Initial Environmental Examination

June 2013

VIE: Secondary Cities Development Project

Buon Ma Thuot Subproject

Prepared by the Provincial People's Committee of Dak Lak for the Asian Development Bank.

CURRENCY EQUIVALENTS

(as of 20 June 2013)

Currency unit	–	dong (D)
D1.00	=	$0.0000475
$1.00	=	D21,033

ABBREVIATIONS

ADB	–	Asian Development Bank
AP	–	affected person
CEMP	–	contractor's environmental management plan
DAKURENCO	–	Dak Lak Urban and Environmental Limited Company
DPH	–	Department of Public Health
DONRE	–	Department of Natural Resources and Environment
EERT	–	external emergency response team
EIA	–	environmental impact assessment
EIAR	–	environmental impact assessment report
EMP	–	environmental management plan
EMR	–	environmental monitoring report
EPC	–	environmental protection commitment
GOV	–	Government of Viet Nam
IEC	–	information, education and communication
IEE	–	initial environmental examination
MONRE	–	Ministry of Natural Resources and Environment
NH	–	national highway
O&M	–	operation and maintenance
O/M&R	–	operation, maintenance and repair
PIS	–	project implementation support
PMU	–	project management unit
PPC	–	provincial people's committee
ROW	–	right-of-way
SCDP	–	Secondary Cities Development Project
USD	–	Unites States dollar
VND	–	Vietnamese dong
W/CPC	–	ward/commune people's committee

WEIGHTS AND MEASURES

C	–	celsius/centigrade
dBA	–	decibel audible
ha	–	hectare/s
km	–	kilometer/s
km^2	–	square kilometer/s
kph	–	kilometer/s per hour
m	–	meter/s
m^3	–	cubic meter/s
mg/l	–	milligram/s per liter
mm	–	millimeter/s

NOTE

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

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I. EXECUTIVE SUMMARY

A. Purpose of the Report

1. This report gives an account of the initial environmental examination (IEE) of the proposed Buon Ma Thuot Subproject of the Secondary Cities Development Project. The IEE was conducted as part of the subproject preparation to primarily: (i) identify and assess potential impacts arising from the implementation of the proposed Subproject on and to the physical, biological, socio-economic and physical cultural environment; and (ii) recommend measures to avoid, mitigate, and compensate for adverse impacts, and enhance positive impacts. The IEE was carried out following the Safeguard Policy Statement (June 2009) of the Asian Development Bank (ADB) and with reference to the Law on Environmental Protection (No. 52/2005/QH11) and its implementation guidelines, namely Decree No. 80/2006/ND-CP, Decree 21/2008/ND-CP and Decree No. 29/2011/ND-CP of the Government of Viet Nam (GOV). Several relevant reports/documents, sites reconnaissance, and consultations with communities, local government agencies and some resource persons have provided bases to the IEE.

B. The Secondary Cities Development Project

2. The proposed Secondary Cities Development Project (SCDP or the "Project") will address the development issues of Buon Ma Thuot City (Dak Lak Province), Ha Tinh City (Ha Tinh Province) and Tam Ky City (Quang Nam Province) to develop these cities as regional economic growth centers to foster balanced regional development. The proposed Project will contribute to diverting rural-urban migration from large metropolitan cities and strengthening ties between the three cities and their rural hinterlands through its expected outcome of increased quality and coverage of climate resilient urban infrastructure in the three cities. The Project will deliver four outputs:

Output 1: New and improved urban infrastructure and services;
Output 2: Increased community awareness on solid waste management, flood protection and disaster risk reduction and management;
Output 3: Improved competencies in urban planning and management; and
Output 4: Strengthened capacity for project implementation.

C. The Buon Ma Thuot Subproject

3. The Buon Ma Thuot Subproject will deliver the following outputs, through three components namely:

- Solid Waste Management
  - improved solid waste disposal
  - remediated open dumpsite
  - a pilot project for community waste at source segregation and a supporting information and education campaign;
- Urban Roads
  - improved/complete major roads
- Capacity Building and Subproject Implementation Support
  - increased efficiency and management capacity of relevant government agencies in project management, particularly in financial management, procurement, project performance monitoring and evaluation.

4. Under the Solid Waste Management Component, a part of Phase 1 of the City's proposed Solid Waste Treatment Plant (SWTP) in Hoa Phu Commune will be implemented and the existing dumpsite in Cu Ebur Commune will be remediated.

5. The Urban Roads Component will improve and widen the existing Tran Quy Cap Road, and improve, extend and partially widen the existing Mai Thi Luu Road. These two roads together with Ba Huyen Thanh, Quan and Y Wang Roads form the eastern ring road of the City.

6. The Subproject's physical components will be implemented over a period of 54 months (4.5 years), to cover: (i) 12 months of preparation of detailed design and bidding documents; (ii) 9 months of procurement process, starting in the 4th Quarter of Y1; and (iii) about 36 months of construction starting in the 3rd Quarter of Y2. Operation of Hoa Phu Sanitary Landfill is estimated to start anytime between 1st and 2nd Quarter of Y5; for the Urban Roads Component, between 1st and 2nd Quarter of Y6, i.e., even before defects liability periods are over. Capacity building and institutional strengthening will be intermittent inputs of various consultants over a four-year period starting 2nd Quarter of Y2.

D. Summary of Impacts and Mitigation Measures

1. Relative to Siting

7. The most salient siting concerns are those affected by land acquisition, i.e., 634 households; 63.14 ha of land, mostly agricultural; 97 houses; 36 graves; 4 businesses; and livelihood of 80-100 dumpsite scavengers. Upstream sections of Ea Tam and Ea Nao Rivers will be crossed by the road sub-components.

2. Relative to Design

8. The essential environmental concerns relative to design include:

- Inadequate incorporation of climate change and seismicity, their threats and impacts, which would render the completed works unable to cope during extreme weather events and earthquakes, and to sustain their effectiveness and life throughout the period they were intended for;
- Inadequate attention on the impacts of roads on local hydrology, such as changes in the surface water flow and groundwater level, and lowering/ worsening of the quality of water resources. Inadequate attention on the significance of sustaining the existence & hydrology of crossing water bodies.
- Unsustainable supply of aggregate materials or unsustainable extraction of these materials to meet construction demand.
- For SWTP, inadequate consideration of existing technical and financial capacity of DAKURENCO in waste disposal operations.
- For roads, inadequate consideration adjacent properties/ communities, e.g., road's impact on surface drainage, environmental conditions, and change in the lifestyle and character of, and degree of safety risk to, the communities.

3. During Construction

9. During construction, the anticipated moderate to significant issues/concerns/impacts are dust, noise, vibration, water resources deterioration due to inadequate management of wastes and sediments, depletion of water resources in the City if these are tapped to meet construction water demand, the demand for fine and coarse aggregates that need to be supplied resulting in impacts associated with quarrying/borrowing, impacts on the sustainability of urban services, traffic and road blocking, blocking of access to properties, local flooding due to haphazard stockpiling blocking surface drainage flow, accidental damages to utility mains resulting in disruption of services, disruption of socio-economic activities, accidental damages to nearby properties, community health and safety hazards and workers health and safety hazards.

4. During Operation

10. The potential salient issues/concerns/impacts during operation include:

- Completed works unable to sustain their effectiveness and life throughout the period they are intended for due to inadequate considerations/incorporations of the following in designs: (i) hazards and risks associated with seismicity and climate change climate change impacts and seismicity; and (ii) keeping crossing streams and sustaining their hydrology.
- Unsustained effectiveness of: (i) completed works due to inefficient operation, maintenance and repair; and (ii) road drains due to indiscriminate dumping of solid wastes.
- From completed roads, potential local flooding in adjacent properties due to impeded surface drainage, increased level of air pollutants and noise in the area, change in the lifestyle in/character of the community.

11. In sanitary landfill operations, the anticipated salient impacts would be (i) air pollution from dust, gas, fumes, noise; (ii) surface and ground water contamination from leachate and ground water contamination from gas migration; (iii) odor and pests/rodents/vermin, bird & stray animal attraction; (iv) wind-blown litters; (v) potential surface water sedimentation and from borrowing activity and stockpiling of soil cover/excavated materials; (vi) fire/explosion; (vii) leachate dripping from garbage trucks en route to the landfill; (ix) community & workers health and safety hazards; (x) unsustained sanitary operations due to lack of technical and financial capabilities; and (xi) damage/s after an earthquake or extreme weather event. During decommissioning of sanitary landfill operations or post-dumpsite remediation (after final cover), gas generation, gas migration, leachate generation impacting on water resources, damage/s during seismic or extreme weather event are the salient concerns.

5. Positive impacts and Benefits

12. There will be opportunities for local employment and increased earnings of local enterprises during construction. When completed, the Subproject will bring about the following benefits that will considerably outweigh the aforementioned adverse impacts:

- Solid Waste Management Component
  - improved solid waste disposal
  - positive contribution to reduced greenhouse gas emissions
- Urban Roads Component
  - reduced inter-provincial and intra-area travel time and operating costs

- positive contribution to energy conservation and reduced greenhouse gas emissions.

13. Overall, the Subproject will bring about qualitative improvement in the urban environment and gain the City great strides towards its green city vision. Living conditions will improve, to include opportunities for improved health. Other benefits are improved mobility, increased productivity and increased land values.

6. Mitigating Measures

14. The recommended mitigation measures consist of actions, activities, plans and documents (resettlement/compensation plans, environmental compliance certificates, Contractor's EMP, among others) that need to be undertaken, observed, obtained, prepared to prevent, mitigate, or compensate for, the identified adverse impacts. The broad measures are as follows; while specific measures are presented in **Section V** and the EMPs.

- Adequate incorporation of climate change impacts, seismicity and other natural hazards in design.
- Prompt compensation for losses associated with land acquisition according to the approved Resettlement/Compensation Plan.
- Ensuring the engagement of an environment-responsible Contractor by: (i) incorporating the SPS compliant Subproject EMPs (SEMP) into the bidding documents for basis in the preparation of Contractor's EMP (CEMP), addressing as minimum the requirements of the SEMP; (ii) stipulating in the contract for civil works the obligations of parties involved to institute the mitigation measures properly and carry out environmental monitoring according to the SPS compliant CEMP/SEMP; (iii) stipulating some tie-up of progress payment and collection of performance bond with the performance in CEMP/SEMP implementation.
- Good environment-friendly engineering practices that avoid first, and (if unavoidable) mitigate, impacts; and full implementation of the CEMP/EMP.
- Quality construction supervision and environmental monitoring by the PMU.
- Sufficient funds for sustained quality of operation and maintenance.
- Observance of the grievance redress mechanism and prompt action/ resolution of lodged grievances.

E. Information Disclosure, Consultation and Participation

15. Stakeholder consultations and information disclosure were conducted during the IEE in accordance with ADB's Safeguard Policy Statement 2009. Stakeholder consultations were conducted through: (i) formal discussions/meetings with local authorities; (ii) informal interviews with randomly picked affected persons during sites visit; (iii) socio-economic survey, wherein environmental queries were incorporated; and (iv) joint social and environmental public meetings.

16. Consultations with local authorities/entities and informal random interviews were carried out in September 2012 and January 2013. The socio-economic survey of affected households was conducted in February-March 2013. Relevant findings are incorporated in the description of socio-economic environment of this report (Section IV-D). Two joint social-environmental public meetings were held on 11 March 2013. Except for the concern of one person on traffic safety, dust and pollution during construction, all other questions were mainly regarding

resettlement. It was emphasized to the consulted group that as presented, there are environmental management plans which will have to be implemented, and that the EMP implementation will be monitored closely by the PMU and consultants.

17. This IEE & its EMPs will be finalized during the detailed design stage. Public consultations will continue throughout Subproject implementation. All stakeholders must be invited and encouraged to participate. The PMU, contractor and/or operator shall be open to contact by the public on matters concerning the progress of the Subproject, adverse impacts, mitigation measures and environmental monitoring. During the actual implementation of the Subproject, the final IEE and its EMPs, as well as the GOV-approved EIA Reports, will be made available in the PMU Offices and Subproject Field Offices for the perusal of interested parties. Copies may be made available upon formal request.

18. To date, the following have been disclosed: (i) Subproject/sub-component descriptions, locations and activities; (ii) expected period of implementation; (iii) positive impacts and benefits of the sub-components; (iv) potential salient impacts and mitigation measures, particularly during construction and operation; (v) environmental monitoring that is open to active community participation; (vi) existence and general overview of a grievance redress mechanism; (vii) continuing consultations and information disclosure; and (viii) status of compliance with GOV and ADB safeguards requirements.

F. Grievance Redress Mechanism

19. Grievances raised on environmental impacts are critical to the health, wellness and safety of affected persons (APs). Hence, grievance redress must be most easily accessible and most responsive to avoid prolonging the misery of APs.

20. Informally, an AP can approach the Contractor (during construction) or the Operator (during operation) directly to lodge complaint either by him/herself or with assistance from a third party of his/her choice. Contractor/Operator shall assess the complaint immediately and act on the complaint within two days from receipt of complaint. If assessment reveals the issue as not associated with the Subproject's environmental performance, the Contractor/Operator shall direct AP to the proper institution or mechanism. If it is associated with the Subproject's environmental performance but is not acted on within two days from receipt of complaint, or if AP is not satisfied with the resolution undertaken by the Contractor/Operator, he/she can access the formal mechanism, as follows:

Step 1: AP, by him-/herself or with assistance of a third party of his choice, writes a letter of complaint to the CPC (for complaints on the Mai Thi Luu Road Sub-component) or the PPC (for complaints on the SWTP, closure of dumpsite And Tran Quy Cap Road Sub-components). (Day 1)

Step 2 CPC/PPC documents/registers the received letter of complaint, and makes sure these are duly referenced; forwards these to their respective PMU for record and action purposes. (Day 1)

Step 3 PMU assesses if complaint is within the scope of the SCDP environmental GRM. If not, then AP is directed to the proper institution/mechanism. If it is, concerned parties visit the site of complaint and verify initial assessment. (Concerned parties would be the AP, Contractor and PMU during construction; and AP and Operator during operation.) If complaint is found to be not Subproject-related or not associated with poor environmental performance of the Subproject, AP is directed to the proper

institution/mechanism. Otherwise, discussion on the cause/s and action/measures to be taken shall be held. Agreement on action/measures and time involved shall be made with the AP. (Day 1/Day2, not to go beyond Day 2)

Step 4 If complaint is minor, i.e., not requiring further investigation and would be easy to resolve, the Contractor/Operator shall immediately implement discussed/agreed on resolution. Otherwise, if further investigation and/or procurement of supplies/parts would be necessary, the Contractor/Operator shall: (i) immediately provide the most suitable interim measure to reduce the magnitude of the impact; and (ii) start work on the final measure not later than 5 days from the day discussion meeting is held. (Day 2/Day3 for minor impacts; otherwise, Day 2/Day3 to Day 6/Day7)

Step 5 If, according to the AP, the impact has been resolved satisfactorily, PMU/Operator shall obtain a written confirmation of satisfaction from the AP. This confirmation will signify closure of grievance and will form part of the grievance documentation. Copy of confirmation will be sent to the CPC/PPC. (1 week after completion of resolution)

Step 6 The PMU/Operator shall monitor the effectiveness of the resolution for at least a week after closure of grievance (that is, when action implemented has been satisfactorily confirmed in writing by the complainant). Monitoring and evaluation shall be properly documented and included in the Environmental Monitoring Report. (for 1 week after closure of grievance)

Step 7 Dissatisfied AP may appeal/raise their dissatisfaction to the City Court (for appeal of complaint on the Mai Thi Luu Road Sub-component) or the Provincial Court (for appeal of complaint on the SWTP, closure of dumpsite, Tran Quy Cap Road Subcomponents).

G. Environmental Management Plan

21. The environmental management plan (EMP) will be the framework for the environmental management of the Subproject from detailed design phase through to operation and decommissioning. **Annexes H** and **I**

22. The institutions that will have major and minor roles in environmental management include the: (i) Dak Lak Province People's Committee (DLPCP), as the executing agency of the Subproject; (ii) Buon Ma Thuot City People's Committee as the implementing agency; (iii) the Project Management Unit (PMU); (iv) Project Steering Committee (PSC); (v) Project Implementation Support (PIS) Team, its Environmental Specialist; (vi) Asian Development Bank (ADB); (vii) Design Consultant; (viii) Civil Works Contractor; (ix) DAKURENCO as operator; (x) Department of Natural Resources and Environment (DONRE); (xi) Department of Public Health (DPH); and (xii) People's Committees of concerned wards and communes (W/CPC).

23. The BMTCPC, through the PMU, will be responsible for the detailed preparation and implementation of the Subproject. The PSC, headed by the vice-chairman of the Dak Lak PPC, will be responsible for deciding on environmental management matters that will require action from the senior-management level. The PMUs shall undertake and manage the day-to-day activities of their Sub-components. Their full-time Environmental Engineers/Scientists shall oversee and monitor the implementation of Component EMPs. The PIS Team shall include Environmental Specialists, who will impart technical advice, guidance support and "hands-on training" to the PMUs, particularly the Environmental Engineers/Scientists, in Subproject environmental management, at least in the first two-three years of Subproject implementation. The ADB shall undertake reviews and approvals of relevant documents, and carry out annual

environmental review missions. The roles and responsibilities of each of these and other institutions are detailed in the draft EMPs. **Annexes H** and **I**

24. The marginal costs for implementing the EMPs of the two components are initially estimated to involve:

- USD 30,108 (or VND 626 million) of fixed costs to cover environmental effects monitoring prior to, and during, construction;
- USD 6,000 (or VND 125 million) annually for environmental monitoring of SWM sub-components during operation;
- USD 3,472 (or VND 72 million) annually for environmental monitoring of urban roads sub-components during operation; and
- USD 11,100 (or 230 million) annually for environmental monitoring during decommissioning phases of the SWTP and Cu Ebur dumpsite (for at least 5 years after closure or as agreed).

25. The estimated costs: (i) include taxes and contingencies for deficiencies in assumed unit costs, but exclude inflation; (ii) exclude the salary of the Environmental Engineer/Scientist as he/she will be existing CPC staff seconded/assigned to the PMU for the environmental management of the Subproject; (iii) exclude the costs spent by PMU for compliance with GOV safeguard requirements in March 2013; and (iv) exclude the cost for technical assistance and "hands-on" training" by Environmental Specialists that will be engaged as part of the PIS Team, a total of USD 21,300 for all three Subprojects under the SCDP.

H. Conclusion

26. The IEE concludes that the proposed Buon Ma Thuot Subproject is not environmentally critical. Having had built comparable or larger projects in the past, the few potentially significant adverse impacts during construction will not be unprecedented and distinct; will be temporary and short-term (i.e., most likely to occur only during peak construction period). The extent of adverse impacts is expected to be local, highly site-specific.

27. The full implementation of a SPS compliant Contractor's EMP that addresses as minimum the requirements of the SPS compliant Subproject EMPs will mitigate the impacts. Simple/uncomplicated mitigation measures, basically integral to socially and environmentally responsible construction practices, are commonly used at construction sites in urban setting and are known to Contractors. Hence, mitigation measures would not be difficult to design and institute.

28. The proposed SWTP will be engineered to avoid and/or minimize the adverse impacts of waste disposal. Its operations will be guided by an Operations Manual that will guide environmental management during operation. As such, its operation is not expected to have long-term, persistent, permanent/irreversible adverse impact on human health and safety, air quality, water quality, biodiversity, and lifestyle and means of subsistence of surrounding local communities.

29. The proposed Solid Waste Management Component will: (i) improve solid waste disposal; and (ii) contribute positively to reduced greenhouse gas emissions. The proposed Urban Roads Component will: (iii) reduce inter-provincial and intra-area travel time and operating costs; (iv) positively contribute to energy conservation and reduce greenhouse gas emissions. Overall, the Subproject will bring about qualitative improvement in the urban

environment and gain the City great strides towards its green city vision. Living conditions will improve, bringing opportunities for improved health, mobility, and productivity.

30. Based on the above conclusions, the classification of Buon Ma Thuot Subproject as Category B is confirmed, and no further special study or detailed EIA needs to be undertaken to comply with the Safeguard Policy Statement of the ADB. Under GOV regulations, the Subproject is classified as Category "I", which require a full EIA Report for: (i) each Urban Roads subcomponent to be appraised and approved by the PPC through the DONRE; and (ii) the Solid Waste Management Component to be appraised and approved by the MONRE. (See Table 4 of Section III-B for the status of, and timeline for, the compliance with GOV EA requirements.)

II. POLICY, LEGAL & ADMINISTRATIVE FRAMEWORK

A. Policy and Legal Framework

31. The basic laws/policies that provide the framework within which environmental assessment is carried out in Viet Nam are the:

The Law on Environmental Protection (No. 52/2005/QH11), dated 29 November 2005, requires the environmental assessment of certain strategies and plans (Articles 14-17), environmental impact assessment (EIA) of certain projects (Articles 18-23), and environmental protection commitments from projects that are not required EIA (Articles 24-27). It sets out the responsibilities of individuals and organizations regarding environmental assessment, protection and rehabilitation.

Decree No. 80-2006-ND-CP, dated 09 August 2006, provides the detailed guidelines for implementation of some articles of the Law on Environmental Protection. Some of its articles were subsequently amended and supplemented by **Decree No. 21-2008-ND-CP**, dated 28 February 2008. More recently, in April 2011, various articles regarding strategic environmental assessment (SEA), environmental impact assessment (EIA) and environmental protection commitment (EPC) were amended and/or supplemented by **Decree No. 29/2011/ND-CP**. Its Appendix II represents the updated list of Projects that are required an approved EIA report prior to applying for construction permit. The following activities listed in Appendix II relate to the Subproject:

- construction, renovation, upgrade of road, grades I to III, regardless of length;
- construction of road, grade IV and V, 100 km or longer;
- construction of road bridges, of length 200 m or longer excluding feeder roads
- construction of centralized waste recycling, treatment and disposal; and
- activities involving the relocation and resettlement of 300 households or more.

Circular No. 26/2011/TT-BTNMT, dated 18 July 2011, of the Ministry of Natural Resources and Environment (MONRE), provides detailed instructions for Article 3 (SEA), Item 1 of Article 12 (EIA), and Article 29 (EPC) of Decree No. 29/2011/ND-CP. e.g., how to conduct EIA; procedures & forms for submitting EIA reports; timeframe for the preparation, appraisal and approval of EIA reports; consultation requirements during EIA, and responsibilities of the proponents and authority agencies upon the approval of EIA reports, among others. It replaces Circular No 05/2008/TT-BTNMT and Circular No 13/2009/TT-BTNMT.

Circular No. 01/2012/TT-BTNMT dated March 16, 2012 of the Ministry of Natural Resources and Environment provides details on the implementation of Clause 6, Article 39 of Decree No. 29/2011/ND-CP, i.e., the formulation, assessment, approval, inspection and certification of the implementation of detailed environmental protection plans, as well as the formulation and registration of simple environmental protection plans.

32. Other relevant laws and regulations providing general context/guide in the environmental assessment of the Subproject include the Law on Water Resources, Law on Cultural Heritage, Law on Construction, Decree No. 59/2007/ND-CP on solid waste management, Law on

Biodiversity, Circular No. 22/2010/TT-BXD, on labor safety in construction, and national technical regulations on environmental quality and their monitoring procedures. **Annex A**

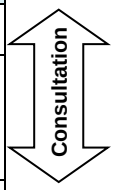
B. Administrative Framework

33. The Ministry of Natural Resources and Environment (MONRE is the lead agency for environmental management in Viet Nam. Apart from MONRE, environment units/divisions in the various line ministries are also carrying out sector-related environmental management. At the provincial level, the MONRE operates through the Departments of Natural Resources and Environment (DONREs). In terms of administrative and technical matters, DONREs fall under the MONRE; in terms of operation, however, they are under the direct control of Provincial Governments through the Provincial People's Committees (PPCs).

34. Projects and services are not granted construction and operation permits without approved EIA reports or registered written environmental protection commitment. From consultation with the Dak Lak DONRE, each component under the Subproject will require the preparation of an EIA Report. These shall be prepared during Subproject feasibility study. The Dak Lak People's Committee shall be the assessing (through its duly formed Appraisal Council) and approving authority of the EIA Report. Public consultations shall be held during the conduct of the EIA through to appraisal of the EIA Report. The Dak Lak PPC sends a copy each of the approval decision and the certified EIA Report to the Subproject proponent, the People's Committees of Subproject-affected wards and communes, and when so requested, the MONRE. (See Table 4 in Section III-B for the status of GOV EA compliance.)

Table 1. The GOV Environmental Impact Assessment Report Preparation, Appraisal, Approval & Implementation Process*

Steps in the Process	Responsible Entity
Preparation & submission of EIA Report	**Project Proponent**
Appraisal of EIA Report Appraisal time limit from receipt of complete & valid dossier : - 30 working days, or - 45 working days for projects with complicated environmental impacts.	**PPC (**through an Appraisal Council)
Approval of EIA report (for this project) Approval time limit from receipt of complete & valid dossier (EIAR must have incorporated comments/recommendations of appraisal results): - 15 working days	**PPC**
Disclosure of contents of approved EIA report (especially its EMP) to concerned Ward/Commune People's Committee/s	**Project Proponent**
Implementation of approved EIA report, compliance with requirements or conditions stated in the decision on the approval of the EIA report, reporting of implementation and compliance, meeting environmental standards	**Project Proponent**
Directing/organizing the monitoring of the implementation of approved EIAR.	**PPC**



***** Features only what is applicable to SCDP, i.e., all subprojects are subject to the preparation of EIA Report.

C. International Environmental Agreements

35. The country is party to various international environmental conventions. With relevance to the Project are the: (i) UNESCO World Heritage Convention; (ii) Ramsar Convention on Protection of Wetlands; (iii) Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES or the Washington Convention); (iv) Convention on Biological

Diversity; (v) UN Framework Convention on Climate Change and its Kyoto Protocol; (vi) Vienna Convention for the Protection of the Ozone Layer, its Montreal Protocol and subsequent Amendments; and (vii) Basel Convention on the Control of Transboundary Movements of the Hazardous Wastes and Their Disposal.

36. Viet Nam is also committed to the Millennium Development Goals, the seventh goal of which is to "ensure environmental sustainability". It is also among the 168 Governments that adopted the Hyogo Framework for Action 2005-2015, a 10-year global footprint for disaster risk reduction efforts, in January 2005. At the regional level, Viet Nam ratified the ASEAN Agreement on Disaster Management and Emergency Response (AADMER) in October 2007.

III. DESCRIPTION OF THE SUBPROJECT

A. The Subproject

37. The Buon Ma Thuot Subproject will deliver the following outputs, through three components namely:

- Solid Waste Management
  - improved solid waste disposal
  - engineered closure of the existing open dumpsite
  - a pilot project for community waste at source segregation and a supporting information and education campaign;

- Urban Roads Component
  - improved/complete major roads;

- Capacity Building and Subproject Implementation Support
  - increased efficiency and management capacity of relevant government agencies in project management, particularly in financial management, procurement, project performance monitoring and evaluation

38. The activities, hereinafter referred to as "sub-components", that are proposed to deliver the outputs under the first two components are the subjects of this IEE (excluding the pilot project for community waste at source segregation & supporting information and education campaign).

1. Solid Waste Management Component

39. Under this Component, a part of Phase 1 of the City's proposed Solid Waste Treatment Plant (SWTP) at Hoa Phu Commune will be implemented and the existing dumpsite at Cu Ebur Commune will be remediated.

40. The partial development of the proposed SWTP at Hoa Phu Commune will provide the following facilities: (i) Cells 1 and 2, including bulk earthworks, liner and protective gravel blanket; (ii) various buildings for ablution blocks, meeting rooms, laboratory, etc.; (iii) access roads both internal and external to the site necessary to reach Cells 1 and 2; (iv) areas to allow stockpiling of recyclables; (v) leachate pipe collection systems and pumping stations, together with re-injection and irrigation systems; (vi) stormwater drainage; (vii) gas vents; (viii) potable

and non-potable water supply; (ix) groundwater monitoring wells; and (x) ancillary works, such as landscaping, weighbridge, lighting and fencing. (Table 2)

Table 2. Summary of SWTP Works Under the SCDP

Item	Detail	Remark/s
1 Waste cells 1 & 2	280 m x 107 m each	Estimated life span of 10 years: - Cell 1, 3 yrs - Cell 2, 3 yrs - Infill between Cells 1 & 2, 4 yrs
2 Buildings	592 m^2, one storey	To house a workshop, offices, laboratory & sleeping quarters
3 Access road	26 m wide (14 m carriageway, 6 m sidewalk both sides) 1,182 m long	All-weather
4 Internal roads	9,760 m^2 , of gravel	Access to Cells 1 & 2
5 Perimeter fencing	2,400 m long, 1.8-2.0 m high, of brick	Around administration building & Cells 1 & 2
6 Groundwater monitoring wells	4 units	2 downstream & 2 upstream
7 Leachate management		
a) Bottom liner	Geo-textile 2 mm HDPE liner 200 mm drainage blanket	
b) Side slopes	1V:2.5H for external batter of waste mound; 5% slope for liner base of cells	
c) Leachate collection	2 units of 300-m long PVC pipe	one in base of each cell
d) Leachate pump	2 units @ 5 l/sec	one for each cell
e) Re-circulation pipe	2 units of 160-m long 75 mm Ø HDPE	one in each cell
f) Longitudinal central drain	Nominally 600 mm x 800 mm, 2.38 km long, trapezoidal reinforced earth drain	
g) Peripheral drain (stormwater drainage)	2- 4500 mm x 600 mm trapezoidal reinforced earth drain, 500 m long	one for each cell
h) Irrigation pipe	2-400 m long pipe	one for each cell
8 Gas vent	20-150 mm Ø x 6 m, PVC (steel cast top)	one at every 50 m x 70 m grid
9 Electrical works	Transformer and poles	
10 Water supply	Ground water for non-potable use and rain water to be stored in underground tanks.	
11 Landscaping		Access and internal roads and around administration building
12 Landfill equipment	1 landfill compactor, 1 bulldozer, 1 excavator, 1 dump truck, 1 water tank	
13 Operations Manual		Basic operational guidance for successful operation of the facility

41. The proposed development of Cells 1 and 2 under the SCDP will provide a total capacity of about ten years: (i) Cell 1 will have a capacity of approximately 390,000 m^3, enough for about three years of operation, with cover material occupying 20% of the total airspace. (ii) Cell 2 in isolation will provide a similar number of years of operation. (iii) The next phase, which is over-topping both of Cells 1 and 2 to develop a unified single cell, will provide more air space to total the capacity to about ten years. (The layout for Phase 1 development features 8 cells, whose capacity, incorporating overtopping, will be 4.6 million m3, sufficient for 25 years of operation, assuming current levels of annual population growth in Buon Ma Thuot. If the area notionally set aside for the leachate treatment facility is converted to waste cells, Phase 1will have a total life span of 30 years.) **Annex B** presents the population and waste quantity projections.

42. The expected wastes for deposition in these cells will be highly organic matter. Based on a waste survey, some 79% of the waste stream is organic matter, 14% is plastic; 3% is paper; and 4% is metal, textile, glass and other materials. The low composition of paper, metal and glass is basically due to an efficient recovery of these high value components from the waste stream by scavengers. With a good manual recovery of plastics as well, there will be an opportunity for reduced plastics and overall volume of waste going into the landfill.

43. The current level of special wastes, e.g., medical, hazardous industrial and construction/demolition wastes is not critical. Overall level of segregation and general management processes of medical waste are acceptable. However, this could be improved through a centralized incinerator at the SWTP in the future. Although not identified in the BMT waste survey and other Viet Nam waste audits referred to by the PPTA, hazardous industrial waste is deemed unlikely to be a significant component of the overall waste stream given the types of local industry, which is largely food processing or agro-based, and household income status. (The dominance of food processing/agro-based industry is expected to remain in the future. No heavy industry is proposed in the City Master Plan.) Construction and demolition waste is presently not collected. In the future, when a shredder/crusher is available at the site, as proposed in the ultimate development plan of the SWTP, construction/demolition waste can be processed into useful aggregates. The Operations Manual, prepared under the PPTA, recommends appropriate management approaches for most other special wastes, such as mattresses and tyres, which are presently co-disposed with the general waste.

44. Stormwater runoff will be managed by a central drain through the middle of the landfill to convey external stormwater away from the site. At the time of over-topping Cells 1 and 2 to provide a consolidated single mound, external flows will be conveyed in diversion drains constructed around the cell perimeter. A key element of site drainage will include management of stormwater impounded in the active cells following a significant rain event. A pipe penetrating the liner from the lowest area in the cell going directly into the central stormwater drain will drain away uncontaminated stormwater. Once the waste reaches this location, the pipe will be blocked off as all rain falling on the Cell will then flow directly off the mound external batters into the perimeter drains.

45. The proposed leachate management strategy is as follows:

- Eliminate seepage of leachate from beneath the site by installing a HDPE liner.

- Encourage lateral movement of leachate by grading the base of the site to the central area and intercepting this seepage in interceptor/collector drains leading to leachate pumping stations.

- Reduce the volume of leachate generated by:
  - using staging, filling, compaction, shaping and covering procedures, which severely inhibit direct rainfall entry;
  - intercepting and by-passing all upstream and external surface water catchment areas around the fill area utilizing surface drainage channels; and
  - segregating rain falling directly into the cells from the leachate systems, and draining this clean stormwater to the central stormwater drain.

- Progressively pump leachate and recycling it through the waste mounds by means of “reinjection dry wells”, irrigating previously worked areas to sustain grass and plant growth on the batters, using for dust suppression and irrigating future cell areas if required.

- Monitor the groundwater quality within and adjoining the site in dedicated wells.

46. Leachate will primarily be pumped up to “dry wells” dug into the upper areas of the waste fill where the leachate is recycled through the waste, encouraging accelerated biodegradation,

absorption and attenuation of many of the leachate chemical constituents. If the monitoring of the deleaching wells and performance of the “dry wells” indicates that leachate generation is excessive, there is ample room on site to dispose of any excess through evapotranspiration on intermediate areas of the landfill area by spray irrigation. This will help sustain grass growth in the dry season.

47. A water balance has been completed to demonstrate that the expected leachate volume can be managed though retention in waste voids through reinjection and irrigation of previously worked areas, and future development areas if needed, without recourse to treatment and discharge to local streams at any time and is presented in Annex 5.12 - Leachate Management, Volume 2 of the PPTA’s Final Report. In the ultimate development plan for the SWTP, an area has been set aside for future leachate treatment facilities; but these are not expected to be required as there will be no need to discharge leachate at any time.

48. Gas collection wells will progressively be installed at the site as it develops (in accordance with Vietnamese requirements). The standard design for these vertical wells is to have them at a 50 m grid pattern spaced over the site. The vents are slotted pipes 150 to 200 mm in diameter placed vertically in a 600 mm diameter gravel wick. These are usually installed when there is sufficient waste on site to generate useful quantities of gas and the earlier acid-forming stages of the aerobic and anaerobic breakdown have finished and methane forming bacteria dominate.

49. Gas wells will be installed when the over-topping stage is underway linking Cells 1 and 2. If methane is later required to be oxidised to reduce greenhouse impact, then a gas flaring system could be installed to convert the methane component to carbon dioxide. (Inclusion of these units is not possible given the budget available under the Loan.) Economic conditions, particularly in relation to energy costs, are almost certain to change over the next 10 years. Hence, flexibility in relation to the use or otherwise of the methane gas is preferred at this stage. Since any one or a combination of the many treatments/controls can be implemented at a later date without detrimental effects there is no need at this stage to make a final decision on this matter. Options include piping unscrubbed landfill gas to adjacent industrial areas to be used for heating purposes, cleaned gas to be compressed and used for vehicle fuel or finally, for power generation. However, the site is too small to be economic for power generation under present generation economics. More details, including gas generation estimates, are presented in Annex 5.13 – Landfill Gas Management, Volume 2 of the PPTA’s Final Report.

50. The remediation works at the Cu Ebur dumpsite is outlined below:

- Remediation will adopt a cut and carry approach to remove all actively burning material and wet it prior to replacing and covering in accordance with a final design.

- Compacted waste will then be covered with a 600 mm clayey soil cap. A 600 mm growing media will then be applied on top of the clay cap and planted grass.

- Landfill gas vents will be installed progressively on the new Cell 1 as it is developed. There is no need to install gas vents on the rehabilitated old waste mound as the organic material has either biologically degraded or been incinerated as part of the ongoing burning activities.

- A perimeter leachate interception drain and associated pumping station will be required for the old mound after remediation. A High Density Poly Ethylene (HDPE) liner and leachate interception system is already being installed at the new cell.
- It is proposed to ultimately use the area for passive recreation such as parks, as well as possibly a sports ground.

- The proposed final cover design and batter slopes will minimise rainfall infiltration and, therefore, leachate generation. Given that the ground water locally is not used for potable water supplies and that the soil has extensive clay content, it is not necessary to install an artificial liner under the exiting waste mound. This would be a large cost for what will be of little environmental benefit.

- Leachate pumping station/s will lift the leachate to irrigate newly planted areas in the dry weather encouraging vegetation cover. This would involve running a permanent pipe to the top of the mound and then having a "relocatable" pipe attached to this outlet. In wet weather, leachate would be pumped to the top of the mound to be re-injected. Four groundwater sampling wells with lockable caps will be also be installed.

2. Urban Roads Component

51. The urban roads component will improve and widen the existing Tran Quy Cap Road, and improve, extend and partially widen the existing Mai Thi Luu Road. These two roads together with Ba Huyen Thanh, Quan and Y Wang Roads form the eastern ring road of the City.

Table 3. Summary of Works Under the Urban Roads Component

Item	Tran Quy Cap Road	Mai Thi Luu Road
Road	18 m wide & 4,224 m long Of asphalt concrete	14 m wide & 2,575 m long (1,100 m existing road, rest is new road.) Of asphalt concrete A total of 15 intersections
Subgrade	30 m wide	24 m wide
Small bridge	Reinforced concrete beam, 9 m long, 31 m wide (30 m carriageway plus 2x0.5 m parapets & guardrails)	None
Sidewalks	2x 6 m, concrete with Terrazzo tiles Tree pots of 1.2 m x 1.2 m Trees at 8 m apart	2x 5 m, concrete with Terrazzo tiles Tree pots of 1.2 m x 1.2 m 516 trees at 8-10 m apart
Drainage	Centrifugal culvert pipes, D80-180 cm, for longitudinal drainage Transverse culvert pipes of D40 cm Technical culverts, BxH=100x100 cm	D=100-150 cm 2,412 m long Transverse Manholes 468 m Drainage culvert gates at 4 discharge gates D=120-180 cm, 808.6 m Transverse culvert D=180 cm, 1 culvert/30m Transverse culverts, BxH= 2x(300x300), 1 culvert/67.08 m Technical culverts, 6 culverts /102 m
Traffic safety system	Whole road	Whole road
Street lighting system	2 sides, whole length of road Underground cable to steel poles of 10 km long	2 sides, whole length of road Underground cable to steel poles of 14 m height

B. Category and Requirements

52. Under ADB classification, the Subproject is a Category B undertaking and an initial environmental examination (IEE) is required. Under GOV policy, all sub-components are Category 1 projects and an EIA report (EIAR) for each sub-component is required. The EIARs for Urban Roads sub-components will be appraised and approved by the Dak Lak Provincial People's Committee. The EIAR for the Solid Waste Management Component will be appraised and approved by the Ministry of Natural Resources and Environment (MONRE).

Table 4. Status of, and Timeline for, the Compliance With GOV EA Requirements (23 Apr 2013)

SUBPROJECT/ Sub-component	Required EA Document	Status as of mid-April 2013	Estimated Timeline		
			Appraisal Done By	Submit for Approval	Approval
BUON MA THUOT					
SWTP	EIAR	EIAR completed. To submit to MONRE anytime this April.	3rd week Jun *	3rd week Jun	2nd week Jul
Tran Quy Cap Rd	EIAR	EIAR not yet completed.	2nd week Jun ^	3rd week Jun	2nd week Jul
Mai Thi Luu Rd	EIAR	Submitted for appraisal mid-March.	Reported done	Submitted to PPC (as reported by PMU on 23 Apr)	2nd week May

Assumptions:
All dossiers submitted for appraisal and for approval are complete and valid and no revisions will be required.
30 working days of appraisal period (but could extend to 45 working days) for EIARs appraised by DONRE
45 working days of appraisal period (but could extend to 60 working days) for EIAR of SWTP, appraised by MONRE
15 working days of approval period
* Assumes PMU submitted for appraisal by mid-April 2013.
^ Assumes PMU will have submitted for appraisal by end April. ^^ Assumes revised EPCs submitted by 3rd week of April.

C. Need for the Subproject

53. By virtue of Decision No.936/QD-TTg, dated 18 July 2012, approving the master plan on socio-economic development of the Central Highlands, Buon Ma Thuot is confirmed as the regional capital for the Central Highlands, with core functions as administrative and service center and as center for science and technology, education and training. The City has confirmed the importance it would like to place on environmental sustainability through the application of "green city" principles. It envisions green city environments for attracting investments.

54. One serious stumbling block to Buon Ma Thuot's move towards a green city is its existing waste disposal site at Cu Ebur. It is in appalling condition and difficult to access on the mud roads. Refuse is being dumped in piles with no covering apparent. About 80-100 waste pickers/scavengers are earning their living with seemingly little management and control. A new solid waste disposal facility is required for Buon Ma Thuot. The existing dump needs to be properly closed. Both activities will reap significant environmental benefits and gain the City great strides towards its green city vision.

55. Tran Quy Cap and Mai Thi Luu Roads are two of the four roads forming the eastern ring road. When improved and extended, together these two roads will cater for increasing inter-provincial traffic passing through the city area and for major movements between the city's urban areas to serve the city's expanding population and traffic volumes. They will improve traffic circulation in the city and reduce the volume of inter-provincial and intra-area traffic passing through the city centre. Such facilities as the Central Highlands Regional Hospital with a capacity of 600 beds (currently being built), the Dak Lak Gifted Sports School, the Thuy Can Hill urban development area of 400 ha, and sports complex with modern provisions will be

served. The expected outcomes of this component are: (i) economic development in Buon Ma Thuot City with enhanced transport efficiency and traffic circulation, and in the highlands with reduced travel time and operating costs; and (ii) positive contribution to energy conservation and reducing greenhouse gas emissions with reduced travel times and distances and optimum vehicle speeds.

D. Subproject Location

56. Sub-components will be implemented in five wards/communes. (Table 5, Map 1)

57. The proposed SWTP will be located in Hoa Phu commune, some 20 km from the city center. It is presently a mix of farming and open grasslands with only 4 houses on the site. The site is a valley shape to the north with a large flat central area where the cells will be developed over time. The site flattens out to the West especially in the area of the second phase. The site is: (i) clayey silt mainly, which is ideal for landfill cover material; (ii) remote from nearby houses and contiguous future development is focused on industrial parks; (iii) not visible from main roads in the precinct.; and (iv) has been extensively worked with previous and current agricultural activities as well as irrigation dam construction. Two high voltage power lines traverse the southern edge of the site. There are no major flows into the drain under the present access roads. The flow is so small that the flow dries up with 50 m of the spring. This spring will be outside the cell footprint and the flow diverted by the perimeter stormwater drain. Other watercourses on site are ephemeral.

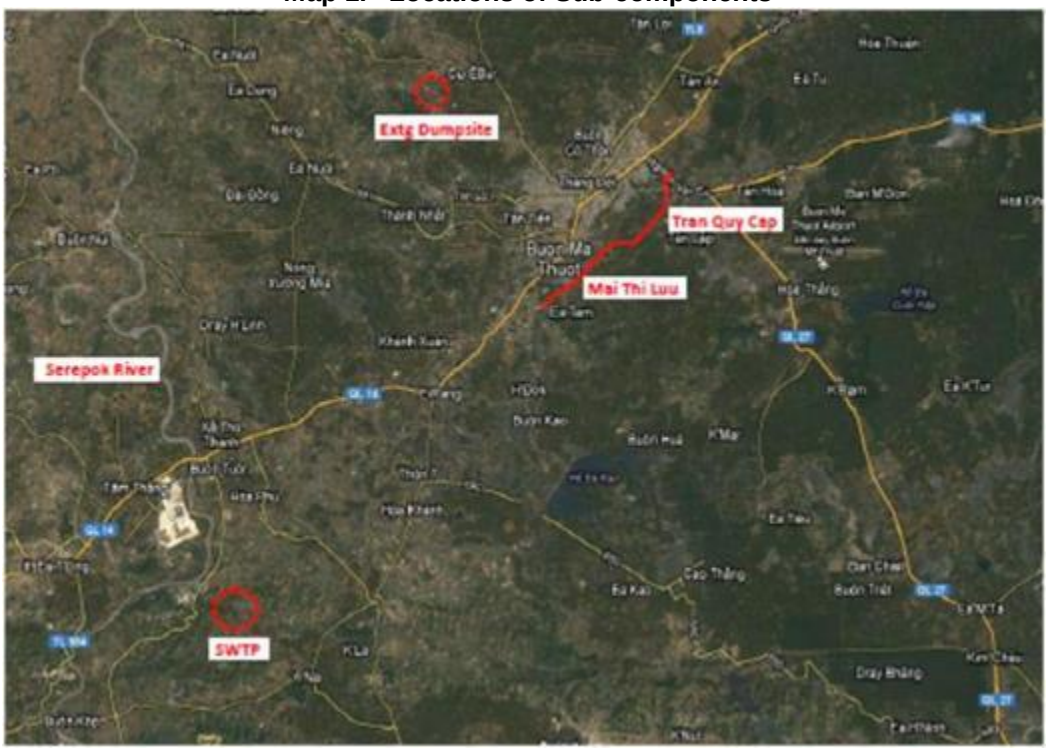
58. The existing Tran Quy Cap Road has a subgrade width of 6.5 m, road surface width of 3.5 m and sidewalk width of 1.5 m on each side. Of the existing stretch, 136 m from the intersection with Nguyen Van Cu Street has a road surface width of 6.5 m and is of 20 cm thick concrete. The rest has a road surface width of 3.5 m and is of 15 cm bituminous macadam, and a shoulder that is strengthened by hilly aggregates. Sections km1+300 Moderate to high density residential area is found along the first 1,300-km and last 500-m stretches. In between these sections, density is very low to low. Existing infrastructure include a 9-m long reinforced concrete bridge, 18 pipe culvert of D100 cm in the first 470 m stretch, 40 box culverts at km1+154, lighting system on the right side, cable system on the left side and domestic water supply lines on both sides.

