC}} = 2 \times 0.8 = 1.6$ or 0.0016	$E_{\text{VOC}} = 3 \times 2.6 = 7.8$ or 0.0780	$E_{\text{VOC}} = 4 \times 2.6 = 10.4$ or 0.0104
NO <sub>2</sub>	$E_{\text{NO}_2} = 2 \times 1.44 = 2.88$ kg or 0.0029	$E_{\text{NO}_2} = 3 \times 1.18 = 3.54$ or 0.0036	$E_{\text{NO}_2} = 4 \times 1.18 = 4.72$ or 0.0072

(Source: modified from CEPT, 2008. EIA)

### 8.2.8.2 Air pollution during construction of facilities

During the project construction, there will be many kinds of vehicles, machinery. In addition, the number of lorries specializing in transporting materials into the site will increase the traffic circulation in the areas. The equipment used for the construction at site will impact the air environment. The sources of air pollutions are:

- Pollution source due to air waste generated from the motor vehicles
- Waste emitted from construction machines and equipment

The traffic pollution level depends much on the quality of the road system, vehicle density, flow of vehicle, quality of vehicle running in the site and the fuel to be consumed. The load of pollutants calculated in the basis "Pollution coefficient" set up by USEPA and WHO as follows (Table 8.10):

**Table 8.10 Pollution load with truck**

1000 km

Air pollutants	Pollution load with loading capacity (kg/1000km)					
	Loading capacity < 3.5 Ton			Loading capacity 3.5 - 16 ton		
	In the town	Outside the town	Expressway	In the town	Outside the town	Expressway
Dust (TSP)	0.2	0.15	0.3	0.9	0.9	0.9
SO <sub>2</sub>	1.16 S	0.84 S	1.3 S	4.29 S	4.15 S	4.15 S
NO <sub>2</sub>	0.7	0.55	1.0	1.18	1.44	1.44
CO	1.0	0.85	1.25	6.0	2.9	2.9
VOC	0.15	0.4	0.4	2.6	0.8	0.8

**Note:** On average, one car consuming 1,000l petrol will generate into the air: 291kg CO, 11.3kg NO<sub>x</sub>; 0.4 kg Aldehyde; 33.2 kg Hydrocarbon (HC); 0.9kg SO<sub>2</sub>; 0.25kg Pb; S is the content of sulfur in petrol, oil (%).

The period of constructing the project items will be divided into 2 phases. The phase 1: from 2010 - 2014 and phase 2: from 2017 – 2020.

In phase 1, the total volume of material, equipment estimated to be transported is 1,150, 000 tons equivalent to 100,000 turns of cars (loading capacity of 3.5 - 15 tons), the circulation standard within the project for 5.5 years. The daily flow of cars within the project estimated 84turns of cars per day or 10 turns of cars per hour. Pollution load in respect of dust, CO, SO<sub>2</sub>, NO<sub>2</sub>, VOC generated from the vehicles within the project site are estimated as for the vehicles running in the city in Table 8.10

In phase 2, the total volume of material, equipment estimated to be transported is 2,250, 000 tons equivalent to 150,000 turns of cars, the circulation standard within the project for 3 years. The daily flow of cars within the project estimated 125turns of cars per day or 16 turns of cars per hour. Pollution load in respect of dust, CO, SO<sub>2</sub>, NO<sub>2</sub>, VOC generated from the vehicles within the project site are estimated in Table 8.11

**Table 8.11 Estimated pollution load during construction phase 1 and 2**

Pollutants	Load kg/1000 km.h or kg/km.h (phase 1) (10 turns per hour)	Load kg/1000 km.h or kg/km.h (Phase 2) (16 turns per hour)
Dust TSP	$E_{\text{dust}} = 10 \times 0.9 = 9$ or 0.009	$E_{\text{dust}} = 16 \times 0.9 = 14.4$ kg or 0.14
CO	$E_{\text{CO}} = 10 \times 6 = 60$ or 0.06	$E_{\text{CO}} = 16 \times 6.0 = 96.0$ or 0.096
SO <sub>2</sub>	$E_{\text{SO}_2} = 10 \times 4.29\text{S} = 42.9\text{S}$ or 0.043 S	$E_{\text{SO}_2} = 16 \times 4.29\text{S} = 68.7\text{S}$ or 0.069 S
VOC	$E_{\text{VOC}} = 10 \times 2.6 = 26.0$ or 0.026	$E_{\text{VOC}} = 16 \times 2.6 = 41.6$ or 0.042
NO <sub>2</sub>	$E_{\text{NO}_2} = 10 \times 1.18 = 11.8$ or 0.012	$E_{\text{NO}_2} = 16 \times 1.18 = 18.9$ or 0.019

(Source: modified from CEPT, 2008. EIA)

During railway line construction, many vehicles, machines and trucks carrying materials at/to construction site. This and many to work will increase output of transport vehicles at the areas.

These vehicles/machines cause main impacts to air environment, such as:

- + High transportation density, which would leads to traffic jam
- + Noise pollution during its construction and vehicles...
- + Pollution due to exhausted gases from vehicles and machines...

The residents living near the project areas (Table 8.12) would be subjected by air pollution, which includes dust, SO<sub>x</sub>, NO<sub>x</sub>, CO, CO<sub>2</sub>, HC ect.

**Table 8.12 Affected groups by Air contamination**

Sections	Description	Use land	Distance to edge of line road (m)	Distance to axis of railway (m)	Note
Ha Noi - Ngoc Hoi					
Ha Noi - Nha Dau	residential area	residential	1-2	7-8	inner City
Nha Dau – Kim Lien	Residential area	residential	1-2	7-8	inner City
Kim Lien – Van Dien	Residential Area, school, hospital	residential, office	1-2	7-8	inner City
Van Dien – Ngoc Hoi	Field	Rice field	10	16	suburban area
Ha Noi – Gia Lam					
Ha Noi - Gia Lam	Residential area	Residential	2-4	8-10	inner City

- *Calculation of dust amount*

The average concentration of TSP dust at any points at Hanoi- Ngoc Hoi is calculated by the Sutton calculating formula as followings:

$$C = \frac{0,8E \cdot \left\{ \exp \left[ \frac{-(z+h)^2}{2\sigma_z^2} \right] + \exp \left[ \frac{-(z-h)^2}{2\sigma_z^2} \right] \right\}}{\sigma_z \cdot u} \quad (\text{mg/m}^3)$$

In which:

C – Concentration of pollution substances in air (mg/m<sup>3</sup>)

E – Amount of pollution substances from waste source (mg/m<sup>3</sup>)

z – Height of calculated points (m).

h – Height of road surface compared with surrounding ground surface (m)

u – Average speed of wind at area (m/s)

Oz – Diffuse coefficient of pollution substances along z way (m)

Numeric value of diffusion coefficient of pollution substance  $\sigma_z$  along horizontal way (z) with stable level of atmosphere is B, which will be defined at the following formula:

$$\sigma_z = 0,53 \times 0,73 \quad (\text{m})$$

In which:

x – Distance between calculated point and waste source, following wind flow, m.

The Metrological data for calculation of total solid particulate (TSP) or dust are presented in Table 8.13



**Table 8.13 Metrological data for calculation**

Area	Summer				Winter			
	Wind Direction	Mean wind velocity (m/s)	TO	Stable lever of atmosphere	Wind Direction	Mean wind velocity (m/s)	TO	Stable lever of atmosphere
Ha Noi	SE	1.4m/s	29.7°C	B	SE	1.5m/s	16.2°C	B

(Source: CEPT, 2008. EIA)

- Phase 1

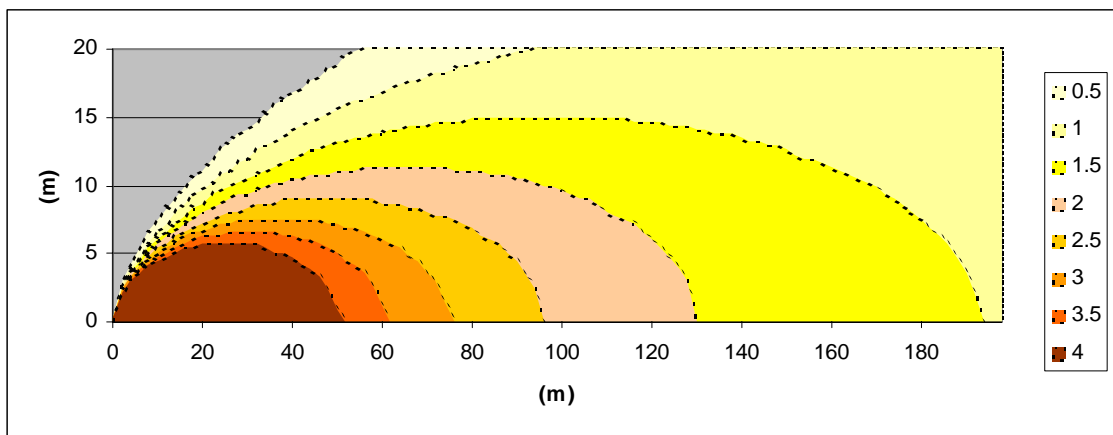
Figure source to forecast dust pollution during period 1 will be said in Table 8.14as followings

**Table 8.14 Data for dust distribution calculation for phase 1**

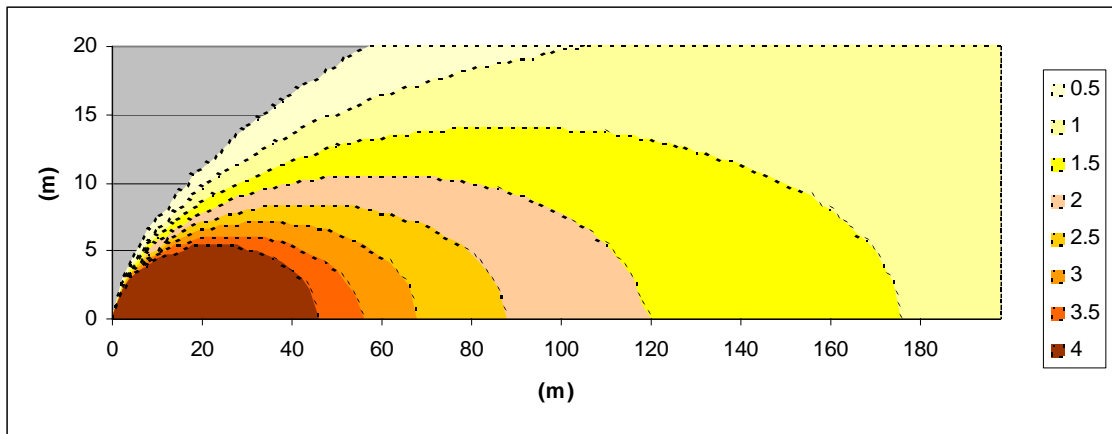
ETSP (mg/ms)	Z (m)	h (m)	X1 (m)	X2 (m)	X3 (m)	X4 (m)	X5 (m)	X6 (m)	X7 (m)	X8 (m)	X9 (m)
32.4	1	0.3	20	40	60	80	100	120	140	160	180

(Source: CEPT, 2008. EIA)

Average concentration of road surface dust caused by transport vehicles in summer at 50m away from the center of the road and 45m in winter is 0,4 mg/m<sup>3</sup>, which is more than 2 times over allowed limit according to regulation of QCVN05-2009 BTNMT on day average (Figure 8.2 and 8.3).



**Figure 8.2 Distribute TSP (dust) in summer - phase 1**



**Figure 8.3 Distribute TSP (dust) in winter - Phase 1**

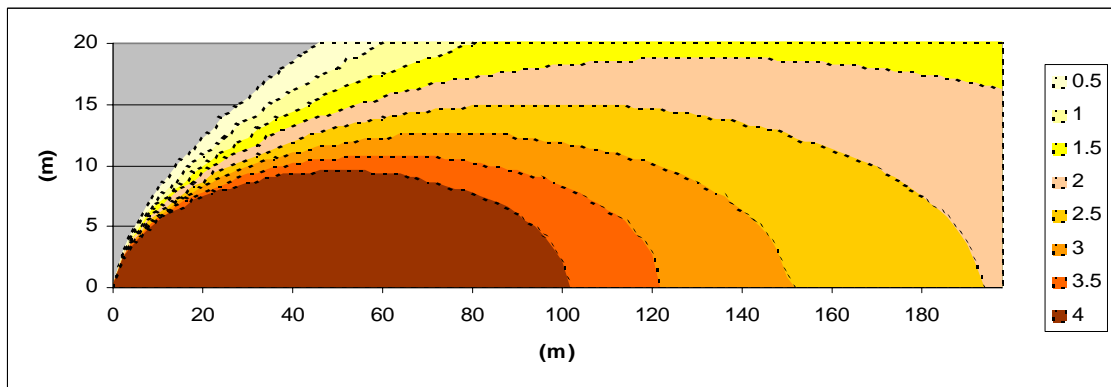
- Phase 2

Figure source to forecast dust pollution of 1 period construction will be presented in Table 8.15 as followings:

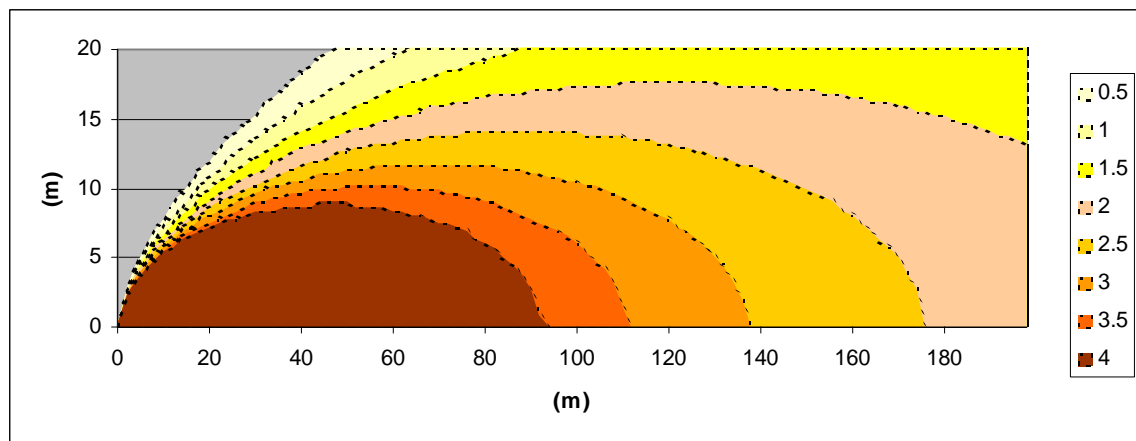
**Table 8.15 Data for calculation of dust distribution for phase 2**

ETSP (mg/ms)	Z (m)	h (m)	X1 (m)	X2 (m)	X3 (m)	X4 (m)	X5 (m)	X6 (m)	X7 (m)	X8 (m)	X9 (m)
54.0	1	0.3	20	40	60	80	100	120	140	160	180

The result showing that the average concentration of road surface caused by transport vehicles in summer at 100m away from heart of road and 90m in winter is 0,4 mg/m<sup>3</sup>, which is 2 times over allowed limit according to regulation of QCVN 05-2009-BTNMT on day average (Figure 8.4 and 8.5).



**Figure 8.4 Distribute TSP (dust) in summer -phase 2**



**Figure 8.5 Distribute TSP (dust) in winter –phase 2**

### Mitigation measures

During the process of construction, the following applicable measures will contribute to mitigating dust and air quality pollution to the surrounding environment:

- The project shall not choose material mobilization sites or production points in sensitive areas (e.g. near the source of water).
- During the construction period, dust will be controlled by watering the surface around the site and the road used for transporting at least 3 times per day. Concrete mixing will be carried out at isolated areas. In any case, the construction site shall be cleaned and kept in the natural state upon completion of the work.
- Measures required to control dust pollution during the process of construction include watering on road sections, covering construction material trucks with canvas and transporting loose cement by means of specialized tank truck.
- Designate a soil transportation road, stipulate the departure time for soil and sand trucks and focus on mitigating dust pollution for these key roads by watering every 2 hours by a sprinkler. In case of high winds, construction activities on the ground and transportation of materials shall be halted to prevent dust from dispersing.
- Satisfactorily make a plan of soil excavation and transportation, to select proper transportation routes and proper types of means of transport.
- Before going out of the construction site, wheels of all construction and transport equipment shall be washed to restrict the taking-out of soil with vehicles.
- To use proper transportation measures such as use of conveyor belt, use of cover plates of 3 m in height around the works. To sprinkle with water on the construction site, form a space between the site and surrounding residential area which will be the buffer zone for the most effective mitigation of impacts. For the workers in work, wear comforters and protective glasses.
- Pay attention to the wind direction to avoid sandy dust's flowing to residential areas.
- Not to burn waste outdoors, not to burn tires and other rubber products in the city.
- For the construction equipment and plants on site causing dust which affects the health of laborers, harm to the surrounding environment and assets, the Contractor shall take necessary preventive measures such as construction zoning, regular watering and etc.

Concrete mixers do not cause dust with concentration more than 50 mg/m<sup>3</sup>. Backward and old construction equipment and plants which can pollute the regional environment shall not be used.

- For the waste water drainage sewerage line, dredging of mud, demolition and removal during the construction, tank trucks shall be used for transporting waste mud not to be spilled and obstruct mud and sediment. The routes used for transporting mud and sediment shall be watered and swept on a regular or transport cycle basis. Dredging and transporting at peak hours shall be restricted.

- During the construction time, traffic and working activities on the construction site will be made sure safety for laborers and limit accidents. Workers receive trainings on labor safety on site. Training on first aid is given to workers and medical stations shall be arranged near the construction site.

The application of these dust and air pollution mitigation measures is appropriate and compliant with “regulation on the implementation of dust mitigation measures in the construction aspect in the area of Hanoi” issued with Decision No. 02/2005/QD-UB dated 10/01/2005 by Hanoi People’s Committee.

Additional recommended measures

- Cover or make fence around exposed stockpiles and material and use them as soon as possible.

**8.2.9 Impact on Water Quality**

**8.2.9.1 Runoff water during construction activities**

As of early 2008 when the EIA report of HURC-1 project approved, the flood situation in the city of Hanoi has happened but in the mean level. However, after the rains at the end of 2008, the perception of City people and leaders was basically changed. The prolonged and regular flooding situation is becoming very serious. This will affect the construction activities very much, results in major changes are such as:

- Level of risk warnings in the construction will be higher than before.
- The impacts of flooding during the construction and operation will be at more dangerous level.
- The construction methods will be recalculated in accordance with current construction conditions and spared in case of heavy rains in the higher levels.
- The task of ensure safety for workers and construction machinery will be calculated to suit the present time.

Southern segment of the project from Ha Noi Station to Ngoc Hoi Station goes through west area of Hanoi. Thus, when heavy rains happen, the flood status of this region occurs regularly with the severity is higher than other areas.

During construction of bridges of the project, impacts to water environment mainly are domestic wastewater of workers, water to cool machines, equipments and rain-water overflowing though area of project. These waste output contains mud and residue causing river pollution.

However, pollution level and quality of surface rolling-water can be controlled by legal organization and management.

During bridge piles foundation construction, staking work and cram stake drilling do not avoid penetration of surface water into underground layer. In case of cement staking work, compress pressure into entrails of the earth during staking work will have capability of penetrating water into underground water source. Cram drilling stake is formed by deep drilling into ground making empty holes with diameter bigger than drilling stake diameter. At weak ground intensity, while drilling there is a need of covering additives substances and intensifying surface degree at drilling area which will reduce penetration of surface water into underground water, but pollute river because of additives substances.

Before cram stake cement spilling, penetration between surface water and underground water is highest. The followings are covering period of pillar bottom, steel rod installment, stone pour and cement mortar spraying. At this period, underground water source can be covered by cement mortar or polluted by plastic additive substances, freeze additive substances in cement mortar. Poor management of these additive substances will significantly pollute rivers.

#### Mitigation measures

Through the contract and supervision activities, the Employer will request the Contractors to take a full of measures in constructing the waterway-crossing works:

- Location of mobilizing and placing construction equipment will be arranged far from the flow so that waste or leaked oil and lubricant will not penetrate in the water source;
- A temporary water guiding system around the construction area of bridge abutment and culverts will be provided to prevent the flood situation when heavy rain leads waste to the construction site and from the site to the flow;
- Elevations of placing petrol tanks shall be higher than the flood water level of  $P=1\%$ ; Warning signs shall be installed at such locations to avoid collision;
- Waterway means in constructing piers in the river current will be equipped with surrounding floats to avoid oil-overflowing. Leaked oil will be collected and transported to the dumping site under the supervision of the Supervision Engineer after obtaining approval of the dumping site with the local authority so as not to pollute the source of run-off and underground water.
- To prevent from penetrating concrete mortar, oil-bearing waste into the flow: concrete waste which is not reused, concrete mortar, oil-bearing waste will be collected, classified and transported out of the construction site and dumped at the given location and as instructed under the control of the Supervision Engineer on the dumping site with the local authority so as not to pollute sources of water.
- Due to mud and soil discharged from cast-in-place bored piles, construction activities of bridge and culvert without toxic substances, they can be used for other proper purposes. They will be used to level for a plan at the locations specified on land under the instruction of the Supervision Engineer after reaching agreement with the local authority;
- Waste overflowing water like vehicle-washing water, waste water from concrete mixing plants, washing materials and etc. shall be guided into a temporary channel to the given holes. After depositing, clear water can be discharged into the surrounding ground area, deposit will be collected and poured as instructed by the Supervision Engineer after reaching agreement with the local authority;

- Gas, lubricant and other fuels used for means, equipment shall be kept carefully to avoid oil spill, at the same time it must have regulations on safety;
- Every occurrence of fuel overflow will be promptly treated by collecting. Soil with oil will be transported out of the construction site to the dumping site as instructed by the Supervision Engineer after reaching agreement with the local authority;
- The construction of cast-in-place bored piles will be completed in due accordance with design sequence in order that waste water cannot flow into the bored piles;
- When using the construction technology is the bored pile in water, the natural water will be mixed with beton after plastering casing to create a solution and reversely a water volume. To mitigate this impact, the project will use deposit tanks. Such tanks bring about not only effect of protecting the source of water but also rotating beton solution. After depositing, the clear water will let reverse-flow into the current of water. Upon completion of construction of bridge pier and collection of beton, these tanks will be filled at-grade and strengthened against scouring;
- The river will be cleared and reinstated upon the completion of construction, i.e, withdrawing the sheet piles driven during the construction of bridge and lifting superfluous concrete blocks.

*Additional recommended measures*

- Storage areas to be prepared to avoid runoff of materials.
- Fuel should be stored in properly sealed containers.
- All fuel storage areas to be securely fenced and provided with oil and water separators. Fuel houses and shut off valve to be locked.
- All refueling to be done at least 20 m away from waterways by trained personnel.
- All waste oil and oil filters to be collected and if possible recycled, otherwise to be disposed of to landfills.
- The contractor is to have developed an accidental spill handling action plan.

**8.2.9.2 Wastewater**

During the construction period of the project, the wastewater generated mainly from the process of concrete curing activities, cooling machinery, equipment and activities by the construction workers at site.

There are two sources of wastewater:

*a. Domestic wastewater generated by construction workers*

The wastewater mainly contains residue, suspended solid (SS), organic substances (BOD/COD), nutrient substances (N,P) and the microorganism. Table 8.16 shows the pollution load of waste substances discharged into the environment by one person (excludes liquid portion) and one construction unit (about 100 workers) during the construction of one main work of the project like national station, viaduct, overpass

**Table 8.16 Pollutants load in domestic waste water of 1and 100 persons per day**

Pollutants	Pollution load (g/person. day)	Load (kg/day) (for 100 persons)
BOD <sub>5</sub>	45 - 54	4.5 - 5.4
COD	72 - 102	7.2 - 10.2
SS	70 - 145	7.0 - 14.5
ΣN	6 - 12	0.6 - 1.2
ΣP	0.8 - 4.0	0.08 - 0.40
Total Coliform (MPN/100ml)	106 - 109	
Feacal Coliform (MPN/100ml)	105 - 106	

(Source CEPT,2008.EIA)

During the construction period of the project, the domestic wastewater is generated by the construction workers at site. When expanding the Ngoc Hoi station complex together with the construction of more works will increase the work volume. The number of construction workers involved more with the extended time will make the total pollution load in wastewater in general and domestic wastewater of workers in particular to be increased. Subjects affected by sewage pollution is that the ponds, canals around the area of Ngoc Hoi station, Gia Lam station, and Ba Mau Lake. The domestic waste water eliminated from workers activity has concentration of BOD to be higher than allowable limit 2.2 to 2.6 times, TSS value is higher than allowable limit 2.2 - 4.6 times (Supplementary EIA 2011)

*b. Pollution source from construction wastewater*

The construction wastewater is generated from washing material, machinery, equipment, concrete curing with the high level of suspended and organic substances will pollute the receiving source within the area (Table 8.17).

**Table 8.17 Concentration of pollutants in construction wastewater**

No.	Parameters	Unit	Construction wastewater	of	Standard: QCVN08-2008 (B)
1	pH	-	6.99		5.5 - 9
2	SS	mg/l	663.0		100
3	COD	mg/l	640.9		80
4	BOD <sub>5</sub>	mg/l	429.26		50
5	NH <sub>4</sub> <sup>+</sup>	mg/l	9.6		10
6	Σ N	mg/l	49.27		30
7	Σ P	mg/l	4.25		6
8	Fe	mg/l	0.72		5
9	Zn	mg/l	0.004		3
10	Pb	mg/l	0.055		0.5
11	As	µg/l	0.305		0.1
12	Oil, grease	mg/l	0.02		5
13	Coliform	MPN/100ml	53x10 <sup>4</sup>		5000

(Source: Centre Urban Environmental Technology and Industrial Area– CEETIA)

Waste water arised from construction process such as washing water, sanitary water for construction machinery have concentration of suspended matter which is larger than the allowable limit 6.6 times, COD concentration is greater than allowable limit 6.4 times and BOD<sub>5</sub> concentration greater than allowable limit 8.6 times. This causes pollution of rivers and lakes in the project area (Supplementary EIA 2011)

#### Mitigation measures

- *For domestic wastewater*

Domestic wastewater needs to be collected to movable toilet on site.

- *For construction water*

Within the project, to maintain the run-off water from construction site to not degrade the water quality, the project will focus on minimizing negative impacts from 3 main activities as follows:

- (i) Road construction activity; (ii) Station facilities construction activities and (iii) Bridges construction activities;

During the process of construction, scouring and sediment under the influence of rain water at the construction site is unavoidable. To prevent or minimize suspended solids, drifts and lubricant & oil from penetrating into the flow and reduce sediment in the water overflowing to the flow when the construction is carried out near rivers, reservoirs, lakes, ponds, the following mitigation measures shall be applied:

- Waste stone and soil shall not be discharged into the flow. They will be stored for using for subsequent consolidation activities.

- Prevent overflow with high suspended content to minimize the sedimentation by the following measures:

- + The overflowing current of water containing sediment will be concentrated in temporary side ditches or sedimentation tank in the construction site before draining off to the general drainage culvert.

- + Setting up of temporary mudguard: A temporary mudguard acts as a filtering membrane through which water penetrates after retaining mud. Such temporary mudguard will be placed at side ditches along the construction road sections through sensitive sources of water. The mudguard will be checked and serviced to ensure good operation. Upon completion of construction of such item of work, deposit will be transported to dumping site under the supervision of the Supervision Consultant.

This will ensure the effective implementation of water environment pollution mitigation measures during the process of the construction by the Contractors. The application of the aforesaid mitigation measures will enable sources of water surrounding the project site not to be polluted during the construction and ensure the quality of water sources within the allowable limits.

#### Additional recommended measure

- The contractor should provide means for disposing of wastewater from toilets, baths and food preparation areas either through a septic tank and soak away, or holding tank with removal by vacuum truck.

- Maintain good drainage system at the worker camp to avoid creating of stagnant water, where mosquito can breed



### **8.2.10 Subsidence**

Because geology of the line lies in low stable land of organic mud pocket and sediment, depression is at high risk. It can harm seriously to surrounding buildings.

Bridge piles construction can affect surrounding buildings. Land depression of some centimes can crack surrounding works and deform walls.

The Ngoc Hoi Complex site lies on swamp and soft ground. Therefore, a significant ground improvement as a soft soil measure method must be completed prior to mobilization of the contractor selected for the construction of the depot facilities. In addition, the construction of various Ngoc Hoi Complex facilities and structures will cause further local differential settlements, which must be strictly limited to acceptable levels.

#### Mitigation measure

Methods to prevent land depression will be carried out by technical measures which are subjective to reality and observation activities to define impact level.

The examined soft soil improvement as measures method applied for the study area as follows.

- PVD with Preload method
- Vacuum Preloading Method
- Low-Improvement-Ratio Cement-Soil Mixing Method
- PCC Method
- Sheet Pile and Low Displacement Cement-Soil Mixing Method
- Cement-Soil Mixing Method

According to the settlement analysis result, it is judged that some settlement measures method shall be applied to the north area of Ngoc Hoi depot. In this area, soft soil is deposited with thickness of more than 30m as same as soil conditions at north side of Ngoc Hoi Complex. Therefore, Low-improvement-ratio cement-soil mixing method that is applied to north side of Ngoc Hoi Complex is applied to the area.

According to the settlement analysis result, it is judged that some settlement measures method shall be applied to the south area Ngoc Hoi depot. In this area, soft soil is thinly deposited. Therefore, PVD with Preload method is applied to south side of Ngoc Hoi Complex.

#### Additional recommended measure

- Develop a plan and method to monitor subsidence in the surrounding areas of bridge piles construction

### **8.2.11 Waste**

#### **8.2.11.1 Solid Waste**

Solid wastes during the constructions which are from soil and ground clearance, foundation work as brick, stone, cement, steel and wood, paper...and from construction work and work completion, machine installment, equipment and life waste of workers. Some of them can be used for other targets, while solid waste is collected and transported to city's optioned dumping ground. Number of these small will cause little impact when project come into operation.

The volume of waste materials to be transported from the Hanoi-Nha Dau- Kim Lien - Van Dien section will be 95,970m<sup>3</sup> and the volume of soil, stone to be transported from Van Dien - Vinh Quynh - Ngoc Hoi section will be 47,987m<sup>3</sup>, the total volume will be 143,957.

*Hanoi to Gia Lam section.* During the ground clearance period of this section, the volume of waste materials to be transported from the Hanoi-Gia Lam section will be 143,955m<sup>3</sup>.

*Ngoc Hoi complex expansion:* solid wastes come from national stations and activities of the factories, solid wastes amount in 2015 is 56.132 kg/day and in 2020 112.264 kg/day (source EIA 2008). Because of Ngoc Hoi station expansion, the amount of solid waste generated from the construction vehicle and transportation of raw materials will increase. However, construction time should be longer so the pollution intensity will not change much. Impacts caused by transport of building-up soil and sand: The quantity of waste soil, embankment soil and sand is increased. They are transported by 10 tons-truck. Number of trucks used to transport this material amount is expected as follows:

- Waste soil: 41,000 turn of truck
- Embankment soil: 52,000 turn of truck
- Embankment sand: 220,000 turn of truck

As optioned, embankment soil amount will be excavated at Tien Xuan and Mat Rong mines (Thach That) 52km away from Ngoc Hoi Station; sand will be transported from Van Phuc and Hong Van mines at 13km away from Ngoc Hoi Station; waste soil will be thrown at suburb at average distance of 5km. Consultant proposed some discharge locations in Yen My, Ngoc Khanh Joint Stock Company (in Yen My commune) and Dumping ground X15 in Duc Tu commune, Dong Anh district and ongoing licensing approval.

#### Mitigation measures

During the construction, it will produce many solid wastes like iron, steel waste, wood, debris, sacks, bottle and etc. These wastes will obstruct the construction, traffic and result in unsafely during the construction. To mitigate impacts, the following measures shall be taken during the process of construction:

- To minimize wastes produced in construction by appropriately calculating materials, educating and rising workers' awareness on saving as well as tightening the management and supervision of the works.
- Debris substances like broken brick, superfluous sand and soil which can be utilized for the leveling.
- Such waste which can be recycled or reused as cement empty bag, bottle, superfluous pieces of iron and steel and etc. shall be collected, classified and transported to the designated site of the city.
- To minimize impacts of the domestic waste produced during the construction period, the following measures shall be taken:
  - + Not to organize collective kitchens in the project area. That's why, to minimize domestic waste water and domestic solid waste produced at the project area.
  - + The domestic solid waste produced at the project area shall be collected and stored in proper bins. A contract shall be made with Hanoi Urban Environment Company for the daily collection and transportation to the treatment place.

+ The domestic solid waste produced at the construction site is about 30kg/day on maximum (equivalent to about 0,15 m<sup>3</sup>/day). Therefore, one bin with capacity of 200 litres shall be provided for each unit at the project site during the construction period.

+ The domestic solid waste shall not be buried or burnt at the site.

+ Movable toilets shall be sufficiently provided for the requirement of workers at the project area. One movable toilet shall be provided for each unit during the construction period.

+Treat human's waste, the Contractor is requested to provide temporary toilets at each site. Such toilets will be provided at least 100m away from the source of water. Their bottoms shall be placed at least 1m away from penetrated soil layer. For the sections to be constructed in the city, movable toilets will be provided.

#### **8.2.11.2 Lubricant waste (oil grease) and hazardous waste**

Waste lubricant and hazardous can be produced during the construction period. These kinds of waste can have severe impact on workers' health as well as on surrounding environment.

##### Mitigation measures

- Minimize repair of construction plants and equipment at the project area. Maintenance area will be temporarily arranged with a waste lubricant collection system from the maintenance work of such construction vehicles.

- The waste lubricant produced at the project area shall not be filled or buried and collected into proper bins placed in the project area.

- A total waste lubricant produced at the construction site is about 100 liters/ day. Therefore, one lubricant bin with capacity of 150 liters shall be provided for each unit at the project site during the construction period. A contract shall be made with Hanoi Urban Environment Company for the transportation and treatment of such lubricant.

- The contractors shall ensure that all hazardous waste is stored and preserved in accordance with the nature of each chemical substance such as flammable temperature, melting point, boiling point. To avoid these substances react with each other, each type of hazardous waste should be isolated by the appropriate bins. In particular, when conducting storage and preservation of flammable explosives, contractors need to install fire prevention systems in storage areas using solid concrete blocks, plasterboard or other fire resistant materials. Contractors will provide and install additional fire resistant equipment at the locations of preservation.

- Conducting training and assignment of responsibilities for each individual in the management and control of wastes and hazardous materials. Areas of storage and preservation need to be strictly protected.

- Closely monitoring the dumping of waste liquids used as solvents for the foundation and pier drilling (the place of storing the waste should be approved by local authorities).

- Inventory chemical substances: The Contractor shall prepare inventory report of chemical components in building materials, the safety data table of the raw materials such as oil and grease solvent. When there are large fluctuations occurring in the construction process, the inventory will be updated monthly.

- Conducting training and assignment of responsibilities for each individual in the management and control of chemicals. Areas of storage and preservation need to be strictly protected.

Additional recommended measure

No additional recommendation

**8.2.12 Noise and Vibration**

**8.2.12.1 Noise**

During the construction within the project, the noise is generated mainly from the machinery, transportation vehicle working at site and from the slash among the machinery, equipment, metal material, and concrete pillar presser. The noise level from this equipment is shown in 8.18.

**Table 8.18 Noise level from construction equipment, machines**

No	Construction equipment	Noise level at distance 1.5m
1	Bulldozer	93
2	Excavator	93
3	Borer	87
4	Compressor	87
5	Power-saw	82
6	Pile driver 1.5 ton	75
7	Concrete mixer machine	88
8	Concrete pumping machine	84
9	Tamper	76
10	Welding machine	72
11	Rail distributive machine	88
12	Lorry	83
13	Forklift truck	72
14	Crane	75
TCTT 1983 (QCVN 26-2010)		90 (70)

Note: TCTT 1983:Noise standard for productive area

*(Source: USA committee for the protection of environment. Noise from construction equipment, machines NJID, 300.1, 31–12–1971)*

Thus, the noise from the vehicle transporting material and machinery, equipment at site will be the main source badly affecting the environment during the construction.

During railway line construction, noises are mainly caused by machines, transport vehicles, and strike between equipment, metal materials, hammers to drive in a stake. Spread of noises to surroundings is defined as followings:

$$L_i = L_p - \Delta L_d - \Delta L_c \quad (\text{dBA})$$

Legend:

$L_i$  – Noise level at calculated point from  $d$  distance from source noise (m)

$L_p$  – Noises level measured at source of noise (at distance of 1,5m)

$\Delta L_d$  - Reduction of noise level concerning  $d$  distance at  $i$  frequency

$$\Delta L_d = 20 \lg [(r_2/r_1)^{1+a}] \quad (\text{dBA})$$

$r_1$  – Distance to source of noise correlatively with  $L_p$  (m).

$r_2$  – Calculated distance of noise reduction concerning distance correlatively with  $L_i$  (m)

$a$  – coefficient affecting to noise absorbent of ground terrain ( $a=0$ )

$\Delta L_c$ - Noise reduction through obstructer at project area  $\Delta L_c = 0$

From the above formula, noise level calculation of equipment to surrounding environment at distance of 50m and 100m is presented in Table 8.19

**Table 8.19 Calculated noise level from construction equipment, machines (dBA)**

No.	Construction equipment, machines	Noise level at distance 1.5m	Noise level at distance 50m	Noise level at distance 100m
1	Bulldozer	93	78	68
2	Driller	87	72	62
3	Compressor	80	65	55
4	Pile driver 1.5T	75	60	50
5	Concrete-mixer machine	75	60	50
TCTT 1983 (QCVN 26-2010)		90	(70)	(70)

In the above table, TCTT 1983 is noise standard of production area and QCVN 26-2010 is noise standard of residential area. The result showing that noise from transportations and machines do not ensure allowed limit of construction area and residential area of less than 50m, but is in allowed limit of residential area of more than 100m according to regulation of QCVN 26-2010.

During bridges construction, noises mainly come from machines, transport vehicles and hammers. The calculation result is presented in Table 8.20

**Table 8.20 Calculated noise level from bridge construction equipment (dBA)**

No	Construction equipment	Noise level at distance 1.5m	Noise level at distance 30m	Noise level at distance 60m	Noise level at distance 90m	Noise level at distance 120m
1	Bulldozer	93	89	83	77	71
2	Pneumatic hammer	97	93	87	81	75
3	Crane	93	90	84	78	72
4	Pile drive	98	92	86	80	78
5	Concrete-mixer	84	78	72	66	64
6	Tamper	74	68	62	56	54
TCTT 1983 (QCVN 26-2010)		90	(70)	(70)	(70)	(70)

Noises from machines, equipment do not ensure allowed limit of construction area and residential area of less than 120m, but is in allowed limit of residential area of more than 120m according to regulation of QCVN 26-2010

The cement mixture station is will be located in Giap Bat and Ngoc Hoi station. Its operation will cause impacts to surroundings.

Maximum noise level about 15m is 90 dBA at cement mixture station, at other distances can be defined by rule 6 dBA reduction at a distance of 2 times. Therefore, noise level is 84 dBA at 30m, 78 dBA at 60m, 72 dBA at 120m. The acceptable noise limit level does not exceed 70 dBA during 24 hours. In case of all day operation, cement mixture area must be far away effected objectives (like residential area). At sensitive area noise level is calculated similarly, 240m is minimum distance to reduce it up to 68 dBA.

The above noise level calculation is based on materials. In case construction unit use modern equipment, the distance can be shorter. For example, cement mixture machines according to GSA standard (United State geology association) only cause noise level of 75 dBA at 15m and 63 dBA at 60m.

#### Mitigation measures

The methods to be applied to mitigate number of sources and impact level of noise during construction period are as follows:

- To control time and activities: When the construction is conducted near the school, hospital or residence areas, the project manager will request contractor use construction means with low level of noise. The working time will be arranged so that the impact of noise will be minimized. Working time will be approved by a consultant who supervises construction
- Use equipment and apply measures of making noise at a low level: The Employer encourages the Contractor to use low-leveled noise equipment. E.g. near the school area instead of using big bulldozer with a noise level of 93dBA, the bulldozer with noise level of 83dBA will be used for the project. The effective reduction of noise level at source depends on a construction method selected by the Contractor. Mitigation of the noise level at source is carried out by applying construction methods which select equipment and plants with the lowest max noise for each specific item of work.
- Control the arrangement of noise equipment: Calculating to place noise equipment stably or near stably, if possible, such as the generator placed far from the school. In case such selected locations are not feasible, movable temporary anti-noise walls with height from 2 to 3 m having wheels shall be placed far several meters for the fixed equipment and 5m for the movable equipment. With the anti-noise retaining plate, the source noise level may reduce 12dBA on average. Depending on the noise level of equipment and distance to the receipt position, the Supervision Engineer will request the Contractor to select an optimum alternative on the location of placing equipment or use of temporary anti-noise plate so that the noise level is smallest.
- Restrict the concurrent operation of noise equipment: the Employer encourages the Contractor to properly arrange its time and construction activities to restrict the simultaneous happening of noise activities to reduce a total noise level. Within the possible limit, if not affecting much to the construction progress, a number of plants and equipment which operate at the same time shall be limited in constructing near the school.
- Comply with construction specification: The strict compliance with the construction specifications at the places and times perhaps will significantly reduce noise during the construction and reduce costs even will not need additional costs, i.e. only operating equipment well-maintained on site; providing maintenance for equipment during the construction period; using and maintaining mufflers and noise-proof devices; switching off

equipment which operate interruptedly if deemed unnecessary to reduce the noise level accumulated at the lowest level.

-Supervise noise pollution in construction: it is a part of construction supervision. The supervision shall be required not only at the areas where equipment make noise at a high level as mentioned above but also at the school campus during the construction period.

The above mitigation measures shall be stated in the contract. This will ensure the effective implementation of noise pollution mitigation measures in the process of the construction by the Contractors. The application of the aforesaid noise and vibration mitigation measures will allow the noise and vibration environment at the project site within the allowable limits of QCVN 26:2010/BTNMT and QCVN 27:2010/BTNMT.

*For sensitive receivers*

- In case the aforesaid noise pollution mitigation measures do not achieve high efficiency for the residential areas, especially at schools, hospital, temporary anti-noise wall shall be used in the project. Such anti-noise wall can be erected in front of any sensitive object or surrounding the noise equipment.

- Due to a big volume of work to be performed under the route-formed project, it is very difficult to provide a series of temporary reverberant walls for all of residential areas, except for areas with availability of sensitive objects against noise. In case the noise in construction at any time exceeds the permissible limit in accordance with regulations of QCVN 26:2010/BTNMT, the Employer will take the initiative in working with People's Committees in wards to notify the affected persons of duration and schedule of operations to obtain their approvals of such exceptional situation.

*Bridge construction activity*

- To temporarily construct noise retaining walls with corrugated iron sheet of 3m in height around the construction site of viaduct foundation and piers in the city to minimize noise affecting to sensitive areas like schools, relic areas and densely-populated areas.

- Such machines and equipment causing big noise and vibration as boring machine, roller and excavator shall be permitted to work in the daytime and restricted the work done from 0h to 5a.m. If the construction is required to be carried out at night to ensure the overall construction progress, this shall be approved by wards, districts and Municipal People's Committee.

- Not to use too old construction plants and equipment because they cause very big noise pollution.

- To provide regular maintenance for noise-reducing devices of the plants and equipment causing big noise like boring machine, roller, bulldozer and excavator and etc.

- To monitor noise level at the construction site.

- To disperse activities of construction equipment and material transport vehicles.

- To educate truck drivers who cater for the construction not to use gas horn when travelling in the city.

*Additional recommended measure*

- If particularly noisy activities are required work may need to be limited to daylight hours.

- Noise not to exceed 55dBA at boundary of any residential area between 2100 - 0600hrs and 70 dBA between 2100 and 0600hrs.

- Location of the strong vibration generation sources should be at least 100m from historical buildings, school, and 50m from houses and shops.
- Residential areas should be at least 24 meters from the road and viaduct.

### 8.2.12.2 Vibration

Source of vibration during bridges construction is from machines, transport vehicles, stake driving machines at work. Vibration level is presented in Table 8.21

**Table 8.21 Vibration from bridge construction equipment (dBA)**

No.	Construction equipment	Vibration at distance 10 m	Vibration at distance 30 m	Vibration at distance 60 m
1	Bulldozer	79	69	59
2	Compressor	81	71	61
4	Pile drive	98	83	73
5	Lorry	74	64	54
QCVN 27-2010/BTNMT				75

(Source CEPT,2008.EIA)

The result showing that shake level of machines, equipment do not meet the allowed limit of construction area and residential area of less than 10m, but is in allowed limit of more than 60m according to regulation of QCVN 27-2010.

#### Mitigation measures

##### Bridge construction activity

- To apply state-of-art construction technology to minimize vibration not to affect the residents and facilities along both road sides.
- To restrict heavy trucks to transport materials at night.
- Piling work shall be carried out in the daytime and an anti-vibration trench system around the boring area.
- To monitor vibration level and supervise the situation of sensitive facilities.
- To inspect and provide a periodic maintenance for construction equipment.
- To disperse activities of construction equipment and traffic flows of transport vehicles.

#### Additional recommended measure

- Location of the strong vibration generation sources should be at least 100m from historical buildings, school, and 50m from houses and shops.

### 8.2.13 Accident

#### *Labor accidents*

During its construction, environmental factors, labor intensity, environmental pollution level can be harmful to workers 'health as tiredness, dizziness or faint. Assembly work, construction and raw material transportation at numerous densities can cause labor accidents and transport accidents.

#### *Traffic accidents*



Hanoi elevated railway line construction can impact to the present transport lines because of road conjunction. In this case traffic jam at construction area is natural leading to travel cost increase. Therefore, maintenance of good operation at the present roads is important.

There is a need of a great number of trucks to transport raw material amount for Project. Numerous transport density on narrow roads at area of project causes increase of traffic jam, accidents on railway lines as well as roads near area of Project.

Activities of trucks and machines will remarkably impact activities of buses, cars, motorbikes, and other vehicles during construction, especially in center of city and key road junction like:

- Nga Tu Vong junction,
- Kham Thien-Le Duan junction,
- Conjunction between railway and Nguyen Thai Hoc road,
- Southern Long Bien bridge junction,
- South Long Bien junction,
- Conjunction between railway and 5 national road.
- Bridge construction

#### Mitigation measures

Proper design and arrangement is required to minimize occurrences of traffic accident or to create advantages for solving out occurrences in principles as follows:

- When the construction is carried out for piers located near the road and in case piers touch on road clearance (horizontally) or passenger way clearance, the Contractor shall firmly consolidate foundation pit wall to ensure traffic safety for means of transport and road-users.
- To install signal posts painted with the reflected paint at the construction areas.
- To use plastic isothermal paint for road safety marking about 1cm in thickness to reduce speed of vehicles at the locations near schools, hospitals or at important intersections.
- To check safety design measures in the initial report and final report of the feasibility study project.
- Proper traffic organization: to construct and complete each item of work at a given moment.
- To make a plan of proper in- and out-flowing division for transporting construction materials to avoid traffic jam, especially at peak hours.
- Large material mobilization places shall not be in the area of streets.
- Not to operate excavators, bulldozer, roller, pile-driving machine at night.

#### Additional recommended measures

- All vehicles to be properly maintained and operated in accordance with road laws.
- All loads to be properly secured to avoid possible dropping or leakages.
- Drivers to be punished if ignore safety requirements.

### **8.3 IMPACTS AND MITIGATION MEASURES DURING OPERATION PERIOD**

During the operation period the impact factor is:

- The presence of elevated railway, stations bridge and other related structures  
These could create impact on the followings aspects.

### 8.3.1 Impact on Public health

Public health is the most concerning problem because a big number of passages will be concentrated at stations, in trains. Thus, solid waste, wastewater and hygienic problems could be generated. In case the wastes are not managed properly, the health of passengers can be affected and epidemics can happen and affect surrounding community.

#### Mitigation measures

Management of waste sources: dust, solid waste and wastewater.

Construction of the treatment plant, planting more trees, removes pollutants

#### Additional recommended measures

- Place waste bin at station and regularly empty them
- Keep public toilet clean
- Provide water for hand washing and hygienic purposes

### 8.3.2 Impact on air quality

The elevated train operated mainly by electricity, not generating wasted air, not impacting the surrounding air environment. In this period, there will not be the wasted gas from the train.

It is expected to see an increase of traffic around stations to load and unload passengers and this may increase the air pollution in the vicinity by the exhaust gas from vehicles, motorbikes and buses.

In the locomotive, coach repairing factories in Ngoc Hoi, Giap Bat, Gia Lam stations, the polluted gases impacting the air environment mainly generated from the activities of these factories. The hazardous gases from the source burning fuel of the machinery, equipment such as kilns, boilers, dryers, forging furnace, electricity generator...using the fuel petrol, DO oil, FO oil which have the main pollutants: dust TSP, SO<sub>2</sub>, NO<sub>2</sub>, HC. The organic substances will evaporate from paint spraying.

Typical sources of pollution impacting the air environment from the locomotive and coach repairing factories as follows (Table 8.22):

**Table 8.22 Sources of air pollution from the locomotive and coach repairing factories**

No	Repairing workshops	Specific
1	Engine repairing	Dust of kiln, gas and dust from paint
2	Mechanics	Metal dust, smoke from kiln
3	Spare parts	Metal dust, volatile organic substance, depressant
4	Wheel	Metal dust, CO, CO <sub>2</sub> , SO <sub>2</sub> , NO <sub>x</sub>
5	Blotie	Metal dust, gas and dust from paint
6	Railroad car	Metal dust, gas and dust from paint
7	Door, window	Wood dust, paint dust, gas and dust from paint
8	Engine-repair station	Metal dust, paint dust, gas of organic solvent
9	Kiln, oven...	Dust, SO <sub>2</sub> , NO <sub>2</sub> , CO, CO <sub>2</sub> , H <sub>2</sub> S, HF

From the annual operation, number of coaches, electric rails necessary every year is estimated as in Table 8.23:

**Table 8.23 The number of railroad cars until 2030**

Year	Amount railroad cars	Total railroad car
2015 - 2020	25 trains 3 railroad cars	75
2020 - 2030	25 trains 6 railroad car	150
After 2030	25 trains 8 railroad cars	200

The data show that the source of pollution will be increased until 2030. Thus the correspondent mitigation measures should be also increased

Mitigation measure

*- For pollution caused by traffic*

During the operation of the project, the following measures shall be taken to mitigate the air environment pollution caused by traffic:

- Road pavement of stations (squares of the stations) is designed on a large and clear basis in order not to result in traffic jam and easily disperse pollutants.
- Create wide sidewalks and long distance between houses and the road.
- Road pavement is spread with asphalt so it is limited to cause dust. When it is dry and hot, cleaning and sprinkling water for such pavement are regularly done.
- Green park at stations are designed under planning to ensure the environmental landscape of the project site and mitigate the pollution.

*- For pollution inside the station structures*

-The source of pollution which is mainly from the inner station works is the pollution caused by the people's activities and engines of plants and equipment available in the works. Therefore, the most proper measure to control thermal pollution is to control it just at the source of production. Basic measures applicable for the project facilities are as follows:

- To implement technical measures to mitigate the pollution inside the works by means of ventilation in combination with air-conditioning system for the stations' rooms with high conveniences.
- To control pollution caused by exhaust gas of air-conditioning systems, fan coil units, air-conditioner, thermal-release tower, cold water pump, circulatory pump and etc. form one closed cycle of cold load for the whole works. Thermal-release towers and pumps shall be installed on the ceiling floor of the building.
- The ventilation system for the works shall be designed and installed mainly for basements and toilets. A general air ventilation system shall be provided at the building basement to ensure the ventilative regime in accordance with hygienic standards. Toilets are naturally ventilated and satisfy an air exchange factor in accordance with regulations of the construction standard.

*- For pollution caused by exhaust gas of engine and wagon car repair enterprises*

- Implement technical measures to mitigate the pollution at enterprises such as calculation, adjustment of technological procedures and fuel, installation of partial exhaust gas treatment system like depositing, filtering, absorbing, adsorbing and biochemical disintegration and etc.

-Apply safety measures against occurrence prevention (fire, explosion and etc.) at manufacturing areas. To make planning, properly arrange a green tree system in the precinct of enterprises. To modernize technological equipment and use types of equipment which do not cause much noise and vibration.

-Set up a plan of periodic inspection, maintenance, replacement or renovation of production plants and equipment on time to prevent pollutants and toxic substances from leaking out to the environment and restrict risks of fire and explosion.

-Implement strictly an operation regime to accurately quantify raw materials and duly comply with the technological procedures, which will reduce an amount of wastes and facilitate a strict management of source and quantity of wastes.

- Regulate technological procedure, raw materials to reduce pollution: This is the measure which is deemed basic because it allows to reduce or eliminate air pollutants the most effectively. Main contents of this measure are to perfect productive technology and use a closed cycle. Technological adjustment measure includes the use of production technologies which produce no or few wastes, replacement of materials and fuel with many toxic substances with non-toxic or less toxic materials and fuel (such as replacement of fuel having a high sulphur content with fuel of low sulphur content like gas, replacement of oil having a high sulphur content with oil of low sulphur content). Concurrently, the use of non-dust production methods or replacement of processing method generating much dust with the wet processing method generating fewer dust and etc.

- Green tree measure applied to mitigate the air environment pollution: A green tree has an effect on shading from the sun, reducing solar radiation to the earth, cleaning and keeping dust, filtering the air, reducing reflex radiation, reducing air temperature and absorbing noise. Sound wave transmitting through tree strips will decline its energy and sound intensity reduces much or depends little on leaf density, leaf type, tree size and width of plantation land strip. Strips of trees will have effect of sound reflection so it reduces noise at enterprises.