59. The existing section of Mai Thi Luu Road, 1.1 km long, is 3-3.5 m wide and is seriously degraded. The new section (extension), 1.275 km long, will run through residential areas (intersection of Y Nue and 19-5 Streets) and agricultural lands, and partially through a cemetery. Low and medium voltage power system runs along the right side of the existing section; while 110 kV and 35 kV lines are found throughout the length of the new section. Street lighting has not been installed in the existing section. There are three reinforced concrete box culverts in the existing section. These are seriously degraded. Ea Bu Stream is within the alignment and will host two drainage discharge gates.

Table 5. Locations of Subcomponents

Component / Sub-component	Ward/Commune Location
Solid Waste Management	
1. Solid Waste Treatment Plant	Hoa Phu Commune
2. Closure of Dumpsite	Cu Ebur Commune
Urban Roads	
3. Tran Quy Cap Road	Tan Lap, Tu An & Ea Tam Wards (From Nguyen Du Road to Mai Thi Luu Road)
4. Mai Thi Luu Road	Ea Tam & Tu An Wards (from Y Wang Road to Tran Quy Cap Road)

Map 1. Locations of Sub-components



60. Sub-component sites are estimated to be within 40 km from the farthest potential source of aggregate materials, Ea M'Roh Commune, Cu M'Gar District.

Table 6. Locations of Sand/Gravel/Soil Cover Sources

Component/Sub-component	Sources of Gravel/Sand/Soil Cover/Growing Medium
For both Components	For sand: - Quynh Ngoc Commune, Krong Ana District, 29.6 km, S of city center - Cau Giang Son Commune, Cu Kun District, 29 km from city center For sand, gravel, crushed rock, quarry stone: - Hoa Phu Commune, BMT, 20 km from city center - Thanh Nhat Ward, BMT, 15 km from city center - Ea M'Roh Commune, Cu M'Gar District, 40 km from city center Residual soils from road construction, may be suitable as final cover of, &/or growing medium for, the Cu Ebur dumpsite remediation.
Solid Waste Management 1. Solid Waste Treatment Plant	For soil cover: - materials dug from the site - excavation material from building sites - crushed rock & broken concrete from building demolition - road demolition material
2. Closure of Dumpsite	For clay cap final cover, 45,000 m3: - silty clay from future cells in dumpsite that are not being developed * - residual soil from urban roads component and from other simultaneous projects, e.g., major roads & proposed secondary & high school in a 10.7-ha site in BMT. For growing medium, 45,000 m3 - topsoil of future cells in the dumpsite that are not being developed * - residual soil from urban roads component and from other simultaneous projects, e.g., major roads & proposed secondary & high school in a 10.7-ha site in BMT.

Urban Roads	
3. Tran Quy Cap Road	- Backfill soil, Ea Pok borrow pit in Cu M'gar District, 18 km - Grade 3 backfill soil, borrow pit in Ea M'droh, 33 km
4. Mai Thi Luu Road	- Backfill soil, left side of Ea Bur Lake in Ea Tam Ward

* Unused/undeveloped area exceeds previously worked area.

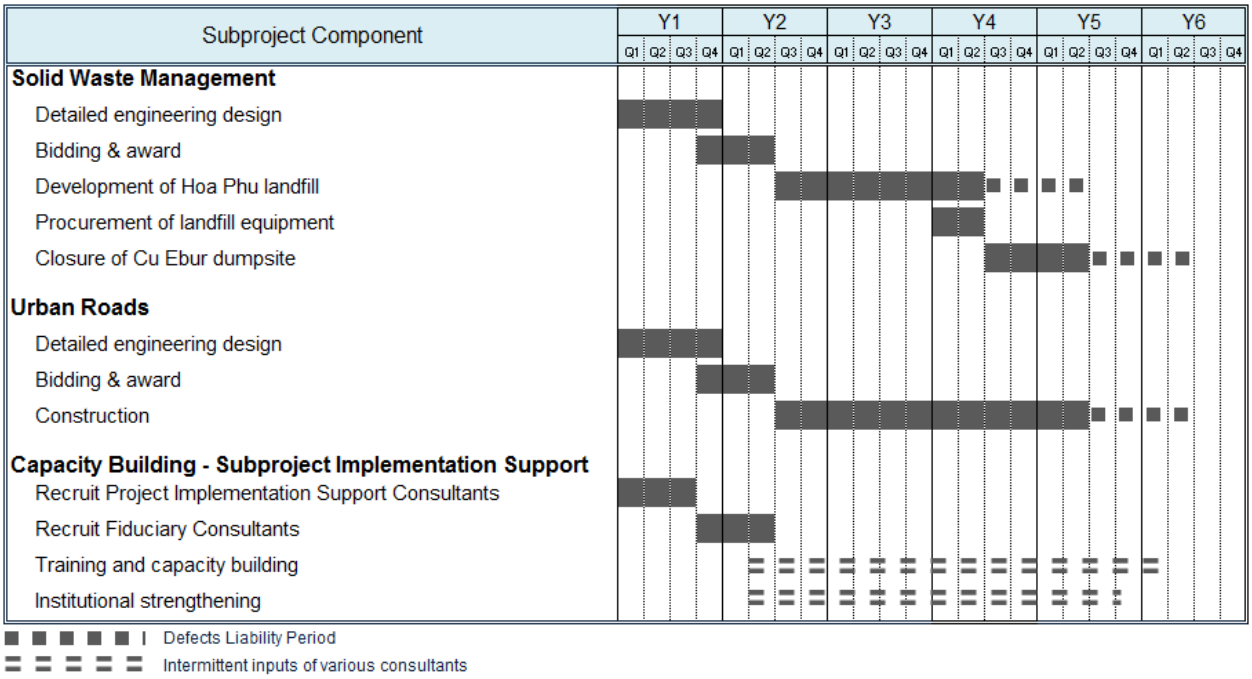
61. Sub-component sites are approximately 35-40 km from the farthest potential disposal site for spoils and residuals at Ea Pok Commune, Cu M'Gar District. Construction spoils and residuals, however, may be disposed of in the following manner:

- From Cu Ebur remediation, the volume of burning waste to be removed and wet down will be placed back into the cell for re-compaction and profiling, an estimated 60,000 m3.
- From the SWTP development:
  - The design for the landfill is based on a balanced cut to fill where the base of the Cell will be at such a level such that the required volume of daily, intermediate and final cover equals the soil excavated to form the cells. Hence, there is no net waste.
  - 154,000 m3 of soil excavated for each of Cell 1 and Cell 2, will be reused as cover material.
  - There would be relatively minor quantities excavated as a balanced cut to fill to prepare building platforms and road alignments and subgrade leveling.
- From road construction:
  - Residual soils could be suitable as final cover of, &/or growing medium for, Cu Ebur remediation or as soil cover material in the SWTP landfill (to minimize borrowing from within the SWTP site).
- Overall, residual soils could be given as free filling materials for other development projects or interested private individuals.

E. Implementation Schedule

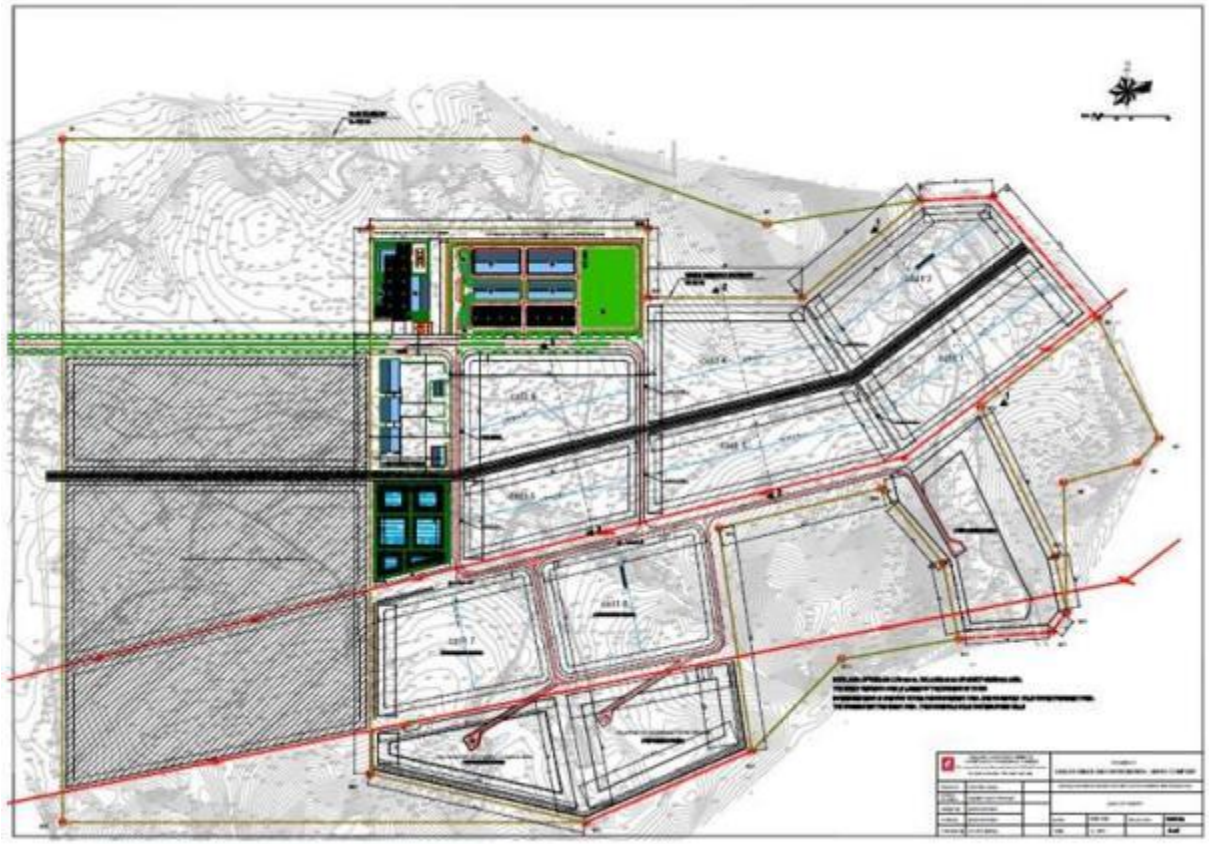
62. As shown in Table 7, the Subproject's physical components will be implemented over a period of 54 months (4.5 years), to cover: (i) 12 months of preparation of detailed design and bidding documents; (ii) 9 months of procurement process, starting in the 4th Quarter of Y1; and (iii) about 36 months of construction starting in the 3rd Quarter of Y2. Operation of Hoa Phu Sanitary Landfill is estimated to start anytime between 1st and 2nd Quarter of Y5; for the Urban Roads Component, between 1st and 2nd Quarter of Y6, i.e., even before defects liability periods are over. Capacity building and institutional strengthening will be intermittent inputs of various consultants over a four-year period starting 2nd Quarter of Y2.

Table 7. Implementation Schedule


Subproject Component
Y1
Y2
Y3
Y4
Y5
Y6
Q1 Q2 Q3 Q4
Solid Waste Management
Detailed engineering design
Bidding & award
Development of Hoa Phu landfill
Procurement of landfill equipment
Closure of Cu Ebur dumpsite
Urban Roads
Detailed engineering design
Bidding & award
Construction
Capacity Building - Subproject Implementation Support
Recruit Project Implementation Support Consultants
Recruit Fiduciary Consultants
Training and capacity building
Institutional strengthening
Defects Liability Period
Intermittent inputs of various consultants

F. Sub-component Layouts

Figure 1. Layout of the Proposed SWTP and Cross Sections of Cells 1 & 2



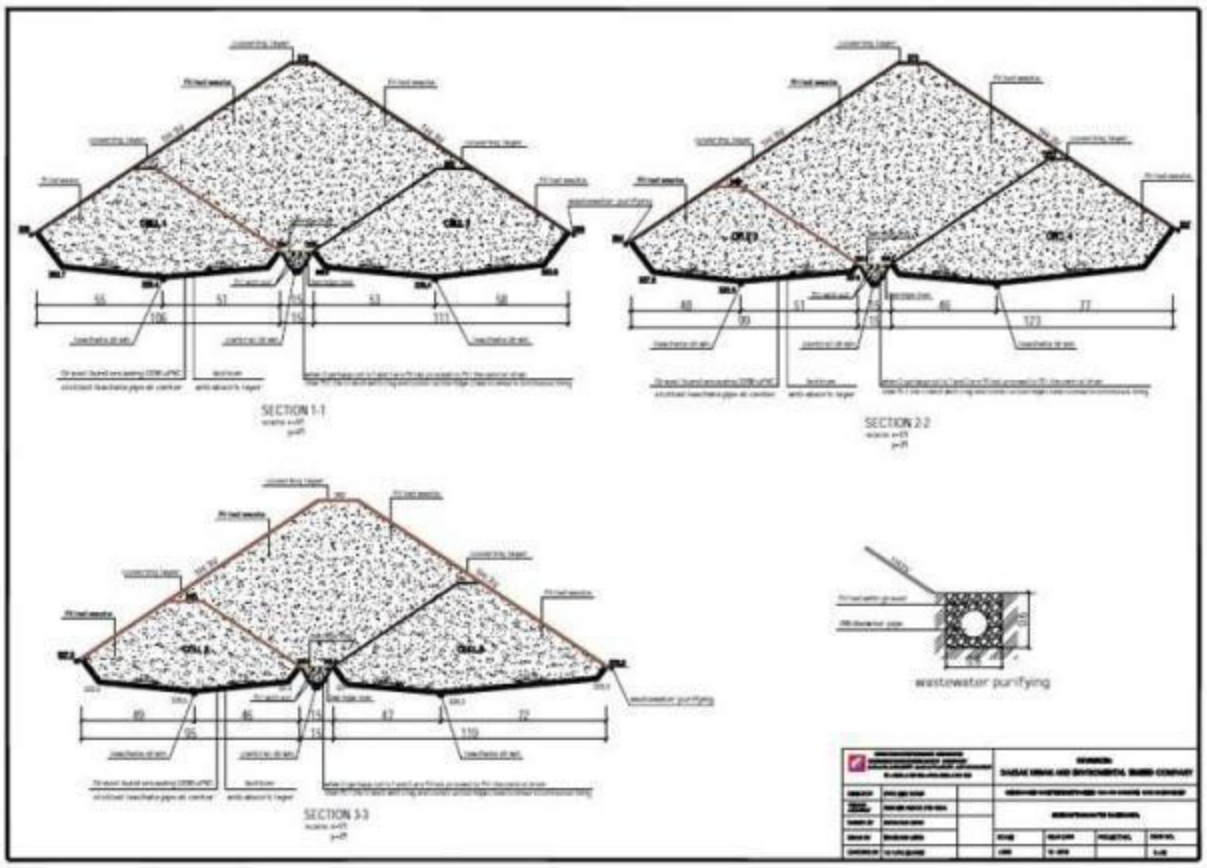

SECTION 1-1
SECTION 2-2
SECTION 3-3
wastewater purifying

Figure 2. The Current Plan and Cross Sections of the Cu Ebur Dumpsite

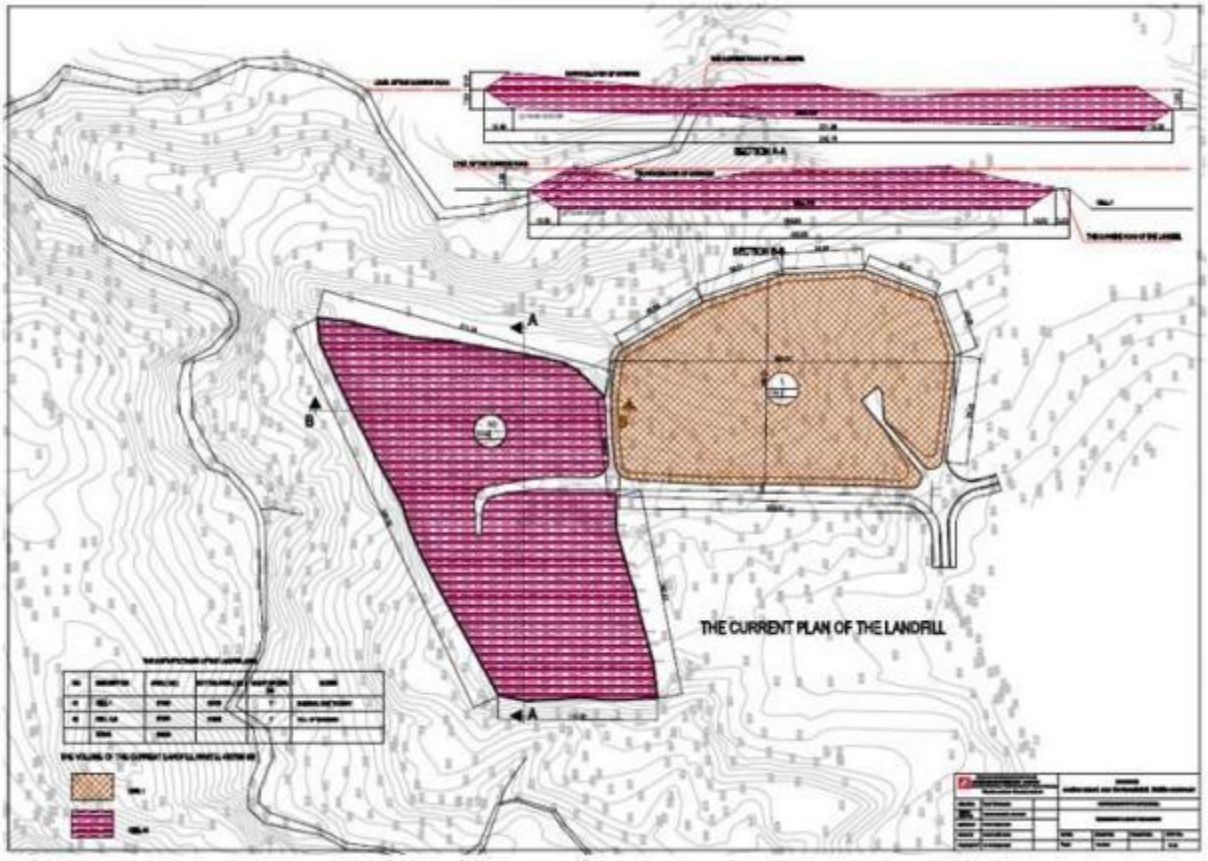


Figure 3. The After-Closure Plan and Cross Sections of the Cu Ebur Dumpsite

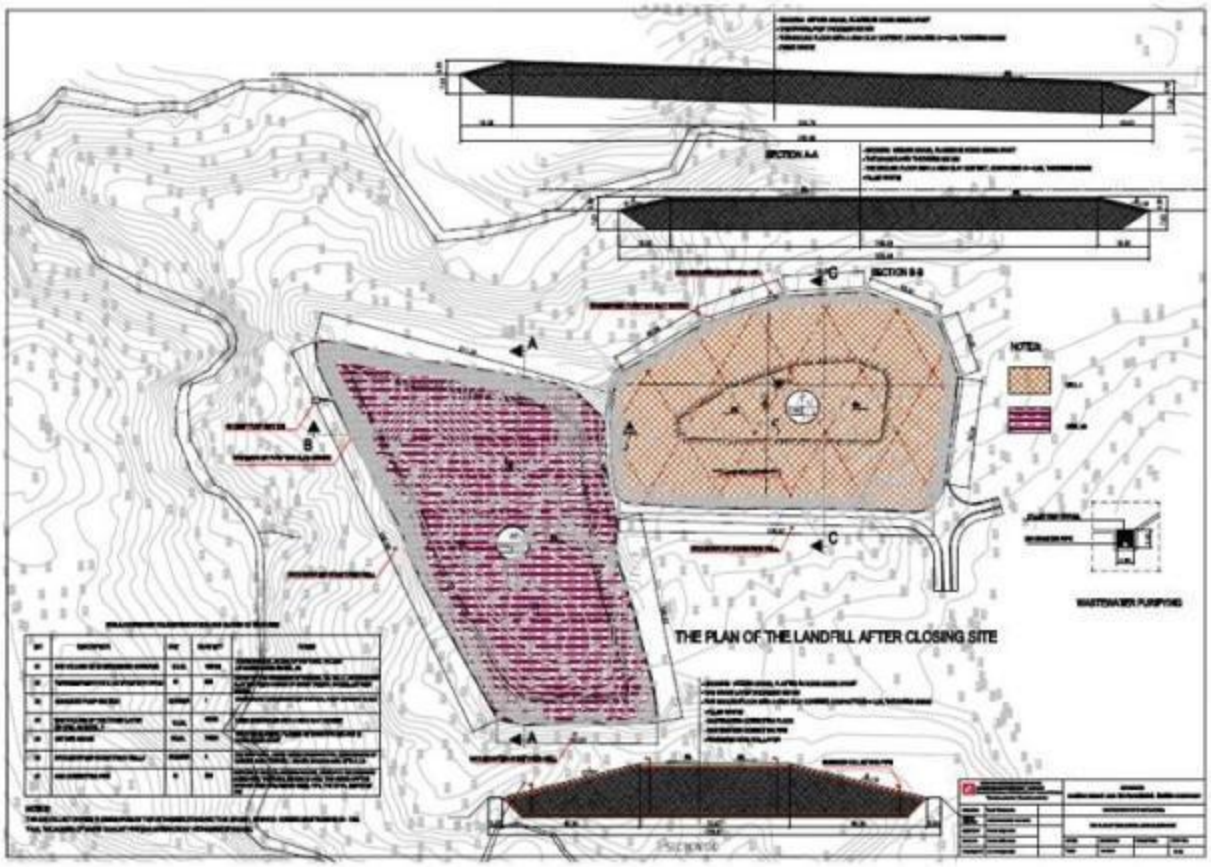

SECTION A-A
SECTION B-B
NOTES
THE PLAN OF THE LANDFILL AFTER CLOSING SITE

Figure 4. Layout & Profile of the Proposed Improvement & Extension of Tran Quy Cap Road

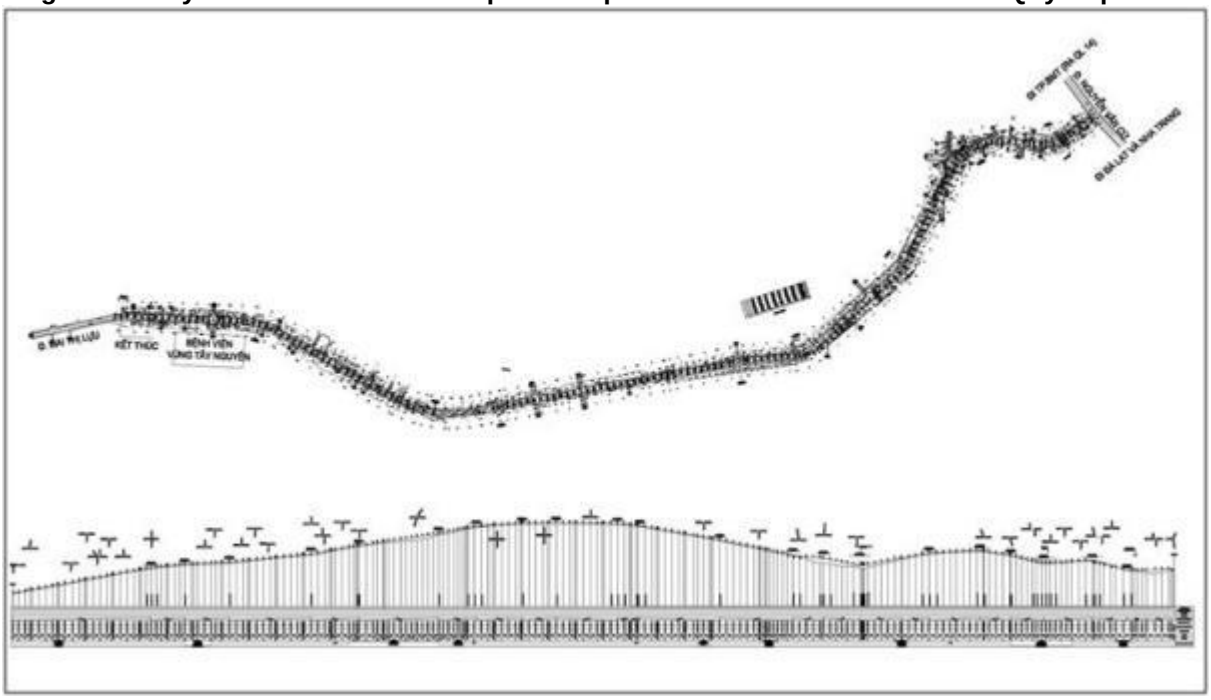
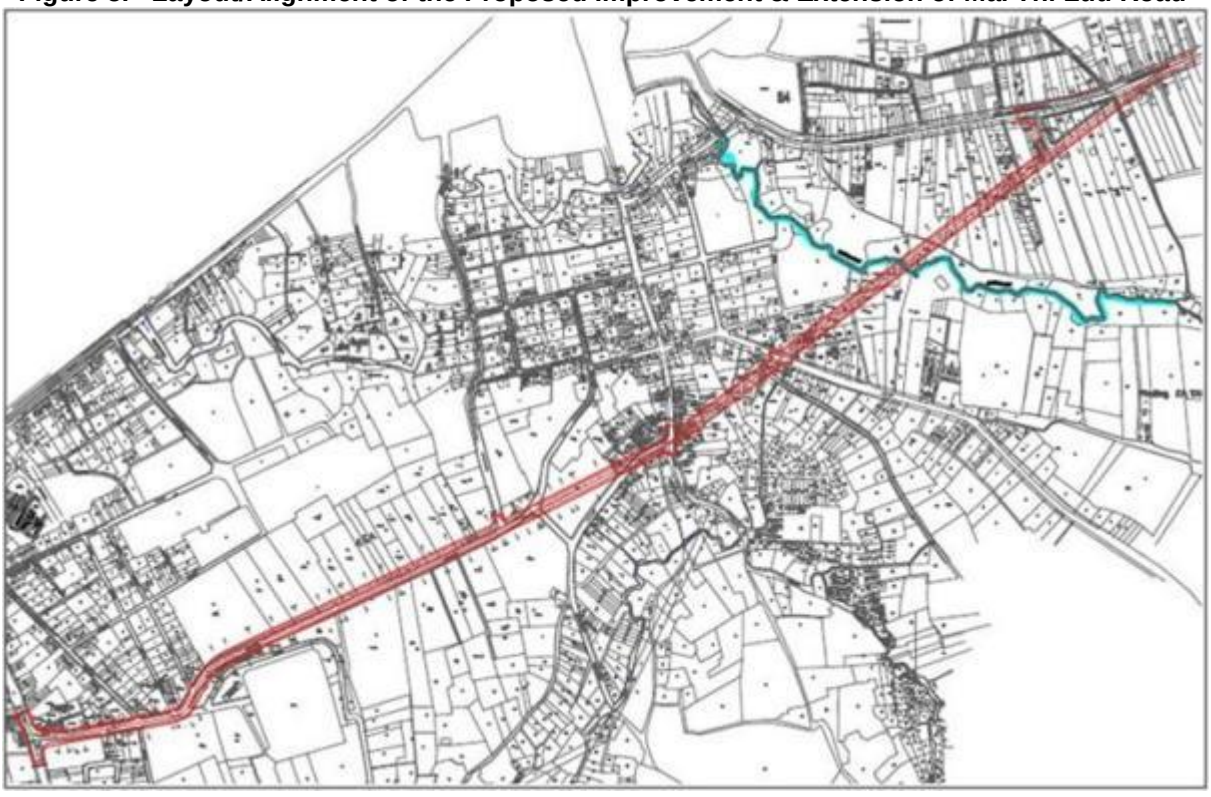


Figure 5. Layout/Alignment of the Proposed Improvement & Extension of Mai Thi Luu Road



IV. DESCRIPTION OF THE ENVIRONMENT

A. Physical/Chemical Environment

63. Buon Ma Thuot City, in Dak Lak Province, lies in the Central Highlands Region of Viet Nam, at $12^0$40' of north latitude and $108^0$3' of east longitude. It is situated along National Highway 14 (or, Ho Chi Minh Highway) and is about 340 km northeast of Ho Chi Minh City. It is bordered by the Buon Don and Cu M'gar Districts in the north; Krong Ana District in the south; Dak Nong Province in the west; and Krong Pac and Cu Kuin Districts in the east. Covering a land area of 37,718 hectares (or, nearly 3 percent of Dak Lak Province).[1]

Map 2. Location of Buon Ma Thuot City

Viet Nam Map | Dak Lak Province Map

1. Climate

64. The temperate climate of Buon Ma Thuot City is of two distinct seasons, rainy season from May to October/November and dry cool season from November/December to April. The Dak Lak climate records of years 2008 to 2011 show annual average temperature ranging from 23.4 to 24.5 0C. Maximum average temperatures ranging from 25-27 0C were experienced in the months of March to June; and minimum average temperatures of 20-22 0C in November through to January/February. Relative humidity averaged at 82-84 percent. The rainy months of July to November registered highest relative humidity at 85-92 percent. The dry months of February, March and April had the lowest relative humidity at 72-81 percent. For the same period 2008 to 2011, annual precipitation was about 1,700 to 2,000 mm. Monthly precipitation was high at more than 250 mm in the months of May to September and low at less than 50 mm from December to March. The dry months of December to April had more than 200 hours of

[1] References:
- Vietnam Tourist Map, 1:2,500,000, Vietnam National Administration of Tourism, Ministry of Culture, Sports and Tourism.
- http://daklak.gov.vn

sunshine monthly. During the rainy season, light southwesterly wind prevails; in the dry season, the northeasterly winds with speed of 2-5 m/s. **Annex C**

65. According to the National Climate Change Strategy, approved through Decision No. 2139/QD-TTg dated 05 December 2011 of the Prime Minister:

- The country has, over the past 50 years, experienced (i) average temperature rise of 0.5-0.7^{o}C; (ii) sea level rise of 20 cm; (iii) more extreme El Niño and La Niña events; and (iv) worsening floods, storms and droughts.

- By the end of the 21st century: (i) annual average temperature will rise by 2-3^{o}C; (ii) total rainfall and rainy season rainfall will increase, while dry season rainfall will decrease; (iii) sea level will rise by 75 cm to 1 m relative to the 1980-199 level, submerging areas in deltaic and coastal regions of the country, directly affecting 10-12% of the population and incurring economic damage cost of about 10% of the GDP.

2. Air Quality and Noise

66. In 2012, quarterly ambient air quality monitoring in six sites within the City revealed: (i) H_2S in 5-6 sampling sites to have consistently exceeded the national standard limit throughout the whole year. (ii) Total suspended solids in five sites in the first two quarters and in two sites in the last two quarters exceeded the national standard limit. (iii) SO_2 and NO_x in almost all sites in the first and second quarters exceeded both the national and international standard limits. (iv) One site each in the second and third quarters had SO_2 within the national standards but exceeded the international standard. (v) SO_2 and NO_x in two sites in the last two quarters exceeded both the national and international standard limits. Air quality monitoring at Cu-Ebur open dumpsite revealed TSP and H_2S, as having consistently exceeded the national standard limits; and SO_2 and NO_x as having exceeded both the national and international standard limits. A summary of parameter exceedances in 2012 is shown in Table 8; while the monitoring results are featured as **Annex D** (D.1, D.2)**.**

Table 8. Exceedances of Air Quality Parameters in 2012

Parameter	Results per Sampling Site																							
	March 2012						May 2012						August 2012						November 2012					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
THC																								
Bui (TSP)																								
H_2S																								
SO_2																								
NO_x																								
CO_2																								

Exceeded national standard limit
Exceeded both national and international standard/guideline limit
Exceeded international standard limit

67. Noise monitoring data has not been obtained. Based on field observation, the City is generally within the standard limit. According to the Project Description Report for the Mai Thi Luu Road, noise level in Mai Thi Luu is from 60-70 dBA, which meets the national standard limit. It is assumed that the Tran Quy Cap vicinity would have the same noise level as it has almost similar development conditions with Mai Thi Luu, Based on field observation, both of the SWTP site and existing open dumpsite would have lower noise levels.

3. Topography and Soils

68. Buon Ma Thuot City is situated on the Dak Lak Plateau to the west of the Truong Son Mountain range. It has an average altitude of about 500 m, with the highest at 560 m at the northern hill range, and the lowest at 350 m at the rice paddies in the south. Occupying a total land area of 371 sq km (nearly a third of Dak Lak Province), it stretches over 90 km from north to south and about 70 km from east to west with undulating terrain of plains, hills and mountains. Most of the plateau is fertile basalt soil, favorable for agriculture, cultivation of industrial plants such as coffee and rubber.

69. Mai Thi Luu Road has many slope changes. Gradient is from 0.5-9.0%. Average elevation is +459 m. The Tran Quy Cap Road runs through different types of terrain, but mainly through the low mountainous terrain with small average slope. The road is located at elevations +473.90 to +510.63 m. The highest point is at the center of the road and the lowest point is at the beginning of the road.

4. Surface Water

70. Buon Ma Thuot is within the Serepok River Basin. Serepok River is one of the main rivers in the Central Highlands. It flows through the west of the City (about a kilometer west of the site for the proposed solid waste treatment plant under the SCDP) for a length of 23 km. Serepok River system flows from the Trung Son Mountains in a northwesterly direction to converge with the Mekong River at 341 km distance. Together with its two main tributaries, Krong Ana and Krong No Rivers, it covers a surface area of 30,100 sq km. Main flow is quite steep, from elevation +400 m to +150 m at the Cambodian border. Its river network density is 0.55 km/km^2; and it has a winding ratio of 1.89. The width of the Serepok River is quite narrow; hence flow is quite strong. Its water level changes by season. In the wet season, water level goes up and water flow is stronger. When precipitation is greater than 100 mm, it overflows and causes flooding. In the dry season, most of the stream stretch runs out of water. Serepok River has been tapped for hydropower and will be the source of a proposed water supply system for Buon Ma Thuot and three districts. The River has an economic resource of about 3.5 billion kWh, annually providing an output of 800 million kWh.

71. In Buon Ma Thuot, there are few natural lakes, many man-made lakes. The largest man-made lake is Ea Kao at elevation +408 m and a capacity of 15 million m^3. The Ea Chu Cap Lake, another man-made lake at elevation +500 m, has a capacity of 11 million m^3. In the dry season of 1997-1998, many lakes and streams dried up.

72. Natural surface waters nearest to sub-components sites include: (i) in Hoa Phu Commune, a very small spring, flowing from a hill that is much higher than the existing ground elevation of Cells 1 & 2, with small flow that dries up after flowing for about 50 m, located about 60 m NE from the nearest edge of Cell 2; (ii) in Cu Ebur Commune, a river that runs at least 65-70 m from the northern boundary and at least 60 m from the western boundary of the dumpsite. (iii) Ea Nao River, which crosses the existing Tran Quy Cap Road; and (iv) a tributary of Ea Tam River, which will be crossed by the extension of the Mai Thi Luu Road. Two-three man-made earth ponds can be found within the Phase 1 SWTP site. These were built to collect surface run-off from the surrounding hills for use in crop irrigation.

73. Based on the results of surface water quality monitoring in 2011/2012, samples taken from surface water bodies 70 m north of the SWTP site in Hoa Phu Commune, 70 m away from the Cu Ebur dumpsite, and 100 m downstream of the BMT wastewater treatment plant had high coliform content, exceeding national and/or international standard limits. Fe content exceeded

international standard limit in March and August; Cd content, in November. **Annex D** (D.3, D.4, D.5)

5. Groundwater

74. Groundwater in Buon Ma Thuot is used for domestic needs, industrial processing and irrigation. Over-exploitation of groundwater for irrigation and the increased unauthorized boreholes have led to a decline in the groundwater level, i.e., 2 m from 1997 to 2003 at (World Bank, 2003). Recent analyses of groundwater samples taken from and around the SWTP site in Hoa Phu Communes, as well as from the existing dumpsite in Cu Ebur have shown high e-coli and coliform content, exceeding national and/or international standard limits. **Annex D** (D.6, D.7)

6. Geology and Seismology

75. According to the FS Report for the Mai Thi Luu Road, the geology of the site has a decomposition of basaltic rocks Quaternary(Qiv) age, basic geologic bay is the original rocks and Qiv layer. This layer includes brown-red sandy clay.

76. Based on Map 3 below, two fault lines (rank 2) traverse Dak Lak Province. One is in a NW-SE trending; the other, a NE-SW trending. Dak Lak is within the zone with a probabilistic seismic hazard of 0-0.06 gal (MSK-64 V-VI). In the Medvedev-Sponheuer-Karnik (MSK-64) scale, earthquake of intensity: (i) V is “fairly strong”, i.e., felt indoors by many and felt outdoors only by a few; moderate vibration; observed slight trembling /swaying of buildings, etc; hanging objects swinging; but no damage to buildings; and (ii) VI is “strong”, i.e., felt by most indoors and by many outdoors; few persons lose their balance; small objects fall; furniture shifted; farm animals may be frightened; visible damage to masonry structures; cracks in plaster; isolated cracks on the ground.

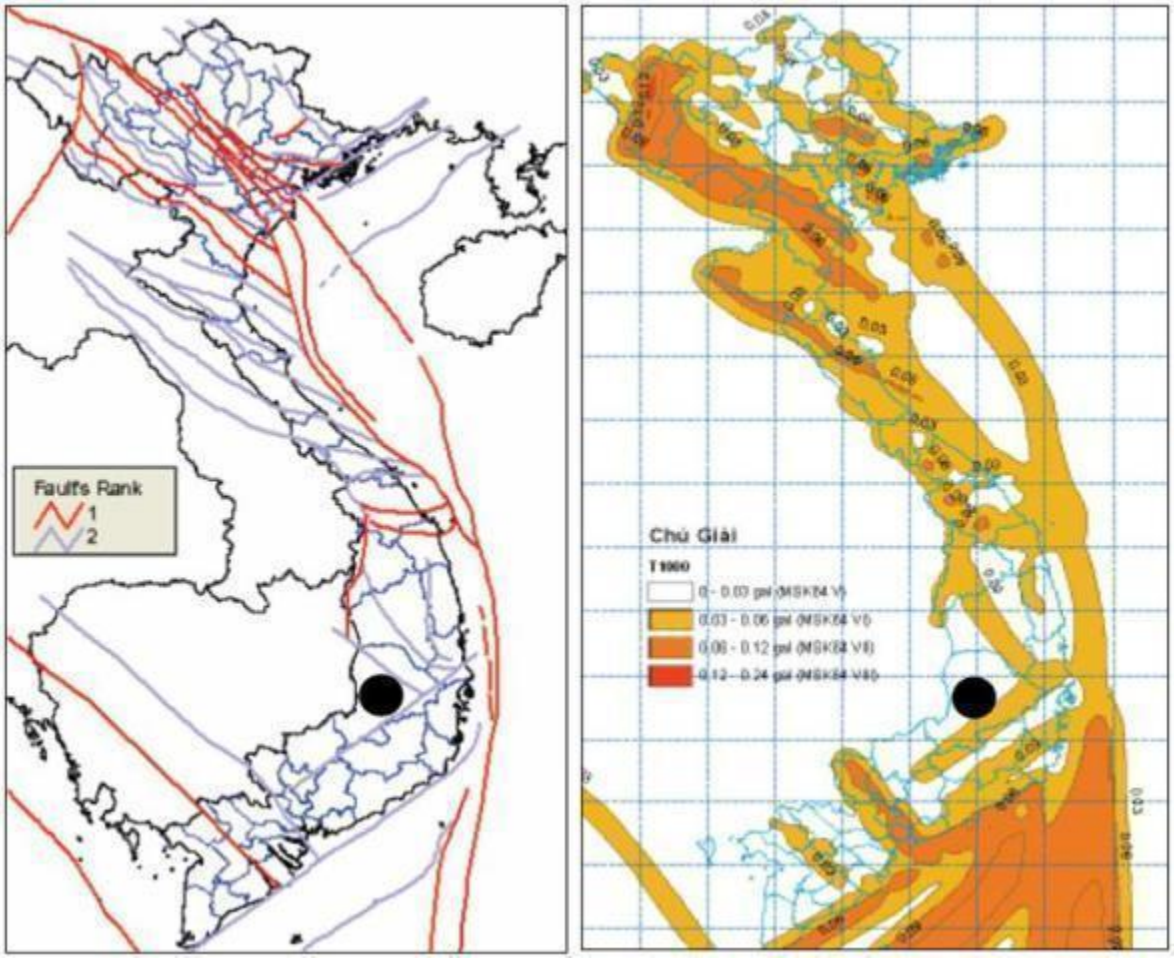
77. Buon Ma Thuot appears to be within the 0-0.03 gal (MSK-64 V) zone. However, it would be advisable to consult GOV geologists and seismologist for the appropriate considerations to be incorporated in the design of proposed structures, particularly for those that will involve/be encountering slopes, as zones shown in Map 3 are mainly indicative. Consulted offices during PPTA have said that earthquakes are very rarely experienced in Buon Ma Thuot.

7. Other Natural Hazards[2]

78. Buon Ma Thuot City BMT is not visited by cyclones/typhoons. Some areas near water bodies flood during heavy rains, with minimal incidence of flood waters entering houses. Due to its topography, steep un-vegetated slopes could be experience erosion, especially during heavy rains. According to DAKURENCO and its local consultant for the proposed SWTP: (i) no severe erosion and landslide have been observed/reported in the Hoa Phu Commune; and (ii) the areas that had severe erosion are some 100 km away from the Hoa Phu sanitary landfill site.

[2] From consultation with DAKURENCO Director on 05 September 2012 in Buon Ma Thuot City.

Map 3. Active Faults in the Territory, and Probabilistic Seismic Hazard Map, of Viet Nam[3]



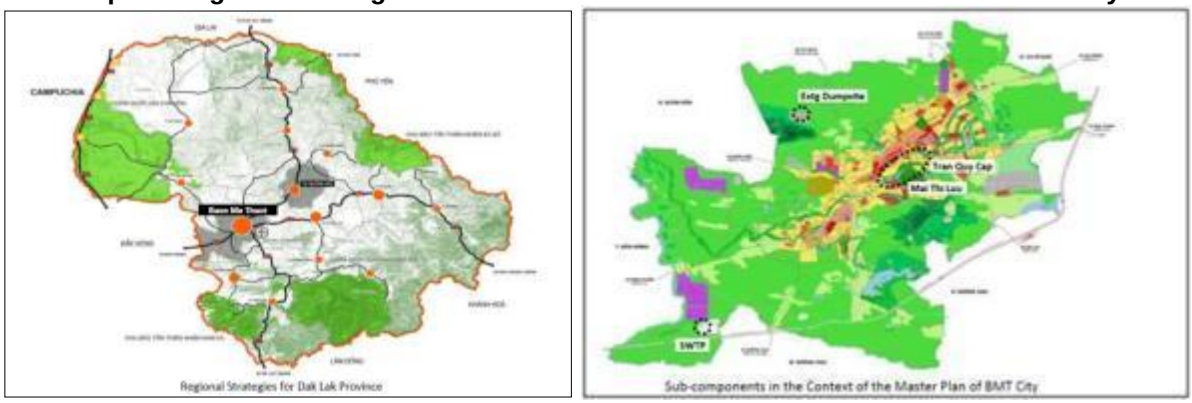
B. Biological Environment

80. The Regional Strategies Map for Dak Lak Province (left map below) shows that there are no natural reserve areas in Buon Ma Thuot City. The Master Plan of Buon Ma Thuot City (right map below) shows that there are no protected areas in the City. The area on the left of the existing dumpsite in Cu-Ebur is zoned as park with green trees and eco-tourism area. The engineered closure of the dumpsite, therefore, supports this zoning.

81. During a discussion with the DONRE of Dak Lak Province, on 5 September 2012 (Interim Field Mission), the Director of the Environmental Monitoring Center informed that there are no rare flora and fauna to watch out for in the City. The re-visit to the Mai Thi Luu Road and Tran Quy Cap Road alignments in January 2013 (DFR Field Mission) saw a few individual fishing activities in the streams in the area. Some common aquatic resources in the Serepok River include carp, catfish and red tail hemibargus.

[3] Seismic Hazard Studies in Viet Nam. Nguyen Hong Phuong. Earthquake Information and Tsunami Warning Centre, Institute of Geophysics, VAST. GEM Semi-Annual Meeting – Academia Sinica, Taipei, Taiwan. 6-9 June 2012.

Map 4. Regional Strategies for Dak Lak Province and the Master Plan for BMT CIty



C. Economic Environment

82. Buon Ma Thuot city is the capital of Dak Lak Province in the Central Highlands of Vietnam. The city is the administrative, economic, social and cultural center of Dak Lak and is the regional hub of the Central Highlands. It is a center of trade, plays a key role in national security and defense, and is a human resource training center for the Central Highlands and Central Coast areas.

83. In terms of economic development, the City gained positive results in recent years with the annual average growth rate of almost 15%, the highest growth rate in Dak Lak Province. The industry and construction sector experienced an increase of 25%; the services sector, an increase of nearly 18%; and agriculture and forestry, a decrease of 9%. The economic structure shifted positively, meeting the socio-economic development orientations, with services contributing 50%; industry, 35%; and agriculture/forestry/ aquaculture, 15%.

84. Occupying a land area of 37,718 ha (or 377.18 sq km), Buon Ma Thuot is administratively subdivided into thirteen wards and eight communes. The City is predominantly agricultural land, 73%. Lands of special uses, e.g., construction, transportation, irrigation, and other related/similar uses, occupy a total of 15%; residential land use, 6%; forest lands, 3%; and unused lands, 3%. In general, land potential is still big. Since 2006, land use structure has been shifted to reduce the agricultural land area and increase the land for specific use/purposes; change purposes of some kinds of land-use to residential and public land use. Land area for urban construction by 2015 will be some 6,000 ha; by 2025, 8000 ha.

85. The major road network in Buon Ma Thuot consists of external and internal roads, the statuses of which are shown in Table 12. The Buon Ma Thuot Airport, 10 km from the City center was built in 2010 to serve 300,000 passengers/year and 3,000 tons of cargo/year. Its second phase will be completed in 2020, to target 800,000 passengers/year and 3,000 tons of cargo/year. Decision No. 1436/QD-TTg dated 10 September 2009, Approving the Adjusted Master Plan on the Development of Vietnam's Railway Transportation up to 2020, with a vision toward 2030, aims to complete the construction of the 160-km long Tuy Hoa - Buon Ma Thuot subsidiary railway by 2030. When completed, it will serve freight and passengers traffic of Dak Lak Province and Western Highland Provinces. It will connect the Central Highlands with the Central Coast ports.

Table 9. Major External and Internal Roads in Buon Ma Thuot

Major Roads	Status
External	
NR 26, connects BMT City to Khanh Hoa Province	Existing
NR 27, connects BMT city to Da Lat City & Phan Rang City	Existing
NR 14, the main road of Central Highland provinces, connects Da Nang, Kon Tum, Dak Lak, Dak Nong and Binh Phuoc (and to the SE Region & HCM City)	Existing
Ho Chi Minh Trail	Being upgraded in sections to the N & S of the City
Western Ring Road	Being implemented
PR No. 8	Currently being improved
Internal	
Road from Dinh Tien Hoang/ Le Duan T-junction to BMT Airport	FS ongoing
Tran Quy Cap street - section from Nguyen Van Cu street to the intersection with Mai Thi Luu street (part of the Eastern inner ring road system of the city	FS done, & is a sub-component of the SCDP.
The inner city roads & roads leading to BMT including the PRs No.5, 1 & 2 1 and 2 are being upgraded	Being upgraded

86. Buon Ma Thout City's centralized water supply system has a capacity of 5,000 m^3 day and night. Water is sourced from 30 wells (100 m deep) and 3 springs. Water is treated with chlorine in the reservoir prior to distribution. Some small decentralized water supply system exists.

87. The City's centralized water supply system will be improved through the Buon Ma Thuot & Three Adjacent Districts of Ea Kar, Buon Don and Krong Nan Water Supply Project under Tranche 2 of ADB's MFF 0054-VIE: Water Sector Investment Program. This Project will source raw water from the Serepok River. Raw water intake facilities including a pumping station with capacity of 35,000 m3 per day will be built in Quyen Ngoc Village, Ea Na Commune, Krong Ana District. Raw water will be pumped through a new raw water transmission pipeline LONG pr No. 2 to the water treatment plant at Tan Lap Hill, Ea Na Commune, Krong Ana District. Treated water from eth water treatment plant will be delivered to the City through a 12.5 km transmission pipeline and to the booster pumping station and a 5,000 m3 storage reservoir at Hamlet 11, Ea Tam Ward, Buon Ma Thuot City prior to distribution to households.

88. The City has a separate sewerage and drainage system. The sewerage system consists of 50 km of sewerage pipes, one central sewage pumping station and a domestic wastewater treatment plant. The drainage system consists of 15 km of stormwater drains. The separate system, serving mainly the core of the City, was constructed under a DANIDA-funded urban sanitation intervention that commenced in 2001. The WWTP was designed to ultimately serve 17,000 households in the future. Current WWTP capacity is 8,000 m^3 (day and night) for 5,500 household connections. Phase 2 capacity of 10,000 m^3 is expected to be reached this year.

89. The entire City, all its wards and communes, is connected to the national power supply grid. The sources of energy include hydropower, fossil fuel, solar, wind and biomass. Having huge potential for renewable energy development, Dak Lak Province targets to make renewable energy account for 25 percent of all energy used in the province in 2015. As of August 2012, Dak Lak Province had 12 small-scale hydropower plants with a combined capacity of about 73 MW; an additional three small- to medium-scale plants were being built; and another eight were about to be built. Solar power was tapped to provide electricity to all of the 180 households of a hamlet in Ea H'leo District in 2002. A proposal to install a large-scale solar battery to provide

about 100 kWh power to every household in 33 hamlets in Lak, Ea Kar, M'drak and Krong Nang Districts have been laid by the PPC. Two private companies have installed wind measuring towers to exploit wind power potential, i.e., two in Ea Khal Commune, and one in the Thanh Vu tapioca starch factory, in Ea H'leo District. Biomass is another renewable source of energy for Dak Lak due to the dominance of agricultural land and agriculture associated activities in the Province. Combined, firewood, bagasse, wood scraps, sawdust, agricultural byproducts and livestock wastes provide potential for could biogas production. The Province has nearly 10,000 units of biogas plants (including 3,947 nationally-funded plants, 6,000 privately set up household plants, and that set up by the Dak Lak tapioca starch factory for its own use). Despite these developments, the renewable energy potential in Dak Lak remains large. [4]

D. Socio-economic Environment

1. Population[5]

90. Buon Ma Thuot City had a total population of about 335,000 people in 2011. With a total land area of 377.18 sq km (377,718 ha), gross population density was 888 persons per sq km (9 persons per ha). The City registered a total population of 326,536 people in the 2009 census, or an average annual growth rate of 1.5 percent from the 282,380 people in the 1999 census. In 2011, Buon Ma Thuot population represents almost a fifth (19%) of the total Dak Lak Province population; in 2009, 16%. Of the total City population in 2011, 65% (or 217,310) was urban population.

Table 10. Population of Sub-component Wards/Communes

Sub-component/ Wards/Communes	Land Area (sq km)	% to Total City Land Area	Population		% to Total BMT Population	Gross Pop'n Density (ppsk)
			Urban	Rural		
SW Treatment Plant						
Hoa Phu Commune	51.04	13.5	-	16,213	4.84	318
Closure of Dumpsite						
Cu Ebur Commune	42.45	11.3	-	16,560	4.94	390
Tran Quy Cap Road						
Tan Lap Ward	9.69	2.6	22,580	-	6.74	2,330
Tu An Ward	5.26	1.4	18,105	-	5.40	3,442
Mai Thi Luu Road						
Ea Tam Ward	13.78	3.7	27,894	-	8.33	2,024

2. Ethnic Minorities [6]

91. Dak Lak Province is a convergence of 47 ethnic groups, including 46 minorities. In 2009, about 33% of the provincial population was from ethnic minority groups, which is greater than the corresponding national proportion. Ede people account for the largest among the minority groups in the Province. More than 90% of the Ede people in the whole country live in Dak Lak. In Buon Ma Thuot, the Kinhs comprised the majority of the population, 80%. Table 11 provides some information on ethnic minority groups in the City, and in their percentage distribution in the sub-component sites.

92. Among the affected households, 6.6% belong to the Ede ethnic minority group. Most of them currently live in the in the SWTP site in Hoa Phu Commune, where they own cashew

[4] Lifted from: Exploiting Renewable Energy Potential. Phuong Lan. Talk Vietnam. 18 October 2012.

[5] Dak Lak Statistical Yearbook 2011 and Buon Ma Thuot Statistical Yearbook 2011.

[6] Lifted from: (i) Strategy Study for Development of Dak Lak Province and Buon Ma Thuot City. DaBuDeSS. 2011. (ii) Ethnic Minority Development Plan. MFF 0054-VIE: Water Sector Investment Program - Tranche 2. September 2011.

plantation. They all speak Vietnamese and live integrated with the majority ethnic Kinh population. No ethnic minority household will have to relocate.

93. The focus group discussion held by PPTA resettlement team with 10 dumpsite scavengers revealed that both 60% of the dumpsite scavengers belong to the Ede ethnic group residing in Bun Ki hamlet and Thanh Nhat Ward, some 9 km from the dumpsite. The remaining 40% are from the Kinh group, residing in a Hamlet 8, which is some 2 km from the dumpsite.

Table 11. Some Information on Ethnic Minority Groups (2011)

	Kinh	Ethnic Minority Group						Total
		Ede	M'nong	Gia Rai	Nung	Thai	Other	
Population	291,913	22,557	191	205	1,288	1,483	10,.838	328,475
Households	89,756	6,431	79	82	376	373	3,420	100,517
Population distribution in Sub-component wards/ communes (5% to total)								
Tan Lap Ward	91.1	8.4	-	-	-	-	0.5	7.669
Tu An Ward	96.3	0.7	-	-	0.7	-	2.2	5.915
Ea Tam Ward	88.6	9.1	-	-	0.5	-	1.8	8.360
Cu Ebur Commune	74.4	25.6	-	-	-	-	-	4.560
Hoa Phu Commune	91.6	0.8	-	-	0.8	6.7	-	4.238

Source: Strategy Study for Development of Dak Lak Province and Buon Ma Thuot City (DaBuDeSS. 2011

Table 12. Ethnic Minorities Among Affected Households

Sub-component	Kinh		Ede		Total
	HH	%	HH	%	HH
Tran Quy Cap Road	337	97.7	8	2.3	345
Mai Thi Luu Road	187	94.9	10	5.1	197
SWTP	66	73.3	24	26.7	90
Total	**590**	**93.4**	**42**	**6.6**	**632**

Source: PPTA Socio-Economic Survey. February-March 2013.

3. Income and Employment

94. In 2011, Buon Ma Thuot had a labor force of nearly 195,000 or (58% of its total population). Of the force, 97% belonged to the working age population. Among the labor force, nearly 4,340 were unemployed (or some 2.3%). Average monthly income in 2011 was USD 1,650/person/year.

95. Average monthly income of surveyed affected households is around 1.6 to 2.3 times higher than the poverty line. Average income is higher for the affected households along the two road sub-components, where many households are involved in trading. In the SWTP site, where most households are involved in agriculture, household income is significantly lower.

Table 13. Average Monthly Income of Affected Households

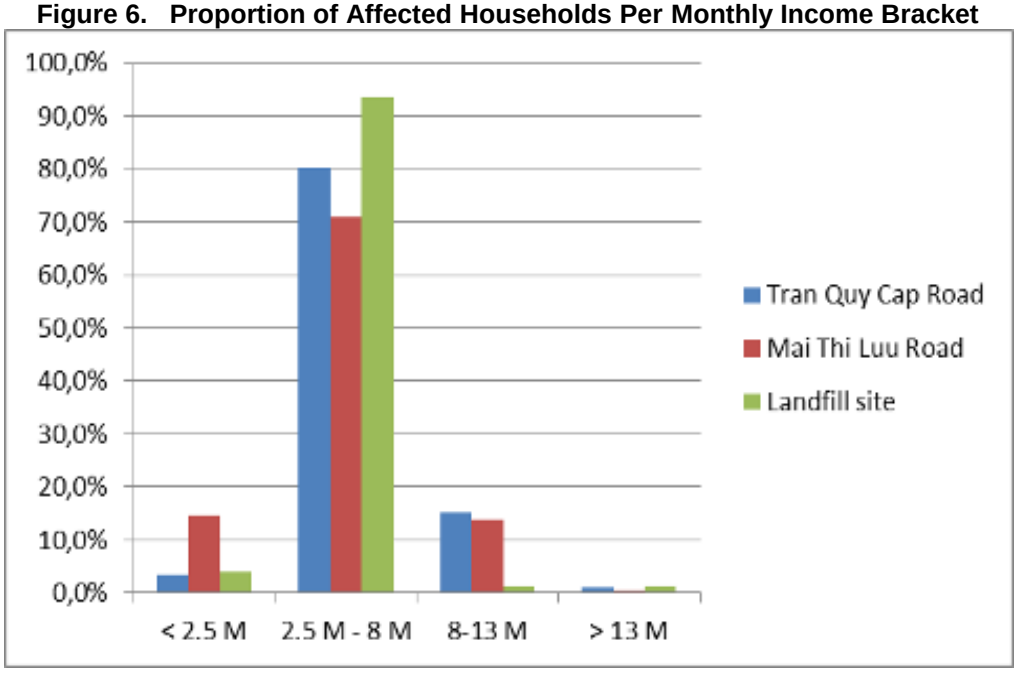
Sub-component	Monthly HH Income (VND)			Urban Poverty Line (family of 4.9 members)
	Surveyed HH	Main source	All source	
Tran Quy Cap Road	80	3,528,750	5,241,250	2,450,000
Mai Thi Luu Road	74	4,255,405	5,593,919	
SWTP	37	2,387,027	3,964,595	
Total	**191**	**3,589,110**	**5,130,576**	

Source: PPTA Socio-Economic Survey. February-March 2013.

96. The average income of dumpsite scavengers on good days, as revealed from the focus group discussion held by PPTA resettlement team with 10 dumpsite scavengers, is about

100,000 VND/person/day; on bad days, about 50,000 VND/person/day. The income is said to just enough to buy food.

Figure 6. Proportion of Affected Households Per Monthly Income Bracket



4. Poverty [7]

97. In 2011, the nationwide poverty rate (or the percentage of the population living below the national poverty line was 12.6%; in the urban area, 5.1%. In the same year, Central Highlands had a poverty rate of 20.3%, and Dak Lak Province, 19.6%.

98. In 2011, 2.59% of Buon Ma Thuot households were poor; while 3.04% were very poor. Based on the socio-economic survey (SES) conducted from February to March 2013, the incidence of poor and very poor households in Sub-component communes, and of poor households in Ea Tam Ward, were higher that of the City in general, as shown below:

- Hoa Phu Commune, 4.46% poor and 5.19% near poor
- Cu Ebur Commune, 5.29% poor and 3.49% near poor
- Tan Lap Ward, 1.49% poor and 2.79 near poor
- Tu An Ward, 0.85% poor and 1.07% near poor
- Ea Tam Ward, 4.58% poor and 2.50% near poor

5. Vulnerable Households

99. A total of 26 affected households have been identified as vulnerable. Among these, 3 are poor. Female head of HHs with dependent, disabled head of HHs and elderly without support account for 11, 6 and 6 HH, respectively. No landless is among the affected HHs.

Table 14. Vulnerable Affected Households

Sub-component	Poor	WHHH	Disabled	Elderly	Landless	Total
Tran Quy Cap Road	-	3	2	-	-	5
Mai Thi Luu Road	**2**	5	4	6	-	17
SWTP	1	3	-	-	-	4

[7] Statistical Handbook of Vietnam 2011. General Statistics Office of Vietnam.

Total	**3**	**11**	**6**	**6**	**-**	**26**

Source: PPTA Socio-Economic Survey. February-March 2013.

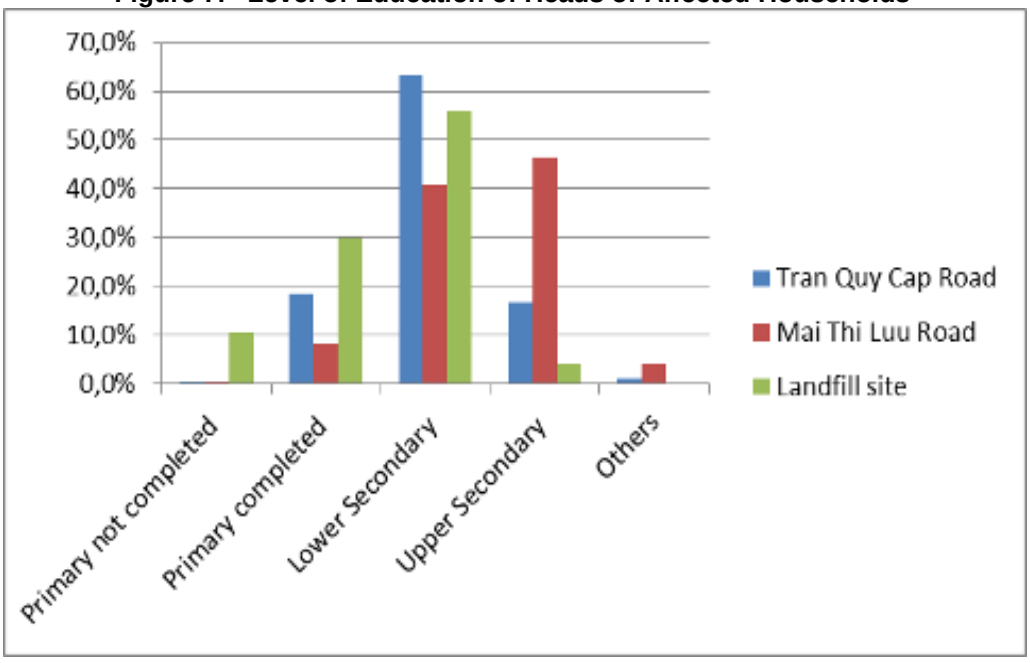
6. Access to Basic Services

100. Health Care As of 2011, the City had 8 hospitals with a total capacity of 1,617 beds, giving a ratio of 48 beds per 10,000 City inhabitants. In addition, a health station in each ward/commune provided a combined capacity of 63 beds. In the same year, the City had 640 doctors, 1,007 physicians and 2,152 nurses (or, 19 doctors, 30 physicians and 64 nurses per 10,000 City inhabitants). Nationwide ratios in 2011 were 7 doctors, 6 assistant physicians and 11 nurses per 10,000 inhabitants.

101. Education Every ward and commune has a primary school. For school year 2011-2012, the City had 67,240 students, of which 43% were in the primary, 35% in lower secondary, and 22% were in upper secondary. The number of students per teacher averaged as follows: (i) primary, 22; (ii) lower secondary, 21; and (iii) upper secondary, 17. The average numbers of students to a teacher in the primary and lower secondary levels were higher than that of the Province, i.e., 18 and 19 students to a teacher, respectively. The number of students per class averaged as follows: (i) primary, 30; (ii) lower secondary, 40; and iii) upper secondary 41. The average numbers of students in a class in the primary and lower secondary levels were higher than that of the Province, i.e., 25 and 37 students in a class, respectively.

102. In the three sub-components, most of the surveyed affected households have reached lower or upper secondary. Slightly lower education level is found among the households affected by the SWTP sub-component. Households affected by the road sub-components have higher level of education, especially those affected by the Mai Thi Luu Road.

Figure 7. Level of Education of Heads of Affected Households



103. From the focus group discussion held by PPTA resettlement team with 10 dumpsite scavengers, it was learned that all of the dumpsite scavengers are literate, having reached at least the 5th grade education level.

104. Water supply, Sewerage/Drainage, Solid Waste Collection and Power Supply[8] Some 48,000 households are supplied with treated water, i.e., 80% of the population of 9 wards and 20% of the population in the urban fringe areas. About 5,406 of about 86,600 HHs (or 6%) are connected to the existing separate sewerage and drainage system. Solid waste collection services cover all wards and areas of communes along the main routes. The entire City, all its wards and communes, is connected to the national power supply grid.

105. In sub-component sites:

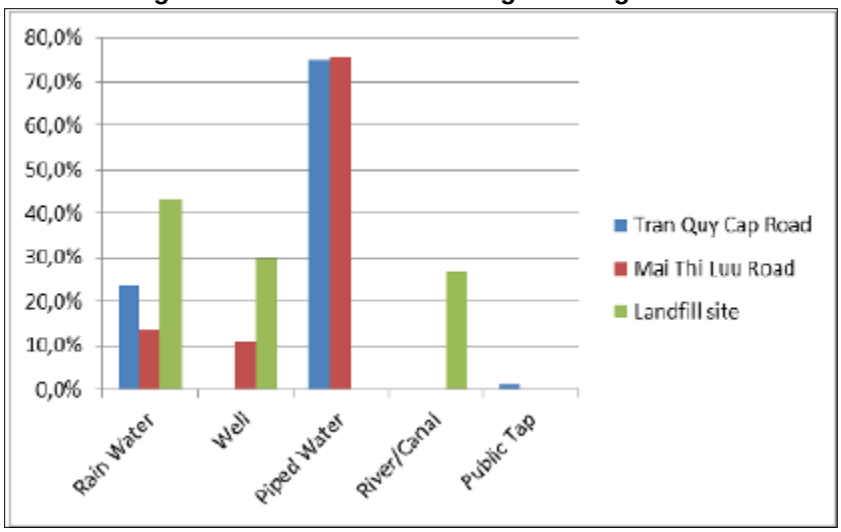
- For cooking and drinking, households affected by the proposed SWTP sub-component use rain water and water from shallow well and river/canal. Those affected by the road sub-components mostly use water from the City's piped water supply; while the rest use rain water. The quality of water is considered good or acceptable by all the surveyed HHs.

- For washing and bathing, households affected by the SSWTP sub-component use rain water, water from well and river/canal. Those affected by the road sub-components used mainly water from well and the City's piped water supply.

- Most households affected by the road sub-components have in-house toilets as sanitation facilities. Those affected by the SWTP sub-component use pit latrine, toilet upon river or in-house toilet. Only few of the affected households have no sanitation facility of any form.

- All affected households are connected to the state power supply network. Electricity is used for lighting. Wood and gas are used for cooking in all sub-components.

Figure 8. Sources of Drinking/Cooking Water



[8] General information obtained from DAKURENCO, DAKWACO and the PMUs.

Figure 9. Sources of Washing/Bathing Water

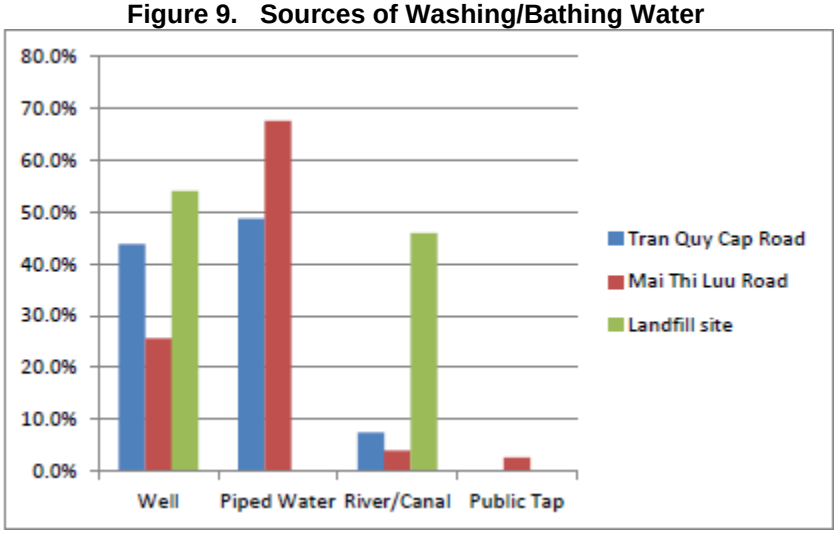
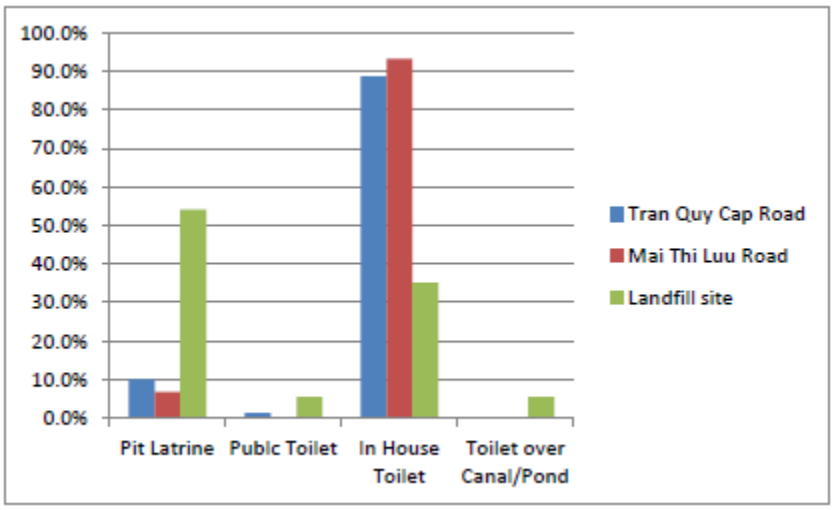


Figure 10. Access to Sanitation Facilities



E. Physical Cultural Resources

106. Buon Ma Thuot City is site to a number of national relics and historical monuments, that are also tourist attractions, such as the Dak Lak Cultural; Ethnology Museum (formerly Bao Dai Palace), Buon Ma Thuot Prison House, Khai Doan Pagoda, Lac Giao Monument, and Lac Giao Communal House, among others. In the road sub-component sites the physical cultural resources of concern are two cemeteries, one of which will be adversely affected. Mai Thi Luu Road will adversely affect 36 graves in the Ngoc Thanh Cemetery. Tran Quy Cap will be built along, but will not adversely affect, the cemetery in Tan Lap Ward.

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

107. The areas of influence of the sub-components include: (i) the subproject sites and the concerned communes and wards; (ii) construction workers camp sites; (iii) quarry sites/ borrow pits as sources for aggregate materials; (iv) disposal sites for construction wastes; (v) regular

transport routes of construction associated vehicles/ equipment; and (vi) for primary benefits, the entire City.

A. Potential Issues/Concerns/Impacts

1. Issues/Concerns Relative to Siting

108. The Subproject will affect a total of 634 HHs (3,114 persons), 63.14 ha of land, mostly agricultural, 97 houses with a total floor area of 10,062 m2, 36 graves and 4 businesses. The proposed roads will cross one river each.

Table 15. Salient Siting Issues and Concerns

Component / Sub-component	Salient Siting Issues / Concerns
1. Solid Waste Management	
1.1 Solid Waste Treatment Plant	▪ About 90 HHs (476 persons) affected. ▪ Loss of 516,901 m2 of agricultural lands of 90 HHs, affecting perennial crops ▪ Loss of 1 house, 105 m2 ▪ 1 HH required to relocate ▪ 2,177 cashew trees affected ▪ Very small spring, flowing from a hill much higher than the existing ground elevation of Cells 1&2, with small flow that dries up after flowing for about 50 m, located about 60 m NE from the nearest edge of Cell 2. ▪ Two high voltage power lines cross site's S edge.
1.2 Closure of Existing Dumpsite	▪ Some 80-100 dumpsite scavengers operating ▪ One water body, running along N & W boundaries of dumpsite, at least 70 m from the N boundary and 60 m from W boundary.
2. Urban Roads	
2.1 Tran Quy Cap	▪ 345 HHs (1,627 persons) affected ▪ Loss of 64,591 m2 of agricultural lands of 311 HHs ▪ Loss of 4,712 m2 of residential lands of 30 HHs ▪ Loss of 317 m2 of other lands of 4 HHs ▪ Loss of houses, 3,515 m2 of houses, 34 HHs ▪ 3 HHs losing houses, 1,562 m2, required to relocate ▪ 31 HHs will have their houses partially affected ▪ 116 fruit & 221 cashew trees affected ▪ 2 registered businesses affected ▪ Potential operation of the currently constructed Regional Hospital during the construction of TQC. ▪ 1 well affected ▪ Will replace existing bridge crossing over Ea Nao River, with a wider one.
2.2 Mai Thi Luu	▪ 197 HHs (1,011 persons) affected ▪ Loss of 37,818 m2 of agricultural lands of 87 HHs ▪ Loss of 3,625 m2 of residential lands of 107 HHs ▪ Loss of 3,420 m2 of other lands of 3 HHs ▪ Loss of houses, 7,342 m2, 62 HHs ▪ 21 HHs losing houses, 3,630 m2, required to relocate ▪ 41 HHs will have their houses partially affected ▪ 1,549 fruit and 64 cashew trees affected ▪ 2 registered businesses to relocate ▪ 36 graves to be relocated ▪ An upstream tributary of Ea Tam River will be crossed by the extension of MTL Rd. ▪ 11 15-22 kV power poles affected ▪ Partially through moderately dense built-up area

Table 15. (continued)

Component / Sub-component	Salient Siting Issues / Concerns
3. Both components	▪ Seismicity Dak Lak is within the zone with a probabilistic seismic hazard of 0-0.06 gal (MSK-64 V-VI). Buon Ma Thuot appears to be within the zone of0-0.03 gal (MSK-64 V) zone. (Refer to Map 3 of Section IV- A). ▪ Climate change According to the National Climate Change Strategy: - Over the past 50 years, Viet Nam experienced average temperature rise of 0.5-0.7^{o}C, more extreme El Niño & La Niña events, worsening storms and droughts. - By the end of the 21st century: (i) annual average temperature will rise by 2-3^{o}C; (ii) total rainfall and rainy season rainfall will increase, while dry season rainfall will decrease. Climate change impacts of concern to Buon Ma Thuot City as a whole: - Increasing/intensifying precipitation - Increasing temperature Drought

Source for the scale of affected HH, lands and other losses: Draft Resettlement Plan for Buon Ma Thuot City. April 2013.

2. Issues/Concerns Relative to Design

109. The essential environmental concerns relative to design include:

- Inadequate incorporation of climate change and seismicity, their threats and impacts, which would render the completed works unable to cope during extreme weather events and earthquakes, and to sustain their effectiveness and life throughout the period they were intended for. Table 16 presents some threats/potential impacts from climate change and seismic events.

- Inadequate attention on: (i) the impacts of roads on local hydrology, such as changes in the surface water flow and groundwater level, and lowering/worsening of the quality of water resources (Table 17); and (ii) sustaining the flow of crossing rivers/streams.

- Inadequate attention on potential unsustainable supply of aggregate materials or unsustainable extraction of these materials to meet construction demand.

- For SWTP, inadequate consideration of existing technical and financial capacity of DAKURENCO in waste disposal operations.

- For roads, inadequate consideration of impacts on adjacent properties/communities, e.g., impact on surface drainage, environmental conditions, and change in the lifestyle and character of, and degree of safety risk to, the communities.

Table 16. Some Threats/Potential Impacts from Climate Change and Seismic Events

Environmental Concern	Some Threats/Potential Impacts	
	On Landfill	On Road & Bridge
1 Climate change - Increased intense precipitation & associated flooding, landslide	- Structural damage - Instability of slopes of waste fills/mounds - Increased leachate production - Altered hydrology of site - Altered waste decomposition rate - Exposure of deposited wastes - Flooding of waste cells & if heavy rains persist, overflow & spread of contaminants - If heavy rainfall introduces additional water into a landfill, increased rate of gas production - Huge volume of post-extreme-event debris to be managed	- Softening of sub-base & subgrade resulting in foundation failure or deterioration - Scouring of road, bridge abutment or pier - Structural damage - Overload of drainage
2 - Rise in temperature/extreme maximum temperature/longer period of very hot days	- Increased NMOC emissions due to triggered volatilization of wastes and reactions of chemicals in wastes - Altered waste decomposition rate - Affects water availability for operation - Increased population of vermin/pest & increased odor - Fire/explosion risk - Adverse effect on vegetation used as landfill screening or planted on completed waste mounds - Increased dust	- Stiffer pavement due to the volatilization & oxidation of asphalt binders, resulting to cracks & reduced durability - Softened asphalt binder allowing the creation of ruts - Thermal stress on/expansion of bridge expansion joints - Migration of liquid asphalt (flushing & bleeding) leading to loss of surface texture on the pavement
3 Seismicity	Torn & stretched liners Cracked covers Moved/displaced leachate & gas collection systems Waste fills may collapse, if side slopes or landfill bedrock foundation is unstable	- Cracked pavement, disintegration of sub-base/ subgrade, structural damage

Table 17. Issues/Concern Relative to Road Planning/Design and Construction

Inadequate consideration during design		Inadequate construction planning & management
Change in surface water flow	Change in groundwater flow	Deterioration of water quality
Flooding	Vulnerability to erosion	Threats in ecological integrity
Erosion	Loss/deterioration of vegetation	Loss/deterioration of vegetation
Siltation	Changes in habitats for fauna	Loss of aquatic species
Channel modification	Loss/scarcity of water for domestic,	Loss/scarcity of water for domestic,
Interruption in fish migration	agricultural, economic, recreational uses	agricultural, economic, recreational uses

3. Issues/Concerns/Impacts During Construction

110. A screening of potential issues/concerns/impacts during construction is presented in **Annex E.**

a. Physical/Chemical Environment

111. Dust/suspended particles, gas emissions, noise and vibration, arising from construction activities, practices and materials, such as, but not limited to, those listed in Table 18, will be more salient during the peak construction period, which is estimated to be at least 20-30% of the construction period. These issues/impacts will be temporary but, if not mitigated, will have potentials to result in long-term consequences in the health of the affected communities and the construction workers. Unmitigated vibration could also lead to permanent damages of sensitive structures.

Table 18. Some Direct Sources of Dust, Gas Emission, Odor, Noise & Vibration

	Source	Issues/Impacts				
		Dust	Gas	Odor	Noise	Vibration
1	Earthworks (clearing, grubbing, excavation, filling/backfilling, quarrying)	√	-	-	√	√
2	Transporting, loading & unloading of aggregates, cement, other materials, and solid wastes/spoils	√	√	-	√	√
3	Movement/operation of construction vehicles/trucks/equipment	√	√	-	√	√
4	Dry exposed areas, prolonged paving of access and sub-component roads	√	-	-	-	-
5	Open stockpiles of dry soil, fine aggregates, cement	√	-	-	-	-
6	Crushing, grinding, mixing, sanding, pavement breaking, drilling, screening	√	-	-	√	√
7	Sweeping/cleaning of construction premises	√	-	-	-	-
8	Poorly managed (burning of) solid wastes	-	√	√	-	-
9	Operation of generator set/s	-	√	-	√	√
10	Power/energy/fuel consumption in field offices & workers camps	-	√	-	-	-
11	Transportation of workforce	-	√	-	-	-
12	If applicable, asphalt processing & specialty applications, e.g., paints, lacquers, adhesives, sealants	-	√	√	-	-
13	Poor storage of hazardous substances, or embodied emissions of hazardous substances/materials	-	√	√	-	-
14	Poor sanitation practices of construction workers	-	-	√	-	-

112. Water resources will be exposed to potential depletion and deterioration. Meeting the huge non-potable water need during construction with piped water supply will impact on the sustainability of water supply services, or with groundwater abstracted from within the city or from areas with critical groundwater conditions will aggravate lowering of groundwater level, contributing to further saline intrusion into the aquifers. Surface and groundwater resources in the vicinities will be prone to pollution from: (i) sedimentation or siltation caused by indiscriminate earthworks; (ii) improper management of wastes and hazardous substances; (iii) irresponsible stockpiling of aggregates and waste; (iv) accidental spills of materials, particularly hazardous substances and wastes; and (v) poor sanitation practices of workers. Polluted surface waters will be detrimental to aquatic biodiversity. Polluted groundwater will pose health risks to the groundwater-reliant households in the cities.

113. Construction will generate significant volume of wastes and spoils, and will require volume of aggregates, to be stored on-site. Outside the SWTP site, and potentially the existing dumpsite, road sub-component sites do not have sufficient suitable space for storing wastes/spoils and stockpiling aggregates, i.e., without causing undue public inconvenience and safety hazard, obstruction to surface drainage flow, siltation/pollution of nearby water bodies, clogging drainage channels causing local flooding, and/or trampling on rice plants and other vegetation.

b. Biological Environment

114. Ea Nao and Ea Tam Rivers and their tributaries are sources of food and possibly income for some households. Surface water bodies within 100 m distance from the dumpsite in Cu

Ebur. The risks to aquatic life in these water bodies will be associated with construction wastes, wastewater, spoils, fine aggregates and hazardous substances directly discharged or transported through surface drainage into the rivers. Sediments and wastes as suspended or settled solids and the resulting turbidity of waters will: (i) lessen penetration of sunlight, reduce euphoric zone, and therefore reduces primary production of some aquatic flora; (ii) reduce the ability of some aquatic fauna to find food, i.e., for those fish that rely heavily on sight in looking for food; (iii) interfere with feeding of some aquatic fauna, reducing survival; and (iv) stress aquatic species that can tolerate sediment in water for a period of time, but only temporarily. Sediment irritates gills of fish, can cause death; destroy protective mucous covering fish eyes and scales. Sedimentation process disturbs, alters and/or destroys habitats; causes habitat alteration and destruction; submerges and chokes eggs; and therefore, disrupts spawning, reduces reproduction. Contact with, and ingestion of, sediments with accumulated metals or hazardous/toxic substances will be perilous to aquatic organisms. Settled/deposited sediments can suffocate plants at the bottom of the river.

115. Loss of vegetation beyond the limits of Subcomponent sites will result if sites clearing, excavation and construction vehicular flow/movement and stockpiling of aggregates and wastes will not be managed well. No loss of wildlife or rare & endangered species will result from Subproject implementation. There is no protected area or nature reserve in Buon Ma Thuot City.

c. Socio-economic Environment

116. The simultaneous construction of the four sub-components is anticipated to bring about the following salient socio-economic issues/concerns/impacts: (i) impact on the sustainability of urban service; (ii) traffic and road blocking; (iii) blocking of access to properties; (iv) local flooding; (v) accidental damages to drainage channels and other utility mains and lines; (vi) disruption of socio-economic activities; (vii) community health and safety hazards; (viii) workers health and safety hazards; and (ix) potential damages to adjacent properties.

117. The following will potentially impact on the sustainability of urban services: (i) construction water demand, if met from piped water supply system; (ii) inadequate management of waste, silt & aggregate stockpiling during construction, resulting to these finding their way to drainage systems, compromising the effectiveness of the systems; (iii) indiscriminate dumping of the huge wastes generated during construction, straining the capacities of DAKURENCO in waste collection services & keeping the cities clean; (iv) volume of solid wastes generated that will be deposited into the cities' disposal sites; and (v) accidental damages to utility lines during construction, causing disruption of services. These concerns apply to the Urban Roads Component.

118. The volume of vehicle movements that will be generated from the simultaneous construction (or somehow overlap of construction periods) of the four sub-components, and the likely closure/blocking of some roads/lanes leading to, the construction activities will cause traffic build-up and choke points.

119. Blocking of access to properties will cause public inconvenience and disruption of socio-economic activities, and will pose safety hazards. During the rainy season, the impact will be worse, most especially when local flooding occurs. When surface drainage is impeded by construction activities and stockpiles, and when existing drainage systems are clogged with construction debris and sediments, local flooding would be inevitable during the rainy season; and would be severe during heavy monsoon rains or occurrence of a tropical cyclone. This concern applies to the Urban Roads Component.

120. Accidental damages of existing drainage channels and utility mains and lines will not only disrupt services and socio-economic activities but also have adverse impact on the health and safety of communities. Disruption of socio-economic activities in the vicinities of sub-component roads will be unavoidable with blocked roads and accesses to properties. In sites adjacent to farms, the haphazard movement of construction vehicles/equipment and activities beyond the effective sub-component site will potentially destroy crops/fruit trees and affect the income of the farmers. This concern applies to the Urban Roads Component.

121. During construction, public health and safety will be exposed to hazards and risks associated with dust, gas emissions, noise, vibration, potential thermal inversion, contaminated water supply (from damaged water supply pipes, contaminated wells &/or broken combined drains), poorly managed wastes and hazardous substances, disruption of urban services, traffic and blocked roads/lanes, blocked access blocking, open excavations, potential fire/explosion, and potential transmittable diseases from the construction workforce, among others. Most hazards and risks apply to the Urban Roads Component. These will be higher in built up sections of their alignments.

122. The health and safety of construction workers will likewise be exposed to dust, gas emissions, noise, vibration, wastes and hazardous substances, movements/operation of construction equipment, open excavations, potential fire/explosion, potential transmittable diseases from the community and the weather, among others.

d. Physical Cultural Environment

123. The presence of private graves within sub-component sites will be verified from the inventory of losses, which as of this reporting is yet to be conducted. Affected cemeteries and graves will require proper consultation and management. The potential for chance find of physical cultural resources (PCRs) during construction is assessed to be moderate in the SWTP site and none to least in the remaining sub-component sites. For safeguards purposes, it would be ideal to consider likely chance find and be prepared with the proper management measures for them.

4. Issues/Concerns/Impacts During Operation

124. A screening of potential issues/concerns/impacts during operation is presented in **Annex F**; the potential salient ones, shown below.

Table 19. Potential Salient Issues/Concerns/Impacts During Operation

	Issues/Concerns/Impacts	Component	
		SWM	Roads
1	Completed works unable to sustain their effectiveness and life throughout the period they are intended for due to inadequate considerations/incorporations of the following in designs: and		
	(i) threats and impacts from extreme climate-change induced events & earthquakes	√	√
	(ii) keeping crossing streams and sustaining their hydrology.	-	√
2	Unsustained effectiveness of:		
	(i) completed works due to inefficient operation, maintenance and repair;	√	√
	(ii) completed road drains due to indiscriminate dumping of solid wastes.	-	√
3	Potential local flooding in adjacent properties due to impeded surface drainage, increased level of air pollutants and noise in the area, change in the lifestyle in/character of the community.	-	√
4	Air pollution from dust, gas emission and noise	√	√

5	Landfill gas migration	√	-
6	Odor, vermin/rodents/insects, birds & stray animal attraction	√	-
7	Litters	√	-
8	Mud spread	√	-
9	Water resources deterioration from leachate	√	-
10	Sedimentation of water bodies from borrowing & stockpiling of soil cover materials	√	-
11	Leachate drippings from trucks hauling wastes	√	-
12	Fire/explosion	√	-
13	Community health and safety hazards	√	√
14	Workers' health and safety hazards	√	-
15	Damages during seismic or extreme weather events	√	√

5. Positive Impacts and Benefits

125. There will be opportunities for local employment and increased earnings of local enterprises during construction. When completed, the Subproject will bring about the following benefits that will considerably outweigh the aforementioned adverse impacts:

- Solid Waste Management Component
  - improved solid waste disposal
  - positive contribution to reduced greenhouse gas emissions
- Urban Roads Component
  - reduced inter-provincial and intra-area travel time and operating costs
  - positive contribution to energy conservation and reduced greenhouse gas emissions.

126. Overall, the Subproject will bring about qualitative improvement in the urban environment and gain the City great strides towards its green city vision. Living conditions will improve, to include opportunities for improved health. Other benefits are improved mobility, increased productivity and increased land values.

B. Proposed Mitigation Measures

127. Some measures to mitigate moderate and significant issues/concerns/impacts are presented in this sub-section. The detailed set of mitigation measures for each sub-component is featured in the Environmental Mitigation Plans of the EMPs (Annexes G and H). "Prior to construction" or "Pre-Construction" covers the period of detailed design and procurement process, culminating in the award of Contract for civil works. "During Construction" covers the period after the awarding of the Contract for civil works until demobilization. "During Operation" commences at commissioning for start of operation.

1. Mitigating Issues/Concerns Prior to Construction

128. The potential issues, concerns and impacts that could arise during construction and operation can be avoided or, at least, mitigated with sufficient incorporation of environmental considerations during the detailed design and/or procurement stages including (but not limited to) the following:

- For all sub-components, the demand for, and availability of and sources for, fine and coarse aggregates to be assessed carefully during detailed design not only to mitigate delays in construction progress and avoid prolonged exposure of open or disturbed surfaces but also to avoid haphazard (and illegal) extraction of

these materials. A Subproject Aggregates Management Plan (SEMP) to be prepared during detailed design to serve as framework for the preparation of Aggregates Management Plan in the Contractor's EMP (CEMP).

- For the sustainability of completed works, designs to incorporate seismicity, the City's vulnerability to damages during earthquakes as well as other natural hazards. The design shall also consider climate change impacts.

  - Design according to the appropriate seismic design criteria, as regulated in Viet Nam. Geo-technical and geologic investigations during the preparation of detailed designs will provide site-specific geo-technical conclusions and recommendations to guide design and construction.

  - Apply adaptation measures in design (a few options in Table 20).

  - Ensure emergency contingency plans for potential climate change impacts are included in the Operations Manual for the SWTP.

Table 20. Some Design Adaptation Options

Climate Change Impact / Mitigation Measures	SWTP	Roads
Reduction in rainfall or increased erosion		
- Using flexible pavement structures	√	√
- Landscaping/planting with drought tolerant species	√	√
- Mulching	√	-
- Using matting/erosion control blanket (waste mounds)	√	-
- Applying granular protection	√	√
- Specify optimum level of compaction (to avoid subsequent settlement)	√	√
- Use of materials with high resistance to dry conditions, as Appropriate	√	√
Increase in precipitation		
- Safety factor incorporated into design assumptions	√	√
- Appropriate slope gradient (waste mound)	√	-
- Increasing size of hydraulic structures/river crossings	-	√
- Raising pavement & adding additional drainage capacity, but should not impede surface drainage of adjacent communities/lands	√	√
- Specify more frequent monitoring to prevent disaster in Operations Manual	√	√
- Using materials that are less affected by water, as appropriate	√	√

* Source: Guidelines for Climate Proofing Investments in the Transportation Sector. ADB. Aug. 2011.

- Planning and design of water crossings:

  - These need to be coordinated with the trend of local aquatic conditions, e.g., flow regimes (including catchment characteristics), fish movement and human use. Inadequate consideration of these aforementioned conditions will lead to improperly sized culverts/bridges that could aggravate flooding, interruption of fish migration, erosion and siltation, and also exposes the structural integrity of the bridge and culvert structures to risks.

  - Consult the MARD, DONRE aquatic resource expert, concerned wards/ communes and local communities (those living along and using the affected rivers), to ensure adequate consideration of hydrological and hydraulic factors that reflect influence of climate change-induced events.

Consideration of changes in volume and speed of water flow should reach as far downstream as observed and projected, taking into account seasonal variations.

- Road design to consider water speed reduction measures, as appropriate, e.g., grass strips, planting of cleared areas; and to specify use of only “clean” fill materials around crossed water bodies and strengthening (such as paving) of sections with erosion potentials particularly in areas close to water crossings.

- Road design to mitigate the adverse impacts (e.g., increased TSP, noise, safety hazards, potential water logging on adjacent properties, etc) that are normally associated with road operations on communities through which it will pass.

  - Plan and design in the context of the environment through which roads pass, availing of all the opportunities to provide service to, and complement/support the surrounding uses/development/socio-cultural patterns and activities (in the short and long-terms).
  - Signage, billbopards
  - Identify existing and future concerns through sufficient consultations with the existing communities. Incorporate consultation outcomes in the plan and design, as appropriate.
  - Blend the streetscape with the character of the surrounding environment.
  - Allow maintenance operations to evolve with the surrounding development.

- To mitigate the adverse impact of land and right-of-way acquisition, resettlement/compensation plans will be prepared in a highly consultative and participatory manner, and implemented accordingly.