- Install exhausted gas treatment system: Depending on dust concentration, physical and chemical properties of dust and air use rotation nature, cleaning shall be divided into 3 levels:

+ Crude cleaning: only separating big specks of dust more than 100 $\mu$ m in size.

+ Medium cleaning: filtering both big specks of dust, medium specks of dust and small specks of dust. Dust concentration in the air after cleaning shall be about 50-100mg/m<sup>3</sup>.

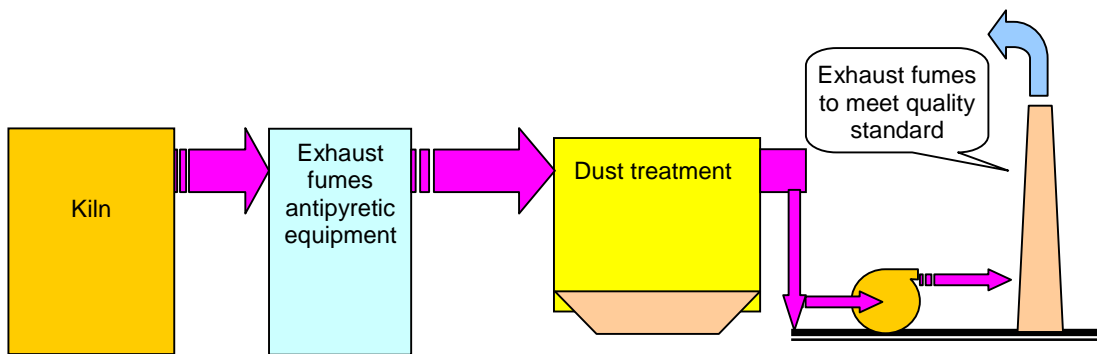
+ Fine cleaning: filtering small specks of dust less than 10 $\mu$ m with output of 60-99%. Dust concentration in the air after cleaning shall be 1-10mg/m<sup>3</sup>.

-Select of pollutant treatment methods in exhaust gas: To treat exhaust gas containing pollutants, the engine and wagon car repair enterprises can select one of the methods as shown in Table 8.24

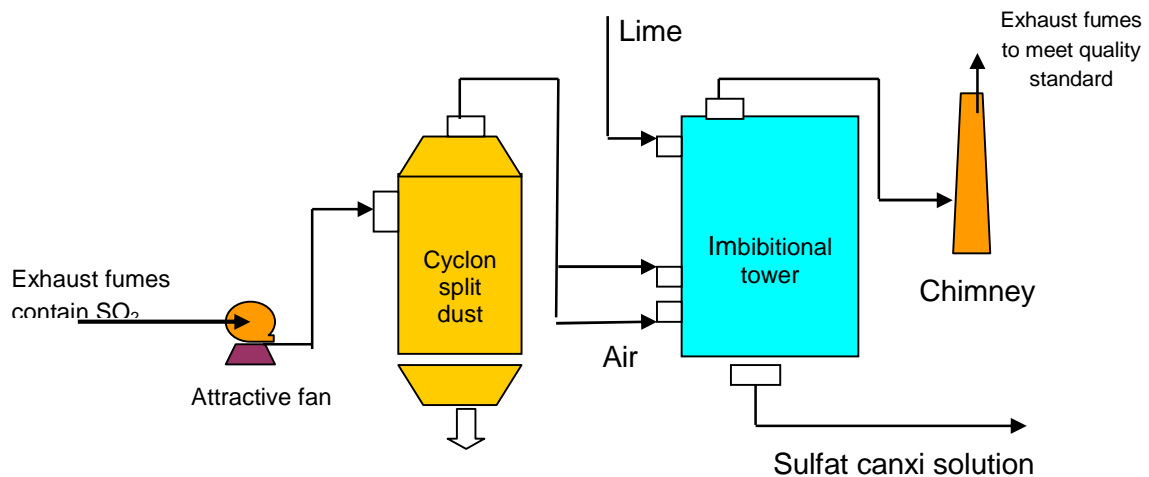
**Table 8.24 Toxic gas treatment methods**

Method	Principle	Advantages &disadvantages
Absorbing exhaust gas by water or solution	<ul style="list-style-type: none"> <li>- Absorb exhaust gas by water or soda or acidic solution</li> <li>- Regenerate or non-generate the absorbed solution</li> <li>- Use buffer absorbing tower or Venturi tower.</li> </ul>	<ul style="list-style-type: none"> <li>- Waste chemicals</li> <li>- Require to treat waste water</li> <li>- Erode equipment</li> </ul>
Absorbing exhaust gas in peat or compost	<ul style="list-style-type: none"> <li>- Absorb and biochemically disintegrate in the peat and compost buffer layer</li> <li>- Buffer materials being self-generated</li> <li>- Treatment output 99,9%.</li> </ul>	<ul style="list-style-type: none"> <li>- Temperature of exhaust gas shall be less than 40°C.</li> <li>- Waste plan.</li> <li>- Loss of pressure is big.</li> </ul>
Absorbing in active coal	<ul style="list-style-type: none"> <li>- Exhaust gas are cooled to 90-100°C, and then passing through an absorbing tower containing active coal.</li> </ul>	<ul style="list-style-type: none"> <li>- Coal must be changed in cycle when the absorbing process is saturated.</li> <li>- Treatment cost is high.</li> <li>- Treatment output is high (80-90%)</li> </ul>

Some dust and toxic gas treatment systems can be applied for engine and wagon car repair enterprises as shown in Figure 8.6 and 8.7

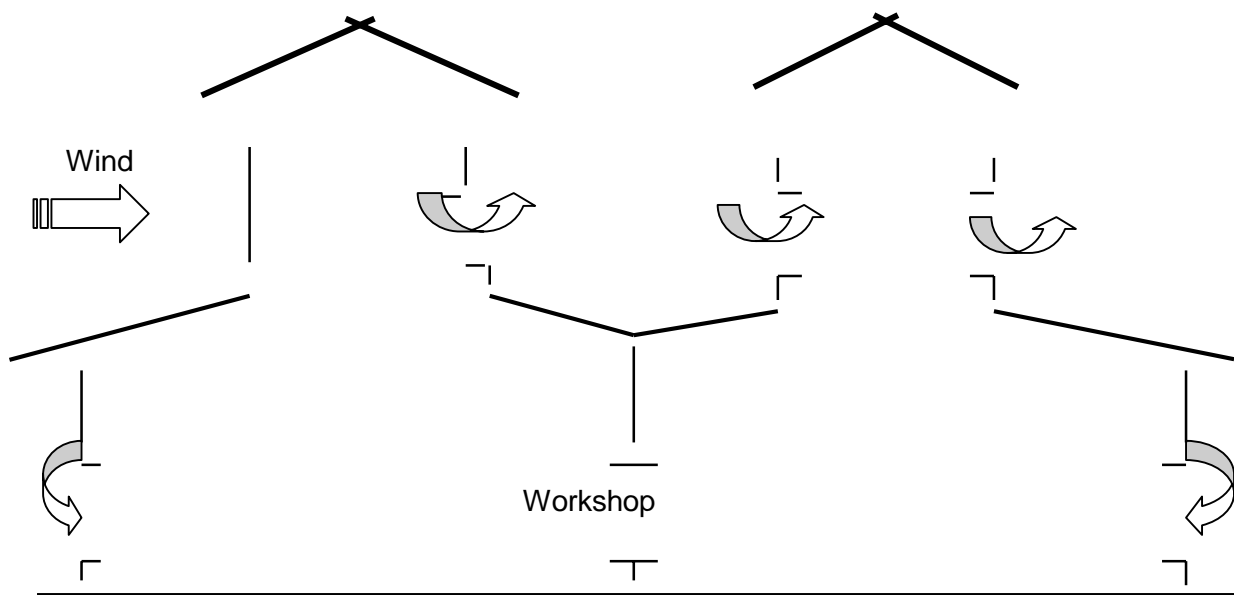


**Figure 8.6 Treatment system for oven exhausted gases**



**Figure 8.7 System of SO<sub>2</sub> gases treatment by lime**

Workshops of the engine and wagon car repair enterprises are designed on a ventilate and weatherproof basis to ensure environmental sanitation conditions (see Figure 8.8).



**Figure 8.8 Ventilated sketch for workshops**

Additional recommended measures

No additional recommendation

**8.3.3 Impact on water quality**

• *Wastewater from stations*

During operation period, the domestic wastewater is mainly generated from stations. This waste water includes suspended solid (SS), organic substances (BOD/COD), nutrients (N, P) and microorganism.

Based on the pollutants load and volume of wastewater discharged into the environment, the concentration of pollutants in wastewater at the national station when untreated can be calculated by the formular

Pollutant load (kg)/ volume of wastewater (m<sup>3</sup>) \* 1000

The results are: BOD<sub>5</sub> about 2250 - 2600 mg/l, TSS about 10,000 mg/l, total N from 300 to 600 mg/l, total P around 39 to 190 mg/l. These values exceed the limits of QCVN 14:2008/BTNMT many times.

The load and concentration of pollutants of domestic wastewater in Gia Lam station is presented in Table 8.24. The results show that the figures exceed permitted standard in QCVN 14:2008/BTNMT many times. Thus, if not being treated before, domestic wastewater will pollute receivers in the project area.

**Table 8.24 Load and concentration of pollutants in domestic waste water at Gia Lam station**

Year	Volume of waste water (m <sup>3</sup> /day)	Pollutant	Load (T/day)	Concentration (mg/l)	
				No treatment	QCVN 14:2008/BTNMT (B)
2015	1.760	BOD5	1.1 – 1.5	246-312	50
		SS	1.4 – 4.1	414-622	100
		Total N	0.11 – 0.33	20-50	-
		Total P	0.02 – 0.10	6-20	-
2020	3.520	BOD5	2.2 – 3.0	346-362	50
		TSS	2.8 – 8.2	410-580	100
		Total N	0.22 – 0.66	40-90	-
		Total P	0.04 – 0.20	8-20	-

Note: (Column B prescribed value of the pollution parameters as a basis for calculating maximum value allowed in the wastewater being discharged into waterways not used for domestic water supply)

According to passenger demand was studied by Almeck, forecast passenger numbers change from feasibility study step. Based on the new forecast data, the assessment of waste water pollution in the national stations has been estimates.

During operation process, number of passengers at national station is forecasted as follows (Table 8.25)

**Table 8.25 Number of passengers in the national stations**

Year	Ngoc Hoi station	Giap Bat station	Ha Noi station	Gia Lam station
2020	34,052	21,710	57,203	42,267
2030	47,459	30,257	79,723	58,909

(Source: Report on detailed design of train component for the HURC-1 project)

The pollutants load in wastewater of one person is estimated as (g/person/day):

BOD<sub>5</sub> = 45 – 54; SS =200; ΣN =6 – 12; ΣP=0.8 – 4.0

Based on the pollutants load in wastewater of one person and the amount of water one person use toilet (about 75% of 0.02m<sup>3</sup>)the pollutant load and the total amount of waste

water volume in the 4 national stations can be calculated for year 2020 and 2030 as in Table 8.26 and Table 8.27

**Table 8.26 Pollutant load and the total amount of waste water volume for year 2020 and 2030 in Ngoc Hoi and Giap Bat stations**

Year	Pollutants	Ngoc Hoi		Giap Bat	
		Pollutant Load (ton)	Volume of WW (m <sup>3</sup> )	Pollutant Load (ton)	WW Volume (m <sup>3</sup> )
2020	BOD <sub>5</sub>	1.1 – 1.3	520	0.73 – 0.88	326
	SS	5.1		3.25	
	Tổng N	0.15 – 0.3		0.1 – 0.2	
	Tổng P	0.02 – 0.1		0.013 – 0.065	
2030	BOD <sub>5</sub>	1.6 – 1.9	712	1.02 – 1.22	454
	TSS	7.1		4.54	
	Tổng N	0.21 – 0.42		0.14 – 0.28	
	Tổng P	0.028 – 0.14		0.018 – 0.09	

(Source: Modified from CEPT, 2008 EIA)

**Table 8.27 Pollutant load and the total amount of waste water volume for year 2020 and 2030 in Ha Noi and Gia Lam Station**

Year	Pollutants	Hanoi		Gia Lam	
		Pollutant Load (ton)	Volume of WW (m <sup>3</sup> )	Pollutant Load (ton)	WW Volume (m <sup>3</sup> )
2020	BOD <sub>5</sub>	1.9 – 2.3	858	1.43 – 1.71	634
	SS	8.6		6.34	
	Tổng N	0.26 – 0.52		0.19 – 0.38	
	Tổng P	0.03 – 0.15		0.025 – 0.125	
2030	BOD <sub>5</sub>	2.7 – 3.2	1196	2.0 – 2.4	884
	TSS	11.96		8.8	
	Tổng N	0.36 – 0.72		0.27 – 0.54	
	Tổng P	0.05 – 0.25		0.035 – 0.176	

(Source: Modified from CEPT, 2008 EIA)

Based on the pollutants load and volume of waste water into the environment, the concentration of pollutants in waste water at the national station when untreated can be calculated, namely BOD<sub>5</sub> about 2250 - 2600 mg/l, TSS about 10,000 mg/l, total N from 300 to 600 mg/l, total P around 39 to 190 mg/l. These values exceed the limits of QCVN 14:2008/BTNMT many times. Therefore, to ensure waste water does not pollute the environment, the project needs to develop appropriate treatment systems at the stations.

- *Wastewater source from the coach repairing factories*

During the operation of the station, the wastewater from the repair of locomotive, coach by the factories could be generated by washing equipment, hot dipping, cooling engine, cleaning dust, pain spraying, cleaning workshops, the wastewater may have different composition and concentration of pollutants but the wastewater contains mainly metal, high concentration of suspended substances, oil etc.





T- Time of dust accumulation

$$G = 220 [1 - \exp (-0,3.15)] 100 = 12.000 \text{ kg}$$

Thus, accumulated dust during 15 days is 12.000kg, they will go with rain-water overflowing area of project which will cause great impacts to water organism and pollute water resource, especially at Red river.

- *Impact of production wastewater from railroad car, railway engine factory*

The wastewater from these factories has different components and concentration, of which depends on function of production period. Regarding characteristics of wastewater generating from washing equipment, heating and cooling engines, covering paint dust, cleaning production shop wastewater has different components and concentration comparing with that from factories. The wastewater mainly contains metal, unsolved substances and oil. Its components and quality are shown in Table 8.28

**Table 8.28 Concentration of pollutants in productive wastewater**

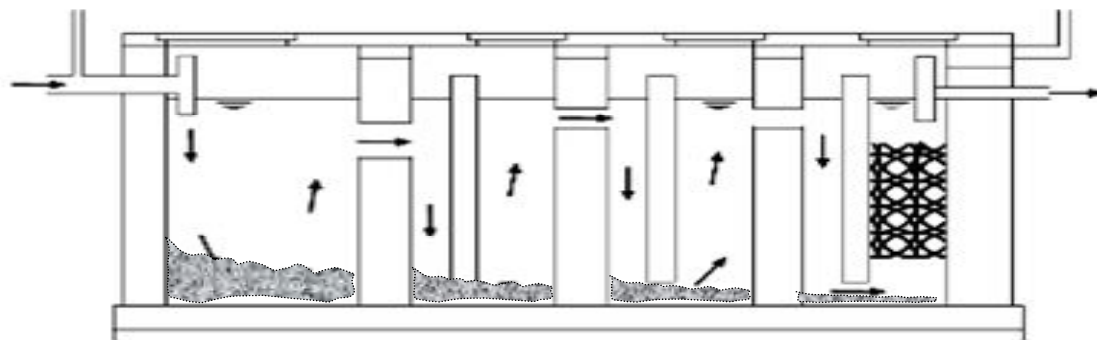
pH	SS (mg/l)	COD (mg/l)	BOD <sub>5</sub> (mg/l)	Oil, grease (mg/l)
6.8 - 7.8	110 - 150	150 - 240	90 - 120	5 - 9

Mitigation measures

- *For domestic wastewater*

As mentioned above, the wastewater at the national stations is highly polluted. The concentration of pollutants is much higher than the permitted limit of QCVN 14:2008/BTNMT. Therefore, in the national stations, it is necessary to build appropriate waste water treatment systems in order to ensure that wastewater after treatment must be within the limits of QCVN 14:2008/BTNMT.

Domestic waste water at stations, shall be treated at separate domestic waste water treatment tanks before discharging into the general drainage system of the city. The domestic waste water treatment tank consists of septic tank with thin partitions and anaerobic filtering compartment called BASTAF tank (Figure 8.6) which is designed with the period of water maintenance of 2 days. This tank is replaced for traditional septic tank with the similar dimension and has treatment output >80% in terms of SS and COD for the domestic waste water (black water).



**Figure 8.6 Anaerobic septic tank design**

(Source: CEPT, 2008.EIA)

After treatment by the septic tank, the wastewater quality could meet standard (see Table 8.29) and can be discharged into water sources that are not being used as water supply sources.

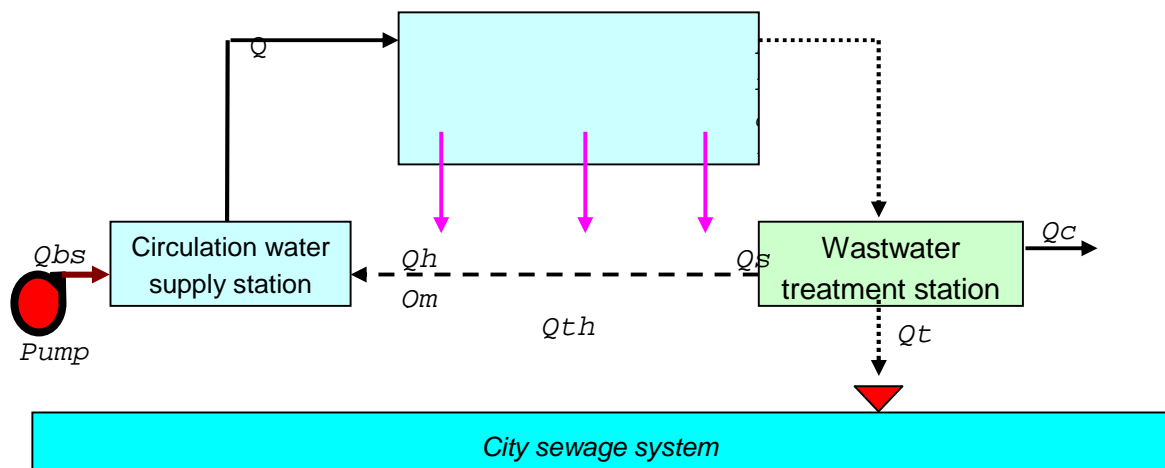
**Table 8.29 Quality and Component of domestic waste water (after treatment)**

No.	Parameter	Unit	No treatment	After treatment	Standard QCVN 14-2008 (B)
1	pH	-	7.2 - 7.5	6.8 – 7.2	5-9
2	SS	mg/l	200	50	-
3	TSS	mg/l	800	400	100
4	BOD	mg/l	150	30	50
5	Nitrat NO <sub>3</sub> <sup>-</sup>	mg/l	60	30	50
6	Food-oil	mg/l	40	20	10
7	Total Coliforms	MPN/100ml	15000	5000	5000

(Source: CEPT, 2008.EIA)

- *Circulatory water supply to wagon car repair enterprises*

For the engine and wagon car repair enterprises, circulatory water supply system can be applied for their production. These systems both economizes the supplied water and restricts pollutants to the environment. Diagram of the circulatory water supply system and reused water supply system applicable for the engine and wagon car repair enterprises is shown in Figure 8.7.



**Figure 8.7 Sketch of the circulatory water supply system**

(Source: CEPT, 2008.EIA)

Notes: Q: usage water;

Qth: circulatory water;

Qbs – additionally supplied water; Qc: water retained with waste water residue;

Qs: water involving in products; Qh: water for steam production;

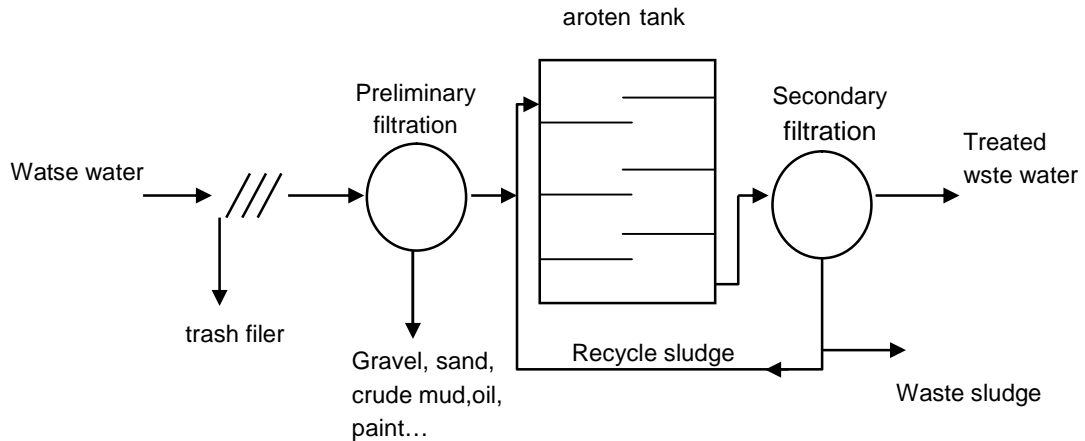
Qm: lost water;

Qt: waste water discharged into the source (because of unsatisfying usage requirements or to reduce an amount of substances dissolving in the supplied water).

\* *Waste water treatment at engine and wagon car repair enterprises*

Waste water from production steps in the engine and wagon car repair enterprises will be led to a central waste water treatment station of such enterprises with average capacity of 6000 m<sup>3</sup>/day & night. The central waste water treatment station using activated sludge techniques shall treat waste water in accordance with regulations of QCVN 08-2008 (Type B) before discharging into the general drainage culvert of the city (see Figure 8.8).

Waste water firstly passes through a rubbish stopper to remove such un-dissolved substances with big dimensions such as rubbish, paper, leaf and etc. then it flows to preliminary sedimentation tank to settle the un-dissolved substances like lubricant, oil, paint and part of suspended solids and finally to aerobic tank. Microorganism in the aerobic tank which form active sludge will dissolve organic substances and remove it from water. Following the aerobic tank is the secondary filtration tank. In it, the active sludge will deposit and water is made clean. The treated wastewater then is discharged into the environment. A part of the active sludge is used as an agent mediating the following stages. Its remainder is transported to the dumping site. Treatment efficiency can remove 85-95% BOD, eliminate compounds with N to 40% and coliform up to 60-90%.



**Figure 8.8 Concentrated waste water treatment system**

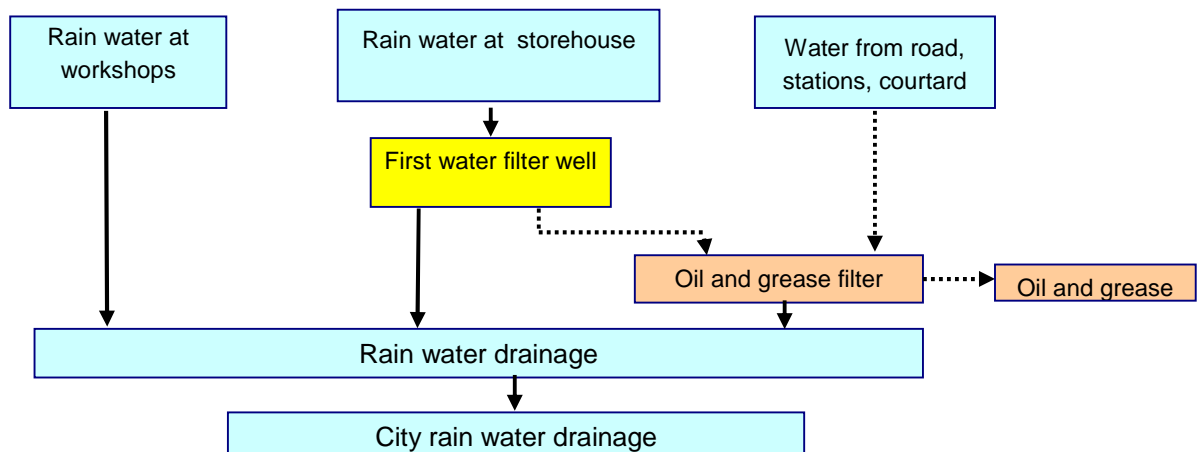
(Source: CEPT, 2008.EIA)

- For rainwater run-off on the area

+ On the bridge: to use side ditch and vertical drain leading to the drainage system of the city.

+ On the ground: to use drainage side ditch leading to the drainage system of the city.

+ Drainage at stations and enterprises: The rain water overflowing the project site, mainly at station areas and engine and wagon car repair enterprises will be arranged to flow into a separate drainage system in self-flowing principle. Sediment manholes with run-off catch-basins are arranged at 40m intervals on the culvert lines. Rainwater culverts are placed mainly along with internal roads in the stations. In general, rainwater culverts are designed with gradients similar to that of the road. Therefore, the depths of culverts are relatively similar. Rainwater drainage organization chart of stations and enterprises are shown in Figure 8.9.



**Figure 8.9 Rainwater drainage system of stations and enterprises**

(Source: CEPT, 2008.EIA)

Additional recommended measure

No additional recommendation

### 8.3.4 Impact on waste generation

Solid waste available during the operation of the project is mainly from stations, machine and wagon car repair enterprises.

#### Mitigation measures

Solid waste will be sorted promptly at site (at the source of origination). For the solid waste of these enterprises, garbage bins which are classified as ordinary solid waste and hazardous solid waste will be provided for each workshop of each enterprise. After that, the specialized vehicles of Hanoi Urban Environment Company will transport such containers to the waste treatment site of the city under the contract.

For the domestic solid waste at the stations and on the trains, solid waste collection and treatment measure shall be treated by classification and later transported for treatment

#### Additional recommended measure

No additional recommendation

### 8.3.5 Impact on Noise and Vibration

During the operation of the elevated trains and stations, noise and vibration are considerably large impacts.

#### **a) Noise**

Activities of railway transport will cause relatively big noises and vibration, especially at night. During its operation, noise generating from engines and rub between wheels and rails is relatively high at elevated line. Residential areas along road lines, entertainment and culture areas (schools, hospitals) are directly affected.

Research on entire railway line of project, in addition to noises from daily life, main noises come from elevated railway line. Noise intensity is up with speed of train and its spread depends on road line distance toward receiver and relative height of elevated rails.

The noise level for elevated train operation has been calculated base on method developed by Japan Ministry of construction.

The first noise forecast during its operation is based on elevated line without retaining wall through dense populated residential areas and on number of urban trains running on elevated line in 2020. The second noise forecast caused by urban electricity train operation depends on noises from two road lines and structure of Railway Bridge.

The equation for calculation is:

$$L_{Aeq} = 10\lg(10^{LA1/10} + 10^{LA2/10}) + \alpha_H + 10\lg\{(3,16*n)/(V*T)\}$$

Legend :  $L_{Aeq}$  : Second noise at forecast point

$\alpha_H$  : Noise reduction coefficient in urban.

n, number of trains:

l: Length of train, l = 114m (19m x 6railroad car)

V: speed of train,

T: T=54000s (at day: 7h-22h), T=324000s (at night 22h-7h)

$L_{A1}$ : noises at forecast point from train

$L_{A2}$ : noises at forecast point from bridge structure

$$L_{A1} = L_{WA1} - 8 - 10\lg r_1 + 10\lg\left[\frac{l/2r_1}{1 + (l/2r_1)^2} + 1/\text{tg}(l/2r_1)\right] + \alpha_d$$

$$L_{A2} = L_{WA2} - 8 - 10\lg r_2 + 10\lg 10[\text{cosa}(1/\text{tg}/2r_1)]$$

$L_{WA1}$ : noise level of rails,  $L_{WA1} = 25\lg V + 57$  (dB)

$r_1$ : distance from center of single rails to the calculated point

$\alpha_d$  = noise reduction coefficient having retaining wall,  $\alpha_d = 0$

$L_{WA2}$ : noise level of bridge structure,  $L_{WA2} = 91$ dB

$r_2$ : distance from center of structure to the calculated point.

a: angle from center of structure to the calculated point

The average height of bridge of 8 m, 15m, 24m is used to calculate Elevated line railway road from 8 to 24m. Under forecast, in 2020 there will have 156 turns of train into urban /one way/day. Length of train  $l = 19\text{m} \times 6\text{railroad car} = 114\text{m}$ ; speed of train  $V = 47,1\text{km/h}$  (from one to another station)

The level of noise at different heights of the line is presented in Table 8.30

**Table 8.30 Noise level at elevated section in operation period**

Distance (m)		5	10	15	20	25	30	50	70
Leq (dB)	Height 8m	78.79	76.40	75.62	75.17	74.79	74.43	72.91	71.37
	Height 15m	78.76	76.38	75.61	75.16	74.79	74.43	72.91	71.37
	Height 24m	78.74	76.36	75.61	75.16	74.79	74.42	72.91	71.37

Therefore, without noise barriers, noise level during operation of elevated railway line in 2020 is greater than allowed limit according to regulation of QCVN 26-1010-BTNMT for surrounding residential areas (70dB). As the railway bridge spanning the Red River will cross close to the Nguyen Trung Truc school area, within a very short distance of about 10m, the noise and vibration generated from construction and operation activities will affect much to the school.

### b) Vibration

Vibration is movement, sound increase and reduction from a center value. Vibration level can greatly vary and depends on many factors as loading capacity of train, speed of train, quality of sound wave spreading environment. Sound wave spreads more easily at solid foundation than at soft foundation. Vibration is expressed directly or indirectly by ones experience at sensitive areas. Impact of shake can damage construction. Calculation of shake level of elevated railway line during its operation process follows the below formula:

$$L = L_0 - 10\log (r/r_0) - 8,7a (r - r_0)$$

Legend:

- L, vibration level calculated by dB unit from distance of "r"m to source;
- $L_0$ , shake level calculated by dB unit (79dB) at distance of "r0" m from source (3m)
- a, inside reduction coefficient of shake to solid foundation (0,01)

The shake forecast result of elevated railway line is presented in Table 8.31

**Table 8.31 Estimative result of vibration during operation phase**

r (m)	5	10	15	20	25	30	35	40	45	50
L (dB)	76.6	73.2	70.9	69.3	67.9	66.7	65.5	64.5	63.6	62.7
QCVN 27-2010/BTNMT	75	75	75	75	75	75	75	75	75	75

(Source: CEPT, 2008.EIA)

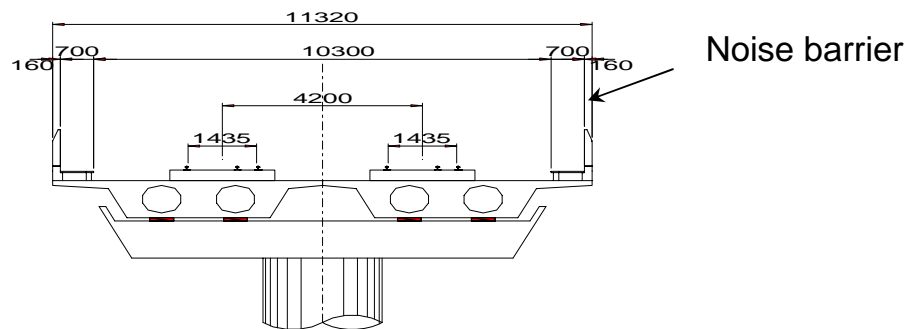
Because vibration level is measured by individual parts, not by average vibration level of parts; thus, forecast of source vibration level and impact vibration level from train on elevated railway line is often calculated at most disadvantageous condition. Vibration at most disadvantageous condition calculated is 76,6dB at distance of 5m away from road axis. As disciplined, speed increase of train of 10km/h, vibration level increase of 3dB while source vibration level is 79,6dB at distance of 5m. Vibration level at outside corridor edge is 73dB which is lower than permitted limit (75dB) according to QCVN 27-2010/BTNMT. Therefore, this impact is not high.

Mitigation measures

To mitigate the pollution caused by noise and vibration from the operation of the elevated railway, the following methods shall be applied for the project. With the mitigation measures below, the impacts on the surrounding area and residents will be reduced and expected to be below the regulated limits.

Placing noise retaining walls along road surface is necessary

- Viaducts on the route: viaducts are used at the sections which are 4m and over higher than the existing ground surface and of 11.32m in width (see Figure 8.10).



**Figure 8.10 Representative cross-section of the viaduct bridge**

- Apply state-of-art construction technology to minimize vibration not to affect the residents and facilities along both road sides.
- Restrict heavy trucks to transport materials at night.
- Piling work shall be carried out in the daytime and an anti-vibration trench system around the boring area.



### Additional recommended measures

- The operation of urban railways should conform with proper procedures and maintenance to ensure noise level within limits
- Noise barrier should be placed at construction site near/next to Trung Truc school to reduce noise impacting the school activities
- Noise not to exceed 55dBA at boundary of any residential area between 2100 - 0600hrs and 70 dBA between 2100 and 0600hrs.
- Monitor vibration level and supervise the situation of sensitive facilities.
- Inspect and provide a periodic maintenance for construction equipment.
- Disperse activities of construction equipment and traffic flows of transport vehicles.

### **8.3.6 Impact on Accidents**

#### **a) Fire prevention measures**

In the works of the project, fire is maybe due to the power supply and transmission network and electrical devices and etc. In the dry season, it is easy to occur fire and explosion struck by lightning. To ensure safety, the following measures shall be taken:

- Set up a plan of periodic inspection, maintenance, replacement or renovation of production plants and equipment on time to prevent pollutants and toxic substances from leaking out to the environment and restrict risks of fire and explosion.
- Setting up a plan of fire and explosion prevention.
- Setting up a safety regulation on fire and explosion.
- Equipping with fire-alarm and extinguishing system.
- In each station, providing fire-extinguishers placed at corridors, lobby, waiting-room area and functional rooms where are easily visible and convenient for accessing, operating as well as getting out for users.
- Outside station entrances, arranging fire-hydrants, pumping and fire-pump system and water for fire-extinguishing.
- Operators and security guards must master troubleshooting plans.
- Having personnel and organizing regular fire-extinguish trainings.
- Emergency ventilation system: In case the source of alternating generation on the wagon car has a problem, any standby battery will supply power to the ventilation system through a DC/AC transformer. Battery capacity ensures the power supply to the emergency ventilation system in a passenger car and cabin at least 45 minutes.

#### **b) Lightning prevention measure**

For the lightning prevention system, a lightning-rod shall be installed at the highest location of one works in the station. The installation of the lightning prevention net system for non-metal structures of > 15 m in height in the station includes lightning-rods arranged around the roof. Dynamic earth resistance of the lightning prevention system shall be  $\leq 10 \Omega$  when earth resistivity is  $< 50,000 \Omega/\text{cm}^2$  and  $\geq 10 \Omega$  when earth resistivity is  $> 50,000 \Omega/\text{cm}^2$ . For trains

and elevated railway system, earthling system is provided to ensure safety in operation as stipulated.

### **c) Traffic problem on the route**

Stations, Depot and engine and wagon car repair workshops and trains are implemented in accordance with technical standards. During the process of using trains and operating transportation, preparatory work and regular inspection of trains and rails are very important to ensure safe and convenient operation without any technical problems or derailing and etc.

#### Mitigation measures

According to EIA 2008, During the process of operation, preparatory and regular inspection work for trains and rail shall be made to ensure safe and advantageous operation.

In order that trains operate at the right speed and quick rotation, it will be required to build a scientific chain of repairs and has proper repair and maintenance procedures. This process is well-organized to achieve economic effectiveness and avoid a waste of time and labor force. A repair and maintenance plan should require a specific cycle for each period for the purpose of transportation and business. Modern communication, signal, control and halting systems shall be equipped to ensure safety for the movement of trains.

#### *- For Signal system*

Due to complicated features when organizing the operation between the urban railway and national railway on the double-gauge double-track railway (1435mm/1000mm) on the route, to ensure safety during the operation of trains, a signal and control system for the urban railway and national railway is selected under the following technical solutions:

#### *- For the national railway station*

- Construct a form of stations with focal electrified signal, electronic interlock, colored lights signal, dynamic or hydraulic camera. Equipment of discovering trains use an electrical circuit of the rail.
- Focal control and supervision system at the operation area is by graphical interface with computer system (the operation area includes stations of the urban railway which it manages).
- Automatic line close system with 3 notations (or 4 notations if required) of the double-gauge double-track railway (1435mm/1000mm) with one way movement of trains will use the electrical circuit of the the rail without insulating board (frequency movement circuit of the rail) to discover trains and transmit data to the trains.

#### *- For the urban railway station*

- Stations of the urban railway are deemed a part of the interlock system of one the national railway station which manages one certain operation area on the route.
- Urban passenger trains consider the urban railway stations as one signal point. In here, a control and supervision system including the interlock system is not arranged. The treatment of controlling changeable lock is set up under the model of interlock which has been programmed and automatic.
- Control system of movement of trains on the double-track railway with the urban train including main systems as follows: automatic line close system, automatic train control system ATC including 3 combined systems: automatic train protection system ATP,

automatic train operation system (ATO), automatic train control and supervision system (ATS).

*Additional recommended measures*

- Proper maintenance of vehicles
- Installation of speed limits and railroad signage
- Proper maintenance of railroad and repair, as required

## **9. ENVIRONMENTAL MANAGEMENT PLAN**

This section identifies mitigation and management measures to avoid, reduce, mitigate adverse environmental impacts that have already been identified in the previous sections. The environmental management plan (EMP) is an environmental management tool that sets out basic principles, procedures, measures, proposed work program and schedules so that the issues are accordingly addressed with regard to the sequence of operations, i.e. those activities that apply to: design/pre-construction, construction and operation phase.

The EMP plan consists two main parts: Environmental mitigation program and Environmental monitoring program, for those two programs an mitigation implementation schedule, responsible organization and cost estimate are included.

### **9.1 ORGANIZATION FOR EMP**

According to EIA 2011, The EMP involves multiple organizations and responsibilities shared among the Railways Project Management Unit (RPMU), the Environmental unit under RPMU, the Supervision Consultant and the Construction Contractor. The detail responsibilities of each unit are describes as follows:

During the construction phase of the project, the contractors will be responsible for implementing mitigation methods. Project owner will have officers in charge of directly monitoring and supervising throughout the construction process, to ensure the mitigation methods outlined in the environmental management plan will be implemented in practice.

#### **Railways Project Management Unit (RPMU)**

RPMU has the general responsibility to implement measures to mitigate environmental impacts by drafting contract terms in order to ensure that contracts will implement pollution mitigation methods in pre-construction and construction phase of the construction components project, as previously outlined in the EIA report.

Through the development and implementation of EMP, the RPMU ensures the following:

- Full compliance with National technical regulations (QCVN), Vietnamese Standards (TCVN), laws, ordinance, and other applicable regulations;
- Full commitment to inform and engage stakeholders in all phases of the project;
- Promoted awareness and understanding among employees and contractors through repetitive and continuous training, identification of roles and responsibilities towards environmental management;
- Full monitoring of environmental performance throughout the project and implementation of pro-active approaches.

RPMU is the representative agent responsible for implementing the Law on Environmental Protection and is the organization that appoints department responsible for environment.

#### **Environmental unit in project management unit**

Environmental unit appointed by RPMU is responsible for project environmental issues in accordance with policies and procedures, at the same time, efficiently controlling the implementation of environmental protection methods of subcontractors and sub-consultants. Environmental unit is responsible for receiving information from construction monitoring consultants, processing and reporting to project management unit.

## **Construction monitoring Consultants**

Construction monitoring Consultants include environmental engineers with experience of environmental monitoring in transportation. Construction monitoring consultant team will coordinate with the department of environment of project management unit in implementing environmental monitoring, adjusting forecasts in line with reality as well as proposing additional environmental protection methods. Construction monitoring consultant team as well as consultants for construction contractors to conduct construction work in accordance with the requirements of environmental protection. Construction monitoring consultant team has responsibility of directly monitoring the implementation of environmental protection methods by contractors and monitoring pollution appropriately. With technical, expertise technique and regular inspection of construction site, Construction monitoring consultant team force contractors and people in charge of construction to efficiently implement mitigation methods listed in technical standard and the contract, as well as additional mitigation methods after being approved by project management unit. Construction monitoring consultant team is also responsible for receiving and processing within its power the question from local authorities and local residents.

The activities of Construction monitoring consultant team are defined as follows:

Observing and monitoring on site: monitoring engineers will be on site throughout construction time from site preparation phase to monitor and advice contractors on water supply, environmental standards and issues related to waste management, etc.

- Environmental assessment: engineers test and monitor the implementation of mitigation methods as proposed in environmental impact assessment report and in technical instructions, additional mitigation methods; monitoring group will manage activities of environmental specialists in different fields, and conduct environmental assessments, record environmental diary and periodically report to the department of environment of management unit, focused on the following issues:

- General situation of the environment;
- Pollution control and efficiency of the implementation of mitigation methods;
- The situation of environment of outside areas that may be affected.

In order to conduct environmental assessment work, construction monitoring consultant group need to have full information about the project, recommendations on environmental protection, survey results, assessment of environmental status in the past, the legal aspects of environmental protection and, in particular, the technical regulations for environmental protection detailed in the contract.

## **Contractors**

In addition to complying with legal documents, contracts are the best way to force contractors to implement the mitigation methods stated in the Technical Standards Project. Based on the recommendations of the environmental assessment reports, technical standards, contractors set up environmental management plans to join bidding.

When winning bid, contractors must fulfill the contract terms on the environmental aspects and commitments stated in environmental management plan under the supervision of construction supervision consultant and RPMU.

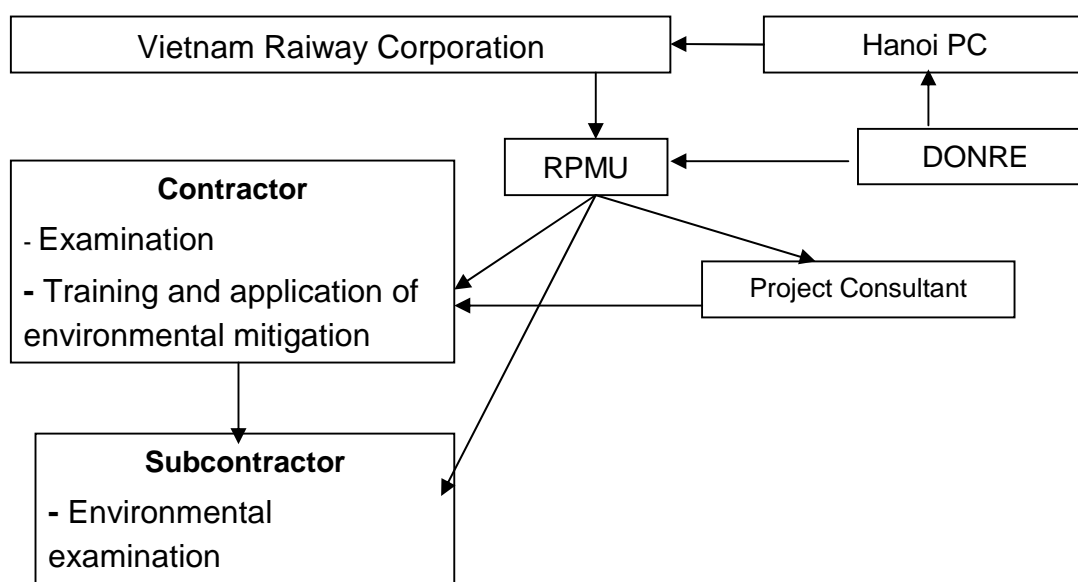
## **Sub-contractors**

Sub-contractors are organizations and individuals being appointed by the project owner to measure and observe the environmental quality.

The roles and responsibilities of related parties are briefly summarized in Table 9.1.

**Table 9.1 Roles and responsibilities of the organizations in environmental management when implementing the project HURC1**

The role	Responsibilities
RPMU	<ul style="list-style-type: none"> <li>- Signing contracts with contractor consultants.</li> <li>- Organizing, assigning specialized department responsible for project environmental issues.</li> <li>- Providing funding for environmental monitoring activities in the pre-construction and construction phase.</li> <li>- Receiving periodical monitoring reports and periodically reporting to the State Administration of Environment every 3 months.</li> </ul>
Environmental Unit	<ul style="list-style-type: none"> <li>- Ensuring all proposed terms of environmental protection in the technical standards to be included in the contracts of the project.</li> <li>- Reviewing and analyzing the environmental monitoring reports throughout the process of project implementation.</li> <li>- Conducting periodical inspection of construction activities to ensure that contractors fulfill responsibilities specified in the contract related to methods to mitigate environmental impact. In case provisions are not implemented, the environment unit has responsibility to report the matter directly with the Project Director, who may suspend the work of contractors.</li> <li>- Supporting and coordinating with construction monitoring consultants.</li> </ul>
Construction monitoring consultants	<ul style="list-style-type: none"> <li>- Coordinating with the staff of the Environmental Unit and the project's contractors to ensure the full implementation of environmental protection methods, which was signed in the contract of the project and the commitment of contractors in environmental management plan.</li> <li>- Reporting directly to the contractors about any potential environmental issues that may hinder the progress of the project.</li> <li>- Periodically reporting.</li> </ul>
Contractor	<ul style="list-style-type: none"> <li>- Responsible for full implementation of methods for environmental protection, signed in the contract of the project and the commitment in the environmental management plan.</li> <li>- Ensuring that sub-contractors hired must also fully implement the methods for environmental protection, signed in the contract of the project and the commitment in the environmental management plan.</li> </ul>
Sub-Consultants	<ul style="list-style-type: none"> <li>- Carrying out environmental monitoring.</li> <li>- Directly reporting monitoring results to the environmental unit.</li> <li>- Performing additional measurements upon request.</li> </ul>



**Figure 9.1 Project Management Structure and Environmental Protection Responsibility**

## 9.2 ENVIRONMENTAL MITIGATION PROGRAM

The detail mitigation measures for impacts during the planning, construction and operation phases have been described in detail in Section 8. The followings are summary of mitigation measures, which project owner, constructor should implement.

### 9.2.1 Mitigation measures in planning/preconstruction period

The summary of mitigations measures for impacts and implementation/supervision responsibility during planning measures is presented in Table 9.2

**Table 9.2 Mitigations measures implementation/supervision responsibility during planning period**

Impacted Items/Impact	Mitigations (summary) in the existing EIA reports	Recommendations for the revised EIA for JICA	Implementation/supervision responsibility
<u>Resettlement:</u> Resettlement of about 2500 households. About 130ha of land is acquired.	<ul style="list-style-type: none"> <li>- General Land Acquisition Plan in accordance with the Vietnamese law and regulations.</li> <li>-To commit all principle and regulation of the State of Vietnam, the People Committee of Hanoi as well as policy on land revetment and resettlement of residents who are affected by space taking process.</li> <li>- To fully provide financial expense for removing constructions as presented at the Chapter IV.</li> </ul>	RAP should be prepared and implemented in accordance with the JBIC guidelines (2002), JICA guidelines (2010), WB safeguard policies and the Vietnamese law and regulations.	Project owner/Local authority.
<u>Living and Livelihood</u> Affected households' living and livelihood may be affected.	<ul style="list-style-type: none"> <li>- To compensate for material damage in accordance with the Decree 197/2004/ND-CP of the Prime Minister and Decision 26/2005/QD-UB of the People Committee of the Hanoi City.</li> <li>- Residents who are losing their job will be retrained in order to find jobs that are suitable to their knowledge, ability.</li> <li>-To priorities recruiting people who are facing</li> </ul>	RAP prepared in accordance with the JBIC guidelines (2002), JICA guidelines (2010), WB safeguard policies and the Vietnamese law and regulations will include the rehabilitation program for affected households.	Project owner/Local authority.

<u>Impacted Items/Impact</u>	Mitigations (summary) in the existing EIA reports	Recommendations for the revised EIA for JICA	Implementation/supervision responsibility
	difficulties or job-less to work for this project. - To compensate material damage relating to farm produce and construction on the garden, farming area.		
<u>Utilization of land and local resources:</u> Land acquisition will affect the land use	-Compensation in accordance with the Vietnamese law and regulations. - Perennial plants shall be calculated equal to the existing value of the plants garden under the prices in the locality at the time of land acquisition. - To compensate material damage relating to farm produce and construction on the garden, farming area - Compensation for the unharvest crop plants and livestock:	The compensation will be paid based on the replacement cost.	Project owner/Local authority.
<u>Existing social infrastructure and services</u> Utility lines need to be relocated	- The houses and facilities of households and individuals shall be compensated equal to the new construction value of a house - For the houses and other construction facilities whose parts are demolished and remaining portion can not be used, compensation shall be made for the whole house and facility	Describe plan for relocation of utilities. Provide suitable location for market, and public infrastructures to make convenience for local people	Project owner/Local authority.
<u>Socially vulnerable groups</u> Affected households may include socially vulnerable groups	Preparing plans for assisting families with socially vulnerable group. Provide them financial and labor resources to move to new places and constructing new living places.	The results of census survey for RAP will be used to identify households in need of special assistance, and appropriate assistance program will be planned and included in RAP. Prepare plans for assisting families with socially vulnerable group. Provide them financial and labor resources to move to new places and constructing new living places	Project owner/Local authority.
<u>Cultural/historical heritage</u> 650 Graves need to be relocated	-The design of components like national station, urban station, overpass, bridges took architectural aspects as well as avoiding cultural/historical heritage sites into consideration so as the least impacts will be made. - Provide financial support and suitable location for relocation of graves	Describe existing and on-going plan for the relocation. Provide financial support and suitable location for relocation of graves.	