- To attract more environmentally responsible bidders, include the SPS compliant Subproject Environmental Management Plan (SEMP) in the bidding document and ask the proposal for specific or additional Mitigation Measures to conduct better SEMP. Selected Contractor to prepare a CEMP that will address as minimum the requirements of the SEMP. The CEMP to be quantitatively and qualitatively evaluated against the SEMP and cleared as fully responsive to the SEMP prior to the commencement of any work on site. The Contract for civil works to explicitly stipulate the obligation to institute the mitigation measures properly and carry out environmental monitoring according to the SPS compliant CEMP. Contract to stipulate some tie-up of progress payment and collection of performance bond with the performance in CEMP implementation.

- Prior to award of Contracts,
  - approval of the Subproject EIA Report shall have been obtained;
  - sufficient prior public information and signboards about the Subproject shall have been conducted in affected villages and posted in strategic places, respectively;
  - an intensive awareness program on potential rise of communicable diseases with the entry of non-local construction workers shall have been conducted; and
  - baseline data on the ambient air quality, noise and vibration levels, ground- and surface water quality shall have been established by the PMU.

2. Mitigating Issues/Concerns/Impacts During Construction

129. Measures to keep construction impacts in Subproject sites to the minimum or acceptable levels are mostly good engineering and construction practices as, but not limited to, those presented in Table 21. A detailed set of mitigation measures are featured in the EMPs (**Annexes I** and **J**). The effective conduct of the following are crucial mitigation measures as well: (i) construction management by the Contractor; (ii) supervision of CEMP implementation by the Contractor's Environmental Management Engineer; (iii) construction supervision by the PMU; (iv) monitoring of CEMP implementation by the PMU; (v) observance of the Grievance Redress Mechanism by all concerned parties; and (vi) the participation of concerned communities in the monitoring of CEMP implementation.

3. Mitigating Issues/Concerns/Impacts During Operation

130. The magnitude of impacts arising from the operation of completed works will highly depend on the degree of environmental considerations made from the start of Subproject development through to operation. Some basic measures are as follows: (i) effective supervision of detailed design and construction, and performance monitoring by the PMU; (ii) quality construction by the Contractor; (iii) sufficient provisions in the budget for operation, maintenance and repair, as well as for emergency response; (iv) undertaking the recommended environmental effects monitoring during operation; (v) prompt action to raised issues/concerns/grievances; (vi) DAKURENCO (operator) to engage/designate a staff to oversee EMP implementation and prepare the required environmental monitoring reports; and (vii) conduct of engineering investigation after every natural hazard event, and prompt action on damages.

131. To sustain the effectiveness of completed structures: (i) during design adequate considerations of seismicity and climate change impacts must be made; (ii) sufficient budget must be regularly and promptly allocated for efficient operation, maintenance and repair. Beneficiary communities must be informed and subsequently reminded about their social responsibility to keep the road drains free of solid wastes. After every seismic or extreme weather event, conduct an engineering investigation of built structures & implement the necessary corrective measures without delay. Prepare written report on the investigation findings & if applicable, the planned or implemented corrective measures.

132. Measures to keep impacts during operation to the minimum or acceptable levels are presented in Table 22. A detailed set of mitigation measures are featured in the EMPs (**Annex H** and **I**).

133. Some measures to mitigate impacts during the decommissioning of the sanitary landfill and the Cu Ebur dumpsite include: (i) conduct of appropriate environmental monitoring for gas, leachate, surface and groundwater quality; and (ii) restricting the access to the site by unauthorized persons; and (iii) prompt due diligence of the structural integrity of the sanitary landfill and closed dumpsite after a natural hazard event.

Table 21. Some Recommended Mitigation Measures for Salient Issues/Concerns/Impacts During Construction *

Issues/Concerns/Impacts	Some Mitigation Measures
air pollution due to dust, gas emissions, noise . .	<u>Dust</u> ▪ Apply segmentation of works. ▪ Water stockpiles & exposed surfaces at least twice a day, or as necessary. ▪ Install water mist sprays in rock crushing & quarry areas & immediate vicinities/jaw crusher & conveyors. ▪ Ensure trucks, especially those hauling natural aggregates, cement & solid wastes, are adequately covered & maintain a min. of 2 feet freeboard. ▪ Enforce slower maximum speed (say, 40 kph) en route to sites & (say, 30 kph) in subproject access roads and sites, rock crushing areas and quarries. ▪ Install wind barrier/screen in aggregate stockpile areas against prevailing wind direction. ▪ Minimize drop heights & spray water when loading/unloading aggregates. <u>Gas emissions/fumes</u> ▪ Coordinate/spread out the hauling of materials, wastes, spoils. ▪ Limit equipment idling to 5 min. ▪ Use only well-maintained vehicles/ equipment, most, if not all, clean-fuelled ones. ▪ Tap power from supply poles, if possible, and minimize use of power generators. When necessary to use generators, use clean-fuelled ones. ▪ Asphalt processing ---lower processing temperature; if feasible or would not impact on the service life & technical qualities of the structures, use recycled asphalt; use technology that has pollution control devices ▪ Prohibit burning of wastes. Dispose of wastes at the landfill promptly. ▪ Use low VOC emitting materials. <u>Noise</u> ▪ Undertake prompt maintenance of equipment. ▪ Enforce use by contractor, suppliers, and sub-contractors of only well-maintained vehicles/equipment with efficient mufflers. ▪ Limit noisy operations at daytime. ▪ Comply with agreed on overtime hours with the villages, and restricting activities only to non-noise generating ones, or observing noise standard limits for evenings. ▪ Set up noise barriers between active work segments & nearest receptors. ▪ When it would be necessary to use power generator sets, use the least noisy technology, adequately enclosed, & located at maximum distance possible from nearest receptors. ▪ Use least noisy equipment, e.g., electrically powered ones, those with efficient mufflers. ▪ Spread out schedule of material deliveries and waste disposal.
water resource problems	<u>Depletion:</u> ▪ Meet construction water demand with water from permitted surface water sources, delivered to sites through water trucks and stored on site in tanks. Collect rain and/or recycle water to augment water supply, as appropriate.

***** The EMP provides measures applicable to each Component.

Table 21. (continued)

Issues/Concerns/Impacts	Some Mitigation Measures
	Degradation/deterioration of quality: ▪ Coordinate broken/leaking, accidentally damaged water pipes immediately with URENCO/PMU. ▪ Ensure non-chlorinated/non-chemical contaminated water for watering exposed areas. ▪ Mitigate siltation/sedimentation through --- segmentation of works; sediment detention basins; silt fences, sediment traps/ nets &/or sand bags; stockpiling of aggregates &excavated soils away from water bodies; programming aggregates delivery to avoid stockpiling of more than needed; disposal of residual soils when longer useful on site; confining clearing/grubbing according to CEMP staking plan; following CEMP excavation management plan. ▪ Provide adequate sanitation facilities and adequate water supply. ▪ Implement proper solid waste management. ▪ Manage hazardous substances and wastes properly during transport, storage, use and disposal --- ensure non-leaking containers/tanks; select safe transport routes with least water bodies; situate storage, at least 50 m from water resources and at least 1 foot above highest flood level; use less hazardous substances; dispose of hazardous wastes properly & promptly; first-response team equipped will spill-clean up kit & linked with an ultimate-response team.
impacts on the sustainability of urban services	▪ Meet construction water demand with water from permitted surface water sources, delivered to sites through water trucks and stored on site in tanks. Collect rain and/or recycle water to augment water supply, as appropriate. ▪ Implement proper solid waste & sediment management to avoid clogging of drainage systems. ▪ Subcontract waste disposal to private sector to avoid depleting availability of City's collection fleet. ▪ Network with interested individuals for the recyclables. Offer residual soils as free filling materials. ▪ Prior to mobilization, coordinate with authorities on location of utility mains & potential transfer of power supply and telephone poles. ▪ Report broken/leaking, accidentally damaged water pipes immediately to URENCO/PMU for coordinated, prompt action.
traffic & road blocking	▪ Prepare traffic management scheme (traffic reroute, parking of equipment, etc) with City traffic control unit & concerned wards/communes. ▪ Spread out schedule for materials delivery & waste disposal, with most volume during lean traffic hours. ▪ Manage arrivals/ departures of trucks efficiently. ▪ Post traffic flagmen at both ends of active work segments; and especially at intersections of main road &/or railway with access road. ▪ Install clear directional signage at strategic places. ▪ Post billboards on, & advanced public announcement of, schedules and locations of traffic disturbances and rerouting. ▪ Store wastes away from access road ROW.
access blocking	▪ With ward/commune authorities and village representatives, agree on safe temporary accesses, parking of private vehicles, other road obstructions. ▪ Give out adequate prior information on start & completion of excavations, & potential delays.

Table 21. (continued)

Issues/Concerns/Impacts	Some Mitigation Measures
	▪ Post clear signage (reflectorized) at active junctions/sections. ▪ Ensure active sites are fenced in and adequately lighted at nighttime.
local flooding	▪ Prior to excavation, cover vulnerable drainage inlets, create diversion route for surface runoff to next nearest inlet or outfall. ▪ Pump out excavation water or impounded water appropriately. ▪ Use silt fence, sediment trap, sand bags, etc, as appropriate. ▪ Stockpile excavated soils, solid wastes, aggregates away from drainage routes. ▪ Dispose of residual soil daily. ▪ Avoid obstructing surface drainage routes.
accidental damage to utility & service infrastructures	▪ During mobilization coordinate with relevant utility companies for the exact locations & set contact arrangements in case of damage/s. ▪ In case of accidental damage, immediately inform the concerned company and/or the PMU. ▪ Give at least 1 week prior notice on planned service interruption due to relocation of power supply poles, water lines, etc.
disruption of socio-economic activities	▪ Provide access to blocked properties/establishments. ▪ Issue prior notice for scheduled service interruptions. Interruption not to go beyond 2 hours. ▪ In case of accidental damage, immediately inform the concerned company and/or the PMU.
community and workers' health & safety hazards	<u>Community & workers' health & safety hazards</u> ▪ Apply measures to mitigate air pollution (dust, emissions, noise) & water resource problems. ▪ Implement proper waste management and enforce proper sanitation practices. ▪ Avoid creating, and pump/drain out, local water impoundment during construction. Institute regular housekeeping of construction premises. ▪ Give preference to more environment friendly substances, equipment & technology, as much as possible, e.g., low-impact paving, non-petroleum-based paving systems, sealants & coatings that emit least VOCs. ▪ Proper management of hazardous wastes & substances --- ensure non-leaking containers/ tanks; select safe transport routes with least water bodies & human settlements & mingling with traffic volume; avoid storing more chemicals on site than needed; situate storage, at least 50 m from water resources & 100 m from human settlements and at least 1 foot above highest flood level; ensure storage can contain spill. ▪ Use least noisy, least vibrating, clean-fuelled, &/or well-maintained construction equipment. ▪ Post legible safety warnings/ reminders at strategic locations. ▪ Set up emergency first- response team linked with an ultimate-response team. ▪ Have sites cleared of potential UXOs by competent entity prior to mobilization of civil works. ▪ Institute prior coordination with right authorities on matters concerning "chance find" UXOs.

Table 21. (continued)

`	Community health & safety hazards ▪ Include public health and safety hazards during construction in community IEC, including potential transmittable diseases brought in by the workforce. ▪ Fence in construction sites and strictly disallow unauthorized entries Workers' health & safety hazards ▪ Provide adequate sanitation facilities, water supply, lighting & safe accesses on site. ▪ Ensure safe, separate storage of hazardous waste and substances, with visible caution signs & labels, secure from unauthorized entry ▪ Strictly enforce use of protective wears. ▪ Include in pre-mobilization orientation on workers health & safety hazards the emphasis on strict observance of safety measures and training on applicable measures. Inform workers on the UXO risks, safety measures & responsibilities.
potential damages on works during seismic or extreme weather event	▪ After every event, conduct an engineering investigation of built structures & implement the necessary corrective measures without delay. Prepare written report on the investigation findings & if applicable, the planned or implemented corrective measures.

Table 22. Some Mitigating Measures for Salient Issues/Concerns/Impacts During Operation

Issues/Concerns/Impacts	Some Mitigation Measures
Completed works not able to sustain their effectiveness and life throughout the period they were intended for	**Both components** ▪ Incorporate adequate considerations during design of the expected growth and intensification of urban activities, together with climate variations and seismicity, to ensure sustainability of capacities of completed works & resilience to impacts of growth & increasing natural hazards. **Sanitary landfill** ▪ Formulate an O&M Manual that specifies continuing capacity building program & budget/ financial requirements for effective O&M, including environmental mitigation, monitoring and reporting).
Air pollution due to dust, gas emissions, fumes, noise	**Sanitary landfill** ▪ Conduct environmental monitoring, as recommended in the SPS compliant EMP and/or operational EMMP. (The recommendations in the SPS compliant EMP as the required minimum.) <u>Dust</u> ▪ Water access road, internal roads, soil cover stockpile, as necessary during dry season. ▪ Enforce max. speed for collection trucks (say, 40 kph) on access & internal roads. <u>Gas emissions/fumes</u> ▪ Implement daily cover of active waste cells ▪ Design with provisions for gas management & monitoring wells. ▪ Recover recyclable materials that will emit volatile organics ▪ Implement flaring or more appropriate method for treating the gas generated & collected in the future. ▪ Install gas alarm system, especially in buildings in SL ▪ Ensure effective bottom and side liners of active waste cells. <u>Noise</u> ▪ Undertake prompt maintenance of equipment. ▪ Use least noisy equipment, equipped with efficient mufflers. **Urban Roads** ▪ Ambient air quality & noise monitoring as specified in the EMP.
Water resource problems	**Sanitary landfill** ▪ Collect rain water to augment water supply (expected to be sourced from groundwater) for operations. ▪ Ensure in design ---- optimum surface runoff management; bottom & sides liners for cells; leachate management; availability of adequate & appropriate soil cover; capping of completed cells; future gas collection and treatment; & monitoring wells for groundwater ▪ Consider in design of leachate management: --- increase in organic waste relative to anticipated urban growth, include growth of food processing industry & the implementation of composting; climate induced changes in precipitation & temperature, & extreme weather events. ▪ Conduct quality monitoring of: (in appropriate frequencies) --- surface waters (when applicable as these are ephemeral), groundwater, leachate, gas. ▪ Manage borrowing for and stockpile of soil cover/excavated soil, ensuring stockpiles are away from the drainage route to the creek/s present in the site.

Table 22. (cont'd)

Issues/Concerns/Impacts	Some Mitigation Measures
nuisance from foul odor and influx of insects, rodents	**Sanitary landfill** ▪ Implement daily cover of active waste cells ▪ Require waste trucks to ensure no (or containment of) leachate drippings during transport. ▪ Require open waste trucks to provide appropriate cover and maintain min. 1.5 foot freeboard. ▪ Use insect-repellant trees/shrubs to green the SL site, e.g., neem, eucalyptus, citronella, etc. ▪ Require trucks to wash body and tires prior to exit from landfill. ▪ Densely plant buffer area with trees.
wind-blown litters	**Sanitary landfill** ▪ Provide movable litter fence around tipping area and active waste cell ▪ Open garbage trucks to be required to tarpaulin cover and maintain min. 2 feet freeboard.
Community and workers' health & safety hazards	**Sanitary landfill** <u>Community and workers' health and safety hazards</u> ▪ Implement measures to mitigate leachate drippings from trucks, air pollution and nuisance (above) <u>Community health and safety hazards</u> ▪ Fence in site and strictly disallow unauthorized entries. <u>Workers' health & safety hazards</u> ▪ Provide protective wear & require use of them inside SL. ▪ Require the observance of proper sanitation practices. ▪ Provide adequate sanitation facilities, water supply (potable & non-potable), lighting & safe accesses. ▪ Equip SL with efficient fire-fighting facilities and trained personnel. ▪ Ensure SL has water supply for fire fighting. ▪ Conduct a comprehensive orientation to include health and safety risks & measures & responsibilities during emergencies. ▪ Establish workers' health baseline data. Include as part of O&M procedure the regular physical exam &.applicable vaccinations for workers ▪ Require workers to confine themselves in unrestricted areas, unless authorized. ▪ Have prior coordination with right authorities on "chance find" UXOs. ▪ Set up emergency first-response team linked with an ultimate-response team. ▪ Conduct regular emergency drills.
Damage/s after an earthquake or extreme weather event	**Both components** ▪ After every seismic or extreme weather event, conduct engineering investigations & implement corrective measures without delay.

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VI. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

134. Stakeholder consultations and information disclosure were conducted during the IEE in accordance with ADB's Safeguard Policy Statement 2009. Stakeholder consultations were conducted through: (i) formal discussions/meetings with local authorities; (ii) informal interviews with randomly picked affected persons during sites visit; (iii) socio-economic survey, wherein environmental queries were incorporated; and (iv) joint social and environmental public meetings.

135. Local authorities/entities that were consulted during the IEE are shown below.

Table 23. Organizations/Entities Consulted

Date	Person / Organization	Topics Discussed
04 Sep 2012	BMT City PMU, DAKURENCO, CPC representatives	- Environmental assessment requirements - Purposes of / need for the proposed sub-components - Scope of involuntary resettlement & resettlement sites - Ethnic minorities & HHs within poverty threshold - Water bodies within or crossed by sub-components - Natural hazards in BMT - Sources of aggregates materials
04 Sep 2012	SWTP FS Consultants	- Proposed SWTP - Environmental concerns in site
05 Sep 2012	Mr. Truong Cong Thai Director DAKURENCO	- Responsibilities of DAKURENCO - Flooding & other natural hazards in BMT - BMT's storm- & wastewater management system & coverage - BMT solid waste & its management and needs in general - Details on the proposed SWTP - Existing Cu Ebur dumpsite - Source of aggregate materials - Types of industry in BMT current and expected in the future
05 Sep 2012	Directors of Environmental Protection & Monitoring Center, DONRE	- Category of the Subproject & requirements - Industrial wastes produced in BMT - Available environmental monitoring entities in BMT - DONRE approval for the SWTP site - Rare flora/fauna species in and around the SWTP site - Sources of aggregate materials - Request for recent environmental quality monitoring results - Request for unit costs for environmental quality monitoring
06 Sep 2012	BMT City PMU, DAKURENCO, CPC representatives	- Potential salient impacts during construction (from sites visit) - Issues/concerns during operation of SWTP - Request for assistance in baseline data gathering
07 Jan 2013	BMT PMU	- Proposed grievance redress mechanism - Capacity needs in environmental management of Subproject
08 Jan 2013	DAKURENCO PMU & DONRE	- Proposed grievance redress mechanism - Capacity needs in environmental management of Subproject - Access to basic services - Recent environmental quality monitoring results - Costs for environmental monitoring
08 Jan 2013	Mr. Vu Van Huyen	- Existing domestic wastewater management
09 Jan 2013	Mr. Tran Van Thien Director Dak Lak Water Co.	- Water supply system of BMT City and extent of coverage - Issues and concerns of water resources in BMT - Serepok River & Proposed BMT & 3 Districts WS Project

136. The socio-economic survey of affected households was conducted in February-March 2013. Relevant findings are in the description of socio-economic environment of this report (Section IV-D). Two joint social-environmental public meetings were held on 11 March 2013. The objectives of the environmental component of the public meetings were:

- To inform the stakeholders of the: (i) anticipated impacts arising from the projects; (ii) proposed measures to avoid and mitigate them; (iii) existence & implementation of the environmental management plan (EMP) that includes environmental mitigation and monitoring; (iv) existence & observance of a grievance redress mechanism (GRM); and (v) compliance with GOV and ADB environmental safeguard policies; and

- To solicit stakeholders' concerns, opinions & comments for the proper consideration in the IEE and EMPs.

Table 24. Joint Social-Environmental Public Meetings

Date	Consultation Venue	Consulted Group	No. of Participants			Issues raised / Discussions / Responses / Outcomes
			Total	M	F	
11 Mar 2013 AM	Tu An Ward People's Committee	Affected persons of the Urban Roads Component With participation of: BMT City PC BMT PMU BMT CLFD Ea Tam Ward PC Tan Lap Ward PC Tu An Ward PC	79	57	22	No questions were raised to react on the environmental presentation. Questions were mainly on resettlement, concerns, which were responded to by the PPTA Resettlement Specialists. (Appendix 3 of the Draft Resettlement Plan)
11 Mar 2013 PM	Hoa Phu Commune People's Committee	Affected persons of the SWM Component With participation of: BMT City PC BMT PMU BMT CLFD Hoa Phu Comm. PC	33	21	12	The only question with environmental concerns is the following, from Mr. Nguyen Sy Hung , representative of the Hoa Phu Commune PC. Question We, all affected households and representatives of Hoa Phu Commune PC agreed with the presentation of the resettlement specialist and environmental specialist, and would like: - the project to implement exactly what is described in the project resettlement policy; - full compensation and allowances to be paid one time to the affected persons; - ensure traffic safety during civil works construction for local people; and - minimize dust, pollution during construction. Answer The resettlement plan and the environmental management plan contain mitigation measures. The RP and EMP implementation will be monitored closely.

137. **Annex G** features the relevant notes of the brief informal interviews with randomly picked persons in the sub-component wards/communes; attendance sheets and photos of the two public meetings and selected photos of random interviews.

138. This IEE & its EMPs will be finalized during the detailed design stage. Public consultations will continue throughout Subproject implementation. All stakeholders must be invited and encouraged to participate. Suggestions from the general public may be sought through the mass media, when necessary. The PMU, contractor and/or operator shall be open to contact by the public on matters concerning the progress of the Subproject, adverse impacts, mitigation measures and environmental monitoring. During the actual implementation of the Subproject, the final IEE and its EMPs, as well as the GOV-approved EIA Reports, will be made available in the PMU Offices and Subproject Field Offices for the perusal of interested parties. Copies may be made available upon formal request.

139. To date, the following have been disclosed: (i) Subproject/sub-component descriptions, locations and activities; (ii) expected period of implementation; (iii) positive impacts and benefits of the sub-components; (iv) potential salient impacts and mitigation measures, particularly during construction and operation; (v) environmental monitoring that is open to active

community participation; (vi) existence and general overview of a grievance redress mechanism; (vii) continuing consultations and information disclosure; and (viii) status of compliance with GOV and ADB safeguards requirements.

VII. GRIEVANCE REDRESS MECHANISM

A. Purpose of the Mechanism

140. The grievance redress mechanism (or mechanism) is meant for persons seeking satisfactory resolution to their complaints on the environmental performance of the Subproject. Grievances raised on environmental impacts are critical to the health, wellness and safety of affected persons. Hence, grievance redress must be most easily accessible and most responsive to avoid prolonging the misery of APs.

B. Access to the Mechanism

141. Any person who has complaint regarding the environmental performance of the Subproject during construction and/or operation shall have access to the mechanism free of administrative and legal charges.

C. The Grievance Redress Mechanism

142. The proposed mechanism addresses both informally and formally raised grievances. It involves the following key actors:

- Affected person/s (AP/s);
- Contractor;
- Operator, i.e., CPC for Mai Thi Luu Road; PPC for the Tran Quy Cap Road or SWTP;
- PMU, i.e., CPC-PMU for Mai Thi Luu Road; DAKURENCO for Tran Quy Cap Road or SWTP;
- City/Provincial Court, i.e., City Court for Mai Thi Luu Road; Provincial Court for Tran Quy Cap Road or SWTP.

143. Informally, an AP can approach the Contractor (during construction) or the Operator (during operation) directly to lodge complaint either by him/herself or with assistance from a third party of his/her choice. Contractor/Operator shall assess the complaint immediately and act on the complaint within two days from receipt of complaint. If assessment reveals the issue as not associated with the Subproject's environmental performance, the Contractor/Operator shall direct AP to the proper institution or mechanism. If it is associated with the Subproject's environmental performance but is not acted on within two days from receipt of complaint, or if AP is not satisfied with the resolution undertaken by the Contractor/Operator, he/she can access the formal mechanism, as follows: (Figure 6)

Step 1 Lodging a Complaint (Day 1)

AP, by him-/herself or with assistance of a third party of his choice, writes a letter of complaint to the CPC/PPC.

Step 2 Documentation & Registration of Complaint (Day 1)
CPC/PPC documents/registers the received letter of complaint, and makes sure these are duly referenced; forwards these to their respective PMU for record and action purposes.

Step 3 Assessment & Discussion (Day 1/Day 2, not to go beyond Day 2)

PMU assesses if complaint is within the scope of the SCDP environmental GRM. If not, then AP is directed to the proper institution/mechanism. If it is, concerned parties visit the site of complaint and verify initial assessment. (Concerned parties would be the AP, Contractor and PMU during construction; and AP and Operator during operation.) If complaint is found to be not Subproject-related or not associated with poor environmental performance of the Subproject, AP is directed to the proper institution/mechanism. Otherwise, discussion on the cause/s and action/ measures to be taken shall be held. Agreement on action/measures and time involved shall be made with the AP.

Step 4 Implementing Resolution (Day 2/Day3 for minor impacts; otherwise, Day 2/Day3 to Day 6/Day7)

If complaint is minor, i.e., not requiring further investigation and would be easy to resolve, the Contractor/Operator shall immediately implement discussed/agreed on resolution. Otherwise, if further investigation and/or procurement of supplies/parts would be necessary, the Contractor/Operator shall: (i) immediately provide the most suitable interim measure to reduce the magnitude of the impact; and (ii) start work on the final measure not later than 5 days from the day discussion meeting is held.

Step 5 Acceptance of Resolution (1 week after completion of resolution)

If, according to the AP, the impact has been resolved satisfactorily, PMU/Operator shall obtain a written confirmation of satisfaction from the AP. This confirmation will signify closure of grievance and will form part of the grievance documentation. Copy of confirmation will be sent to the CPC/PPC.

Step 6 Monitoring and Evaluation (for 1 week after closure of grievance)
The PMU/Operator shall monitor the effectiveness of the resolution for at least a week after closure of grievance (that is, when action implemented has been satisfactorily confirmed in writing by the complainant). Monitoring and evaluation shall be properly documented and included in the Environmental Monitoring Report.

Step 7 Appeal for Dissatisfied AP

Dissatisfied AP may appeal/raise their dissatisfaction to the City/Provincial Court.

D. Public Disclosure of the Mechanism

144. The PMUs shall have sufficiently disclosed the mechanism to the Subproject area of influence one month prior to the award of contract for civil works. Revealing and explaining the mechanism to the stakeholders shall be done:

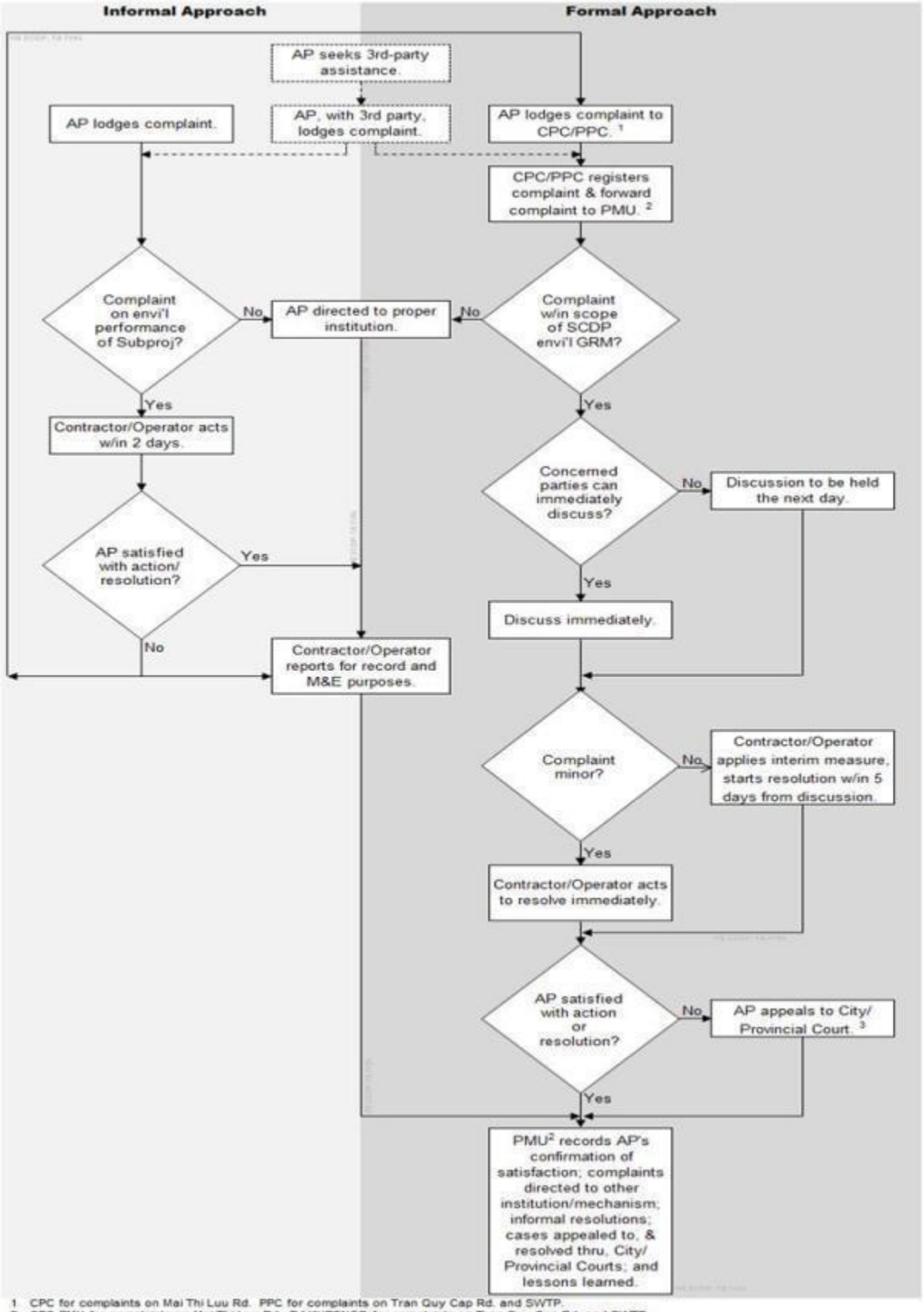
- during an independent IEE disclosure at the latter part of the detailed engineering design stage, and/or during a social preparation or information, education &

communication (IEC) campaign prior to award of contract for civil works, clearly informing the stakeholders of, at least, the following,:

- objective/purpose of the mechanism;
- who can raise grievances;
- what grievances are within the scope of the mechanism;
- no cost charged on complainants;
- benefits from/advantages of using the mechanism;
- informal and formal approaches;
- types of immediate response that complainants will expect from the entities when they lodge complaint, which will vary depending on the time (daytime or nighttime), day (weekday or weekend), weather (fine or stormy), and magnitude of impact complained about (minor or major), among others; and
- names and contact details of offices & their environmental officers.

- through display of the mechanism at the ward/commune offices and at other strategic locations in the Subproject's area of influence, in easily understandable form and complete in basic information, such as the:
  - name of the Subproject and its executing agency,
  - map showing locations of works,
  - implementation schedule;
  - purpose and target users of the mechanism;
  - the procedures (informal and formal);
  - access to the mechanism at no cost; and
  - names and contact details of key persons of the PMUs, Contractor and Operator.

Figure 11. Grievance Redress Procedure



1 CPC for complaints on Mai Thi Luu Rd. PPC for complaints on Tran Quy Cap Rd. and SWTP.
2 CPC-PMU for complaints on Mai Thi Luu Rd. DAKURENCO for complaints on Tran Quy Cap Rd. and SWTP.
3 City Court for appeal regarding Mai Thi Luu Rd. Provincial Court for appeal regarding Tran Quy Cap Rd. and SWTP.

Abbreviations
AP - affected person CPC - BMT City People's Committee envi'l - environmental GRM - grievance redress mechanism
M&E - monitoring & evaluation PCP - Dak Lak Provincial People's Committee SCDP - Secondary Cities Development Project w/in - within

VIII. ENVIRONMENTAL MANAGEMENT PLAN

145. The environmental management plan (EMP) will be the framework for the environmental management of the Subproject that will commence from detailed design phase through to operation. The draft EMPs for the two components of the Subproject are featured herein as **Annexes H** and **I.** These will be finalized by the PMU based on the detailed design, with technical assistance from the Environmental Specialist of the Project Implementation Support (PIS) Team. The EMPs will be carried out by the detailed design Consultant, PMUs, Contractor for civil works, and the DAKURENCO, the Operator.

A. Implementation Arrangements

146. The institutions that will have major and minor roles in environmental management include the: (i) Dak Lak Province People's Committee (DLPCP), as the executing agency of the Subproject; (ii) Buon Ma Thuot City People's Committee as the implementing agency; (iii) the Project Management Unit (PMU); (iv) Project Steering Committee (PSC); (v) Project Implementation Support (PIS) Team, its Environmental Specialist; (vi) Asian Development Bank (ADB); (vii) Design Consultant; (viii) Civil Works Contractor; (ix) DAKURENCO as operator; (x) Department of Natural Resources and Environment (DONRE); (xi) Department of Public Health (DPH); and (xii) People's Committees of concerned wards and communes (W/CPC).

147. The BMTCPC, through the PMU, will be responsible for the detailed preparation and implementation of the Subproject. The PSC, headed by the vice-chairman of the Dak Lak PPC, will be responsible for deciding on environmental management matters that will require action from the senior-management level. It will ensure the allocation and timely disbursement of adequate resources for the monitoring of EMP implementation and conduct of environmental monitoring activities. The PMUs shall undertake and manage the day-to-day activities of their Sub-components. Their full-time Environmental Engineers/Scientists shall oversee and monitor the implementation of Component EMPs. The PIS Team shall include Environmental Specialists, who will impart technical advice, guidance support and "hands-on training" to the PMUs, particularly the Environmental Engineers/Scientists, in Subproject environmental management, at least in the first two-three years of Subproject implementation. The ADB shall undertake reviews and approvals of relevant documents, and carry out annual environmental review missions. The roles and responsibilities of each of these and other institutions are detailed in the draft EMPs. **Annexes H** and **I**

B. Capacity Development

148. Capacity development on environmental management will be implemented through: (i) conduct of lectures and seminars; and (ii) through "learning-by-doing". Lectures/seminars will range from "overview and key points for managers" to "specifics of environmental management of urban infrastructure projects." The preliminarily identified subjects include: (i) GOV legal framework vis-a-vis ADB safeguard policy; (ii) environmental management systems including challenges and strategies in developing and implementing them; (iii) environmental management plan (including mitigation, monitoring and reporting); (iv) grievance redress mechanism; (v) meaningful public consultation; (vi) climate change impacts and adaptation; and (vii) other subjects of interest to the PMU that might arise during detailed design stage. The requirement for the conduct of the courses and seminars is integrated in the overall budget for the Subproject capacity development.

149. The Environmental Specialist of the Project Implementation Support (PIS) Team shall conduct his/her technical assistance to the PMU as capacity development in itself All institutions involved in the Project/Subproject environmental management will be encouraged and invited to participate. However, training will be focused on the PMU, especially its Environmental Engineer/Scientist. Training shall be highly "hands-on" or adopting the "learning while doing" approach. The draft outline ToR for the Environmental Specialist is appended in the draft EMPs.

C. Preliminary Costs

150. The marginal costs for implementing the EMPs of the two components are initially estimated to involve:

- USD 30,108 (or VND 626 million) of fixed costs to cover environmental effects monitoring prior to, and during, construction;
- USD 6,000 (or VND 125 million) annually for environmental monitoring of SWTP during operation;
- USD 3,472 (or VND 72 million) annually for environmental monitoring of urban roads sub-components during operation; and
- USD 11,100 (or 230 million) annually for environmental monitoring during decommissioning phases of the SWTP and the Cu Ebur dumpsite (for at least 5 years after closure or as agreed).

151. The estimated costs: (i) include taxes and contingencies for deficiencies in assumed unit costs, but exclude inflation; (ii) exclude the salary of the Environmental Engineer/Scientist as he/she will be existing PPC or CPC staff seconded/assigned to the PMU for the environmental management of the Subproject; (iii) exclude the costs spent by PMU for compliance with GOV safeguard requirements in March 2013; and (iv) exclude the cost for technical assistance and "hands-on" training" by Environmental Specialists that will be engaged as part of the PIS Team, a total of USD 21,300 for all three Subprojects under the SCDP. Table 25

Table 25. Preliminary Costs for EMP Implementation

Activity			Cost	
			Fixed	Annual
Project Readiness				
A. Preparation & appraisal/approval of GOV EIARs			c/o PMU FS preparation	-
Sub-Total		USD	-	-
		VND	-	-
Environmental Effects Monitoring				
A. Solid Waste Management Component				
1 Pre-Construction *			2,372.00	-
2 Construction **			10,476.00	-
3 Operation			-	6,000.00
4 Decommissioning			-	11,072.00
Sub-Total		USD	12,848.00	-
	(thousand)	VND	267,238.40	-
B. Urban Roads Component				
1 Pre-Construction *			3,105.00	-
2 Construction ***			14,155.00	-
3 Operation			-	3,472.00
Sub-Total		USD	17,260.00	-
	(thousand)	VND	359,008.00	-
TOTAL		USD	30,108.00	-
	(thousand)	VND	626,246.40	-
Project Implementation Support Technical Assistance				
Environmental Specialists			21,300.00	-

PIS TA = USD 21,300 covers technical assistance for all 3 SCDP Subprojects.

IX. CONCLUSION AND RECOMMENDATION

152. The IEE concludes that:

- The activities involved in the Buon Ma Thuot Subproject are: (i) not environmentally critical; and (ii) not adjacent to or within environmentally sensitive/critical areas.

- The subcomponents are not large scale activities. Comparable activities could have been implemented in the city in the past decade, such as the 8,125 m3/d wastewater treatment plant, 26 km of sewers, 20 km of stormwater drains under DANIDA. Hence, the few potentially significant adverse impacts during construction will not be unprecedented and distinct.

- The extent of adverse impacts is expected to be local, confined within the sub-component sites, quarry sites, waste disposal sites, and the routes to and from these sites. Except during windy days, heavy rainfall and extreme weather event, fugitive dust, fine aggregates, sediments and/or wastes would not be the transported beyond the aforementioned sites. With mitigation measures in place and ensuring that the bulk of works are completed (or at least almost complete) prior to the onset of the rainy season, the potential adverse impacts during construction would be highly/more site-specific.

- The activities will not impact on protected areas and fragile systems.

- The few significant adverse impacts during construction will be temporary and short-term (i.e., most likely to occur only during peak construction period). These will not be sufficient to threaten or weaken the surrounding resources. The preparation and implementation of a Contractor's EMP that would address as minimum the requirements of the SPS compliant Subproject EMP will mitigate the impacts. Simple/uncomplicated mitigation measures, basically integral to socially and environmentally responsible construction practices, are commonly used at construction sites in urban settings and are known to Contractors. Hence, mitigation measures would not be difficult to design and institute.

- The proposed SWTP will be engineered to avoid and/or minimize the adverse impacts of waste disposal. Its operations will be guided by an O&M Manual that will embody environmental management during operations. As such, its operation is not expected to have long-term, persistent, permanent/irreversible adverse impact on human health and safety, air quality, water quality, biodiversity, and lifestyle and means of subsistence of surrounding local communities.

- Other adverse impacts during operation, i.e., during major repair works, would be similar to those during construction, but narrower in scope. Hence, these can be mitigated without difficulty.

153. The proposed Solid Waste Management Component will: (i) improve solid waste disposal; and (ii) contribute positively to reduced greenhouse gas emissions. The proposed Urban Roads Component will: (i) reduce inter-provincial and intra-area travel time and operating

costs; (ii) positively contribute to energy conservation and reduce greenhouse gas emissions. Overall, the Subproject will bring about qualitative improvement in the urban environment and gain the City great strides towards its green city vision. Living conditions will improve, bringing opportunities for improved health. Other benefits are improved mobility, increased productivity and increased land values.

154. Based on the above conclusions, the classification of Buon Ma Thuot Subproject as Category B is confirmed, and no further special study or detailed EIA needs to be undertaken to comply with the Safeguard Policy Statement of the ADB. Under GOV policy, all sub-components are Category 1 projects and an EIA report (EIAR) for each sub-component is required. (See Table 4 of Section III-B for the status of compliance with GOV EA requirements.)

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Annex A. Other Relevant Laws & Regulations

Law on Water Resources (No. 08/1998/QH10)
- wastewater discharges onto water resources to meet permissible standards
- planning & management of landfills to ensure protection of water resources from pollution
- prohibition of activities causing sedimentation of water channels & illegal filling public ponds & lakes

Law on Cultural Heritage (No. 28/2001/QH10), on the conservation and protection, & prohibits destruction, of cultural heritage
Law Amending and Supplementing a Number of Articles of the Law on Cultural Heritage (No. 32/2009/QH12)
- Cl 18, Art 1, on "chance find" of object/s that may be of cultural heritage value during construction, supplements Article 37 of Law on Cultural Heritage with details, as follows:
  In case of chance find during construction,
  - Project implementer/proponent shall immediately suspend works & notify the state agencies in charge of culture, sports and tourism.
  - Upon notification, said state agencies must promptly implement measures to ensure construction progress.
  - In the event, a termination of construction activity in the location of the "chance find" will be necessary in order to protect the relics, the same state agencies shall report the case to competent higher level authorities for decision.

Decree No. 98/2010/ND-CP, details a number of articles of the Law on Cultural Heritage & Law Amending and Supplementing a Number of Articles of the Law on Cultural Heritage

Law on Construction (No. 16-2003-QH11)
- ensured protection of the environment & general landscape
- ensured lives & property of people, fire-fighting/prevention, explosion prevention & environmental hygiene
- non-encroachments into cultural or historical heritage sites
- avoiding areas vulnerable to landslide & flooding, except for works that are intended to overcome these hazards
- ensured environmental hygiene, including the air environment, water environment, solid waste & noise management, & other requirements
- compliance with the provisions of laws on the protection of the environment

Decree No. 59/2007/ND-CP**,** on solid waste (SW) management
- disposal facility to operate only when it has an environmental supervision programs, plans & measures to ensure safety
- disposal operations to have plans/programs/measures to prevent & respond to environmental incidents; implement environmental supervisions programs; and implement labor safety plans
- environmental quality monitoring to be undertaken at the disposal facility at least once every 6 months, by the operator/owner:
  - throughout operation period
  - for at least 5 years after landfill closure or termination of disposal operations
  - to cover air environment and ecosystem, noise & vibration
- environmental quality monitoring to be also undertaken by the operator/owner at other locations & at frequencies recommended in the approved EIA Report
- environmental quality monitoring report to be submitted by the operator/owner/ investor to the local state agency for environmental protection
- result of the quality monitoring of effluent from the leachate treatment facility, & that of groundwater & environment to be part of the report on the actual state of the landfill & appurtenances to be submitted to the state agency for environmental protection within 6 months after landfill closure

Law on Biodiversity (No. 20/2008/QH12)
- prohibits the building of structures or houses in strictly protected sections of conservation areas, except works for defense and security purposes, and illegally building of works & houses in ecological restoration sections of conservation areas
- requires proposed investment projects within buffer zones of conservation areas to prepare EIA Report & have this approved accordingly

Circular No. 22/2010/TT-BXD, on labor safety in construction

- stipulates safety requirements that construction sites must satisfy, including but not limited to, proper storage/stockpile of supplies and materials, prompt & proper removal/disposal of wastes, drainage/storm water management, adequate fencing, adequate & strategically posted signage, warning boards, instructions for accident prevention, functioning signal lighting system, power safety, fire & explosion safety, labor safety rule enforcement, among others.

Annex A. (cont'd)

National technical regulations on, and technical procedures for monitoring of, environmental quality

Air Quality
- QCVN 05:2009/BTNMT, on ambient air quality
- QCVN 06:2009/BTNMT, on hazardous substances in ambient air
- Circular No. 28/2011/TT-BTNMT, on technical procedures for monitoring ambient air & noise

Noise
- QCVN 26:2010/BTNMT, on permitted maximum noise level in public & residential areas

Vibration
- QCVN 27:2010/BTNMT, on permitted maximum levels of vibration from construction & industrial activities in public and residential areas

Water Quality
- QCVN 08:2008/BTNMT, on surface water quality
- QCVN 09:2008/BTNMT, on ground water quality
- TCVN 6774:2000, on freshwater quality for aquatic lives
- Circular No. 29/2011/TT-BTNMT, on technical procedures for monitoring inland surface water
- Circular No. 30/2011/TT-BTNMT, on technical procedures for monitoring groundwater

Wastewater Quality
- QCVN 25:2009/BTNMT, on wastewater of solid waste landfill sites

Annex B. Population and Waste Quantity Projections

The existing disposal site has a working weighbridge. Based on the weighing records, the City is presently disposing about 200 tpd at Cu Ebur dumpsite. For a population of 340,000, this equates to 0.59 kg/day, which is typical. Allowing for the fact that only an estimated 85% is collected, this converts to 0.68 kg/day, consistent with other developing cities moving towards higher income status.

Table B.1 presents the population and waste quantity projections. Future populations in the City were predicted based on historical growth rates. These growth predictions are less than the future populations specified in the Master Plan. However, if the actual population growth rates are closer to the master plan predictions, there will be a significant impact on the size of the collection fleet required. The equipment and facilities at the waste disposal site will remain appropriate, but there will be a reduced landfill life cycle.

The population figures were applied to the central government specified waste generation rates per person over time (increasing to 1.3 kg/day by 2025) as well as collection efficiency requirements (increasing to 100% by 2025). Assumptions were made about increased recycling at source due to most increases in household waste being associated with packaging, and centralised recycling equipment being purchased in the future, such as a combined chipper/crusher which can recycle both green waste and construction and demolition waste. Additional allowances were made for other wastes such as medical waste. Based on this data, the total mass of waste going to the landfill, as well as the required cover material quantities, were then estimated. Ten years after the commencement of the site in 2015, approximately 1.4 million cubic metres of landfill airspace will be consumed by compacted wastes and cover material. After 30 years of operation, this increases to 5.2 million cubic metres of waste and cover.