### 9.2.2 Mitigation measures in construction period

The summary of mitigations measures for impacts and implementation/supervision responsibility during construction period is presented in Table 9.3



**Table 9.3 Mitigations measures and implementation/supervision responsibility during construction phase**

<u>Impacted Items/Impact</u>	<u>Mitigations measures</u>	<u>Recommendations for the revised EIA for JICA</u>	<u>Implementation / supervision responsibility</u>
<u>Living and livelihood</u> Construction activities, traffic controls around the construction site may affect local economic activities	-Detailed traffic control -Cooperation with police and other authorities. Large material storage should not be in the area of streets. - Not to operate excavators, bulldozer, roller, pile-driving machine at night. - Construct a fence around the construction area, to provide stores for storing machines and necessary facilities; to build sentry-boxes and have security guards on duty all day (24/24h). - Coordinate with the local authority in notifying the traffic flow division	Affected business should be properly assisted through the RAP implementation in accordance with the JBIC guidelines (2002), JICA guidelines (2010), WB safeguard policies and the Vietnamese law and regulations. Provide suitable access to households living in the surrounding area	Constructor/ RPMU
<u>Existing social infrastructure and services</u> Construction activities, traffic controls around the construction site may affect the access to hospitals and schools. Construction activities may affect the utility services.	-Compliance to the Vietnamese regulation. - Develop detailed traffic control. -Cooperation with police and other authorities. - Design traffic organization in strict compliance with road signal regulations - Use plastic isothermal paint for road safety marking about 1cm in thickness to reduce speed of vehicles at the locations near schools, hospitals or at important intersections. - To check safety design measures in the initial report and final report of the feasibility study project. - Proper traffic organization:	. No recommendation	Constructor/ RPMU
<u>Public Health</u> Inflow of workers may affect public health.	-Education on healthy living style. -Waste and waste water at the camp should be properly controlled.	Workers should receive education on personal hygiene and STD. Health awareness including HIV/AIDS awareness program should be implemented	Constructor/ RPMU
<u>Infectious diseases</u> Inflow of workers may increase the risk of pandemic.	Workers will be provided with accommodation with proper living condition.	Health awareness including HIV/AIDS awareness program should be implemented, including education on personal hygiene and STD. ,	Constructor/ RPMU
<u>Working Environment</u> Workplace accidents and poor health of workers	<ul style="list-style-type: none"> <li>• Increase technical and labor safety</li> <li>• Workers will be provided with accommodation with proper living condition. Protective working cloths will be provided to work outside.</li> <li>• Risk prevention and safety measures to be taken for dangerous activities.</li> <li>• ID cards will be issued to keep the security at the construction site.</li> </ul>	<ul style="list-style-type: none"> <li>• Compliance to Vietnamese labor code and other regulations to maintain the working place safe and healthy.</li> <li>• General safety measures for the construction works, such as provision of safety equipment, safety procedures, should be implemented.</li> <li>• To accommodate the needs of the workforce, the contractor should provide suitable housing, adequate supplies of potable water, and toilet and bathing facilities within the housing area. Onsite facilities for preparing food need to be provided, or food service contracted.</li> </ul>	Constructor/ RPMU
• <u>Land erosion</u> During construction of the bridge, the	<ul style="list-style-type: none"> <li>• Minimize impacts by design and construction process.</li> <li>• Implement soil erosion and control</li> </ul>	• Installation of rock or stabilization structures	Constructor/ RPMU

<u>Impacted Items/Impact</u>	<u>Mitigations measures</u>	<u>Recommendations for the revised EIA for JICA</u>	<u>Implementation / supervision responsibility</u>
<p>following may occur</p> <ul style="list-style-type: none"> <li>Increased sedimentation</li> <li>Slope instability</li> </ul>	<p>measures at susceptible locations</p> <ul style="list-style-type: none"> <li>Proper grading practices and water diversion structures</li> <li>Maintain vegetation cover or apply concrete for slope embankment, etc.</li> </ul>		
<p><u>Hydrology</u> During construction of the bridge, interference in the river flow.</p>	<ul style="list-style-type: none"> <li>Minimize impact with design and construction process.</li> <li>Avoid construction of structure during flooding season.</li> <li>Maintain vegetation cover for slope embankment.</li> <li>Temporary drainage to prevent flooding</li> <li>Occupying dyke for the working platform shall not exceed 1/3 of the flow section</li> </ul>	<p>-The construction bridge's pile/abutment will be one by one so the impact on hydrology will be minimized</p>	<p>Constructor/ RPMU</p>
<p><u>Global Warming</u> Emission from vehicles and heavy machinery</p>	<ul style="list-style-type: none"> <li>-Not covered, but the mitigation for the air pollution will be applicable.</li> <li>- Not to use too old vehicles and equipment to transport materials and use for construction.</li> <li>- Not to transport construct material exceed a vehicle' load.</li> <li>- Maintain regularly construction trucks and equipment to minimize exhausted gases</li> <li>- Implement technical measures to mitigate the pollution</li> <li>-Set up a plan of periodic inspection, maintenance, replacement or renovation of production plants and equipment on time to prevent pollutants and toxic substances from leaking out to the environment</li> </ul>	<p>No specific recommendation. The same mitigation as air quality can be applied.</p>	<p>Constructor/ RPMU</p>
<p><u>Air Quality</u> Dust, emission from vehicles and heavy machinery, ground clearance, construction activities,</p>	<ul style="list-style-type: none"> <li>Compliance to the Vietnamese regulations</li> <li>Dust control measures are in place. Examples are: <ul style="list-style-type: none"> <li>Watering work area</li> <li>Minimizing traffic</li> <li>Cover stockpiles and material.</li> <li>Minimizing emission of air pollutants with measures such as;</li> <li>Maintenance of vehicles and equipment</li> <li>Control load and time.</li> </ul> </li> </ul>	<p>Cover or make fence around exposed stockpiles and material and use them as soon as possible</p>	<p>Constructor/ RPMU</p>
<p><u>Water Quality</u> Leak or spillage of water pollutants, flowing of waste water into surface or ground water, run-off</p>	<ul style="list-style-type: none"> <li>- Location of mobilizing and placing construction equipment will be arranged far from the flow</li> <li>- A temporary water guiding system around the construction area of bridge abutment and culverts will be provided to prevent the flood situation</li> <li>- Elevations of placing petrol tanks shall be higher than the flood water level</li> <li>- Waste overflowing water like vehicle-washing water, waste water from concrete mixing plants, washing materials and etc. shall be guided into a temporary channel to the garbage chamber. Gas, lubricant and other fuels used for means, equipment shall be kept carefully to avoid oil spill, at the</li> </ul>	<ul style="list-style-type: none"> <li>- Storage areas to be prepared to avoid runoff of materials.</li> <li>- Fuel should be stored in properly sealed containers.</li> <li>- All fuel storage areas to be security fenced and provided with oil and water separators. Fuel houses and shut off valve to be locked.</li> <li>-All refueling to be done at least 20 m away from waterways by trained personnel.</li> <li>- All waste oil and oil filters to be collected and if possible recycled, otherwise to be disposed of to landfills.</li> <li>- The contractor is to have developed an accidental spill handling action plan.</li> </ul>	<p>Constructor/ RPMU</p>

<u>Impacted Items/Impact</u>	<u>Mitigations measures</u>	<u>Recommendations for the revised EIA for JICA</u>	<u>Implementation / supervision responsibility</u>
	<p>same time it must have regulations on safety;</p> <ul style="list-style-type: none"> <li>- Prevent from penetrating concrete mortar, oil-bearing waste into the flow</li> </ul> <p>Along with waste management, enough measures are in place, such as prevention of spillage or leak of oil, fuel, lubricant, location of equipment, waste water management, mudguard, etc.</p>	<ul style="list-style-type: none"> <li>- Maintain good drainage system at the worker camp to avoid creating of stagnant water, where mosquito can breed</li> </ul>	
<p><u>Sediment/</u> Aluvium, suspended solid could be built up at river bed during construction of bridge</p>	<ul style="list-style-type: none"> <li>- Control to prevent the redundant on the talus spill over into the water flow.</li> <li>- Vegetation recovery shall be done soon in the vegetation lost areas.</li> <li>- The bridge piles in the river shall be constructed in dry season and the abutments at the two ends of the riversides shall be reinforced to prevent erosion. The abutment reinforcement shall be carried out by titling raw stones from the bottom upward.</li> <li>- Materials gathering points including earth, stones and sand shall be located appropriately with cover, to protect against spilling over into the water flow in rains.</li> <li>- The materials gathering site with a volume bigger than 20m<sup>3</sup> shall be covered with oilpaper or other similar materials during the rainy time;</li> </ul>	<p>No recommendation</p>	<p>Constructor/ RPMU</p>
<p><u>Wastes</u> Wastes from ground clearance, construction site and camp, and construction activities</p>	<ul style="list-style-type: none"> <li>· To minimize wastes produced in construction</li> <li>- Debris substances like broken brick, superfluous sand and soil which can be utilized for the leveling.</li> <li>· Such waste which can be recycled or reused</li> <li>· The domestic solid waste produced at the project area shall be collected and stored in proper bins.</li> <li>- The domestic solid waste shall not be buried or burnt at the site.</li> <li>- Movable toilets shall be sufficiently provided for the requirement of workers at the project area. One movable toilet shall be provided for each unit during the construction period.</li> <li>-The waste lubricant produced at the project area shall not be filled or buried and collected into proper bins placed in the project area.</li> <li>- Not to directly pour solid wastes into the source of water</li> <li>-Treat human's waste, the Contractor is requested to provide temporary toilets at each site. Such toilets will be provided at least 100m away from the source of water</li> <li>-Waste management according to the type of waste, e.g. solid wastes and wasted oils, is in place.</li> </ul>	<p>All waste materials to be collected and sorted;</p> <ul style="list-style-type: none"> <li>(i). those that can be recycled and</li> <li>(ii) those that need to go to an approved landfill site for disposal.</li> </ul>	<p>Constructor/ RPMU</p>
<p><u>Noise and Vibration</u> Noise and vibration nuisance to surrounding</p>	<ul style="list-style-type: none"> <li>· Compliance with the Vietnamese regulations.</li> <li>· Control time and activities.</li> <li>· Use of equipment of low level noise.</li> </ul>	<ul style="list-style-type: none"> <li>- If particularly noisy activities are required work may need to be limited to daylight hours.</li> <li>- Noise not to exceed 55dBA at</li> </ul>	<p>Constructor/ RPMU</p>

<u>Impacted Items/Impact</u>	<u>Mitigations measures</u>	<u>Recommendations for the revised EIA for JICA</u>	<u>Implementation / supervision responsibility</u>
communities.	<ul style="list-style-type: none"> <li>• Setting up fixed machine far from residence or sensitive areas.</li> <li>• Avoid using noise/vibration generating equipment at the same time.</li> <li>• Supervise the level of noise/vibration.</li> <li>• Anti-noise walls, when necessary.</li> </ul>	boundary of any residential area between 2100 - 0600hrs and 70 dBA between 2100 and 0600hrs. - In construction phases, location of the strong vibration generation sources should be at least 100m from historical buildings, school, and 50m from houses and shops. -. Residential areas should be at least 24 meters from the road and viaduct.	
<u>Accident</u> Accidents caused by not properly organized traffic. Accident during operation of heavy machinery, handling hazardous subsistence, etc. The project site is in the flood prone area.	<ul style="list-style-type: none"> <li>• Detailed traffic control and accident prevention measures</li> <li>• Measures in case of flooding are mentioned.</li> <li>• Cooperation with police and other authorities.</li> </ul>	- All vehicles to be properly maintained and operated in accordance with road laws. -All loads to be properly secured to avoid possible dropping or leakages. -Drivers to be punished if ignore safety requirements.	Constructor/ RPMU

### 9.2.3 Mitigation measures in operation phase

The summary of mitigations measures for impacts and implementation/supervision responsibility during operation period is presented in Table 9.4

**Table 9.4 Mitigations measures and implementation/supervision responsibility during operation period**

Impacted Items	Mitigations (summary) in the existing EIA reports	Recommendations for the revised EIA for JICA	Implementation/ supervision responsibility
Public Health/ Many pagegers will gather at station, creating solid waste, wastewater and infactious desisies	Management of waste sources: dust, solid waste and wastewater. Construction of the treatment plant, planting more trees, removes pollutants	<ul style="list-style-type: none"> <li>- Place waste bin at station and regularly empty them</li> <li>- Keep public toilet clean</li> <li>- Provide water for hand washing and hygienic purposes</li> </ul>	Hanoi Urban Railway Company /DONRE
<u>Air pollution</u> Emission of air pollutants from locomotive, coach repairing factories. Emission from traffic around stations. Pollution inside stations.	For repair factories, measures are: <ul style="list-style-type: none"> <li>• Technical measures will be applied.</li> <li>• Tree planting</li> <li>• Regular maintenance of machines and equipment, etc.</li> <li>• Road surface around station areas will be paved.</li> <li>• Proper ventilation and air conditioning system to limit pollution inside stations.</li> </ul>	No recommendation	Hanoi Urban Railway Company /DONRE

Impacted Items	Mitigations (summary) in the existing EIA reports	Recommendations for the revised EIA for JICA	Implementation/ supervision responsibility
<u>Water quality</u> Waste water from stations and locomotive, coach repairing factories. Industrial waste water from operation of locomotive, coach repairing factories. Overflowing of rain water.	Waste water treatment for different types for waste water is in place. Drainages on the route, station and enterprises are in place.	No recommendation	Hanoi Urban Railway Company /DONRE
<u>Waste</u> Waste from stations and locomotive, coach repairing factories.	Proper waste management (separation and collection) is in place.	No recommendation	Hanoi Urban Railway Company /DONRE
<u>Noise and Vibration</u> Noise and vibration from operation of the elevated railway. Noise and vibration from operation of locomotive, coach repairing factories	For the elevated railways, measures are: · Mitigation by design. · Anti-noise walls For repairing factories: · Anti-noise buffers at the leg of fan and compressor, · Proper setting and maintenance of machines. · Installing silencer and vibration-proof rubber, etc.	- The operation of urban railways should conform with proper procedures and maintenance to ensure noise level within limits - Noise barrier should be placed at construction site near/next to Trung Truc school to reduce noise impacting the school activities - Noise not to exceed 55dBA at boundary of any residential area between 2100 - 0600hrs and 70 dBA between 2100 and 0600hrs.	Hanoi Urban Railway Company /DONRE.
<u>Accident</u> Railway accident Fire, lightning, power lines	Accident prevention measures such as installation of signal system, information system, dispersed current system, fire prevention measures, etc., are in place.	1. Proper maintenance of vehicles - Installation of speed limits and railroad signage - Proper maintenance or railroad and repair, as required	Hanoi Urban Railway Company /Hanoi Police Department

### 9.3. ENVIRONMENTAL MONITORING PROGRAM

Environmental monitoring program is conducted in 3 phases: Updating the baseline just before the construction period (baseline environment); throughout construction process and operation period (during 03 first years).

#### 9.3.1 Air, water and soil monitoring program

The monitoring program will be conducted for air and vibration at 13 locations, for noise at 14 locations, for surface water quality at 10 locations, for ground water quality at 7 locations and for soil quality at 7 locations. The names of locations are presented in Table 9.5

**Table 9.5 The names of monitoring locations**

	<b>Air monitoring</b>	<b>Surface water monitoring</b>	<b>Underground water monitoring</b>	<b>Soil monitoring</b>
<b>1</b>	Ngoc Hoi Station complex 1	Ngoc Hoi Station complex 1	Residential areas nearby Ngoc Hoi station complex 1	Ngoc Hoi Station complex 1
<b>2</b>	Ngoc Hoi Station complex 2	Ngoc Hoi Station complex 2	Residential areas nearby Ngoc Hoi station complex 2	Ngoc Hoi Station complex 2
<b>3</b>	Ngoc Hoi Station complex 3	Ngoc Hoi Station complex 3	Residential areas nearby Ngoc Hoi station complex 3	Ngoc Hoi Station complex 3
<b>4</b>	Ngoc Hoi Station complex 4	Ngoc Hoi Station complex 4	Residential areas nearby Ngoc Hoi station complex 4	Ngoc Hoi Station complex 4
<b>5</b>	Ngoc Hoi Station complex 5	To Lich river at Van Dien bridge area	Residential area nearby Long Bien station	Ngoc Hoi Station complex 5
<b>6</b>	Giap Bat Station	Ba Mau lake	Residential area nearby Gia Lâm station	Long Bien bridge area
<b>7</b>	Bach Mai Station	Long Bien bridge (downstream)	Residential area nearby Kham Thien street	Gia Lam Station
<b>8</b>	Thong Nhat Park Station	Long Bien bridge (upstream)		
<b>9</b>	Kham Thien street	Duong bridge (downstream)		
<b>10</b>	Ha Noi Station	Duong bridge (upstream)		
<b>11</b>	Nguyen Trung Truc school (only measure noise)			
<b>12</b>	Long Bien Nam Station			
<b>13</b>	Long Bien Bac Station			
<b>14</b>	Gia Lam Station			

Table 9.6 presents the parameters, frequency and number of monitoring location and standards to be followed for environmental parameters

**Table 9.6 The parameters, frequency and number of monitoring location and standards**

No	Items	Updating the baseline data	Construction phase	Operation phase
<b>I</b>	<b>Noise monitoring</b>			
	1. Parameters	Leq, Lmax, L50	Leq, Lmax, L50	Leq, Lmax, L50
	2. Frequency	During continuous 3days,15 hours per day, 3 times per hour.	1 time per month, 15 hours per day, 3 times per hour.	1 time per 6 months during 36 months, 15 hours per day, 3 times per hour.
	3. Locations	At 14 locations	At 14 locations	At 14 locations
	4. Standard	QCVN 26:2010/BTNMT	QCVN 26:2010/BTNMT	QCVN 26:2010/BTNMT
<b>II</b>	<b>Vibration monitoring</b>			
	1. Parameters	Velocity, acceleration and frequency	Velocity, acceleration and frequency	Velocity, acceleration and frequency
	2. Frequency	During continuous 3days, 15hours per day, 3 times per hour.	1 time per month, 15 hours per day, 3 times per hour.	1 time per 6 months during 36 months, 15 hours per day, 3 times per hour.
	3. Locations	At 13 locations	At 13 locations	At 13 locations
	4. Standard	QCVN 27:2010/BTNMT	QCVN 27:2010/BTNMT	QCVN 27:2010/BTNMT
<b>III</b>	<b>Air quality monitoring</b>			
	1. Parameters	HC, CO, SO2, NOx, dust and microclimate.	HC, CO, SO2, NOx, dust and microclimate.	HC, CO, SO2, NOx, dust and microclimate.
	2. Frequency	During continuous 3 days, 15 samples at 1 location.	1 time per 3 months, 15 samples at 1 location.	1 time per 6 months during 36 months, 15 samples at 1 location.
	3. Locations	At 13 locations	At 13 locations	At 13 locations
	4. Standard	QCVN 05:2009/BTNMT QCVN 06:2009/BTNMT	QCVN 05:2009/BTNMT QCVN 06:2009/BTNMT	QCVN 05:2009/BTNMT QCVN 06:2009/BTNMT
<b>IV</b>	<b>Surface water quality monitoring</b>			
	1. Parameters	Temp, pH, TSS, turbidity, conductivity, BOD, COD, DO, PO4 <sup>3-</sup> , NO2 <sup>-</sup> , NO3 <sup>-</sup> , Cu, Zn, Pb, As, Fe, Cd, Hg, Oil and grease, Coliform	Temp, pH, TSS, turbidity, conductivity, BOD, COD, DO, PO4 <sup>3-</sup> , NO2 <sup>-</sup> , NO3 <sup>-</sup> , Cu, Zn, Pb, As, Fe, Cd, Hg, Oil and grease, Coliform	Temp, pH, TSS, turbidity, conductivity, BOD, COD, DO, PO4 <sup>3-</sup> , NO2 <sup>-</sup> , NO3 <sup>-</sup> , Cu, Zn, Pb, As, Fe, Cd, Hg, Oil and grease, Coliform
	2. Frequency	During 3continuous days, 2 samples at 1 location.	1 time per month, 2 samples at 1 location	1 time per 6 months during 36 months, 2 samples at 1 location
	3. Locations	At 10 locations	At 10 locations	At 10 locations
	4. Standard	QCVN 08:2008/BTNMT	QCVN 08:2008/BTNMT	QCVN 08:2008/BTNMT

No	Items	Updating the baseline data	Construction phase	Operation phase
<b>V</b>	<b>Underground water quality monitoring</b>			
	1. Parameters	Temp., pH, hardness, TSS, As, Cd, Pb, Cu, Mn, Zn, CN <sup>-</sup> , Hg, Fe, NO <sub>2</sub> <sup>-</sup> , NO <sub>3</sub> <sup>-</sup> , Cl <sup>-</sup> , SO <sub>4</sub> <sup>2-</sup> , Fecal coli, Coliform	Temp., pH, hardness, TSS, As, Cd, Pb, Cu, Mn, Zn, CN <sup>-</sup> , Hg, Fe, NO <sub>2</sub> <sup>-</sup> , NO <sub>3</sub> <sup>-</sup> , Cl <sup>-</sup> , SO <sub>4</sub> <sup>2-</sup> , Fecal coli, Coliform	Temp., pH, hardness, TSS, As, Cd, Pb, Cu, Mn, Zn, CN <sup>-</sup> , Hg, Fe, NO <sub>2</sub> <sup>-</sup> , NO <sub>3</sub> <sup>-</sup> , Cl <sup>-</sup> , SO <sub>4</sub> <sup>2-</sup> , Fecal coli, Coliform
	2. Frequency	During 3 continuous days, 3 samples at 1 location.	1 time per month, 3 samples at 1 location	1 time per 6 months during 36 months, 3 samples at 1 location
	3. Locations	At 7 locations	At 7 locations	At 7 locations
	4. Standard	QCVN 09:2008/BTNMT	QCVN 09:2008/BTNMT	QCVN 09:2008/BTNMT
<b>VI</b>	<b>Soil quality monitoring</b>			
	1. Parameters	pHH <sub>2</sub> O, Total organic compounds, T-N, T-P, exchange acidity, Cl <sup>-</sup> , SO <sub>4</sub> <sup>2-</sup> , Cu, Zn, Cd, Pb, Hg, pesticide (organic chloride)	pHH <sub>2</sub> O, Total organic compounds, T-N, T-P, exchange acidity, Cl <sup>-</sup> , SO <sub>4</sub> <sup>2-</sup> , Cu, Zn, Cd, Pb, Hg, pesticide (organic chloride)	pHH <sub>2</sub> O, Total organic compounds, T-N, T-P, exchange acidity, Cl <sup>-</sup> , SO <sub>4</sub> <sup>2-</sup> , Cu, Zn, Cd, Pb, Hg, pesticide (organic chloride)
	2. Frequency	During 3 continuous days, 3 samples at 1 location.	1 time per month, 1 sample at 1 location	1 time per 6 months during 36 months, 1 sample at 1 location
	3. Locations	At 7 locations	At 7 locations	At 7 locations
	4. Standard	QCVN 03:2008/BTNMT; QCVN 15:2008/BTNMT	QCVN 03:2008/BTNMT; QCVN 15:2008/BTNMT	QCVN 03:2008/BTNMT; QCVN 15:2008/BTNMT

(Source: Supplemental EIA report, 2011)

### 9.3.2 Solid waste monitoring/management program

#### **Solid waste management during construction period**

- The domestic solid waste produced at the project area shall be collected and stored in proper bins. A contract shall be made with Hanoi Urban Environment Company for the daily collection and transportation to the treatment place.
- Movable toilets shall be sufficiently provided for the requirement of workers at the project area. One movable toilet shall be provided for each unit during the construction period.
- Minimize wastes produced in construction by appropriately calculating materials, educating and reminding workers on sense of saving as well as tightening the management and supervision of the works.
- Waste is the unharmed substances like broken brick, superfluous sand and soil which can be utilized for the levelling.
- Such waste which can be recycled or reused as cement sack, bottle, superfluous pieces of iron and steel and etc shall be collected, classified and transported to the assigned site of the city.

#### **Solid waste management during operation period**

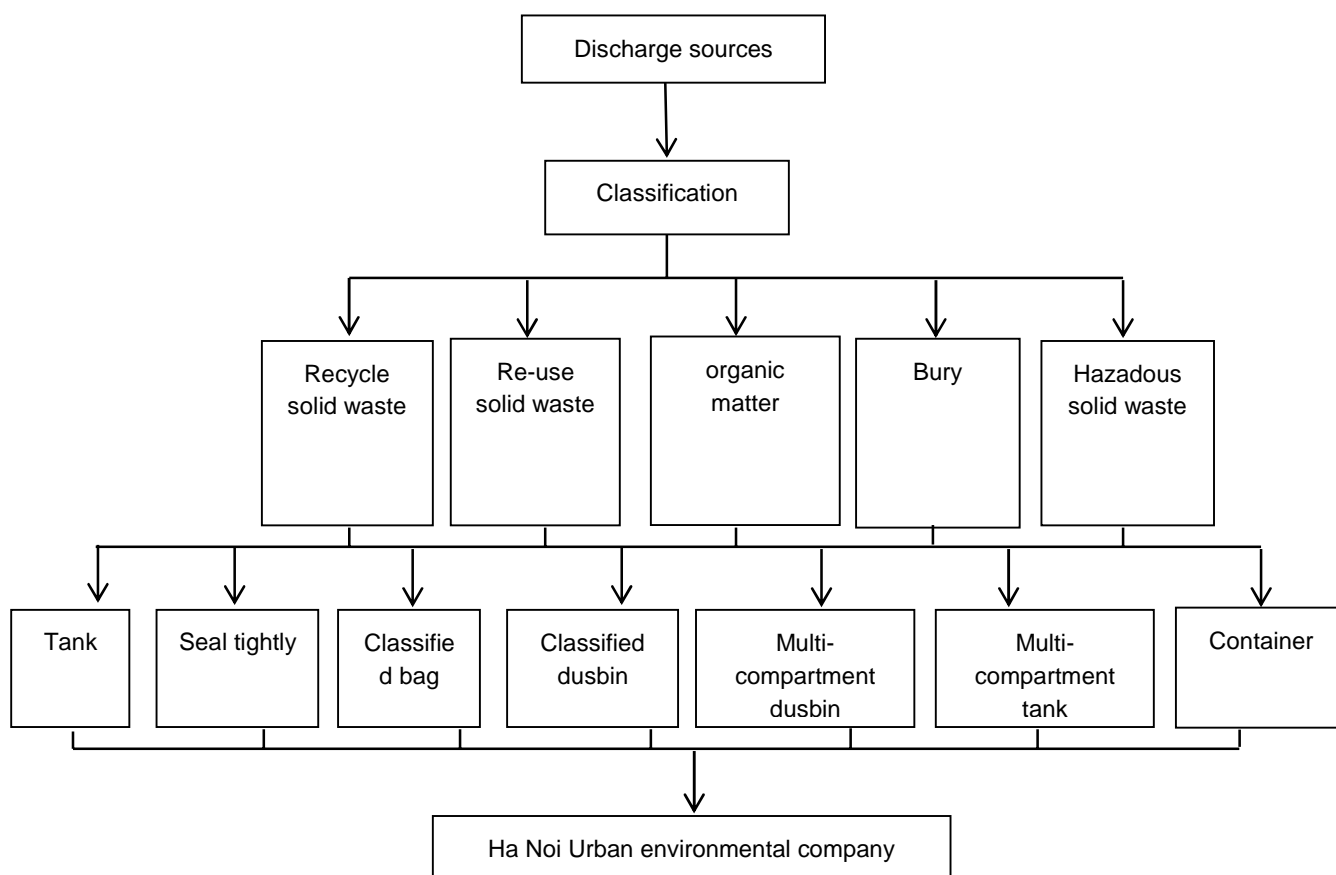
Solid waste available during the operation of the project is mainly from stations and engine and wagon car repair enterprises. Solid waste will be sorted promptly at site (at the source of origination).



For the domestic solid waste at the stations and on the trains, solid waste collection and treatment measure shall be taken as follows: at the stations being provided with colourful rubbish bins for various rubbish (yellow bins for the rubbish which can be recycled, blue bins for redundant food, brown bins for normal rubbish, red binds for harmful waste). Dustbins are designed colourful and stylish to create an impression of environmental landscape in the station. Each type of rubbish sorted in the bins will be periodically transported for treatment by Hanoi Urban Environment Company.

For the solid waste of these enterprises, solid waste bins which are classified as ordinary solid waste and hazadous solid waste will be provided for each workshop of each enterprise. After that, the specialized vehicles of Hanoi Urban Environment Company will transport such containers to the waste treatment site of the city under the contract.

Solid waste classification procedures of the engine and wagon car repair enterprises are shown in Figure 9.2



**Figure 9.2. Solid waste classification procedures of the engine and wagon car repair enterprises**  
 (Source CEPT,2008.EIA)

#### 9.4 EMP COST

Most of the costs for mitigate measures created by environmental demands are already included in the investment costs of the proposed project, or they should be part of normal operation and maintenance procedures. Monitoring of the safety aspects during the construction includes to the Contract.

#### 9.4.1 Budget for environmental treatment work

The followings are cost, combining both cost calculated in 2008 and 2011 EIAs for purchasing environmental treatment work/facilities for construction (Table 9.7) and operation period (Table 9.8)

The budget from 2008 EIA is given for reference. The budget for 2001 items is roughly estimated. Thus the actual cost should be calculated based on the cost at monitoring, purchasing time.

**Table 9.7 Budget for environmental treatment work in the construction period**

No.	Contents	Quantity	Units	Per unit (1000 VND)	Amount (1000 VND)
1	Waste bins for domestic solid waste, 200 liters	28	bin	4,000	112,000
2	Mobile toilets, capacity of 200 liters	28	piece	4,285.715	120,000
3	Barrels for containing waste oil, capacity of 150 liters	28	piece	4,285.715	120,000
	<b>Total 2008</b>				<b>352,000</b>
<b>Added in 2011</b>					
4	Dustbins for domestic solid waste, 200 liters	28	Bin	4,000	112,000
5	Mobile toilets, capacity of 400 liters	28	piece	4,285.715	120,000
6	Barrels for containing waste grease, capacity of 150 liters	28	piece	4,285.715	120,000
7	Containers of volume 1000 liters to store bentonite drilling liquid and mud	28	bin	2,000	56,000
8	Drainage systems for rain water	32	system	270,885.235	8,668,327.520
9	Drainage systems for wastewater	32	system	270,885.235	8,668,327.520
10	Waste water treatment systems for stations, car locomotive enterprises	56	system	19,200	1,075,200
11	Anti-noise wall at 2 sides along viaducts	16.4	km	50,000	820,000
12	Waste water treatment stations of the locomotive car enterprises	4	station	500,000	2,000,000
13	Canvas cover, water truck				473,088
	<b>Total 2011</b>				<b>22,112,943</b>
	<b>Grand Total</b>				<b>22,464,934</b>

The Total budget for environmental treatment work in the construction phase is **352,000,000 VND**, For items added in 2011 EIA, it is **22,112,943,000** and grant total is **22,464,934,000**

**Table 9.8 Budget for environmental treatment work in the operation phase**

No.	Items	Quantity	Units	Per unit (1000 VND)	Amount (1000 VND)
<b>I</b>	<b>Construction structure (including provision expenditure)</b>				
	<b>Phase 1</b>				
I.1	Water outlet sluice U300	12,050	m	558.6	6,731,130
	U400	6,247	m	617.4	3,856,897.8
	<b>Phase 2</b>				
I.2	Water outlet sluice U300	4,900	m	558.6	2,737,140
	U400	5,348	m	617.4	3,301,855.2
<b>II</b>	<b>Railway stations</b>				
<b>II.1</b>	<b>Urban client stations at viaducts</b>				
II.1.1	Area of water outlet system	1,500	m <sup>2</sup>	55.440	83,160
II.1.2	Area for equipment sanitation	1,500	m <sup>2</sup>	36.96	55,440
II.1.3	Area for preventing and fighting fire	1,500	m <sup>2</sup>	25.2	37,800
II.1.4	Area for putting waste water bins	1,500	m <sup>2</sup>	84	126,000
<b>II.2</b>	<b>Urban client stations at flyovers</b>				
II.2.1	Area of water outlet system	1,900	m <sup>2</sup>	55.440	105,336
II.2.2	Area for equipment sanitation	1,900	m <sup>2</sup>	36.960	70,224
II.2.3	Area for preventing and fighting fire	1,900	m <sup>2</sup>	25.2	47,880
II.2.4	Square for putting waste water bins	1,900	m <sup>2</sup>	84	159,600
<b>II.3</b>	<b>Hanoi Railway Station</b>				
II.3.1	Area of water outlet system	5,200	m <sup>2</sup>	55.44	288,288
II.3.2	Area for equipment sanitation	5,200	m <sup>2</sup>	36.96	192,192
II.3.3	Area for preventing and fighting fire	5,200	m <sup>2</sup>	100.8	524,160
II.3.4	Square for putting waste water bins	5,200	m <sup>2</sup>	84	436,800
<b>II.4</b>	<b>Giap Bat Railway Station</b>				
II.4.3	Area of water outlet system	1,900	m <sup>2</sup>	55.44	105,336
II.4.4	Area for equipment sanitation	1,900	m <sup>2</sup>	36.96	70,224
II.4.5	Area for preventing and fighting fire	1,900	m <sup>2</sup>	25.2	47,880
II.4.6	Area for putting waste water bins	1,900	m <sup>2</sup>	84	159,600
<b>II.5</b>	<b>National Client stations on fly-overs</b>				
II.5.3	Area of water outlet system	2,300	m <sup>2</sup>	55.44	127,512
II.5.4	Area for equipment sanitation	2,300	m <sup>2</sup>	36.96	85,008
II.5.5	Area for preventing and fighting fire	2,300	m <sup>2</sup>	25.2	57,960
II.5.6	Area for putting waste water bins	2,300	m <sup>2</sup>	84	193,200
<b>III</b>	<b>Water treatment station at Engine, railroad car repairing enterprises</b>	4	station	500,000	2,000,000
<b>IV</b>	<b>Noise defending walls</b>	16.4	km	50,000	820,000
	<b>Total 2008</b>				<b>22,420,623</b>
<b>Added in 2011</b>					
<b>V</b>	<b>Containers for domestic solid waste on the trains</b>	60	bin	200	12,000
<b>VI</b>	<b>Waste water treatment systems on the trains</b>	60	system	200,000	12,000,000
<b>VII</b>	<b>Fire prevention and extinguishment systems</b>				715,680

No.	Items	Quantity	Units	Per unit (1000 VND)	Amount (1000 VND)
VIII	Planting trees in the stations, enterprises.	1000	tree	500	500,000
	<b>Total 2011</b>				<b>13,227,680</b>
	<b>Grand Total</b>				<b>35,648,303</b>

The Total budget for environmental treatment work in the operation phase is **22,420,623,000** VND, For items added in 2011 EIA, it is **13,227,680,000** and grant total is **35,648,303,000**

#### **9.4.2 Cost of environmental inspection and monitoring**

Cost for environmental supervision and monitoring activities is presented in Table 9.9 and divided into stages of construction and operation as follows. (The detail of costs for monitoring is found in Annex C).

**Table 9.9 Cost of environmental supervision and monitoring**

No	Items	Time	Progress	Cost (Million VND)
1	Monitoring air, noise and vibration (baseline)	Updating the baseline data	Updating the baseline data	549
2	Monitoring surface and ground water (baseline)	Updating the baseline data	Updating the baseline data	81
3	Monitoring noise, vibration and hazardous exhaust	Construction phase (3 months/time)	Based on progress of project implementation at each stages	8,804
4	Monitoring water quality	Construction phase (3 months/time)	Based on progress of project implementation at each stages	1,296
5	Monitoring and supervising depression	Construction phase (3 months/time)	Based on progress of project implementation at each stages	2200
6	Monitoring environmental quality in operation stage	In operation phase (6 months/time)	In operation at least 3 initial years of the project	2060
	<b>Total</b>			<b>14.990</b>

(Source: CEPT, 2008. EIA)

Total cost: 14.990,000 VND. This cost is preliminarily estimated in 2008. Specific cost will be calculated exactly through agree between RPMU and Constructors before constructing works.

The cost for analyzing environmental parameters calculated in 2012 is presented in Table 9.10 The detail calculation is presented in Annex C

**Table 9.10 Cost for monitoring**

Monitored Item	Parameters	Frequency	Locations	Total sample	Total cost (VND)	Standard
<b>Updating the baseline data</b>						
<b>Noise</b>	Leq, Lmax, L50	During continuous 3 days, 15 hours per day, 3 times per hour.	14	42	4,599,000	QCVN 26:2010/ BTNMT
<b>Vibration</b>	Velocity, acceleration and frequency	During continuous 3 days, 15 hours per day, 3 times per hour.	13	39	7,129,200	QCVN 27:2010/ BTNMT
<b>Air quality</b>	HC, CO, SO <sub>2</sub> , NO <sub>x</sub> , dust and microclimate	During continuous 3 days, 15 samples at 1 location.	13	39	57,146,700	QCVN 05:2009/ B TNMT QCVN 06:2009/ B TNMT
<b>Surface water quality</b>	Temp, pH, TSS, turbidity, conductivity, BOD, COD, DO, PO <sub>4</sub> <sup>3-</sup> , NO <sub>2</sub> <sup>-</sup> , NO <sub>3</sub> <sup>-</sup> , Cu, Zn, Pb, As, Fe, Cd, Hg, Oil and grease, Coliform	During 3 continuous days, 2 samples at 1 location.	10	30	138,054,000	QCVN 08:2008/ B TNMT
<b>Underground water quality</b>	Temp., pH, hardness, TSS, As, Cd, Pb, Cu, Mn, Zn, CN <sup>-</sup> , Hg, Fe, NO <sub>2</sub> <sup>-</sup> , NO <sub>3</sub> <sup>-</sup> , Cl <sup>-</sup> , SO <sub>4</sub> <sup>2-</sup> , Fecal coli, Coliform	During 3 continuous days, 3 samples at 1 location..	7	21	98,418,600	QCVN 09:2008/ B TNMT
<b>Soil quality</b>	pH <sub>H2O</sub> , Total organic compounds, T-N, T-P, exchange acidity, Cl <sup>-</sup> , SO <sub>4</sub> <sup>2-</sup> , Cu, Zn, Cd, Pb,	During 3 continuous days, 1 sample at 1 location.	7	21	47,264,700	QCVN 03:2008/ B TNMT; QCVN 15:2008/ B TNMT
<b>Construction phase</b>						
<b>Noise</b>	Leq, Lmax, L50	1 time per month, 15 hours per day, 3 times per hour.	14	14	1,533,000	QCVN 26:2010/ BTNMT
<b>Vibration</b>	Velocity, acceleration and frequency	1 time per month, 15 hours per day, 3 times per hour.	13	13	2,376,400	QCVN 27:2010/ B TNMT
<b>Air quality</b>	HC, CO, SO <sub>2</sub> , NO <sub>x</sub> , dust and microclimate	1 time per 3 months, 15 samples at 1 location.	13	13	19,048,900	QCVN 05:2009/ B TNMT QCVN 06:2009/ B TNMT
<b>Surface water quality</b>	Temp, pH, TSS, turbidity, conductivity, BOD, COD, DO, PO <sub>4</sub> <sup>3-</sup> , NO <sub>2</sub> <sup>-</sup> , NO <sub>3</sub> <sup>-</sup> , Cu, Zn, Pb, As,	1 time per month, 2 samples at 1 location	10	10	46,018,000	QCVN 08:2008/ B TNMT

Monitored Item	Parameters	Frequency	Locations	Total sample	Total cost (VND)	Standard
	Fe, Cd, Hg, Oil and grease, Coliform					
<b>Underground water quality</b>	Temp., pH, hardness, TSS, As, Cd, Pb, Cu, Mn, Zn, CN <sup>-</sup> , Hg, Fe, NO <sub>2</sub> <sup>-</sup> , NO <sub>3</sub> <sup>-</sup> , Cl <sup>-</sup> , SO <sub>4</sub> <sup>2-</sup> , Fecal coli, Coliform	1 time per month, 3 samples at 1 location	7	7	32,806,200	QCVN 09:2008/B TNMT
<b>Soil quality</b>	pH <sub>H2O</sub> , Total organic compounds, T-N, T-P, exchange acidity, Cl <sup>-</sup> , SO <sub>4</sub> <sup>2-</sup> , Cu, Zn, Cd, Pb,	1 time per month, 1 sample at 1 location	7	7	15,754,900	QCVN 03:2008/B TNMT; QCVN 15:2008/B TNMT
<b>Operation phase</b>						
<b>Noise</b>	Leq, Lmax, L50	1 time per 6 months during 36 months, 15 hours per day, 3 times per hour.	14	84	9,198,000	QCVN 26:2010/ BTNMT
<b>Vibration</b>	Velocity, acceleration and frequency	1 time per 6 months during 36 months, 15 hours per day, 3 times per hour.	13	78	14,258,400	QCVN 27:2010/B TNMT
<b>Air quality</b>	HC, CO, SO <sub>2</sub> , NO <sub>x</sub> , dust and microclimate	1 time per 6 months during 36 months, 15 samples at 1 location.	13	78	114,293,400	QCVN 05:2009/B TNMT QCVN 06:2009/B TNMT
<b>Surface water quality</b>	Temp, pH, TSS, turbidity, conductivity, BOD, COD, DO, PO <sub>4</sub> <sup>3-</sup> , NO <sub>2</sub> <sup>-</sup> , NO <sub>3</sub> <sup>-</sup> , Cu, Zn, Pb, As, Fe, Cd, Hg, Oil and grease, Coliform	1 time per 6 months during 36 months, 2 samples at 1 location	10	60	276,108,000	QCVN 08:2008/B TNMT
<b>Underground water quality</b>	Temp., pH, hardness, TSS, As, Cd, Pb, Cu, Mn, Zn, CN <sup>-</sup> , Hg, Fe, NO <sub>2</sub> <sup>-</sup> , NO <sub>3</sub> <sup>-</sup> , Cl <sup>-</sup> , SO <sub>4</sub> <sup>2-</sup> , Fecal coli, Coliform	1 time per 6 months during 36 months, 3 samples at 1 location	7	42	196,837,200	QCVN 09:2008/B TNMT
<b>Soil quality</b>	pH <sub>H2O</sub> , Total organic compounds, T-N, T-P, exchange acidity, Cl <sup>-</sup> , SO <sub>4</sub> <sup>2-</sup> , Cu, Zn, Cd, Pb,	1 time per 6 months during 36 months, 1 sample at 1 location	7	42	94,529,400	QCVN 03:2008/B TNMT; QCVN 15:2008/B TNMT
<b>Total cost (VND)</b>					<b>1,175,374,000</b>	

Note: the cost for preconstruction and construction phase is for one monitoring time.

The cost for operation phase is for the whole phase

## **10. PUBLIC CONSULTATIONS**

### **10.1 THE LEGAL REQUIREMENT FOR PUBLIC CONSULTATION**

Public consultation process for EIA is specified as a mandatory content of the EIA report by Article 20, the 2005 Vietnam's Law on Environmental Protection (LEP). It is subsequently elaborated regarding EIA with a number of Decrees by the Government and Circulars by Ministry of Natural Resources and Environment. The latest documents are Decree 29/2011/ND-CP and Circular 26/TT-BTNMT in 2011 in which the public consultation and information disclosure is conducted with commune-level People's Committee (PC) and Fatherland Front Committee (FFC) and representatives of affected communities for every commune/ward/township within the project zone. Affected people will be consulted if and when necessary; normally when the projected environmental impacts could be serious. The one-time public consultation process is required during the preparation of EIA in forms of written letters and meetings.

The public consultation is also required in JBIC Guidelines for Confirmation of Environmental and Social Considerations (2002) and World Bank Environmental and Social Safeguards Policies.

### **10.2 THE PURPOSES OF PUBLIC CONSULTATION**

The key purposes of Public consultation are as follow:

- To know the opinion and awareness of the community about the Project, especially those from directly affected people. This will serve as the basis to solve any disputes arising during Project preparation.
- To listen to the community about their needs and concerns to the Project, especially listening to their voice on direct effects on their life.
- To solve any disputes among community on environmental issues as well as any delays during project implementation.
- To understand the difficulties of the local authority and residential people at the Project site.
- To discuss and receive feedbacks from local governments and affected people
- To Encourage public participation and foster transparency in project processes

### **10.3 THE METHOD OF PUBLIC CONSULTATION ACTION**

Railway project management Unit (RPMU) – VietNam Railway company send Official letter with the project brief description to People's Committee and Fatherland Front of ward/commune in the project areas to consult opinion about the Project.

Various techniques for the public consultation and information disclosure have been introduced, including:



- Sending the project brief that includes a summary of environmental impacts and respective mitigation measures to related PCs and FFCs within the project area for comments.
- Providing project brochures and information leaflets to households along project line.
- Organizing meetings with local governments and people to inform about the project, social and environmental impacts and measures to be taken. Local people are widely invited with notices in public places and local public radio systems.
- Quick surveying 350 households in the project area to receive their perception of the project and its environmental and social impacts.

#### 10.4 RESULTS OF PUBLIC CONSULTATIONS

The following summarizes the public consultation process that was undertaken for the project, the results of the surveys and consultation meetings, and the concerns raised by the stakeholders. The details of the public consultation in 2007 and 2008 are found in Annex D and E.

The public consultation has been conducted by the Project Owner (HURC) twice in 2007 and 2010 as a supplement. In 2007-2008, the first round of public consultation and information disclosure has been made with assistance from consultants following Vietnam environmental laws and JBIC guidelines to (i) inform about the project objective, scope and alignment of railways, bridges, and location of stations; (ii) to inform the key environmental impacts and mitigation measures and (iii) to discuss and get feedbacks from local government and residents.

Consultations in written communication were made in almost all of wards and communes. Meetings were held later in various localities within 6 districts of Hoang Mai, Dong Da, Hoan Kiem, Long Bien, Thanh Tri and Ba Dinh, Hanoi city from 18th October 2007 to 19<sup>th</sup> April 2008. The summary of key information of the public meetings is presented in Table 10.1. The minutes of meetings of public consultation meeting held in 2008 are detailed in Annex D.

**Table 10-1 Summary of Public Meetings during EIA 2008**

Date/Time/Place	Participants	Key issues raised
9AM 25/10/2007 Thanh Tri District PC office meeting room	Total: 42 Dist. PC Representative: 3 Commune PC Rep: 6 Project Owner Rep: 2 EIA consultant: 2 TA consultant: 1 Local resident: 28	Detailed information about project progress and land clearance should be provided when available. Ground leveling should be considered in construction of resettlement sites. Livelihood restoration and provision of utilities for displaced people.
8.30AM,28/3/2008 Thin Liet Ward-Hoang Mai District PC office meeting room	Total: 28 PC Representative: 3 FFC Representative: 1 Project Owner Rep: 1 EIA consultant: 2 TA consultant: 1 Local residents: 20	More detailed information should provided about size of project, resettlement and compensation Environmental protection should be prioritized.
8.30 AM, 19/4/2008 Hoang Liet Commune-	Total: 24	Timely implementation of the project is very important in minimizing impacts.

Hoang Mai District PC office meeting room	PC Representative: 9 FFC Representative: 2 Project Owner Rep: 2 EIA consultant: 2 Local resident: 19	Compensation with land should be considered
8.30AM, 19/3/2008 Phuong Liet Ward- Thanh Xuan District PC office meeting room	Total: 42 PC Representative: 8 FFC Representative: 0 Police Representative: 1 Women's Union Rep: 1 Youth's Union Rep: 1 Communities Rep: 5 Project Owner Rep: 2 EIA consultants 3 TA consultant: 1 Local resident: 20	Environmental problems require proper and timely measures. Land acquisition and compensation must be done according current laws and coordination between Project Owner and local stakeholder is crucial. High consensus on the project among local government and residents
9AM, 9/11/2007 Dong Da District PC office meeting room	Total: about 30 Dist. PC Representative: 6 Dist. FFC Rep: 1 Ward PC Rep: 8 Project Owner Rep: 1 EIA consultant: 3 TA consultant: 1 Local resident: >7 (some names missing)	Further information of project alternatives should be provided. Consider to build railways outside the city.
2PM, 11/4/2008 Phuc Xa Ward- Ba Dinh District PC office meeting room	Total: 39 PC Representative: 9 FFC Representative: 1 Police Representative: 1 Project Owner Rep: 2 EIA consultant: 4 Local resident: 22	Information about resettlement and compensation should be disclosed on time.
3PM, 10/4/2008 Dien Bien Ward- Ba Dinh District PC office meeting room	Total: 49 PC Representative: 8 FFC Representative: 1 Police Representative: 2 Women's Union Rep: 1 Project Owner Rep: 2 Company: 1 EIA consultants 2 TA consultant: 2 Local resident: 30	Environmental problems require proper and timely measures. Land acquisition and compensation must be done according current laws and coordination between Project Owner and local stakeholder is crucial. High consensus on the project among local government and residents
2PM, 7/11/2007 Cua Nam Ward- Hoan Kiem District PC office meeting room	Total: 28 PC Representative: 6 FFC Representative: 1 Women's Union Rep: 1 Project Owner Rep: 2 EIA consultant: 2 TA consultant: 2 Local residents: 14	Environmental problems require proper and timely measures. Land acquisition and compensation must be done according current laws and coordination between Project Owner and local stakeholder is crucial. High consensus on the project among local government and residents
2PM, 18/10/2007 Dong Xuan Ward- Hoan	Total: 69	Environmental problems require proper and timely measures

Kiem District PC office meeting room	PC Representative: 1 JBIC Representative:2 Project Owner Rep: 3 EIA consultant: 2 TA consultant: 1 Local residents: 60	Land acquisition and compensation must be done according current laws High consensus on the project among local government and residents
8.30AM,27/3/2008 Long Bien District PC office meeting room	Total: 28 Dist. PC Representative: 9 Ward PC Rep: 4 Traffic Police Rep: 1 Project Owner Rep: 1 EIA consultant: 2 TA consultant: 1 Local resident: 8	The use of land beneath the elevated railway.  Progress of project  Coordination between Project Owner and local government in land clearance.

Beside district/ward representatives, traffic police representatives, project owner representative and EIA consultant. The total affected people were consulted in 2008 was 238.

In 2010 the supplementary public consultation was held in all 7 districts to inform adjustments in project coverage and include 12 newly added wards. In this round covered only the written communication with People's Committees and Fatherland Front Committees that were not consulted in 2008.

Table 10.2 presented the comments and environmental issues raised by the stakeholders from district/ communal authorities by written communications in 2008 and 2010. In general opinions of people in the project area are in favor of the implementation of the project.

**Table 10.2 Comments from district/ communal authorities by written communications in 2008 and 2010**

	District	Date		Wards/ Communes	Opinions/Comments
		2007- 2008	2010		
1	Thanh Tri	x		Lien Ninh	- Agree with the Project - Attention should be paid to the drainage system for the project
		x		Vinh Quynh	- Agree with the Project - Compensation should be made properly before construction - Noise and dust should be minimized and drainage system should be protected.
		x		Van Dien	- Agree with the Project - Although Option 1b for the Project is more costly it should be selected because it suits better with the long term planning.
		x		Ngoc Hoi	- Agree with the Project - Collaboration between the Project Owner and local authority should be fostered to minimize social and environmental impacts. - Local people agree with the Project and willing to relocate for the Project implementation
2	Hoang Mai	x		Hoang Liet	- People in the ward agree with the project and hope that it will complete soon.

					<ul style="list-style-type: none"> <li>- The project owner should have strict schedule of project construction and operation so that the impact on people's life is minimized.</li> <li>- Ward people suggest compensation with land.</li> </ul>
		x		Thinh Liet	<ul style="list-style-type: none"> <li>- Local government agrees with the project and the project will meet increasing travel demand.</li> <li>- Suggesting people to support and continue promulgating the surrounding people to support the project.</li> <li>- Project Owner should pay attention in construction stage especially obstructing the existing roads and building temporary roads for construction.</li> <li>- The ward will cooperate with RPMU to answer residents' questions.</li> </ul> <p>Before informing the land acquisition data in the next step, the Project Owner should carry out the collection of existing data carefully and clearly.</p>
		x		Giap Bat	<p>Agree with the Project and the Project should start as soon as possible</p> <p>More detailed information about the train technology and construction techniques should be provided.</p>
				Dinh Cong	Agree with the Project and its impact and mitigation measures
3	Thanh Xuan	x		Phuong Liet	<ul style="list-style-type: none"> <li>- The transportation of construction materials does not affect on traffic and people's life.</li> <li>- Project owner should organize sensibly construction plan in order to avoid pollution of air, wastewater, solid waste and noise, and then to minimize the negative environmental impacts on people in the residential areas along the railway, considering the 25 residential clusters from the Vong intersection.</li> <li>- Agree with investment of HURC1 and recommend the investor to comply with guidelines for assessing environmental impacts. Project owner is responsible to compensate for damage on environment, health and production.</li> </ul>
4	Dong Da		x	Phuong Mai	<ul style="list-style-type: none"> <li>- Project owner need to do better coordination with the PC and other agencies of the ward, population groups and residential areas in the project area.</li> <li>- Propagate workers and staffs to be responsible for environmental protection, resist traffic jam, ensure traffic safety.</li> <li>- Propose RPMU to work and discuss with local government periodically.</li> </ul>

		x	Phuong Lien	<p>The project will causes:</p> <ul style="list-style-type: none"> <li>- Changes in geology cause land subsidence, landslides and cracking the works surrounding the project.</li> <li>- Air pollution, wastewater and disturb the daily life of the people.</li> <li>- Complaints about the complex social issues.</li> </ul> <p>Project owner should:</p> <ul style="list-style-type: none"> <li>- Implement measures to ensure construction safety and property status of the people in the area.</li> <li>- Maintain measures to prevent pollution and noise.</li> <li>- Comply with regulations and procedures of state agencies in the process of project implementation, ensuring publicity, democracy and consensus.</li> </ul>
		x	Trung Phung	<ul style="list-style-type: none"> <li>- Negative effects of project on the environment are mainly dust and noise. In addition, on Le Duan street, there are a number of household businesses affected by the clearance of the project area (70 households).</li> <li>- The project owner needs to use advanced and modern technology to minimize negative impacts on environment.</li> <li>- Project owner need to pay special attention to the inspection, construction supervision, construction quality, ensure strict implementation of the construction schedule, should not extend to affect the quality of works and activities of the people.</li> </ul>
		x	Van Mieu	<ul style="list-style-type: none"> <li>- Agree with the Project.</li> <li>- The project owner and contractors should comply strictly with environmental protection measures so the impacts are least to local people.</li> <li>- Due attention should be paid to traffic during construction.</li> <li>- Noise and vibration should be minimized especially for households within 10m from construction.</li> </ul>
		x	Kham Thien	<ul style="list-style-type: none"> <li>- Agree with the Project</li> <li>- Pay attention to the aesthetic aspect of the project</li> <li>- Noise and dust barriers should be installed</li> <li>- The project should start and complete in due time</li> </ul>
5	Hoan Kiem	x	Dong Xuan	<ul style="list-style-type: none"> <li>- Agree with the Project</li> <li>- Noise and dust should be minimized during construction</li> <li>- Construction activities should be avoided in rush hours</li> </ul>
		x	Cua Nam	<ul style="list-style-type: none"> <li>- Local authorities agree with the project.</li> <li>- The project should be implemented democratically and publicly, especially the compensation for the households. The Project Owner should coordinate with the local authority and the relevant agencies to ensure the living condition of the people and minimize the negative matters arising during the implementation of the project.</li> <li>- The Project Owner should have adequate measures to minimize impacts on the environment and during land acquisition.</li> </ul> <p>The people are kindly to create favorable condition for the investor to carry out the survey and facilitate the project.</p>

		x	Hang Bong	<ul style="list-style-type: none"> <li>- The project will cause impacts to the natural landscape and socio-economic sector. The project needs to pay attention to ground clearance, resettlement issues compensation, the issue of population movement and noise.</li> <li>- Solutions and measures to mitigate the negative impact of a project on should more focus on: propagate to households about the project, settling in places (if any) and adequate compensation money on time, during construction process, need to ensure the normal travel of people, avoid too much noise.</li> <li>- The Project Owner must comply with environmental laws, implement well measures to minimize impacts in order to manage and protect environment during project implementation.</li> <li>- Need to ensure high quality of the project.</li> </ul>
		x	Cua Dong	<ul style="list-style-type: none"> <li>- Have no negative impacts on natural environment and socio-economic situation.</li> <li>- Need a good shielding of the project, ensuring safe railway corridors when coming into operation, creating favorable conditions as well as the needs of households living within the project.</li> <li>- Should minimize noise when the train passes through and the waste on board thrown down, keep order and security at the train station and general hygiene.</li> </ul>
		x	Hang Ma	<p>The construction and building urban railways will have negative environmental impacts such as dust, constant high noise will affect the health of people especially children and the elderly, affect activities, trade and travel of people.</p> <ul style="list-style-type: none"> <li>- During construction, contractor should water to reduce dust, install proper shielding to ensure safe, arranging staffs to protect dangerous areas; construction hours should not exceed 22:00, avoid damaging the buildings and underground infrastructure (water supply, power, communications..).</li> <li>- Need early markers for landmark.</li> <li>- There should be adequate compensation to support people; the resettlement houses should ensure quality and comfort.</li> </ul>
		x	Nguyen Trung Truc	<ul style="list-style-type: none"> <li>- Agreed with the report.</li> <li>- Agreed on measures to minimize adverse impacts of the project launched.</li> <li>- Project owners work closely with government agencies and unions to implement the project achieved good results.</li> <li>- Ensure traffic safety, environmental protection.</li> <li>- Educate workers to have a sense of responsibility in implementation of project.</li> </ul>

6	Ba Dinh	x		Phuc Xa	<p>- The negative impacts of the project include noise, air pollution, population relocation and site clearance will spend the state budget, destabilizing the life of a part of population, clearance Long Bien market affects the business.</p> <p>- Minimize level of noise, waste, air emissions.</p> <p>- Make good propaganda and mobilization for households to be site clearance, compensation for the right audience, fair democratic regulations.</p> <p>- Must coordinate with other professional bodies and localities to implement fully the process of clearance under the provisions of the Land Law.</p>
		x		Dien Bien	<p>- Agree to summary report of environmental impact assessment.</p> <p>- Agree to measures to minimize the adverse impact of the project.</p> <p>- Project owner needs to pay close attention to project and impulse the project to be conducted as schedule.</p> <p>- Project owner needs to closely coordinate with local authorities.</p> <p>- Educate workers to have a sense of responsibility in implementation of project.</p>
7	Long Bien		x	Ngoc Thuy	<p>- Agree with the Project</p> <p>- Collaboration between the Project Owner and local authority should be tightened before, during and after construction</p> <p>- Information should be disclosed to all concerned stakeholders.</p>
			x	Ngoc Lam	No report
			x	Gia Thuy	<p>- Agree with the contents presented in the above report of project owner.</p> <p>- Propose project owner to seriously implement mitigation measures of impacts, prevent and response to environmental incidents presented in the above report of the project.</p> <p>- Propose project owner to ensure the objectives and principles of LAR plan, implement schedule to minimize the impact on the lives of the people.</p> <p>- Propose project owner coordinate closely with local governments during project implementation.</p>
			x	Thuong Thanh	<p>- Fully agree with the contents as stated in the project.</p> <p>- Focus on specific policy mechanism to address site clearance and compensation as schedule.</p>
			x	Duc Giang	- Agree with the Project and mitigation measures

### **Summary of comments from local residents**

- Total 14 wards were consulted in 2008 and 12 wards were consulted in 2010
- People agree and wish the project would be implemented soon
- The Project Owner should further promote dissemination of information and benefits and impacts of the project on mass media to local people.
- More detailed information about the project area, land acquisition, clearance boundary, relocation of affected households within the project area should be provided.