Table B.1 Population and Waste Quantity Projections

Year	Population[1]	Domestic Waste Generation Rate (after recycling)[2] (kg/p.d)	Household Waste for Disposal (tpd)	Collection Efficiency	Domestic Waste Hauled to Landfill (tpd)	Industrial Waste Generated[3] (tpd)	Industrial Waste for Disposal (after recycling)[4] (tpd)	Hospital Mixed Waste & Mediwaste (tpd)	Total Waste for Disposal Daily (t)	Total Waste for Disposal Annually (t)	Cumulati Tons Haul Landfil (t)
2010	331,262										
2011	334,674										
2012	338,121										
2013	341,604										
2014	345,122										
2015	348,677	0.68	237	0.85	202	24	12	-	213.39	77,887	77,
2016	352,268	0.70	247	0.87	215	25	12	-	226.86	82,804	160,
2017	355,897	0.73	260	0.88	229	26	13	-	241.62	88,191	248,
2018	359,563	0.75	270	0.90	243	27	13	-	256.19	93,509	342,
2019	363,266	0.77	279	0.91	254	28	14	-	267.48	97,630	440,
2020	367,008	0.78	288	0.92	265	29	7	-	271.91	99,247	539,
2021	370,788	0.80	297	0.93	276	30	7	-	283.64	103,527	642,
2022	374,607	0.82	306	0.96	294	31	8	-	301.83	110,169	752,
2023	378,465	0.84	316	0.97	307	32	8	-	314.44	114,770	867,
2024	382,364	0.85	326	0.98	319	33	8	-	327.40	119,502	987,
2025	386,302	0.85	328	1.00	328	33	8	-	336.57	122,846	1,110,
2026	390,281	0.85	332	1.00	332	33	8	-	340.03	124,112	1,234,
2027	394,301	0.85	335	1.00	335	34	8	-	343.53	125,390	1,359,
2028	398,362	0.85	339	1.00	339	34	8	-	347.07	126,682	1,486,
2029	402,465	0.85	342	1.00	342	34	9	-	350.65	127,986	1,614,
2030	406,611	0.85	346	1.00	346	35	9	-	354.26	129,305	1,743,
2031	410,799	0.85	349	1.00	349	35	9	-	357.91	130,637	1,874,
2032	415,030	0.85	353	1.00	353	35	9	-	361.59	131,982	2,006,
2033	419,305	0.85	356	1.00	356	36	9	-	365.32	133,342	2,139,
2034	423,624	0.85	360	1.00	360	36	9	-	369.08	134,715	2,274,
2035	427,987	0.85	364	1.00	364	36	9	-	372.88	136,102	2,410,
2036	432,395	0.85	368	1.00	368	37	9	-	376.72	137,504	2,547,
2037	436,849	0.85	371	1.00	371	37	9	-	380.60	138,921	2,686,
2038	441,348	0.85	375	1.00	375	38	9	-	384.52	140,352	2,827,
2039	445,894	0.85	379	1.00	379	38	9	-	388.49	141,797	2,968,
2040	450,487	0.85	383	1.00	383	38	10	-	392.49	143,258	3,112,
2041	455,127	0.85	387	1.00	387	39	10	-	396.53	144,733	3,256,
2042	459,815	0.85	391	1.00	391	39	10	-	400.61	146,224	3,403,
2043	464,551	0.85	395	1.00	395	39	10	-	404.74	147,730	3,550,
2044	469,336	0.85	399	1.00	399	40	10	-	408.91	149,252	3,700,
2045	474,170	0.85	403	1.00	403	40	10	-	413.12	150,789	3,850,
2046	479,054	0.85	407	1.00	407	41	10	-	417.38	152,342	4,003,
2047	483,988	0.85	411	1.00	411	41	10	-	421.67	153,911	4,157,
2048	488,973	0.85	416	1.00	416	42	10	-	426.02	155,497	4,312,
2049	494,010	0.85	420	1.00	420	42	10	-	430.41	157,098	4,469,
2050	499,098	0.85	424	1.00	424	42	11	-	434.84	158,716	4,628,
2051	504,239	0.85	429	1.00	429	43	11	-	439.32	160,351	4,788,
2052	509,432	0.85	433	1.00	433	43	11	-	443.84	162,003	4,950,
2053	514,679	0.85	437	1.00	437	44	11	-	448.41	163,671	5,114,
2054	519,981	0.85	442	1.00	442	44	11	-	453.03	165,357	5,279,
2055	525,336	0.85	447	1.00	447	45	11	-	457.70	167,060	5,446,

1 Based on Master Plan and also local growth predictions using actual historical population data

2 Based on PM Decree where waste generation is to be 1.3kg/p.d from 2020. Assume that most fo the increased waste generated is packaging or greenwaste and would be recycled . Waste mass after recycling. Assumes that a chipper is purchased in 2020 and greenwaste diverted (30% reduction) and also more glass, paper and plastics due to increased packaging (20%)

3 Assume 10% of domestic waste

4 Assume 80% recyclable after chipper/crusher installed in 2020. Crushed concrete/bricks/tiles used for gravel in drains and gas vents as well as gravel for roads. Reinforcing steel to be recycled.

5 Assume waste density after compaction of 850 kg/m3

6 Assume 20% of airspace is cover material

Annex C. Climate Data, Dak Lak Province, 2008-2011

Average Temperature (^{o}C)

Month	2008	2009	2010	2011
January	20.7	20.1	22.3	20.3
February	20.8	23.5	24.6	22.3
March	23.5	25.3	25.4	22.5
April	26.1	25.5	27.2	24.9
May	24.6	24.7	27.5	25.9
June	25.1	25.0	25.9	24.7
July	24,7	24.4	24.6	24.7
August	24.1	25.1	24.6	24.7
September	23.8	23.7	24.4	23.9
October	24.3	23.8	23.8	23.8
November	22.6	22.8	22.3	22.9
December	21.1	22.1	21.3	20.9
Annual Average	**23.4**	**23.8**	**24.5**	**23.4**

Average Relative Humidity (%)

Month	2008	2009	2010	2011
January	81	78	78	80
February	79	77	73	73
March	73	75	72	78

April	75	81	72	74
May	87	86	76	81
June	85	86	85	87
July	87	88	87	86
August	90	86	88	87
September	91	92	88	90
October	88	87	89	88
November	88	83	91	84
December	85	79	83	84
Annual Average	**84**	**83**	**82**	**83**

Total Rainfall (mm)

Month	2008	2009	2010	2011
January	12.1	0.9	24.5	0.0
February	4.2	0.0	1.1	0.0
March	112.9	22.7	0.8	3.6
April	10.4	139.8	24.6	76.9
May	405.3	233.4	119.2	259.3
June	163.0	138.4	217.6	263.9
July	87.3	391.1	371.9	345.1
August	273.7	241.7	176.7	218.4
September	354.1	562.5	294.3	361.2
October	227.2	215.7	253.9	386.1
November	148.8	89.4	260.4	105.8
December	25.2	0.0	18.6	8.4
Total Rainfall	**1,824.2**	**2,035.6**	**1,763.6**	**2,028.7**

Total Sunshine Hours Monthly

Month	2008	2009	2010	2011
January	219.4	248.4	267.7	157.7
February	229.6	219.9	269.7	268.3
March	262.7	262.7	269.9	154.5
April	267.9	218.6	264.6	268.5
May	177.2	184.8	263.7	218.1
June	228.4	211.0	243.5	168.0
July	205.8	152.1	193.3	191.0
August	175.0	195.3	162.5	196.4
September	106.8	104.7	187.1	112.7
October	181.3	170.6	119.0	158.1
November	109.1	189.1	81.7	183.0
December	169.2	285.2	176.2	116.8
Total Sunshine Hours	**2,332.4**	**2,442.4**	**2,498.9**	**2,193.1**

Source: Dak Lak Province Statistical Yearbook, 2011.

Annex D. Recent Environmental Quality Monitoring Results

D.1 Air Quality: Buon Ma Thuot City

18 March 2012

No.	Parameter (mg/m^3)	Results per Sampling Site						QCVN	WHO [a]
		1	2	3	4	5	6	05:2009/BTNMT	US-EPA [b]
1	THC	0.084	0.71	1.33	0.65	1.30	1.10	5	
2	Bui (TSP)	0.12	0.41	0.56	0.47	0.55	0.39	0.30	-
3	H_2S	4.54	4.52	6.81	3.72	2.48	2.63	0.042	-
4	SO_2	0.38	1,81	2.19	1.54	1.34	1.73	0.35	0.20 [b]
5	NO_x	0.23	2.68	2.67	1.82	1.76	1.93	0.20	0.20 [a]
6	CO_2	751	862	1,053	837	948	899	-	-

25 May 2012

No.	Parameter (mg/m^3)	Results per Sampling Site						QCVN	WHO [a]
		1	2	3	4	5	6	05:2009/BTNMT	US-EPA [b]
1	THC	0.071	0.55	1.20	0.54	1.08	0.76	5	
2	Bui (TSP)	0.10	0.32	0.47	0.36	0.45	0.38	0.30	-
3	H_2S	1.22	3.87	5.74	3.45	4.53	3.49	0.042	-
4	SO_2	0.35	1.25	1.85	1.28	1.80	1.31	0.35	0.20 [b]
5	NO_x	0.19	1.64	2.31	1.83	2.15	1.88	0.20	0.20 [a]
6	CO_2	722	760	982	816	935	827	-	-

10 August 2012

No.	Parameter (mg/m^3)	Results per Sampling Site						QCVN	WHO [a]
		1	2	3	4	5	6	05:2009/BTNMT	US-EPA [b]
1	THC	0.05	0.71	1.26	0.09	0.08	0.46	5	
2	Bui (TSP)	0.03	0.41	0.52	0.15	0.26	0.21	0.30	-
3	H_2S	0.019	1.62	2.80	0.17	1.30	3.15	0.042	-
4	SO_2	0.17	1.85	2.81	0.21	0.16	0.17	0.35	0.20 [b]
5	NO_x	0.15	2.58	1.63	0.19	0.14	0.18	0.20	0.20 [a]
6	CO_2	538	895	1,035	742	794	751	-	-

12 November 2012

No.	Parameter (mg/m^3)	Results per Sampling Site						QCVN	WHO [a]
		1	2	3	4	5	6	05:2009/BTNMT	US-EPA [b]
1	THC	0.04	0.85	1.51	0.063	0.14	0.25	5	
2	Bui (TSP)	0.047	0.23	0.68	0.35	0.38	0.16	0.30	-
3	H_2S	0.013	2.52	3.26	0.14	1.73	1.49	0.042	-
4	SO_2	0.15	1.36	2.61	0.16	0.159	0.14	0.35	0.20 [b]
5	NO_x	0.18	1.69	1.48	0.18	0.168	0.17	0.20	0.20 [a]
6	CO_2	649	914	1,067	683	832	775	-	-

D.2 Air Quality: Existing Cu Ebur Dumpsite

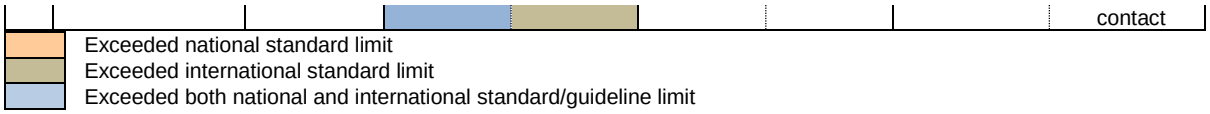
No.	Parameter (mg/m^3)	Sampling 1		Sampling 2		Sampling 3		QCVN	WHO [a]
		16 Sep '11	08 Dec '11	16 Sep '11	08 Dec '11	16 Sep '11	08 Dec '11	05:2009/BTNMT	US-EPA [b]
1	THC	0.09	0.08	0.72	0.67	1.55	1.49	5	
2	Bui (TSP)	0.33	0.40	0.53	0.55	0.71	0.68	0.30	-
3	H_2S	3.15	3.09	4.46	4.43	6.30	6.22	0.042	-
4	SO_2	0.73	0.69	2.55	2.54	2.88	2.81	0.35	0.20 [b]
5	NO_x	0.40	0.38	3.77	3.75	4.07	4.03	0.20	0.20 [a]
6	CO_2	760	745	998	983	1,160	1,143	-	-

Source: DONRE, Dak Lak Province

SO_2 guideline for 1 hr, converted using 1 ppb = 2.62 µg/m3 (applicable to SO_2)

D.3 Surface Water Quality: Water Body at 100 m Downstream of Wastewater Treatment Plant

No.	Parameter	Unit	Monitoring Results (mg/l)		QCVN 08:2008/BTNMT (mg/l)		US-EPA Recommended Surface Wtr Qlty Criteria (mg/l)	
			15/08/2011	12/12/2011	B1	B2	Aquatic Life	Human Health
1	pH	-	7.13	7.45	5.5-9	5.5-9	6.5-9	5-9
2	COD	mg/l	26.50	18.20	30.00	50.00	-	-
3	BOD_5	mg/l	12.60	9.10	15.00	25.00	-	-
4	TSS	mg/l	20.20	15.50	50.00	100.00	-	-
5	Total N	mg/l	4.10	3.80	-	-	-	-
6	Total P	mg/l	2.90	2.50	-	-	-	-
7	NH4/N	mg/l	1.25	0.43	0.50	1.00	-	-
8	Coliform	MPN/100ml	8,000	7,000	7,500	10,000	-	500 primary



Exceeded national standard limit
Exceeded international standard limit
Exceeded both national and international standard/guideline limit

D.4 Surface Water Quality: Water Body at 70 m N of the SWTP Site at Hoa Phu Commune

No.	Parameter	Unit	2012 Monitoring Results (mg/l)				QCVN 08:2008/ BTNMT (mg/l)		US-EPA Surface Wtr Quality Criteria (mg/l)	
			08 Mar	15 May	10 Aug	12 Nov	B1	B2	Aquatic Life	Human Health*
1	pH	-	7.5	7.4	7.6	7.4	5.5-9	5.5-9	6.5-9	5-9
2	COD	mg/l	16.2	15.8	16.5	15.8	30.0	50.0	-	-
3	BOD_5	mg/l	7.8	7.6	7.8	7.3	15.0	25.0	-	-
4	TSS	mg/l	32	28	30	27	50	100	-	-
5	Total N	mg/l	6.5	6.3	6.7	6.9	-	-	-	-
6	Total P	mg/l	0.28	0.3	0.35	0.42	-	-	-	-
7	Cr^{6+}	mg/l	0.01	0.013	0.015	0.005	0.040	0.050	-	-
8	Cu	mg/l	0.08	0.05	0.04	0.03	0.50	1.00	-	-
9	Zn	mg/l	0.2	0.17	0.2	0.32	1.50	2.00	-	-
10	As	mg/l	0.003	0.002	0.003	0.007	0.050	0.100	0.1500	0.0014
11	Cd	mg/l	0.002	0.001	0.0012	0.0025	0.0100	0.0100	0.0020	0.0100
12	Fe	mg/l	0.32	0.30	0.40	0.28	1.50	2.00	1.00	0.30 domestic use
13	E. Coli	MPN/100ml	60	48	40	35	100	200	-	235 primary contact
14	Coliform	MPN/100ml	7,200	7,300	7,200	7,300	7,500	10,000	-	500 primary contact

Source: DONRE, Dak Lak Province

B1 - Used for irrigation or other uses with the same water quality requirements or other similar purposes, such as type B2.

B2 - Water transport and other purposes with the requirements of low quality.

Exceeded US-EPA standard limit for human health and/or aquatic life

D.5 Surface Water Quality: Water Body at 70 m from Existing Cu Ebur Dumpsite

No.	Parameter	Unit	Monitoring Results (mg/l)		QCVN 08:2008/BTNMT (mg/l)		US-EPA Recommended Surface Wtr Qlty Criteria (mg/l)	
			16/09/2011	08/12/2011	B1	B2	Aquatic Life	Human Health
1	pH	-	6.97	6.95	5.5-9	5.5-9	6.5-9	5-9
2	SS	mg/l	31	27	-	-	-	-
3	BOD_5	mg/l	12	11	15	25	-	-
4	COD	mg/l	25.80	24.50	30.00	50.00	-	-
5	Total N	mg/l	4.60	4.30	-	-	-	-
6	Total P	mg/l	0.82	0.75	-	-	-	-
7	Fe	mg/l	0.49	0.46	1.50	2.00	1.00	0.30 domestic use
8	Pb	mg/l	0.004	0.004	0.05	0.05	-	0.05
9	Hg	mg/l	< 0.001	< 0.001	0.001	0.002	0.0014	-
10	As	mg/l	< 0.001	< 0.001	0.050	0.100	0.15	0.0014
11	Cd	mg/l	< 0.001	< 0.001	0.010	0.010	0.002	0.01
12	E. Coli	MPN/100ml	284	277	100	200	-	235 primary contact
13	Coliform	MPN/100ml	7,700	7,500	7,500	10,000	-	500 primary contact

Source: DONRE, Dak Lak Province

B1 - Used for irrigation or other uses with the same water quality requirements or other similar purposes. such as type B2.

B2 - Water transport and other purposes with the requirements of low quality.

Exceeded national standard limit

Exceeded international standard limit

Exceeded both national and international standard/guideline limit

D.6 Ground Water Quality: At, and in the Vicinities of, the SWTP Site in Hoa Phu Commune

No.	Parameter	Unit	Monitoring Results at Different Sampling Sites													
			15/03/2012				25/05/2012				10/08/2012				12	
			1	2	3	4	1	5	6	7	1	5	6	7	1	5
1	pH	-	6.3	6.35	6.5	6.45	6.4	6.3	6.7	6.5	6.5	6.7	6.6	6.4	6.7	
2.	SS	mg/l	3.2	3.7	3.2	2.8	3.3	3.5	3.4	2.9	3.4	3.6	3.2	3.0	3.8	
3	COD	mg/l	3.6	3.8	3.2	3.5	3.8	3.5	3.4	3.0	3.7	3.6	3.5	3.2	3.3	
4	BOD_5	mg/l	2.3	2.5	2.0	2.2	2.7	2.6	2.3	1.8	2.8	2.5	2.4	1.9	2.4	
5	Total N	mg/l	4.5	4.7	4.2	4.3	4.6	4.5	4.4	4.1	4.3	4.4	4.2	4.2	4.2	
6	Total P	mg/l	1.8	2.0	1.7	1.5	2.0	1.7	1.6	1.4	2.2	1.8	1.5	1.3	2.0	
7	Fe	mg/l	0.30	0.28	0.25	0.23	0.32	0.25	0.22	0.20	0.35	0.27	0.23	0.22	0.32	0
8	Cu	mg/l	0.05	0.02	0.03	0.07	0.03	0.01	0.02	0.05	0.02	0.015	0.03	0.04	0.015	0.0
9	As	mg/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
10	Cd	mg/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
11	Cr^{6+}	mg/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
12	Zn	mg/l	0.013	0.010	0.02	0.016	0.018	0.015	0.010	0.014	0.018	0.015	0.010	0.014	0.02	0.0
13	E. Coli	MPN/100ml	2	3	1	2	1	2	1	2	2	1	2	1	1	
14	Coliform	MPN/100ml	18	22	15	30	15	18	16	20	12	16	15	17	18	

ND Not detectable

1 Drilled well in at management house of proposed SWTP.
2 Drilled well of a HH, 600 m to the south of the SWTP site.
3 Drilled well of a HH, 1,000 m to the south of the SWTP site.
4 Drilled well of a HH, 1,500 m to the south of the SWTP site.
5 Drilled well at concrete casting factory, Binh Minh Ltd.Co., 500 m to the southeast of the SWTP site.
6 Drilled well at Tam Cao Compost Factory, 800 m to the southeast of the SWTP site.
7 Drilled well of Mr. Doan Ai Dung, 1,200 m to the southeast of the SWTP site.

D.7 Ground Water Quality: At the Existing Cu Ebur Dumpsite

No.	Parameter	Unit	Monitoring Results		QCVN 09:2008/BTNMT	WHO DW Quality Guideline
			16/09/2011	08/12/2011		
1	pH	-	6.32	6.27	5.5-8.5	6.5-9.5
2	SS	(mg/l)	4.10	3.90	-	-
4	BOD_5	(mg/l)	1.83	1.80	-	-
5	COD	(mg/l)	3.80	3.80	4.00	-
6	Total N	(mg/l)	4.50	4.30	-	-
7	Total P	(mg/l)	1.90	1.90	-	-
8	Fe	(mg/l)	0.35	0.32	5.00	-
9	Pb	(mg/l)	0.002	0.0016	0.0100	0.0100
	Hg	(mg/l)	ND	ND	0.001	0.006
10	As	(mg/l)	0.006	0.0054	0.0500	0.0100
11	Cd	(mg/l)	< 0.001	< 0.001	0.005	0.003
12	E. Coli	MPN/100ml	87	83	Must not be detectable	Must not be detectable
13	Coliform	MPN/100ml	5	3	3	Must not be detectable

Source: DONRE, Dak Lak Province

Exceeded WHO DW quality guideline
Exceeded national and WHO DW quality guideline

D.8 Leachate Quality: At Cu Ebur Dumpsite

Parameter		Unit	2011		2012				QCVN 25/ 2009/BTNMT (B1)
			16 Sep	08 Dec	08 Mar	25 May	10 Aug	12 Nov	
1	Ph	-	7.8	7.75	7.8	8.2	8.4	8.6	5.5-9
2	BOD5	mg/l	526	510	10,000	10,370	10,830	11,120	100
3	COD	mg/l	1250	1235	15,000	15,980	16,120	16,870	400
4	SS	mg/l	279	263	1600	1810	1870	1950	100
5	Total N	mg/l	288	279	2,800	2950	2890	2650	60
6	Total P	mg/l	7.7	7.5	270	292	315	305	^ 6
7	Fe	mg/l	3.2	3.2	5.8	5.7	5.9	5.5	^ 5
8	Pb	mg/l	0.2	0.18	-	-	-	-	^ 0.5
9	As	mg/l	0.05	0.05	0.18	0.2	0.23	0.3	^ 0.1
10	Hg	mg/l	0.02	0.01	-	-	-	-	^ 0.01
11	Cd	mg/l	0.01	0.008	0.2	0.4	0.45	0.47	^ 0.1
12	Cr^{6+}	mg/l	-	-	0.5	0.8	0.9	1.3	^ 0.1
13	Cu	mg/l	-	-	2.5	3.2	3.5	3.8	^ 2
14	Zn	mg/l	-	-	3.8	3.6	3.7	4.2	^ 3

15	Coliform	MPN/100 ml	18,500	17,800	28,000	35,000	34,500	38,000	^ 5,000
16	E. Coli	MPN/100 ml	547	526	500	580	610	580	-

Source: DONRE, Dak Lak Province

Column B1 under QCVN 25/2008/BTNMT prescribes the maximum allowable concentration of pollutants in wastewater from landfills operating before 01 January, 2010, when discharged into the water not used for water supply purposes.

^ QCVN 40/2011/BTNMT, National Technical Regulation on Industrial Wastewater

Annex E. Screening of Potential Adverse Impacts During Construction *

Factors	Solid waste Management		Urban Roads
	Solid Waste Treatment Plant	Closure of Existing Dumpsite	
Land area disturbed: (focused on the subcomponent sites, not necessarily including the quarry sites and waste disposal sites and associated routes to and from)	Significant	Significant	Moderate
Deviation from existing conditions			
Air Quality			
Dust	S deviation. Currently agro-forestry trees zone. Possibility of few intermittent times in a day and few intermittent days in a month to exceed regulatory limit.	M deviation	S deviation. Low to moderate urban development, largely residential and undeveloped lands. Possibility of few intermittent times in a day and few intermittent days in a month to exceed regulatory limit, particularly during the peak construction period.
Gas emissions	S deviation. Currently agro-forestry trees zone.	L deviation	M-S deviation. Gas emissions now from low-moderate vehicular traffic.
Noise	S deviation, particularly during peak construction period. Currently agro-forestry trees zone.	S deviation	S deviation, particularly during peak construction period. Now, largely undeveloped land.
Water Resources			
Availability/reliability concerns (water demand to be met using water supply or groundwater)	S deviation (groundwater). Especially when peak construction period falls within the dry season.	S deviation (groundwater). Especially when peak construction period falls within the dry season.	S deviation
Surface water quality	None. Nearest spring, 60 m from the nearest edge of Cell 2, is higher than existing ground elevation of Cells1, 2.	L-M. Nearest water body is at least 70 m from N boundary, & at least 60 m from W boundary of dumpsite.	M-S deviation. Significant during the peak construction of culverts (MTL Rd) and bridge (TQC Rd).
Groundwater quality	N-L deviation. Currently agro-forestry trees zone. GW level is some 70-80 m below.	N-L deviation. Site is leachate contaminated.	L deviation. Few groundwater wells as the wards are supplied with piped water.
Sanitation conditions (poor sanitation & SW)	M-S deviation	N-L deviation	M deviation
Availability/reliability/capacity of services (URENCO collection & city's disposal site)	N deviation	N deviation	S deviation
Drainage conditions (SW, sediment, aggregates)	N-L deviation	N-L deviation	M-S deviation

Annex E. (cont'd)

Factors	Solid Waste Management		Urban Roads
	Solid Waste Treatment Plant	Closure of Existing Dumpsite	
Traffic	M-S deviation. Expected significant deviation during peak construction period at points where & times when construction trucks converge with City peak traffic.	M-S deviation. Expected significant deviation during peak construction period at points where & times when construction trucks converge with City peak traffic.	M-S deviation. Expected significant deviation during peak construction period at points where & times when construction trucks converge with City peak traffic.
Public health and safety hazards	M deviation. Only from existing level of road safety hazard during convergence of construction traffic with peak city traffic & during the entire peak construction period.	N-S deviation. No deviation from current level of health hazard. Significant deviation from current safety hazard level from movement of vehicles and equipment and potential fire/explosion and trash slide.	M-S deviation. Moderate deviation from existing low level of health hazard. Moderate deviation from existing road safety hazard during convergence of construction traffic with peak city traffic & during the entire peak construction period.
Sensitivity of resources in effective vicinities	M-S. Some significant impacts on construction workers, particularly during peak construction period. Potential moderate impacts on: - farmers working in the rice paddies & residents along access road, - rice plants in rice paddies along access road, & - other vegetation in the vicinities.	M-S. Significant impact on workers. Moderate impact on surrounding vegetation.	M-S. Some significant impacts on workers and residents, and aquatic resources in crossed river, particularly during peak construction period. Potential moderate impacts on the vegetation in the vicinities.

* Assumes "without mitigation case". Focused on sub-component sites and vicinities. N is "none", L is "low", M is "moderate", S is "significant".

Annex F. Screening of Potential Adverse Impacts During Operation *

Factors	Solid Waste Management SWTP	Urban Roads
Land area disturbed	Significant.	N/A
Deviation from existing conditions		
Air Quality		
Dust	S deviation	M-S deviation
Gas emissions	S deviation	M-S deviation
Noise	M deviation	M-S deviation
Water Resources		
Availability/reliability concerns (if use groundwater for operations	S deviation. Especially during dry season.	N deviation
Surface water quality	N deviation	M-S deviation, if new replacement bridge (TQC Rd) & culvert/s (MTL Rd) narrows passage of flow of crossed rivers and if road impedes surface drainage in the area.
Groundwater quality	S deviation	N deviation
Sanitation conditions (poor sanitation & SW)	S deviation	N deviation
Availability/reliability/capacity of SW services (URENCO collection & disposal site)	N/A	L deviation. Low contribution of improved road to the expected growth along the roads, as development is currently progressing moderately along the existing MTL and TQC Roads.
Drainage conditions	S deviation. Build up of more paved areas or conversion of natural land to waste cells would cause change in &/or impeding of surface drainage patterns in the site.	L-M deviation with inadequate consideration of surface drainage and climate patterns in design.
Traffic	L-M deviation.	M-S deviation.
Public health/safety hazards (only in site & vicinity)	S deviation.	M deviation
Sensitivity of resources in effective vicinities	L-S Significant impacts on: (i) workers, particularly those handling wastes; (ii) on vegetation and Potential low impacts on farmers working in the rice paddies adjacent to access road and travelling along Industrial Road	M

* Assumes "without mitigation case". Focused on sub-component sites and vicinities.
N is "none", L is "low", M is "moderate", S is "significant".

Annex G. Notes of Consultations

G.1 Notes of Consultations

The table below features mainly the notes of informal interviews with randomly picked affected persons who agreed to be interviewed.

Date	Name	Topics Discussed
05 Sep 2012	Mr. Do Tan Khen Scavenger Cu Ebur Dumpsite	Mr. Do Tan Khen, one of 4 scavenger couples allowed to stay at dumpsite; 34 years old, married and has 5 children who don't stay with them. They visit the children once a week to give VND 100,000 for food. Scavenging for a year now. - Total number of scavengers *80 persons.* - How many live at the dumpsite? *Only 4 HHs, with clearance from DAKURENCO.* - Where do you source water from? *Go to DAKURENCO to ask for water for drinking & cooking.* *For washing, water from the lake, about 500 m away.* - Source of food for the 4 scavengers allowed to stay in site

		Walk to the market, about 3 km from the dumpsite. - Earnings from scavenging *He and his wife earn about VND 150,000 daily.* - Availability of sanitation facility in site for the 4 scavengers *None. They dispose anywhere in the dumpsite.* - Incidence of water-borne disease *Stomach trouble, no see doctor, just buy and take medicine.* - What happens during heavy rains in the site? *House gets wet inside, so they wear rain coat & go elsewhere.* - Any incident of trash slide *No.* - Awareness that the dumpsite will be closed. *No.*
08 Jan 2013	Male, Head of HH Affected by MTL Rd Sub-component	- Awareness of the Subproject & impact on his HH *He or his HH is not aware of the proposed MTL Rd project. He is worried because the depth of their property is short, no adequate space for living will be left. He would like to be informed about the impact on his HH.*
09 Jan 2013	Mr. Nguyen Van Ngot Head of HH Affected by SWTP Sub-component	- Awareness of the Subproject & impact on his HH *He heard it from the Commune People's Committee & from the news* *He & his family have been living in this place for 7 years. His family of 3 generations is living together in this house. He has 9 ha of land, equally shared among him & his 2 sons. He has cashew, coffee, mango trees and fish ponds in his land.* - Potential impacts of the proposed SWTP *He worries about pollution, especially water pollution, and flies during operation; and dust during construction. He supports the project and is willing to be relocated, although he prefers to be compensated and wishes his 2 sons to have jobs at the landfill.*
09 Jan 2013	Mr. Dao Ngoc Thieu Resident of Hoa Phu Commune (outside SWTP site)	- Awareness of the Subproject *No, he has not heard because he and his family are just about to move in to this house. (House was being fixed during the informal interview.)* - Potential impacts during construction & operation *He thinks their house is far away to be affected by the SWTP operations. He is just worried that the Industrial Road will be further degraded. He expects dust to be the serious impact on them during construction & operation from movement of trucks. The road would become impassable if not upgraded.* - His source of water *A 10-m deep well.*
10 Jan 2013	Ms. Vu Thi Gam Resident Partially affected by TQC Rd Sub-component	- Awareness of the Subproject & impact on her HH *She & her family have been living here since 1992. They have a small convenient store (which she runs) in front of their house. No, they have not heard about the project. But, they are aware that something is going to happen as they see surveyors & people laying down stakes/ground markers.* - Her comments when told about the upcoming project *Now road is narrow, there has been frequent accidents. With wider road, it would be more convenient for traffic and business & land value will increase. She supports the project and will agree to give up the affected front of their property, move back & rebuild their house, if the compensation is reasonable.* - Potential impacts *During construction, travel & her business will be disrupted. They will have access problems, too. Impacts on air, noise & accidents will be caused.*

G.2 Attendance Sheets and Photos of Public Meetings

Morning, 11 March 2013 – Tu An, Tan Lap, Ea Tam Wards

ICF G.H.K VICA

SCDP Form No. 001

TA 7856 VIE: SECONDARY CITIES DEVELOPMENT PROJECT
SCDP PPTA CONSULTANT (45198-001)
GHK CONSULTING LTD.
(TA 7856 VIE: DỰ ÁN PHÁT TRIỂN ĐÔ THỊ LOẠI VỪA (SCDP)
TƯ VẤN HỖ TRỢ KỸ THUẬT (45198-001)
CÔNG TY TƯ VẤN GHK)
510 Hung Vuong, Tam Ky City, Quang Nam Province, Vietnam
(510 Hùng Vương, Tam Kỳ, Quảng Nam, Việt Nam)

PROJECT POLICY INTRODUCTION MEETING IN Tu An, Tan Lap, Ea Tam wards, BUON MA THUOT
(CUỘC HỌP GIỚI THIỆU DỰ ÁN TẠI 3 phường, Tp. BUÔN MA THUỘT)

SÁNG 11 /3/2013

ATTENDANCE SHEET (DANH SÁCH NGƯỜI THAM GIA HỌP)

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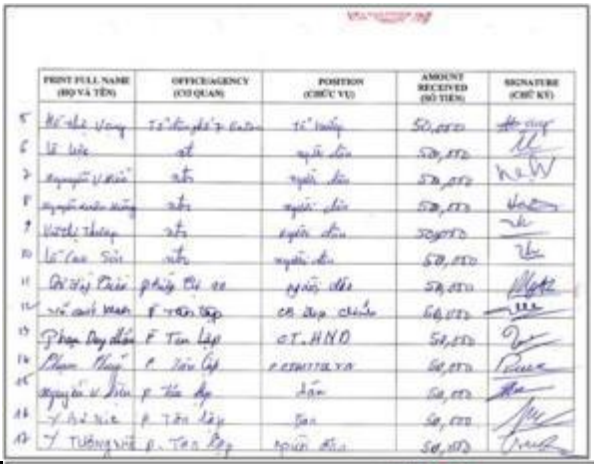

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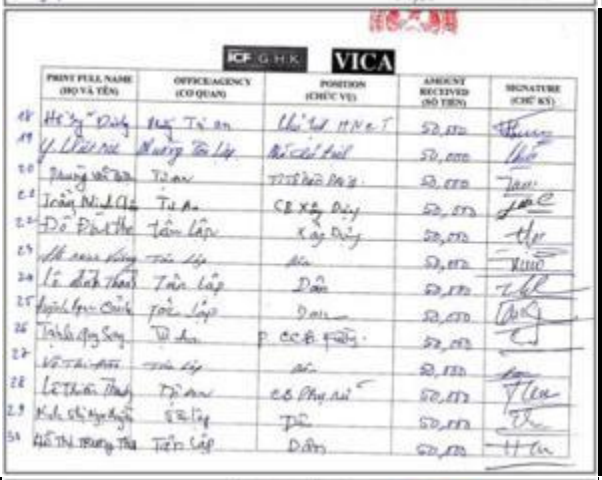

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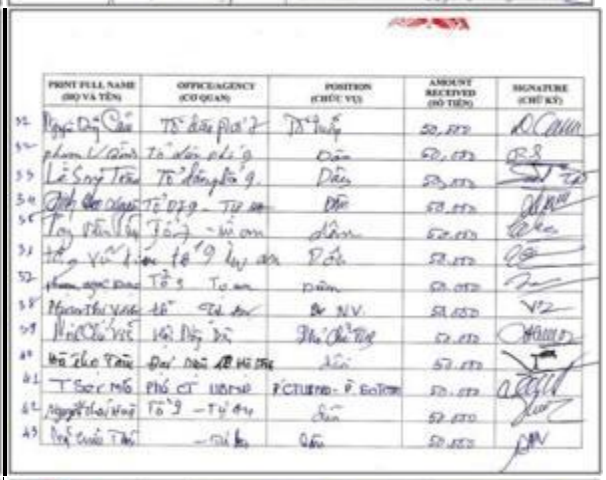

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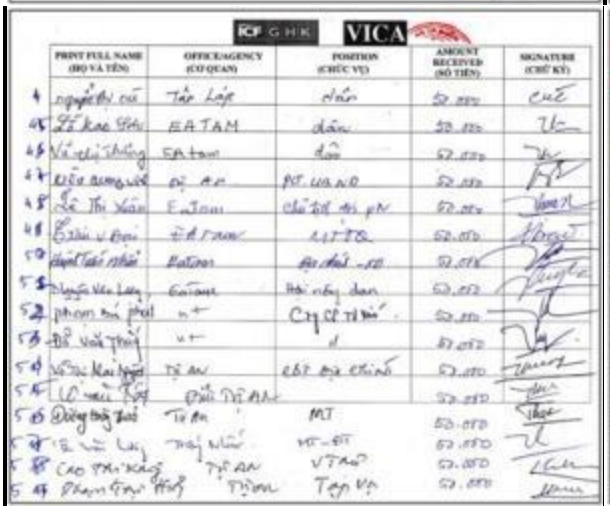

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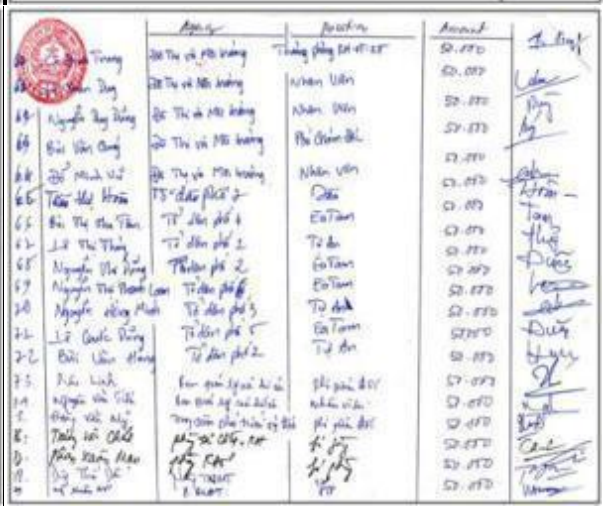

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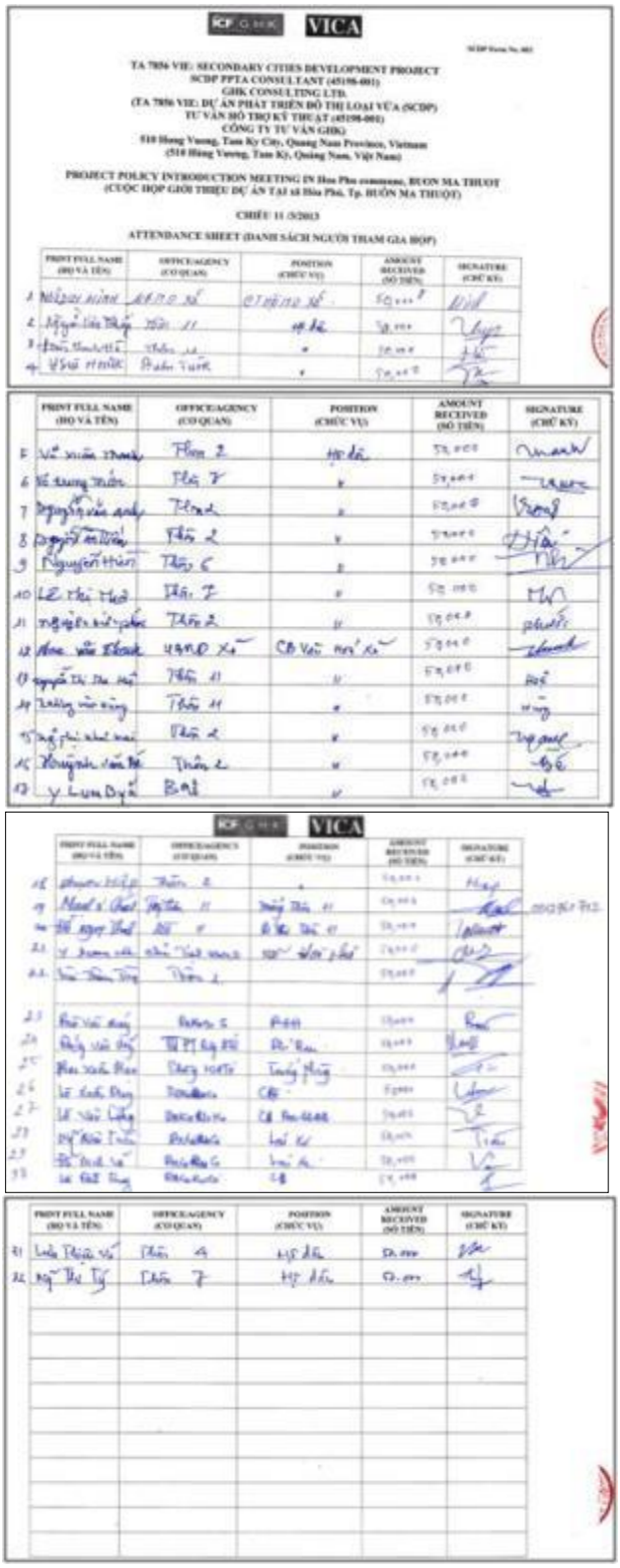
Afternoon, 11 March 2013 – Hoa Phu Commune



TA 7856-VIE: SECONDARY CITIES DEVELOPMENT PROJECT
SCDP PPTA CONSULTANT (45198-001)
GHK CONSULTING LTD.
(TA 7856 VIE: DỰ ÁN PHÁT TRIỂN ĐÔ THỊ LOẠI VỪA (SCDP)
TƯ VẤN HỖ TRỢ KỸ THUẬT (45198-001)
CÔNG TY TƯ VẤN GHK)
510 Hung Vuong, Tam Ky City, Quang Nam Province, Vietnam
(510 Hùng Vương, Tam Kỳ, Quảng Nam, Việt Nam)

PROJECT POLICY INTRODUCTION MEETING IN Hoa Phu commune, BUON MA THUOT
(CUỘC HỌP GIỚI THIỆU DỰ ÁN TẠI xã Hòa Phú, Tp. BUÔN MA THUỘT)

CHIỀU 11 /3/2013

ATTENDANCE SHEET (DANH SÁCH NGƯỜI THAM GIA HỌP)

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G.3 Photos of Two Random Interviews

08 January 2013 – Mai Thi Luu Road

05 September 2012 – Cu Ebur Dumpsite

Annex H.

(Draft) **Environmental Management Plan**
for the
Solid Waste Management Component

Buon Ma Thuot Subproject
of the
Secondary Cities Development Project

Environmental Management Plan (draft)

Project No. XXXX
April 2013

Socialist Republic of Viet Nam: Secondary Cities Development Project --- Buon Ma Thuot Subproject Solid Waste Management Component

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CURRENCY EQUIVALENTS
(as of 17 May 2013)

Currency unit	–	dong (D)
D1.00	=	$0.0000477
$1.00	=	D20,925

Abbreviations

ADB	Asian Development Bank
CEMP	Contractor's Environmental Management Plan
CEMR	Contractor's Environmental Management Report
DAKURENCO	Dak Lak Urban Engineering Company
DONRE	Department of Natural Resources and Environment
DPH	Department of Public Health
EERT	External Emergency Response Team
EMP	Environmental Management Plan
EMR	Environmental Monitoring Report
GOV	Government of Viet Nam
IEC	Information, Education and Communication
IEE	Initial Environmental Examination
PIS	Project Implementation Support
PMU	Project Management Unit
SC	Safety Coordinator
ST	Safety Team
ToR	Terms of Reference
USD	United States Dollar
VND	Viet Nam Dong

I. BACKGROUND

155. This draft Environmental Management Plan (EMP) for the Solid Waste Management Component is part of the Initial Environmental Examination (IEE) Report for the Buon Ma Thuot City Subproject of the Secondary Cities Development Project. The IEE was conducted during project preparation that started in the 3rd Quarter of 2012. This draft EMP shall be finalized by the Project Management Unit (PMU) based on the detailed design, with technical assistance from the Environmental Specialist of the Project Implementation Support (PIS) Team. This document, together with the IEE, will have to be agreed on by Loan Fact Finding and endorsed soon thereafter for uploading to the ADB website.

156. The Buon Ma Thuot City Subproject under the Secondary Cities Development Project will deliver the following outputs, through three components namely:

(i) Solid Waste Management Component
   i. improved solid waste disposal
   ii. remediated open dumpsite
   iii. a pilot project for community waste at source segregation and a supporting information and education campaign;

(ii) Urban Roads Component
   i. improved/complete major roads; and

(iii) Capacity Building and Subproject Implementation Support
   i. increased efficiency and management capacity of the relevant government agencies in project management, particularly in financial management, procurement, project performance monitoring and evaluation.

157. Under the Solid Waste Management Component, a part of Phase 1 of the City's proposed Solid Waste Treatment Plant (SWTP) in Hoa Phu Commune will be implemented and the existing dumpsite in Cu Ebur Commune will be remediated. (Figures H.1, H.2, H.3) The summary of works for the proposed SWTP is presented in Table H.1; the remediation works in Cu Ebur are briefly described below:

- Remediation will adopt a cut and carry approach to remove all actively burning material and wet it prior to replacing and covering in accordance with a final design.
- Compacted waste will then be covered with a 600 mm clayey soil cap. A 600 mm growing media will then be applied on top of the clay cap and planted grass.
- Landfill gas vents will be installed progressively on the new Cell 1 as it is developed. There is no need to install gas vents on the rehabilitated old waste mound as the organic material has either biologically degraded or been incinerated as part of the ongoing burning activities.
- A perimeter leachate interception drain and associated pumping station will be required for the old mound after remediation. A High Density Poly Ethylene (HDPE) liner and leachate interception system is already being installed at the new cell.
- It is proposed to ultimately use the area for passive recreation such as parks, as well as possibly a sports ground.
- The proposed final cover design and batter slopes will minimise rainfall infiltration and, therefore, leachate generation. Given that the ground water locally is not used for potable water supplies and that the soil has extensive clay content, it is not necessary to install an artificial liner under the exiting

waste mound. This would be a large cost for what will be of little environmental benefit.

- Leachate pumping station/s will lift the leachate to irrigate newly planted areas in the dry weather encouraging vegetation cover. This would involve running a permanent pipe to the top of the mound and then having a "relocatable" pipe attached to this outlet. In wet weather, leachate would be pumped to the top of the mound to be re-injected. Four groundwater sampling wells with lockable caps will be also be installed.