- Policies of land clearance and resettlement should be adequate, appropriate and practical to ensure openness and transparency.
- Environmental impacts during construction (air, noise, vibration, transportation, etc.) should be dealt properly with strong commitment by the Project Owner and other stakeholders in the implementation of mitigation measures and corrective actions.
- The resettlement area should be ensured with the conditions for the daily activities for displaced people (electricity, water, transportation, etc. )



## 11. RECOMMENDATION TO VNR AND RPMU ON REVISING EIA REPORTS

After reviewing the EIA report (2008) and the supplement EIA report (2010), we recommend the following to the project owner.

- The contents of this revised EIA report for JICA should be incorporated in the EIA reports for Phase 1 and 2a that are to be submitted to MOT.
- The description of the alternative analysis should be more detailed with the comparison of costs and environmental and social impacts for each alternative.
- The description of impact and mitigation measures for subsidence is not enough. More detailed information about expected impacts and mitigation measures are needed. A plan and system to monitor subsidence at the project site and surrounding areas during the construction and operation periods should be developed.
- The EMP implementing organization during operation must be organized when the operation and management organizations for the elevated railway itself are determined.
- Based on the contents of this revised EIA report for JICA, update and recalculate the costs for mitigation measures, EMP, etc. Clarify the process to secure the budget for the costs.
- The EIA report submitted to MOT should be disclosed in the same manner as in 2008 for an appropriate length of time, and RPMU should continue to be open to receive comments/opinions from public concerning the project and its EIA report.
- RPMU should continue with and strength the information dissemination about the project. When there is a time lag after the previous public meetings and before the actual commencement of ground works, it is assumed that some of the residents around the project site moved in recently and are not informed about the project. Therefore, it may be necessary to hold public meetings just before the commencement of ground works.
- Additional public meetings are necessary, when the project design is changed and it leads to changes in impacts
- If further stakeholder meetings are to be held in future, detailed information on meetings, such as the date, venue, purpose of meetings, the number of participants, stakeholder group types, minutes of meetings with full records of dialogues between participants and hosts, pictures, etc., should be kept systematically.

## REFERENCES

1. Binh Duong People Committee (2011). Decision No. 3078/QD-UBND on the unit price of environmental monitoring activities in the province.
2. Center for Technological Science and Transport Environment Protection, (2008), Environmental Impact Assessment of Hanoi elevated Railway Project (Ngoc Hoi - Yen Vien section).
3. Hanoi Statistical office, 2011. Hanoi Statistical Yearbook 2010
4. Railway Projects Management Unit (RPMU), (2011), Report on Supplemental Environmental Impact Assessment (Draft): Engineering Consulting Services fo Ha Noi City Urban Railway Construction Project Line 1 - Phase1.
5. Scientific and Technological Center for Environment Protection in Transportation, (2008), Report of public consultation: Ha Noi elevated railway project Ngoc Hoi – Yen Vien section.
6. Transport Investment and Construction Consultant Joint Stock Company, (2008), Land Acquisition Plan: Ha Noi Urban Railway Construction Project, Line 1-Phase1.

**ANNEX A METHODOLOGY FOR NATURAL ENVIRONMENT COMPONENT ANALYSIS**

**A1 The EIA sampling location**

<b>N<sup>o</sup></b>	<b>Item</b>	<b>Location</b>	<b>Notation</b>
1	Air, Noise, Vibration measuring and sampling	Ngoc Hoi station complex 1	KK1, NS1, VS1
		Ngoc Hoi station complex 2	KK2, NS2, VS2
		Ngoc Hoi station complex 3	KK3, NS3, VS3
		Bach Mai station	KK4, NS4, VS4
		Thong Nhat Park station	KK5, NS5, VS5
		Phung Hung station	KK6, NS6, VS6
		Gia Lam station	KK7, NS7, VS7
2	Surface water sampling	Ngoc Hoi station complex 1	NM1
		Ngoc Hoi station complex 2	NM2
		Ngoc Hoi station complex 3	NM3
		Ba Mau lake	NM4
		Long Bien bridge (upstream)	NM5
3	Underground water sampling	02 residential areas nearby Ngoc Hoi industrial zone	NN1, NN2,
		Residential area nearby Gia Lam station	NN3
		Residential area nearby Kham Thien street	NN4
4	Soil sampling	Ngoc Hoi station complex 1	D1
		Ngoc Hoi station complex 2	D2
		Ngoc Hoi station complex 3	D3
		Long Bien bridge	D4

## **A.2 Air quality monitoring**

\* *Methodology:* Following the regulations on air monitoring of MONRE and Viet Nam National Standards about the environmental parameter monitoring and analyzing, comparing the results basing on the application of QCVN 05:2009 and QCVN 06:2009 (National Technical Regulation on Ambient Air quality).

\* *Parameters:* CO, NO<sub>x</sub>, SO<sub>2</sub>, HC, TDS and some microclimate parameters include: temperature, humidity, pressure, wind velocity, wind direction.

\* *Frequency:* One day per time, 8 measuring times at 1 location during 16 hours (from 6am to 10pm).

\* *Equipment:* DustScan Scout Aerosol Monitor.

\* *Analysis method:*

<b>Parameter</b>	<b>Method</b>
CO	Chromatography following TCVN 5972-1995 or folin-Ciocalteu testing method
NO <sub>2</sub>	Griss-Saltman method following ISO 6768/1995
SO <sub>2</sub>	Tetracloromercurat (TCM/pararosanilin) following TCVN 5971-1995
TDS	Weight measurement following TCVN 5067-1995
HC	Chromatography
Temperature	Thermometer (°C)
Air humidity	Humidistat
Air pressure	Air pressure gauge
Wind velocity, direction	Wind gauge

## **A.3 Noise and Vibration monitoring**

\* *Methodology:* the sampling and analysing is based on the standard methods according to MONRE's requirement and the devices' calibration.

- The sampling location is positioned with GPS.

- Reference standard: TCVN 5949:1998 (Acoustics – Noise in public and residential areas); TCVN 6962:2001 (Vibration and Shock – vibration emitted by construction works and factories – Maximum permitted levels in the environment of public and residential areas).

\* *Parameters:*

- Noise level Leq, Lamax, L50; vibration acceleration, velocity and frequency.

\* *Frequency:* one day per time, 3 times/hrs during 16 hrs (from 6am to 10pm) at each location.

\* *Equipment:*

- Rion NL-21, Japan; Japanese Riovibro model VM53 RION. The equipments are calibrated before used.

#### **A.4 Surface water quality monitoring**

*\* Methodology:*

- The sampling and analysing is based on the standard methods according to MONRE's requirement and the devices' calibration.
- The sampling location is positioned with GPS.
- Reference Standard: QCVN 08:2008/BTNMT- B1: (National Technical Regulation on surface water quality).

*\* Parameters:*

- The parameters include: pH, temperature, turbidity, conductivity, DO, COD, BOD<sub>5</sub>, TSS, PO<sub>4</sub><sup>3-</sup>, NO<sub>2</sub><sup>-</sup>, NO<sub>3</sub><sup>-</sup>, Cu, Zn, Pb, As, Fe, Cd, Hg, Coli form, grease and oil.

*\* Frequency:*

- One day per time, 2 samples each day (morning and afternoon) for each location.

*\* Equipment:*

- The parameters such as: pH, temperature, conductivity, DO are measured on-site with American YSI water measurement device,.
- Others such as: TSS, BOD<sub>5</sub>, Coliform, oil and grease, Cu,... will be sampled, preserved and analyzed later. The equipment are calibrated before used.

*\* Analysis method:*

<b>Parameter</b>	<b>Analysis Method-Equipment</b>
<b>Physical parameters</b>	
pH	pH meter
Temperature	Thermometer
Turbidity	Spectrophotometer
TSS	Weight method
DO	DO meter
<b>Non-organic parameter</b>	
Alkalinity	Titration method
Acidity	Titration method
Total -N	Macro - Kjeldahl
Total - P	SnCl <sub>2</sub> method

Parameter	Analysis Method-Equipment
<b>Organic parameter</b>	
BOD <sub>5</sub>	5 day BOD Test
COD	Convolution boiling method
Oil and grease	Extraction method
<b>Heavy metal</b>	
Fe, Cd, Hg, As	Nuclear absorption spectrum method
<b>Micro-organism</b>	
Coliform	Filter

### **A.5 Underground water quality monitoring**

*\* Methodology:*

- The sampling and analysing is based on the standard methods according to MONRE's requirement and the devices' calibration.
- The sampling location is positioned with GPS.
- Reference Standard: QCVN 09:2008/BTNMT- B1: (National Technical Regulation on underground water quality).

*\* Parameters:*

- The parameters include: temperature, pH, hardness, TSS, As, Cd, Pb, Cu, Mn, Zn, CN<sup>-</sup>, Hg, Fe, NO<sub>2</sub><sup>-</sup>, NO<sub>3</sub><sup>-</sup>, Cl<sup>-</sup>, SO<sub>4</sub><sup>2-</sup>, Fecal coli, Coli form.

*\* Frequency:*

- One day per time, 3 samples for each location.

*\* Equipment:*

- The parameters such as: pH, temperature, conductivity, DO are measured on-site with American YSI water measurement device, the rest will be sampled, preserved and analyzed later in the lab.

*\* Analysis method:*

Parameter	Analysis Method-Equipment
<b>Physical parameters</b>	
pH	pH meter
Màu	Spectrophotometer
TDS	HACH
DO	DO portable meter

Parameter	Analysis Method-Equipment
<b>Non-organic parameter</b>	
Alkalinity	Titration method
Acidity	Titration method
Hardness	Spectrophotometer
NO <sub>3</sub> <sup>-</sup>	Spectrophotometer
SO <sub>4</sub> <sup>2-</sup>	Spectrophotometer
<b>Organic parameter</b>	
BOD <sub>5</sub>	5 day BOD Test
COD	Convolution boiling method
Grease and oil	Extraction method
<b>Heavy metal</b>	
Fe, Cd, Pb, Hg, As	Nuclear absorption spectrum method
<b>Micro-organism</b>	
Ecoli and Coliform	Filter

### **A.6 Soil quality monitoring**

*\* Methodology:*

- Samples are taken on-site and analyzed later in the lab.
- The sampling location is positioned with GPS.
- Reference Standard: QCVN 03:2008/BTNMT: (National Technical Regulation on the allowable limits of heavy metals in the soils) and QCVN 15:2008/BTNMT (National Technical Regulation on the pesticide residues in the soils).

*\* Analysis method:*

TN <sup>o</sup>	Parameters	Method
1	pH <sub>H2O</sub>	pH met
2	Total organic matter	Chemical method
3	Exchanging acidity	Titration and pH met

## ANNEX B NOISE AND VIBRATION RESULTS

**Table B.1 Results of noise measurement at NS1 and NS2 (dBA)**

No	Time	Monitoring results						QCVN 26:2010/BTNMT
		L <sub>eq</sub>		L <sub>amax</sub>		L <sub>50</sub>		
		NS1	NS2	NS1	NS2	NS1	NS2	
1	6:00 - 7:00	58.1	60.8	72.0	82.3	55.2	55.9	Average from 6:00 to 21:00: 70dBA Average from 21:00 to 6:00:50dBA
2	7:00 - 8:00	61.3	65.8	73.7	82.1	57.6	59.4	
3	8:00 - 9:00	60.8	68.0	79.1	85.9	54.6	61.0	
4	9:00 - 10:00	61.0	63.1	80.3	80.2	54.7	56.7	
5	10:00 - 11:00	55.9	65.1	68.5	80.4	53.1	58.1	
6	11:00 - 12:00	63.1	63.6	76.4	77.7	54.4	57.2	
7	12:00 - 13:00	62.2	64.7	78.3	81.8	56.0	56.7	
8	13:00 - 14:00	56.7	62.5	73.7	78.7	58.9	56.3	
9	14:00 - 15:00	53.1	63.4	70.1	82.1	48.8	56.0	
10	15:00 - 16:00	52.2	66.1	66.1	84.5	50.0	58.7	
11	16:00 - 17:00	61.0	63.9	80.6	82.7	51.2	55.6	
12	17:00 - 18:00	63.4	64.4	81.7	81.9	52.8	54.4	
13	18:00 - 19:00	53.1	62.5	78.2	78.8	47.3	52.2	
14	19:00 - 20:00	52.5	63.3	66.3	75.0	46.0	50.8	
15	20:00 - 21:00	54.5	60.3	68.1	71.6	46.6	50.1	
16	21:00 - 22:00	53.9	58.3	63.3	71.0	48.3	48.8	
<b>Average from 6:00 to 21:00</b>		<b>57.9</b>	<b>63.8</b>	<b>74.2</b>	<b>80.4</b>	<b>52.5</b>	<b>55.9</b>	
<b>Average from 21:00 to 6:00</b>		<b>53.9</b>	<b>58.3</b>	<b>63.3</b>	<b>71.0</b>	<b>48.3</b>	<b>55.9</b>	

**Table B2. Results of noise measurement at NS3 and NS4 (dBA)**

No	Time	Monitoring results						QCVN 26:2010/BTNMT
		L <sub>eq</sub>		L <sub>amax</sub>		L <sub>50</sub>		
		NS3	NS4	NS3	NS4	NS3	NS4	
1	6:00 - 7:00	64.5	69.8	78.3	89.2	56.7	67.9	



2	7:00 - 8:00	66.2	72.3	80.7	83.9	57.7	70.8
3	8:00 - 9:00	68.2	72.0	84.9	85.3	61.1	70.8
4	9:00 - 10:00	65.7	71.8	83.1	85.3	58.5	70.3
5	10:00 - 11:00	68.4	73.5	87.6	88.6	61.3	71.0
6	11:00 - 12:00	70.1	71.7	84.4	87.0	65.6	70.4
7	12:00 - 13:00	64.5	71.4	84.5	85.1	56.3	69.0
8	13:00 - 14:00	62.7	70.6	77.7	87.1	56.2	68.7
9	14:00 - 15:00	64.4	71.0	84.5	83.4	59.0	69.8
10	15:00 - 16:00	66.1	76.9	84.7	92.5	60.2	70.6
11	16:00 - 17:00	65.6	72.3	85.0	86.2	61.9	71.1
12	17:00 - 18:00	63.4	73.7	85.8	85.7	57.2	72.3
13	18:00 - 19:00	65.8	72.6	85.2	84.6	55.2	71.2
14	19:00 - 20:00	61.3	66.8	79.1	85.5	53.9	65.4
15	20:00 - 21:00	61.1	65.6	79.4	84.3	53.4	64.2
16	21:00 - 22:00	61.3	63.0	75.7	85.0	52.4	61.6
<b>Average from 6:00 to 21:00</b>		<b>65.2</b>	<b>71.5</b>	<b>83.0</b>	<b>86.2</b>	<b>58.3</b>	<b>69.6</b>
<b>Average from 21:00 to 6:00</b>		<b>61.3</b>	<b>63.0</b>	<b>75.7</b>	<b>85.0</b>	<b>52.4</b>	<b>61.6</b>

Average from 6:00 to 21:00: 70dBA  
Average from 21:00 to 6:00: 50dBA

**Table B3. Results of noise measurement at NS5 and NS6 (dBA)**

No	Time	Monitoring results						QCVN 26:2010/BTNM T
		Leq		Lamax		L50		
		NS5	NS6	NS5	NS6	NS5	NS6	
1	6:00 - 7:00	75.0	73.6	86.6	85.3	73.2	71.8	
2	7:00 - 8:00	69.7	73.7	81.3	85.3	67.9	71.9	
3	8:00 - 9:00	71.1	73.1	82.8	84.8	69.3	71.3	
4	9:00 - 10:00	71.1	73.1	82.8	84.8	69.3	71.3	
5	10:00 - 11:00	74.4	76.4	86.1	88.1	72.6	74.6	
6	11:00 - 12:00	72.8	74.8	84.5	86.5	71.0	73.0	

Average from 6:00 to 21:00: 70dBA  
Average from 21:00 to 6:00: 50dBA

7	12:00 - 13:00	70.9	72.9	82.6	84.6	69.1	71.1
8	13:00 - 14:00	72.9	74.9	84.6	86.6	71.1	73.1
9	14:00 - 15:00	69.2	71.2	80.9	82.9	67.4	69.4
10	15:00 - 16:00	74.3	73.2	85.9	84.9	72.5	71.4
11	16:00 - 17:00	72.0	74.0	83.7	85.7	70.2	72.2
12	17:00 - 18:00	71.5	73.5	83.2	85.2	69.7	71.7
13	18:00 - 19:00	70.4	72.4	82.0	84.0	68.6	70.6
14	19:00 - 20:00	71.3	73.3	83.0	85.0	69.5	71.5
15	20:00 - 21:00	70.1	72.1	81.7	83.7	68.3	70.3
16	21:00 - 22:00	70.8	72.8	82.4	84.4	69.0	71.0
<b>Average from 6:00 to 21:00</b>		<b>71.8</b>	<b>73.5</b>	<b>83.4</b>	<b>85.2</b>	<b>70.0</b>	<b>71.7</b>
<b>Average from 21:00 to 6:00</b>		<b>70.8</b>	<b>72.8</b>	<b>82.4</b>	<b>84.4</b>	<b>69.0</b>	<b>71.0</b>

**B4 Results of noise measurement at NS7 (dBA)**

No	Time	Monitoring results			QCVN 26:2010/BTN MT
		Leq	Lamax	L50	
1	6:00 - 7:00	76.1	96.5	69.3	Average from 6:00 to 21:00: 70dBA  Average from 21:00 to 6:00: 50dBA
2	7:00 - 8:00	68.4	82.7	61.6	
3	8:00 - 9:00	74.9	92.3	67.7	
4	9:00 - 10:00	68.9	82.7	66.3	
5	10:00 - 11:00	68.2	85.1	65.3	
6	11:00 - 12:00	72.2	88.1	68.4	
7	12:00 - 13:00	81.9	98.7	69.8	
8	13:00 - 14:00	12:00 - 13:00	81.9	65.6	
9	14:00 - 15:00	72.9	93.5	65.9	
10	15:00 - 16:00	72.3	90.4	64.1	
11	16:00 - 17:00	69.5	84.6	68.4	
12	17:00 - 18:00	75.8	93.0	65.7	
13	18:00 - 19:00	73.7	90.1	64.6	

14	19:00 - 20:00	72.6	89.0	65.5
15	20:00 - 21:00	73.5	89.9	59.5
16	21:00 - 22:00	67.5	83.9	54.4
<b>Average from 6:00 to 21:00</b>		<b>72.6</b>	<b>89.4</b>	<b>65.8</b>
<b>Average from 21:00 to 6:00</b>		<b>62.4</b>	<b>78.8</b>	<b>54.4</b>

Source: Center for Environmental Protection in Transport, April 2010

**B.5 Results of vibration measurement at V1, V2 and V3**

No	Time	Results						QCVN 27:2010/BTNMT (Vibration acceleration - m/s <sup>2</sup> )
		V1		V2		V3		
		<i>L</i> <sub>aeq</sub> (m/s <sup>2</sup> )	<i>L</i> <sub>veq</sub> (m/s)	<i>L</i> <sub>aeq</sub> (m/s <sup>2</sup> )	<i>L</i> <sub>veq</sub> (m/s)	<i>L</i> <sub>aeq</sub> (m/s <sup>2</sup> )	<i>L</i> <sub>veq</sub> (m/s)	
1	6:00 - 7:00	0.00062	0.0003	0.00197	0.00107	0.00980	0.00277	Average from 6:00 to 21:00: 0.030 Average from 21:00 to 6:00: 0.010
2	7:00 - 8:00	0.00090	0.0004	0.00274	0.00168	0.00798	0.00258	
3	8:00 - 9:00	0.00124	0.0006	0.00375	0.00247	0.00974	0.00287	
4	9:00 - 10:00	0.00186	0.0013	0.00387	0.00266	0.00915	0.00264	
5	10:00 - 11:00	0.00266	0.0020	0.00659	0.00250	0.00790	0.00284	
6	11:00 - 12:00	0.00251	0.0021	0.00606	0.00229	0.00735	0.00235	
7	12:00 - 13:00	0.00127	0.0009	0.00408	0.00223	0.00309	0.00158	
8	13:00 - 14:00	0.00272	0.0020	0.00446	0.00212	0.00829	0.00298	
9	14:00 - 15:00	0.00272	0.0017	0.01059	0.00241	0.00827	0.00265	
10	15:00 - 16:00	0.00207	0.0009	0.00958	0.00276	0.00850	0.00326	
11	16:00 - 17:00	0.00213	0.0011	0.00907	0.00242	0.00817	0.00319	
12	17:00 - 18:00	0.00222	0.0011	0.00842	0.00404	0.00717	0.00286	
13	18:00 - 19:00	0.00083	0.0006	0.01013	0.00205	0.00425	0.00209	
14	19:00 - 20:00	0.00087	0.0005	0.00881	0.00221	0.00250	0.00130	
15	20:00 - 21:00	0.00069	0.0005	0.00724	0.00230	0.00219	0.00110	
16	21:00 - 22:00	0.00072	0.0005	0.00588	0.00221	0.00210	0.00121	
<b>Average 6:00 to 21:00</b>		<b>0.00169</b>	<b>0.00107</b>	<b>0.00649</b>	<b>0.00235</b>	<b>0.00696</b>	<b>0.00247</b>	

<b>Average 21:00 to 6:00</b>	<b>0.00072</b>	<b>0.0005</b>	<b>0.00588</b>	<b>0.00221</b>	<b>0.00210</b>	<b>0.00121</b>	
------------------------------	----------------	---------------	----------------	----------------	----------------	----------------	--

**B6 Results of vibration measurement at V4, V5 and V6**

No	Time	Results						QCVN 27:2010/BTNMT (Vibration acceleration - m/s <sup>2</sup> )
		V4		V5		V6		
		<i>La<sub>eq</sub></i> (m/s <sup>2</sup> )	<i>L<sub>Ve</sub></i> (m/s)	<i>La<sub>eq</sub></i> (m/s <sup>2</sup> )	<i>L<sub>Ve</sub></i> (m/s)	<i>La<sub>eq</sub></i> (m/s <sup>2</sup> )	<i>L<sub>Ve</sub></i> (m/s)	
1	6:00 - 7:00	0.01491	0.00505	0.01034	0.00398	0.01039	0.00398	Average from 6:00 to 21:00: 0.030 Average from 21:00 to 6:00: 0.010
2	7:00 - 8:00	0.01393	0.00470	0.00971	0.00408	0.01016	0.00422	
3	8:00 - 9:00	0.01657	0.00523	0.01152	0.00455	0.01229	0.00475	
4	9:00 - 10:00	0.01528	0.00481	0.01059	0.00386	0.01139	0.00404	
5	10:00 - 11:00	0.01645	0.00518	0.01141	0.00431	0.01222	0.00430	
6	11:00 - 12:00	0.01212	0.00428	0.00841	0.00329	0.00928	0.00353	
7	12:00 - 13:00	0.00722	0.00288	0.00499	0.00199	0.00543	0.00206	
8	13:00 - 14:00	0.01409	0.00544	0.00981	0.00456	0.01058	0.00502	
9	14:00 - 15:00	0.01386	0.00484	0.00967	0.00435	0.00769	0.00346	
10	15:00 - 16:00	0.01438	0.00594	0.01003	0.00485	0.00798	0.00386	
11	16:00 - 17:00	0.01753	0.00581	0.01220	0.00505	0.00971	0.00401	
12	17:00 - 18:00	0.01731	0.00602	0.01202	0.00474	0.00956	0.00377	
13	18:00 - 19:00	0.01590	0.00458	0.01103	0.00355	0.00878	0.00282	
14	19:00 - 20:00	0.01181	0.00527	0.00820	0.00285	0.00652	0.00226	
15	20:00 - 21:00	0.00785	0.00418	0.00544	0.00184	0.00432	0.00147	
16	21:00 - 22:00	0.00546	0.00290	0.00377	0.00143	0.00300	0.00114	
<b>Average 6:00 to 21:00</b>		<b>0.01395</b>	<b>0.00495</b>	<b>0.00969</b>	<b>0.00386</b>	<b>0.00909</b>	<b>0.00357</b>	
<b>Average 21:00 to 6:00</b>		<b>0.00546</b>	<b>0.00290</b>	<b>0.00377</b>	<b>0.00143</b>	<b>0.00300</b>	<b>0.00114</b>	

**B7 Results of vibration measurement at V7**

No	Time	Results		QCVN 27:2010/BTNMT (Vibration acceleration - m/s <sup>2</sup> )
		<i>La<sub>eq</sub></i> (m/s <sup>2</sup> )	<i>L<sub>Ve</sub></i>	

1	6:00 - 7:00	0.03858	0.01562	Average from 6:00 to 21:00: 0.030 Average from 21:00 to 6:00: 0.010
2	7:00 - 8:00	0.00350	0.00058	
3	8:00 - 9:00	0.01181	0.00350	
4	9:00 - 10:00	0.00622	0.00202	
5	10:00 - 11:00	0.00695	0.00111	
6	11:00 - 12:00	0.00845	0.00177	
7	12:00 - 13:00	0.02376	0.00950	
8	13:00 - 14:00	0.01304	0.00538	
9	14:00 - 15:00	0.01021	0.00391	
10	15:00 - 16:00	0.00469	0.00197	
11	16:00 - 17:00	0.01407	0.00573	
12	17:00 - 18:00	0.01405	0.00575	
13	18:00 - 19:00	0.01039	0.00440	
14	19:00 - 20:00	0.00701	0.00291	
15	20:00 - 21:00	0.00492	0.00176	
16	21:00 – 22:00	0.00362	0.00138	
<b>Average 6:00 to 21:00</b>		<b>0.01184</b>	<b>0.00439</b>	
<b>Average 21:00 to 6:00</b>		<b>0.00362</b>	<b>0.00138</b>	

Source: Center for Environmental Protection in Transport, April 2010

### ANNEX C ENVIRONMENTAL PARAMETER ANALYSIS COST

<b>COST OF NOISE AND VIBRATION MONITORING</b>							
<b>Parameters</b>	<b>Unit price (VND)</b>	<b>Pre-construction phase</b>		<b>Construction phase</b>		<b>Operation phase</b>	
		<b>Number of sample</b>	<b>Cost</b>	<b>Number of sample</b>	<b>Cost</b>	<b>Number of sample</b>	<b>Cost</b>
Leq, Lmax, L50	109,500	42	4,599,000	14	1,533,000	84	9,198,000
Velocity, acceleration and frequency	182,800	39	7,129,200	13	2,376,400	78	14,258,400

<b>COST OF AIR QUALITY MONITORING</b>							
<b>Parameters</b>	<b>Unit price (VND)</b>	<b>Pre-construction phase</b>		<b>Construction phase</b>		<b>Operation phase</b>	
		<b>Number of sample</b>	<b>Cost</b>	<b>Number of sample</b>	<b>Cost</b>	<b>Number of sample</b>	<b>Cost</b>
<b>HC</b>	265,500	39	10,354,500	13	3,451,500	78	20,709,000
<b>CO</b>	265,500	39	10,354,500	13	3,451,500	78	20,709,000
<b>SO2</b>	251,400	39	9,804,600	13	3,268,200	78	19,609,200
<b>Dust</b>	500,100	39	19,503,900	13	6,501,300	78	39,007,800
<b>Microclimate</b>	182,800	39	7,129,200	13	2,376,400	78	14,258,400
<b>Total cost (VND)</b>			<b>57,146,700</b>		<b>19,048,900</b>		<b>114,293,400</b>

<b>COST OF SURFACE WATER QUALITY MONITORING</b>							
<b>Parameters</b>	<b>Unit price (VND)</b>	<b>Pre-construction phase</b>		<b>Construction phase</b>		<b>Operation phase</b>	
		<b>Number of sample</b>	<b>Cost</b>	<b>Number of sample</b>	<b>Cost</b>	<b>Number of sample</b>	<b>Cost</b>
<b>Temp</b>	36,400	30	1,092,000	10	364,000	60	2,184,000
<b>pH</b>	36,400	30	1,092,000	10	364,000	60	2,184,000
<b>TSS</b>	152,000	30	4,560,000	10	1,520,000	60	9,120,000
<b>Turbidity</b>	36,400	30	1,092,000	10	364,000	60	2,184,000

<b>Conductivity</b>	70,900	30	2,127,000	10	709,000	60	4,254,000
<b>BOD</b>	152,200	30	4,566,000	10	1,522,000	60	9,132,000
<b>COD</b>	174,400	30	5,232,000	10	1,744,000	60	10,464,000
<b>DO</b>	77,200	30	2,316,000	10	772,000	60	4,632,000
<b>PO<sub>4</sub><sup>3-</sup></b>	169,800	30	5,094,000	10	1,698,000	60	10,188,000
<b>NO<sub>2</sub><sup>-</sup></b>	200,300	30	6,009,000	10	2,003,000	60	12,018,000
<b>NO<sub>3</sub><sup>-</sup></b>	181,100	30	5,433,000	10	1,811,000	60	10,866,000
<b>Cu</b>	300,400	30	9,012,000	10	3,004,000	60	18,024,000
<b>Zn</b>	300,400	30	9,012,000	10	3,004,000	60	18,024,000
<b>Pb</b>	329,700	30	9,891,000	10	3,297,000	60	19,782,000
<b>As</b>	373,800	30	11,214,000	10	3,738,000	60	22,428,000
<b>Fe</b>	300,400	30	9,012,000	10	3,004,000	60	18,024,000
<b>Cd</b>	329,700	30	9,891,000	10	3,297,000	60	19,782,000
<b>Hg</b>	373,800	30	11,214,000	10	3,738,000	60	22,428,000
<b>Oil and grease</b>	600,300	30	18,009,000	10	6,003,000	60	36,018,000
<b>Coliform</b>	406,200	30	12,186,000	10	4,062,000	60	24,372,000
<b>Total cost (VND)</b>			<b>138,054,000</b>		<b>46,018,000</b>		<b>276,108,000</b>



COST OF UNDERGROUND WATER QUALITY MONITORING							
Parameters	Unit price (VND)	Pre-construction phase		Construction phase		Operation phase	
		Number of sample	Cost	Number of sample	Cost	Number of sample	Cost
Temp	35,900	21	753,900	7	251,300	42	1,507,800
pH	35,900	21	753,900	7	251,300	42	1,507,800
Hardness	152,700	21	3,206,700	7	1,068,900	42	6,413,400
TSS	152,000	21	3,192,000	7	1,064,000	42	6,384,000
As	373,800	21	7,849,800	7	2,616,600	42	15,699,600
Cd	326,100	21	6,848,100	7	2,282,700	42	13,696,200
Pb	330,100	21	6,932,100	7	2,310,700	42	13,864,200
Cu	299,200	21	6,283,200	7	2,094,400	42	12,566,400
Mn	299,200	21	6,283,200	7	2,094,400	42	12,566,400
Zn	299,200	21	6,283,200	7	2,094,400	42	12,566,400
CN <sup>-</sup>	189,100	21	3,971,100	7	1,323,700	42	7,942,200
Hg	371,200	21	7,795,200	7	2,598,400	42	15,590,400
Fe	299,200	21	6,283,200	7	2,094,400	42	12,566,400
NO <sub>2</sub> <sup>-</sup>	181,800	21	3,817,800	7	1,272,600	42	7,635,600
NO <sub>3</sub> <sup>-</sup>	184,700	21	3,878,700	7	1,292,900	42	7,757,400
Cl <sup>-</sup>	189,400	21	3,977,400	7	1,325,800	42	7,954,800
SO <sub>4</sub> <sup>2-</sup>	153,700	21	3,227,700	7	1,075,900	42	6,455,400
Fecal Coli	407,200	21	8,551,200	7	2,850,400	42	17,102,400
Coliform	406,200	21	8,530,200	7	2,843,400	42	17,060,400
<b>Total cost(VND)</b>			<b>98,418,600</b>		<b>32,806,200</b>		<b>196,837,200</b>

<b>COST OF SOIL QUALITY MONITORING</b>							
<b>Parameters</b>	<b>Unit price (VND)</b>	<b>Pre-construction phase</b>		<b>Construction phase</b>		<b>Operation phase</b>	
		<b>Number of sample</b>	<b>Cost</b>	<b>Number of sample</b>	<b>Cost</b>	<b>Number of sample</b>	<b>Cost</b>
<b>pH-H<sub>2</sub>O</b>	87,000	21	1,827,000	7	609,000	42	3,654,000
<b>Total organic compounds</b>	247,300	21	5,193,300	7	1,731,100	42	10,386,600
<b>T-N</b>	247,300	21	5,193,300	7	1,731,100	42	10,386,600
<b>T-P</b>	192,000	21	4,032,000	7	1,344,000	42	8,064,000
<b>Exchange acidity</b>	87,000	21	1,827,000	7	609,000	42	3,654,000
<b>Cl<sup>-</sup></b>	189,600	21	3,981,600	7	1,327,200	42	7,963,200
<b>SO<sub>4</sub><sup>2-</sup></b>	152,500	21	3,202,500	7	1,067,500	42	6,405,000
<b>Cu</b>	264,000	21	5,544,000	7	1,848,000	42	11,088,000
<b>Zn</b>	264,000	21	5,544,000	7	1,848,000	42	11,088,000
<b>Cd</b>	260,000	21	5,460,000	7	1,820,000	42	10,920,000
<b>Pb</b>	260,000	21	5,460,000	7	1,820,000	42	10,920,000
<b>Total cost (VND)</b>			<b>47,264,700</b>		<b>15,754,900</b>		<b>94,529,400</b>

## ANNEX D PUBLIC CONSULTATION MINUTES OF MEETINGS

PEOPLE'S COMMITTEE OF  
HOAN KIEM DISTRICT  
PEOPLE'S COMMITTEE OF DONG XUAN WARD

SOCIALIST REPUBLIC OF VIETNAM  
Independence-Freedom - Happiness

### MEETING MINUTES

On collecting public opinions

For overhead railway construction project in Hanoi, Ngoc Hoi-Yen Vien route

Today, at 14:00 of October 18, 2007, at the Meeting Hall of the People's Committee of Dong Xuan Ward, Hoan Kiem District, Hanoi, the People's Committee of Dong Xuan Ward ,the Railway Projects Management Unit and related units hold the meeting to collect opinions of people for overhead railway construction project in Hanoi, Ngoc Hoi-Yen Vien route.

#### A. PARTICIPANTS:

##### **1.Representative of the People's Committee of DongXuan Ward (Chairing unit of the Meeting):**

Mr. Duong Quyet Tien Position: Chairman of ward

##### **2. Representatives of the Project Owner: Railway Projects Management Unit (RPMU)**

Mr. Tran Van Luc Position: Director

Mr. Pham Quang Duy Position: Deputy Head of Planning Section and Project Official

Mr. Nguyen Khanh Tung Position: Expert

##### **3. Representatives of the Center for Technological Science and Transport-Environment Protection (Consulting unit for making reports on Environmental Impact Assessment of the Project):**

Mrs. Dang Thi Phuong Nga Position: Acting Director of the Center.

Mr. Pham Tien Sy Position: Official of the Center

Mrs. Phan Minh Hoa Position: Official of the Center

##### **4. Consulting representative for making project: Transport Investment and Construction Joint Stock Company**

Mr. Duong Dang Hai Position: Head of Project Office

##### **5. Representatives of households at impacted area of the project about 60 households**

##### **6. Representatives of the sponsor: Japan Bank for International Corporation (JBIC) as supervisors:**

Mr. Norio Saito Position : Director of Section 2 – Department of environment analysis

Mr. Daisuke Oura                      Position: Director of Section 2 – Department of environment analysis

## **B. CONTENTS OF THE MEETING**

**1. Mr. Duong Quyet Tien – Vice Chairman of the Ward People's Committee** Representing reasons, purposes, requirements and program of the Meeting.

**2. Mr. Tran Van Luc – Representative of the Project Owner:** Generally representing to investment policy and project preparation process as well as aspirations of the Project Owner so that the people may frankly speak their opinions and aspirations in relation with the project.

**3. Mr. Duong Dang Hai – Consulting representative for making project:** Representing contents in details on construction scale, scope, ground clearance scope of the over head railway construction project in Hanoi, Ngoc Hoi – Yen Vien route, especially ground clearance scope at Dong Xuan Ward.

**4. Mr. Pham Tien Sy - Consulting representative for environment:** Representing impacts of the project to natural and social environment; reduction measures of environmental impacts of the project.

### **5. Synthesis of all opinions:**

**\* Mr. Tran Trung Dung (House No. 13 Gam Cau Street):**

- Supporting the project, however requesting RPMU to indicate clearer scope of the project in the ground of Dong Xuan Ward.
- Schedule of the project?
- During construction, have the households to remove temporarily?
- During construction, influence of noise and vibration may happen, the executive unit is requested to have a clear and appropriate arrangement plan of construction site to minimize influence on the people.

**\* Mr. Nguyen Van Thanh (House No. 2 Gam Cau Street):**

- Supporting the policy of project construction.
- Current railways cause environmental pollution because of poor hygiene works of trains. Requesting the Project Owner to have consideration and settlement measures of this problem when the project comes into action.

**\* Mr. Nguyen Van Canh (House No. 20 Gam Cau Street):**

- Supporting the project. The Project shall create a modern infrastructure to the City.
- Environmental hygiene work during construction should be attended.

**\* Mrs. Nguyen Thi Nghi (House No. 12 Gam Cau Street):**

- Supporting the project. The Project shall improve the infrastructure to the City.
- The project should ensure living conditions of the people during its construction, minimize influences of noise, vibration, dust,

**6. Mr. Tran Van Luc (Representative of the Project Owner) and Consulting representative for making project answers questions:**

- As estimated, the area of Gam Cau Street, Dong Xuan where the project shall run through shall be directly influenced by the project, influenced scope shall be on the side of even numbers of the street with distance from 14m (at the head of the street) to 37m (at the end of the street, next to Long Bien Bridge) counted from the edge of rail of current rail line.
- Collect the opinions suggested by the representatives of local authorities and people.
- The Project Owner commits to apply the reduction measures of environmental impacts of the project during construction and operation period in the future as suggested by the people.
- The project is at the period of making its feasibility study, therefore the above-mentioned problems are only general, preliminary. Detailed influences shall be studied in the period of technical design and executive preparation. At that time, the Project Owner and the local authorities shall hold other meetings to collect opinions and reasonably settle legitimate petitions of people.
- As result of working with the sponsor JBIC, in 2007, JBIC shall finance to survey make the technical design for phase 1 of the project and construction is estimated to start from 2012, and complete in 2016. Therefore right from 2008, companies for survey, inspection, making plans of compensation, support and resettlement shall be implemented. The Project Owner requests the People's Committee as well as people of Dong Xuan Ward to consider, help and create good conditions so that the Project Owner, Consultants and contractors may well complete their tasks.

### **C. CONCLUSION:**

**After listening to exchanged opinions and discussion of the Meeting, Mr. Duong Quyet Tien-Chairman of the Meeting sets forth some the following conclusions:**

1. The Project is agreed by the local authorities.
2. When the project is deployed, it shall have environmental impacts and the ground clearance, the Project Owner is requested to have adequate measures to reduce these environmental impacts. Compensation of the ground clearance, resettlement must be in compliance with current regulations of the State and the City, ensure legitimate rights of the people.
3. Local people are requested to facilitate and coordinate with the Project Owner in deploying inspection, survey, making the technical design to meet requirements on the schedule so that construction of the project shall be completed upon the policies of the Government and Hanoi City.

**The Meeting ended at 16.00 at the same day.**

**REPRESENTAIVE OF PEOPLE'S  
COMMITTEE OF DONGXUAN WARD**

(Singed and sealed)

**REPRESENTAIVE OF RAILWAY PROJECTS  
MANAGEMENT UNIT**

(Singed and sealed)

**CONSULTING REPRESENTATIVE FOR  
MARKING PROJECT**

(Singed and sealed)

**CONSULTING REPRESENTATIVE FOR MARKING  
REPORTS ON ENVIRONMENTAL IMPACT  
ASSESSMENT**

(Singed and sealed)

PEOPLE'S COMMITTEE OF HOANG  
MAI DISTRICT  
**PEOPLE'S COMMITTEE OF  
THINH LIET WARD**

SOCIALIST REPUBLIC OF VIETNAM  
Independence – Freedom - Happiness

## **MEETING MINUTES**

### **on collecting public opinions**

#### **For overhead railway construction project in Hanoi, Ngoc Hoi – Yen Vien route**

Today, at 8:30 of March 18, 2007, at the Meeting Hall of the People's Committee of Thinh Liet Ward, Hoang Mai District, Hanoi, the People's Committee of Thinh Liet Ward, the Railway Projects Management Unit and related units hold the meeting to collect opinions of people for overhead railway construction project in Hanoi, Ngoc Hoi-Yen Vien route.

#### **A. PARTICIPANTS:**

##### **1. Representative of the People's Committee of Thinh Liet Ward:**

Mr Le Van Mao	Position: Chairman of ward
Mr Nguyen Hong Lac	Position: Party committee secretary
Mrs Le Thi Linh	Position: Chairman of the Father land Front
Mrs Tran Mai Phuong	Cadastral officer

##### **2. Representatives of the Project Owner: Railway Projects Management Unit (RPMU)**

Mr Pham Quang Duy

##### **3. Representatives of the Center for Technological Science and Transport Environment Protection (CEPT):**

Mr Pham Tien Sy	Position: Environmental Specialist
Mrs Phan Minh Hoa	Position: Environmental Specialist

##### **4. Consulting representative for making project: Transport Investment and Construction Joint Stock Company (TRICC.JSC)**

Mr Nguyen Duc Phuong	Position: Specialist
----------------------	----------------------

##### **5. Representatives of the households residing within project area in Thinh Liet Ward: (residential area number 5,6,9)**

#### **B. CONTENT OF THE MEETING**

- 1. Mr Tran Mai Phuong:** Cadastral officer of the ward: stating the reason, purpose, requirement and content of the Meeting.
- 2. Mr Pham Quang Duy – Representative of the Investor:**

Representative of the Investor: general introduction on the policy and preparation of the project.  
Representing contents in details on construction scale, scope, ground clearance scope of the overhead railway construction project in Hanoi, Ngoc Hoi – Yen Vien route, especially ground clearance scope at Think Liet ward.

**3. Mr Pham Tien Sy** – Consulting representative for environment: Representing impacts of the project to natural and social environment; reduction measures of environmental impacts of the project.

**4. Synthesis of all opinions:**

**\* Mr Nguyen Tien Binh (23, residential area 9):**

- Supporting the policy of project construction
- Schedule of the project?

**\* Mr Luu Duc Manh (Giap Bat collective quarter):**

- Supporting the policy of project construction.
- In construction phase, some impacts will be increased and effect to habitants in the project area. Therefore, RPMU should establish department to collect and solve petition from habitants in the project area.
- In construction phase, RPMU need to construct temporary road for habitants travelling.

**\* Mr Vu Hong Giang (42, residential area 5):**

- Establishing detail list of habitants that being clear around to them prepare.
- Supporting the policy of project construction. And the project will improve city infrastructure.
- The project need to ensure habitant's life condition during implementation process and restrict maximum effect from noise, dust and vibration.

**6. Mr Pham Quang Duy answers questions:**

- Specific construction method will be studied practically in technique study report and temporary road will be also constructed to serve construction process and people travel. And technique document will be sent precincts and expose to people.
- In Hoang Mai district, about 55 households will be clear ground. RPMU and project consultant will contact with district and precinct to defind exactly effected habitants. And the list of effected households will be exposed to people.
- For Giap Bat temporary station, the object of project will construction 4 lines of train to serve national passengers. And after that, it is stopped when constructing completely Ngoc Hoi station.
- In construction phase, impacts to environmental quality is not easy to avoid, thus RPMU will also apply mitigation measurement as mentioned in Environmental Impact Assessment report.
- As result of working with the sponsor JBIC, in 2007, JBIC shall finance to survey, make the technical design for phase I of the project and construction is estimated to start from 2012, and complete in 2016. Therefore, right from 2008, companies for survey, inspection, making plans of compensation, support and resettlement shall be implemented. The Project Owner requests the People's Committee as well as people of Think Liet ward to consider, help and create good



conditions so that the Project Owner, Consultants and contractors may well complete their tasks.

- All of opinion from habitants will be contacted directly with RPMU at 95-97 Le Duan or Project Consultation at 371 Kim Ma, Environmental Consultation at 1252 Lang road.

**C. CONCLUSION:**

**After listening to exchanged opinions and discussion of the Meeting, Mr. Le Van Mao-Chairman of the Meeting sets forth some the following conclusions:**

1. The meeting will be initial step to implement project to local.
2. Local government also agree with the project, and the project will meet travel demand from current people.
3. Suggesting people support and continue propagating to around people supporting the project.
4. Suggesting the project specifically in construction phase and firstly constructing collection road and temporary road.
5. In people have any question, please to contact directly RPMU.
6. Precinct will co-operate with RPMU to solve their questions.
7. When informing for taking back land, next step, enumerating property and land area to prepare clearing ground activities.
8. Local people are requested to facilitate and coordinate with the Project Owner in deploying inspection, survey, making the technical design to meet requirements on the schedule so that construction of the project shall be completed upon the policies of the Government and Hanoi City.

**The Meeting ended at 10.30 at the same day.**

**REPRESENTAIVE OF PEOPLE'S  
COMMITTEE OF DONG XUAN WARD**

(Singed and sealed)

PEOPLE'S COMMITTEE OF HANOI CITY  
PEOPLE'S COMMITTEE OF  
DONGDA DISTRICT

SOCIALIST REPUBLIC OF VIETNAM  
Independence - Freedom - Happiness

## MEETING MINUTES

### On collecting public opinions

#### For overhead railway construction project in Hanoi, Ngoc Hoi – Yen Vien route

Today, at 9.00 of November 9, 2007, the People's Committee of Dong Da District, Hanoi, the Railway Projects Management Unit (RPMU) and related units hold the meeting to collect opinions of people for overhead railway construction project in Hanoi, Ngoc Hoi – Yen Vien route.

Location: At the Meeting Hall of People's Committee of Dong Da District.

#### A. PARTICIPANTS:

##### 1. Representatives of the People's Committee of Dong Da District

Mr. Tran Viet Trung- Vice Chairman of the District People's Committee

Mr. Chu Tuan Anh - District Party Committee

Mrs. Bui Hang Nga – Vietnamese Fatherland Front (VFF)

Mr. Le Trang Ngo – Head of Construction – Urban Section

Mr. Dinh Nguyen Roan – Natural Resources and Environment Section

Mr. Bach Quang Trung- Expert of Construction-Urban Section

Mr. Truong Minh Quang – Expert of Construction - Urban Section.

##### 2. Representatives of the Ward People's Committees

Mr. Bui Huy Hoang – Chairman of Phuong Lien Ward People's Committee

Mr. Truong Dinh Duc – Chairman of Phuong Mai Ward People's Committee

Mr. Vu Xuan Tien –Official of Phuong Mai Ward

Mr. Vo Van Tan - VFF of Phuong Mai Ward

Mr. Bach Van Dung – Chairman of Kham Thien Ward People's Committee

Mr. Nguyen Thanh Truong – Chairman of Kham Thien Ward People's Court

Mr. Dao Van Thu - Chairman of VFF of Kham Thien Ward

Mrs. Tran Hoai An – Construction Official of Kham Thien Ward

##### 3. Representatives of the Center for Technological Science and Transport Environment Protection (Consulting unit for making reports on Environmental Impact Assessment of the Project):

Mr. Pham Tien Sy - Expert of Environmental impact assessment

Mrs. Nguyen Thi Minh Hien – Expert of Environmental impact assessment  
Mrs. Phan Minh Hoa  
–Official of the Center.

---

#### **4. Consulting representative for making project: Transport Investment and Construction Joint Stock Company**

Mr. Le Doan Thanh – In charge of the project

#### **5. Representatives of some households at wards:**

- Phuong Lien Ward.
- Phuong Mai Ward
- KhamThien Ward

### **B. CONTENTS OF THE MEETING**

**1. Mr. Le Trong Ngo - Head of Construction -Urban Section of the District: Introducing the program of the Meeting.**

**2. Mr. Nguyen Khanh Tung -- Representative of RPMU: Introducing overview, origin of the project.**

**3. Mr. Le Doan Thanh - Consulting representative for making project:** Representing in summary the scale of the project, the construction scope, the ground clearance of the overhead railway construction project in Hanoi, Ngoc Hoi – Yen Vien route, especially ground clearance scope at Dong Da District.

**4. Mr. Pham Tien Sy – Consulting representative for environment:** Representing in summary environmental impacts of the project; reduction measures of environmental. Impacts of the project.

#### **5. Synthesis of all opinions:.**

**\* Mr. Le Trong Ngo – Head of Construction – Urban Section of the District:**

- Requesting RPMU to introduce more details about the project, project scope through the ground of wards in the district. How are overhead scope of stations, bridge and stations structure?

- How is the scope of ground clearance?

**\* Mr. Tran Viet Trung – Vice Chairman of the district:**

- This project shall have a special importance in setting traffic stoppage and influence on many households.

- The project should have other plans to compare.

- Environmental impacts should be stated more particularly. How is about impacts of noise?

- How is a system of used means? Technology of operation, rail system?

- The project's purpose is to serve transportation of people and goods. However, whether it is necessary to run through inner city, if any, it should have comparison plans to choose the best feasible plan in environment line plan, ground clearance.

**\* Mr. Luyen Ngoc Mac (No. 386 Le Duan):**

- It shouldn't build a railway within the city, except build it the suburbs with 2 clue stations as Giap Bat and Gia Lam.

**\* Mr. Pham Van Tu (No. 428 Le Duan):**

- How is about project progress? Time for removal, compensation and compensated price?
- Where will removed households be resettled?
- To avoid influences on living of people, it is the best to not build the railway within the city.

**\* Mr. Phung Huu Uoc (No. 366 Le Duan):**

- How is about project progress?

The Project Owner should pay attention to popularization of the project and compensation policy to ground clearance widely to people because this is a main matter interested by the people.

**\* Mr. Dang Gia Phu (No. 374 Le Duan):**

- At present, traffic situation of the city is overloaded, therefore it should have reference to solutions of surrounding countries. It shouldn't build the railway through the city to limit the traffics to page and influences on people at either sides.

**\* Mr. Le Quang Minh (No. 370 Le Duan):**

- Overhead railway may influence on the people because of its noise, influence on the beauty of the city.
- Current railway system still has dropping litters directly causing environmental pollution, therefore it should have expenses to settle this problem.
- Expenditure of the project for ground clearance compensation is difficult to meet demands of people.
- This project shall be adverse to the State and people.

**\* Mr. Dao Van Thu (VFF of Kham Thien Ward)**

- Currently urgent problem of Hanoi City is an improvement of traffic stoppage. Therefore, it is necessary to build an overhead railway through the city.
- The Project Owner should set forth many plans and select the best feasible plan.
- It should duly apply reduction measures of noise, air pollution as stated above.
- Plan for following line to current railway is the best reduction plan of ground clearance.
- During construction, it should be quick, complete and ensure the traffic safety and urban environment.
- Advocating the project

**\* Mr. Dinh Trong Ngoc (No. 418 Le Duan):**

- The Project should be implemented to reduce traffic stoppage and accidents. The project is under the mass plan of the Government and being deployed by the Ministry of Transports.
- Plan for compensation, ground clearance, resettlement should be popularized in details to people.