Table H.1 Summary of Works Under Phase 1 of the Proposed SWTP

	Item	Detail	Remark/s
1	Waste cells 1 & 2	280 m x 107 m each	Estimated life span of 10 years: - Cell 1, 3 yrs - Cell 2, 3 yrs - Infill between Cells 1 & 2, 4 yrs
2	Buildings	592 m^2, one storey	To house a workshop, offices, laboratory & sleeping quarters
3	Access road	26 m wide (14 m carriageway, 6 m sidewalk both sides) 1,182 m long	All-weather
4	Internal roads	9,760 m^2 , of gravel	Access to Cells 1 & 2
5	Perimeter fencing	2,400 m long, 1.8-2.0 m high, of brick	Around administration building & Cells 1 & 2
6	Groundwater monitoring wells	4 units	2 downstream & 2 upstream
7	Leachate management		
	i) Bottom liner	Geo-textile 2 mm HDPE liner 200 mm drainage blanket	
	j) Side slopes	1V:2.5H for external batter of waste mound; 5% slope for liner base of cells	
	k) Leachate collection	2 units of 300-m long PVC pipe	one in base of each cell
	l) Leachate pump	2 units @ 5 l/sec	one for each cell
	m) Re-circulation pipe	2 units of 160-m long 75 mm Ø HDPE	one in each cell
	n) Longitudinal central drain	Nominally 600 mm x 800 mm, 2.38 km long, trapezoidal reinforced earth drain	
	o) Peripheral drain (stormwater drainage)	2- 4500 mm x 600 mm trapezoidal reinforced earth drain, 500 m long	one for each cell
	p) Irrigation pipe	2-400 m long pipe	one for each cell
8	Gas vent	20-150 mm Ø x 6 m, PVC (steel cast top)	one at every 50 m x 70 m grid
9	Electrical works	Transformer and poles	
10	Water supply	Ground water for non-potable use and rainwater to be stored in underground tanks.	
11	Landscaping		Access and internal roads and around administration building
12	Landfill equipment	1 landfill compactor, 1 bulldozer, 1 excavator, 1 dump truck, 1 water tank	
13	Operations Manual		Basic operational guidance for successful operation of the facility

158. The Component will be implemented over a period of 54 months (excluding defects liability period), to cover: (i) 12 months of preparation of detailed design and bidding documents; (ii) 9 months of procurement process; and iii) about 36 months of construction. Operation of Hoa Phu Sanitary Landfill is estimated to start by the beginning of the 58^{th}/61^{st} month, even before defects liability period is over. Cu Ebur Dumpsite is expected to gradually or fully stop receiving wastes as soon as the Hoa Phu Sanitary Landfill is commissioned to operate. Table H.2

Table H.2 Implementation Schedule

Subproject Component	Y1				Y2				Y3				Y4				Y5				Y6			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Solid Waste Management																								
Detailed engineering design	■	■	■	■																				
Bidding & award				■	■	■																		
Development of Hoa Phu landfill						■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
Procurement of landfill equipment													■	■	■	■								
Closure of Cu Ebur dumpsite															■	■	■	■	■	■	■	■	■	■
Capacity Building - Subproject Implementation Support																								
Recruit Project Implementation Support Consultants	■	■	■	■																				
Recruit Fiduciary Consultants				■	■	■																		
Training and capacity building					=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=			
Institutional strengthening					=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=				

■ ■ ■ ■ ■ | Defects Liability Period

= = = = = Intermittent inputs of various consultants

Figure H.1 Layout for the Proposed SWTP and Cross Sections of Cells 1 & 2

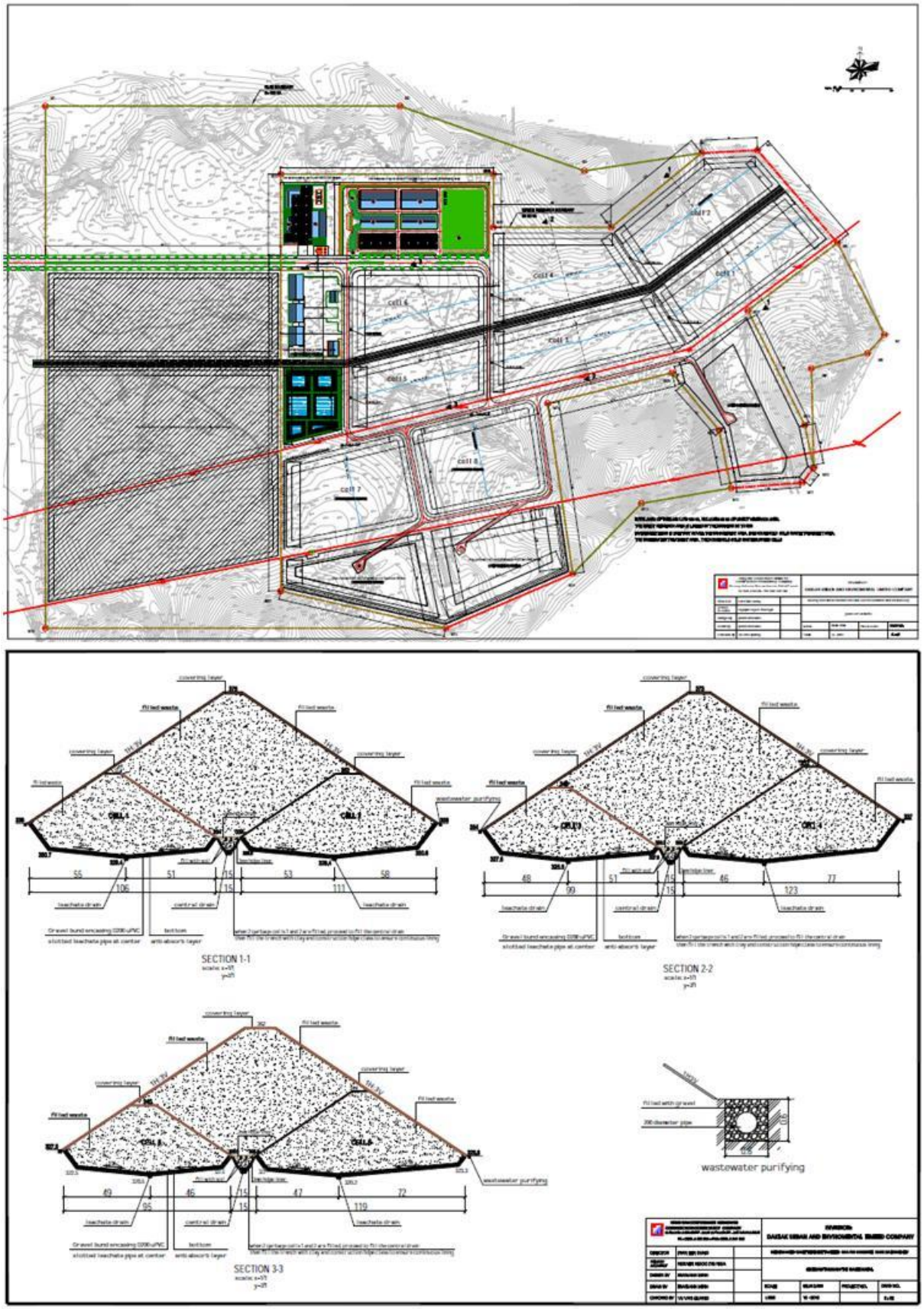


Figure H.2 The Current Plan and Cross Sections of the Cu Ebur Dumpsite

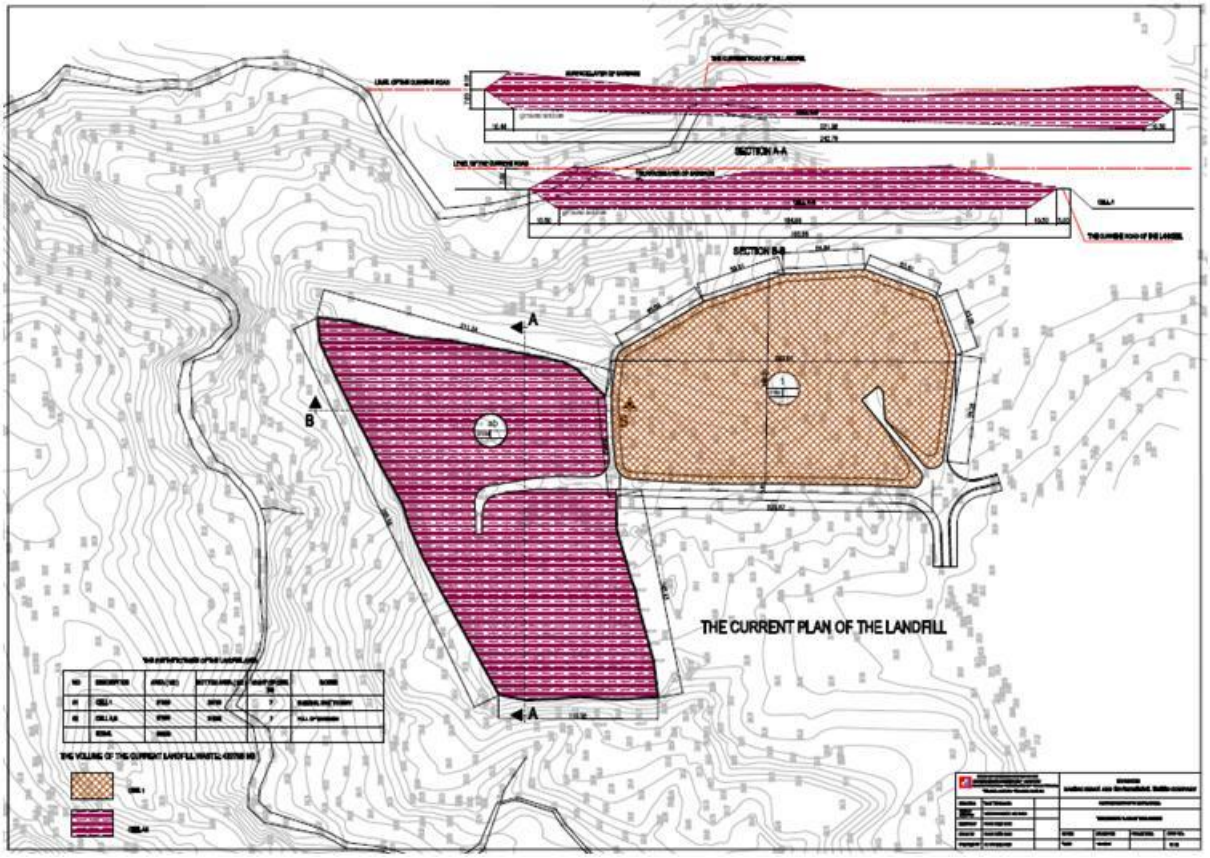
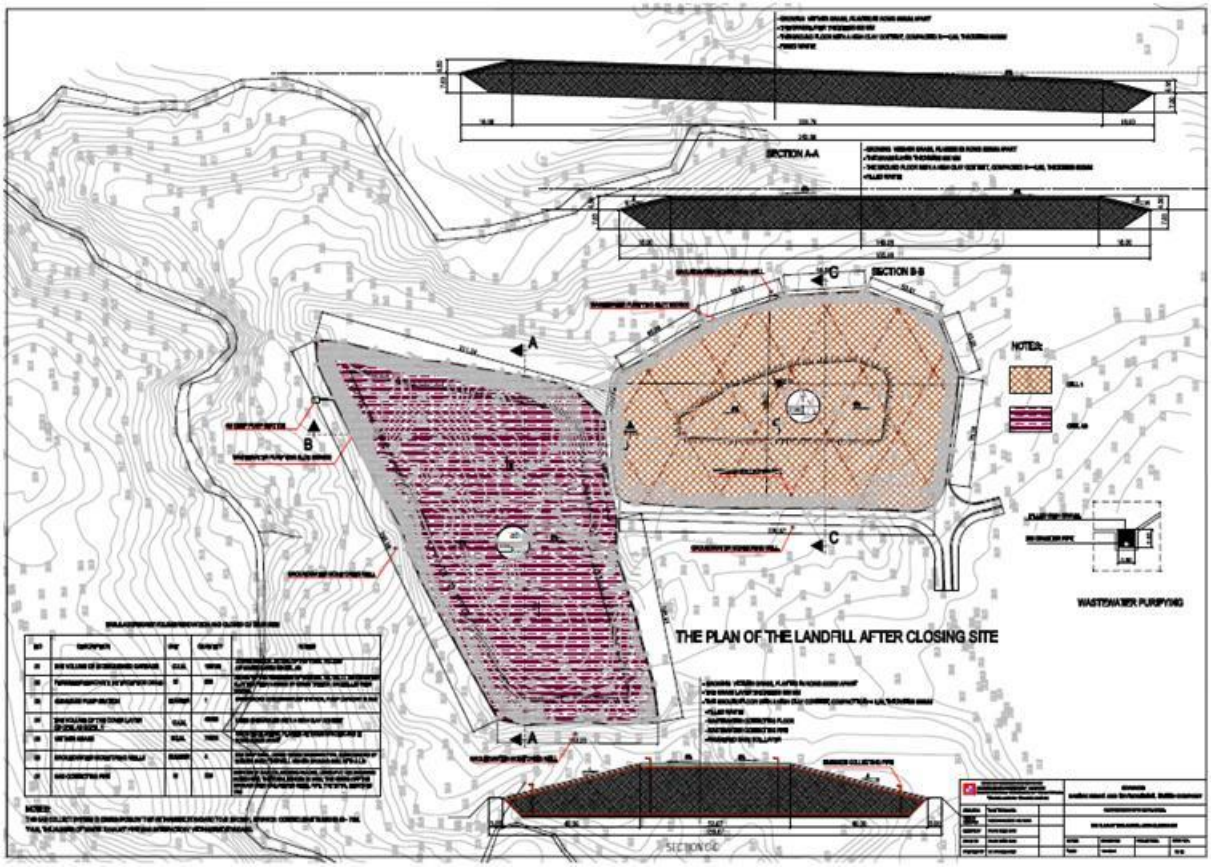


Figure H.3 The After-Closure Plan and Cross Sections of the Cu Ebur Dumpsite



II. SUMMARY OF ISSUES/CONCERNS/IMPACTS

159. The IEE identified and screened a range of likely concerns/impacts arising from the implementation of the aforementioned works. Those assessed as moderate to significant are summarized below.

Table H.3 Summary of Issues/Concerns/Impacts

Issues/Concerns/Impacts	Type	Overall Magnitude
Pre-Construction Phase		
Inadequate incorporation of climate change and seismicity in Design	Negative	Moderate-Significant
Inadequate attention on potential unsustainable supply of gravel, sand, soil or unsustainable extraction of these materials meet construction demand	Negative	Moderate
Inadequate consideration of existing technical and financial capacity of DAKURENCO in waste disposal operations		Significant
Displacement of people, loss of assets & income	Negative	Significant
Construction Phase		
Dust/suspended particles	Negative	Moderate-Significant
Gas emissions	Negative	Least-Moderate
Noise	Negative	Moderate-Significant
Vibration	Negative	Least-Moderate
Impacts associated with quarrying for construction aggregates (dust, noise, vibration, visual impact on landscape, groundwater/ surface water contamination, traffic, smoke, accidents, etc)	Negative	Least-Significant
Water resource problems	Negative	Moderate-Significant
Traffic & road blocking	Negative	Moderate
Community health and safety hazard	Negative	Moderate
Workers' health & safety hazard	Negative	Moderate
Operation Phase		
Dust	Negative	Moderate-Significant
Landfill gas emission	Negative	Least-Moderate
Odor & population of vermin/rodents/insects/pests	Negative	Significant
Noise	Negative	Moderate
Wind-blown litters	Negative	Moderate-Significant
Mud spread	Negative	Least-Moderate
Groundwater & (potential) surface water contamination from leachate	Negative	Moderate-Significant
Sedimentation/pollution of creek/channel from borrowing activities for/stockpile of soil cover material	Negative	Least-Moderate
Leachate drippings from trucks hauling wastes, odor & litters from open garbage trucks	Negative	Least-Moderate
Fire/explosion from gas/heat build up	Negative	Moderate
Community health & safety hazards	Negative	Moderate
Workers' health & safety hazards	Negative	Significant
Unsustained sanitary operations due to insufficient operational & financial capabilities	Negative	Moderate-Significant
Damages during seismic or extreme weather events	Negative	Least-Moderate
Improved urban environment	Positive	Significant
Reduced greenhouse gas emissions	Positive	Significant

III. ENVIRONMENTAL MITIGATION

160. The recommended mitigation measures consist of actions, activities, plans and documents (including resettlement/compensation plan, environmental approval documents, Contractor's EMP) that need to be undertaken, observed, obtained, prepared to prevent, mitigate, or compensate for, the salient adverse impacts enumerated in Table H.3. The broad measures are outlined below; while the specific measures are presented in the Environmental Mitigation Plan (Table H.4):

(i) Incorporating in detailed design adequate considerations and conditions relative climate change and seismicity to sustain the structural integrity and effective operations of completed works.
(ii) Prompt compensation for losses associated with ROW acquisition according to the approved Resettlement/Compensation Plan.
(iii) Ensuring the engagement of an environment-responsible Contractor by incorporating the SPS compliant Subproject EMP into the bidding documents, for use as basis in the preparation of the Contractor's CEMP by the selected Contractor, addressing as minimum the requirements of the Subproject EMP. CEMP to be quantitatively and qualitatively evaluated against the Subproject EMP and cleared by ADB prior to the commencement of any work on site. The contract for civil works to explicitly stipulate the obligation to institute the mitigation measures properly and carry out environmental monitoring according to the SPS compliant CEMP and Subproject EMP. The Contract to stipulate some tie-up of progress payment and collection of performance bond with the performance in CEMP/Subproject EMP implementation.
(iv) A CEMP that ensures good and environment-friendly engineering practices that avoid first, and (if unavoidable) mitigate, adverse impacts; and commitment from Contractor to fully implement the CEMP/Subproject EMP.
(v) Quality construction supervision and environmental monitoring by the PMU.
(vi) Conduct of engineering investigations of built structures after every seismic and extreme weather events during construction and during operation and full disclosure of investigation reports.
(vii) Sufficient funds for sustained quality of operation and maintenance.
(viii) Observance of the grievance redress mechanism and prompt action/ resolution of lodged grievances.

161. The Environmental Mitigation Plan attempts to be comprehensive to: (i) point out that most measures are the usual good engineering practices and are, therefore, not difficult to institute, and (ii) to facilitate monitoring by the PMU and other relevant institutions. Mitigation measures for some least impacts are included to aid in monitoring by the PMU.

IV. ENVIRONMENTAL MONITORING AND REPORTING

A. Environmental Monitoring

162. Environmental monitoring will consist of environmental effects monitoring; and performance monitoring. Environmental effects monitoring will cover ambient air quality, noise and vibration levels, groundwater quality, surface water quality and community and workers' health and safety prior to construction, during construction and/or during operation. Performance monitoring will monitor and evaluate the performance of the Design Consultant, Contractor and DAKURENCO in complying with, or adhering to, the CEMP and/or Component EMP. A draft Environmental Monitoring Plan is presented as Table H.5.

B. Reporting

163. Environmental monitoring activities and findings shall be documented for purposes of reporting, recording, verifying, referring on and evaluating the environmental performance of the Subproject. The documentation shall also be used as basis in correcting and enhancing further environmental mitigation and monitoring. An Environmental Monitoring Report (EMR) shall not only report on the progress and results of environmental monitoring and compliance of CEMP/EMP implementation but shall also: (i) assess the effectiveness, of instituted measures; (ii) point out violation/s, if any; (iii) assess/recommend corrective actions; and (iv) cite any coordination made for corrective actions and, if applicable, certifications for having

instituted them effectively. It shall also feature possible innovative mitigation measures applied by the Contractor, Operator or affected residents themselves, and other lessons learned in CEMP/EMP implementation. These will be useful in adjusting the CEMP/EMP to adapt to real ground situations. (Proposed adjustments/enhancement of the CEMP/EMP must have prior ADB clearance.) A draft EMR outline is presented as End Note H.1.

164. EMRs shall be prepared as follows:

(i) Monthly by the Contractor during construction and by the Operator during operation, submitted to the PMU.
(ii) Semi-annually by the PMU's Environmental Engineer/Scientist during detailed design and during construction, to be submitted to the ADB.
(iii) Annually by the PMU's Environmental Engineer/Scientist during operation until loan closure or as agreed, to be submitted to the ADB.

Table H.4 Environmental Mitigation Plan

A. Prior to Construction Phase

A.1 Detailed Engineering Design

Potential Environmental Concerns/Impacts		Recommended Mitigation Measures		Location	Estimated Cost [3] (USD)	Institutional Responsibilities	
						Implement	Supervise & monitor
1	Inadequate incorporation of climate change, seismicity, their threats & potential impacts, resulting in: - completed works unable to cope during extreme weather events & earthquakes - non-sustainability of completed facility & effectiveness of its services during its intended life span.	1.1	Design to seismic design criteria as regulated in Viet Nam	Not applicable	c/o design cost	Design Consultant	PMU & PIS Envi Sp/ ADB*
		1.2	Undertake the necessary geo-technical & geological investigations for basis in detailed design.				
		1.3	Some design options for works to adapt to reduction in rainfall --- landscaping with drought tolerant species, mulching, using flexible pavement structures, applying matting/erosion control blanket (may be applicable to waste mounds), specify optimum degree of compaction to avoid settlement (soil cover, final cap and roads)	Not applicable	-		
		1.4	Some design options for works to adapt to increased precipitation --- appropriate slopes for waste mounds; optimum degree of compaction of soil cover & cap; raised pavement for roads; additional capacity of drains for stormwater & leachate.				
		1.5	Include emergency response procedures and contingency plans in the SWTP Operations Manual.				
2	Inadequate attention on potential unsustainable supply of gravel, sand, soil or unsustainable extraction of these materials to meet construction demand	2.1	Prepare a Subproject Aggregates Mgnt Plan (AMP), confirming location of sources, estimating supply of, & demand for, aggregates during construction, linked to cut-&-fill management plan. This will form basis for Contractor's AMP.	Not applicable	c/o design cost		
		2.2	Specify in bidding documents Contractor's obligation to obtain aggregates only from quarries & crushing plants still operating within allowed extraction threshold per environmental permit.	Not applicable	-		
3	Inadequate consideration of the technical & financial capacity of DAKURENCO in waste disposal operations.	3.1	Design to include the preparation of O&M Manual that will provide for continuous capacity development & specify the financial requirements for efficient O&M.	Not applicable	-		

Table H.4 (continued)

A.2 Land Acquisition, Obtaining Approvals, and Community Preparation

	Potential Environmental Concerns/Impacts		Recommended Mitigation Measures	Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
						Implement	Monitor
4	Displacement of HH. loss of land, & parts of structures, crops/trees, income	4.1	Finalize Resettlement Plan, after Detailed Measurement Survey, through highly consultative & participatory process.	All affected villages	-	Design Consultant	PMU & PIS Envi Sp/ ADB*
		4.2	At least 30 days before awarding of contract for civil works, losses shall have been fully compensated for.	All affected villages	c/o resettlement cost	PMU	PIS Envi Sp/ ADB*
5	GOV EA requirements & approvals	5.1	Prepare EIA report and obtain approval from the PPC.	Not applicable	c/o PMU's counter-part obligations		
6	Potential communicable/transmittable diseases brought with entry of workers & overall health and safety hazards during construction	6.1	Intensive awareness program on communicable/transmittable diseases, e.g., SARS, H1N1, STD, HIV/AIDS, tuberculosis, and diseases that may be brought with entry of workers and on the health and safety hazards during construction.	All affected villages	c/o PMU's counter-part obligations	PMU with DPH, W/CPC	

A.3 Procurement & Prior to Mobilization

	Potential Environmental Concerns/Impacts		Recommended Mitigation Measures	Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
						Implement	Review & Evaluate
7	Engagement of environmentally irresponsible contractor for civil works	7.1	SPS compliant Sub-component EMP (SEMP), as part of bidding documents.	Not applicable	-	PMU	PIS Envi Sp/ ADB*
		7.2	SEMP to be appended to Contract for basis of preparation of Contractor's EMP (CEMP) that will address as minimum the requirements of the SPS compliant SEMP & for compliance.				
		7.3	Contract to require Contractor's submission of monthly envi'l monitoring report, outline appended in Contract.				
		7.4	Contract to also stipulate some tie up of progress payment & collection of performance bond with the performance in CEMP/ SEMP implementation.				
		7.5	CEMP to be quantitatively & qualitatively evaluated against SEMP; cleared as fully responsive to SEMP before start of any work on site or establishment of project construction-related facilities.				

B. Construction Phase

Potential Environmental Concerns/Impacts		Recommended Mitigation Measures		Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
						Implement	Monitor
PHYSICAL / CHEMICAL ENVIRONMENT							
8	Dust/suspended particles from: - earthworks (clearing, grubbing, levelling, excavation, backfilling) - dry exposed areas - stockpile of dry soil, sand, cement - transport of aggregates, cement, wastes - loading/unloading of fine aggregates, cement and other materials - movements of construction vehicles	8.1	Watering of dry unpaved/exposed surfaces, stockpiles of sand & excavated materials, debris from demolition, at least twice daily.	All applicable sites	c/o Construction running cost	Contractor	PMU & PIS Envi Sp/ ADB*
		8.2	Wet wastes prior to disturbance/removal/transfer	Cu Ebur dumpsite			
		8.3	Tarpaulin or similar cover on trucks carrying aggregates, cement residual soils, & wastes. Maintain min. 2 feet freeboard.	Entire hauling route	c/o Supplier's cost	Supplier & Contractor	
		8.4	Minimize drop heights when loading/unloading soil onto trucks/ground. Spray water on soil being loaded/unloaded.	All sites	-	Contractor	
		8.5	Limit speed of construction trucks in /around sites to max. 30 kph.				
9	Gas emissions from; - exhaust of operating equipment/vehicles including generator sets - use of high VOC emitting specialty applications, asphalt processing - burning of solid/hazardous wastes - disturbance of smouldering/burning wastes during dumpsite remediation	9.1	Limit engine idling to a max. of 5 minutes.	All sites	-		
		9.2	Use only well maintained construction vehicles/equipment, with emission test certificate.				
		9.3	Use existing power poles as far as possible. Minimize use of generators. Use clean-fuelled generators.				
		9.4	Use low VOC-emitting asphalt processing & other materials, e.g., adhesives, sealants, paints, lacquers, linings, etc.				
		9.5	No burning of wastes.				
		9.6	Wetting the smouldering/burning wastes prior to disturbance.				
10	Odor from: - gas emission sources - use of high VOC emitting specialty applications, asphalt processing - disturbing of burning/decomposing wastes during dumpsite remediation -	10.1	Application of gas emission mitigation measures. (No. 9 above)	All sites	-		
		10.2	Properly store, promptly dispose of, organic & hazardous wastes.				
		10.3	Require enclosed trucks for, or effective cover when, hauling wastes to the disposal site & chemicals to construction sites.				
		10.4	When there is high odor release from activities, slow down/adjust, or suspend, some activities, especially when wind blows towards residential areas,				
		10.5	Where applicable, install barriers around potential odor generators, located against prevailing wind directions.	All sites	c/o Construction mobiliz'n cost (preliminaries)		
		10.6	Provide adequate sanitation facilities, adequate water supply.				
		10.7	Strictly enforce observance of sanitation practices.	All sites	-		
11	Noise & vibration from: - operating equipment/vehicles (especially those diesel-fed & without efficient mufflers),	11.1	Use only equipment that emit least noise, e.g. electrically powered equipment, hydraulic tools, those with efficient mufflers. Allow only well-maintained equipment/vehicles, with certificates of compliance to noise standards, to be used in construction.	Applicable sites	c/o Construction mobiliz'n cost (preliminaries)		

Table H.4 (continued)

Potential Environmental Concerns/Impacts	Recommended Mitigation Measures	Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
				Implement	Monitor
- processes such as drilling/pavement breaking, excavation, concrete mixing, earthmoving, demolition of existing structures	11.2 Workers to be required the use of ear mufflers.	All sites	-	Contractor	PMU PIS Envi Sp/ ADB*
	11.3 Limit engine idling to a max. of 5 minutes.				
	11.4 Use available equipment & tools that emit least vibrations per manufacturer's specifications, or equipped with shock absorber, & has a handbook for user's safety & specifies requirements on vibration. Maintain equipment/tools to specifications.	All sites	c/o Construction mobiliz'n cost (preliminaries)		
	11.5 Limit speed to max. 40 kph en route to sites, 30 kph in access road and sites.	All sites	-		
12 <u>Impacts from extracting (quarrying/</u> borrowing) materials - dust, noise, vibration during quarrying/ borrowing, during transport, during loading/unloading, from wind-blown stockpiles in quarry - siltation/sedimentation of water body in surface drainage path, in quarry/borrow areas & while stored in sites - visual impact on the landscape in quarry/borrow areas - traffic & smoke generated during transport - potential accidents, especially during transport	12.1 Implement Contractor's Aggregates Management Plan (CAMP) that is linked to a cut-&-fill (or excavation-backfill) management plan (should be part of the ADB-cleared CEMP).	All sites			
	12.2 Source aggregate only from quarry/borrow areas with environmental clearance & license to operate, & that still have high ratio of extraction capacity over loss of natural state.				
	12.3 If Contractor/Sub-contractor shall operate its own quarry/borrow - Contractor to obtain environmental certificate & license to operate prior to extraction.	Not applicable	c/o Contractor's Project Cost		
	- Implement site restoration after extraction for Component.	Contractor's quarry/borrow area			
	- Verify Contractor's license to, environmental clearance for, quarry.	Contractor's quarry/borrow area	-	PMU	PIS Envi Sp/ ADB*
	- Ensure site restoration plan is implemented by Contractor after completion of borrowing for Subproject.				
	12.4 Aggregate trucks to: - observe max. speed limit of 40 kph en route to sub-component sites; 30 kph in access roads to, & in, sub-component sites	Quarry/borrow area to sites			
	- maintain min. of 2 feet freeboard & provide tight cover	Quarry/borrow area to sites	c/o Supplier's cost	Supplier/ Contractor	PMU & PIS Envi Sp/ ADB*
	- be well-maintained, with up-to-date emission test certificate				
	- minimize drop heights during loading/unloading; spray water on aggregates being loaded/unloaded				
	12.5 Manage aggregate stockpiles in quarry sites, e.g. stockpiling only enough, providing wind barrier, regularly wetting stockpiles.				
	12.6 Sub-contract for aggregates supply to stipulate the obligation to comply to all of the above and all applicable mitigation measures stipulated in CEMP/Subproject EMP.				
13 <u>Depletion of water resources</u> from using piped water supply &/or groundwater to meet construction water demand	13.1 Meet construction water demand using water from permitted surface water sources, delivered to sites by water trucks & stored on site	All sites	c/o Construction running cost (preliminaries)		

Table H.4 (continued)

Potential Environmental Concerns/Impacts	Recommended Mitigation Measures	Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
				Implement	Monitor
14 Deterioration of surface & ground water resources from improper/inadequate management of the following in workers camp & sub-component sites: - sewage/wastewater - solid & hazardous wastes - sediments, silts - hazardous construction materials	14.1 Provide adequate sanitation facilities, adequate water supply. Strictly enforce observance of sanitation practices.	All construction sites &/or field offices & workers accommodations	c/o Construction mobiliz'n, safety & running costs (preliminaries)	Contractor	PMU & PIS Envi Sp/ ADB*
	14.2 Implement an eco-friendly solid/hazardous waste management: - practices waste minimization, reuse and segregation - has adequate covered storage bins/containers, color-coded clearly marked to avoid mixing, especially hazardous wastes - has separate enclosed storage areas for solid & hazardous wastes, that can contain spills, clearly marked/labelled - networks with recyclers & implements prompt disposal - coordinate with DAKURENCO for disposal of hazardous wastes - workers & waste contractors to observe safety measures - requires waste contractors to promptly submit a manifest from disposal site for every disposal, from recyclers/junkshops for every delivery of re-usable construction spoils/refuse.				
	14.3 Implement measures to mitigate sedimentation/siltation. - stockpile on flat grounds & away from, not obstructing, main surface drainage routes, limit to max height of 2 m. - dispose of unsuitable & excess soils as soon as possible - avoid stockpiling on site more than what is needed - use any combination of silt fences, sediment basins/traps, sandbags, barrier nets, earth berm/bund, perimeter dike, speed stilling humps, seeding, mulching, establishing general vegetation, whichever would be appropriate. - divert offsite runoff around disturbed soils to stable areas	All sites			
	14.4 Implement measures to mitigate potential adverse impact from use and storage of hazardous substances - have safe storage, with visible caution signage, secure from unauthorized entry or use & can contain spillage. - if using stationary ground storage, it should be at least 30 m from water bodies or nearest groundwater resource, at least 1 foot above highest flood level. - if using mobile storage, it should always be in good condition, color-coded, with clear labels. - have equipment clearly leaking oil repaired off site at once - no vehicle maintenance and refuelling on site - use less hazardous substances - store no more hazardous substances on site than needed - spill clean up materials to be readily available on site	All sites			

Table H.4 (continued)

Potential Environmental Concerns/Impacts	Recommended Mitigation Measures	Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
				Implement	Monitor
BIOLOGICAL ENVIRONMENT					
15 Impairment of aquatic life in nearby water bodies	15.1 Implement the measures recommended above to mitigate the deterioration of water resources. (No. 14 above)	All sites	c/o Construction (preliminaries)	Contractor	PMU & PIS Envi Sp/ ADB*
16 Loss of vegetation beyond Subproject sites, due to: - un-directed movement of equipment - un-guided excavation - haphazard stockpiling of materials - haphazard parking of equipment	161 Physically mark limits for ROW and clearing and grubbing. 16.2 Install reflectorized guides, signage, markers to direct vehicular/equipment traffic along the access roads. 16.3 Designate stockpiling of materials and spoils, as well as parking of construction vehicles/equipment in areas where there is least, or no, vegetation.	All sites Access roads All sites	c/o Construction mobiliz'n cost (preliminaries)		
SOCIO-ECONOMIC & CULTURAL ENVIRONMENT					
17 Impacts on the sustainability of urban services from: - meeting construction water demand with piped water supply - indiscriminate dumping of construction wastes, putting pressure on the limited capacity of DAKURENCO - volume of SW to bring to the disposal site	17.1 Meet construction water demand using water from permitted surface water sources, delivered to sites by water trucks & stored on site. 17.2 Contractor to be responsible for hauling wastes to disposal sites (by itself or by a sub-contractor) to avoid competing with City for DAKURENCO's collection services. 17.3 Reduce wastes going to the disposal site: - Network with junkshops for the recyclables. - Offer residual soils as free filling materials to interested private individuals or to Government's infrastructure projects.	All sites	c/o Construction running costs (preliminaries)	Contractor	PMU & PIS Envi Sp/ ADB*
18 Traffic and road blocking due to construction generated traffic	18.1 Prepare traffic management scheme, & coordinate implementation with the City traffic control agency & affected wards & communes. 18.2 Post billboards on road/lane closure, traffic rerouting plan at strategic places, min. 1 week prior to effectivity. 18.3 Post traffic (flag) persons during entire working hours. 18.4 Spread out schedule for materials delivery in non-peak hours.	Concerned wards/communes All affected sites Access roads	- c/o Construction safety cost (preliminaries)		
19 Community health/safety hazard from, among others: - dust, noise, gas emissions, odor, vibration - water resource depletion & deterioration - spillage of hazardous substances - haphazard movement of construction vehicles/equipment - increased traffic - rise of communicable/transmittable diseases with entry of workers	19.1 Implement a CEMP that addresses the Subproject EMP as minimum requirements to mitigate dust, gas emissions, noise, odor, vibration, water depletion and deterioration, traffic, road blocking. In addition: - Adequate/appropriate lighting, reflectorized barrier (or temporary fences, where applicable) around active work sites - Emergency response preparedness (procedures, trained staff, equipment, tools & supplies), including for fire-fighting. - Posting of billboards on the Sub-components, informing on dates of start & finish, names & contact details of contractor, supervising person on site, PMU, route of trucks, layouts, etc. - In case of "chance find" UXO, immediate coordination with the W/CPC & proper authorities for proper handling.	All sites All sites	c/o Construction mobiliz'n & running costs (preliminaries) &/or main Project cost -		

Table H.4 (continued)

Potential Environmental Concerns/Impacts		Recommended Mitigation Measures		Location	Estimated Cost [3] (USD)	Institutional Responsibilities	
						Implement	Monitor
		-	Adequate social preparation regarding construction activities, & associated health & safety risks, grievance redress mechanism, to be conducted at least one month prior to award of Contract.	All villages within construction area of influence	c/o PMU counterpart fund	PMU	PIS Envi Sp/ ADB*
20	Workers' health/safety hazard from, among others: - dust, noise, gas emissions, odor, vibration - inadequate waste/wastewater management - poor sanitation practices - exposure to hazardous substances - operating equipment/handling of tools - haphazard movement of construction vehicles/equipment - open excavations - rise of communicable/transmittable diseases from community - exposure to extreme weather	20.1	Orient workers, prior to mobilization, on occupational health & safety hazard and strict observance of safety measures.	All sites	c/o Construction mobiliz'n & running costs (preliminaries)	Contractor	PMU & PIS Envi Sp/ ADB*
		20.2	Strictly enforce use of protective wears, e.g., eye masks, nose masks, ear mufflers, helmets gloves, appropriate footwear.	Not applicable			
		20.3	Implement recommended measures to mitigate dust, gas emission, odor, noise, vibration, traffic.	All sites			
		20.4	Install adequate lighting, safe accesses to & from work areas.				
		20.5	Provide safe accommodations with reliable supply of potable water, adequate sanitation facilities.				
		20.6	Provide adequate water for washing & safe drinking, and adequate sanitation facilities, in construction sites.				
		20.7	Pre-construction orientation & training on safe operation/ handling of hazardous equipment/tools				
		21.8	Strict enforcement of wearing protective clothing/gear prescribed when using vibrating equipment.				
		20.8	Require workers to submit health certificates for employment & for worker's health baseline data.	Not applicable	-		
		20.9	Arrange with nearest primary & tertiary health institutions for health & emergency care of workers.				
		20.10	Set up emergency response team equipped with adequate staff, equipment, tools & supplies, including for fire-fighting.	All sites	c/o Construction safety cost		
		20.11	In case of "chance find" UXO, immediately coordinate with village concerned & proper authorities for proper handling.	All sites	-		
21	Damages to "chance find" physical cultural resources	21.1	Prior coordination with W/CPC or relevant institution for the appropriate action to take with "chance finds".	All sites	-		
SUSTAINABILITY CONTRIBUTION							
22	Damages during seismic or extreme weather event	22.1	After every seismic or extreme weather event, conduct engineering investigation of built structures & implement corrective measures without delay.	All sites	c/o Construction insurance cost	Contractor	PMU & PIS Envi Sp/ ADB*
Sub-Total (Prior to Construction and During Construction)				USD	-		

Table H.4 (continued)

C. Operation Phase

Potential Environmental Impacts	Recommended Mitigation Measures	Location	Estimated Cost [a] (USD)	Institutional Responsibilities Per Phase				
				Pre-Operation Phases			Operation Phase	
				Det. Design Consultant	Contractor	PMU, PMIS Envi Sp	Dak Lak URENCO	PMU & ADB*
23 Dust - in dry season & on windy days - from trucks entering/leaving the SWTP, especially from tipping face - from loading/unloading of soil cover, unloading of wastes - from soil covering activity - from borrowing activity - from wind-blown stockpile of soil cover material	23.1 During dry season, water access & internal roads, stockpile of soil cover, twice a day or more as necessary.	SWTP	c/o Operations running & safety costs	Include in O&M Manual	-	Supervise & monitor	Implement	Monitor
	23.2 Spraying water when spreading soil cover.	Landfill						
	23.3 Seeding of exposed areas as soon as possible							
	23.4 Protect stockpile soil cover with a wind break/shield (artificial or natural or combination).	Borrow/stockpile area						
	23.5 Enforce on all open trucks hauling garbage, aggregates, soil cover & similar materials to have proper cover & maintain min. 2 feet freeboard.	To, from SWTP	c/o respective Operations Costs					
	23.6 Limit vehicle speed inside facility to maximum of 30 kph.	SWTP	-					
	23.7 Minimize drop heights when loading/unloading soil onto trucks/waste cell and when unloading wastes.	Landfill						
24 Production of landfill gas, gas migration, potential explosion & loss of deep-rooted vegetation	24.1 Provide gas collection & vents.	Landfill	c/o Project cost	Include in design	Implement	Supervise & monitor	-	-
	24.2 Install appropriate bottom liner, sides liner.							
	24.3 Apply soil/alternative cover daily.	Landfill	c/o Operations running cost	Include in O&M Manual	-	Supervise & monitor	Implement	Monitor
	24.4 Initially, vent gas. Flaring may be done occasionally, as necessary, but process to be kept simple.							
	24.5 Implement landfill gas monitoring per EMP. Use result to evaluate effectiveness of system. (Gas is expected to be generated after 5 years from start of operation.)							
	24.6 In case landfill gas monitoring reveals high content of hazardous compounds, e.g., halogenated compound: - filter gas, prior to flaring; the filtered should not be burned, but should be handled carefully & disposed of properly. - implement separation of cells for organic & other wastes - implement use of collected gas suitable for each cell							
	24.7 In case of gas migration: - establish a buffer area; create an impermeable wall between buffer area and waste cell - set up monitoring well within buffer area after the wall & implement continuous monitoring.							
25 Odor, vermin/pests/ insects/rodents, bird & animal attraction	25.1 Apply soil/alternative cover daily.	Landfill	c/o Operations running cost					
	25.2 Pest control, as necessary, but should use non-persistent one							
	25.3 Rodent/vermin controls, as necessary, e.g., bait stations							

Table H.4 (continued)

Potential Environmental Impacts	Recommended Mitigation Measures	Location	Estimated Cost [a] (USD)	Institutional Responsibilities Per Phase				
				Pre-Operation Phases			Operation Phase	
				Det. Design Consultant	Contractor	PMU, PMIS Envi Sp	Dak Lak URENCO	PMU & ADB*
	25.4 Movable perimeter (litter) fence around active cell to prevent stray animals from feeding on wastes prior to soil cover.	Landfill	c/o Operations running cost	Include in O&M Manual	-	Supervise & monitor	Implement	Monitor
	25.5 Landscaping, perimeter greening, creating a buffer area, planted with trees & shrubs that repel insects, e.g., eucalyptus, citronella (Pelargonium citrosum), neem (Azadirachta indica); trees and shrubs that bear sweet smelling flowers, e.g., ylang-ylang (Cananga odorata), champaca (Michelia champaca), sampaguita (Jasminum sambac), champasak. (Plumeria rubra or Plumeria alba), among others.	SWTP						
	25.6 Perimeter fencing at least around landfill area.	Landfill	c/o Project cost	Include in design	Implement	Supervise & monitor	-	-
26 Noise from truck movements/ equipment operation could pose hazard to workers	26.1 Limit speed inside facility to maximum of 30 kph.	SWTP	-	Include in O&M Manual	-	Supervise & monitor	Implement	Monitor
	26.2 Spread out arrivals of trucks.							
	26.3 No blowing of horn inside the facility.							
	26.4 Workers to wear ear mufflers.	Landfill	c/o Operations running cost					
	26.5 Use low-noise landfill equipment & to be turned off when idle.							
	26.6 Borrowing only as programmed. Use low-noise equipment, with muffler, well maintained, for borrowing & hauling.	Borrow area						
27 Wind-blown litters	27.1 Provide movable litter fence around tipping area & active waste cell.	Landfill	c/o Operations running cost					
	27.2 Open garbage trucks (dump trucks) will be required to maintain at least 2 feet freeboard and provide tarpaulin cover	To, from SWTP	respective Operations Costs					
28 Mud spread	28.1 Trucks to have washed/wet tires prior to leaving SWTP.	SWTP	-	Include in wash facility in design.	Implement	Supervise & monitor	Implement	Monitor
29 Groundwater & (potential) surface water contamination from leachate.	29.1 Install /provide the following: - appropriate bottom & sides liners - perimeter surface runoff drains - leachate management system - groundwater monitoring wells	Landfill	c/o Project Cost	Include in design	Implement	Supervise & monitor	-	-
	29.2 Apply soil/alternate cover daily.	Landfill	c/o Operations running cost	Include in O&M Manual	-	Supervise & monitor	Implement	Monitor
	29.3 Apply capping to completed cells.							
	29.4 Undertake monitoring of leachate & groundwater as prescribed in the EMP.							