**\* Mr. Nguyen Trong Hieu (No. 424 Le Duan):**

- Advocating the project.
- Will households be influenced by Ngoc Hoi Railway Station?

**6. Mr. Nguyen Khanh Tung (Representative of the Project Owner) and Consulting representative for marking project answer questions:**

- Collect the opinions suggested by the representatives of local authorities and people.

This is one of seven urban rail lines as planned of the City.

- Selecting the plan for following current railway to minimize the ground clearance.
- During operation, noise shall be minimize by installing noise – protection boards along with both sides of bridge banisters.
- Height of the line shall be 8m at min compared with the surface of the road, width of bridge surface shall be 12m. Each urban station shall be 210m long and 21m wide.
- The Project is at the period of making its feasibility study, therefore the above - mentioned problems are only general, preliminary. Detailed influences shall be studied in the period of technical design and executive preparation. At that time, the Project Owner and the local authorities shall hold other meetings to introduce in more details about the project, the ground clearance, the resettlement and environmental issues.

**C. CONCLUSION:**

After listening to exchanged and discussed opinions, the Meeting has the following conclusions:

1. This is a specially: important project of the City.
2. At present, there are 2 opinion currents of the people: it shouldn't build railway through the city; and the Project should be implemented to improve the infrastructure, reduce the traffics to page and accidents.
3. The Project Owner is requested to introduce in more details about other comparison plans in later meetings to set forth the best feasible plan.
4. Everybody may directly suggested their opinions to the Project Owner at address: RPMU, No. 95-97, Le Duan, HaNoi.

The participants agreed to above conclusion. The Meeting ended at 11.00 at the same day.

**PEOPLE'S COMMITTEE OF DONGDA  
DISTRICT**

(Singed and sealed)

## MINUTES

### ***Supplying information for the Project of constructing the overhead railway through Hanoi, from Ngoc Hoi to Yen Vien***

Today, at 9.00 dated October 25, 2007

In the meeting room of Thanh Tri District People's Committee.

#### **A. PARTICIPANTS:**

**1. Meeting chairman: Mr. Nguyen Quang Hieu** – Chief of Secretariat of Thanh Tri District People's Committee.

#### **2. Representatives of Thanh Tri District**

Mr. Tran Van Huy – Chairman of Thanh Tri District People's Committee.

Mr. Nguyen Ngoc Hang – Vice Head of Urban – Construction Department of Thanh Tri District People's Committee.

Mr. Nguyen Trung Thanh – Vice Head of Urban – Construction Department of Thanh Tri District People's Committee.

#### **3. Representatives of People's Committee of communes**

Mr. Hoang Van Khuyen – Chairman of Lien Ninh Commune Committee of Fatherland Front.

Mr. Nguyen Quang Te – Chairman of Lien Ninh People's Committee.

Mrs. Hoang Thi Thu – Secretary of Lien Ninh commune.

Mr. Nguyen Van Chien-Official of Lien Ninh commune.

Mr. Hoang Van Tien – Chairman of Ngoc Hoi Commune People's Committee

Mr. Hoang Van Thuong – Secretary of Ngoc Hoi People's Committee.

#### **4. Representatives of Railway Project Management Unit**

Mr. Pham Hai Bang – Vice Director

Mr. Nguyen Khanh Tung – Official of Project Department

**5. Representative Consultant for preparation of report on environment impact evaluation:  
Transport Environmental Protection and Science, Technology Center – Institute of  
Transport Science and Technology.**

Mr. Pham Tien Sy – Expert

Mrs. Nguyen Thi Minh Hien - Expert

## **6. Representative Consultant for project: Transport Construction Investment and Consultant JSC**

Mr. Duong Dang Hai – Head of Project Department.

## **7. Households residing in Lien Ninh commune**

- Residential Quarter of the Ministry of Agriculture: Mr. Tran Dinh Quy, Nguyen Van Uy, Le Van Long, Nguyen Van Han, Tran Duc Ninh, Le Duc Han, Nguyen Van Thinh.

- Residential Quarter of the Company 26-4: Tran Ngoc Tot, Pham Quang Nhan, Nguyen Thi Binh, Nguyen Huu Co, Vu Lien Bang, Nguyen Duy Hung, Vu Ngoc Luyen, Pham Ngoc Khuong.

## **8. Households residing in Ngoc Hoi commune.**

Group 8: Nguyen Trang Duong, Dinh Van Bung, Nhan Thi Phan, Kim Van Hoan, Trinh Van Mau.

Group 7: Nhan Van Hai, Nguyen Thi Sang.

- Ngoc Hoi village: Dinh Cai Thang, Nguyen Van Kha, Kim Van Thuan, Nhan Ngoc Kien, Hoang Tuan Vi, Nguyen Thanh Ha.

## **B. CONTENTS OF MEETING**

**1. Mr. Nguyen Quang Hieu - Chief Secretariat of the District People's Committee, stating content of the meeting.**

**2. Mr. Pham Hai Bang - Representative of Railway Project Management Unit, stating overview of the project.**

**3. Mr. Duong Dang Hai - Representative Consultant for preparing project:** stating the contents of the overhead railway project through Hanoi from Ngoc Hoi to Yen Vien, scope of project in the district.

**4. Mr. Pham Tien Sy - Representative of Environment Consultant:** stating the impact on environment by the project; the measures minimizing bad impact from the project to the environment.

### **5. The opinions:**

After the Meeting approves the basic contents of the project, the impacts and the measures minimizing bad impact from the project to the environment, Mr. Nguyen Quang Hieu – Meeting Chairman ask the Meeting to show opinion:

**\* Mr. Pham Quang Nhan - Residential Quarter of the Company 26-4 - Lien Ninh:**

Agreed to the project.

- Asked the Project Unit to have a detailed design for the Project in the commune so that people more clearly understand.

**\* Mr. Nguyen Trong Duong – Group 8 Ngoc Hoi commune**

- Agreed to the project.

- Does Ngoc Hoi Station affect any households?

**\* Mr. Dinh Cao Thang – Ngoc Hoi village, Ngoc Hoi commune**

- Expense for the Project is costly. Does this a work going overhead into the city cause traffic jam? And does the noise affect residents? Is the Project Technology back ward to the world?

**\* Mr. Nguyen Ngoc Hang - Vice Head of District Training - Construction Department:**

How is two overpasses affect to the land clearance?

**\* Mr. Nguyen Van Thinh – Residential Quarter of the Ministry of Agriculture:**

The Project needs to pay attention to the environmental protection during the implementation of the Project.

The progress of implementing the Project needs to be ensured.

**6. Answer by Mr. Hai (Representative of the design consultant):**

- Ngoc Hoi station shall not be affected to any households, the land clearance happens only at the construction location for two overpasses in the North and South of the station.

**7. Answer by Mr. Pham Hai Bang (Representative of the PMU):**

- Representatives' opinions of the local authority is acquired.
- The Project is being submitted for approval. When it is approved officially, the project investor shall propagate in detail it to residents who live in that area.
- When the Project is completed, the traffic jam situation of the city shall be improved. The Project shall construct the sound proofed wall to decrease noise. The noise of new railway shall be smaller than the noise of the present railway.
- The Project shall use the most modern technology, its longevity shall be about 100 years.
- During operation, a good train shall stop at Ngoc Hoi station, only a passenger train shall be permitted to go in Hanoi station.
- The settlement plan was submitted to the City and localities to ask their opinion.
- The resettlement program included an employment support after the resettlement.

**C. CONCLUSION OF MEETING**

**After listening to the opinion and discussion, Mr. Tran Van Huy - (Chairman of Thanh Tri District People's Committee) concluded as follows:**

1. This is the Project of National stature. The local authorities within the above project in the district agree absolutely with the Project and show that the Project shall develop infrastructure for city.
2. The project investor has to notify specifically the project progress and the land clearance scale to residents.
3. The Project Investor is requested to ensure the above – mentioned diminishable method of environmental protection, anti-noise and environmental hygiene.
4. Water, power supply and drainage system are ensured in the resettlement area.  
The resettlement plan must be propagated in detail. It is necessary to create employment and ensure residents' life after the resettlement.
5. Construction of the resettlement area shall bring about higher piles of land that shall affect to the relevant area, so please pay attention.

**The participants agreed to the Chairman's conclusion. The Meeting finished at 11.00**



**DISTRICTPEOPLE'S COMMITTEE**

(Singed and sealed)

PEOPLE'S COMMITTEE OF BA DINH  
DISTRICT  
**PEOPLE'S COMMITTEE OF  
DIEN BIEN WARD**

SOCIALIST REPUBLIC OF VIETNAM  
Independence-Freedom- Happiness

## **MEETING MINUTES**

### **On collecting public opinions**

#### **For overhead railway construction project in Hanoi, NgocHoi – YenVien route**

Today, at 15.00 of April 10, 2008, at the Meeting Hall of the People's Committee of Dien Bien Ward, Ba Dinh District, Hanoi, the People's Committee of Dong Xuan Ward, the Railway Projects Management Unit and related unit should the meeting to collect opinions of people for overhead railway construction project in Hanoi, NgocHoi – Yen Vien route.

#### **A. PARTICIPANTS**

##### **1. Representative of the People's Committee of Dien Bien Ward**

Mr Nguyen Trong Khanh	Deputy Chairman of the ward
Mr Pham Hong Vuong the Ward	Chairman of the Fatherland and Front of the Ward
Mr Tran Manh Quan Ward	Chairman of the People's Council of the Ward
Mr Doan Duy Hung Council of the Ward	Deputy Chairman of the People's Council of the Ward
Mrs Nguyen Thi Thu Huong	Cadastral officer of the ward
Mrs Truong Diem Phuong the Ward	Chairwoman of the Women's Union of the Ward
Mr Le Huy Hoang	Policeman of the Ward
Mrs Nguyen Kim Oanh	Officer of the Ward
Mr Nguyen Ba Ha	Policeman of the Ward

##### **2. Representatives of the railway PMU**

Mr Pham Hai Bang	Vice director
Mr Nguyen Khanh Tung	Specialist

##### **3. Representatives of the Center for Technological Science and Transport Environment Protection (Consulting unit for making reports on Environmental Impact Assessment of the Project):**

Mrs Phan Thi Minh Hoa	Environmental Specialist
-----------------------	--------------------------

Mrs Nguyen Thi Minh Bien

Environmental Specialist

**4. Consulting representative for making project: Transport Investment and Construction Joint Stock Company (TRICC.JSC)**

Mr Le Doan Thanh Specialist

Mr Nguyen Duc Phuong Specialist

**5. Representative habitants and offices in the project area: 30 households and 01 office.**

**B. MEETING CONTENT**

**1. Mr Nguyen Trong Khanh - Precinct Vice President:** Introducing reason, object and requirement of meeting.

**2. Mr Pham Hai Bang - Representative project owner:** Introducing generally investment object, project prepare process and principle content of project and wishing to receive advice opinion and desiring from habitants to project.

**3. MRS Nguyen Thi Minh Hien - Representative environmental consultation:** Showing impacts sourced from the project to natural environment and social environment; mitigation measurement for the impacts.

**4. Summary opinions**

- Agreeing implementation of the project.
- Suggesting project owner carry out completely information expose of project to people knew and support.
- Need to implement completely hygienic environment issue in the project area to avoid longterm impacts to habitants.

**5. Mr Pham Hai Bang – Representative project owner answer discussed opinion:**

- Acquiring advice opinion from local government and people of Dien Bien precinct.
- Committing for applying mitigation measurement of impact to environmental quality in construction phase and operation phase according to advice opinion of habitants.
- The project is stage of planning construction investment currently; so above issues only mentioned preliminarily. And specific effect will be mentioned in technique design and construction prepare stage. At that time, Project Owner and local government continue organizing next meetings to listen to opinions and as well as solving petition from habitants.
- According to results form work process with JBIC, about in 2007 years, JBIC will supply capital to survey, plan technique design for phase1and construct in 2012 and ending in 2016. Therefore, starting in 2008 year, survey operation, planning methods of clearing ground and resettlement as well as environmental supervision will be also implemented. Project owner wishing to receive support from precinct people's commitment, unions and people in precinct to develop project sucessfully.

**C. CONCLUSION**

**After listening reports and advice opinion from residents. Mr Nguyen Trong Khanh – Chairman of meeting give conclusion as follows:**

1. Local government and inhabitants agree with project.
2. In construction phase, project will impact to environmental quality and implement clearing groun plan, thus suggesting project owner must apply mitigation measurement to environment. Clearing ground and resettlement activities must be obeyed current regulation of nation and the city, ensuring rights of households.
3. Suggesting local people create advantage conditions and cooperation with project owner develop survey and collect information aim to ensure given process and complete project construction as guidelines from Government and Hanoi city.

**Meeting ended in 17h00 in day.**

**REPRESENTATIVE OF DIEN BIEN  
PRINCT PEOPLE'S COMMITTEE**

(Singed and sealed)

PEOPLE'S COMMITTEE OF THANH  
XUAN DISTRICT  
**PEOPLE'S COMMITTEE OF  
PHUONGLIET WARD**

SOCIALIST REPUBLIC OF VIETNAM  
Independence - Freedom - Happiness

## **MEETING MINUTES**

### **On collecting public opinions**

#### **For overhead railway construction project in Hanoi, Ngoc Hoi – Yen Vien route**

Today, at 08:30 of March 19, 2008, at the Meeting Hall of the People's Committee of Phuong Liet Ward, Thanh Xuan District, Hanoi, the People's Committee of Dong Xuan Ward, the Railway Projects Management Unit and related units hold the meeting to collect opinions of people for overhead railway construction project in Hanoi, Ngoc Hoi – Yen Vien route.

#### **A. PARTICIPANTS:**

##### **1. Representative of the People's Committee of Phuong Liet ward**

Mr Pham Huy Loi	Chairman of ward
Mr Ta Minh Hai	Chairman of the People's Council of the ward
Mr Le Trung Hieu Deputy	Chairman of the People's Council of the ward
Mrs Nguyen Lien Huong	Deputy Chairman of ward
Mrs Nguyen Thi Thu Huong	Cadastral officer of the ward
Mrs Vuong Thi Dung	Chairwoman of the Women's Union of the ward
Mr Ngo Van Tinh	Chairman of the police of the ward
Mrs Dang Thi Ngoc Ha	The secretary to the ward's youth union
Mr Vu Nhu Khoa	Urban officer
Mr Vu Song Hai	Officer
Mrs Tran Hong Anh	Accountant
Mr Nguyen Vinh Long	Leader of group No.40
Mrs Pham Thi Chong	Leader of group No.35
Mrs Nguyen Thi Lan	Leader of group No.36
Mr Nguyen Van Minh	Leader of group No.33
Mr Le Tan Khanh.	Leader of group No.34

##### **2. Representative of project investment owner: Railway projects management unit (RPMU)**

Mr Pham Quang Duy Official	Deputy Head of Planning Section and Project
-------------------------------	---

Mr Nguyen Khanh Tung Expert

**3. Representatives of the Center for Technological Science and Transport Environment Protection (Consulting unit for making reports on Environmental Impact Assessment of the Project):**

Mrs Dang Thi Phuong Nga	Director
Mr Nguyen Trung Thanh	Expert
Mrs Phan Minh Hoa	Expert
Mrs Nguyen Thi Minh Bien	Expert

**4. Representatives of the Center for Technological Science and Transport Environment Protection (Consulting unit for making reports on Environmental Impact Assessment of the Project):**

Mr Nguyen Duc Phuong Expert

**5. Representatives of households at impacted area of the project: about 20 households**

**B. CONTENTS OF THE MEETING**

**1. Mr Pham Huy Loi – Chairman of the Ward People's Committee:** Representing reasons, purposes, requirements and program of the Meeting.

**2. Mr Pham Quang Duy – Representative of the Project Owner:** Representative of the Investor: general introduction on the policy and preparation of the project.

Representing contents in details on construction scale, scope, ground clearance scope of the overhead railway construction project in Hanoi, Ngoc Hoi – Yen Vien route, especially ground clearance scope at Thinh Liet ward.

**3. Mrs Nguyen Thi Minh Hien - Consulting representative for environment:** Representing impacts of the project to natural and social environment; reduction measures of environmental impacts of the project.

**4. Synthesis of all opinions**

**\* Mrs Nguyen Thi Lan (Vice – leader of group No.36):**

- Agree the project, however, suggesting RPMU show project scope at Phuong Liet ward area because of Giai phong is narrow?

**\* Mr Nguyen Vinh Long (Leader of group No.40):**

- At group No.40, there are 26 households near current railway, thus the project should organize meeting with habitants before carrying out the project.

- For the habitants without red document, how will do implement compensation activities?

- After constructing new railway completely, how do use old railway?

- How high is new railway? How far is from hear of railway?

- The other project increased traffic jam and travelling difficulty for people, thus the project need to avoid this issue.

**\* Mr Nguyen Dang Luan (Cell Secretary 10):**

- Supporting the policy of project construction. Project will create modernization infrastructure to the city..
- The methods of environmental protection mentioned very well, suggesting Project Owner must apply completely in implementation process.
- How do drilling piles impact to local works?
- Need to construct temporary road for people traveling construction phase.
- The project should inform previously implementation plan as well as policies of compensation to effected households.

**\* Mrs Truong Thi Nhiem (140, Giai Phong street):**

- Supporting the policy of project construction.
- Activities of measurement, list and compensation must be carried out fast to people stabilize life, avoiding long time of compensation.

**\* Mr Nguyen Van Ai (Leader of group 26):**

- Supporting the project.
- How is moving plan and resettlement?

**\* Mr Nguyen Thien Anh (group 44B): Supporting the project.**

- Are space method approved? Defining clearly route alignment and avoiding suspended project phenomenon.
- Have to organization meeting to inform information of the project to every people in the area in order to they knew and support.

**\* Mr Ta Minh Hai (Chairman of the People's Council of the ward):**

- Supporting the project.
- In the precinct, there are 05 gates passing railway, thus transportation issue is very importance and taken care to solve as specific method before constructing.
- Additionally, water drainage system along the route is restricted as usually flooded, thus suggesting project owner consider to plan method avoid flood phenomenon effecting the project as well as areas.

**\* Mrs Tran Thi Hoa (leader of group no.25):**

- Supporting the project.
- From experience flyover Vong intersection increased environmental hygienic issue and effect life's habitant in group. Suggesting project owner take care and give measurement to solve this issue fast when developing the project.

**\* Mr Nguyen Van Thinh (Leader of group No.31):**

- Supporting the project.
- Now, at group 31, there are 18 kiosks is business, thus suggesting the project arranging area that can business in moving and resettlement process.

**5. Mr. Pham Quang Duy (Representative of the Project Owner) and Consulting representative for making project answers questions:**

- As estimated, the area of Phuong Liet ward where the project shall run through shall be directly influenced by the project, influenced scope shall be on the side of even numbers of the street with distance from 10m counted from the edge of rail of current rail line.
- Collect the opinions suggested by the representatives of local authorities and people.
- The Project Owner commits to apply the reduction measures of environmental impacts of the project during construction and operation period in the future as suggested by the people.
- The project is at the period of making its feasibility study, therefore the above-mentioned problems are only general, preliminary. Detailed influences shall be studied in the period of technical design and executive preparation. At that time, the Project Owner and the local authorities shall hold other meetings to collect opinions and reasonably settle legitimate petitions of people.
- As result of working with the sponsor JBIC, in 2007, JBIC shall finance to survey, make the technical design for phase 1 of the project and construction is estimated to start from 2012, and complete in 2016. Therefore, right from 2008, companies for survey, inspection, making plans of compensation, support and resettlement shall be implemented. The Project Owner requests the People's Committee as well as people of Phuong Liet ward to consider, help and create good conditions so that the Project Owner, Consultants and contractors may well complete their tasks.

### **C. CONCLUSION**

- **After listening to exchanged opinions and discussion of the Meeting, Mr. Pham Huy Loi**
- **Chairman of the Meeting sets forth some the following conclusions**

1. The Project is agreed by the local authorities.
2. When the project is deployed, it shall have environmental impacts and the ground clearance, the Project Owner is requested to have a adequate measures to reduce these environmental impacts. Compensation of the ground clearance resettlement must be in compliance with current regulations of the State and the City, ensure legitimate rights of the people.
3. Local people are requested to facilitate and coordinate with the Project Owner in deploying inspection, survey, making the technical design to meet requirements on the schedule so that construction of the project shall be completed upon the policies of the Government and Hanoi City.

**The Meeting ended at 11.30 at the same day.**

**REPRESENTAIVE OF PEOPLE'S COMMITTEE  
OF PHUONG LIET WARD**

(Singed and sealed)



## MINUTES

### Reference to public opinion for

### The project of constructing the overhead railway through Hanoi, from Ngoc Hoi to Yen Vien

Today, at 14:00, November 7, 2007, in the meeting room of Cua Nam Ward People's Committee, Hoan Kiem District, Hanoi, the Cua Nam Ward People's Committee, PMU relating to railways and the relevant agencies hold a meeting to collect the opinions from the local people relating to the project of constructing the overhead railway through Hanoi from Ngoc Hoi to Yen Vien.

#### A. PARTICIPANTS

**Meeting chairwoman:** Mrs. Tran Thi Minh Tuyet – Cadastral officer of Dong Xuan Ward.

#### 2. Representatives of Cua Nam Ward People's Committee:

Mr. Le Hong Phu – Chairman of the Ward

Mr. Pham Nga – Chairman of the Fatherland Front of the Ward

Mr. Tran Xuan Dung – Chairman of the People's Council of the Ward

Mr. Nguyen Van Binh – Vice Chairman of the People's Council of the Ward

Mrs. Nguyen Thi Minh – Chairwoman of the Women's Union of the Ward

Mrs. Trinh Thanh Hai - Officer of the Ward

Mr. Nguyen Xuan Nguyen – Officer of the Ward

#### 3. Representatives of the railway PMU:

Mr. Pham Quang Duy

Mr. Nguyen Khanh Tung

#### 4. Representative Consultant for preparation of report on environment impact evaluation: Transport Environmental Protection and Science, Technology Center

Mr. Pham Tien Si - Officer

Mrs. Nguyen Thi Minh Hien - Officer

#### 5. Representative Consultant for project: Transport Construction Investment and Consultant JSC

Mr. Duong Dang Hai – Head of Project Department

Mr. Le Doan Thanh- Officer in charge of technique

## **6. Representatives of the households residing within project area in Cua Nam Ward:**

Mr. Le Huynh Dong – 29E Nguyen Thai Hoc,

Mrs. Nguyen Thi Minh Nga - 8D Dien Bien Phu,

Mrs. Nguyen Thi Thuc Oanh – 29 Nguyen Thai Hoc,

Mrs. Nguyen Thi Cuc – 5C Le Duan,

Mr. Pham Truong Xuan – 10H Dien Bien Phu, Mr. Nguyen Quang Ngoc - 4D Nguyen Thai Hoc,

Mr. Tran The Cau - 8E Dien Bien Phu,

Mr. Nguyen Thai - 29D Nguyen Thai Hoc,

Mr. Ngo Chi Duoc – 1 Jane 5 Le Duan,

Mr. Tran Quang Duc - 8E Dien Bien Phu,

Mrs. Ho Thi Loi - 8E Dien Bien Phu,

Mrs. Nguyen Thi Khanh - 29G Nguyen Thai Hoc,

Mr. To Huu Tien – 29 Nguyen Thai Hoc,

Mr. Dang Van Long - 8E Dien Bien Phu.

### **B. CONTENT OF THE MEETING**

**1. Mrs. Tran Thi Minh Tuyet** – Cadastral officer of the ward: stating the reason, purpose, requirement and content of the Meeting.

**2. Mr. Pham Quang Duy** – Representative of the Investor: general introduction on the policy and preparation of the project.

**3. Mr. Duong Dang Hai** – Representative Consultant for preparing project: stating the content of the overhead railway project through Hanoi from Ngoc Hoi to Yen Vien, the scope of the construction, scope of land clearance, especially land clearance in Cua Nam ward.

**4. Mr. Pham Tien Sy** – Representative Environment Consultant: stating the impact on environment by the project; the measures minimizing bad impact from the project to the environment.

#### **5. The opinions:**

**\* Mr. Le Huynh Dong (29E Nguyen Thai Hoc):**

- Agreed to the project;

- Asked the PMU to point out the area to be cleared at the Nguyen Thai Hoc crossroad;

- The progress of land clearance?

**\* Mr. Nguyen Van Binh (Vice Chairman of ward People's Council):**

- For what purpose the area right below the bridge to be used?

- It is necessary to have the measure to release the traffic tram at the road junction between the railway and land road during the construction.

**\* Mr. Nguyen Quoc Lam (29D Nguyen Thai Hoc):**

- For the work to be partly cleared, how to deal with the remaining area (about 30m<sup>2</sup>).

**\* Mr. Le Huynh Dong (29E Nguyen Thai Hoc):**

- Where is the resettlement, the quality of resettlement house must be good. The new resettlement house must be the same or better the old one.
- Advocating the project because it will improve the infrastructure of the city.
- The project needs to ensure the living conditions for the people during the implementation of the project, minimizing the noise, vibration, dust.

**\* Mr. Nguyen Quang Ngoc (4D Nguyen Thai Hoc):**

- The area to be occupied for project needs to be specified.
- Progress of land clearance and project?
- Worry about the financial source for land clearance may slow down the project.

**\* Mr. Ngo Chi Duoc (1 lane 5 Le Duan)**

- Advocating the project
- Made request to the PMU to carry out the project as soon as possible to minimize the current traffic jam situation in the city.

**6. Answer by Mr. Pham Quang Duy:**

- The Investor received the opinions from the local authorities and people.
- The area to be cleared through the ward will be on the left from Hanoi railway station to Long Bien.
- The PMU will send the plan of land clearance, resettlement to the locality to have opinions.
- The area right below the bridge will be used for public traffic, services (car parking, advertisement ..)
- The construction plan in the intersections have been carefully studied in the feasibility report.
- The work to be partly cleared. Project will not further clear for other work.
- The quality of resettlement house will be according to the current regulation approved by State and City.
- The project is under feasibility study, above matters are of primary level only. The detailed matters will be further studied in the process of feasibility design and preparation for construction. At that time, the Investor and local authority will hold, other more meetings to receive the opinions and reasonably deal with the petition from the people.

**C. CONCLUSION:**

After listening to the opinion and discussion, conclusion is as follows:

1. Local authority agreed to the project.
2. Project must be deployed democratically and publicly, especially the compensation for the households whose land to be with drawn must be planned in detailed. The Investor needs to coordinate with the local authority and the relevant agencies to stabilize the living condition of the people, minimize the negative arising matters during the deployment of project.
3. The project during the construction will impact the environment and the land clearance is in dispensable.

4. The people are kindly required to create favor able condition for the Investor to carry out the survey, facilitate the project.

**The participants agreed to above conclusion.**

**CONFIRMATION BY CUA NAM WARD PC**

(Singed and sealed)



#### **5. Representatives of the effected households in project area in Thinh Liet Ward**

1. Ms. Pham Thi Ngat
2. Mr. Chu Kim Ban
3. Ms. Do Thi Chut
4. Mr. Dam Van Hai
5. Ms. Nguyen Thi Thuy
6. Mr. Tran Van Nhat
7. Mr. Dam Van Thanh
8. Mr. Trinh Van Quang
9. Ms. Nguyen Thi Uyen
10. Mr. Le Van Huan
11. Mr. Truong Xuan Thanh
12. Mr. Chu Duc Nhan
13. Mr. Vu Dang Khoa
14. Mr. Bui Minh Tam
15. Mr. Nguyen Dang Thanh
16. Mr. Dang Xuan Nhu
17. Mr. Bui Xuan Hong
18. Mr. Bui Huy Trong
19. Mr. Tran Viet Nhat
20. Mr. Le Van Vy
21. Ms. Nguyen Thi Thu Dong
22. Mr. Dam Van Kha and other people

## **B. CONTENT OF THE MEETING**

### **1. Representative local government (Mr. Tran Duc Dat - President of precinct):.**

Introducing participants and meeting content.

**2. Representative Investor: Mr Pham Quang Duy:** General introduction on the policy and preparation of the project as well as showing contents in details on construction scale, scope, ground clearance scope of the Hanoi elevated railway construction project, section Ngoc Hoi - Yen Vien, especially ground clearance scope at Phuc Xa ward.

**3. Representative environment consultancy:** Mr Pham Tien Sy show impacts of the project to natural, social environment; reduction measures of environmental impacts of the project and commitment.

### **4. Opinion from people:**

#### **\* Ms. Bui My Tam – Cell Secretary Group No.10**

- Current railway route is creating noise to habitant area
- How will hygienic issue be treating on the train? Suggesting the project do not effect to habitant in the local area.
- Showing clearly exhaust from train

#### **\* Mr. Nguyen Dang Thanh – Group 7, habitant area No.2**

- How is time and process of construction?
- How far is between new bridge and old bridge?
- How do the project implement clearing ground and resettlement? Where is people resettlement?

#### **\* Ms. Do Thi Chut – Group 7, habitant area No.3**

- Suggesting the project must reserve good hygienic condition at site when developing project, avoiding to effect people's life in area.

#### **\* Mr. Vu Dang Khoa – Cell secretary No.9**

- It is outside of Red river embankment, thus the project must apply flood protection measurement when constructing and operating.

### **5. Representative Project Owner answer questions:**

- For train operation, it is modernization urban railway route meeting International standard and do not impact to environmental hygienic quality of Phuc Xa precinct as well as all of the route.
- Construction time is 2013-2016 and Long Bien Bridge also is constructed at that time.
- Acquiring opinions from local government and people.
- Project Owner commits applying mitigation measurement of impact to environment in all of project phase. Ensuring life and environment in the area.

## **C. CONCLUSION**

- Precinct people agree with the project, wishing the project is carried out early
- Suggesting project owner need to expose specifically information of clearing space and resettlement in next phase.

- Suggesting project owner co-operate closely with local government when developing the project.

- People in the precinct will support all of condition for the project.

**The Meeting ended at 16.30 in day.**

**REPRESENTAIVE OF PEOPLE'S  
COMMITTEE OF PHUC XA PRECINCT**

(signed and sealed)

**President**

**Tran Duc Dat**



**MEETING MINUTES**  
**Public Consultation**

**For Hanoi elevated railway construction project, section Ngoc Hoi – Yen Vien**

Today, at 8:30 of March 27, 2008, at the Meeting Hall of the People's Committee of Long Bien District, Hanoi, the People's Committee of Long Bien district, the Railway Projects Management Unit and related units hold the meeting to collect opinions of people for Hanoi elevated railway construction project, section Ngoc Hoi – Yen Vien route.

**A. PARTICIPANTS:**

**1. Representative of the Long Bien district People's Committee:**

1. Mr. Dang Vu Nhat Thang – Vice – President of district
2. Mr. Nguyen Huy Hoang – Vice – Chief of secretariat.'
3. Ms. Nguyen Thi Thu Huong – Vice – Chief of secretariat
4. Mr. Ngo Viet Hai – Natural resource and Environment department
5. Mr. Tran Duc Dung – Science and Plan department
6. Mr. Tran Duc – Urban construction department
7. Mr. Pham The Thang – Clearing space department
8. Mr. Nguyen Anh Tuan – Clearing space department
9. Mr. Duong Dinh Trieu – Vice – Leader of Transportation police department No.5
10. Mr. Phung Tuan Anh – Clearing space department

**2. Representative of precincts**

Ngoc Lam precinct: Nguyen Van Tuan – President of People's Committee

Ngoc Thanh precinct: Le Dang Lap – President of People's Committee

Thuong Thanh precinct: Nguyen Minh Dung – Land officer

Gia Thuy precinct: Nguyen Huu Hong – President of People's Committee

**3. Project Owner: Railway Projects Management Unit (RPMU)**

1. Mr Pham Hai Bang – Vice - Director
2. Mr. Nguyen Khanh Hung - Expert

**4. Representatives of the Center for Technological Science and Transport Environment Protection(CEPT):**

1. Mr Pham Tien Sy  
Team leader of Environmental Specialist
2. Mrs Phan Minh Hoa  
Environmental Specialist

**5. Consulting representative for making project: Transport Investment and Construction Joint Stock Company (TRICC.JSC)**

1. Mr Nguyen Manh Thang Project Specialist

**6. Representatives of the effected households in project area**

1. Mr. Nguyen Cong Minh People group No.23
2. Ms. Nguyen Thi Hat People group No. 25
3. Mr. Nguyen Van Dung People group No.4- Ngoc Thuy
4. Mr. Nguyen Van Hai People group No.23-Thuong Thanh
5. Ms. Tran Van Duong People group No.23-Ngoc Thuy
6. Ms. Pham Thi Mui People group No.26
7. Mr. Vuong Ly Phuc People group No.22 – Thuong Thanh
8. Mr. Le Binh Sang ThuongThanh

**B.CONTENTOFTHEMEETING**

**1. Representative Project Owner (Mr. Pham Hai Bang):** General introduction on the policy and preparation of the project as ell as showing contents in details on construction scale, scope, ground clearance scope of the Hanoi elevated railway construction project, section Ngoc Hoi – Yen Vien, especially ground clearance scope in Long Bien district.

**2. Representative environment consultancy:** Mr. Pham Tien Sy show impacts of the project to natural, social environment; reduction measures of environmental impacts of the project and commitment.

**3. Opinion from people:**

- Mr.Vice-director of the district: Introducing content discussed in the meeting
- Nguyen Cong Minh – Group 23 - Ngoc Lam: How is toilets treated?
- Nguyen Duc Hong – President of Ngoc Thuy precinct:
  - + There are 140 households in the precinct, but the report mentioned 102 households, thus what does this mean?
  - + There are many households divided into many small household, thus it should re-consider for clearing ground and suggesting resettlement for all of group.
- Tran Van Duong – People group No.23 Ngoc Thuy precinct: How is distance from heart of route?

Report need to be mentioned to content of ground water and specific sites of worker camps

- Investment project has not approved, thus it do not decide with draw land
- Excepting resettlement, where are the mud and soil discharged?
- How many land area issued for the project?

**5. Representative Project Owner answer questions:**

- Do not phenomenon of discharging refuse directly to road, because of the project do not install toilet.

- In clearing ground phase, the project investigates clearly and resettlement in district after being decided investment.

- Distance is 11m far from heart of route

- Wishing to co-operate with district and precincts to investigate exactly data and effected households

### **C. CONCLUSION**

- Mr. Dang Vu Nhat Thang - Vice-president of district give conclusion:

+ Agreeing to co-operate for logistic of clearing ground data.

+ Suggesting informing how is area under elevated railway used?

+ Suggesting the project should plan clearly when implementing or step by step to reach high results

The Meeting ended at 11.00 in day.

**REPRESENTAIVE OF PRECINCTS PEOPLE'S  
COMMITTEE**

(signed and sealed)

## **MEETING MINUTES**

### **Public Consultation**

#### **For Hanoi elevated railway construction project, section Ngoc Hoi – Yen Vien**

Today, at 8:30 of 19 April, 2008, at the Meeting Hall of the People's Committee of Hoang Liet precinct, Hanoi, the People's Committee of Hoang Liet precinct, the Railway Projects Management Unit and related units hold the meeting to collect opinions of people for Hanoi elevated railway construction project, section Ngoc Hoi – Yen Vien route.

#### **A. PARTICIPANTS:**

##### **1. Representative of the Hoang Liet precinct People's Committee:**

1. Mr. Nguyen Quoc Dung – President of the precinct
2. Mr. Nguyen The Hung – Party committee secretary
3. Mr. Nguyen Van Sang - Vice-President of People's council
4. Mr. Nguyen Tien Nhan – President of Front Committee
5. Mr. Phung Trung Hai – Vice president of People's Committee
6. Mr. Ta Van Hai – Vice president of People's Committee
7. Ms. Vu Thi Tuyet Mai - Officer
8. Mr. Nguyen Tai Tuan – Information Culture
9. Mr. Luu Bach Tao – President of People's Council
10. Mr. Tran Ba Giap – Chief of Veteran Club
11. Ms. Nguyen Thi Giang - Officer

##### **2. Project Owner: Railway Projects Management Unit (RPMU)**

1. Mr Pham Quang Duy – Project Director
2. Mr. Nguyen Khanh Tung - Expert

##### **3. Representatives of the Center for Technological Science and Transport Environment Protection(CEPT):**

1. Mr Pham Tien Sy
2. Mrs Nguyen Thi Minh Hien

##### **4. Consulting representative for making project: Transport Investment and Construction Joint Stock Company (TRICC.JSC)**

##### **5. Representatives of the effected households in project area**

1. Nguyen Thi Dan – People group No.12
11. Nguyen Van Hieu – People group No.12

- |   |  |
|---|--|
| 2. Nguyen Van Nhung – People group No.12    | 12. Hoang Thi Nhan – People group No.12      |
| 3. Khuc Thi Bien – People group No.13       | 13. Nguyen Bac My- Tu Ky secretary           |
| 4. Nguyen Dang Minh – People group No.13    | 14. Bui Dinh Thanh - No.12 Giai Phong street |
| 5. Nguyen Anh Tuan – People group No.14     | 15. Phung Dinh Chuong- People group No.14    |
| 6. Nguyen Xuan Tien – People group No.14    | 16. Phan Thanh Xuan – People group No.15     |
| 7. Tran Ba Giap – Veteran Club              | 17. Nguyen Thi An - People group No.12       |
| 8. Nguyen Trung Phuong – People group No.14 | 18. Bui Hung Quang - People group No.15      |
| 9. Luyen Thuy Ha – People group No.12       | 19. Tran Van Son - People group No.12        |
| 10. Nguyen Dinh Huy – People group No.14    |  |

## **B. CONTENT OF THE MEETING**

**1. Representative local government (Mr. Nguyen Quoc Dung):** Introducing members and meeting content

**2. Representative project Owner (Mr Pham Quang Huy):** General introduction on the policy and preparation of the project as well as showing contents in details on construction scale, scope, ground clearance scope of the Hanoi elevated railway construction project, section Ngoc Hoi –Yen Vien, especially ground clearance scope in Long Bien district.

**2. Representative environment consultancy:** Mr Pham Tien Sy show impacts of the project to natural, social environment; reduction measures of environmental impacts of the project and commitment.

### **3. Opinion from people:**

\* Mr. Nguyen Quoc Dung – President of People's Committee

- People agree the project

- How is the new route and old route planned?

- For compensation, how is resettlement mentioned in next phase?

\* Mr. Nguyen Thi Dan – People Group No.12

- I wonder that my family have not got site of business to stabilize life, wishing the project brings advantage for people ensuring their life.

- Mr. Nguyen Ngoc Trinh: Phap Van hamlet, group.12

+ Supporting the project

+ Opening 10m each sides, do the project is exactly?

+ Clearing ground is carried out early to avoid complex

+ Resettlement carried out by divided into parts, thus compensation avoid loss for people

- Ms. Khuc Thi Hien - Group12

+ Do people know time of clearing ground to stable life

- Ms. Luyen Thuy Ha - Group12

+ How is alignment of clearing space issue?

- Mr. Pham Thanh Xuan – Group 15

- + Agreeing with the project
- + The project show exactly how many is area of clearing space from old heart of route?
- Mr. Nguyen The Hung – Precinct Secretary
- + Where is temporary station in the precinct?

**5. Representative Project Owner answer questions:**

- Thanks for your opinion to the project and the project accept support opinion to complete.
- The project go along heart of old route to reuse transportation alignment and reduce clearing ground
- Temporary Giap Bat is near Elevated Giap Bat station to serve passenger during 10 years and after that the project will clear space for ever to serve national railway.
- Informing clearing ground and border line is surveyed and sent to Hoang Mai district.
- Clearing ground will be carried out in 2015 - 2017 of phase2.
- General policy of the city for resettlement inside city is by house

**C. CONCLUSION**

1. People agree with the project
2. Suggesting the project owner show exactly time of project implementation to people stabilize their life.
3. Suggesting the project show clearly resettlement methods?
4. If any people have question, please to contact Project Owner at 95-97 Le Duan
5. Wishing the project developed fast to avoid effect to people
6. People propose resettlement through land
7. Acknowledge of people's sacrificing for development of the city and country

**The Meeting ended at 11.30 in day.**

**MEETING SECRETARY**

(Signed)

**Nguyen Thi Minh Hien**

**REPRESENTATIVE OF HOANGLIET**

**PRECINCT PEOPLE'S COMMITTEE**

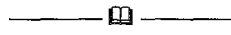
(signed and sealed)

**President**

**Nguyen Quoc Dung**

**ANNEX E. REPORT OF PUBLIC CONSULTATION**

**VIETNAM RAILWAYS  
RAILWAY PROJECTS MANAGEMENT UNIT**



**REPORT OF  
PUBLIC CONSULTATION**

**HANOI ELEVATED RAILWAY PROJECT  
NGOC HOI – YEN VIEN SECTION**

**REPRESENTATIVE OF INVESTOR**

**RAILWAY PROJECTS MANAGEMENT UNIT**

**INVESTMENT CONSULTANT**

**SCIENTIFIC AND TECHNOLOGICAL CENTER FOR  
ENVIRONMENT PROTECTION IN TRANSPORTATION**



**GIÁM ĐỐC**

*Dương Chi Phương Nga*

**Hà Nội, 5/2008**

## CONTENTS

	Page
PART 1. GENERAL INTRODUCTION	1
1.1. Legal bases	1
1.2. The Project Background	2
1.3. Project Description	3
PART 2. PUBLIC CONSULTATION	7
2.1. Social – economic Characteristics	7
2.2. Reason of public consultation action	9
2.3. The Purposes of Public consultation	10
2.4. Content of Public consultation Mission	10
2.5. Method of Public consultation	10
2.6. Implementation of the Public Consultation	11
PART 3. RESULTS OF PUBLIC CONSULTATION	12
3.1. Comments Collection from Wards/Commune Fatherland Front	12
3.2. Generalization of social– economic survey questionnaire	17
3.3. Delivery of Project leaflets to the households along the line	21
3.4. Quickly Interview of some households along the line	21
3.5. Orgnazing meetings nad discussing with local goverment and people in the project area.	23
3.6. Preliminary survey on natural environment, social– economic condition and the ideas of the Project Affected People	32
CONCLUSION	36



Appendix 1: Opinions from fatherland front Committee and People's Committee of the precinct/commune lever

Appendix 2: Questionary for society – economy

Appendix 3: Leafles of the project

Appendix 4: Questionnare for quick interview

Appendix 5: The minutes of pupblic consultant meeting at precincts/communes

Appendix 6: Several photographs on meeting at districts, precincts

Appendix 7: Questionnaire for survey on natural environment and social – economic situation

## PART 1

### GENERAL INTRODUCTION

#### 1.1. Legal bases

- Construction Law No 16/2003/QH11 on 26 November 2003 by Parliament of Vietnamese Socialist Republic.

- Decree No. 51/1999/ND-CP on 08 July 1999 by Government on detail requirement for implementing Domestic investment.

- Law of environmental protection in 2005 year.

- Decree No. 80/2006/ND-CP dated 09/08/2006 of Government on detail regulation and implementation guidelines on items of environmental protection law.

- Circular No. 08/2006/TT- BTNMT dated Sept. 08, 2006 of MONRE guiding Strategy environmental assessment, environmental impact assessment and environmental protection commitment.

- Circular No. 16/2005/ND-CP dated on 07/02/2005 on Work Construction Investment Project Management and guideline circular.

- Decision No. 478/QĐ-BGTVT dated 3/3/2004 by Minister of Transportation Ministry on accepting to plan Feasibility Study Project of Hanoi Elevated Railway Project and Railway project management unit as Investment Owner Royal court-room;

- Basing on document No. 989/BGTVT-KHĐT dated on 24/02/2006 from Ministry of Transportation on agreeing Centre of Environmental Protection Science and Technology in Transportation – Institute of Transportation Science and Technology plan environmental impact assessment report for Hanoi Elevated Railway project – Section Ngoc Hoi – Yen Vien;

- Basing on Decision No. 2484/QĐ-BGTVT dated on 17/11/2006 from Ministry of Transportation on approving Draft and Predicted Cost for planning of environmental impact assessment and society report;

- Basing on Meetings documents on 21/09/2007, 12/10/2007, 19/10/2007 the project signed by Vietnamese Representative Partner (Ministry of Transportation, Ministry of Plan and Investment, Ministry of Finance, Vietnamese Railway Corporation) and JBIC.

- Basing on Document No. 780/RPMU-PPD dated on 26/9/2007 on completing EIA report and RAP report of Hanoi Elevated Railway Construction project, section Ngoc Hoi – Yen Vien.

- Basing on Document No. 7527/VPCP-QHQT dated on 28/12/2007 from Governmental Office inform opinion of Vice-Prime Minister Pham Gia Khiem on conditions of credit borrow for Hanoi Elevated Railway Construction project, section Ngoc Hoi – Yen Vien.

- Basing on Document No. 4879/BTNMT-TĐ dated on 10/12/2007 from Ministry of Natural Resource and Environment sent to Vietnamese Railway Corporation for completing and revised EIA report of Hanoi Elevated Railway Construction project, section Ngoc Hoi – Yen Vien.

## **1.2. The Project Background**

During 100 years of operation, the North South railway route goes through Centre of Hanoi city with the rail route 1000mm. Otherwise, the route is single and has same height with urban roads so that the disadvantages arise to develop economic and culture of Capital, including:

- The so low railway speed due to have many intersections. The available infrastructure system is old, backward lagging. The intersections arises unsafety issues and traffic jam, especially at rush hours.

- Limiting capacity of passing both railway and roads. International direct traffic trains with rail size 1,435mm can not go to Centre due to available rail size 1,000 mm.

- Safety railway corridor in the City is narrow and this issue broke regulations of Branch and State for limited size, safety scope of life and train running. Conditions not only create restriction of train speed but also arising accidents.

- Existing traffic means polluting environment due to weak equipment and high noise...

Aiming to above restraint to railway transportation according to Decision No. 108/QĐ -TTg dated 20/6/1998 on approving Hanoi general development plan until 2020 by Prime Ministry as follows:

“Priority for constructing Urban railway to create key axle-axis of capital public custom traffic network, including both of elevating and underground route and firstly constructing Van Dien - Hang Co - Gia Lam - Yen Vien route”.

Report of Public consultation - Hanoi elevated railway project, Ngoc Hoi - Yen Vien section

According to Decision No. 06/2002/QĐ-TTg dated 07/1/2002 on approving Railway Transportation Master Development plan to 2020 by Prime Minister show that: "Upgrading, constructing to complete custom station, good station step by step for key areas, especially for noting custom stations at Central Hanoi and HoChiMinh city - these areas are Railway central station, transfer areas and connecting transportation means, multi-function service" ...

Sourced from above requirements, constructing Hanoi Elevating railway from Ngoc Hoi to Yen Vien is necessary and must be constructed early.

### 1.3. Project Description

#### 1.3.1. The old Project: Hanoi Elevated Railway Project, Ngoc Hoi - Yen Vien section.

*The new Project: HaNoi CTTY Urban Railway Construction Project, Line 1.*

#### 1.3.2. Project owner: Vietnam Railways

*Representative investment owner: Railway Projects Management unit (RPMU)*

#### 1.3.3. Construction scale of the project

- Scope of the Project : Total length of the project is 28.68 Km.

- Main work items include :

+ Constructing the elevated railway from Ngoc Hoi - Yen Vien with total length of 28.68 Km, in which length of elevated running sections of 20.71Km, ground running sections of 7.97 Km.

+ Constructing 5 national railway stations.

+ Constructing 11 urban railway stations.

+ Constructing 6 technical areas to adjust equipment of locomotives of the national railways and 1 technical complex area Depo for urban railways.

+ Plan for master planning of hanoi Railway Station with use of remaining land fund of railways after the building the elevated rail line.

+ Purchasing 100 trains for urban railways.

- Total used land area of all line of Phase 1:

**Table 1.1. Synthesizing ground clearance and resettlement volumes of Phase 1**

	Items	Unit	Volume
A	Land	m <sup>2</sup>	

*Report of Public consultation - Hanoi elevated railway project, Ngoc Hoi - Yen Vien section*

	<b>Iterms</b>	<b>Unit</b>	<b>Volume</b>
1	Total		1,565,632
2	Existing land		175,738
3	New land		1,389,894
-	Land for living in urban	m <sup>2</sup>	133,192
-	Land for living in communes	m <sup>2</sup>	10,928
-	Soil	m <sup>2</sup>	0
-	area of ponds	m <sup>2</sup>	117,868
-	land for agriculture	m <sup>2</sup>	1,023,434
4	Temporary land	m <sup>2</sup>	
B	House	house/m <sup>2</sup>	1219/81,745
-	fourth class	house /m <sup>2</sup> with the built area	116/5,691
-	1 floor	house /m <sup>2</sup> with the built area	450/36,025
-	2 floors	house /m <sup>2</sup> with the built area	372/22,583
-	3 floors	house /m <sup>2</sup> with the built area	240/12,177
-	4 floors	house /m <sup>2</sup> with the built area	41/5,270
-	5 floors	house /m <sup>2</sup> with the built area	1/76
C	Construction on land		
1	Fruits of the earth	m <sup>2</sup>	1,023,434
2	Plants	Tree	18,482
3	Aquatic product	m <sup>2</sup>	117,868
D	Tomb		650
-	Built tomb	Tomb	440
-	Tomb's covered with ground	Tomb	210

- Total used land area of all line of Phase 2:

**Table 1.2. Synthesizing ground clearance and resettlement volumes of Phase 2**

	<b>Iterms</b>	<b>Unit</b>	<b>Volume</b>
A	Land	m <sup>2</sup>	
1	Total		358,786

Scientific and Technological Center For Environmental Protection in Transportation (CEPT)

*Report of Public consultation - Hanoi elevated railway project, Ngoc Hoi - Yen Vien section*

	<b>Iterms</b>	<b>Unit</b>	<b>Volume</b>
2	Existing land		225,072
3	New land		133,714
-	Land for living in urban	m <sup>2</sup>	100,565
-	Land for living in communes	m <sup>2</sup>	4,396
-	Soil	m <sup>2</sup>	2,648
-	area of ponds	m <sup>2</sup>	1,910
-	land for agriculture	m <sup>2</sup>	24,196
4	Temporary land	m <sup>2</sup>	41,548
B	House		567/33115
-	fourth class	household/m <sup>2</sup> with the built area	2/153
-	1 floor	household/m <sup>2</sup> with the built area	406/20082
-	2 floors	household/m <sup>2</sup> with the built area	101/7000
-	3 floors	household/m <sup>2</sup> with the built area	58/5880
C	Construction on land		
1	Fruits of the earth	m <sup>2</sup>	24,196
2	Plants	Tree	6762
3	Aquatic product	m <sup>2</sup>	1,910
D	Tomb		
-	Built tomb	Tomb	-
-	Tomb's covered with ground	Tomb	-

- The Project is divided into 2 phases to invest, including:

+ Phase 1 (estimated from 2008-2016) shall be invested from Giap Bat - Gia Lam and Ngoc Hoi Railway Station.

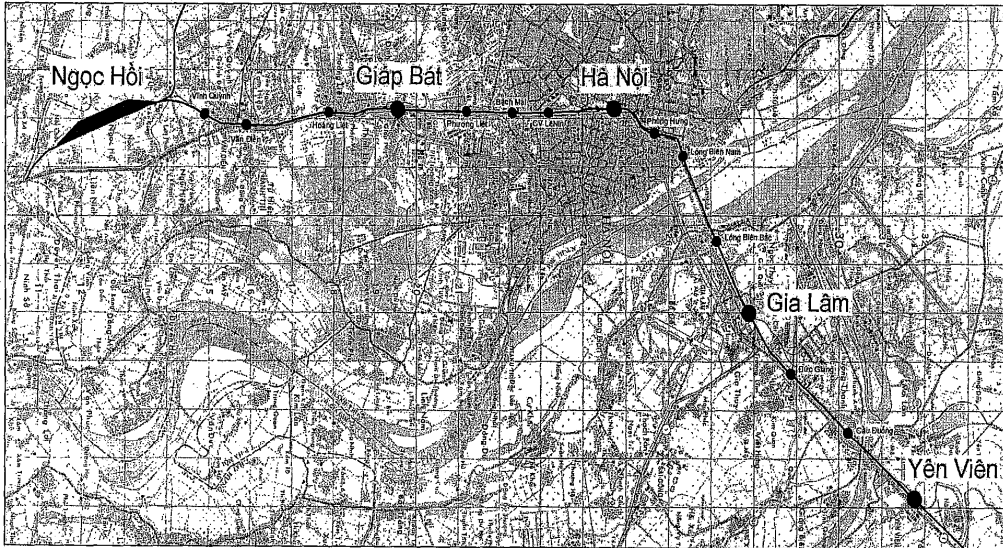
+ Phase 2 (estimated from 2017-2020): remaining section including Giap Bat - Ngoc Hoi and Gia Lam - Yen Vien.

- Total investment capital of the project is VND 28,000 billion, in which :

+ Phase 1: Total investment capital of VND 19,500 billion.

+ Phase 2: Total investment capital of VND 8,500 billion.

Figure 1.1. The alignment of the project



## PART 2

### PUBLIC CONSULTATION

#### 2.1. Social – economic Characteristics

Socio-economic Characteristics Under the strong and huge impact of urbanization, the overall socio-economic situation in Hanoi has quickly improved. Gross regional domestic product (GRDP) has grown constantly at 11% a year since 1995, while per capita GRDP growth has been more than 7% a year. While poverty rate has sharply dropped, the ownership of vehicles as well as other durable household goods has increased significantly. The development during this period is largely fuelled by the rapid progress of industrialization led by the government sector and FDI's. Contribution due to the growth in tourism both domestic and foreign is also notable.

(1) *Economy and Employment:* During the last decade, GRDP has increased by 11% per year, and employment has likewise increased. However, the increase is only slightly higher than that of population, indicating that Hanoi cannot provide sufficient job opportunities to a growing population.

A characteristic of Hanoi is that the share of the tertiary sector (services) decreased, from 64% in 1995 to 60% in 2000 and further to 58% in 2003. Meanwhile, that of the secondary sector (industries) increased from 31% in 1995 to 36% in 2000 and 38% in 2003. In many other large cities, urbanization has generated more employment in the tertiary sector. Since appropriate locations within Hanoi for the secondary sector are getting constrained, it is expected that there will, and should, be more employment opportunities in Hanoi in the tertiary sector.

Compared to 1995, turnover of import and export has increased rapidly. The same trend can be seen in the drastic increase in FDI's. The growth rate of export and import is at 9% and 21%, respectively, and notably, it increased by more than 40% per year in the last few years.

(2) *Poverty:* As the country's economy has grown, poverty incidence in the Red River Delta, to which Hanoi belongs, has quickly decreased, from 62.7% in 1993 to 29.3% in 1998 and 22.4% in 2002. Hanoi's HDI (Human Development Index) is a strength that can further help eradicate poverty and contribute to competitive economic development. In 1999, it ranked second overall in HDI, at 0.798.



(3) *Motorization*: Parallel to population growth, motorization has made rapid progress, too. Vehicle ownership particularly that of motorcycle has increased sharply. Up to 2005, there are 164 thousand cars and 1,566 thousand motorcycles in Hanoi; in comparison with the respectively quantity of 97 thousand and 786 thousand previously. Within the period 2000 - 2005, the number of cars has increased by 13 thousand items, and the number of motorcycles has increased by 156 thousand items, the annually average growth rate is 11.1% and 14.8% regarding cars and motorcycles respectively. It is noticed that the growth rate regarding motorcycles within the period 2004 – 2005 is very low, only at the rate of 1.5%, this is the result of the Hanoi city's restriction of motorcycle registration policy. Now, 84% of households own a motorcycle, of which 40% have more than two.

Although car ownership is still low at 1.6% of the total population in Hanoi, this figure has increased rapidly, posing a threat to smooth traffic flow in some locations. While bus services have quickly expanded, its share in the total urban transportation demand is still insignificant. Rapid economic growth at a rate of 11% per year is expected to further accelerate ownership of private vehicles such as motorcycles and cars.

(4) *Lifestyle*: Currently, about 27% of households belong to the low-income class, 41% to the middle-income class, and 32% to the high-income class. Most households live in detached houses. The ratio of apartments and high-rise residents is still low and only high-income class households live in such kind of housing. No matter how low or high-income, most households in Hanoi own one or more motorcycles. Car ownership is still low at 2% in the whole city. Seven percent of the lowest-income group does not have any vehicle of their own.

Differences in lifestyle can be observed by locations such as the urban core and the suburban. Households in the urban core, as well as Thanh Xuan and Long Bien districts, in the urban fringe have high income (more than VND 5 million / month) and own more electric appliances as well as vehicles than those in suburban and rural areas. The ratio of households who live in apartments is also high in the urban core. However, households in urban core have smaller living spaces and tend to live in relatively old housing, while those in suburban and rural districts enjoy larger housing space in spite of their low income level. It is remarkable that more than half of households in suburban and rural districts own more than one motorcycle even if their incomes are relatively low. This indicates that people in these areas still have less accessibility to public transportation or other means of transportation.

(5) *Housing*: In 2003, total housing floor area in Hanoi increased to 20 million m<sup>2</sup>, showing a 35% increase from the 15 million m<sup>2</sup> in 1999. In urban areas of Hanoi, the housing floor area was estimated at 11.7 million m<sup>2</sup>, or a remarkable increase of nearly 60% from 7.5 million m<sup>2</sup>.

According to Hanoi's Department of Construction, illegal construction activities are rampant in the city, although the situation has reportedly improved in the last couple of years. For instance, the number of construction permits issued in 2004 was around 2,800, while the number of illegal construction cases was about 3,000, or a difference of around 200 unauthorized projects.

(6) *Transportation Infrastructure and Road Network*: Hanoi has a total road length of 624km, a railway length of 123.2km, and inland waterway length of 80.7km. The ratio of road area to Hanoi's total land area is 1.9%, which is absolutely low compared to other major cities such as Tokyo's 18.8%. The road is densely developed in urban areas, while less dense in rural areas, which causes unequal distribution of accessibility to transport of different area within Hanoi. The road network basically consists of radial and ring roads. The radial road network is connected directly to the regional primary road network including NH1, NH5, NH3, NH2, NH32, and Lang - Hoa Lac Highway. It has been observed that the road design standard is often inconsistent with the road function, e.g. arterial roads suddenly becoming narrow or interrupted in many places.

## **2.2. Reason of public consultation action**

Public consultation is one part of environmental impact assessment action to the project. And it implemented by co-operation between Investment Owner, Project Consultation and Environmental Consultancy with local people in the project area. And the results of public consultation process will be used to assess design method, propose mitigation measurement and show support from community during project implementation process.

The publication of project information and consultation from the project affected people and the related parties are important issues in the study and project implementation. If this activity is carried out well, it will assist to reduce the contradiction generation, the risks in the project implementation and the Environmental Impact Assessment report making as well as the appropriate, satisfactory Resettlement Action Plan preparing, which will give priority to the project affected people and contribute to improve the socio-economic efficiency of the project.

### **2.3. The Purposes of Public consultation**

The key goals of Public consultation are as follow:

- ✓ To ensure local authority and representative of the project effected people to take part in the process of planning and decision-making
- ✓ To provide the project affected people with information on components and activities of Project
- ✓ Collecting information of economic, society condition of the districts/village/precincts along the route;
- ✓ To collect information about the project effected people's demand and priorities and take their opinion about proposed actions and policies.
- ✓ To obtain cooperation and participation from effected people as well as communities for necessary missions in term of planning and implementing Resettlement.
- ✓ To ensure transparency for all the business related Land Acquisition and Resettlement and economical restoration

### **2.4. Content of Public consultation Mission**

The public consultation mission includes such contents as:

- (i) To inform and consult about all process of the Project to the affected people;
- (ii) The environmental Consultant Group participates in public consultation meetings to discuss with the local authority and the community
- (iii) To evaluate awareness of authorities and citizen of the Project
- (iv) To evaluate awareness of households settling in the project impacted areas.

### **2.5. Method of Public consultation**

Procedures of the public consultation mission are carried out as following:

1) Received opinion from People's commitment and front commitment to the project and issues of environment, collecting economic, society condition of the village/precincts along the route



1) Deliver leaflets on the project to the households along the alignment.



2) Quick interview on 150 households along the project (according to the form of questionnaire) to collect basic data for preparing next public consultation steps



3) Organizing meetings, discussing with local government and people.



4) Surveying social economic environment and opinion from habitants in project area. (About 350 households).

### 2.6. Implementation of the Public Consultation

Implementation of Environmental Protection Law 2005 and JBIC guidelines for Confirmation of Environmental and Social considerations, RPMU cooperated with the environmental consultation agency which is CEPT to carry out the community consultation for The Elevated Railway Project, Ngoc Hoi - Yen Vien section, phase 1.

The list of RPMU, CEPT and TRICC.JSC representatives:

1	Pham Hai Bang	RPMU	Vice - Director
2	Pham Quang Duy	RPMU	Chief of project department
3	Nguyen Khanh Tung	RPMU	Expert
4	Đang Thi Phuong Nga	CEPT	Acting Director
5	Nguyen Huu Nhat	CEPT	Vice Director
6	Pham Tien Sy	CEPT	Expert
7	Nguyen Thi Minh Hien	CEPT	Expert
8	Nguyen Trung Thanh	CEPT	Expert
9	Phan Minh Hoa	CEPT	Expert
10	Pham Ngoc Thuy	CEPT	Expert
11	Bui Thi Huyen	CEPT	Expert
12	Le Doan Thanh	TRICC.JSC	Expert
13	Nguyen Duc Phuong	TRICC.JSC	Expert

### **PART 3**

## **RESULTS OF PUBLIC CONSULTATION**

Applicable methods to collect the socio – economic data of the project affected area include:

- Collect available data: such data on socio – economic condition of the wards/commune adapted from the statistical data and the annual final report of the wards/commune. The data of the is collected from the prepared questionnaire which issued in advance.

- Qualitative study: sound interview with the ward/commune staffs (Chairman and Deputy Chairman of the ward/commune People’s Committee, Chairman of the ward/commune Fatherland Front Committee), representatives of the residential areas and the householders to collect the data.

- Quantitative study: survey and investigation by using the questionnaire and direct interview with about 20% of the total impacted households.

- Object of the interview: the householders (husband or wife) or the person who has the principle role in the economic of the household with the age of more than 18.

RPMU cooperated with the local authorities to organize the public consultation meetings in districts and wards/commune in the project affected areas. Participated in the meetings were representatives of RPMU, CEPT, TRPC.JSC, authorities of the districts and wards/commune in the project affected area; representatives of the social organizations such as the Fatherland Front Committee, Women Association, and the people living in the project affected area. The purpose of such meetings were to public the project information to the multiplied levels of local authorities, the project affected people as well as to collect the ideas, comments, desire, contribution of the affected households to the proposed activities of the project and the related policies in the project implementation stage. The result of the public consultation:

### **3.1. Comments Collection from Wards/Commune Fatherland Front (refer appendix 1):**

Railway project management Unit (RPMU) – VietNam Railway company send Official dispath No. 252/RPMU-PPD dated on 05 april 2007 with the project brief to People’s Committee and Fatherland Front to consult opinion about the Project. Following is feedback.

**Table 3.1. General of opinions from consulted village in the project area**

No	Communes /Wards	Opinions from Local People's Committee and Fatherland Front
1	Van Mieu People's Committee	- Agree with content of the project - Propose to follow strickly environmental protection methods, not cause impacts to people in the area.
2	Van Mieu Fatherland Front Committee	- Agree with content of the project - Need to minimize traffic jam during conctruction process - Need to calculate to reduce noise and vibration for households from 10m space.
3	Van Chuong People's Committee	- Agree with content of the project Propose to implement measures to minimize environmental pollution.
4	Van Chuong Fatherland Front Committee	- Need more information about the Project.
5	Kham Thien People's Committee	- Agree with content of the project - Propose to carry out the Project early.
6	Kham Thien Fatherland Front Committee	- Agree with content of the project - Should pay attention to the beauty of road. - Need to build defending walls to reduce noise and dust. - Start as soon as possible, construct completely for each road stretch.
7	Dong Xuan People's Committee	- Agree with content of the project - Need to minimize noise and dust during construction process. - Avoid implementing at rush hours
8	Dong Xuan Fatherland Front Committee	- Agree with content of the project - Ensure the environmental sanitation during construction process - Avoid implementing at rush hours
9	Cua Nam People's	- Agree with content of the project

*Report of Public consultation - Hanoi elevated railway project, Ngoc Hoi - Yen Vien section*

No	Communes /Wards	Opinions from Local People's Committee and Fatherland Front
	Committee	
10	Cua Nam Fatherland Front Committee	- Agree with content of the project
11	Tran Hung Dao People's Committee	- Agree with content of the project - Propose to upgrade the road stretch from Long Bien bridge to highway No.5 to harmonize and create safe and comfortable psychology for clients on the train. - Need to erupt water and equip waste bins during construction process.
12	Tran Hung Dao Fatherland Front Committee	- Agree with content of the project, however, the construction period is quite long. - Should start early.
13	Nguyen Du People's Committee	- Agree with content of the project
14	Nguyen Du Fatherland Front Committee	- Agree with content of the project - The clearance and compensation activities should be implemented suitably to settle people's opinions. - Construct completely for each road stretch.
15	Ngoc Thuy People's Committee	- Agree with content of the project - Should have the close cooperation between Project owner and local authority before, during and after project implementation. - Provide information about the Project to all organizations and people to carry out the Project effectively.
16	Ngoc Thuy Fatherland Front Committee	- Agree with content of the project - Propose to carry out the Project early, follow strictly urban environmental protection methods.
17	Duc Giang People's Committee	- Agree with content of the project
18	Duc Giang Fatherland Front Committee §øc	- Agree with content of the project - Agree with contents related to environmental impacts

*Report of Public consultation - Hanoi elevated railway project, Ngoc Hoi - Yen Vien section*

No	Communes /Wards	Opinions from Local People's Committee and Fatherland Front
	Giang	and minimum measures.
19	Giap Bat People's Committee	- Agree with content of the project - Should strengthen the responsibility of management staff, professional morality and use the cross examination approach.
20	Giap Bat Fatherland Front Committee	- Agree with content of the project - Should carry out the Project early - Give the questions to the Project as What is the level that the Project belong to -regional or world scope level. Which technology would be used for implementation.
21	Hoang Liet People's Committee	- Agree with content of the project
22	Hoang Liet Fatherland Front Committee	- Agree with content of the project - Need to build water system, not cause flood for resident areas. - Should pay attention to worker hygiene at construction areas, not effect to surrounding inhabitants - Supervise and monitor the implementation of mitigation measures to the environment
23	Thinh Liet People's Committee	- Agree with content of the project
24	Thinh Liet Fatherland Front Committee	- Agree with content of the project
25	Thinh Cong People's Committee	- Agree with content of the project - Agree with environmental impacts and mitigation measurements.
26	Thinh Cong Fatherland Front Committee	- Agree with content of the project - Should solve well current urban traffic jam issues.
27	Lien Ninh People's Committee	- Agree with content of the project - Need to build a solid water treating system.



*Report of Public consultation - Hanoi elevated railway project, Ngoc Hoi - Yen Vien section*

No	Communes /Wards	Opinions from Local People's Committee and Fatherland Front
28	Lien Ninh Fatherland Front Committee	<ul style="list-style-type: none"> <li>- Agree with content of the project</li> <li>- Need to build a solid water treating system.</li> </ul>
29	Vinh Quynh People's Committee	<ul style="list-style-type: none"> <li>- Agree with content of the project</li> <li>- Should carry out clearance and compensation for people before the Project started.</li> <li>- Avoid noise, dust. Ensure the water treating system, not effect to the production of people in the area</li> </ul>
30	Vinh Quynh Fatherland Front Committee	<ul style="list-style-type: none"> <li>- Agree with content of the project</li> <li>- Should carry out clearance and compensation for people before the Project started.</li> <li>- Avoid to make materials dropped out, ensure the water treating system, not effect to the production of people in the area</li> </ul>
31	Van Dien People's Committee	<ul style="list-style-type: none"> <li>- Agree with content of the project</li> <li>- Propose to select the method 1b, it is more expensive but suitable for long term scale.</li> </ul>
32	Van Dien Fatherland Front Committee	<ul style="list-style-type: none"> <li>- Agree with content of the project</li> <li>- Propose to select the method 1b</li> </ul>
33	Ngoc Hoi Fatherland Front Committee	<ul style="list-style-type: none"> <li>- Agree with content of the project</li> <li>Should strengthen the cooperation between Project investor and local authority to minimize impacts to the environment as social evils.</li> <li>- People are agreeable and ready for site clearance for project implementation.</li> </ul>
34	Ngoc Hoi People's Committee	<ul style="list-style-type: none"> <li>- Agree with content of the project</li> <li>- People support for the Project</li> </ul>
35	Yen Vien People's Committee	<ul style="list-style-type: none"> <li>- Need to be studied more about the Project.</li> <li>- Should carry out clearance and compensation for people before the Project started.</li> </ul>
36	Yen Vien Fatherland Front Committee	<ul style="list-style-type: none"> <li>- Need to be studied more about the Project.</li> </ul>

All answers were agreeable on the implementation of the Project Elevated Railway Project through Hanoi (Ngoc Hoi - Yen Vien section) and shown that the Project is necessary, urgent to improve current traffic jam situation in Hanoi city, to decrease traffic accidents and cut down air pollution in the area.

All comments approved of natural and social issues during project construction period pointed out by Environment Consultants as dust, vibration, noise, water surface pollution and impacts to psychology and life of residents who are effected by the Project.

Therefore, People's Committee and Fatherland Front Committee of communes and wards agreed to propose that Project Owner should implement mitigation measures to air pollution, dust, noise, water resource, ecological system and sight protection in the area.

The site clearance and resettlement compensation must be solved completely. All opinions agreed with migrating and receiving compensation but must be followed right policies and expense before starting the Project.

Comments proposed the Project Investor must define the project's specific boundary and the time for land acquisition so prevent uncertainties and worries among the publics.

### **3.2. Generalization of social- economic survey questionnaire (information from Ward/Commune People's Committee) (Refer Appendix 2):**

At each public consultation meeting at the district level, RPMU and the environmental consultation (CEPT) sent the socio - economic questionnaire to the ward/commune People's Committee to collect foundation data of the ward/commune. Following are some statistics from feedbacks

**Table 3.2. Population condition in the Project area**

No	Ward/Commune	Population condition			
		Population	Total of household	Average HH size	Growth rate/year (%)
1	Van Mieu	13000	2900	4	1
2	Van Chuong	18550	4186	4	1.58
3	Kham Thien	-	-	-	-
4	Dong Xuan	10926	2535	4	1.65

*Report of Public consultation - Hanoi elevated railway project, Ngoc Hoi - Yen Vien section*

5	Cua Nam	12186	3000	4	0.015
6	Tran Hung Dao	11810	3316	4	1.16
7	Nguyen Du	10297	2621	4	0.14
8	Ngoc Thuy	-	-	-	-
9	Duc Giang	25000	5765	4	3.5
10	Giap Bat	16000	-	-	-
11	Hoang Liet	-	-	-	1.09
12	Thinh Liet	23935	4938	5	-
13	Dinh Cong	28552	7038	4	-
14	Lièn Ninh	11063	2772	4	1.2
15	Vinh Quynh	20652	4773	4	1.4
16	Van Dien town	15798	3561	4	0.22
17	Ngoc Hoi	8671	2230	4	1.1
18	Yen Vien town	12308	2796	4	-

**Table 3.3. Profile of land use**

No	Ward/Commune	Profile of land use				
		Total of area (ha)	Area of Tenure Land (ha)	Area of Industrial land (ha)	Area of specialized land (ha)	Trade and service land
1	Van Mieu	0.295075	8.71	0	-	0.21
2	Van Chuong	3303534	17.6867	0	-	-
3	Kham Thien	-	-	-	-	-
4	Dong Xuan	17	8.1	-	-	-
5	Cua Nam	26.5	9.2268	00	9.641	4.4303

*Report of Public consultation - Hanoi elevated railway project, Ngoc Hoi - Yen Vien section*

6	Tran Hung Dao	50	14.7962	-	-	-
7	Nguyen Du	380	913	54.2		
8	Ngoc Thuy	-	-	-	-	-
9	Duc Giang	-	-	1.2236	-	-
10	Giap Bat	75	-	-	-	-
11	Hoang Liet	487.8	153.3	143.3	-	-
12	Thinh Liet	326	-	46.8	-	-
13	Dinh Cong	-	-	-	-	-
14	Lien Ninh	420.4	113.7	251.9	-	-
15	Vinh Quynh	630.5	21.6	337	-	-
16	Van Dien town	89.9	32.7	15.1	-	-
17	Ngoc Hoi	375	53.8	195.5	-	-
18	Yen Vien town	101.6	60.5	0	-	-

**Table 3.4. Economic profile**

No	Ward/Commune	Economic profile			
		Total of worker	Average income (million/month)	Number of poor household	Numbers of household used clean water.
1	Van Mieu	6400	700000	-	100%
2	Van Chuong	10703	2300000	32	100%
3	Kham Thien	-	-	-	100%
4	Dong Xuan			100	100%
5	Cua Nam	11209	1500000	15	100%
6	Tran Hung Dao				100%
7	Nguyen Du	3900	600000	25	100%
8	Ngoc Thuy	-	-	-	-

*Report of Public consultation - Hanoi elevated railway project, Ngoc Hoi - Yen Vien section*

9	Duc Giang		700000	78	99%
10	Giap Bat				85%
11	Hoang Liet	1520	650000	19	80%
12	Thinh Liet				85%
13	Dinh Cong		600000	21	100%
14	Lien Ninh	6969	600000	5	100%
15	Vinh Quynh	13443	600000	185	71%
16	Van Dien town				100%
17	Ngoc Hoi	5527	800000	96	98%
18	Yen Vien town	12308		43	97%

**Table 3.5. Profile of public works and services**

No	Ward/ Commune	Profile of public works and services						
		Head office	School	Factory	Hospital	Market	Religious Work	Cemetery
1	Van Mieu	41	5	-	3	1	8	0
2	Van Chuong	2	4	16	1	1	4	0
3	Kham Thien	-	-	-	1	2	3	0
4	Dong Xuan	-	3	-	1	2	15	0
5	Cua Nam	26	1	-	-	1	6	0
6	Tran Hung Dao	-	7	-	2	1	2	0
7	Nguyen Du	35	3	61	3	0	3	0
8	Ngoc Thuy	-	-	-	1	2	5	0
9	Duc Giang	187	10	157	4	2	1	1
10	Giap Bat	-	3	-	2	3	3	0
11	Hoang Liet	45	4	-	1	1	14	5
12	Thinh Liet	-	2	-	2	-	7	-

13	Dinh Cong	24	-	-	-	1	0	2
14	Lien Ninh	8	3	16	1	0	11	5
15	Vinh Quynh	3	5	22	0	1	10	4
16	Van Dien town	23	5	105	7	1	0	1
17	Ngoc Hoi	-	3	32	2	2	8	3
18	Yen Vien town	18	3	85	1	2	0	1

**3.3. Delivery of Project leaflets to the households along the line:**

The leaflets (refer Appendix 3) were delivered to households along the alignment. News about the Project have been propagandizing through media like Television, Broadcast, newspaper, electronic newspaper, etc.

**3.4. Quickly Interview of some households along the line**

Amount of consulted households are 151 (refer Appendix 4). Questionnaire was delivered to the households in the street front, along the alignment in the form of quick, random interview.

**Table 3.6. General Description of the interviewed households**

Total of household	Total of people	Average household size	Number of employee	Average number of employee per households
151	754	5	361	2

**Table 3.7. Occupation of the interviewed households**

Total of household	Worker and official of State	Small service and vendors	Craft and related trader workers	Others	Average of household income (million/month/person)
151	89	58	11	25	1.15

Table 3.8. Water use

Total of household	Piped water	Well-water	River water
151	147	6	0
100%	97.4%	3.97%	0%

Table 3.9. Housing Condition of the interviewed households

Total of household	Level 1	Level 2	Level 3	Level 4
151	13	53	53	32
100%	8.6%	35.1%	35.1%	21.2%

Table 3.10. Proportion of households having land-use certificate

Total of household	Title-deed		Non title-deed	
	Amount	% to Total	Amount	% to Total
151	122	80.8%	29	19.2%

Table 3.11. Opinion about living environment

Total of household	Situation		Type of polluted environment				
	Yes	No	Noise	Dust and waste	Awful water quality	Low and dam	Near market and coach stations
151	131	20	106	76	24	0	0

Table 3.12. Awareness of the Project

Total of household	Known	Unknown
151	131	20
100%	86.8%	13.2%

**Table 3.13. Opinion about the Project**

Total of household	Ideas		
	Agreement	Against	Non- comment
151	132	3	16
100%	87.4%	2.0%	10.6%

**3.5. Organizing meetings and discussing with local government and people in the project area.**

From 10/2007 – 4/2008, RPMU and CEPT co-operated with local government and people organize meetings to public consultation at districts as Long Bien, Hoan Kiem, Ba Dinh, Dong Da, Thanh Xuan, Hoang Mai and Thanh Tri districts. And through village and precinct government define numbers of effected habitant by the project to invite them go to meetings. Moreover, time and locations of meeting also informed on the radio of precincts to other people go to.

Subject of the public meetings :

- Opinion of communities about impacts caused by the implementing of the Project to the environment and development of society.
- What issues are considered to protect environment during construction and operation phases?
- Suggestion and demand to the project
- Agree or object to the project

In the meetings, RPMU introduces main content of the Project. Environmental Consultant (CEPT) presents environmental impacts caused by the Project and proposed remedies for minimizing adverse impacts. Process of each meeting is recorded in minutes, in which participants sign. (refer appendix 5).

**Table 3.14. Timetable, venue and participants of districts, ward/commune public consultation meetings**

Venue	Time	Participants
The Meeting Hall of the People's Committee of Dong	14h00	- Chaired by: Mr Duong Quyet Tien - Deputy Chairman of Dong Xuan ward



*Report of Public consultation - Hanoi elevated railway project, Ngoc Hoi - Yen Vien section*

Xuan Ward, Hoan Kiem District	18/10/2007	<ul style="list-style-type: none"> <li>- Representative of RPMU</li> <li>- Representative of JBIC</li> <li>- Representative of CEPT.</li> <li>- Habitants in Dong Xuan ward</li> <li>- Representative of TRICC-JSC.</li> </ul>
The number 1 meeting hall of Thanh Tri district	09h00 25/10/2007	<ul style="list-style-type: none"> <li>- Chaired by: Mr Tran Van Huy - Chairman of Thanh Tri district</li> <li>- Representatives from some departments such as Urban Construction, Environment and Resources, Administration.</li> <li>- Authorities and union of wards: Lien Ninh, Ngoc Hoi</li> <li>- Representative of RPMU</li> <li>- Representative of CEPT</li> <li>- Representative of TRICC-JSC.</li> <li>- Habitants in Lien Ninh, Ngoc Hoi ward</li> </ul>
The meeting hall of Cua Nam ward, Hoan Kiem district	14h00 07/11/2007	<ul style="list-style-type: none"> <li>- Chaired by: Mr Le Hong Phu - Chairman of Cua Nam ward</li> <li>- Authorities and union of Cua Nam ward.</li> <li>- Representative of RPMU</li> <li>- Representative of CEPT</li> <li>- Representative of TRICC-JSC</li> <li>- Habitants in Cua Nam ward</li> </ul>
The number 2 meeting hall of Dong Da district	09h00 9/11/2007	<ul style="list-style-type: none"> <li>- Chaired by: Mr Tran Viet Trung - Deputy Chairman of Dong Da district</li> <li>- Deputy Chairman of Dong Da People's Council</li> <li>- Vice Chairman of Dong Da Father Land Front</li> <li>- Representatives of several departments such as: Urban Construction, Environment and Resources, Administration.</li> </ul>

*Report of Public consultation - Hanoi elevated railway project, Ngoc Hoi - Yen Vien section*

		<ul style="list-style-type: none"> <li>- Authorities and Unions of wards: Phuong Lien, Phuong Mai, Kham Thien</li> <li>- Representative of RPMU</li> <li>- Representative of CEPT</li> <li>- Representative of TRICC-JSC</li> <li>- Representative of habitants in Phuong Lien, Kham Thien and Phuong Mai ward</li> </ul>
The meeting hall of Phuong Liet ward, Thanh Xuan district	08h30 19/3/2008	<ul style="list-style-type: none"> <li>- Chaired by: Mr Pham Huy Loi - Chairman of Phuong Liet ward</li> <li>- Authorities and Unions of Phuong Liet ward: Chairman, Deputy Chairman of people's council, Deputy Chairman of Fatherland Front, The secretary to the ward's youth union, Urban Construction, women's union, Cadastral officer of the ward.</li> <li>- Representative of RPMU</li> <li>- Representative of CEPT</li> <li>- Representative of TRICC-JSC</li> <li>- Habitants in project area belong to ward location.</li> </ul>
The meeting hall of Long Bien district	08h30 27/2/2008	<ul style="list-style-type: none"> <li>- Chaired by: Mr Dang Vu Nhat Thang - Chairman of Long Bien district</li> <li>- Authorities and Unions of Long Bien district: Administration, land acquisition Board, Urban Construction, Environment and Resources.</li> <li>- Authorities and union of wards: Ngoc Lam, Ngoc Thuy, Thuong Thanh, Gia Thuy.</li> <li>- Representative of RPMU</li> <li>- Representative of CEPT</li> <li>- Representative of TRICC-JSC</li> <li>- Habitants in the project area belong to Ngoc Thuy, Gia Thuy, Ngoc Lam and Thuong Thanh</li> </ul>

*Report of Public consultation - Hanoi elevated railway project, Ngoc Hoi - Yen Vien section*

		preincincts.
The meeting hall of Thinh Liet ward, Hoang Mai district	08h30 28/3/2008	<ul style="list-style-type: none"> <li>- Chaired by: Mr Le Van Mao - Chairman of Thinh Liet ward</li> <li>- Authorities and Unions of Hoang Mai district: Fatherland Front, party Committee Secretary, Cadastral officer of the ward.</li> <li>- Representative of RPMU</li> <li>- Representative of CEPT</li> <li>- Representative of TRICC-JSC</li> <li>- Habitants in project area belong to ward location</li> </ul>
The meeting hall of Dien Bien ward, Ba Dinh district	15h00 10/4/2008	<ul style="list-style-type: none"> <li>- Chaired by: Mr Nguyen Trong Khanh – Deputy Chairman of Dien Bien ward</li> <li>- Authorities and Unions of ward: party Committee Secretary, Chairman of people’s council, Fatherland Front, Cadastral officer of the ward, urban officer, police, women’s union.</li> <li>- Habitants in project area belong to ward location</li> <li>- Representative of RPMU</li> <li>- Representative of CEPT</li> <li>- Representative of TRICC-JSC</li> </ul>
The meeting hall of Phuc Xa ward, Ba Dinh district	14h00 11/4/2008	<ul style="list-style-type: none"> <li>- Chaired by: Mr Tran Duc Dat - Chairman of ward</li> <li>- Authorities and Unions of ward: Party Committee Secretary, Deputy Chairman of people’s council, Cadastral officer of the wardr, cultural and informational officer.</li> <li>- Habitants in project area belong to ward location</li> <li>- Representative of RPMU</li> <li>- Representative of CEPT</li> <li>- Representative of TRICC-JSC</li> </ul>

The meeting hall of Hoang Liet ward, Hoang Mai district	8h30 19/4/2008	<ul style="list-style-type: none"> <li>- Chaired by: Mr Nguyen Quoc Dung - Chairman of ward</li> <li>- Authorities and Unions of ward: Party Committee Secretary, Chairman of people's council, Deputy Chairman of people's council, Deputy Chairman of ward, Chairman of Fatherland Front, Chairman of Veterans' organization, Cadastral officer of the ward, cultural and informational officer.</li> <li>- Habitants in project area belong to ward location</li> <li>- Representative of RPMU</li> <li>- Representative of CEPT</li> <li>- Representative of TRICC-JSC</li> </ul>
---	-------------------	---

**Table 3.15. Summary of opinion from districts public consultation meetings**

Location	Opinion
Dong Xuan ward, Hoan Kiem district	<ul style="list-style-type: none"> <li>- The Project is agreed by the local authorities.</li> <li>- When the project is deployed, it shall have environmental impacts and the ground clearance, the Project Owner is requested to have adequate measures to reduce these environmental impacts. Compensation of the ground clearance, resettlement must be in compliance with current regulations of the State and the City, ensure legitimate rights of the people.</li> <li>- Local people are requested to facilitate and coordinate with the Project Owner in deploying inspection, survey, making the technical design to meet requirements on the schedule so that construction of the project shall be completed upon the policies of the Government and Hanoi City.</li> </ul>
Thanh Tri district	<ul style="list-style-type: none"> <li>- This is the Project of National stature. The local authorities within the above project in the district agree absolutely with the Project and show that the Project shall develop infrastructure for city.</li> <li>- The project investor has to notify specifically the project progress and the land clearance scale to residents.</li> <li>- the Project Investor is requested to ensure the above-mentioned</li> </ul>

*Report of Public consultation - Hanoi elevated railway project, Ngoc Hoi - Yen Vien section*

Location	Opinion
	<p>diminishable method of environmental protection, anti-noise and environmental hygiene.</p> <ul style="list-style-type: none"> <li>- Water, power supply and drainage system are ensured in the resettlement area. The resettlement plan must be propagated in detail. It is necessary to create employment and ensure residents' life after the resettlement.</li> <li>- Construction of the resettlement area shall bring about higher piles of land that shall affect to the relevant area, so please pay attention.</li> </ul>
Cua Nam ward, Hoan Kiem district	<ul style="list-style-type: none"> <li>- Local authority agreed to the project.</li> <li>- Project must be deployed democratically and publicly, especially the compensation for the households whose land to be withdrawn must be planned in detailed. The Investor needs to coordinate with the local authority and the relevant agencies to stabilize the living condition of the people, minimize the negative arising matters during the deployment of project.</li> <li>- The project during the construction will impact the environment and the land clearance is indispensable.</li> <li>- The people are kindly required to create favourable condition for the Investor to carry out the survey, facilitate the project.</li> </ul>
Dong Da district	<ul style="list-style-type: none"> <li>- This is a specially important project of the City.</li> <li>- At present, there are 2 opinion currents of the people: it shouldn't build railway through the city; and the Project should be implemented to improve the infrastructure, reduce the traffic stoppage and accidents.</li> <li>- The Project Owner is requested to introduce in more details about other comparison plans in later meetings to set forth the best feasible plan.</li> <li>- Everybody may directly suggested their opinions to the Project Owner at address : RPMU, No. 95-97, Le Duan, Ha Noi.</li> </ul>



*Report of Public consultation - Hanoi elevated railway project, Ngoc Hoi - Yen Vien section*

Location	Opinion
Phuong Liet ward, Thanh Xuan district	<ul style="list-style-type: none"> <li>- Local government and people agree with the project .</li> <li>- When constructing the project, some impacts to environment arose and carry out clearing ground activities, suggesting project owner must apply effective mitigation measurement of environment. And resettlement and compensation also obeyed trully current nation and city regulation, ensuring right of habitants.</li> <li>- Suggesting local people create advantage consitions and co-operarte with project owner develop survey and collect information aim to ensure given process and complete project construction as guidelines from Government and Hanoi city.</li> </ul>
Long Bien district	<ul style="list-style-type: none"> <li>- Welcome to the project</li> <li>- District will co-operation in listing and logistic of clearing ground data.</li> <li>- Suggesting to exposing area under elevated railway how used?</li> <li>- The project is so large, thus it's plan must be clearly when construction to receive most effective.</li> </ul>
Thinh Liet ward, Hoang Mai district	<ul style="list-style-type: none"> <li>- The meeting will be initial step to implement project to local.</li> <li>- Local government also agree with the project, and the project will meet travel demand from current people.</li> <li>- Suggesting people support and continue promagating to around people supporting the project</li> <li>- Suggesting the project specifically in construction phase and firstly constructing collection road and temporary road.</li> <li>- If people have any question, please to contact directly RPMU.</li> <li>- Precinct will co-operate with RPMU to solve their questions.</li> <li>- When informing for taking back land, next step, enumerating property and land area to prepare clearing ground activities.</li> <li>- Local people are requested to facilitate and coordinate with the Project Owner in deploying inspection, survey, making the technical design to meet requirements on the schedule so that</li> </ul>

*Report of Public consultation - Hanoi elevated railway project, Ngoc Hoi - Yen Vien section*

Location	Opinion
	construction of the project shall be completed upon the policies of the Government and Hanoi City
Dien Bien ward, Ba Dinh district	<ul style="list-style-type: none"> <li>- Local government and habitants agree with project.</li> <li>- In construction phase, project will impact to environmental quality and implement clearing ground plan, thus suggesting project owner must apply mitigation measurement to environment. Clearing ground and resettlement activities must be obeyed current regulation of nation and the city, ensuring rights of households.</li> <li>- Suggesting local people create advantage conditions and cooperate with project owner develop survey and collect information aim to ensure given process and complete project construction as guidelines from Government and Hanoi city.</li> </ul>
Phuc Xa ward, Ba Dinh district	<ul style="list-style-type: none"> <li>- People in precinct agree with the project and wishing develop early.</li> <li>- Suggesting Project Owner expose information clearer for clearing ground method and resettlement in next phase.</li> <li>- Precinct people will also create advantages to the project develop successfully.</li> </ul>
Hoang Liet ward, Hoang Mai district	<ul style="list-style-type: none"> <li>- People in precinct agree with the project and wishing develop project early.</li> <li>- Suggesting project owner show trully time of developing the project to people stabilize life.</li> <li>- Suggesting to promote the project process to restrict impacts to people.</li> <li>- Precinct people suggest resettle by land.</li> <li>- If people have any question, please to contact with RPMU at 95-97 Le Duan, Ha Noi.</li> <li>- Recording to large sacrifice from people for developing the city and country.</li> </ul>



Collect the comments and answers of the Project Owner

- Appreciate the agreement and support of the local authorities, the social organizations of the districts, wards/commune and the project affected people.

- Collect the opinions suggested by the representatives of local authorities and people.

- The Project Owner commits to apply the reduction measures of environmental impacts of the project during construction and operation period in the future as suggested by the people.

- The project is at the period of making its feasibility study, therefore the above-mentioned problems are only general, preliminary. Detailed influences shall be studied in the period of technical design and executive preparation. At that time, the Project Owner and the local authorities shall hold other meetings to collect opinions and reasonably settle legitimate petitions of people.

- As result of working with the sponsor JBIC, in 2007, JBIC shall finance to survey, make the technical design for phase 1 of the project and construction is estimated to start from 2012, and complete in 2016. Therefore, right from 2008, companies for survey, inspection, making plans of compensation, support and resettlement shall be implemented. The Project Owner requests the People's Committee as well as people of Dong Xuan Ward to consider, help and create good conditions so that the Project Owner, Consultants and contractors may well complete their tasks.

- The project propaganda is carried out by the Project Owner positively to obtain the assent and support of the people in and near the project area.

- RPMU expects to receive the incorporate relation with the local authorities and the communities to have the proper compensation policy, land acquisition and resettlement policy, contribute to accelerate the project implementation process.

The key opinions at the meetings

All the exchange and suggestion views and conclusions of the meetings are detailed recorded in the minutes (refer at Appendixes, enclosed with this report). Following is summary of the main opinions:

- The locals agree and support project of Hanoi Elevated Railway Construction – the project construct Hanoi public transportation route, bringing civilization and modernization to the city.

- Welcome the introduction of Project in locality level. It is necessary to bring in to play democracy and propagandize about Project in order to ensure public agreement and support for the success of the project.

- Compensation for Land Acquisition is very costly and complicated which will affect the project progress, so it is necessary to consider carefully. Moreover, mechanisms and policies on Compensation and Resettlement have to be done and completed before the start of construction phase.

- Call for authorities and unions where the line passing through to create favorable condition to investor and its consultant in collecting socio-economic documents and interviewing communities, solving the arisen problems during the construction stage.

### **3.6. Preliminary survey on natural environment, social- economic condition and the ideas of the Project Affected People**

Environment consultant group sent questionnaires and the leaflet to the households that are potentially to be impacted.

Items of Questionnaire concentrate on living condition, income, living condition and traffic situation, environment issue and oppinions about the Project (*refer Appendix 7*)

Total copies of questionnaire sent was 350. Number of feedback was 353.

#### *The result of the interviewed households in the project affected area*

**Table 3.16. General description of the interviewed households**

Total of households	Average age of householders	Gender		Total of people	Average HH size	Total of employee	Average number of employee
		Male	Female				
353	54.7	244	109	1762	5	884	2.5

**Table 3.17. Occupation of the interviewed households**

Total of households	Agriculture	Worker and official of State	Small service and vendors	Craft and related trader workers	Breeding	Average income of household (mil/month)
353	1	237	161	36	0	5.3

**Table 3.18. Housing and Accommodation**

Total of households	Level 1	Level 2	Level 3	Level 4	Average of housing area (m <sup>2</sup> )
353	10	65	197	79	61.7m <sup>2</sup>
100%	2.8%	18.4%	55.8%	22.4%	

**Table 3.19. Situation of housing ownership – households having land-use certificate**

Total of households	Title-deed		Non title-deed	
	Amount	% to Total	Amount	% to Total
353	259	83.6	58	16.4

**Table 3.20. Awareness of the Project**

Known	Unknown
296	53

**Table 3.21. Opinion on living environment**

Resettlement	Air pollution when construction	Water pollution	Noise when construction	Obstructing traffic when construction	Noise from trains	Solid waste from construction	Vibration from train
203	212	57	203	171	138	97	51

**Table 3.22. Option on Compensation and Resettlement**

Total of households	Option			
	Centralized Resettlement	Money	Land	Others
353	219	104	12	18
100%	62.0%	29.5%	3.4%	5.1%

Table 3.23. Opinion of advantage project

Creating infrastructure of the city	Improving economic condition ... of the locals	Improving traffic condition
251	99	301

Table 3.24. Ideas about the project

Total of households	Ideas		
	Agreement	Disagree	Non-comment
353	302	8	43
100%	85.6%	2.3%	12.2%

Summarized the ideas of the project affected households:

- Most of the project affected people (85.6%) agree with the project. Only 2.3% of the households disagree and 12.2% non-comment with the project implementation. The reason of the objection is due to the inadequate knowledge and awareness of the property loss by the project; they know insufficiently about the project so they disagree with the project.
- The project propaganda, public the benefit and interest of the project on public means such as radio, TV, newspaper, etc... should be accelerated and improved.
- The detail map about the project area, the area of the land acquisition, resettlement, specific affected households in the wards of the district where the project goes through should be informed in order for the proper comments. The location of the station should be appropriate. Land acquisition and resettlement policy should be suitable, in comply with the actual condition, and assure the open and transparency.
- Environmental impacts mitigation measures during the construction stage (air, noise, vibration, soil transportation, etc...) should be carried out strictly under the commitment of the project owner and the related agencies, to deal with and solve incident during the project construction.
- Resettlement need to be ensured dairly life condtions to people (electric, water and traffic...)

## CONCLUSION

Public consultation task was carried out under Vietnamese Law on environmental Protection and JBIC requirements. Purpose of the task is to inform communities, especially project effected people about main contents of the project and impacts on natural-socio- economic environment. In this task, policies on compensation, land acquisition and resettlement were presented. An important task is to collect local authorities and effected people's opinion about the project. At public consultant meetings, Investor and its consultant (CEPT) collected suggestion and answered the questions of the participants, took note of the recommendations to have solution in the following stage.

According to the preliminary survey, in the project implementation, the displaced households in order to have the surface for construction are few. The expectation of the displaced households is to have the sound and proper compensation and to be resettled in a new residential area with a better living condition. However, most of the households have the common require that the alignment and the technical option should be appropriate in order to ensure the living condition for the households and the propaganda about the project should be accelerated for the better understanding of the project affected people to obtain their support during the project implementation stage.

Annex 13 RAP フレームワーク (案)



# **RESETTLEMENT FRAMEWORK (DRAFT)**

---

## **Hanoi Urban Railway Construction Project Line 1**

**March -2012**



## **NOTE TO READERS**

In this RAP Framework, the compensation policies are based on the full replacement costs, as it is required by the JICA guidelines for environmental and social consideration (2010). However, by the letter issued from JICA to VNR/RPMU on 2 March 2012, the compensation policies based on the prices issued by Hanoi Peoples' Committee are applicable to the Hanoi Urban Railway Project Line 1. Therefore the readers of this Frame Work should be aware that parts concerning the replacement costs are not applicable to the project.

## Contents

<b>Note to Readers</b> .....	2
<b>I Introduction</b> .....	6
A. The Project .....	6
B. Basic purpose of the project .....	6
C. Application of the Resettlement Framework (RF) .....	6
<b>II. Objectives, Policy Framework, and Entitlements</b> .....	7
A. Viet Nam Laws, Decrees and Decisions.....	7
B. Project Entitlements.....	13
<b>III. Socioeconomic Information, Consultation and participation</b> .....	31
A. Detailed Measurement Survey.....	31
B. Socioeconomic Survey .....	31
C. Public Consultation and participation.....	32
<b>IV. Compensation, Income Restoration and Relocation</b> .....	34
A. Relocation Strategy .....	34
B. Income Restoration Measures .....	36
<b>V. Grievance Redress Mechanism</b> .....	37
<b>VI. Institutional Arrangements and Implementation</b> .....	38
A. The Project Management Board.....	39
B. District Compensation Board and Center for Land Fund Development .....	39
C. Commune/Ward People's Committee.....	40
D. External Monitoring Agency.....	40
E. Project Supervision Consultants.....	40
F. Implementation Process .....	41
<b>VII. Budget and Financing</b> .....	43
<b>VIII. Monitoring and Evaluation</b> .....	43
A. Internal Resettlement Monitoring.....	43
B. External Resettlement Monitoring.....	44
<b>Appendix 1</b>	

## ABBREVIATIONS

AH	Affected Household
CLDF	Center for Land Development Fund
DCRB	District Compensation and Resettlement Board
DMS	Detailed measurement survey
DOF	Department of Finance
DONRE	District Department of Natural Resources and Environment
DP	Displaced Persons
DPC	District People's Committee
EMA	External Monitoring Agency
Hanoi CPC	Hanoi City Peoples' Committee
IOL	Inventory of Losses
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
LURC	Land Use Right Certificate
MOLISA	Ministry of Labor, Invalids and Social Affairs
PIB	Public Information Brochure
PMB	Project Management Board
ROW	Right-of-Way
RP	Resettlement Plan
RF	Resettlement Framework
SES	Socioeconomic Survey
TA	Technical Assistance
TOR	Terms of Reference
VND	Viet Nam Dong
WB	World Bank

## Definition of Terms

<b>Compensation</b>	Payment in cash or kind to which the affected people are entitled in order to replace the lost asset, resource or income.
<b>Cut-off date</b>	Date that the Decision on land recovery within the project areas is declared by the Ha Noi City People's Committee and published broadly by the District People's Committee to local communities and affected people. Anyone who occupies or encroaches the defined boundaries of the project area after this date will not be compensated by the Project.
<b>Displaced Persons</b>	In the context of involuntary resettlement, displaced persons are those who are physically displaced (relocation, loss of residential land, or loss of shelter) and/or economically displaced (loss of land, assets, access to assets, income sources, or means of livelihoods) as a result of (i) involuntary acquisition of land, or (ii) involuntary restrictions on land use or on access to legally designated parks and protected areas
<b>Eligibility Criteria</b>	Basis used in the Project for determining if a person or entity is entitled to be compensated or assisted in relation to land acquisition and resettlement impacts from the Project.
<b>Encroachers</b>	People who move into the project area after the cut-off date and are therefore not eligible for compensation or other rehabilitation measures provided by the project or persons who have trespassed government land, adjacent to his/her own land or asset, to which he/she is not entitled, by deriving his/her livelihood there. Such act is called "Encroachment."
<b>Entitlement</b>	Entitlement means the range of measures comprising compensation in cash or kind, relocation cost, income rehabilitation assistance, transfer assistance, income substitution, and business restoration which are due to DPs, depending on the type and degree nature of their losses, to restore their social and economic base.
<b>Household</b>	Household means all persons living and eating together as a single-family unit and eating from the same kitchen whether or not related to each other. The census used this definition and the data generated by the census forms the basis for identifying the household unit.
<b>Price of Land Use Right/Land Price</b>	The amount of money for a land area unit prescribed by the State or formed in a transaction relating to land use rights.
<b>Income restoration</b>	Income restoration means re-establishing income sources and livelihoods of DPs.
<b>Involuntary Resettlement</b>	Any resettlement, which does not involve willingness of the persons being adversely affected, but are forced through an instrument of law. Resettlement is considered involuntary when displaced individuals or communities do not have the right to refuse land acquisition that result in displacement.
<b>Land acquisition</b>	Land acquisition means the process whereby a person is compelled by a public agency to alienate all or part of the land s/he owns or possesses, to the ownership and possession of that agency, for public purposes in return for fair compensation.
<b>Rehabilitation</b>	Assistance provided to displaced persons to supplement their income losses in order to improve, or at least achieve full restoration of, their pre-project living standards and quality of life.

## **I. Introduction**

### **A. The Project**

Hanoi with population of 3.1 million (2004) is the capital of Socialist Republic of Vietnam and has been becoming more and more important as a center of politics and economy since the introduction of “Doi Moi” Policy in 1986. It is forecasted that there will be an increasing demand of city traffic generated by an enlargement of social and economic activities, expanding of megalopolis area and increasing of income in near future. Hanoi lacks infrastructures of urban transport in conformity with the present socio-economic conditions and increasing city’s transport demands. As a result, it is easily thought that a decline of city functions and productivity, and a deterioration of environmental condition due to traffic congestion, will adversely affect socio-economic activities and the life of citizen.

It is an urgent matter for a construction of urban mass RPid transit system to be carried out because the present transport facility does not cope with not only the present city traffic demands but also city traffic demands with an estimated population of 4.5 to 5.0 million (Hanoi capital and the surroundings) in 2020 and a deterioration of environment circumstance in the future will be sure.

The Government of Vietnam (GOV), Ministry of Transport (MOT), Hanoi People’s Committee (HPC) and Vietnam Railways (VNR) fully recognized that a construction of urban mass RPid transit system is an indispensable policy, and have established the Hanoi Development Master Plan 2020 in 2003. The plan gives priority to Hanoi Elevated Railway Project, Ngoc Hoi – Yen Vien. Prime Minister approved officially the investment policy to the Hanoi Elevated Railway Project, Ngoc Hoi – Yen Vien and basic contents of Pre-Feasibility Study Project in 2004.

This Project is assessed to be priority in urban railway line in Ha Noi by the Leader of Ministry of Transportation, because it is not only specifically important with urban transport system but also important significance in railway transport system of Vietnam Railways.

### **B. Basic purpose of the project**

Purpose of the Project is an improvement in urban transport situation of the Hanoi Capital and enhancing the exploiting capacity of national railway by rehabilitating the central railway axis to get the following basic requirements:

- Building Hanoi Elevated Railway line Ngoc Hoi – Yen Vien section to serve Hanoi – HCMC passenger trains, international trains, travel trains and urban trains;
- Developing the first section in the system of the Capital (track driving wheel) urban traffic routes;
- Strengthening operation capacity and service quality of national railway;
- Providing a public passenger transportation system frequently, punctually, safely and quickly;
- Minimizing urban traffic jams due to attract a great number of passengers who use public transport on North – South axis and erasing the crossing with East – West axis of city because of raising the railway’s height;
- Saving energy and protecting environment.

According to the initial survey, it is estimated with about 2325 affected household (with 9.619 people) have to relocate to new places.

### **C. Application of the Resettlement Framework (RF)**

1 This RF aims to guide the conduct of preparation, updating, and implementation of a Resettlement Plan for the Displaced persons who are affected by land acquisition by the project. It aims to come up with a uniform and systematic approach in dealing with land acquisition related impacts/displacement in connection to the Project, across all components regardless of funding source (either by host country fund or by donor funded).

2 The resettlement Plan (RP) will be prepared based on the agreed RF. Full scale of land recovery and resettlement as well as final figures on the recovered land, houses, construction, farm produce, trees and other damaged asset and precise figure about affected household number, etc. of the Project for every relevant period will be defined when there is sufficient data about detailed technical design and when clearance landmarks have been marked on site. Then, detailed measurement survey will be conducted to determine the total number of affected people and severity of impacts. The Resettlement Plan is planned to be implemented from 2012 to the end of 2015

## **II. Objectives, Policy Framework, and Entitlements**

3 The Resettlement Framework (RF) formulated for the Project aims to avoid involuntary resettlement wherever possible, to minimize involuntary resettlement by exploring project and design alternatives; to enhance, or at least restore, the livelihoods of all displaced persons in real terms relative to pre-project levels; and to improve the standards of living of the displaced poor and other vulnerable groups. It is based on Vietnamese laws, decrees and decisions related to land acquisition, including provision of compensation and assistance to displaced people and communities, as well as the Japan Bank for International Cooperation guidelines for confirmation of environmental and social considerations in 2002 (“JBIC guidelines”) and Japan International Cooperation Agency guidelines for environmental and social considerations in 2010 (“JICA guidelines”) and World Bank’s policies on involuntary resettlement (“WB policies”).

### **A. Viet Nam Laws, Decrees and Decisions**

4 The Constitution of the Socialist Republic of Viet Nam (1992) confirms the right of citizens to own and protect the ownership of a house. In addition, the Government has enacted a number of laws, decrees and regulations that constitute the legal framework for land acquisition, compensation and resettlement. The principal documents include the Land Law of 2003, providing Viet Nam with a comprehensive land administration law; Decree No. 197/2004/NĐ-CP, on compensation, rehabilitation and resettlement in the event of land recovery by the State, as amended by Decree No. 17/2006/NĐ-CP; Decrees No. 188/2004/ND-CP and 123/2007/NĐ-CP, Decree No. 84/2007/NĐ-CP specifying the methods for land pricing and land price frameworks in the event of land recovery by the State and Decree no 69/2009/NĐ-CP dated 13/8/2009 providing additional guidelines on land use, compensation, support and resettlement.

5 Laws, decrees and decisions relevant to public disclosure of information include Land Law, No. 13/2003/QH11, Article 39, requiring disclosure of information to affected people prior to recovery of agricultural and non-agricultural lands of a minimum of 90 and 180 days minimum respectively. MONRE also issued Circular No 14/2009/TT-BTNMT on the allocation of new residential land or a resettlement house or monetary compensation for displaced persons that need to relocate and granting authority to People’s Committees to determine whether certain structures built after 1 July 2004 violated approved land use. At the local level, on September 29, 2009, the Hanoi People’s Committee issued Decision No. 108/2009/QD-UBND that provides updated guidelines on land compensation and involuntary resettlement support for development projects in Hanoi.