Table H.4 (continued)

Potential Environmental Impacts	Recommended Mitigation Measures	Location	Estimated Cost [a] (USD)	Institutional Responsibilities Per Phase				
				Pre-Operation Phases			Operation Phase	
				Det. Design Consultant	Contractor	PMU, PMIS Envi Sp	Dak Lak URENCO	PMU & ADB*
30 Sedimentation/pollution of creek/channel from borrowing activities & associated stockpiles	30.1 Borrow away from creek.	Borrow/Stockpile area	c/o Operations running cost	Include in O&M Manual	-	Supervise & monitor	Implement	Monitor
	30.2 Program borrowing to avoid borrowing & stockpiling more than will be needed immediately & for contingency.							
	30.3 Stockpile at least 50 m away from a creek/channel or main surface drainage route. Use any combination of silt fences, sediment traps, sandbags, barrier nets, to prevent soil cover from being eroded/blown away wind/rain:							
	30.4 Limit stockpile to a maximum height of 2 m.							
	30.5 Limit amount of hazardous substances stored in the borrow area, e.g., oil, fuel for equipment maintenance.							
	30.6 Have vehicles/equipment clearly leaking oil repaired at once, but off-site.							
	30.7 For every tree removed due to borrowing, plant 4 new trees in the periphery buffer area or vicinity of creek/channel.							
31 Leachate drippings from trucks hauling wastes, odor & litters from open garbage trucks	31.1 Require waste trucks to ensure no leachate drippings during transport.	To, from SWTP	-	Include in O&M Manual	-	Supervise & monitor	Implement	Monitor
	31.2 Require open waste trucks to maintain min. 2 feet freeboard & provide the appropriate cover.							
	31.3 Require trucks to wash body & tires prior to exit from landfill.	Landfill/SWTP						
32 Fire/explosion from gas build build up, heat, etc.	32.1 Equip SWTP with adequate/appropriate fire-fighting equipment.	SWTP	c/o Project cost & Operations running cost	Include in design & O&M Manual	Implement	Supervise & monitor	Implement	Monitor
	32.2 Set up trained Safety Team (as initial responders) linked to the fire department & other ultimate responders.							
	32.3 Install gas collection & treatment. Monitor landfill gas.							
	32.4 Conduct regular fire/explosion/emergency drills	SWTP	-					
	32.5 Enforce a "No Smoking" Policy within the SWTP premises.							
33 Community health & safety hazard from dust, gas, water resource contamination, pests/ insects/rodents, fire/explosion	33.1 Conduct IEC regarding the hazards & risks of completed/ operated sub-components.	Hoa Phu & Cu Ebur Communes	c/o Operations safety cost'	Include in O&M Manual	-	Implement	-	-
	33.2 Perimeter fencing around SWTP, or at least around the landfill.	SWTP	c/o Project cost & Operations running cost	Include in design & O&M Manual	Implement	Supervise & monitor		
	33.3 Install sufficient warning signs against unauthorized entry							
	33.4 Implement measures to mitigate dust, gas, leachate, pests/ insects/rodents, incidence of fire/explosion.							
	33.5 Secure premises against unauthorized entry by public.	SWTP	c/o Operations running cost'					

Table H.4 (continued)

Potential Environmental Impacts		Recommended Mitigation Measures		Location	Estimated Cost [a] (USD)	Institutional Responsibilities Per Phase				
						Pre-Operation Phases			Operation Phase	
						Det. Design Consultant	Contractor	PMU, PMIS Envi Sp	Dak Lak URENCO	PMU & ADB*
		33.6	Collaborate with Commune People's Committees for community safety	Hoa Phu & Cu Ebur Communes	-	-	-	-	Implement	Monitor
34	Workers' health & safety hazard	34.1	Conduct a comprehensive orientation on the O&M Manual, to include health and safety risks & mitigation measures.	Not applicable	c/o Operations running cost	-	-	-	Implement	Monitor
		34.2	Set up emergency response mechanism & train workers of their roles & responsibilities in the mechanism.							
		34.3	Workers to undergo semi-annual physical examinations & be provided with appropriate vaccinations. Establish & update workers' health baseline data.	Not applicable	c/o Operations social/safety cost					
		34.4	Provision of required protective wear, i.e., clothing, cap, hand glove, ear muffler, nose/mouth mask, eye wear, footwear (boots) for workers' compliance.							
		34.5	Access to adequate sanitation facilities and potable water.	Landfill	-					
		34.6	Observance of good sanitation practices.							
35	Unsustained sanitary operations due to insufficient operational & financial capabilities.	35.1	O&M Manual to specify capacity development, budget requirements for O&M.	Not applicable	c/o Design cost	Include in design	-	Supervise & monitor	-	-
		35.1	Implement regular capacity development.	Not applicable	c/o Operations running cost	-	-	-	Implement	Monitor
36	Damages during seismic or extreme weather events	36.1	After every seismic or extreme weather event, conduct engineering investigation of built structures & implement corrective measures without delay.	SWTP	c/o Operations safety cost	-	Implement	Supervise & monitor		
Sub-Total (During Operation)				USD	-					
TOTAL				USD	-					

[a] No marginal costs. During construction, most costs on Contractors are included in preliminaries. During operation, costs are integral part of annual budget of Operator.

* Preliminarily, it is assumed that PIS will be provided by combined man-months of international and national Environmental Specialists only in the first 2-3 years of Project implementation. After PIS period, monitoring assumed to be done thru ADB Review Missions until loan closure.

Table H.5 Environmental Monitoring Plan

I. ENVIRONMENTAL EFFECTS MONITORING

	Aspects/Parameters to be Monitored	Location	Means of Monitoring	Frequency	Estimated Cost (USD)	Responsibility	
						Implement	Compliance Monitoring
A.	**Prior to Construction Phase** During procurement prior to awarding of contract for civil works						
1	Ambient air quality TSP, SO_2, CO, NO_2, TSP, SO_2, CO, NO, NO_2, CH_4, CO_2, O_2, temperature *Review results against GOV standards & WHO Ambient Air Quality Guidelines, whichever is more stringent. Results as baseline data before mobilization.*	2 in Hoa Phu 2 in Cu Ebur'	Analytical methods outlined in QCVN 05:2009/BTNMT & Cir.No.28/2011/TT-BTNMT	Once	204.00 482.00	PMU	PIS Envi Sp/ADB*
2	Ambient noise and ground vibration levels *Review noise levels against GOV standards & WHO Guidelines for Community Noise, whichever is more stringent. Results as baseline data before mobilization.*	1 in Hoa Phu 2 in Cu-Ebur	Analytical methods outlined in QCVN 26:2010/BTNMT & QCVN 27:2010/BTNMT	Once	22.00 44.00		
3	Groundwater quality pH, DO, EC, SS, $CaCO_3$, NH_4, Total N, Total P, Fe, Cu, Zn, Mn, Pb, Cd, Hg, As, Cr^{6+}, CN, E-coli, coliform *Review results against GOV standards & current WHO Guidelines for Drinking-water Quality, whichever is more stringent. Results as baseline data before mobilization.*	2 in Hoa Phu 2 in Cu Ebur	Analytical methods outlined in QCVN 09:2008/BTNMT & Circ.No.30/2011/TT-BTNMT	Once	386.00 386.00		
4	Surface water quality pH, DO, EC, SS, $CaCO_3$, NH_4, Total N, Total P, Fe, Cu, Zn, Mn, Pb, Cd, Hg, As, Cr^{6+}, CN, E-coli, coliform *Review results against GOV standards & current WHO Guidelines for Drinking-water Quality, whichever is more stringent. Results as baseline data before mobilization.*	2 in Hoa Phu 2 in Cu Ebur	Analytical methods outlined in QCVN 08:2008/BTNMT & Circ.No.29/2011/TT-BTNMT	Once	424.00 424.00		
5	Community health & safety conditions - Incidence of diseases associated with respiratory, nervous circulatory & digestive systems, skin, cancer, communicable/transmittable diseases - incidence of accidents (vehicular, fire, etc) & crime *Information as baseline data before mobilization.*	Hoa Phu Commune Cu Ebur Commune	Information from & close coordination with ward/commune health centers, City's Department of Health	Once	-		
	Sub-Total (Prior to Construction for baseline data)				2,372.00		

Table H.5 (continued)

	Aspects/Parameters to be Monitored	Location	Means of Monitoring		Estimated Cost (USD)	Responsibility	
						Implement	Compliance Monitoring
B.	**Construction Phase**						
6	Ambient air quality TSP, SO_2, CO, NO_2, TSP, SO_2, CO, NO, NO_2, CH_4, CO_2, O_2, temperature *Review results against GOV standards & WHO Ambient Air Quality Guidelines, EPA Guidelines, whichever is more stringent.*	2 in Hoa Phu 2 in Cu Ebur*	Analytical methods outlined in QCVN 05:2009/BTNMT & Cir.No.28/2011/TT-BTNMT	Once monthly (peak) Once quarterly (rest)	1,224.00 2,892.00	Contractor	PMU / PIS Envi Sp/ADB*
7	Ambient noise and ground vibration levels *Review noise levels against GOV standards & WHO Guidelines for Community Noise, whichever is more stringent.*	2 in Hoa Phu 2 in Cu-Ebur	Analytical methods outlined in QCVN 26:2010/BTNMT & QCVN 27:2010/BTNMT	Once monthly (peak) Once quarterly (rest)	264.00 264.00		
8	Groundwater quality pH, DO, EC, SS, $CaCO_3$, NH_4, Total N, Total P, Fe, Cu, Zn, Mn, Pb, Cd, Hg, As, Cr^{6+}, CN, E-coli, coliform *Review results against GOV standards & current WHO Guidelines for Drinking-water Quality, whichever is more*	2 in Hoa Phu 2 in Cu-Ebur	Analytical methods outlined in QCVN 09:2008/BTNMT & Circ.No.30/2011/TT-BTNMT	Once monthly (peak) Once quarterly (rest)	1,392.00 1,392.00		
9	Surface water quality pH, DO, EC, SS, $CaCO_3$, NH_4, Total N, Total P, Fe, Cu, Zn, Mn, Pb, Cd, Hg, As, Cr^{6+}, CN, E-coli, coliform *Review results against GOV standards & current WHO Guidelines for Drinking-water Quality, whichever is more stringent. Results as baseline data before mobilization.*	2 in Hoa Phu 2 in Cu Ebur	Analytical methods outlined in QCVN 08:2008/BTNMT & Circ.No.29/2011/TT-BTNMT	Once monthly (peak) Once quarterly (rest)	1,524.00 1,524.00		
10	Community health & safety - Incidence of diseases associated with respiratory, nervous circulatory & digestive systems, skin, cancer, communicable/transmittable diseases - incidence of accident, fire & crime *In affected communities*	Hoa Phu Commune Cu Ebur Commune	Close coordination with village health centers & village offices of affected communities, and with the Department of Health	Once monthly (peak) Once quarterly (rest)	-		
11	Workers' health & safety - Incidences of illness due to work - Incidences of work-related accident, injuries/deaths to emergencies, crime involving workers	Hoa Phu SWTP Cu Ebur dumpsite	Records of Safety Engineer	Once quarterly	-		
	Sub-Total (Construction)				10,476.00		
	Sub-Total (Prior to Construction and During Construction)				12,848.00		

Table H.5 (continued)

Aspects/Parameters to be Monitored	Location	Means of Monitoring	Frequency	Estimated Cost (USD)	Responsibility	
					Implement	Compliance Monitoring
C. Operation Phase						
12 **Ambient air quality** TSP, SO_2, CO, NO, NO_2, CH_4, CO_2, O_3, temperature *Review results against GOV standards & WHO Ambient Air Quality Guidelines, EPA Guidelines, whichever is more stringent.*	2 in Hoa Phu	Analytical methods outlined in QCVN 05:2009/BTNMT & Cir.No.28/2011/TT-BTNMT	Once quarterly	1,928.00	DAKURENCO	PMU / PIS Envi Sp/ADB*
13 **Leachate Quality** pH, COD, BOD_5, SS,Total N, Total P, Fe, Pb, Cd, As, Hg, Cr^{6+}. Cu. Zn *Review results against GOV standards.*	2 in Hoa Phu	Analytical methods outlined in QCVN 25:2009/BTNMT	Once quarterly	1,200.00		
14 **Groundwater quality** pH, DO, EC, SS, $CaCO_3$, NH_4, Total N, Total P, Fe, Cu, Zn, Mn, Pb, Cd, Hg, As, Cr^{6+}, CN, E-coli, coliform *Review results against GOV standards & current WHO Guidelines for Drinking-water Quality, whichever is more*	4 in Hoa Phu	Analytical methods outlined in QCVN 09:2008/BTNMT & Circ.No.30/2011/TT-BTNMT	Once quarterly	1,856.00		
15 **Surface water quality** pH, DO, EC, SS, $CaCO_3$, NH_4, Total N, Total P, Fe, Cu, Zn, Mn, Pb, Cd, Hg, As, Cr^{6+}, CN, E-coli, coliform *Review results against GOV standards & current WHO Guidelines for Drinking-water Quality, whichever is more stringent. Results as baseline data before mobilization.*	2 in Hoa Phu	Analytical methods outlined in QCVN 08:2008/BTNMT & Circ.No.29/2011/TT-BTNMT	Once quarterly	1,016.00		
16 **Community health & safety** - Incidence of diseases associated with respiratory, nervous circulatory & digestive systems, skin, cancer, communicable/transmittable diseases - incidence of accident, fire & crime *In affected communities*	Hoa Phu	Close coordination with village health centers & village offices of affected communities, and with the Department of Health	Once quarterly Once quarterly	-		
17 **Workers' health & safety** - Incidences of illness due to work - Incidences of work-related accident, injuries/deaths to emergencies, crime involving workers	SWTP	Records of Safety Engineer	Once quarterly	-		
Total Annual Cost (Operation)				6,000.00		

Table H.5 (continued)

	Aspects/Parameters to be Monitored	Location	Means of Monitoring	Frequency	Estimated Cost (USD) ^	Responsibility	
						Implement	Compliance Monitoring
D.	**Decommissioning Phase**						
18	**Ambient air quality** TSP, SO_2, CO, NO, NO_2, CH_4, CO_2, O_3, temperature *Review results against GOV standards & WHO Ambient Air Quality Guidelines, EPA Guidelines, whichever is more stringent.*	2 in Hoa Phu 2 in Cu Ebur	Analytical methods outlined in QCVN 05:2009/BTNMT & Cir.No.28/2011/TT-BTNMT	Once quarterly (at least for 1st 5 yrs., may be reduced thereafter depending on conditions)	1,928.00 1,928.00	DAKURENCO	PMU / PIS Envi Sp/ADB*
19	**Leachate Quality** pH, COD, BOD_5, SS,Total N, Total P, Fe, Pb, Cd, As, Hg, Cr^{6+}. Cu. Zn *Review results against GOV standards.*	2 in Hoa Phu 2 in Cu Ebur	Analytical methods outlined in QCVN 25:2009/BTNMT	Once quarterly	1,200.00 1,200.00		
20	**Groundwater quality** pH, DO, EC, SS, $CaCO_3$, NH_4, Total N, Total P, Fe, Cu, Zn, Mn, Pb, Cd, Hg, As, Cr^{6+}, CN, E-coli, coliform *Review results against GOV standards & current WHO Guidelines for Drinking-water Quality, whichever is more*	4 in Hoa Phu 2 in Cu-Ebur	Analytical methods outlined in QCVN 09:2008/BTNMT & Circ.No.30/2011/TT-BTNMT	Once quarterly	1,856.00 928.00		
21	**Surface water quality** pH, DO, EC, SS, $CaCO_3$, NH_4, Total N, Total P, Fe, Cu, Zn, Mn, Pb, Cd, Hg, As, Cr^{6+}, CN, E-coli, coliform *Review results against GOV standards & current WHO Guidelines for Drinking-water Quality, whichever is more stringent. Results as baseline data before mobilization.*	2 in Hoa Phu 2 in Cu Ebur	Analytical methods outlined in QCVN 08:2008/BTNMT & Circ.No.29/2011/TT-BTNMT	Once quarterly	1,016.00 1,016.00		
22	**Community health & safety** - Incidence of diseases associated with respiratory, nervous circulatory & digestive systems, skin, cancer, communicable/transmittable diseases - incidence of accident, fire & crime *In affected communities*	Hoa Phu Cu Ebur	Close coordination with village health centers & village offices of affected communities, and with the Department of Health	Once quarterly Once quarterly	-		
23	**Workers' health & safety** - Incidences of illness due to work - Incidences of work-related accident, injuries/deaths to emergencies, crime involving workers	Construction sites	Records of Safety Engineer	Once quarterly	-		
	Total Annual Cost (Operation)				11,072.00		

Table H.5 (continued)

II. PERFORMANCE MONITORING

	Aspects/Parameters to be Monitored	Location	Means of Monitoring	Frequency	Responsibility		Estimated Cost [a] (USD)
					Implement	Compliance Monitoring	
A.	**Prior to Construction Phase**						
	A.1 Detailed Design Preparation						
1	Completion of detailed design & O&M Manual incorporates EMP requirements.	Not applicable	Review of detailed design documents.	Once, prior to finalization Once, prior to approval	Design Consultant	PMU & PIS Envi Sp/ADB*	-
	A.2 Obtaining Clearance						
2	EIA Report approval obtained	SWM Component	Presence of EIAR approval document.	Once, at least 30 days prior to contract award	PMU	PIS Envi Sp/ADB*	
3	Intensive awareness program on health and safety hazards, communicable/transmittable diseases, on the grievance redress mechanism	Hoa Phu and Cu Ebur	Review of relevant report of the PMU's Social, Environmental & Communication Teams.	Once, at least 30 days prior to contract award			
	A.3 Procurement						
4	Procurement process complied with EMP requirements: SPS compliant EMP part of bidding documents.	Not applicable	Verifying EMP in bidding document.	Once, prior to procurement	PMU	PIS Envi Sp/ADB*	
	CEMP/EMP compliance stipulated in Contract	Not applicable	Review of Draft & Final Contract.	Once, during draft Once, prior to signing			
	Contract stipulates some tie up of progress payment & collection of performance bond with performance in CEMP/EMP implementation.						
	A.4 Post-Procurement Prior to Mobilization						
5	Preparation by selected Contractor its CEMP, addressing Subproj. EMP requirements as minimum, & includes (but not limited to) plans for: aggregates mgnt; excavation mgnt (linked to removed soil mgnt); dust, noise & vibration controls; gas emission mitigation; solid & hazardous waste mgnt; traffic mgnt (to be coordinated with authorities); occupational health & safety; grievance redress; emergency response; environmental monitoring & reporting.	Not applicable	Verifying existence of CEMP. Evaluating CEMP against Subproj EMP.	Once prior to mobilization			
7	CEMP reviewed/cleared as fully responsive to the SEMP.	Not applicable	Verifying review/clearing report.	Once prior to mobilization			
8	Environmental effects monitoring for baseline data	Hoa Phu SWTP &Cu Ebur dumpsite	As prescribed in the EMP.	Once prior to mobilization			
B.	**Construction Phase**						
9	Environmental mitigation implemented according to the CEMP/EMP.	Hoa Phu SWTP Cu Ebur dumpsite	Field observations. Consulting affected residents. Review of lodged grievances. Review of records of workers accidents & sick leave.	Regular & random Random At least once a week. Once a month	Contractor	PMU / PIS Envi Sp/ADB*	

Table H.5 (continued)

	Aspects/Parameters to be Monitored	Location	Means of Monitoring	Frequency	Responsibility		Estimated Cost [3] (USD)
					Implement	Compliance Monitoring	
10	Environmental effects monitoring	Hoa Phu SWTP &Cu Ebur dumpsite	As prescribed in the EMP.	As prescribed in the EMP	Contractor	PMU / PIS Envi Sp/ADB*	-
11	Monthly EMR submitted promptly using prescribed outline	For the SWM Component	Review of Contractor's monthly EMR.	Once a month			
12	Informally lodged grievances acted on promptly and successfully &/or Grievance Redress Mechanism observed.	On the SWM Component	Review of lodged grievances. Consulting village authorities.	Regular and random At least once a week			
13	Engineering investigation after each seismic &/or extreme weather event, and, if applicable, remediation works taken.	All sites	Review of investigation & remediation works report.	Latest, 1 week after each event			
14	Semi-Annual EMR submitted promptly following prescribed outline.	For the SWM Component	Existence of semi-annual EMR.	Semi-annually	Contractor & PMU	PIS Envi Sp/ADB*	
C.	**Operation Phase**						
15	Operation following the O&M Manual & EMP	Hoa Phu SWTP	Field observation.	Regular & random check	DAKURENCO	PMU, PIS Envi Sp/ADB*	
16	Measures to mitigate non-sustainability of operation instituted, especially on allocating adequate budget for proper sanitary landfill operations, maintenance & repair, & environmental effects monitoring.	Landfill	Verifying promptness in maintenance & repair	Regular & random check until loan closure			
17	Environmental effects monitoring	Landfill as prescribed in the EMP	As prescribed in the EMP.	As prescribed in the EMP			
18	Borrowing for soil cover with environmental certificate & permit to operate/borrow, as necessary.	Hoa Phu SWTP	Verifying existence of envi'l certificate & permit to operate (if these required)	Once prior to start of operation			
19	Monthly EMR submitted promptly using prescribed outline	For the SWM Component	Review of Operator's monthly EMR.	Once a month			
20	Informally lodged grievances acted on promptly and successfully &/or Grievance Redress Mechanism observed.	On the SWM Component	Review of lodged grievances. Consulting village authorities.	Regular and random At least once a week			
21	Engineering investigation after each seismic &/or extreme weather event, and, if applicable, remediation works taken.	All sites	Review of investigation & remediation works report.	Latest, 1 week after each event			
22	Annual EMR submitted promptly using prescribed outline.	For the SWM Component	Review of the annual EMR.	Annually	DAKURENCO & PMU	PIS Envi Sp/ADB*	
D.	**Decommissioning Phase**						
23	Environmental effects monitoring	Landfill as prescribed in the EMP	As prescribed in the EMP.	As prescribed in the EMP	DAKURENCO	PMU, PIS Envi Sp/ADB*	
24	Informally lodged grievances acted on promptly and successfully &/or Grievance Redress Mechanism observed.	On the SWM Component	Review of lodged grievances. Consulting village authorities.	Regular and random At least once a week			

Table H.5 (continued)

	Aspects/Parameters to be Monitored	Location	Means of Monitoring	Frequency	Responsibility		Estimated Cost [a] (USD)
					Implement	Compliance Monitoring	
25	Engineering investigation after each seismic &/or extreme weather event, and, if applicable, remediation works taken.	All sites	Review of investigation & remediation works report.	Latest, 1 week after each event	DAKURENCO	PMU, PIS Envi Sp/ADB*	-
26	Annual EMR submitted promptly following prescribed outline.	For the SWM Component	Review of the annual EMR.	Annually	DAKURENCO & PMU	PIS Envi Sp/ADB*	
TOTAL COST						USD	-

Notes:

1) Unit costs obtained from the HTPPC-approved unit costs for each parameter of March 2011.
2) The minimum set of parameters to be monitored after establishing the baseline will be that observed quarterly by the DONRE.
^ 1st 5 years after closure, may be continued at same frequency if warranted.

V. EMERGENCY RESPONSE PROCEDURES

A. Emergency Response Roles and Responsibilities

165. Considering the nature of the Sub-component, emergency response procedure will be necessary only during construction. The key players in emergency response will include the: (i) Safety Team (ST) of the Contractor as initial responder; and (ii) City fire and police departments, emergency medical services (City and Provincial General Hospitals), collectively referred to as the External Emergency Response Team (EERT), as ultimate responders.

Table H.6 Roles and Responsibilities in Emergency Response

Entity	Responsibilities
Safety Team (ST)	- Communicates/alerts EERT. - Prepares the emergency site to facilitate response action by EERT, e.g., vacating and clearing site, restricting entry to site. - Applies first aid. - When necessary & requested by EERT, lends support/provides assistance during EERT's response operations.
External Emergency Response Team (EERT)	- Solves the emergency.
Contractor	- Provide & sustain ST staff, equipment, tools, supplies & funds. - Maintain good communication lines with EERT to ensure prompt help response & adequate protection, by keeping them informed of work progress.

166. The ST will be led by a Safety Coordinator (SC). He/she will be assisted by a Deputy SC, who will be authorized to act in behalf of the SC, when necessary. Trained first-aiders and security crew will be the core members of the ST. Supervising engineers and foremen will also be assigned supporting roles during initial response, especially in evacuation, and will, therefore, undergo orientation and training in proper initial response procedures. Volunteers from the work force will be encouraged and properly trained for their role. The Contractor will ensure that ST members and volunteers are physically, technically and psychologically fit for doing their emergency response roles and responsibilities.

167. To ensure effective emergency response, prior to mobilization of civil works, the Contractor shall have: (i) set up the ST and its station/s with support equipment and facilities in working conditions; (ii) made arrangements with the EERT; (iii) conducted proper training of ST members, and encouraged and trained volunteers from the work force; (iv) conducted orientation to all construction workers on the emergency response procedures and facilities, particularly evacuation procedures, evacuation routes, evacuation assembly points, and self-first response, among others; and (vi) conducted drills for different possible situations.

168. To sustain effective emergency response throughout Sub-component implementation: (i) adequate budget shall be provided to sustain the capabilities and efficiency of the emergency response mechanism; (ii) emergency response equipment, tools and facilities shall be inspected weekly and supplies (as that for first aid kits) replenished as necessary; and (iii) drills and reminders to be done regularly, the former at least ever quarter and the latter at least every month.

B. Communicating and Alerting

169. Means of reporting and alerting an emergency situation may be any combination of: (i) siren, bell and/or gong as audible alarm; (ii) blinking/rotating red light and/or orange

safety flag as visual alarm; (iii) telephone (landline); (iv) mobile phone; (v) two-way radio; and (vi) public address system/loud speakers.

Table H.7 Rules on Communicating & Alerting

Item	Rule
On alerting	Upon detecting an emergency situation: - call the attention of other people in the emergency site, - sound the nearest alarm, and/or - communicate the emergency situation to the SC.
Authority to communicate with the EERT	- Only the SC and, if SC is not available, the Deputy SC are authorized to communicate with the EERT. - Exceptional cases to this rule may be necessary, e.g., during fire, & should be defined in the Emergency Management Plan.
Communicating/alerting an emergency to the EERT	- Provide EERT with at least the: - type of emergency situation; - correct location of the emergency; - estimated magnitude of the situation; - estimated persons harmed, if applicable; - time it happened; - in case of a spill, which hazardous substance spilled; - in case of fire and explosion, what caused it.

170. For an effective reporting/alerting of an emergency situation, the names and contact details of key ST members and EERT institutions should be readily available in, or near to, all forms of communication equipment, and strategically posted (at legible size) in all work sites and vehicles. Work sites should have good access to any communication/alerting equipment. Contractor's construction vehicles should also be equipped with the appropriate communication facilities.

C. Emergency Response Procedures

171. The subsequent paragraphs suggest general procedures that will be finalized in the final EMP during detailed design, and described in more detail in the Emergency Management Plans of the CEMP.

1. Evacuation

172. The aim of the evacuation procedure should be to "safely move all workers/staff, sub-contractors, site visitors/the public concerned out from the emergency site and its influence area immediately to safe grounds." Foremen of every construction sub-group shall lead evacuation accordingly.

Table H.8 Evacuation Procedure

Procedure	Remarks
▪ Move out as quickly as possible as a group, but avoid panic.	▪ All workers/staff, sub-contractors, site visitors to move out, guided by the ST.
▪ Evacuate through the directed evacuation route.	▪ The safe evacuation shall have been determined fast by the ST/Deputy ST & immediately communicated to ST members.
▪ Keep moving until everyone is safely away from the emergency site and its influence area.	▪ A restricted area must be established outside the emergency site, all to stay beyond the restricted area.
▪ Once outside, conduct head counts.	▪ Foremen to do head counts of their sub-groups; SC/Deputy SC of the ST.
▪ Report missing persons to EERT immediately.	▪ SC/Deputy SC to communicate with the EERT.
▪ Assist the injured in evacuation & hand them over to the ST first-aiders or EERT medical group.	▪ ST to manage injured persons to ensure proper handling.
▪ If injury warrants special care, DO NOT MOVE them, unless necessary & instructed/directed by the EERT.	▪ SC/Deputy SC communicates with EERT to get instructions/directions in handling the injured.

2. Medical Emergency

173. A medical emergency is a situation when a person is seriously ill or injured and his/her situation poses an immediate risk to his/her life or long-term health.

Table H.9 Response Procedure During Medical Emergency

Procedure	Remarks
▪ Administer First Aid regardless of severity immediately.	▪ Fundamentals when giving First Aid: - Safety first of both the rescuer and the victim. - Do not move an injured person unless: - victim is exposed to more danger when left where they are, e.g., during fire, chemical spill - it would be impossible for EERT to aid victims in their locations, e.g., under a collapsed structure - instructed or directed by the EERT. ▪ First AID to be conducted only by a person who has been properly trained in giving First Aid.
▪ Call the EERT emergency medical services &/or nearest hospital.	▪ By SC/Deputy SC or authorized on-site emergency communicator.
▪ Facilitate leading the EERT to the emergency site.	▪ Designated ST member on- site to meet EERT at access road/strategic location. He/she shall hold orange safety flag to get their attention & lead them to site. ▪ Other ST members and volunteer crew to clear access road for smooth passage by the EERT.
▪ If applicable, vacate site & influence area at once, restrict site, suspend work until further notice.	▪ Follow evacuation procedure.

3. Fire

174. The immediate aim of fire response should be to move out all workers/staff, sub-contractors, site visitors/the public concerned out to safe grounds.

Table H.10 Response Procedure In Case of Fire

Procedure	Remarks
▪ Alert a fire situation.	▪ Whoever detects the fire shall immediately - call the attention of other people in the site, - sound the nearest alarm, - contacts the fire department, &/or - report/communicate the emergency situation to the SC/Deputy SC.
▪ Stop all activities/operations and evacuate.	▪ All (non-ST) workers/staff sub-contractors, site visitors and concerned public to move out to safe grounds following the evacuation procedure.
▪ Activate ST to contain fire/control fire from spreading.	▪ Guided by the training they had, ST members assigned to mitigate fire shall assess their own safety situation first before attempting to control fire spread.
▪ Call the nearest fire & police stations &, if applicable, emergency medical services.	▪ When alerting the EERT, to give the location, cause of fire, estimated fire alarm rating, any injuries.
▪ Facilitate leading the EERT to the emergency site.	▪ Designated ST member to meet EERT at access road or strategic location. He/she shall hold the orange safety flag to get their attention and lead them to the site. ▪ Other ST members/volunteers to stop traffic in, & clear, the access road to facilitate passage by EERT.
▪ SERT to vacate the site as soon as their safety is assessed as in danger.	▪ Follow appropriate evacuation procedure.

4. Explosion

175. Explosion may be caused by unsuitable mix of hazardous substances. It may result in physical injuries and fire. The explosion itself will be the alarm. The immediate aim is to safely move out all workers/staff, sub-contractors, site visitors/the public concerned following the evacuation procedure.

Table H.11 Response Procedure In Case of Explosion

Procedure	Remarks
▪ Take shelter and be prepared for further explosion/s &/or fire.	▪ From where he/she is, SC/Deputy SC will quickly determine the following to give proper directions: - Where the explosion occurred, - What caused it, - If a fire has resulted, or if further explosions are expected.
▪ Evacuate as soon as possible, when no further explosion is expected.	▪ All workers/staff sub-contractors, site visitors and concerned public to move out to safe grounds following the evacuation procedure.
▪ Call the nearest fire & police stations &, if applicable, emergency medical services.	▪ When alerting EERT, SC/Deputy SC to give location, cause of explosion. If fire has resulted, provide the estimated fire alarm rating, any injuries.
▪ If fire has resulted, DO NOT ATTEMPT to do any fire control activity.	▪ Possibility of further explosion will put ST members' lives in danger.
▪ Facilitate leading the EERT to the emergency site.	▪ SC/Deputy SC to instruct: - a SERT member to meet EERT at access road or strategic location & lead them to the site. He/she shall hold the orange safety flag to get their attention and lead them to the site. - some SERT members to stop traffic in, & clear, the access road to facilitate passage of the EERT.

D. Post-emergency Follow-Up

176. After every emergency event, the SC/Deputy SC shall prepare a report that will not only will document the incident but also present a post-evaluation of the response, assessing its overall adequacy and effectiveness, i.e., in terms of organizational set up and capacity (human resources, skills, equipment, communication and alerting, initial response procedures, recovery). Lessons learned from each response experience shall be highlighted to correct mistakes, cite inadequacies and gaps in the procedures and systems, and/or enhance strengths. First Aid kits shall be replenished. Changes that will be introduced into the emergency response procedures/system and improvements in preparedness must be relayed to the workers/staff. Appropriate training and drills incorporating the changes shall have to be conducted.

VI. IMPLEMENTATION ARRANGEMENTS

A. Implementation Schedule

177. Environmental management will be implemented from the detailed design phase through to procurement, construction and operation. Table H.12 presents the indicative time frame of key EMP activities in relation to Subproject implementation schedule.

Table H.12 Environmental Management Implementation Schedule

Activity	Indicative Time Frame
SUBCOMPONENT IMPLEMENTATION	
Detailed Design & Bidding Documents	Q1Y1 – Q4 Y1
Procurement	Q4 Y1 – Q2 Y2
Hoa Phu Sanitary Landfill Development	Q3 Y2 – Q2 Y4
Closure of Cu Ebur Dumpsite	Q3 Y4 – Q2 Y5
Defects Liability Period (Hoa Phu Sanitary Landfill)	Q3 Y4 – Q2 Y5
Defects Liability Period (Cu Ebur Dumpsite)	Q3 Y5 – Q2 Y6
ENVIRONMENTAL MANAGEMENT	
Overall	
1. Project Implementation Support (PIS) – intermittent inputs of environmental specialists	Q2 Y2 – Q1 Y6
2. PMU's submission of Environmental Monitoring Report (EMR)	
- Monthly EMR for Subproject's Monthly Progress Report	- 1st week after effective month
- Semi-annual EMR during construction for submission to ADB	- 1st week after effective 6-mos period
- Annual EMR for submission to ADB	- 2nd week after effective year
Prior to Construction Mobilization	
1. Finalization/revision of IEE & EMP, as necessary	Q2 Y1 - Q3 Y1
2. ADB review & clearance of revised IEE & EMP.	Q4 Y1
3. Obtaining EIA approval.	Q3 Y1 (at the latest)
4. Community preparation (including display of GRM)	Q2 Y2
5. Establishment of baseline data of ambient water quality, air quality, noise & vibration levels in subproject sites & incidence of diseases (communicable, transmittable, water-borne, etc) at commune level	Q2 Y2 (shall have been done prior to award of contract)
6. Compensation/replacements due to land/ ROW acquisition	c/o Resettlement Plan
7. Preparation of CEMP by selected Contractor, review of CEMP against Subproject EMP.	Q2/Q3 Y2, before start of works on site or establishment of construction-related facilities.
Construction Period	
Mobilization to Demobilization	
1. Implementation of mitigation measures and conduct of environmental effects monitoring following the SPS compliant CEMP	Q3 Y2 – Q2 Y4 (Hoa Phu SL) Q3 Y4 – Q2 Y5 (Cu Ebur DS)
2. Submission of Contractor's Envi'l Monitoring Report (CEMR)	Q4 Y2 – Q2 Y4 (Hoa Phu SL) Q4 Y4 – Q2 Y5 (Cu Ebur DS)
- Monthly CEMR for Monthly Construction Progress Report	- Last week of each effective month
- Semi-Annual CEMR for Semi-annual Subproj.EMR to be submitted to ADB	- 4th week of every 6th month
Operation/Decommissioning Period (potentially could start even before DLP is over)	
1. Implementation of mitigation measures & monitoring activities as specified in the Subproject EMP	Starting Q1/Q2 Y5 (Hoa Phu SL) Starting Q1/Q2 Y6 (Cu Ebur DS)
2. Submission of Operator's Envi'l Monitoring Report (OEMR)	Starting Q4 Y5 or Q1 Y6 (Hoa Phu SL) Starting Q4 Y6 or Q1 Y7 (Cu Ebur DS)
- Monthly OEMR for Monthly Operational Report	- Last week of each effective month
- Annual OEMR for Annual Subproject EMR to be submitted to ADB	- Mid of last month of effective year (until Project Completion or as agreed)

B. Institutional Responsibilities

178. The Dak Lak Province People's Committee (DLPPC) will be the executing agency. The BMT City People's Committee, as implementing agency, will be responsible for the detailed preparation and implementation of the Component. The Project Steering Committee (PSC), headed by the vice-chairman of the DLPPC, will be responsible for deciding on environmental management matters that will require action from the senior-management

level. It will ensure the allocation and timely disbursement of adequate resources for the processing of the necessary environmental assessment approval/s, monitoring of EMP implementation and conduct of environmental monitoring activities required from the implementing agency in the Environmental Monitoring Plan.

179. The PMU shall undertake and manage the day-to-day activities of the Component. Its full-time Environmental Engineer/Scientist shall oversee and monitor the implementation of Subproject EMPs. The Project Implementation Support (PIS) Team shall include Environmental Specialists, who will impart technical advice, guidance support and "hands-on training" to the PMU, particularly its Environmental Engineer/Scientist, in Subproject environmental management, at least in the first three years of Subproject implementation. The ADB shall undertake reviews and approvals of relevant documents, and carry out annual environmental review missions.

180. The specific responsibilities are presented in Table H.13. "Prior to construction" period covers the detailed design period until prior to awarding of civil works contract. Construction period covers the period from the effective start date of the Notice to Proceed until commissioning for operation. Operation period commences at commissioning of the Sub-component.

C. Capacity Development

181. Capacity development on environmental management will be implemented through: (i) conduct of lectures and seminars; and (ii) through "learning-by-doing". Lectures/seminars will range from "overview and key points for managers" to "specifics of environmental management of urban infrastructure projects." The preliminarily identified subjects include: (i) GOV legal framework vis-a-vis ADB safeguard policy; (ii) environmental management systems including challenges and strategies in developing and implementing them; (iii) environmental management plan (including mitigation, monitoring and reporting); (iv) grievance redress mechanism; (v) meaningful public consultation; (vi) climate change impacts and adaptation; and (vii) other subjects of interest to the PMU that might arise during detailed design stage. The requirement for the conduct of the courses and seminars is integrated in the overall budget for the Subproject capacity development.

182. The Environmental Specialist of the Project Implementation Support (PIS) Team shall conduct his/her technical assistance to the PMU as capacity development in itself All institutions involved in the Project/Subproject environmental management will be encouraged and invited to participate. However, training will be focused on the PMU, especially its Environmental Engineer/Scientist. Training shall be highly "hands-on" or adopting the "learning while doing" approach. The draft outline ToR for the Environmental Specialist is presented as End Note H.2.

D. Preliminary Costs

183. The marginal costs for implementing the EMP are initially estimated to involve:

(i) USD 12,848 (or VND 267 Million) of fixed costs to cover environmental effects monitoring prior to, and during, construction;
(ii) USD 6,000 (or VND 125 Million) annually to cover environmental effects monitoring during operation; and
(iii) USD 11.100 (or VND 230 Million) annually to cover environmental effects monitoring after closure for at least 5 years or as agreed. Table H.14

184. The estimated costs: (i) include taxes and contingencies for deficiencies in assumed unit costs, but exclude inflation; (ii) exclude the salary of the Environmental

Engineer/Scientist as he/she will be existing CPC staff seconded/assigned to the PMU for the environmental management of the Subproject; (iii) exclude the costs spent by PMU for compliance with GOV safeguard requirements in March 2013; and (iv) exclude the cost for technical assistance and "hands-on" training" by Environmental Specialists that will be engaged as part of the PIS Team, a total of USD 21,300 for all three Subprojects under the SCDP.

VII. PERFORMANCE INDICATORS

185. This Section presents the preliminary set of environmental performance indicators to evaluate the effect of Subproject implementation on the environment, i.e., whether or not the Solid Waste Component (or "Component") is enhancing, sustaining or deteriorating the state of the environment. The indicators are directed on two environmental areas that will be impacted by Component implementation: (i) natural resources; and (ii) health and safety of the concerned people. The selected indicators are limited to only those that can be measured/gauged from activities during subproject implementation and that can be tracked over a defined period. Table H.15

Table H.13 Institutional Responsibilities

Prior to Construction	During Construction	During Operation
PMU Environmental Engineer/Scientist With technical advice, guidance, support from the PIS Environmental Specialists, will: - oversee incorporation of EMP recommendations into the design/bid documents, the finalization of the Subproject IEE & EMP - ensure the procurement of an environmentally responsible contractor - ensure that an EIA Report approval has been secured prior to the awarding of civil works contract - set up baseline ambient air quality, noise & vibration levels, ground- & surface water quality & baseline statistics on incidence of diseases & accidents/crimes in the concerned wards/communes - conduct intensive awareness campaign on health and safety impacts of Subproject implementation and on the existence of a grievance redress mechanism - review the Final CEMP of the selected Contractor - prepare monthly inputs for incorporation into the Det. Design Monthly Progress Report, and semi-annual EMR for the ADB	PMU Environmental Engineer/Scientist With technical advice, guidance, support from the PIS Environmental Specialists, will: - conduct inspections and spot checks to monitor the performance of the Contractor in implementing the SPS compliant CEMP. - review results of groundwater quality, air quality, noise & vibration monitoring done by Contractor - oversee & monitor the management of grievances & effectiveness of the grievance redress mechanism - collect monthly EMRs from the Contractor, and prepare and submit semi-annual EMR to ADB	PMU Environmental Engineer/Scientist - conduct inspections and spot checks to monitor the environmental performance of the completed Subproject and DAKURENCO - prepare executing agency's EMR, incorporate the DAKURENCO EMR, and submit annual EMR to ADB until loan closure, or as agreed.
PIS Environmental Specialist - provide the PMU, particularly its Environmental Engineer/Scientist, technical advice, guidance, support and capacity strengthening in Subproject environmental management		
ADB - review & approve/clear IEE & EMP - review submitted semi-annual EMRs	ADB - review semi-annual EMRs - carry out annual environmental review missions	ADB - review submitted annual EMRs - carry out annual environmental review missions
Design Consultant - incorporate all EMP requirements/ recommendations into the design and bidding documents - finalize the IEE & EMP - if applicable, prepare/finalize the GOV EIA based on the Subproject IEE and its EMP		

Table H.13 (cont'd)

Prior to Construction	Construction Period	Operation Period
DONRE - review EIA Report/s for PPC's approval	DONRE - conduct random monitoring in line with EIA Report approval - conduct validation and provide technical guidance on environmental effects monitoring, when necessary	
PPC - approve EIA Report/s based on the review conclusion of the DONRE		
Concerned W/CPCs - actively participate in public disclosure of Subproject IEE, EMP & EMRs, and in the community awareness program on health and safety impacts of Subproject implementation and in the establishment of health and safety baseline data prior to construction	Concerned W/CPCs - review EMRs and results of environmental monitoring by the Contractor - disseminate EMR highlights & findings of environmental effects monitoring to communities	Concerned W/CPCs - review EMRs and results of environmental monitoring by the Contractor - disseminate EMR highlights & findings of environmental effects monitoring to communities
DPH - spearhead the conduct of intensive awareness campaign on the health and safety impacts of Subproject implementation		
	Contractor - prior to mobilization prepare a CEMP, addressing as minimum the requirements of the Subproject EMP - engage an Engineer to manage the CEMP implementation & reporting - implement all environmental mitigation measures - conduct all environmental monitoring activities; - ensure preparedness for emergency response as provided in the CEMP - observe the grievance redress mechanism in addressing complaints - prepare monthly and semi-annual Contractor's EMRs (CEMRs)	
		DAKURENCO - set up a team to manage the EMP implementation and reporting - implement mitigation and protection measures that will ensure sustained effectiveness of the completed Sub-components - prepare monthly and annual EMRs

Table H.14 Preliminary Costs for EMP Implementation

Activity		Estimated Cost (USD) & Funding Source			
		Integrated in Construction Cost	PMU Budget (Counterpart Cost)	DAKURENCO Annual Budget	Technical Assistance for PIS
Environmental Mitigation					
A. Pre-Construction Phase					
A.1 Preparation and appraisal/approval of GOV EIAR		-	c/o PMU FS preparation	-	-
A.2 Intensive community awareness campaign		-	c/o social cost	-	-
A.3 Resettlement, compensation		-	c/o resettlement cost	-	-
B. Construction Phase					
B.1 Implementation of environmental mitigation plan		c/o construction preliminaries & running costs	-	-	-
C. Operation Phase					
C.1 Implementation of environmental mitigation plan		-	-	c/o operations running cost	-
Sub-Total	USD	-	-	-	-
	(thousand) VND	-	-	-	-
Environmental Effects Monitoring					
A. Pre-Construction Phase					
A.1 Establishment of baseline environmental data		-	2,372.00	-	-
B. Construction Phase					
B.1 Monitoring of air, noise, vibration, ground & surface water		10,476.00	-	-	-
B.2 Monitoring of community & workers' health and safety		-	-	-	-
C. Operation Phase					
C.1 Monitoring of air, leachate, ground & surface water		-	-	6,000.00	-
C.2 Monitoring of community & workers' health and safety		-	-	-	-
D. Decommissioning Phase					
D.1 Monitoring of air, leachate, ground & surface water		-	-	11,072.00	-
D.2 Monitoring of community & workers' health and safety		-	-	-	-
Sub-Total	USD	10,476.00	2,372.00	-	-
	(thousand) VND	217,900.80	49,337.60	-	-
Performance Monitoring					
Environmental Engineer *		-	-	-	-
Sub-Total	USD	-	-	-	-
	VND	-	-	-	-
Technical Assistance					
Environmental Specialist ^	USD	-	-	-	21,300.00
Total	USD	10,476.00	2,372.00	-	-
Grand Total	USD		12,848.00	-	-
	(thousand) VND		267,238.40	-	-

1 US$ = 20,800 VND (as of April 2013)

* It is expected that an Environmental Engineer/Scientist (EE/S) will be PPC or CPC staff seconded/assigned to the PMU.

^ Assumed 4 months (spread in 2-3 years) of combined international & national consultant inputs, includes fees, per diem, visa, transport. USD 21,300 covers technical assistance for all 3 SCDP Subprojects.

Table H.15 Environmental Performance Indicators

Indicator			Data Source
Output & Impact	Performance	Target Outcome	
During Construction			
1 Emission of noise			
1.1 Ambient noise level	- % excess of level over the more stringent limit between GoV & WHO Guidelines	- Levels should be below the more stringent limits between GoV & WHO Guidelines.	- Result of noise monitoring by Contractor - Result of pre-construction noise monitoring by PMU
	- % excess of level over the pre-construction ambient level (if latter has exceeded the more stringent limit between GoV & WHO Guidelines)	- If pre-construction ambient noise level has exceeded the more stringent limit between GoV & WHO Guidelines, increase in ambient noise level should not be more than 3 dB at the nearest reception location off-site.	
	- % of the total HHs in construction influence area that lodged complaint on health impacts &/or nuisance due to severe noise	- No community complaint lodged on health impact or nuisance from severe noise.	- Grievance Redress Mechanism Record & Report (Construction influence area to be the area within 50 m from the edges of construction sites.)
During Construction & During Operation			
2 Emission of dust/particulates			
2.1 Ambient concentrations of dust/ particulates (TSP)	- % excess of level over the more stringent limit between GoV & WHO Guidelines	- Level should be below the more stringent limit between GoV & WHO Guidelines.	- Result of air quality monitoring by Contractor - Result of pre-construction air quality monitoring by PMU
	- % excess of level over the pre-construction ambient level (if latter has exceeded the more stringent limit between GoV & WHO Guidelines)	- If pre-construction ambient level has exceeded the more stringent limit between GoV & WHO Guidelines, level during construction should not exceed pre-construction level.	
	- % of the total HHs in construction influence area that lodged complaint on health impact &/or nuisance due to severe dust	- No community complaint lodged regarding health impact or nuisance from severe	- Grievance Redress Mechanism Record & Report (Construction influence area to be the area within 50 m from the edges of construction sites.)
3 Emission of gases			
3.1 Ambient concentrations of gas in air	- % excess of levels over the pre-construction ambient levels	- Levels should not be more than 5% higher than pre-construction levels AND should be below the more stringent limits between GoV & WHO Guidelines.	- Results of air quality monitoring by Contractor - Results of pre-construction air quality monitoring by PMU
	- % of the total HHs in construction influence area that lodged complaint on health impacts &/or nuisance due to gas emissions	- No community complaint lodged regarding health impact or nuisance from gas emissions.	- Grievance Redress Mechanism Record & Report (Construction influence area to be the area within 50 m from the edges of construction sites.)