6 Key legal bases of the project:

Decision No.108/QD-TTg dated 20/6/1998 on general planning regulation of Hanoi capital until 2020; No 06/2002/QD-TTg dated 07/01/2002 on master plan of railway transportation development until 2020; No. 206/2004/QD-TTg dated 10/12/2004 on Vietnam transport development strategy; No.621/QD-TTg dated 16/05/2007 on approval of development master plan of Vietnam Railways stage 2007-2010 by a Prime Minister. Decision No.90/2008/QD-TTg dated 09/07/2008 by Prime Minister on approval transport development plan of Hanoi capital until 2020.

Document No.164/TB-VPCP dated 11/7/2008 by Government Office on conclusion of Prime minister Nguyen Tan Dung at Government permanent meeting on Vietnam railway transportation development strategy till 2020 and vision to 2050; Conclusion 27/KL-TU dated 17/9/2008 by politburo of the Party Central Committee on Vietnam railway transportation development strategy until 2020 and vision to 2050

Document No.195/CP-CN dated 12/02/2004 by Prime Minister on consent of investment and approval of main content of pre-feasibility study report on Hanoi Elevated railway project, Ngoc Hoi – Yen Vien section.

Decision No.478/QD-BGTVT dated March 03.2004 was issued by Minister of Ministry of Transportation on consents of planning the Feasibility Study of Hanoi Elevated Railway Project and delivered to Vietnam Railways as a Project Contractor.

Letter No.13/TB-BGTVT dated January. 17. 2005 was concluded by Minister of Ministry of Transportation at the meeting on the Project “Hanoi Elevated Railway line, Ngoc Hoi-Yen Vien section”.

Letter No.204/TB-BGTVT dated April. 29. 2005 was concluded by Deputy Minister-Ngo Thinh Duc at the meeting on Project “Hanoi Elevated Railway line, Ngoc Hoi-Yen Vien section”.

Letter No.216/TB-DS-VP dated September.09.2005 concluded by Leader of Vietnam Railways at the meeting on “Hanoi Elevated Railway Project, Ngoc Hoi-Yen Vien Section”.

Announcement No.519/TB-BGTVT-UBHN dated October.11.2005 concluded by MOT and the chairman of HPC at the meeting on master report of “Hanoi Elevated railway line Ngoc Hoi-Yen Vien section”. In which MOT and HPC agrees to execute early implementation of construction investment of Hanoi Elevated Railway Project, Ngoc Hoi – Yen Vien in accordance with instruction of the Prime Minister. Besides, some matters are adopted such as train operation alternatives, alignment alternatives, position of Long Bien Bridge, construction gauges, land clearance and acquisition, land use, landscape and architecture and connection to East Circular Line and other dedicated railway lines.

Letter No.173/TB-BGTVT dated April.14.2006 concluded by Deputy Minister-Pham The Minh at the meeting on the final report of JETRO Consultant (Japanese): “Hanoi Elevated Railway project, Ngoc Hoi-Yen Vien Section”.

Statement No.173/TT-KHDT dated April.14.2006 on requirement of draft and survey cost estimation approving to establish the investment “Hanoi Elevated Railway project, Ngoc Hoi-Yen Vien Section”.

Decision No.730/Q§ - BGTVT dated May.15.2006 on approval of the survey cost estimation, establishment of Feasibility Study Report on “Hanoi Elevated Railway project, Ngoc Hoi-Yen Vien Section”.

Announcement No.57/TB-BGTVT dated February.05.2007 was concluded by Deputy Minister of Ministry of Transport at the meeting on Interim Report of Feasibility Study “ Hanoi Elevated Railway Project, Ngoc Hoi-Yen Vien Section”, in which the contents of interim report is approved.

Notice No.326/TB-BGTVT dated 19/07/2007 on Deputy Prime Minister - Mr.Ngo Duc Thinh’s conclusion at the meeting on Final Report of “Hanoi Elevated Railway, Ngoc Hoi – Yen Vien Section” Project.

Letter No.375/TB-BGTVT dated 13/08/2007 by Deputy Minister Ngo Duc Thinh’s conclusion at the meeting of progress of project – Hanoi elevated railway line Ngoc Hoi – Yen Vien section and announcement no.210/TB-DS dated 24/8/2007 by General Director of VNR’s conclusion at the meeting of Deputy of Minister Nguyen Hong Truong’s conclusion deploy.

Letter No.1907/DS-DACL dated 28/8/2007 by VNR sent to MOT requesting of the division of Hanoi Elevated Railway Project into 2 sub- projects.

Letter No.6453/VPCP-CN dated 08/11/2007 of Government Office on announcing opinion of Deputy Prime Minister Hoang Trung Hai on approval principle other division of Hanoi Elevated Railway Project into 2 sub – projects.

*JBIC/JICA Requirements on Social Safeguard Policy and Waivers required for the gaps between JBIC/JICA guidelines and GOV on the policy on compensation and resettlement*

7. Following the guidelines of JICA and JBIC and the Government policies on land acquisition, compensation, assistance and resettlement, the overall objectives of this resettlement policy are

(i) to avoid, if not, minimize resettlement impacts; (ii) if impacts are unavoidable, the RP is prepared in a way to ensure that affected persons are not worse off; rather, they should be able to at least maintain or otherwise improve their pre-project living standards and income-earning capacity. The Project should also provide an opportunity for the local population to derive benefits from it. Likewise, the Project should serve as an occasion for the local population to participate in its planning and implementation, thereby engendering a sense of ownership over this development undertaking.

8. The main objectives and principles of JICA guidelines on involuntary resettlement are: (i) Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives. When, after such an examination, avoidable is proved unfeasible, effective measures to minimize impact and to compensate for losses must be agreed upon with the people who will be affected; (ii) People must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported by project components etc. in a timely manner. Prior compensation, at full replacement cost, must be provided as much as possible. Host countries must make efforts to enable people affected by the project and to improve their standard of living, income opportunities, and production levels, or at least to restore these to per-project levels. Measures to achieve this may include: providing land and monetary compensation for losses, supporting means for an alternative sustainable livelihood, and providing the expenses necessary for the relocation and reestablishment for communities at resettlement sites; and (iii) Appropriate participation by affected people and their communities must be promoted in the planning, implementation, and monitoring of resettlement action plans and measures to prevent the loss of their means of livelihood. In addition, appropriate and accessible grievance mechanisms must be established for the affected people and their communities.

9. For projects that will result in large –scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. In preparing resettlement action plan, consultations must be held with the affected people and their communities based on the sufficient information made available to them in advance. When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people. It is desirable that, the resettlement action plan include elements laid out in the World Bank Safeguard policy, OP 4.12.

10. The compensation and resettlement Principles

To pursuit of the above objectives, the following principles are adopted.

(a) The acquisition of land and other assets and resettlement of the project affected persons will be minimized as much as possible.

(b) All DPs residing, operating, working or cultivating land in the project area either permanently or temporarily which identified or can prove that they have properties in the project affected areas before the cut-off date are entitled to compensation, restoration and rehabilitation measures sufficient to assist them to at least restore or otherwise improve their pre-project living standards, income earning capacity and production levels. Lack of legal rights or documentation will not bar DPs from entitlement to such measures.

(c) No land recovery or site clearing will be done for the project construction in anticipation or ahead of it being approved for inclusion in the project subject to this plan. Compensation will be at the replacement costs; no deductions of depreciation and for salvageable materials.

(d) The compensation measures will be provided include (i) in cash or in kind compensation for houses and other structures at full replacement costs. (ii) productive land-for-land replacement of equal productive capacity or cash equivalent at full replacement cost if productive land is not available; (iii) replacement of residential land of equal size, similar location, infrastructures and social services or cash equivalent; (iv) cash compensation for renters; cash compensation for crops, trees and other productive assets lost due to the project; (v) cash compensation for grave



removal and relocation; (vi) replacement or re-installation of utilities and facilities, such as water meters, sanitation facilities, electric meters, telephone lines; and (vii) in cash or in kind compensation for relocation of public works and other collective assets.

(e) The restoration, rehabilitation measures to be provided include:

- Stabilization and transport allowances for all DPs temporarily or permanently displaced;
- Resources or other income restoration/improvement programs (such as land development, access to credit, training for farming and non-farm activities etc.,) to assist the full restoration of income earning capacity of DPs. Livelihood restoration programs will be developed to help DPs restore their living standards as soon as possible.
- Special assistance to vulnerable groups such as the poor, elderly; disable people; women-headed households etc.

(f) The resettlement sites will be as close as possible to the affected places and the previous level of community infrastructures and social services will be maintained or improved.

(g) The DPs will be consulted and will be given the opportunity to participate in through entire of phased of RP, fro its preparation to implementation as well as to share with benefits of the project.

(h) Financial and physical resources for resettlement and rehabilitation will be made available as and when required. Institutional arrangements will ensure effective preparation and implementation of the DP.

(e) Ongoing monitoring and evaluation of the implementation of the RP will be carried out in order to ensure that DP will be implemented effectively. A clear complaint and settling mechanism will be developed to make sure that the DP will be fairly treated.

## 11. Project Displaced Persons (DPs)

The DPs include the following persons and organizations:

- a) Persons whose houses and/or property are in part or in total affected by the Project;
- b) Persons whose agricultural and/or residential land are in part or in total affected (permanently or temporarily) by the Project;
- c) Persons whose crops (annual or perennial) and trees are affected in part or in total by the Project;
- d) Persons who affected by land acquisition for the relocation sites, if required to be developed for the project DPs.

Non-eligible DPs include those making claims based on subsequent occupation after the project cut- off date.

The DPs are categorized into non-severely and severely affected DPs. The severely affected DPs are the affected households who will (i) lose 10% or more of their total productive land and/or assets, (ii) have to relocate; and/or (iii) lose 10% or more of their total income sources due to the Project. The severely affected DPs and vulnerable affected groups will need special assistance to make sure that the objectives of RP are achieved.

## 12. Eligibility

The DPs eligible for compensation and rehabilitation will include:

- a) Those who have formal legal rights to land or other assets;
- b) Those who initially do not have formal legal rights to land or other assets but have a claim to legal rights based upon the laws of the country; upon the possession of documents such as land tax receipts and residence certificates; or upon permission of local authorities to occupy or use the project affected plots; and
- (b) Those who have no recognizable legal right or claim to the land they are occupying.

(c) Persons covered under (a) and (b) are provided compensation for the land they lose, and other assistance. Persons covered under (c) are provided resettlement assistance, in lieu of compensation for the land they occupy, and other assistance, as necessary, to achieve the objectives set out in this policy, if they occupy the project area prior to the Cut-Off Date of the project.

The cut-off date will be declared by Ha Noi PC and by RPMU, the cut-off date should be immediately after the bench marks put on the ground for the areas with land to be acquired for the project.

### 13. Reconciliation of Government and JBIC/JICA's Guideline on Involuntary Resettlement

With the promulgation of Decree 197/2004/ND/CP (3/12/2004), Decree 84/2007; Decree 69/2009-ND-CP and other relevant decrees as stated above, the policies and practices of the Government have been significantly improve time to time and become more consistent with the international standards on social safeguards policies. Nonetheless, provisions and principles adopted in this Resettlement Entitlement will supersede the provisions of the relevant decrees currently in force in Viet Nam wherever a gap exists, as provided for under Decree 131/2006/ND-CP (November 2006), which regulates the management and use of official development assistance.

It should also be noted that as per Decree 197/2004 (i) Article 1, Item 2 states that for the projects which financed from ODA, if the compensation, assistance and resettlement required by the international financiers are different form Decree 197/2004/ND-CP, before signing the international loan agreement, the project owner must report to the Prime Minister for his considerations and decision; (ii) Article 32, it states "Apart from the supports prescribed in Articles 27, 28, 29, 30 and 31 of this Decree, basing themselves on the local realities, the provincial-level People's Committee presidents shall decide on other supporting measures to stabilize life and production of persons who have land recovered; special cases shall be submitted to the Prime Minister for decision".

With the promulgation of Decree 197/2004/ND/CP (3/12/2004), Decree 84/2007; Decree 69/2009-ND-CP and other relevant decrees as stated above, the policies and practices of the Government of Viet Nam have been significantly improve time to time and become more consistent with the requirements on the social safeguards policies of the International Financiers including the Guidelines for Environmental and Social Considerations of JICA (JICA proposes that OP 4.12 of the World Bank should be applied). Nonetheless, provisions and principles adopted in this Resettlement Plan will supersede the provisions of the relevant decrees currently in force in Viet Nam wherever a gap exists, as provided for under Decree 131/2006/ND-CP (November 2006), which regulates the management and use of official development assistance.

There is basic congruence between Viet Nam's laws and International Financiers, including JBIC/JICA/WB on Involuntary Resettlement Policy especially with regard to the entitlement of persons with legal rights/titles. Existing legislation that provide guidance in (i) determining market/replacement rates and payment of compensation for various types of affected assets; (ii) options for land-for-land and cash compensation; (iii) provision of relocation assistance and support to displaced households during the transition; (iv) provision of resettlement land and housing with secured tenure; (v) additional assistance for severely affected and vulnerable households; (vi) support to livelihood restoration and training; and (vii) notification/disclosure, consultation, and grievance mechanisms. However, most of international financiers (such as the World Bank, Asian Development Bank and JICA) do not consider the absence of legal rights of affected persons on the acquired land as an impediment to receiving compensation for other

assets and for rehabilitation assistance. Non-registration of DP's business also does not bar them from being assisted in restoring their business. There is also slight difference in the definition of major/severe impacts.

Key differences between International Financiers on Resettlement Policy and Viet Nam's legislation, including measures to address the differences, are outlined in table 1 below.

Table 1: Main Gap Analysis between the Policy of GOV and International Financiers (Including JICA) and Gap-Filling Measures

Item with Difference in Policy	JICA and other International Financier's (WB and JICA) Requirements	Viet Nam Legislation	Proposed Measures to Address the Difference
Compensation rate	Compensation at full replacement cost.	The unit price for land is enacted by the province or city every January and allowed the price only within the land price frame according to the Decree 123/2007/ND-CP. However, additional assistance to garden land, fishpond land agricultural land (Article 16, 20 and 21 of Decree 69/2009/ND-CP)	Evaluate for the land and non-land assets at the full replacement costs (no deduction of the depreciation) and pay to DPs for their affected assets at full replacement cost. Either paid for land at the replacement cost or with the cost enacted yearly by Ha Noi PC plus with the assistance as defined in the relevant Articles of Decree 69/2009 whichever is higher.
Support to physically displaced persons (subject to relocation)	Provide secured tenure to relocation land, better housing at resettlement sites with comparable access to employment and production opportunities, and civic infrastructure	Encroachers or those occupying land illegally, persons whose land lease from the State has expired and not extended, and persons who fail intentionally to discharge their obligations to the State are not entitled to be provided land or apartment in a resettlement site.	For households who are not eligible for compensation but cannot find alternative residence will be assisted in cash or in-kind. Households who belong to poor and vulnerable households or households whose compensation payment is not sufficient to purchase an apartment will be provided additional assistance.

<p>Definition of severe/major impacts</p>	<p>Physical displacement from housing, and/or loss of 10% or more of DPs' productive assets (income generating).</p>	<p>Physical displacement from housing and/or loss of 30% or more of DPs' agricultural land.</p>	<p>DPs who lose 30% or more of their agricultural land will be provided with additional assistance. DPs who lose from 10 % to 30% of their agricultural land, but determined to depend heavily in agriculture for their livelihood will also be assisted.</p>
---	--	---	---

The entitlement policy in this RP will be developed to bridge for the gaps analyzed as above and will need the endorsement by Ha Noi City People's Committee and then waiver from the Prime Minister or from Ha Noi city People's Committee under the Prime Minister's authorization.

## B. Project Entitlements

14. The project entitlements developed and presented in the entitlement matrix below correspond to the impacts identified during the inventory of losses. Entitlements adopted are based on Government laws and Ha Noi's Decision (Decision 108/2009/QD-UBND dated 29 September 2009) on land acquisition, resettlement and assistance, and JBIC/JICA guidelines on the Environmental and Social Considerations. It should be noted that these entitlements may be enhanced, as necessary, following the conduct of DMS and consultation with DPs to ensure that losses are restored and peoples' livelihood are stabilized or improved. The entitlement matrix is as in table 2 below. The compensation will be either in cash or in kind such as land for land or replacement of house etc. Productive or residential land for land is important, but in case that land is not available to replace for the land lost, it need to be clearly documented on the effort of seeking land for land and consultation with the stakeholders on the alternatives of land for land, but not possible to arrange with this alternative.

Table 2: Entitlement Matrix

Type of Impact/Loss	Eligibility/ application	Project Entitlement policy	Implementation Issues
<p><b>1. LOSS OF AGRICULTURAL LAND</b></p>	<p>1.1 Owners of land with (i) LURC or (ii) in the process of acquiring LURC or (iii) are eligible to obtain LURC:</p>	<ul style="list-style-type: none"> <li>- Land for land if land is available or cash compensation based on replacement cost or applied with compensation and assistance to land compensation whichever is higher. Compensation and assistance to agricultural land guided in the Decision 108 of Ha Noi PC followed Articles 16, 20 and 21 of Decree 69/2009 and details described in Articles 13 and 15 of Decision 108/2009 of Ha Noi PC.</li> <li>- Owners will be exempt from paying transaction costs (admin cost, certification cost, taxes).</li> <li>- If agricultural land is within the residential area, cash assistance amounting from 30% to 70% of compensation unit cost of residential land (residential land price enacted by HN People's Committee with the replacement value).</li> <li>- If land is not eligible to compensation, assistance to the affected household/person to make sure that the affected household will not be worse off.</li> </ul> <p>Bonus and Allowance are described as in Article 39 of Decision 108/2009 of HN PC and Articles 26 of Decree 197/2004; Articles 20,23 of Decree 69/2009 and Articles 27, 62 of the Labor law. Article 39 describes in details about the assistance to DPs who are severely affected on agricultural land (classified by categories such as losing from 30% to 70% with and without relocating impact); losing over 70% of agricultural with and without relocating</p>	<p>If the remaining area of plot is not economically viable, the Displace Person (DP) would be compensated for a full plot. The viability of remaining land will be officially determined by Center for Land Development Fund (CLDF) or District Compensation, Assistance and Compensation Board (DCACB) depend on which agency would be appointed for the service by Ha Noi city PC and concurred with by the affected household during the Detailed Measurement Survey (DMS).</p> <p>Details of eligibility and compensation, assistance policy is described in Articles 8 of Decree 197/2004; Articles 44,45,46 of Decree 84/2007; Article 14 of Decree 69/2009 and described in details of case by case as in Articles 7, 8,9,10,11 and13 of Decision 108 of Ha Noi PC.</p> <p>Compensation for the land of collectives followed the Article 15 of Decision 108 of Ha Noi PC.</p>

Type of Impact/Loss	Eligibility/ application	Project Entitlement policy	Implementation Issues
		<p>impact etc). However, to meet with the requirement of OP 4.12 on involuntary resettlement of the World Bank, it is proposed that the DP losing from 10% to 30% of agricultural land also would have the same level of assistance as DP losing from 30% to 70%.</p>	
	<p>1.2. Users who have no sufficient legal rights to the land but they do not violate the plans (e.g. plan for long term development of city for all sectors such as transport system, residential sites, industrial zones etc) approved in public by competent state agencies and marked boundary stakes, not illegally occupied, and certified "free of conflict" by the Commune People's Committee (C/WPC) in the area. They could be eligible for having LURC if they request to the authorities</p>	<p>Users of agricultural land without land dossiers and has been using the land prior to the issuance of investment project decision of the Government will be compensated equivalent to 100% of the replacement cost of agricultural land or otherwise to be assisted to meet with the objective of the project resettlement policy . The area exceeding the land quota can only be compensated for the investments made on the land. Bonus and Allowance are described as in Article 39 of Decision 108/2009 of HN PC and Articles 26 of Decree 197/2004; Articles 20,23 of Decree 69/2009 and Articles 27, 62 of the Labor law. Article 39 describes in details about the assistance to DPs who are severely affected on agricultural land (classified by categories such as losing from 30% to 70% with and without relocating impact); losing over 70% of agricultural with and without relocating impact etc). However, to meet with the requirement of OP 4.12 on involuntary resettlement of the World Bank, it is proposed that the DP losing from 10% to 30% of agricultural land also would have the same level of assistance as DP losing from 30% to 70%.</p>	<p>Details of eligibility and compensation, assistance policy is described in Articles 8 of Decree 197/2004; Articles 44,45,46 of Decree 84/2007; Article 14 of Decree 69/2009 and described in details of case by case as in Articles 7, 8,9,10,11 and13 of Decision 108 of Ha Noi PC.</p> <p>-All of affected households will be requested to fulfill the requirements for the legal supporting papers related to land and non-land assets as per the requirements in the policies of the Government.</p>
	<p>1.3 DPs who do not have sufficient basis for compensation for loss of</p>	<p>structures, crops and trees based on the market</p>	<p>The market prices of structures, crops, trees will be evaluated by the qualified and independent agency</p>

Type of Impact/Loss	Eligibility/ application	Project Entitlement policy	Implementation Issues
	<p>land. (No Land Use Right Certificate of LURC or cannot become legalizable or on public land).</p>	<p>price. Item 6 of Article 10 of Decree 197/2004 states that if DP is mainly earning income from agriculture, local authorities could consider to allocate land for the DP based on the conditions of locality.</p>	<p>for Ha Noi CPC to review and approval. The TOR for the replacement cost survey will be prepared by the Project Management Board and then consultant for this service will be recruited by the Project Management Board.</p>
<p><b>2. LOSS OF RESIDENTIAL LAND</b> Fully affected (includes DPs whose remaining area is less than 80m<sup>2</sup> (standard defined as in item 1(c) of Decision 108/2009 of HNPC</p>	<p>1.4. Agricultural lands that are rented between households or individuals.</p> <p>2.1. Owners of land with (i) LURC or (ii) in the process of acquiring LURC or (iii) are eligible to obtain LURC:</p>	<p>Compensation for land will be paid to Land use owner but compensation equivalent to the current market value of the plants and crops will be paid to the land-users.</p>	<p>The market prices of structures, crops, trees will be evaluated by the qualified and independent agency for Ha Noi CPC to review and approval. The TOR for the replacement cost survey will be prepared by the Project Management Board and then consultant for this service will be recruited by the Project Management Board.</p>
		<p>DPs will be compensated equivalent to the replacement cost of the land including the transaction costs (admin cost, certification cost, taxes).</p> <p>If the house on residential plot is fully affected and remaining area of the affected residential plot (is smaller than the minimum standard area (80 m<sup>2</sup>) to rearrange of house on the remaining area, the remaining area will also be acquired and the household will be paid compensation. On the other hand, if the area acquired is more than the area of residential plot in the resettlement site, the Hanoi</p>	<p>Details of compensation or assistance for the different cases is instructed as is Articles 16 to 27 of Decision 108/2009/QĐ-UBND of Ha Noi CPC which based on the relevant Articles Of Decree 197; 84 and 69 of the Government.</p> <p>A minimum standard area will be based on the consultation with the DPs and relevant Departments of Ha Noi such as DONRE, DOC and then get it approved by Ha Noi city PC.</p>

Type of Impact/Loss for the plain rural area)	Eligibility/ application	Project Entitlement policy	Implementation Issues
		<p>CPC may allocate an additional residential plot provided it does not exceed the area of the recovered land. If the house is fully affected but the remaining land is more than 80 m<sup>2</sup>, the family will reconstructed on their remaining area (do not have to move to new place)</p> <p>If the owners have not completed their finance obligations to government on the land, the amount of money need to fulfill for the financial obligation will be deducted from the compensation.</p> <p>Cash compensation for recovered land equivalent to 50% of replacement cost for households changing land use purpose for stable residential land before 15<sup>th</sup> October 1993, provided that (a) the land did not violate the land use/planning or secured corridor of construction works that have been publicly approved and marked boundary stakes (b) not illegally occupied/encroached, (c) not converted to agricultural land use, and (d) is certified as “free of conflict” by the local authority.</p> <p>One of the two following compensation rate will be applied (with whichever is higher):</p> <p>Land area which exist the residential land quota and lands with garden/pond in a residential area will be compensated at the rate of agricultural land (perennial crops type) plus with an assistance with 70% of the compensation cost for residential land (in the same plot) if the land is used before 15 October 2003. If the land is continuously used from</p>	<p>The resettlement assistance to fully affected residential land with house is defined as in Article 38 of Decision 108/2009/QĐ-UBND of HN CPC.</p> <p>A package of compensation and assistance should be fully paid in one installment.</p>



Type of Impact/Loss	Eligibility/ application	Project Entitlement policy	Implementation Issues
		<p>15/10/1993 and prior to 09/4/2002, land will be compensated at 30% of the residential land price for the recognized area. Land that is beyond the limit of support will be compensated at 20% of the land price as regulated in the same area (Decree 17 and Article 44 and 47 of Decree 84).</p> <p>Bonus and Allowance are described as in Article 38,39,40, 43, 45, of Decision 108/2009 of HNPC.</p>	
	<p>2.2. DPs who do not have sufficient basis for compensation for loss of land. (No LURC or cannot become Legalizable)</p>	<p>If the land-user is not eligible for compensation and has no other place to reside, the user will be assisted to buy an apartment in a tenement house by the Hanoi PC</p> <p>Households who belong to poor and vulnerable households or households whose compensation payment is not sufficient to purchase an apartment will be offered special arrangements such as payment on a lease-to-own arrangements or long-term and low cost interest payment.</p>	<p>Details policy (compensation and assistance) as described in Articles from 38 to 48 of Decision 108/2009 of HNPC.</p> <p>Effort from the district need to be made to maximize the benefits from these DP to other financial sources or loans of the Government to cross support for this group to make sure that the objective of the resettlement plan that the DPs will not be worse off at least or otherwise improve their livelihood after land acquisition.</p> <p>Monitoring and evaluation after land acquisition.</p>
	<p>2.3. DPs who are using residential land that belong to the State or self-governing organizations (not multi-level apartment with many households) who have to be relocated and cannot continue to rent</p>	<p>If the managing agency and commune peoples committee (CPC) confirm that the whole land area and the area is continuously used before 01/7/2004, the DP will be given cash compensation equivalent to 100% of the replacement cost of residential land. However, financial obligation of the DP to the Government will be deducted. The amount that exceeds the established amount for residential land</p>	<p>Details are described as in Article 23 of Decision 108/2009 of HNPC.</p>

Type of Impact/Loss	Eligibility/ application	Project Entitlement policy	Implementation Issues
	state house at the proposed resettlement site	will be compensated at the same level as agriculture land, garden and pond at replacement cost .	
<b>Partially affected</b> (DPs whose remaining area is more than 80 m <sup>2</sup> )		Cash compensation for affected area at replacement cost s if DPs are eligible to compensation as defined above.  Owners will be exempt from paying transaction costs (admin cost, certification cost, taxes).	Details of eligibility to compensation are defined as in Article 13 of Decree 197/2004.
<b>3. LOSS OF NON-RESIDENTIAL LAND (COMMERCIAL LAND)</b>	Owners of land with (i) LURC or (ii) in the process of acquiring LURC or (iii) are eligible to obtain LURC according to the regulations of Gov.	Cash compensation based on replacement cost . Owners will be exempt from paying transaction costs (admin cost, certification cost, taxes).  Bonus Allowance if land is handed over in a timely manner is instructed as in Article 43, item (b) of Decision 108/2009/QD-UBND of Ha Noi CPC	Details of compensation for commercial land for individuals and Collectives are instructed as in Article 14 and 15 of Decision 108/2009/QD-UB of Ha Noi CPC.
<b>IMPACT ON STRUCTURES</b>	Houses and structures owned by households and individuals on land where they hold dossiers/Land Use Rights Certificates	Will be compensated with an amount equal to 100% of the value of the structure in conformity with the unit prices of a newly built house or structure as per result of replacement cost survey and approved by the Hanoi PC.  Depreciation or value of salvaged materials will not be deducted from the amount of compensation.  If only a portion of the structure is affected, the AP	Details of compensation for the structures for individuals and Collectives are instructed as in Articles 32,33 and 34 of Decision 108/2009/QD-UB of Ha Noi CPC.  Details of policy on the resettlement are instructed as in Chapter V (Articles 44 to 48 of Decision 108/2009/QD-UB of Ha Noi CPC)

Type of Impact/Loss	Eligibility/ application	Project Entitlement policy	Implementation Issues
		<p>will be compensated for the affected structure in conformity with the unit prices of a newly built house or structure as per result of replacement cost survey and approved by the Hanoi CPC and repair cost of the remaining structure at replacement cost (i.e., cost of labor at the time of payment).</p>	
	<p>Structures built on land ineligible for residential land compensation but at the time of building, do not violate master plan of city (plan for long term development of city for all sectors such as transport system, residential sites, industrial zones etc), protection corridors</p>	<p>Will be compensated equal to 80% of the value of a newly-built structure and additional (top-up) cash assistance amounting to 20% of value of a newly-built structure (as additional subsidize to compensation to meet with a replacement value and to make sure that the DP will not be worse off as required in OP 4.12 OF THE World Bank).</p>	<p>Monitoring and evaluation need to be done by local authorities and independent monitoring agency to make sure that the objective of this resettlement framework is achieved (total package of compensation and assistance is 100 % of the house value).</p>
	<p>Structures built on land without sufficient condition for compensation before 01 July 2004 that violated publicly master plan and safety corridors</p>	<p>Will be compensated at 50% of the value of a newly-built structure provided that the owners have been notified of these violations and recorded in a minute.  If no public notification of the land use plan was made and the violations were not recorded in the district or ward, then compensation will be equivalent to 100% of the value of a newly-built structure.</p>	<p>The DPs of this group need to be identified through IOL and then DMS and analyzed with SES to see if they are vulnerable DPs and if yes, effort from the district need to be made to maximize the benefits from these DP to other financial sources or loans of the Government to cross support for this group to make sure that the objective of the resettlement plan that the DPs will not be worse off at least or otherwise improve their</p>

Type of Impact/Loss	Eligibility/ application	Project Entitlement policy	Implementation Issues
<p><b>4. LOSS OF RENTED STRUCTURE (HOUSE / SHOP)</b></p>	<p>People who rent privately-structure/shop and have a permanent address in the locality</p>	<p>If the violation has been notified/recorded but the household belongs to the poor and vulnerable households, an additional cash assistance amounting to 50% of new construction price will be provided.</p> <p>Will be assisted with VND 3,000,000/household as a moving allowance and 30 kg of rice equivalent per household member in three months. exceeding the rent value for 3 months (Article 41 of Decision 108/2009/QD-UB of Ha Noi CPC</p>	<p>livelihood after land acquisition. Monitoring and evaluation after land acquisition.</p> <p>Details assistance is instructed as in Article 41 of Decision 108/2009/QD-UB of Ha Noi CPC.</p>
<p><b>5.IMPACT ON BUILDING FACILITIES</b> (water supply connection, cable, telephone, power, etc)</p>	<p>Owner of the rented building</p> <p>All DPs of the facilities</p>	<p>Cash compensation for income loss from rental of structure equivalent to the remaining value of the rent contract not exceeding the house/shop rent value for 3 months. People who are supported must have a house-rent contract.</p> <p>Compensation for cost of installation and connection fees. If lessees of structure installed the facilities, payment will go to the lessees.</p>	<p>The DPs need to supply the contracts as attached legal paper to the DMS in order to determine the entitlement for them.</p> <p>At the full replacement cost for re-installment. Need the direction from the city PC to all relevant institutions for their assistances to the DPs to make sure that they could have water, power, and telephone etc supply when they moved to the new sites.</p>
<p><b>6. LOSS OF ANNUAL CROPS</b></p>	<p>Owners regardless of tenure status</p>	<p>Annual crops and aquaculture products equivalent to current market value of crops/aquaculture products at the time of compensation;</p>	<p>Details of compensation for crops, trees are instructed as in Article 36 of Decision 108/2009/QD-UB of Ha</p>

Type of Impact/Loss	Eligibility/ application	Project Entitlement policy	Implementation Issues
<p><b>7. LOSS OF TREES AND FARM PRODUCE</b></p>	<p>Landowners/renters of land who plant the affected tree</p>	<p>Owners/growers of perennial crops, trees and farm produce will be compensated according to the average market price of these trees and farm produce based on annual average volume and/or according to substitution cost applied to long-day trees.</p> <p>For trees that may be transferred to other places, compensation will be based on the actual damage in addition to tree displacement cost. Method to calculate substitution price of tree and farm produce, aquatic production will be implemented according to Article 24, Decree 197/2004/NĐ-CP.</p>	<p>Noi PC.</p> <p>Details of compensation for crops, trees are instructed as in Article 36 of Decision 108/2009/QĐ-UB of Ha Noi PC.</p>
<p><b>8. IMPACTS ON INCOME AND BUSINESS</b></p>	<ul style="list-style-type: none"> <li>Individuals/ households who are with business license or valid business registration and fulfill their taxation duties and had to discontinue their business because of relocating to new place</li> <li>Individuals/households who are without business license or valid business registration but fulfilled their taxation duties and had to discontinue their</li> </ul>	<p>Cash assistance during transition period.</p> <p>The type of assistance and assistance amount will be in conformity with the locality's conditions (Ha Noi PC states in decision 108/2009/QĐ-UB)</p>	<p>Cash assistance is stated in Article 39, item 3 and 4 of Decision 108/2009/QĐ-UB of Ha Noi PC. The type of cash assistance may change at the time of RP preparation.</p> <p>The DPs need to submit their legal supporting papers related to their business such as licenses, tax payment receipt, contracts with employees etc as the attached to DMS in order to define the entitlement for them based on the policies of Government and of Ha Noi city PC.</p> <p>If DPs without business license or</p>

Type of Impact/Loss	Eligibility/ application	Project Entitlement policy	Implementation Issues
	business because of relocating to new place		valid business registration and do not pay their taxation duties, no cash assistance. However, the RPMU should consider to help them with a suitable location at the resettlement site, so that they could continue with their business.
	Employees of companies or entities	Will be assisted with remuneration for job discontinuation.	As per Article 39, item 4 of Decision 108/2009/QD-UB of Ha Noi CPC
	Households who directly produce agriculture products who are not eligible for compensation for land	<p>Will be supported life stabilization support. The type of assistance and actual amount will be in conformity with the locality's actual conditions.</p> <p>Other rehabilitation measures will be provided such as assistance with seeds or improved young animals, agricultural extension training, services, plant protection or veterinary services, technical assistance for business or non-farm production. The type of rehabilitation measures will be identified during the preparation of the RP in consultation with the DPs.</p>	Income restoration plan need to be prepared by the consultants of the Project Management Board for these DPs based on the consultation with the DPs on their preferences to the activities (non land base and land base) and other stakeholders such as local NGOs (farmer Association, Women Union), Department of Agricultural and Rural development, Extension Center for Agriculture, Management Units of the Industrial Zones, Vocational training centers etc. The implementation of the income activities need to be monitored and evaluated periodically.
<b>9. IMPACT ON PUBLIC FACILITIES</b>	Owners of the affected assets	Cash compensation at replacement cost for the affected facilities or reconstruction, reinstatement, if	In cash or in kind compensation to the owners based on the negotiation between the Project Management

Type of Impact/Loss (electric poles, community assets, etc.)	Eligibility/ application	Project Entitlement policy	Implementation Issues
		required by the owners	Unit and with the owners.
<p><b>10. IMPACTS ON AFFECTED VULNERABLE GROUPS</b></p>	<p>Households headed by women, social policy households (poor families), households with all members are the elderly and households with the disabled.</p>	<p>As described earlier, the project will assist poor and vulnerable households in obtaining a new place to live and re-establish their income resources. The type of assistance and actual amount will be in conformity with the locality's actual conditions.</p> <p>In addition, APs who are currently receiving social assistance will receive cash assistance. These DPs are:</p> <ol style="list-style-type: none"> <li>Those who participated in the August 1945 Revolution for Independence, Military Hero, Vietnamese Hero Mothers, Labor Hero, wounded or disabled soldier, and those ones who receive social assistance similar to war disable persons losing more than 81% human working capacity, relatives of military martyr who are receiving monthly social allowance;</li> <li>Wounded soldiers, sick soldiers, and those entitled to policies as for wounded and sick soldiers with labor capability loss of from 61% to 80%</li> <li>Wounded soldiers, sick soldiers, and those entitled to policies as for wounded and sick soldiers with labor capability loss of from 41% to 60%;</li> <li>Martyr families, supporters of the Revolution enjoying monthly allowance, wounded soldiers and those are entitled to policies as for wounded</li> </ol>	<p>Details of assistance are instructed as in Article 42 of Decision 108/2009/QD-UB of Ha Noi PC.</p> <p>The amount of assistance as per Hanoi PC decision vary from 3,000,000 VND to 7,000,000 VND.</p> <p>Monitoring and evaluation on the implementation (internally and externally) and propose for the solutions if necessary to make sure that the objective of this resettlement framework is achieved.</p>

Type of Impact/Loss	Eligibility/ application	Project Entitlement policy	Implementation Issues
		<p>and sick soldiers with labor capability loss of from 21% to 40%; and</p> <p>5. Households entitled to the State's social allowance policies.</p>	
<p><b>11. IMPACT DURING TRANSITION STAGE</b></p>	<p>All relocating households</p>	<p><b>Displacement support/ transportation allowance.</b></p> <p>If households who is fully affected on house but partially affected on residential land (remaining area is sufficient for rebuilding the house, the household will be entitled to displacement support/ allowance. The actual amount will be in conformity with the locality's actual conditions</p> <p><b>House rental allowance.</b></p> <p>For households relocating to government-provided plot of land or apartment or if the household opted to self-relocate.</p> <p>The actual amount will be in conformity with the locality's actual conditions and date of hand-over:</p> <p>(i) from the date of handing over their land area to the date of receiving the new land plus 6 months for building the house, if the household is assigned new land;</p> <p>(ii) from the date of handing over their land area to the date of the receiving house/resettlement apartment, if the household has the right to buy a</p>	<p>As instructed in Articles 38 to 48 of Decision 108/2009/QĐ-UB of Hà Nội PC</p>



Type of Impact/Loss	Eligibility/ application	Project Entitlement policy	Implementation Issues
		<p>new apartment or rent a new house; and (iii) 6 months if the household opts to self-relocate.</p> <p>Households that are partially or totally affected on residential land and remaining land is sufficient for rebuilding the house, will also be provided with rental allowance. The actual amount will be in conformity with the locality's actual conditions and date of hand-over:</p> <p>(i) 6 months rental allowance for those whose structures have to be completely dismantled; and (ii) 3 months rental allowance for those whose structures will only involve partial dismantling)</p> <p><b>Additional Displacement Support</b></p> <p>Households who satisfy all conditions for compensation and relocation but opted for self-relocation, households who do not meet the conditions of getting a plot of land or apartment, and households who belong to poor and vulnerable households will be entitled to additional displacement support. The amount will be regulated by Hanoi PC.</p> <p><b>Bonus for timely handover of land.</b></p> <p>Households who hand-over their affected properties on time (partially or totally affected land) will be</p>	

Type of Impact/Loss	Eligibility/ application	Project Entitlement policy	Implementation Issues
		<p>provided with bonus allowance. The actual amount will be in conformity with the locality's actual conditions.</p> <p><b>Self-Relocation (Article 45, item 5(b))</b></p> <p>If households opted to self-relocate, each household will receive a lump-sum allowance. The actual amount will be in conformity with the locality's actual conditions.</p>	
	Renters of houses/shops	<p><b>Displacement support/ transportation allowance.</b></p> <p>The compensation and assistance amount will be in conformity with the locality's actual conditions.</p>	Internally and Externally monitoring for the assistance payment where and when required and in a timely manner.
	Households losing land	<p><b>Bonus for timely handover of land.</b></p> <p>Households who hand-over their affected properties on time (partially or totally affected land) will be provided with bonus allowance. The actual amount will be in conformity with the locality's actual conditions.</p>	Bonus and incentive need to be made immediately when the DPs agree to hand over their properties and sign a minutes for giving up their properties to the Project Management Board
	Households who directly produce agriculture products	<p>Assistance for income restoration:</p> <p>a) Losing between 30% to 70% or those losing less</p>	As per Article 20, Decree 69/2009 for Life Stabilization Allowance for those households losing 30% or

Type of Impact/Loss	Eligibility/ application	Project Entitlement policy	Implementation Issues
		<p>than 30% who depend heavily and can no longer sustain a household.</p> <ul style="list-style-type: none"> <li>• 30 kg of rice per person per month for 6 months if not relocating</li> <li>• 30 kg of rice per person per month for 12 months if relocating</li> </ul> <p>b) Losing more than 70%</p> <ul style="list-style-type: none"> <li>• 30 kg of rice per person per month for 12 months if not relocating</li> <li>• 30 kg of rice per person per month for 24 months if relocating</li> <li>• 30 kg of rice per person per month for 24 months or more but not more than 36 months if relocating to a difficult socio-economic condition area.</li> </ul> <p>Assistance for changing to new employment instead of agricultural activities is instructed as in Article 40 of Decision 108/2009/QD-UBND of Ha Noi CPC.</p> <p>Other rehabilitation measures will be provided such as assistance with seeds or improved young animals, agricultural extension training, services, plant protection or veterinary services, technical assistance for business or non-farm production. The type of rehabilitation measures will be identified during the preparation of the RP in consultation with the APs.</p>	<p>more. However, for this project, to meet with the requirement in OP 4.12 of the World Bank households who lose less than 30% of their productive land and who are determined to depend heavily on agricultural production and the remaining land will no longer be sufficient to support a household will also be entitled to life stabilization assistance similar to those losing 30% or more.</p>

Type of Impact/Loss	Eligibility/ application	Project Entitlement policy	Implementation Issues
<p><b>12. TEMPORARY IMPACTS DURING CONSTRUCTION</b></p>	<p>DPs affected by temporary land acquisition/impacts</p>	<p>Additional displacement support will be provided for poor and vulnerable groups. The amount will be regulated by Hanoi PC.</p> <p>Cultivated land that is temporarily affected will be (i) fully compensated for affected crops and trees based on replacement cost ; (ii) compensated for income loss from crop during the duration of the project's temporary use; and, (iii) supported for the restoration of land to its original state or better conditions.</p> <p>Temporarily affected residential land will be (i) fully compensated for affected assets and (ii) assisted in restoring the land to its original state or better conditions.</p> <p>Temporarily disrupted production and business will be (i) compensated for income loss equivalent to average net income for at least 3 months; (ii) compensated for impacted assets at replacement price; and, (iii) assisted in restoration the land to its original state or better condition.</p> <p>Civil works contracts under the Project will require the contractor to be careful, and to avoid damage to property during the time of construction. In case of damage, the contractor is obligated to immediately compensate the household, group, community or state-owned agency according to compensation</p>	<p>Article 45 of Land Law, Article 37 of Decree 181/2004 and Article 30 of Decision 108/2009 of HN PC.</p> <p>It needs with the supervision of commune authorities and the Project Management Unit about impacts cause by the contractors in a construction phase and an Article in a contract between the Project Management Board and contractors should described about the responsibilities of parties related to temporary impacts causing by the contractors to the DPs and communities.</p>

Type of Impact/Loss	Eligibility/ application	Project Entitlement policy	Implementation Issues
<p><b>13. LOSS OF LIVELIHOOD</b></p>	<p>Households losing livelihood/income</p>	<p>levels applied to other properties affected by the Project. Moreover, the restoration of damaged property will be implemented after completion of construction activities.</p> <p>In connection with the overall objective of the RP to assist DPs to enhance or at least maintain their livelihood and living conditions in real terms prior to pre-project levels, additional support will be provided to assist DPs who are found to be unable to at least restore their previous livelihood/income levels and living conditions even after receiving the assistance package as provided for in this RP.</p> <p>Hanoi PC will consider specific proposals for providing additional support to help already assisted DPs to fully restore their livelihood and living conditions. Support may be through the provision of additional farm-support equipment/facilities, inputs to improve soil fertility and irrigation at a level similar to previous farmlands of the DPs, marketing support, job-referrals to members of DP households, credit facilities and other appropriate assistance as may be identified in the assessment during RP implementation and evaluation.</p>	<p>The Project Management Unit need to prepare TOR for the consultant who is responsible for preparing and TA the income restoration programs. The consultant of the Project Management Board for income restoration needs to prepare for the income restoration programs and assist the relevant institutions to implement for the programs. The programs must be prepared based on the consultation and participation of stakeholders such as DPs, NGOs, authorities from the provincial to the commune level, training centers, The Management Units of the industrial zones etc.</p> <p>Internal and external monitoring and evaluation of the results in implementing the income restoration programs.</p>

For non-house assets, the households will hand over the properties by no later one month from the date of receiving full payment and for houses the households will hand over the houses by no later than 5 months from the date they are fully paid.

### **III. Socioeconomic Information, Consultation and participation**

#### **A. Detailed Measurement Survey**

15. The conduct of the updated census and Detailed Measurement Survey (DMS) will be organized by the Project Management Board (PMB), District Centers for Land Development Fund, and District Compensation and Resettlement Boards following final design and marking the areas for the stations, alignment and access line and for the relocation site development. The DMS will provide a detailed recording of all land and non-land assets of the DPs. The DMS form, together with the result of the replacement cost survey (RCS) as reviewed and approved by the Hanoi CPC, will be the basis of preparation of the Compensation Plans and RP.

16. For each affected household, the scope of the data for the census will include:
- Total and affected areas of land, by type of land assets; for residential land it needs to be clearly documented about the total area, the affected area in order to determine for the remaining area (if less than 80 m<sup>2</sup>)
  - Total and affected areas of structures, by type of structure (main or secondary); for the house, it needs to be clearly documented about the total area of house, the affected area in order to determine that if the house would be fully or partially affected.
  - Legal status of affected land and structure assets, and duration of tenure and ownership;
  - Quantity and types of affected crops and trees;
  - Quantity of losses, e.g., business or other income, jobs or other productive assets; estimated daily net income from informal shops;
  - Summary data on AHs, by ethnicity, gender of head of household, household size, primary and secondary source of household income viz-a-viz poverty line, income level, whether household is headed by women, elderly, disabled, poor or ethnic minority households;
  - Identify whether source of income is primary source of income; and
  - AH knowledge of the project and preferences for compensation

#### **B. Socioeconomic Survey**

17. The period of RP preparation, the SES and IOL need to be done by consultants of the Project Management Board for the purposes of identifying the socioeconomic conditions of the DPs and having initial estimate for land acquisition impacts. This time the IOL is carried out base on the cadastral map and the alternatives of the project routes made on the cadastral map, the approval for the routes and other project areas are still under study and the bench marks demarcating for the project areas on the ground are not yet put. At a minimum, the socioeconomic survey (SES) will collect information from a sample of 10% of affected households and 20% of severely affected households, disaggregated by gender and ethnicity. The purpose of the socioeconomic survey is to provide baseline data of AHs to assess resettlement impacts, and to be sure proposed entitlements are appropriate, and to be used for resettlement monitoring. The scope of data to be collected includes:

- Household head: name, sex, age, livelihood or occupation, income, education and ethnicity;
- Household members: number, livelihood or occupation, school age children and school attendance, and literacy, disaggregated by gender;

- Living conditions: access to water, sanitation and energy for cooking and lighting; ownership of durable goods; and
- Access to basic services and facilities.

18. When the RP and route and other project area are decided and approved by the competent authorities and the bench marks are put on the ground and the DP and local authorities are aware, the DMS need to be done by the District compensation and site clearance committees at the beginning time of the RP implementation. At the time of DMS activities, all DPs will be required to submit copies of the LURCs or any legal papers to assist the CLDF/DCRBs in the preparation of the Compensation Plan. All DMS forms will be reviewed and signed by DPs and authorities as required by the law.

19. The official list of DPs, their losses, and corresponding payments due will be disclosed to the displaced persons. The following procedures will be observed in the preparation, review and approval of the compensation plans and revised RP based on the DMS, census, and socioeconomic surveys:

- a. During DMS, DPs to participate and give copy of LURC/legal papers to CLDF/DCRB
- b. CLDF/DCRB to prepare Compensation Plan (as per DMS and RCS rate approved by the Hanoi CPC)
- c. CLDF/DCRB to disclose Compensation and Resettlement Plan to DPs
- d. DPs to review Compensation Plan and sign for concurrence
- e. CLDF/DCRB to submit to Department of Finance (DOF) and DONRE for review. The DONRE and DOF to submit to Hanoi CPC for its approval.
- g. CLDF/DCRB to include DMS and Compensation Plan in the RP

20. Any disagreement on the DMS and Compensation Plan will not be signed by the DP until it is resolved following the grievance redress process.

21. The findings of the census and survey will be reported in the RP and the detailed census records appended. A computerized database of all DP related information will be established and maintained by PMB.

### ***C. Public Consultation and participation***

22. Disseminating information to the affected people by the Project and to relevant agencies is an important part of the project preparation and implementation. Consultation with affected people and ensuring their active participation will reduce the possibility of arising conflicts and minimize the risks of delaying the project. It enables the project to design the restoration and resettlement program as a comprehensive development program in compliance with the needs and priorities of affected people, and therefore maximizes the socioeconomic efficiency and benefits of the investment.

23. In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. When consultations are held explanations must be given in a form, manner, and language that are understandable to the affected people.

24. The PMB will closely cooperate with Hanoi People's Committees, districts and wards during the project implementation process to continue the consultation activities. Objectives of the information dissemination and community consultation include:

- a. To ensure the participation of local competent authorities and displaced persons' representatives into the process of planning and making decisions.

- b. To share all information about the project's planned items and activities with the affected people.
- c. To collect information about the needs and priority of the affected people as well as to receive their feedbacks on policies and predicted activities.
- d. To ensure that affected people are fully informed about the decisions which directly impact on their income and living standards, and have opportunities to participate in activities and decisions that directly affect them. A discussion should be held for the different groups of the project affected people such as women, poor households, elderly, families have to relocate to new places, severely affected households etc to obtain their feedback on the arrangement of socioeconomic survey, census, inventory, DMS, resettlement site construction and plot allocation, gender, income restoration, resettlement alternatives, entitlement, implementation, grievances and settling, monitoring and evaluation etc. All minutes of meetings and group discussion need to be documented and with all feedback from the participants to the meetings or from interviewees.
- e. To ensure the transparency in all activities concerning land recovery, compensation, resettlement and restoration.

25. At the early stage of the detailed design phase, community meetings will be held at every affected ward/commune to provide affected people with additional information and to encourage affected people's participation in open discussions on resettlement policies and procedures. Meeting invitations to all affected people will be delivered at least 2 weeks before the meetings at the localities.

26. The community meetings will aim to provide updated information and create opportunity for affected people to discuss their concerns issues and clarify the information. Written notices, public posters in communities where DPs live, announcement on radios newspapers will be made to inform DPs and the general public about the meetings. Both male and female members of affected households and other members of the community will be encouraged to be involved. The meeting contents should convey information about the project, the households' benefits and rights and questions concerning these. These meetings will be done periodically until the completion and evaluation of the RP implementation.

27. In order to provide adequate information to affected people during community meetings, information will be made available at the relevant wards and in the project area. The following guidelines will be observed in the conduct of meetings:

- a. Explain through words and images, including print and design drawings of different items of the Project;
- b. Create opportunities for affected people to express their opinions and receive answers. To encourage affected people to provide feedback on the restoration plans to be provided to them;
- c. The CLDF will make a list of all the affected people attending the meetings;
- d. The CLDF will make full collection of the questions, comments and opinions during the meetings.

28. Disclosure of the Resettlement Plan: The PMB will disclose key information of the RP to the displaced persons prior to submission to JICA for review and concurrence. This will include (i) compensation, relocation and rehabilitation options, (ii) DMS results, (iii) detailed asset valuations, (iv) entitlements and special provisions, (v) grievance procedures,



(vi) implementation schedule and timing of payments, (vii) displacement schedule; and (viii) key relevant laws, Decrees, Circulars, Decisions related to compensation and relocation (from central to the city levels). The information will be made publicly available in Project and ward offices and provided to the displaced persons in the form of a summary RP, an information leaflet or Public Information Brochure (PIB).

29. External monitoring reports will also be made available to Hanoi People's Committee, district and wards. This RP and its update agreed between JICA and PMB, and monitoring reports will also be submitted to JICA for posting at the JICA website.

Consultation, information dissemination and participation need to be done through all phases of the RP preparation and implementation. The cut off date of the project also need to be clearly inform to all affected communities and affected people with a formal letter from relevant authorities and in a timely manner (once the city PC decided for the cut off date with a bench marks put on the ground for the project areas)

## **IV. Compensation, Income Restoration and Relocation**

30. Measures to assist affected people to restore their livelihood and living conditions include provision of (i) compensation for affected land and structures at replacement cost that will enable them to avail of lands with similar productive/economic value and construct structures similar to those that will be damaged by the Project, (ii) rehabilitation assistance during the transition period which includes transportation support, and house rent allowance for relocated households, (iii) additional assistance for DPs losing 10% or more of their agricultural lands, (v) additional compensation for agricultural lands within or adjacent to residential plots/areas, (vi) compensation for income losses of affected businesses, (vii) compensation for displaced workers from affected businesses, (viii) provision of replacement residential land or apartment for physically displaced households, and (ix) additional assistance to vulnerable groups.

### **A. Relocation Strategy**

31. The degree of impact on affected residential land with houses thereon may be any of these two possibilities: (i) the remaining unaffected portion of the residential land is sufficient for the affected household to reconstruct their house thereat; or (ii) the entire residential land is inside the affected area or the remaining unaffected area is not sufficient for the household to reconstruct their house and, thus, they have to move to a new place either through an arrangement with the CLDF/DCRB or by themselves (self-relocation).

32. For those who prefer to relocate to the resettlement site, discussions will be done through individual household visits, community meetings to consult them about their special needs. The displaced persons will be provided with detailed information about resettlement sites, basic facilities available, access to social services. Results of the consultations with the DPs will be used as inputs in finalizing the design of the resettlement site.

33. Households who choose to self-relocate will be compensated at full replacement cost for their properties and allowances stated in the entitlement matrix before land is acquired for the project. Special assistance will be provided to poor and vulnerable groups.

33. Following the final decision of affected households with regard to their relocation options, the key steps below present the required activities, timeline, and groups responsible in order to design, construct and relocate households to the new resettlement sites.

The DCRB (mainly responsible for the DMS, determining for the entitlement of the households, payment compensation and assistance, arrangement of resettlement, involve in settling for the grievances) and CLDF (mainly responsible to arrangement of land bank for the resettlement site development or even DMS if they are contracted by the Project Management Board or to be assigned with the other tasks related to compensation and resettlement by Ha Noi city PC) to propose the sites to Hanoi CPC for approval (total area of the site, number of plots, areas of plots etc.). The sites for relocating DPs of the project in wards could be the part of the planned sites in the districts.

- a.
- b. The DCRB and/ or CLDF to prepare the TOR for the site planning and detailed design, select consultants for these services.
- c. The DCRB and CLDF to submit the site planning and detailed design including the cost of the site construction and EIA for the sites and Hanoi CPC for their review and approval on the land recovery and detailed planning of the sites.
- d. Bidding and selection of contractors for the site construction (could be included of housing if HH prefer the project to construct the house for them).
- e. Plot or Apartment allocation to HH and issuance of LURC and ownership of house.
- f. During the preparation of detailed planning, the DCRB and CLDF will (i) consult with relocating households to discuss final location of the relocation site, size of plot, costs, payment conditions, relocation schedule, and procedures for the awarding of plots to households; (ii) inform the affected households that if the value of the plot is lower than the replacement cost of the affected household's lost residential land, the price difference will be paid in cash to the affected household; (iii) document agreements reached with the households and posted in the office of the commune. The DCRB and CLDF will also take into consideration suitable plots for households who have businesses and ensure that the plot that will be allocated for them will have suitable commercial potential.

The resettlement sites should be as close to the affected areas as possible based on the consultation with stakeholders and need to be constructed with the physical infrastructures and social services as requirements on Viet Nam standards for residential areas in urban area (at least as the same as the standards at the affected areas or otherwise improved). The sites development need to be prepared with EIA as requested in the laws and the EIA need to be reviewed and then approved by city DONRE. The guidelines on plot allocation at the resettlement sites has to be developed, reviewed and approved by the relevant authorities of Ha Noi city PC.

Table 1: Process and Steps for site study and relocation implementation

No.	Steps	Estimated time (months)	Responsibility
1	Final survey and proposal for the sites	3	DCRB, CLDF and Hanoi PC and PMB
2	Approval for sites of city/province PC	1	PMB to submit to Hanoi PC
3	Prepare TOR and selection of consultants for site planning and detailed design	1	PMB
4	Prepare a draft detailed planning according to Vietnam standards (physical infrastructure, plot arrangement, kindergarten, market etc)	1	Consultants under the supervision of PMB
5	Consultation with stakeholders on the site planning, get feedback from them.	0.5	Consultants with the help from PMB and DCRB and CLDF
6	Finalize the planning including EIA , Compensation Plan for the site, submit to DOC, DONRE, DOF for their reviews and then to the Hanoi CPC for Approval.	1	PMB

	Disclose the approved planning at the affected communes.		
7	Detailed Design and Bidding Document based on the approved detailed planning.	1.5	Consultants of PMB
8	Bidding invitation, bidding evaluation and selection of contractors for the site construction. Approval of relevant authorities on the results of bidding evaluation and award the contract to the successful bidder	1.5	PMB and Hanoi PC
9	Construction of the site	5-12	Contractor
10	Demarcate Plot	.5	Contractor
11	Allocate Plot to HH based on the regulation of plot allocation	.5	PMB, CLDF and DCRB
12	Construction of Houses and Public social services (done in parallel)	4 to 5	HH or Contractors
13	Relocation of HHs	2-3	HH with the help of local authorities

34. With regard to timing of payment to DPs and relocation, disbursement of compensation will be at least four months prior to displacement. For villas, at least 5 months is needed. This will allow DPs to have sufficient time to rebuild their houses. Displaced persons will not be displaced until the commune/ward allocates land acceptable to DPs and until DPs received full compensation and allowances due them.

35. For affected households who opt to receive cash compensation for self-relocation will be compensated in full for all their losses (land and non-land assets) and the necessary relocation and transition allowances as per agreed RP. Local authorities will also help relocating families (if needed) to deal with residential land developers in the localities in case DPs want to buy plots or apartments at the sites which developed by site developers or by districts (not by the project owner). Special assistance will be provided to vulnerable households during relocation. Their needs will be assessed during the DMS.

## **B. Income Restoration Measures**

36. Additional support will be provided to DPs losing productive assets, incomes, employment or sources of living, to supplement payment of compensation for acquired assets, in order to achieve, at a minimum, restoration of living standards and quality of life. Preparation of the RP during loan implementation will also include supplemental interventions for already-compensated affected people at the depot area.

37. The Income plan needs to be prepared by the consultant of the Project Management Board according the TOR prepared by the Project Management Board. An income restoration plan need to be prepared based on the consultation with and participation of stakeholders such as NGOs, training centers (on agriculture and vocational), local authorities, managers of the local industrial zones. Design of suitable income restoration measures/programs will be carried out during RP preparation or updating. Appropriate budget will be allocated for income restoration based on consultation with the affected people and concerned livelihood agencies and training institutes. Apart from households losing (or lost) productive land at the depot area, three groups of DPs are also eligible for income restoration support: (i) the owners of house cum-shops; (ii) the owners of the rented shops and (iii) employees for shops. The following income restoration measures are proposed.

- a. assistance in finding suitable sites for DPs to re-establish their shops.

- b. priority in employment in the construction and operation of the Project for selected qualified and interested persons of both genders. Related to this, DPs will be informed of available jobs related to the project and advised on how to apply
- c. re-evaluation of the training requirements of DPs seeking to improve or change occupation and development of an appropriate training program and pilot projects with support from livelihood agencies and training institutes.

## **V. Grievance Redress Mechanism**

38. Complaints and grievances related to any aspect of the Project will be handled through negotiation aimed at achieving consensus. According to the Article 138 of land law 2003, Article 63 and Article 64 of this Decree and provisions on settlement of claims in Decree 136/2006/NN-CP and Decree 197/2004/ND-CP, complaints should pass through three stages before they are taken to a court of law as a last resort. The DPs will be free from any fees for filing a complaint.

39. The mechanism of complaint and complaint and grievances resolution steps are as below:

a. First Stage - At Commune/Ward People's Committee (C/WPC)

An aggrieved DP may bring his/her complaint to any member of the C/WPC, in writing or verbally. It is incumbent upon said member of C/WPC to notify the C/WPC about the complaint. The C/WPC will meet personally with the aggrieved DP and will have 15 days following the lodging of the complaint to resolve it. The C/WPC secretariat is responsible for documenting and keeping file of all complaints that it handles.

b. Second Stage - At District People's Committee (DPC)

If after 15 days the aggrieved DP does not hear from the C/WPC, or if the C/WPC gives its solutions, but DP is not satisfied with the decision taken on his/her complaint, the DP may bring the case, either in writing or verbally, to any member of DPC or DCRB. The DCRB in turn will have 15 days to resolve the case. The DCRB is responsible for documenting and keeping file of all complaints that it handles.

c. Third Stage - At the Hanoi People's Committee (HANOI CPC)

If after 15 days the aggrieved DP does not hear from the DCRB, or if the DP is not satisfied with the decision taken on his/her complaint, the DP may bring the case, either in writing or verbally, to any member of the Hanoi CPC. The Hanoi CPC has 15 days within which to resolve the complaint to the satisfaction of all concerned. The PC secretariat of Hanoi is also responsible for documenting and keeping file of all complaints that it handles.

d. Final Stage - Court of Law

If after 15 days following the lodging of the complaint with the Hanoi CPC, the aggrieved DP does not hear from the Hanoi CPC, or if he/she is not satisfied with the decision taken on his/her complaint, the case may be brought to a court of law for adjudication. Under no circumstance, the DP will be evicted from his/her property or for the Government to take over his/her property without the explicit permission of the court.

At level (a); (b) and (c) need to have the involvement of the representatives of the DPs and local NGOs such as Women Union; Father Front; Farmer Association etc.

40. The external monitoring agency will be responsible for checking the procedures for and resolutions of grievances and complaints. The EMA may recommend further measures to be taken to redress unresolved grievances. Project consultants will provide the necessary training to improve grievance procedures and strategy for the PMB and District staff as and when required.

41. Alternatively, people with concerns about the Project may contact the Environment and Resettlement Team of PMB who will be concurrently designated as grievance officers which will be tasked to receive, follow-up and report on a weekly basis all complaints, disputes or questions received about the Project to PMB.

42. The Environment and Resettlement Team of PMB will develop and maintain a database of complaints received related to the Project which will contain the following information: nature of the complaint, source & date of receiving complaints, name and address of complainant, action taken, and current status.

43. The displaced persons are entitled to claim about their rights of compensation, compensation unit price and policies, land recovery, resettlement and other rights related to restructure support programs. Displaced persons' claims must be in written documents. In case of verbal claims, the reception board will record these inquiries in the grievance form at the first meeting with affected people. Affected people will present their own cases to PMB, People's Committees of districts and wards without any charge or fee.

44. The grievance resolution process for the Project, including the names and contact details of grievance officers of PMB, will be disseminated through information brochures and posted in the offices of the People's Committees at the wards and districts and the PMB Office.

## **VI. Institutional Arrangements and Implementation**

45. The institutional arrangement for the preparation and implementation of RP is guided by Chapter VI of the Decree 197/2004-ND-CP and Chapter V of the Decree 84/2007-ND-CP. The responsibilities of key parties are described in Decree 197/2004;184/2007 and in the Decision 108/2009/QD-UBND of Hanoi People's Committee.

46. The Hanoi City Government and Districts within the City are not new to resettlement. Several resettlement projects have been implemented in the city previously. DPCs and DCRBs are familiar with procedures related to the preparation of Compensation Plans. However, familiarity of staff in the City and Districts with JBIC/JICA guidelines and procedures related to resettlement planning is still limited. At the same time, PMB does not currently have limited familiarity with JBIC/JICA guidelines and procedures. Therefore, VNR/RPMU/JKT is going to assist and monitor RAP preparation and implementation

47. Hence, there is a need to orient staff in the District and Wards on the RP for the Project and their roles related resettlement. Staff of PMB also needs to be augmented by resettlement experts to guide the RP preparation and implementation and ensure that units at the Districts and Wards are fully aware of the requirements and procedures on resettlement to be observed in the Project.

48. Hanoi-CPC will have the following responsibilities:

- a. Generate awareness on the project development to all relevant institutions and various administrative levels within the City
- b. Approve the RP and its update (following DMS) prepared for the Project and request for waivers as may be authorized by the Prime Minister to meet the requirements of JICA on involuntary resettlement.
- c. Direct its relevant departments such as Departments of finance, construction, agriculture and rural development, transport and environment to help in the preparation, updating, and implementation of the RP.
- d. Approve the unit rates which are detailed in the replacement cost survey report as proposed by the qualified appraiser to enable DCRB/CLDF in finalizing the compensation plans.
- e. Approve the compensation plan and overall budget in the Updated RP which will be reviewed and submitted by the DOF.
- f. Settle complaints and outstanding at the city level, as well as forced relocation as may be necessary.

#### **A. The Project Management Board**

49. The PMB, through its Environment and Resettlement Team, will have the following key responsibilities related to resettlement:

- a. Participate in preparation, updating, and implementation of the RP in collaboration with the People's Committees at various levels, CLDF, and DCRBs and submit the same for approval of Hanoi CPC and for JICA to review
- b. Develop and implement a training program for the People's Committees of affected Districts, affected Wards, Compensation Boards and related groups regarding the RP updating and implementation and complaint handling
- c. Engage a qualified appraiser to carry out replacement cost survey. Submit the unit rates proposed by the qualified appraiser to Hanoi CPC for review and approval to assist the DCRB/CLDF in finalizing the compensation plan.
- d. Secure the budget for preparation and implementation of the RP, ensure that funds for compensation, assistance and resettlement are available and in a timely manner.
- e. Coordinate with the Hanoi CPC to direct their relevant departments and various levels of authorities in implementing the project and RP.
- f. Serve as grievance officers for PMB and monitor/track/report on grievances related to the Project.
- g. Conduct internal monitoring of RP, updating, implementation and evaluation.
- h. Coordinate with the District Natural Resources and Environment Offices for the expeditious allocation of replacement land to eligible DPs;
- i. Internally monitor the preparation and implementation of the RP and ensure that resettlement-related activities are carried out in accordance with the RP agreed between PMB and JICA
- j. Oversee the disclosure of resettlement related documents and consultation with DPs and key stakeholders
- k. Prepare semi-annual progress reports on preparation, updating, and implementation of RP for submission to JICA.
- l. Coordinate the work of the External Resettlement Monitoring Agency

#### **B. District Compensation Board and Center for Land Fund Development**

50. The DCRB will be headed by the Vice-Chairman of DPC, and will include the heads of the Finance Department, the Natural Resources and Environment Department, Transport Department, and the Agriculture Department. In addition, representatives of the district

Fatherland Front, Farmers' Associations, Women's Union and representatives of the DPs (including women DPs) will also be invited to the DCRB.

51. The main responsibilities of the DCRB are as follows:

- a. Assist the Hanoi CPC and district PCs in the dissemination of information on the RP;
- b. Organize, plan and carry out land recovery, compensation, assistance and other resettlement activities in the district on behalf of the DPC as per agreed RP
- c. Conduct the DMS and prepare compensation plans for DPs and submit them to DPC and PMB for review
- d. Conduct consultation and participation activities, income restoration program, and coordination with various stakeholders in implementing RPs.
- e. Pay compensation and allowances, subsidies to DPs after the Updated RP has been agreed between PMB and JICA. Ensure the timely delivery of payments of compensation, assistance and other entitlements to DPs; and
- f. Assist the DPC in the resolution of grievances at the district level.
- g. Coordinate with other agencies in the design and implementation of income restoration measures and relocation of households.

52. It should be noted that for Hanoi City People's Committee, the Center for Land Fund Development under the HPC is responsible for the planning and implementation of resettlement activities. Therefore, the responsibilities mentioned above will also be the same for CLDF.

### **C. Commune/Ward People's Committee**

53. The C/WPC will assist the DCRB/CLDF in its compensation, assistance and resettlement tasks. Specifically, the C/WPC will be responsible for the following:

- a. Handle the day-to-day preparation, updating, and implementation of the RP
- b. Form ward working teams and direct their functions, assign ward officials to assist the DCRB and the PMB in conducting DMS, preparing dossiers of land recovery for the project, preparation and implementation of resettlement activities;
- c. Identify replacement land for eligible DPs and propose for income restoration programs suitable to conditions of people and locality;
- d. Sign the DMS forms, certify legal papers or history of land use, land transfer for DPs to fulfill the requirements for preparing compensation plans for them;
- e. Settle the complaint and grievances at the first level as required by the laws;
- f. Actively participate in all land recovery, compensation payment, assistance and resettlement activities and concerns.

### **D. External Monitoring Agency**

54. An agency/organization or a research institute specialized in the social sciences will be hired to carry out external resettlement monitoring. The main objective of external resettlement monitoring is to provide an independent periodic review and assessment of (i) achievement of resettlement objectives; (ii) changes in living standards and livelihoods; (iii) restoration of the economic and social base of the affected people; (iv) effectiveness and sustainability of entitlements; and (v) the need for further mitigation measures as required. The EMA will submit semi-annual progress reports to JICA.

### **E. Project Supervision Consultants**

55. The Project Supervision Consultants (PSC) will be composed of one international resettlement consultant and a team of domestic resettlement consultants to assist PMB and the local authorities in the preparation, updating, and implementation of the RP. The consultants will also assess the capacity of the implementing agencies and provide the necessary capacity building interventions (such as orientation, workshops, on-the-job training) on resettlement.

## **F. Implementation Process**

56. The implement process is as below:

- a. Establishment of the District Compensation and Resettlement Boards. For districts not covered by the Center for Land Development Fund and if the DCRBs have not yet established, Hanoi-CPC will establish DCRBs for the Project, and entrust tasks to relevant agencies and entities. PMB will have its representatives working as permanent members of these DCRBs in charge of appraising documents for submission to the Hanoi CPC for decision.
- b. Land clearance/boundary setting for the Project. After receiving the Decision of Hanoi CPC and DPCs in revoking land and handing over land to PMB for implementing the Project, PMB will cooperate with the City Department of Natural Resources, Environment and Land and the specialized cadastral agency having a contract with PMB to determine the Project land clearance red line and setting out boundary at the field, handing over land to implement compensation, assistance and resettlement tasks for affected people, in order to clear land for the Project. Relevant Offices of Natural Resources, Environment and Land of districts and People's Committees of wards of the Project will assign their staff working as members of District Compensation Board to implement this task.
- c. Training for resettlement staff. After the DCRBs have been formed, the PMB will develop and implement a training program for the implementation of the RP. The training will include at least an orientation on the RP, roles of agencies in RP preparation and implementation, complaint handling/recording/reporting, DP participation/ consultation, gender-related concerns and strategy, internal monitoring, and reporting. Target participants to the training include representatives from the Ward PCs, DCRB/CLDF, and DPC and Viet Nam Women's Union.
- d. Engagement of External Monitoring Agency. PMB will engage the services of an external monitoring agency to carry out independent monitoring and evaluation of RP preparation and implementation activities. Semi-annual progress reports will be submitted by the EMA to PMB and JICA.
- e. Information campaign before DMS. According to Decree No.181/2004/ND-CP, before land acquisition, within 90 days in case of agricultural land and 180 days in case of non-agricultural land, the DCRB/CLDF must send written notices to affected land owners in respect of reasons for land acquisition, time and plan of displacement, compensation/resettlement options, land clearance and resettlement.
  - o Before inventory, detailed measurement and census survey, PMB in cooperation with local authorities of districts and wards will provide Project information to residents in the Project area. Information will be broadcasted via the public address system of the locality in combination with other multi-media such as radios, press, television, brochures or letters delivered to households to be open posted in public areas.



- o Orientation meetings with project affected people will be held in the Project affected wards to notify the affected community about the scope and scale of the project, impacts, policies and rights for all kinds of damages, implementation schedule, responsibilities for organization, and complaint mechanism. Brochures including (images, photos or books) related to Project implementation will be prepared and delivered to all affected wards in the meetings.
- f. Conduct of Replacement cost Survey by a Qualified Appraiser. A qualified appraiser will be hired to assist Hanoi CPC in determining the replacement cost of land and non-land assets. If there is a significant difference between compensation price and market price as per replacement cost survey carried out by a qualified appraiser, Hanoi-CPC will update the compensation unit price according to regulations and implementation guidance of Decree No.197/2004/CP and 17/2006/ND-CP.
  - g. Detailed Measurement Survey, Census and Inventory of Losses. DMS, census and inventory of losses will be undertaken once detailed design is finalized. These surveys will be the basis for the preparation of compensation plan and for preparation of the RP.
  - h. Preparation of Compensation and resettlement Plan. CLDF and DCRBs are responsible for applying prices and preparing compensation tables for each affected precinct/commune. PMB and People's Committees of districts will appraise these tables in respect of prices, quantities of affected assets, rights that the Project affected people are entitled to, etc. before notifying each precinct/commune for review and comments. All tables of compensation price application must be checked and signed by affected people to prove their consensus. PMB and DCRB/CLDF will submit the proposed unit rates as per result of the replacement cost survey to Hanoi CPC for review and approval. The unit rates to be applied will be based on the approved unit rates of Hanoi CPC. See the attached with a proposed format for the RP as annex 1
  - i. Preparation of Income Restoration Measures and Relocation Plan. DCRBs, together with the concerned agencies or organizations on income restoration or livelihood and with the assistance of project consultants will design suitable income restoration measures and relocation plan for severely affected and vulnerable households. This also includes households already compensated in the depot area.
  - j. Submission of RP and JICA review. PMB will prepare Updated Resettlement Plan, disclose key information of the RP to the affected people and submit the same to JICA for review and Concurrence.
  - k. RP Uploading on JICA website. Once the RP is acceptable to JICA, the RP will be uploaded on the JICA website.
  - l. Implementation of RP. Compensation and assistance will be paid directly to the DPs under the supervision of representatives of DCRBs, ward authorities and representatives of affected people. Income restoration and relocation plan will be implemented in close consultation with the DPs and concerned agencies.
  - m. Issuance of Notice-to-Proceed (NTP) for Specific Sections. NTP will only be issued by PMB to the civil works contract to commence construction activities

once the head of the DCRB/CLDF has officially confirmed in writing that (i) payment has been fully disbursed to the DPs and rehabilitation measures are in place for that specific section as per RP agreed between PMB and JICA; (ii) already compensated DPs for that specific section have cleared the area in a timely manner; and (iii) that the specific section is free from any encumbrances..

- n. Monitoring. Internal monitoring and independent monitoring will be implemented from RP preparation to implementation. Grievances received will be addressed through the grievance redress mechanism set up for the project. One post-project assessment survey will be undertaken by the EMA within 6 to 12 months after completion of compensation and resettlement activities.

## **VII. Budget and Financing**

57. The budget will cover for the SES, IOL, cadastral maps, preparing for the RP and updating for the RP as well as for compensation costs (calculated based on the replacement values) , cost for the resettlement sites, resettlement assistance/ allowances and rehabilitation measures, administration costs, internal and external monitoring, and physical and inflation contingency.

The PMB will use fund for RP preparation and implementation and ensure timely provision of fund for resettlement to meet any unforeseen obligations in excess of the resettlement budget in the agreed RP in order to satisfy resettlement requirements and objectives. The RP will identify key activities for which funds will be used, any disbursement milestones and auditing requirements that will facilitate appropriate and timely delivery. The budget for the compensation and assistance will be from the recipient fund.

## **VIII. Monitoring and Evaluation**

### **A. Internal Resettlement Monitoring**

58. Internal Monitoring is the responsibility of PMB, CLDF and DCRB with support from the project consultants. Internal resettlement monitoring aims to:

- a. ensure payment of compensation to affected people are provided based on the type of losses and categories of impacts
- b. ensure resettlement activities are conducted according to the compensation policies as per agreed RP and its update.
- c. determine if the required transition, income restoration measures and relocation assistance are provided on time.
- d. assess if income source recovery and recovery support have been provided and propose remedial measures if objectives of restoring income of households have not been met .
- e. disseminate information and procedures openly
- f. determine if complaint procedures are followed and if there are pending issues that require management attention.
- g. give priority to displaced persons' concerns and needs, specially the poor and vulnerable households
- h. ensure transition between relocation or site clearing and commencement of civil works is smooth and that sites are not handed over for civil works until displaced persons have been satisfactorily compensated, assisted and relocated

59. PMB, through its Environment and Resettlement Team, will submit semi-annual monitoring reports to JICA. Internal monitoring reports will include but not limited to the following information:

- a. Number of displaced persons and categories, status of compensation payment and relocation of DPs.
- b. Status of disbursement of compensation payment to DPs.
- c. Status of income restoration planning and implementation issues
- d. Results of complaint handling and any pending issues that require management attention and action
- e. Concerns and needs raised by severely affected households, poor and vulnerable groups and how these concerns are being addressed.

## **B. External Resettlement Monitoring**

60. The main objective of external resettlement monitoring is to provide an independent periodic review and assessment of (i) achievement of resettlement objectives; (ii) changes in living standards and livelihoods; (iii) restoration of the economic and social base of the affected people; (iv) effectiveness and sustainability of entitlements; and (v) the need for further mitigation measures as required.

61. The external resettlement monitoring address specific issues such as the following:

- (ii) Public consultation and awareness of resettlement policy and entitlements;
- (iii) Documentation of impacts and payments (DMS forms, compensation documents,) as per agreed RP;
- (iv) Coordination of resettlement activities with construction schedule;
- (v) Land acquisition and transfer procedures;
- (vi) Construction/rebuilding of replacement houses and structures on residual land or to new relocation sites;
- (vii) Level of satisfaction of DPs with the provisions and implementation of the RPs;
- (viii) Grievance redress mechanism (documentation, process, resolution);
- (ix) Effectiveness, impact and sustainability of entitlements and rehabilitation measures and the need for further improvement, as required;
- (x) Gender impacts and strategy;
- (xi) Capacity of DPs to restore/re-establish livelihoods and living standards. Special attention provided or to be provided to severely affected and vulnerable households;
- (xii) Resettlement impacts caused during construction activities;
- (xiii) Participation of DPs in RP planning, updating and implementation;
- (xiv) Institutional capacity, internal monitoring and reporting.
- (xv) Channeling of government funds for payment of land, non-land assets and allowances to the displaced persons (if done transparently, efficiently and effectively)

62. Monitoring of RP implementation will be based on desk review and field visits, meetings with various ministries and local officials, and displaced persons. Separate meetings will be held with women and vulnerable households.

63. Between 6 to 12 months following completion of resettlement, the external resettlement monitoring consulting services will conduct an evaluation study to determine whether or not the objectives of resettlement have been achieved. The methodology for the

evaluation study will be based mainly on a comparison of the socio-economic status of severely affected households prior to and following displacement. If the findings of the study would indicate that the objectives of the RP have not been achieved, the EM will propose appropriate additional measures to meet the RP objectives. Activities will include the following:

- Evaluate baseline data that was collected under the socio-economic survey to assess changes in: household income and expenditures, expenditure composition patterns, primary and secondary occupations, borrowing amounts and debts patterns, materials conditions and possessions of consumer items, land area and tenure arrangements, school attendance of children, child malnutrition and general health, and distances to public services and infrastructure.
- Collect qualitative indicators on the DPs' own assessment of changes in living standards before and after the project at households and community levels, which may be collected through open-ended questions, semi-structured interviews, case-studies, or group discussions employing a range of PRA tools and methods.
- Verify with the DPs that community services and resources damaged during construction works have been fully restored to their previous conditions and operational capacity.

64. The external resettlement monitoring will be undertaken by an international consulting firm composed of international and national experts. Monitoring will be carried out on a semi-annual basis and all monitoring reports will be submitted to PMB and JICA. The semi-annual reports will highlight the issues and problems arising and, if required, suggest time-bound and specific mitigation measures. In terms of submission, reports to be submitted will be as follows:

- a. A brief inception report to be submitted within two weeks after completion of the inception activity.
- b. Compliance monitoring reports and final monitoring report within two weeks after completion of the monitoring activity.
- c. Post- evaluation report will be submitted within two weeks after completion of the monitoring activity.

Inputs, outputs, index for evaluating outcomes for monitoring should be covered in RP.

The TOR for the external monitoring will be prepared by the Project Management Board and should cover at least on (i) the project background ;(ii) brief information on the RP; (iii) task of external monitoring; (iv) Qualified consultant; (v) working localities; and (vi) reporting and other deliverables and the TOR should be attached as one Annex of the RP.

# **Appendix 1**

## **Draft Format for a Resettlement Plan (RP)**

### **Executive Summary**

#### **1. Introduction**

(General description of the project, its components, project area, the component for which the resettlement action plan is prepared, alternatives considered to avoid or minimize resettlement, status of the project design/implementation, (status/type (draft/updated/final /retrofitted) of resettlement plan )

#### **2. Impact Assessment**

This section:

- a. discusses the project's potential impacts, and includes maps of the areas or zone of impact of project components or activities;
- b. describes the scope of land acquisition (provide maps) and explains why it is necessary for the main investment project;
- c. summarizes the key effects in terms of assets acquired and displaced persons; and
- d. provides details of any common property resources that will be acquired.

#### **3. Socioeconomic Information and Profile**

This section outlines the results of the social impact assessment, the census survey, and other studies, with information and/or data disaggregated by gender, vulnerability, and other social groupings, including:

- a. define, identify, and enumerate the people and communities to be affected;
- b. describe the likely impacts of land and asset acquisition on the people and communities affected taking social, cultural, and economic parameters into account;
- c. discuss the project's impacts on the poor, indigenous (if any) and/or ethnic minorities, and other vulnerable groups; and
- d. identify gender and resettlement impacts, and the socioeconomic situation, impacts, needs, and priorities of women.

#### **4. Objectives, Policy Framework and Entitlements**

This section:

- a. describes national and local laws and regulations that apply to the project and identify gaps between local laws and JBIC/JICA guidelines' requirements; and discuss how any gaps will be addressed.
- b. describes the legal and policy commitments from the executing agency for all types of displaced persons;
- c. outlines the principles and methodologies used for determining valuations and compensation rates at replacement cost for assets, incomes, and livelihoods; and set out the compensation and assistance eligibility criteria and how and when compensation and assistance will be provided.
- d. describes the land acquisition process and prepare a schedule for meeting key procedural requirements.
- e. defines displaced persons' entitlements and eligibility, and describes all resettlement assistance measures (includes an entitlement matrix);
- f. specifies all assistance to vulnerable groups, including women, and other special groups; and.

- g. outlines opportunities for displaced persons to derive appropriate development benefits from the project.

## **5. Information Disclosure, Consultation, and Participation**

This section:

- a. identifies project stakeholders, especially primary stakeholders;
- b. describes the consultation and participation mechanisms to be used during the different stages of the project cycle;
- c. describes the activities undertaken to disseminate project and resettlement information during project design and preparation for engaging stakeholders;
- d. summarizes the results of consultations with displaced persons (including host communities), and discusses how concerns raised and recommendations made were addressed in the resettlement plan;
- e. confirms disclosure of the draft resettlement plan to displaced persons and includes arrangements to disclose any subsequent plans; and
- f. describes the planned information disclosure measures (including the type of information to be disseminated and the method of dissemination) and the process for consultation with displaced persons during project implementation.

## **6. Grievance Redress Mechanisms**

This section describes mechanisms to receive and facilitate the resolution of displaced persons' concerns and grievances. It explains how the procedures are accessible to displaced persons and gender sensitive.

## **7. Compensation, Relocation of Housing and Settlements and Income Restoration**

This section:

- a. describes options for relocating housing and other structures, including replacement housing, replacement cash compensation, and/or self-selection (ensure that gender concerns and support to vulnerable groups are identified);
- b. describes alternative relocation sites considered; community consultations conducted; and justification for selected sites, including details about location, environmental assessment of sites, and development needs;
- c. provides timetables for site preparation and transfer;
- d. describes the legal arrangements to regularize tenure and transfer titles to resettled persons;
- e. outlines measures to assist displaced persons with their transfer and establishment at new sites;
- f. describes plans to provide civic infrastructure; and
- g. explains how integration with host populations will be carried out.
- h. identifies livelihood risks and prepare disaggregated tables based on demographic data and livelihood sources;
- i. describes income restoration programs, including multiple options for restoring all types of livelihoods (examples include project benefit sharing, revenue sharing arrangements, joint stock for equity contributions such as land, discuss sustainability and safety nets);
- j. outlines measures to provide social safety net through social insurance and/or project special funds;
- k. describes special measures to support vulnerable groups;
- l. explains gender considerations; and
- m. describes training programs.

## **8. Institutional Arrangements**

This section:

- a. describes institutional arrangement responsibilities and mechanisms for carrying out the measures of the resettlement plan;
- b. includes institutional capacity building program, including technical assistance, if required;
- c. describes role of NGOs, if involved, and organizations of displaced persons in resettlement planning and management; and
- d. describes how women's groups will be involved in resettlement planning and management,

#### **9. Resettlement Budget and Financing Plan**

This section:

- a. provides an itemized budget for all resettlement activities, including for the resettlement unit, staff training, monitoring and evaluation, and preparation of resettlement plans during loan implementation.
- b. describes the flow of funds (the annual resettlement budget should show the budget-scheduled expenditure for key items).
- c. includes a justification for all assumptions made in calculating compensation rates and other cost estimates (taking into account both physical and cost contingencies), plus replacement costs.
- d. includes information about the source of funding for the resettlement plan budget.

#### **10. Implementation Schedule**

This section includes a detailed, time bound, implementation schedule for all key resettlement and rehabilitation activities. The implementation schedule should cover all aspects of resettlement activities synchronized with the project schedule of civil works construction, and provide land acquisition process and timeline.

#### **11. Monitoring and Reporting**

This section describes the mechanisms and benchmarks appropriate to the project for monitoring and evaluating the implementation of the resettlement plan. It specifies arrangements for participation of displaced persons in the monitoring process. This section will also describe reporting procedures.

#### **Appendices**

List of Displaced persons/Households/Legal Entities  
Public Information Brochure (PIB)

Annex 14 RAP 作成業務の TOR (案)





**OUTLINE FOR SOCIO-ECONOMIC SURVEY AND PROJECT'S IMPACTS ASSESSMENT  
FOR THE PURPOSE OF RESETTLEMENT ACTION PLAN PREPARATION  
HANOI CITY URBAN RAILWAY CONSTRUCTION PROJECT**

**1. Project's background**

Ha Noi is the capital of the Socialist Republic of Vietnam, with a population of 6.56 million people (2010), is developing to become a key socio-economic center of the country since the Renovation Policy in 1986. Traffic demand in the city is expected to rise significantly due to the expansion of socio-economic activities, development of large urban areas and growth in income in the near future. However, Ha Noi Capital is deficient in urban transport infrastructures in accordance with the current socio-economic conditions and growing transport needs in the city. The visible consequences are the decline in function and performance of the city, and the degradation of the environmental conditions due to traffic congestion which in turn will affect the socio-economic activities as well as people's life.

The urgent priority is therefore to build a system of large volume public transport as the current facility does not meet the transportation needs in the city of which the estimated population is up to 4.5 to 5 million people in 2020 (the capital Hanoi and the surrounding areas) and environmental conditions are also deteriorating.

The Government of Vietnam, the Ministry of Transport, Ha Noi City People's Committee and Vietnam Railways are clearly aware of the necessity to build a large volume public transport system. Overall Planning of Hanoi Capital till the year 2020 was established in 2003. In this Overall Planning, the elevated Ngoc Hoi – Yen Vien railway is given the first priority. In 2004, the Prime Minister also approved the investment of Hanoi Railway System Project, Ngoc Hoi-Yen Vien line, and the basic contents of Pre-feasibility Study.

In 2008, Government of Vietnam (GVN) received ODA Loan provided by Japan Bank for International Cooperation (JBIC: merged with Japan International Cooperation Agency, JICA, in ODA section in October 2008) for the consulting engineering services including design and assistance to tendering procedure for Phase 1 and Phase 2a.

**Project's Objectives**

To meet with the increasing transportation demand in Hanoi City by constructing mass rapid transit system, thereby contributing to regional economic development and improvement of urban environment, through mitigation of traffic congestion and pollution.

**PROJECT'S IMPACTS**

The characteristic of the urban railway No.1 is that it is planned to base on the current railway except the area of Long Bien Bridge. As regards the part of Long Bien Bridge, the railway is

decided to go toward the upstream of the current bridge and it is 30m far from the current bridge. The Ngoc Hoi station is located in the area which is identified on the available city planning. The sphere of secure corridor of the project is 3m from the edge of construction to each side. The project corridor is 17.31m for center part of the station; in the urban station, the project width is 22.5m and in the national station, the specific area is as in the project. (***For more details, see Annex 1).***

## **2. Requirements for RAP preparation**

The Government of Vietnam has imposed requirements to secure the transparency, equity and improve the living quality of the people affected by land acquisition to serve infrastructure development projects, which is shown in the decrees and legal documents issued by the Government related to land acquisition and social development policies.

Japan International Cooperation Agency (JICA), an implementing agency of the Japanese ODA, plays an important role in contributing to sustainable development in the developing countries. The projects assisted by JICA are therefore paid due attention to secure environmental and social considerations and proposed mitigation measures in order to minimize impacts caused by preparation, construction and operation of the project.

Thus, for Hanoi City Urban Railway Construction Project (Line 1) (hereinafter referred to as “the Project”), JICA requires to have appropriate measures related to impacts caused by land acquisition as well as other social impacts in order to make sure that these documents are consistent with the policies and requirements of JICA and the majority of people support the project, which facilitates JICA and implementing parties to ensure the transparency, accountability and examination of environmental and social considerations.

A Resettlement Plan has to be prepared according to JBIC Guidelines for Confirmation of Environmental and Social Considerations (2002) (hereinafter “JBIC guidelines”) as well as referring to JICA Guidelines for Environmental and Social Considerations (2010) (hereinafter “JICA guidelines”) and World Bank Safeguard Policies (hereinafter “WB policies”), in order to ensure that JICA-assisted projects create development efficiencies for the local population and limit or minimize any adverse social impact likely to happen, and at the same time, ensure that the income levels of the affected people will be equal to, if not better than, the pre-project levels. Therefore, JICA/RPMU requires a consultancy service for preparing the Resettlement Action Plan of the project as to secure the above mentioned objectives.

### **Objectives of RAP preparation**

One of the key principles of the Project is to minimize involuntary resettlement caused by construction of the main works as well as auxiliary structures. However, in specific situation of

the Project, involuntary resettlement is unavoidable. The primary principles to prepare the Resettlement Action Plan are:

- Minimize land acquisition, and damage of properties, structures and resettlement to the extent possible;
- Implement compensation and resettlement arrangement to ensure that project affected people's living standards are equal or better improved than the time before the project.

In general, RAP has to meet the laws and regulations of the Government of Vietnam and JBIC guidelines while referring to JICA guidelines and OP 4.12 of the World Bank on Involuntary Resettlement. In case of any discrepancy between the provisions of the Government of Vietnam and JBIC guidelines, the JBIC guidelines shall take precedence as regulated at the Article 1.2 of the Decree No. 197.

The purpose of this work is to help the RPMU prepare document which is approved by the Viet Nam Government and JICA and the content of RAP can be made public through posting up in the People's Committees of wards or districts in the project area. This document will help and assist the district and ward authorities to implement resettlement work according to the requirements of RAP. Therefore, they will understand clearly the legal basis of resettlement and site clearance.

RAP has to closely comply with the rules of the Resettlement Policy Framework applied to the Project and prove that the implementing measures meet the objectives set.

### **Scope of Work**

The Consultant will conduct the following surveys to ensure the activities for preparing the Resettlement Action Plan of the project.

#### **2.1 Socio-economic survey**

The Consultant will conduct the socio-economic survey with about 25% of the samples in order to create an overall picture of the affected area of the project, which focuses on affected household group. Collected socio-economic data will serve (a) to design consultation and information dissemination programs, (b) to design livelihood restoration program for the affected communities as well as the communities in the project area; and (c) as a basis for evaluating the effectiveness of resettlement action.

#### **2.2 Inventory of Losses**

Based in the identified scope of site clearance of the Project, the inventory of losses aim: (a) to establish the total investment for site clearance of the Project; (b) together with other activities to determine the number of affected persons/ households and their compensation and

resettlement options; (c) to serve as one of the bases to develop a livelihood restoration program for DPs and identify assistances for the affected communities; and (d) to serve as the basis for preparation of compensation and resettlement plan of the districts.

The inventory of losses has to cover (i) the project affected households; (ii) businesses and organizations affected by the project.

### **2.3 Consultation with project's stakeholders**

Consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people.

### **2.4 Requirements for RAP outline**

Elements to be covered in the RAP will include:

- a) Description of the project and identification of affected project areas;
- b) Identification of the project components or activities that give rise to resettlement; the zone of impact of such component or activities; the alternatives considered to avoid or minimize resettlement; and the mechanisms established to minimize resettlement, to the extent possible, during project implementation;
- c) Objectives of RP;
- d) Socioeconomic studies: baseline information (DP characteristics, economic and cultural conditions, existing incomes and use of natural resources, and information necessary);
- e) Census/survey results: identification and enumeration of all DP, and identification and inventories of all lost land, structures and other assets (including temporary impacts) through a 100% census and survey. The census and inventory should cover but not limited to the followings:
  - i. all types of DPs;
  - ii. number and names of DP in each PAH;
  - iii. number, type, and area of the houses or other structures lost;
  - iv. number and area of all the residential plots lost;
  - v. number, category and area of agricultural land lost;
  - vi. quantity and types of crops and trees lost;
  - vii. businesses lost including structures, land and other fixed assets;
  - viii. productive assets lost as a percentage of total productive assets;
  - ix. quantity and category of other fixed assets affected; and
  - x. temporary damage to productive assets.

- f) Legal and Institutional framework
- g) Eligibility criteria for compensation and all other forms of assistance
- h) Valuation of and compensation for losses, in kind or in cash, at the cost announced by HPC
- i) Site selection (including environmental assessment of proposed sites), site preparation, and relocation
- j) Replacement or restoration of public infrastructure and social services
- k) Detailed arrangements for livelihood improvement (or restoration)
- l) Identification of vulnerable PAH, and full description of planning measures for which they are eligible
- m) Consultation and participation arrangements, including mechanism for grievance redress.
- n) A detailed implementation schedule, corresponding as appropriate to the timetable for construction of civil works
- o) Costs and budget, identifying all unit rates for compensation, and including contingencies for price escalation and unanticipated expenses
- p) Arrangements for internal and external monitoring
- q) Entitlement Matrix, listing by column all categories of adverse impact including categories of land or other assets lost, eligibility criteria, and entitlements (specified by unit rate, allowance amount, or other measure) for each category
- r) Annexes.

***(For more details see Annex 2.)***

### **3. Requirements for Consultant**

The selected Consultant should be a consultancy firm that has at least 10 years of experience in resettlement following the procedures of the Donors such as JICA, WB and ADB.

The members of the Consultant team should meet the following requirements:

- Educational background in social sciences or other related areas. Have at least 10 years of experience in the areas related to resettlement and at least 5 years of experience in projects in the urban areas (Task Team Leader);
- Have at least 5 years of experience working in Vietnam and experiences in other similar projects (members);
- Familiar with both qualitative and quantitative analysis, particularly social assessment methods and participatory research methods.
- Knowledgeable of projects funded by JICA, WB and ADB;
- Good communication skills; and
- Good command of both English and Vietnamese (Task Team Leader).

### **4. Scope and Schedule**

Scope: The socio-economic survey, inventory of losses and preparation of Resettlement Action Plan is conducted in the areas of the communes/wards of the districts affected by the Project, which are listed in the Annex 1.

### **Implementation schedule**

Mobilization of consultant: The Consultant will start to carry out the assignment since .....

Preparation for the first draft report to submit to RPMU and JICA for review (in both English and Vietnamese):.....

Adjust report if necessary and submit the second draft within 15 days after receiving feedback from RPMU and JICA.

The final report is submitted upon approval from RPMU and JICA.

### **5. Outputs**

- Main report.
  - o Resettlement Action Plan report for the Project.
  - o Report will be submitted in both English and Vietnamese. The number of each version is 10 and an electronic file in a CD.
- Besides, the Consultant needs to submit the following supporting outputs:
  - o Questionnaires;
  - o Survey data;
  - o Consultation minutes;
  - o Supporting outputs should be submitted in form of an original and 4 copies.
- The draft reports submitted in both English and Vietnamese, 3 copies each.

## **Annex 1 – SCOPE OF PROJECT’S IMPACTS AND SCALE OF SITE CLEARANCE AND RESETTLEMENT**

Site clearing scope of the Project

See Table on the next page for the summary of site clearance.

*For the overhead structure:* 2 sides of the railway is identified based on the Basic Design Plan of the Project as follows:

- 👉 3 m from the side of railway structure to each side for overhead structure.
- 👉 5 m from the toe of embankment or 3m from the side of the drain ditch for the roadway embankment (according to the Railway Law);

*Site clearing scope of the station:* The protection area of the station includes fences, landmark, land area, space within the fences and landmark of the station, the land from arrival signal pole one side to the arrival signal pole another side of the station.

*Site clearing scope of the cross road:* The railway is in the area of Hanoi City, it is not designed at-grade intersection but only geometry intersection, so there is no cross road on the main line. Therefore, there is no site clearance for cross road.

*Scope of permanent acquisition:* The scope of permanent acquisition is the land in the construction area and protection area of the railway, it will not be returned to the locality after the construction is completed and comes into operation. In this Project, the scope of permanent acquisition is the scope of the railway security corridor.

*Scope of temporary acquisition:* The scope of temporary acquisition is land for siding, temporary bridge and land serving the construction process and will be returned after the construction is completed. In this project, land serving the construction is the land managed by VNR and in the railway security corridor which is implemented site clearance. Therefore, there is no temporary acquisition.

*Scope of the railway security corridor:* The railway security corridor in the project is identified as 3 m from the side of railway structure to each side for overhead structure, 5 m from the toe of embankment or 3m from the side of the drain ditch for the roadway embankment. This is also the construction protection corridor of the railway project.



Table: Summary of Site Clearance for HURC

No.	District Name	Land acquisition area (m2)	Displaced House		Household/People		Graves
		New allocation	Number (house)	Area (m2)	HH	People	
I	Thanh Tri	1,097,706	462	22,252	661	2,584	650
	Phase 1	1,050,605	99	6,666	298	1,132	650
	Phase 2a	47,101	363	15,586	363	1,452	
II	Hoang Mai	20,775	114	7,038	116	477	0
	Phase 1	4,420	52	3,663	54	229	-
	Phase 2a	16,355	62	3,375	62	248	
III	Thanh Xuan	2,625	44	7,180	66	396	0
IV	Dong Da	12,524	255	18,767	361	1419	0
V	Hoan Kiem	12,866	219	13,733	350	1282	0
VI	Ba Dinh	7,063	40	2,995	52	284	0
VII	Long Bien	78,128	554	39,831	719	3177	0
<b>Total</b>		<b>1,231,687</b>	<b>1,688</b>	<b>111,796</b>	<b>2,325</b>	<b>9,619</b>	<b>650</b>

## **Annex 2 - Requirements for the Resettlement Action Plan (RAP)**

The scope and details of the RAP vary depending on the magnitude and complexity of the resettlement itself. Nevertheless, RAP is expected to be based on up-to-date and reliable information about (a) proposed resettlement and its impacts on the affected households, and (b) legal issues involved in resettlement. A RAP should cover the elements below, as relevant.

1. *Description of the project.*

2. *Potential impacts.* Identification of

- (a) project component/activities that give rise to resettlement;
- (b) zone of impact of such component/activities;
- (c) alternatives considered to avoid/minimize resettlement; and
- (d) mechanisms established to minimize resettlement, to the extent possible, during project implementation.

3. *Objectives of the resettlement program.*

4. *Socioeconomic studies.* findings of socioeconomic studies conducted during project preparation with the involvement of potentially displaced people, including

- (a) results of census survey covering
  - (i) current occupants of the affected area to establish a basis for the design of the resettlement program and to exclude subsequent inflows of people from eligibility for compensation and resettlement assistance;
  - (ii) demographic, socioeconomic traits of affected households, including a description of production systems, labor, and household organization; and baseline information on livelihoods (including, where relevant, production levels and income derived from both formal and informal economic activities) and standards of living (including health status) of the affected population;
  - (iii) magnitude of expected loss of assets, and the extent of resettlement, physical or economic;
  - (iv) information on vulnerable groups or persons as provided for whom special provisions may have to be provided; and

(v) provisions to update information on the affected people's livelihoods and standards of living at regular intervals so that the latest information is available at the time of their resettlement.

(b) Other studies, as relevant, describing the following:

(i) land tenure and transfer systems, including an inventory of common pool resources (natural resources which people rely on as their livelihoods and sustenance, non-title-based systems (i.e. fishing, grazing, or use of forest areas) governed by local recognized land allocation mechanisms, and any issues raised by different tenure systems in the project area;

(ii) patterns of social interaction in the affected communities, including social networks and social support systems, and how they will be affected by the project;

(iii) public infrastructure and social services that will be affected; and

(iv) social and cultural characteristics of affected communities, including a description of formal and informal institutions (i.e. community organizations, ritual groups, nongovernmental organizations relevant to the consultation strategy and to designing and implementing the resettlement activities.

5. *Legal framework.* The findings of an analysis of the legal framework, covering

(a) scope of the power of eminent domain and the nature of compensation associated with it, in terms of both the valuation methodology and the timing of payment;

(b) the applicable legal and administrative procedures, including a description of remedies available to affected people in the judicial process and the normal timeframe for such procedures, and any available alternative dispute resolution mechanisms that may be relevant to resettlement under the project;

(c) relevant law (including customary and traditional law) governing land tenure, valuation of assets and losses, compensation, and natural resource usage rights; customary personal law related to resettlement; and environmental laws and social welfare legislation;

(d) laws and regulations relating to the agencies responsible for implementing resettlement activities;

(e) gaps, if any, between local laws covering eminent domain and resettlement and the Bank's resettlement policy, and the mechanisms to bridge such gaps; and

(f) any legal steps necessary to ensure the effective implementation of resettlement activities under the project, including, as appropriate, a process for recognizing claims to legal rights to land--including claims that derive from customary law and traditional usage.

6. *Institutional Framework.* The findings of an analysis of the institutional framework covering

(a) identification of agencies responsible for resettlement activities

(b) an assessment of the institutional capacity of such agencies; and

(c) any steps proposed to enhance existing institutional capacity of agencies for resettlement implementation.

7. *Eligibility.* Definition of affected persons and criteria for determining their eligibility for compensation and other resettlement assistance, including relevant cut-off dates.

8. *Valuation of and compensation for losses.* Method to be used in valuing losses to determine their replacement cost; and a description of the proposed types and levels of compensation under the regulation of Hanoi city.

9. *Resettlement measures.* A description of the packages of compensation and other resettlement measures that will assist each category of eligible displaced persons to achieve the objectives of the policy. In addition to being technically and economically feasible, the resettlement packages should be compatible with the cultural preferences of the affected persons, and prepared in consultation with them.

10. *Site selection, site preparation, and relocation.* Alternative relocation sites considered and explanation of those selected, covering

(a) institutional and technical arrangements for identifying and preparing relocation sites, whether rural or urban, for which a combination of productive potential, locational advantages, and other factors is at least comparable to the advantages of the old sites, with an estimate of the time needed to acquire and transfer land and ancillary resources;

(b) any measures necessary to prevent land speculation or influx of ineligible persons at the selected sites;

(c) procedures for physical relocation under the project, including timetables for site preparation and transfer; and

(d) legal arrangements for regularizing tenure and transferring titles to resettlers.

11. *Housing, infrastructure, and social services.* Plans to provide (or to finance resettlers' provision of) housing, infrastructure, and social services; plans to ensure comparable services to host populations; any necessary site development, engineering, and architectural designs for these facilities.

12. *Environmental protection and management.* A description of the boundaries of the relocation area; and an assessment of the environmental impacts of the proposed resettlement and measures to mitigate and manage these impacts (coordinated as appropriate with the environmental assessment of the main investment requiring the resettlement).

13. *Community participation.* Involvement of resettlers and host communities,

(a) description of the strategy for consultation with and participation of resettlers and hosts in the design and implementation of the resettlement activities;

(b) a summary of the views expressed and how these views were taken into account in preparing the resettlement plan;

(c) a review of the resettlement alternatives presented and the choices made by displaced persons regarding options available to them, including choices related to forms of compensation and resettlement assistance, to relocating as individuals families or as parts of preexisting communities or kinship groups, to sustaining existing patterns of group organization, and to retaining access to cultural property (e.g. places of worship, cemeteries...); and

(d) institutionalized arrangements by which affected people can communicate their concerns to project authorities throughout planning and implementation, and measures to ensure that such vulnerable groups as indigenous people, ethnic minorities, the landless, and women are adequately represented.

14. *Integration with host populations.* Measures to mitigate the impact of resettlement on any host communities, including

(a) consultations with host communities and local governments;

(b) arrangements for prompt tendering of any payment due the hosts for land or other assets provided to resettlers;

(c) arrangements for addressing any conflict that may arise between resettlers and host communities; and

(d) any measures necessary to augment services (e.g., education, water, health, and production services) in host communities to make them at least comparable to services available to resettlers.

15. *Grievance procedures.* Affordable and accessible procedures for third-party settlement of disputes arising from resettlement; such grievance mechanisms should take into account the availability of judicial recourse and community and traditional dispute settlement mechanisms.

16. *Organizational responsibilities.* The organizational framework for implementing resettlement, including identification of agencies responsible for delivery of resettlement measures and provision of services; arrangements to ensure appropriate coordination between agencies and jurisdictions involved in implementation; and any measures (including technical assistance) needed to strengthen the implementing agencies' capacity to design and carry out resettlement activities; provisions for the transfer to local authorities or resettlers themselves of responsibility for managing facilities and services provided under the project and for transferring other such responsibilities from the resettlement implementing agencies, when appropriate.

17. *Implementation schedule.* An implementation schedule covering all resettlement activities from preparation through implementation, including target dates for the achievement of expected benefits to resettlers and hosts and terminating the various forms of assistance. The schedule should indicate how the resettlement activities are linked to the implementation of the overall project.

18. *Costs and budget.* Tables showing itemized cost estimates for all resettlement activities, including allowances for inflation, population growth, and other contingencies; timetables for expenditures; sources of funds; and arrangements for timely flow of funds, and funding for resettlement, if any, in areas outside the jurisdiction of the implementing agencies.<sup>6</sup>

19. *Monitoring and evaluation.* Arrangements for monitoring of resettlement activities by the implementing agency, supplemented by independent monitors as considered appropriate by the Bank, to ensure complete and objective information; performance monitoring indicators to measure inputs, outputs, and outcomes for resettlement activities; involvement of the displaced persons in the monitoring process; evaluation of the impact of resettlement for a reasonable period after all resettlement and related development activities have been completed; using the results of resettlement monitoring to guide subsequent implementation.