Table H.15 (cont'd)

Indicator			Data Source
Output & Impact	Performance	Target Outcome	
4 Water resource problem			
4.1 Concentrations of pollutants in groundwater resources	- % excess of levels over the pre-construction ambient levels	- For parameters with pre-construction levels equal to or exceeding the more stringent limits between GoV & WHO guidelines for drinking water quality, their levels during construction should not be higher than pre-construction levels.	- Results of ground water quality monitoring by Contractor - Results of pre-construction ground water quality monitoring by PMU
		- For parameters with pre-construction levels below the more stringent limits between GoV & WHO guidelines for drinking water quality, their levels during construction should not be more than 3% higher than pre-construction levels AND should be below the more stringent guideline limits.	
	- % of the total HHs in immediate vicinity of construction area that lodged complaint on health impacts due to deteriorating ground water quality	- No community complaint lodged regarding health impacts due to deteriorating ground water quality	- Grievance Redress Mechanism Record & Report
4.2 Concentrations of pollutants in surface water in the vicinity	- % excess of levels over the pre-construction ambient levels	- For parameters with pre-construction levels equal to or exceeding the more stringent limits between GoV & WHO guidelines for drinking water quality, their levels during construction should not be higher than pre-construction levels.	- Results of surface water quality monitoring by Contractor - Results of pre-construction ground water quality monitoring by PMU
		- For parameters with pre-construction levels below the more stringent limits between GoV & WHO guidelines for drinking water quality, their levels during construction should not be more than 3% higher than pre-construction levels AND should be below the more stringent guideline limits.	
	- % of the total HHs in immediate vicinity of construction area that lodged complaint on impacts on fish resources due to polluted rivers, on disturbing odor from rivers, etc.	- No community complaint lodged regarding health impacts due to deteriorating ground water quality	- Grievance Redress Mechanism Record & Report

Table H.15 (cont'd)

Indicator			Data Source
Output & Impact	Performance	Target Outcome	
5 Generation of construction-associated traffic, especially of big trucks 5.1 Public safety hazard/risks	- % of total construction days when construction-associated trucks encountered road accidents	- None or 0%.	- Contractor's ST and PMU's progress & monitoring reports - Grievance Redress Mechanism Record or Report - Record & report of the Safety Team
	- % of total construction days with accident that caused serious injuries &/or fatalities	- No accident or emergency should result in permanent/long-term injury or fatality.	- Record & report of district police &/or traffic authorities - Hospital records
During Operation & During Decommissioning			
6 Generation of landfill gas 6.1 Fire and explosion, public health/ safety hazards	- % excess of migration levels over pre-construction levels	- For parameters with pre-construction levels exceeding the more stringent limits between GoV & EPA guidelines, their levels during operation should be lower than pre-construction levels AND within the more stringent limits.	- Result of pre-construction landfill gas monitoring by PMU - Result of landfill gas monitoring by Contractor during demobilization - Grievance Redress Mechanism Record or Report - Hospital records
		- For parameters with pre-construction levels within the more stringent limits between GoV & EPA guidelines their levels during operation should be lower than pre-construction levels.	- Report of Commune People's Committee - Report of City Fire Department - Report of the ST & EERT - Report of the Landfill Management
	- % of days in a year when fire &/or explosion occurred due to landfill gas	- No such incidence.	
	- % of total workers that encountered injury/ fatality from fire/explosion due to landfill gas	- None or 0%.	
	- % of the total HHs in influence area that complaint on health impacts &/or nuisance due to gas migration	- None or 0%.	(Influence area = within 300 m from edges of landfill and dumpsite)
7 Generation of leachate 7.1 Concentrations of pollutants in groundwater resources	- % excess of levels over the pre-construction levels	- For parameters with pre-construction levels equal to or exceeding the more stringent limits between GoV & WHO guidelines for drinking water quality, their levels during construction should not be higher than pre-construction levels.	- Results of ground water quality monitoring by Contractor - Results of pre-construction ground water quality monitoring by PMU
		- For parameters with pre-construction levels below the more stringent limits between GoV & WHO guidelines for drinking water quality, their levels during construction should not be more than 3% higher than pre-construction levels AND should be	

Table H.15 (cont'd)

Indicator			Data Source
Output & Impact	Performance	Target Outcome	
8 Population of pests, insects, rodents vermin) Health & safety hazard	- % of the total HHs in landfill influence area that lodged complaint on health impacts &/or nuisance due to severe noise	- No community complaint lodged on health impact or nuisance from severe noise.	- Grievance Redress Mechanism Record & Report (Influence area to be the area within 300 m from the edges of the landfill)
9 Damage during earthquake or extreme weather event	- No. of days of disruption in disposal services due to damage.	- No such incidence.	- Field reports by operator. - Field reconnaissance after extreme event & random interview.

End Note H.1 Draft Outline for the Environmental Monitoring Report

1. Introduction

(Purpose of report; order of submission of the report e.g., first, second….nth report; period covered**;** preparer; and structure of the report)

2. Component Description

(Briefly describes the component, its sub-component activities and their sizes/scales, locations, costs and implementation schedules. Remains the same in every reporting, unless there are changes in scope, size or details, locations. Include map showing locations of components.)

3. Physical Progress of the Component

3.1 Previous Reporting Period

3.2 Current reporting period

(target and actual, for each Sub-component, and for Component overall)

4. Compliance with GOV Environmental Requirements

GOV Environmental Regulatory Requirements	Compliance Status

5. Loan Agreement's Environmental Requirements (other than EMP compliance)

Loan Agreement Reference No. & Provision	Compliance Status

6. Compliance with the EMP

6.1 Implementation of Mitigation Measures

From EMP		Measures Undertaken				Necessary Corrective Action	Results
Impacts	Measures	What	When	How often	Effectiveness		

6.2 Conduct of Environmental Effects Monitoring

Monitoring Activity Stated in EMP	Undertaken?			Results	Remarks
	Yes	No	Date		

6.3 Observance of the Grievance Redress Mechanism

Complaint		Complainant		Action Taken	Result	Remarks
When Filed	What	Name	Address			

7. Performance Monitoring

7.1 Effectiveness of Instituted Mitigation Measures (suggested)

Assessment	Description	Scoring
Very Good	96-100% fully effective	5
Good	76-95% effective	4
Fair	51-75% effective	3
Poor	26-50% effective	2
Very Poor	0-25% effective	1

7.2 Performance in EMP Implementation (suggested assessment levels, descriptions & scoring)

A. Environmental Impact Mitigation

Assessment	Description	Scoring
Very Good	96-100% of the required mitigations carried out accordingly	5
Good	76-95% of the required mitigations carried out accordingly	4
Fair	51-75% of the required mitigations carried out accordingly	3
Poor	26-50% of the required mitigations carried out accordingly	2
Very Poor	0-25% of the required mitigations carried out accordingly	1

B. Environmental Effects Monitoring

Assessment	Description	Scoring
Very Good	96-100% of the required effects monitoring carried out accordingly	5
Good	76-95% of the required effects monitoring carried out accordingly	4
Fair	51-75% of the required effects monitoring carried out accordingly	3
Poor	26-50% of the required effects monitoring carried out accordingly	2
Very Poor	0-25% of the required effects monitoring carried out accordingly	1

7.3 Overall Environmental Performance of the Subproject

Impact (EMP)	Performance		Met Target Outcome?			Basis of Info	Remarks
	Indicator (EMP)	Value	Met	Failed			
				Frequency	Date/s		

8. Summary of Corrective/Follow Up Actions to be Taken

9. Lessons Learned

10. Conclusion

End Note H.2 Draft Outline Terms of Reference for PIS Environmental Specialist

1. This ToR applies to a collective effort of the international and national local environmental specialists, for at least 4 months spread over two-three years of Project implementation.

2. The Environmental Specialist will provide the PMU: (i) technical assistance and advice in supervision of EMP implementation; and (ii) capacity development in environmental monitoring and reporting. Capacity development shall be highly focused in the training of the PMU's Environmental Engineer/Scientist (EE/S). Training shall be highly "hands-on" or adopting the "learning while doing" approach.

3. The Environmental Specialist shall have at least a Master's degree in Environmental Science or Environmental Engineering, and at least 10 years of experience in the management of environmental performance of infrastructure projects (preferably for basic urban services) including environmental monitoring and environmentally responsible procurement. He/she shall ensure that his/her engagement of (at least) 4 months, spread over two-three years, will allow the EE/S to operate effectively on his/her own after two-three years until loan closure. His/her responsibilities include, but not limited to, the following:

Prior to construction

i. Finalization of the IEEs and EMPs.
ii. Monitoring of the incorporation of relevant mitigation measures in the detailed designs.
iii. Ensuring conduct of integrated social-environmental public consultations and disclosure.
iv. Ensuring GOV EA requirements will not cause delay in the commencement of the construction phase.
v. Preparation for procurement, i.e., ensuring that the SPS compliant Subproject EMP is part of the bidding documents; incorporation of environmental criteria, scoring and weight in the evaluation of bids.
vi. Preparations for the activation of the grievance redress mechanism, e.g., materials for dissemination and posting, documentation and communication systems, among others.
vii. Partially conduct the training lectures/seminars.
viii. Implementation of pre-construction environmental monitoring as recommended in the EMP.

During construction

ix. Review of the Contractor's EMP against the SPS compliant SEMP.
x. Provision of guidance to the EE/S on the supervision of EMP implementation, and advice on any actions required to ensure EMP compliance.
xi. Assessment of the implementation of the grievance redresses mechanism and identification of improvement/s in the mechanism.
xii. Review of the results of Contractor's environmental effects monitoring.
xiii. Guidance in the preparation of environmental monitoring report.

During the Entire Engagement Period

xiv. Review monthly and semi-annual EMRs prepared by the EE/S. Together with the EE/S finalize EMRs for submission to the PMU. Identify necessary improvement/s in monitoring.

xv. Prepare the necessary report that will be required from him/her as part of the PIS Team, e.g. progress report on his/her technical assistance.

xvi. Perform other tasks that are relevant to his position and are not mentioned above.

Annex I.

(Draft) **Environmental Management Plan**
for the
Urban Roads Component

Buon Ma Thuot Subproject
of the
Secondary Cities Development Project

Environmental Management Plan (draft)

Project No. XXXX
April 2013

Socialist Republic of Viet Nam: Secondary Cities Development Project --- Buon Ma Thuot Subproject Urban Roads Component

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CURRENCY EQUIVALENTS
(as of 17 May 2013)

Currency unit	–	dong (D)
D1.00	=	$0.0000477
$1.00	=	D20,925

Abbreviations

ADB	Asian Development Bank
CEMP	Contractor's Environmental Management Plan
CEMR	Contractor's Environmental Management Report
DAKURENCO	Dak Lak Urban Engineering Company
DONRE	Department of Natural Resources and Environment
DPH	Department of Public Health
EERT	External Emergency Response Team
EMP	Environmental Management Plan
EMR	Environmental Monitoring Report
GOV	Government of Viet Nam
IEC	Information, Education and Communication
IEE	Initial Environmental Examination
PIS	Project Implementation Support
PMU	Project Management Unit
SC	Safety Coordinator
ST	Safety Team
ToR	Terms of Reference
USD	United States Dollar
VND	Viet Nam Dong

VIII. BACKGROUND

186. This draft Environmental Management Plan (EMP) for the Urban Roads Component is part of the Initial Environmental Examination (IEE) Report for the Buon Ma Thuot Subproject of the Secondary Cities Development Project. The IEE was conducted during project preparation that started in the 3rd Quarter of 2012. This draft EMP shall be finalized by the Project Management Unit (PMU) based on the detailed design, with technical assistance from the Environmental Specialist of the Project Implementation Support (PIS) Team. This document, together with the IEE, will have to be agreed on by Loan Fact Finding and endorsed soon thereafter for uploading to the ADB website.

187. The Buon Ma Thuot Subproject under the Secondary Cities Development Project will deliver the following outputs, through three components namely:

( ) Solid Waste Management Component
- improved solid waste disposal
- i. remediated open dumpsite
- ii. a pilot project for community waste at source segregation and a supporting information and education campaign;

(i) Urban Roads Component
- improved/complete major roads; and

( ) Capacity Building and Subproject Implementation Support
- increased efficiency and management capacity of the relevant government agencies in project management, particularly in financial management, procurement, project performance monitoring and evaluation.

188. The Urban Roads Component will improve and widen the existing Tran Quy Cap Road, and improve, extend and widen the existing Mai Thi Luu Road. These two roads together with Ba Huyen Thanh, Quan and Y Wang Roads form the eastern ring road of the City.

Table I.1 Summary of Works Under the Urban Roads Component

Item	Tran Quy Cap Road	Mai Thi Luu Road
Road	18 m wide & 4,224 m long Of asphalt concrete	14 m wide & 2,575 m long (1,100 m is existing road, the rest is new road.) Of asphalt concrete A total of 15 intersections
Subgrade	30 m wide	24 m wide
Bridge	Reinforce concrete beam, 9 m long T-shaped	None
Sidewalks	2x 6 m, concrete with Terrazzo tiles Tree pots of 1.2 m x 1.2 m Trees at 8 m apart	2x 5 m, concrete with Terrazzo tiles Tree pots of 1.2 m x 1.2 m 516 trees at 8-10 m apart
Drainage	Centrifugal culvert pipes, D80-180 cm, for longitudinal drainage Transverse culvert pipes of D40 cm Technical culverts, BxH=100x100 cm	D=100-150 cm 2,412 m long Transverse Manholes 468 m Drainage culvert gates at 4 discharge gates D=120-180 cm, 808.6 m Transverse culvert D=180 cm, 1 culvert/30m Transverse culverts, BxH= 2x(300x300), 1 culvert/67.08 m Technical culverts, 6 culverts /102 m
Traffic safety system	Whole road	Whole road
Lighting system	2 sides, whole length of road	2 sides, whole length of road

Figure I.1 Layout for the Proposed Improvement & Extension of Tran Quy Cap Road

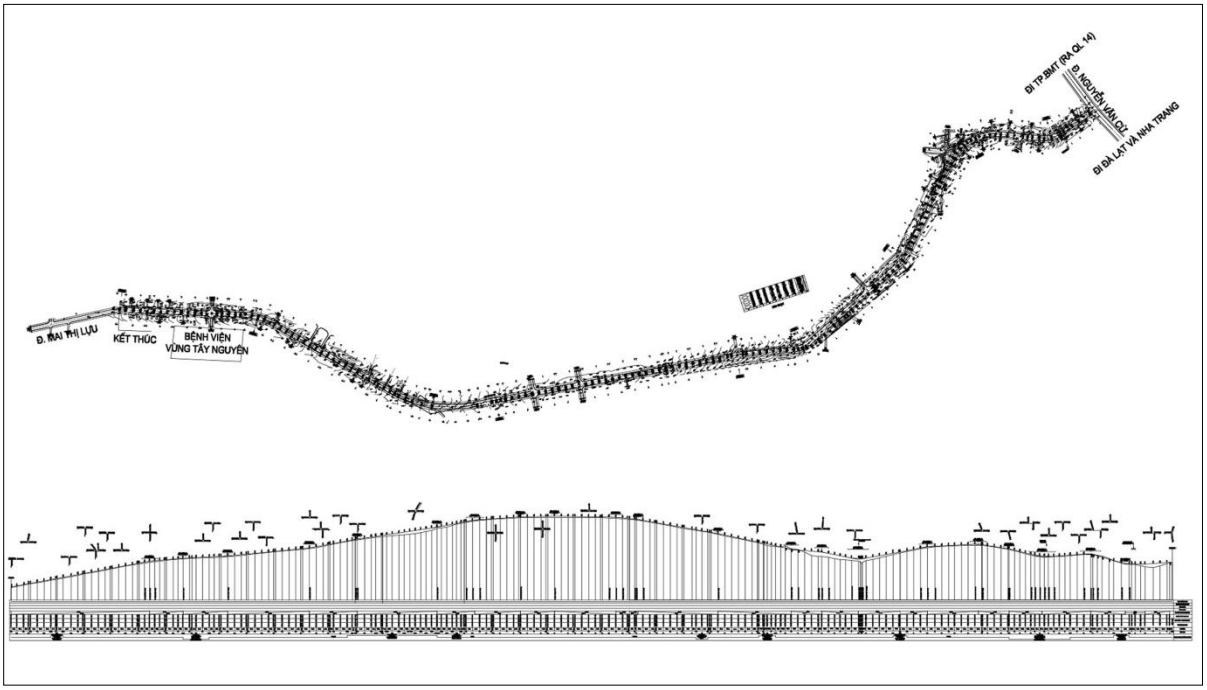
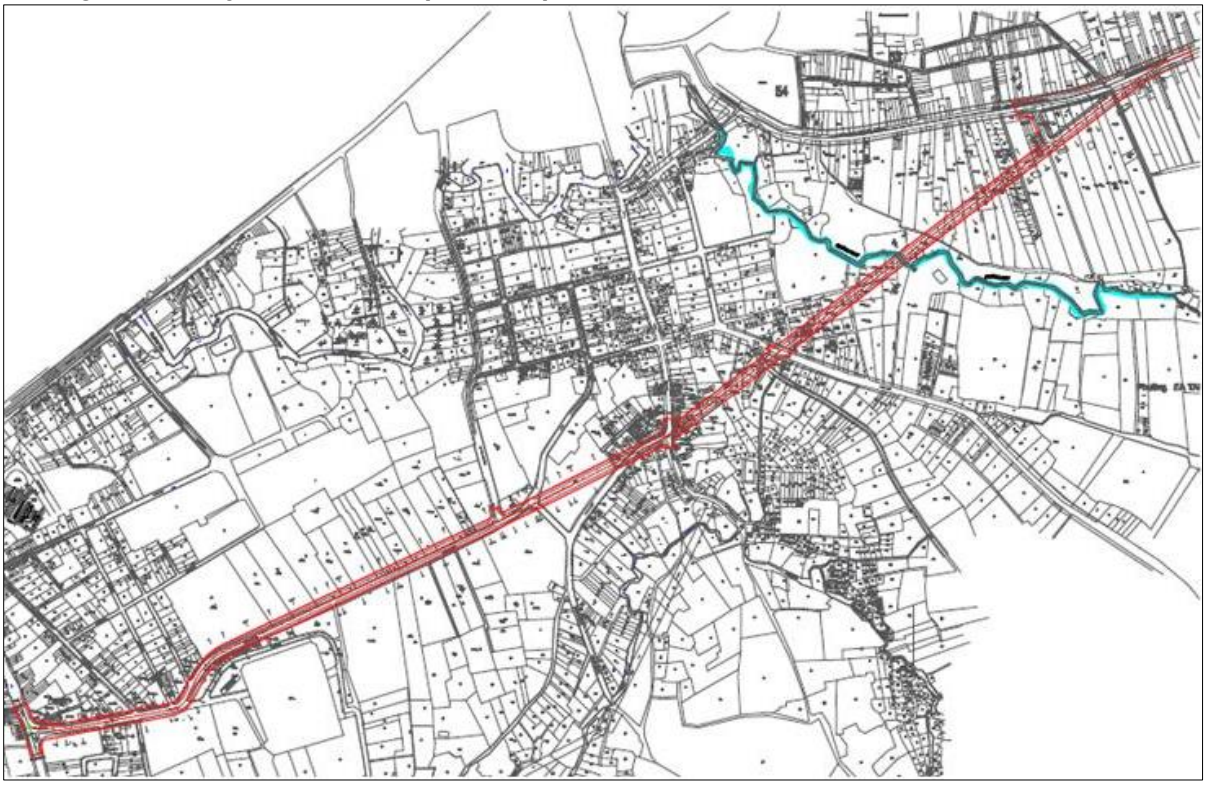
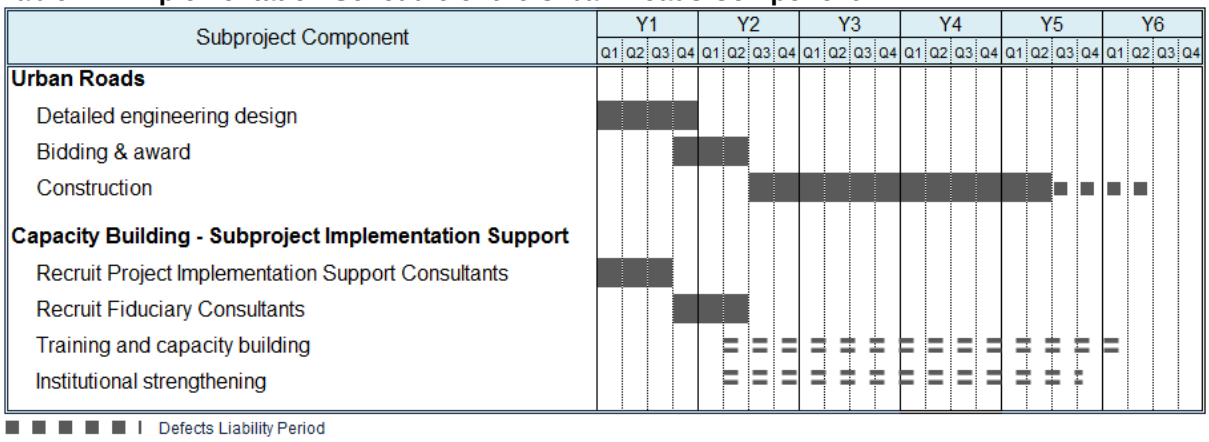


Figure I.2 Layout for the Proposed Improvement & Extension of the Mai Thi Luu Road



189. The Component will be implemented over a period of 54 months (excluding defects liability period), to cover: (i) 12 months of preparation of detailed design and bidding documents; (ii) 9 months of procurement process; and iii) about 36 months of construction. The roads could possibly be open for use by the 58th/61st month, even before defects liability period is over. Table I.2

Table I.2 Implementation Schedule of the Urban Roads Component



IX. SUMMARY OF ISSUES/CONCERNS/IMPACTS

190. The IEE identified and screened a range of likely issues/concerns/impacts arising from the implementation of the aforementioned sub-components. These are summarized below.

Table I.3 Summary of Issues/Concerns/Impacts

Issues/Concerns/Impacts	Type	Overall Magnitude
Pre-Construction Phase		
Inadequate incorporation of climate change and seismicity in design	Negative	Moderate-Significant
Inadequate attention on the impacts of roads local hydrology	Negative	Moderate-Significant
Inadequate consideration of sustaining flow of sustaining river/stream	Negative	Moderate
Inadequate attention on potential unsustainable supply of gravel, sand, soil; or unsustainable extraction of these materials to meet construction demand	Negative	Moderate
Displacement of people, loss of assets & income	Negative	Significant
Construction Phase		
Dust/suspended particles	Negative	Moderate-Significant
Gas emissions	Negative	Least-Moderate
Noise	Negative	Moderate-Significant
Vibration	Negative	Least-Moderate
Impacts associated with quarrying for construction aggregates (dust, noise, vibration, visual impact on landscape, groundwater/ surface water contamination, traffic, smoke, accidents, etc)	Negative	Least-Significant
Generation of spoils/solid wastes	Negative	Moderate-Significant
Traffic & road blocking	Negative	Moderate-Significant
Access blocking	Negative	Moderate-Significant
Local flooding due to obstructed surface drainage or damage to existing drainage channel	Negative	Moderate-Significant
Accidental damage to utilities, resulting in service interruptions	Negative	Least-Moderate
Disruption of socio-economic activities	Negative	Least-Moderate
Accidental damage to properties/structures	Negative	Least-Moderate
Community health and safety hazard	Negative	Moderate
Workers' health & safety hazard	Negative	Moderate
Operation Phase		
Unsustained efficiency of operation due to inefficient O&M/R	Negative	Moderate-Significant
Damages during seismic or extreme weather events	Negative	Least-Moderate
Completed main roads, providing better, shorter access for inter-provincial and intra-area traffic.	Positive	Significant
Climate resilient City roads, ensuring safe access particularly during extreme weather events.	Positive	Significant

X. ENVIRONMENTAL MITIGATION

191. The recommended mitigation measures consist of actions, activities, plans and documents (including resettlement/compensation plan, environmental approval documents, Contractor's EMP) that need to be undertaken, observed, obtained, prepared to prevent, mitigate, or compensate for, the salient adverse impacts enumerated in Table I.3. The broad measures are outlined below; while the specific measures are presented in the Environmental Mitigation Plan (Table I.4):

(i) Incorporating in detailed design adequate considerations and conditions relative climate change and seismicity to sustain the structural integrity and effective operations of completed works.
(ii) Prompt compensation for losses associated with ROW acquisition according to the approved Resettlement/Compensation Plan.
(iii) Designs that sustain crossing rivers.
(iv) Ensuring the engagement of an environment-responsible Contractor by incorporating the SPS compliant Subproject EMP into the bidding documents, for use as basis in the preparation of the Contractor's CEMP by the selected Contractor, addressing as minimum the requirements of the Subproject EMP. CEMP to be quantitatively and qualitatively evaluated against the Subproject EMP and cleared by ADB prior to the commencement of any work on site. The contract for civil works to explicitly stipulate the obligation to institute the mitigation measures properly and carry out environmental monitoring according to the SPS compliant CEMP and Subproject EMP. The Contract to stipulate some tie-up of progress payment and collection of performance bond with the performance in CEMP/Subproject EMP implementation.
(v) A CEMP that ensures good and environment-friendly engineering practices that avoid first, and (if unavoidable) mitigate, adverse impacts; and commitment from Contractor to fully implement the CEMP/Subproject EMP.
(vi) Quality construction supervision and environmental monitoring by the PMU.
(vii) Conduct of engineering investigations of built structures after every seismic and extreme weather events during construction and during operation and full disclosure of investigation reports.
(viii) Sufficient funds for sustained quality of operation and maintenance.
(ix) Observance of the grievance redress mechanism and prompt action/ resolution of lodged grievances.

192. The Environmental Mitigation Plan attempts to be comprehensive to: (i) point out that the most measures are the usual good engineering practices and are, therefore, not difficult to institute, and (ii) to facilitate monitoring by the PMU and other relevant institutions.

XI. ENVIRONMENTAL MONITORING AND REPORTING

C. Environmental Monitoring

193. Environmental monitoring will consist of environmental effects monitoring; and performance monitoring. Environmental effects monitoring will cover ambient air quality, noise and vibration levels, groundwater quality, surface water quality and community health and safety prior to construction and during construction; and workers health and safety during construction. Performance monitoring will monitor and evaluate the performance of the Design Consultant, Contractor and Operator in complying with, or adhering to, the CEMP and/or Component EMP. A draft Environmental Monitoring Plan is presented as Table I.5.

D. Reporting

194. Environmental monitoring activities and findings shall be documented for purposes of reporting, recording, verifying, referring on and evaluating the environmental performance of the Subproject. The documentation shall also be used as basis in correcting and enhancing further environmental mitigation and monitoring. An Environmental Monitoring Report (EMR) shall not only report on the progress and results of environmental monitoring and compliance of CEMP/EMP implementation but shall also: (i) assess the effectiveness, of instituted measures; (ii) point out violation/s, if any; (iii) assess/recommend corrective actions; and (iv) cite any coordination made for corrective actions and, if applicable, certifications for having instituted them effectively. It shall also feature possible innovative mitigation measures applied by the Contractor, Operator or affected residents themselves, and other lessons learned in CEMP/EMP implementation. These will be useful in adjusting the CEMP/EMP to adapt to real ground situations. (Proposed adjustments/enhancement of the CEMP/EMP must have prior ADB clearance.) A draft EMR outline is presented as End Note I.1.

195. EMRs shall be prepared as follows:

(i) Monthly by the Contractor during construction and by the Operator during operation, submitted to the PMU.
(ii) Semi-annually by the PMU's Environmental Engineer/Scientist during detailed design and during construction, to be submitted to the ADB.
(iii) Annually by the PMU's Environmental Engineer/Scientist during operation until loan closure, or as agreed, to be submitted to the ADB.

Table I.4 Environmental Mitigation Plan

A. Prior to Construction Phase

A.1 Detailed Engineering Design

Potential Environmental Concerns/Impacts		Recommended Mitigation Measures		Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
						Implement	Supervise & monitor
1	Inadequate incorporation of climate change, seismicity, their threats & potential impacts, resulting in: - completed works unable to cope during extreme weather events & earthquakes - non-sustainability of completed facility & effectiveness of its services during its intended life span	1.1	Design to seismic design criteria as regulated in Viet Nam	Not applicable	c/o design cost	Design Consultant	PMU & PIS Envi Sp/ ADB*
		1.2	Undertake the necessary geo-technical & geological investigations for basis in detailed design.				
		1.3	Some design options for works to adapt to reduction in rainfall --- landscaping with drought tolerant species, using flexible pavement, specify optimum degree of compaction to avoid subsequent settlement, use of materials with high resistance to dry conditions, as appropriate.	Not applicable	-		
		1.4	Some design options for works to adapt to increased precipitation ---optimum degree of compaction; raised pavement; increasing size of hydraulic structures/river crossings; additional capacity of drains				
2	Inadequate attention on the impacts of road on local hydrology	2.1	Specify water flow control measures, e.g., grass strips/plant on cleared area, earth ditch, as appropriate.	Not applicable	-		
		2.2	Specify only "clean" fill material especially around water bodies.				
		2.3	Strengthen (e.g., pave) sections with erosion potential, especially areas close to water bodies.				
2A	Inadequate consideration of sustaining flow of crossing river/stream	2A.1	Design needs to be coordinated with the trend of local aquatic conditions, e.g., flow regimes, fish movement & human use.	Not applicable	-		
		2A.2	Consult the MARD, DONRE aquatic resource expert, concerned wards/communes/local communities for technical, biological & social inputs into climate change considerations.				
		2A.3	Avoid constricting river flow, instead provide enough easement to allow for potential increased & stronger flow.				
3	Inadequate attention on potential unsustainable supply of gravel, sand, soil or unsustainable extraction of these materials to meet construction demand	3.1	Prepare a Subproject Aggregates Mgnt Plan (AMP), confirming location of sources, estimating supply of, & demand for, aggregates during construction, linked to cut-&-fill management plan. This will form basis for Contractor's AMP.	Not applicable	c/o design cost		
		3.2	Specify in bidding documents Contractor's obligation to obtain aggregates only from quarries & crushing plants still operating within allowed extraction threshold per environmental permit.	Not applicable	-		

Table I.4 (cont'd)

Potential Environmental Concerns/Impacts	Recommended Mitigation Measures	Location	Estimated Cost[a] (USD)	Institutional Responsibilities	
				Implement	Supervise & monitor
3A Inadequate consideration of impacts of completed road on adjacent properties/ communities.	3A.1 Road design to mitigate the adverse impacts (e.g., increased TSP, noise, safety hazards, potential water logging on adjacent properties, etc) that are normally associated with road operations on communities through which it will pass. - Plan/design in the context of the surrounding environment, availing of the opportunities to provide services to, & support or complement the surrounding uses/development/socio-cultural patterns & activities (in the short & long terms). - Identify existing & future concerns through consultations with existing communities. Incorporate consultation outcomes in plan/design, appropriately. - Blend the streetscape with the character of the surrounding environment. - Design to allow maintenance operations to evolve with the surrounding development.	Not applicable	-	Design Consultant	PMU & PIS Envi Sp/ ADB*

A.2 ROW Acquisition, Obtaining Approvals, and Community Preparation

Potential Environmental Concerns/Impacts	Recommended Mitigation Measures	Location	Estimated Cost[a] (USD)	Institutional Responsibilities	
				Implement	Monitor
4 Displacement of HH. loss of land, & parts of structures, crops/trees, income	4.1 Finalize Resettlement/Compensation Plan, after Detailed Detailed Measurement Surveys, through highly consultative & participatory process.	All affected villages	-	Design Consultant	PMU & PIS Envi Sp/ ADB*
	4.2 At least 30 days before awarding of contract for civil works, losses shall have been fully compensated for.	All affected villages	c/o resettlement cost	PMU	PIS Envi Sp/ ADB*
5 GOV EA requirements & approvals	5.1 Prepare EIA report and obtain approval from the PPC.	Not applicable	c/o PMU's counter-part obligations		
6 Potential communicable/transmittable diseases brought with entry of workers & overall health and safety hazards during construction	6.1 Intensive awareness program on communicable/transmittable diseases, e.g., SARS, H1N1, STD, HIV/AIDS, tuberculosis, and diseases that may be brought with entry of workers and on the health and safety hazards during construction.	All affected villages	c/o PMU's counter-part obligations	PMU with DPH, W/CPC	

Table I.4 (cont'd)

A.3 Procurement & Prior to Mobilization

Potential Environmental Concerns/Impacts	Recommended Mitigation Measures	Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
				Implement	Review & Evaluate
7 Engagement of environmentally irresponsible contractor for civil works	7.1 A SPS compliant Subproject EMP (SEMP), as part of bidding documents. 7.2 SEMP to be appended to the Contract for basis of preparation of Contractor's EMP (CEMP) that will address as minimum the requirements of the SPS compliant SEMP & for compliance. 7.3 Contract to require Contractor's submission of monthly envi'l monitoring report, outline appended in Contract. 7.4 Contract to also stipulate some tie up of progress payment & collection of performance bond with the performance in CEMP/ SEMP implementation. 7.5 CEMP to be quantitatively & qualitatively evaluated against SEMP. cleared as fully responsive to SEMP before start of any work on site or establishment of project construction-related facilities.	Not applicable	-	PMU	PIS Envi Sp/ ADB*

B. Construction Phase

Potential Environmental Concerns/Impacts	Recommended Mitigation Measures	Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
				Implement	Monitor
PHYSICAL / CHEMICAL ENVIRONMENT					
8 Dust/suspended particles from: - earthworks (clearing, grubbing, levelling, excavation, backfilling) - dry exposed areas - stockpile of dry soil, sand, cement - demolition works - transport of aggregates, cement, residual soil for disposal, & wastes - loading/unloading of fine aggregates, cement and other materials - movements of construction vehicles	8.1 Segmentation of works. Keep road base course & backfilling works following appropriately close to excavation work.	All sites	-	Contractor	PMU & PIS Envi Sp/ ADB*
	8.2 Watering of dry unpaved/exposed surfaces, stockpiles of sand & excavated materials, debris from demolition, at least twice daily.	All applicable sites	c/o Construction running cost		
	8.3 Tarpaulin or similar cover on trucks carrying aggregates, cement residual soils, & wastes. Maintain min. 2 feet freeboard.	Entire hauling route	c/o Supplier's cost	Supplier & Contractor	
	8.4 Minimize drop heights when loading/unloading soil onto trucks/ground. Spray water on soil being loaded/unloaded.	All sites	-	Contractor	
	8.5 Clean up work surfaces at the end of each day's work.				
	8.6 Limit for construction trucks in /around sites to max. 30 kph.				
	8.7 For works within 30 m from sensitive receptors, e.g., health care facilities, schools, houses, among others, set up a temporary wall between receptor & work area. Wall to be at least 2.5 m high & at least 10 m beyond each end of active work area.	All sites	c/o Construction safety cost (preliminaries)		

Table I.4 (cont'd)

Potential Environmental Concerns/Impacts	Recommended Mitigation Measures	Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
				Implement	Monitor
9 Gas emissions from; - exhaust of operating construction equipment/vehicles, including generator sets - burning of solid/hazardous wastes - overall power/energy use in construction - use of high VOC emitting specialty applications	9.1 Reduced vehicular movements through: - coordinated transport of materials, spoils & waste - worker's accommodations at walking distances, or providing mass transport for workers - bigger capacity trucks for hauling of wastes/spoils, where access roads allow	All sites	-	Contractor	PMU & PIS Envi Sp/ ADB*
	9.2 Turn off equipment/vehicle when not in use. Limit engine idling to a max. of 5 minutes.				
	9.3 Use existing power poles as far as possible. Minimize use of generators. Use clean-fuelled generators.				
	9.4 No burning of wastes. No indiscriminate dumping of waste, especially organic wastes, left to decompose.				
	9.5 Use low VOC-emitting asphalt processing & other materials, e.g., adhesives, sealants, paints, lacquers, linings, etc.				
	9.6 Use only well maintained construction vehicles/equipment, with emission test certificate.				
10 Odor from: - gas emission sources - use of high VOC emitting specialty applications - poorly managed solid & hazardous wastes - poor sanitation practices of workers	10.1 Application of gas emission mitigation measures. (No. 9 above)	All sites	-		
	10.2 Properly store, promptly dispose of, organic & hazardous wastes.				
	10.3 Require enclosed trucks for, or effective cover when, hauling wastes to the landfill & chemicals to construction sites.				
	10.4 Schedule as much activities that generate odor as possible to specific times of the day (non-peak hours of public presence) and consider weather conditions (wind & temperature).				
	10.5 When there is high odor release from activities, slow down/adjust, or suspend, some activities, especially when wind blows towards residential areas, &/or during peak hours of public presence.				
	10.6 Where applicable, install barriers around potential odor generators, located against prevailing wind directions.	All sites	c/o Construction mobiliz'n cost (preliminaries)		
	10.7 Provide adequate sanitation facilities, adequate water supply. Strictly enforce observance of sanitation practices.				

Table I.4 (cont'd)

Potential Environmental Concerns/Impacts	Recommended Mitigation Measures	Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
				Implement	Monitor
11 Noise from: - operating equipment/vehicles (especially those diesel-fed & without efficient mufflers), - processes such as drilling/pavement breaking, excavation, concrete mixing, earthmoving, demolition of existing structures - unloading of aggregates	11.1 Set up noise barriers, for example: - temporary fence around active work area, 2.5 m high - sound-absorbing enclosure around generator sets	Applicable sites	c/o Construction mobiliz'n cost (preliminaries)	Contractor	PMU & PIS Envi Sp/ ADB*
	11.2 Restrict use of noisy equipment from 8 AM-5 PM. Overtime work should not go past 10 PM, observe reduced noise level, not use noisy equipment, be coordinated with W/CPC. Inform affected communities at least 3 days in advance.	All sites	-		
	11.3 Use only equipment that emit least noise, e.g. electrically powered equipment, hydraulic tools, those with efficient mufflers. Allow only well-maintained equipment/vehicles, with certificates of compliance to noise standards, to be used in construction.				
	11.4 Locate noise generators at max. distance from nearest receptors.				
	11.5 Turn off equipment/vehicles when not in use.				
	11.6 Spread out schedule of material, spoil & waste transport, in the day (off-peak traffic hours), or early evening.				
12 Vibration generated from: - operation of equipment/vehicles & movement of trucks to & from sites - construction activities, e.g., drilling, excavation	12.1 Restrict use of equipment emitting vibrations, 8 AM-5 PM.	All sites	-		
	12.2 Prior to start, identify vibration-sensitive areas & structures in the construction influence area to plan for the appropriate technology, equipment/ tools & procedure level to apply or use.				
	12.3 Schedule separately ground-impacting activities as necessary to reduce the intensity of impact.				
	12.4 Limit engine idling to a max. of 5 minutes.				
	12.4 Limit speed to max. 40 kph en route to sites, 30 kph in access road and sites.	En route to and in, Subproject sites			
	12.6 Use available equipment & tools that emit least vibrations per manufacturer's specifications, or equipped with shock absorber, & has a handbook for user's safety & specifies requirements on vibration. Maintain equipment/tools to specifications.	All sites	c/o Construction mobiliz'n cost (preliminaries)		
13 Impacts from extracting (quarrying/ borrowing) materials to meet construction needs	13.1 Implement Contractor's Aggregates Management Plan (CAMP) that is linked to a cut-&-fill (or excavation-backfill) management plan (should be part of the ADB-cleared CEMP)	All sites	-		

Table I.4 (cont'd)

Potential Environmental Concerns/Impacts	Recommended Mitigation Measures	Location	Estimated Cost[a] (USD)	Institutional Responsibilities	
				Implement	Monitor
- dust, noise, vibration during quarrying/ borrowing, during transport, during loading/unloading, from wind-blown stockpiles in quarry - siltation/sedimentation of water body in surface drainage path, in quarry/borrow areas & while stored in sites - visual impact on the landscape in quarry/borrow areas - traffic & smoke generated during transport - potential accidents, especially during transport	13.2 Source aggregate only from quarry/borrow areas with environmental clearance & license to operate, & that still have high ratio of extraction capacity over loss of natural state.			Contractor	PMU PIS Envi Sp/ ADB*
	13.3 If Contractor/Sub-contractor shall operate its own quarry/borrow operations: - Contractor to obtain environmental certificate & license to operate prior to extraction & implement site restoration after extraction for Component.	Contractor's quarry/borrow area	c/o Contractor's Project Cost		
	- Verify Contractor's license to, environmental clearance for, quarry. - Ensure site restoration plan is implemented by Contractor after completion of borrowing for Subproject.	Contractor's quarry/borrow area	-	PMU	PIS Envi Sp/ ADB*
	13.4 Aggregate trucks to: - observe max. speed limit of 40 kph en route to sub-component sites; 30 kph in access roads to, & in, sub-component sites - maintain min. of 2 feet freeboard & provide tight cover - minimize drop heights during loading/unloading; spray water on aggregates being loaded/unloaded - be well-maintained, with up-to-date emission test certificate 13.5 Sub-contract for aggregates supply to stipulate the obligation to comply to all of the above and all applicable mitigation measures stipulated in CEMP/Subproject EMP.	Contractor's quarry/borrow area to sites	-	Contractor/ Supplier	PMU & PIS Envi Sp/ ADB*
14 Depletion of water resources from using piped water supply &/or groundwater to meet construction water demand	14.1 Meet construction water demand using water from permitted surface water sources, delivered to sites by water trucks & stored on site in tanks.	All sites	c/o Construction running cost (preliminaries)		

Table I.4 (cont'd)

Potential Environmental Concerns/Impacts	Recommended Mitigation Measures	Location	Estimated Cost [3] (USD)	Institutional Responsibilities	
				Implement	Monitor
15 Deterioration of surface & ground water resources from improper/inadequate management of the following in workers: camp & sub-component sites: - sewage/wastewater - solid & hazardous wastes - sediments, silts - hazardous construction materials	15.1 Provide adequate sanitation facilities, adequate water supply. Strictly enforce observance of sanitation practices.	All construction sites &/or field offices & workers accommodations	c/o Construction mobiliz'n, safety & running costs (preliminaries)	Contractor	PMU & PIS Envi Sp/ ADB*
	15.2 Implement an eco-friendly solid/hazardous waste management: - practices waste minimization, reuse and segregation - has adequate covered storage bins/containers, color-coded clearly marked to avoid mixing, especially hazardous wastes - has separate enclosed storage areas for solid & hazardous wastes, that can contain spills, clearly marked/labelled - networks with private individuals/entities that are into waste recovery & recycling to reduce wastes brought to landfills - implements prompt disposal at the City landfill - coordinate with URENCO for the disposal of hazardous wastes - workers & hazardous waste contractors to observe safety measures/system when handling hazardous wastes - requires waste contractors to promptly submit a manifest from City landfill for every disposal, from recyclers/junkshops for every delivery of re-usable construction spoils/refuse.				
	15.3 Implement measures to mitigate sedimentation/siltation. - stockpile on flat grounds & away from, not obstructing, main surface drainage routes, limit to max height of 2 m. - dispose of unsuitable & excess soils as soon as possible - avoid stockpiling on site more than what is needed - use any combination of silt fences, sediment basins/traps, sandbags, barrier nets, earth berm/bund, perimeter dike, speed stilling humps, seeding, mulching, establishing general vegetation, whichever would be appropriate. - apply permanent/temporary soil stabilization practices to cleared areas within 15 days after final grade is reached on any part of sites (most especially bridge, & applicable, road sites.) - divert & convey offsite runoff around disturbed soils & slopes to stable areas.	All sites			

Table I.4 (cont'd)

Potential Environmental Concerns/Impacts	Recommended Mitigation Measures	Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
				Implement	Monitor
	15.4 Implement measures to mitigate potential adverse impact from use and storage of hazardous substances - have safe storage, with visible caution signage, secure from unauthorized entry or use & can contain spillage. - safe storage - if using stationary ground storage, it should be at least 30 m from water bodies or nearest groundwater resource, at least 1 foot above highest flood level; or - use mobile storage for easy transfer during potential flooding - should always be in good condition, color-coded, with clear labels - have vehicles/equipment clearly leaking oil repaired immediately off-site. - no vehicle maintenance and refuelling will be allowed in the Subproject sites. - use less hazardous substances - store no more hazardous substances on site than needed - spill clean up materials for all types of hazardous substances present in the sites to be readily available in the sites.	All sites	c/o Construction mobiliz'n & running costs (preliminaries)	Contractor	PMU & PIS Envi Sp/ ADB*
BIOLOGICAL ENVIRONMENT 16 Impairment of aquatic life in nearby water bodies	16.1 Implement the measures recommended above to mitigate the deterioration of water resources. (No. 15 above)	All sites	c/o Construction mobiliz'n & running costs (preliminaries)	Contractor	PMU & PIS Envi Sp/ ADB*
17 Loss of vegetation beyond Subproject sites, due to: - un-directed movement of construction vehicles/ equipment - un-guided excavation - haphazard stockpiling of materials - haphazard parking of construction vehicles/equipment	17.1 Physically mark limits for ROW and clearing and grubbing. 17.2 Install reflectorized guides, signage, markers to direct vehicular/equipment traffic along the access roads. 17.3 Designate stockpiling of materials and spoils, as well as parking of construction vehicles/equipment in areas where there is least, or no, vegetation.	All sites Access roads All sites	c/o Construction mobiliz'n cost (preliminaries)		

Table I.4 (cont'd)

Potential Environmental Concerns/Impacts		Recommended Mitigation Measures		Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
						Implement	Monitor
SOCIO-ECONOMIC & CULTURAL ENVIRONMENT							
18	Impacts on the sustainability of urban services from: - meeting construction water demand with piped water supply - inadequate management of wastes, silt, aggregate stockpiling that could compromise the effectiveness of the urban drainage systems - indiscriminate dumping of construction wastes, putting pressure on the limited capacity of DAKURENCO - volume of SW to bring to the landfill - accidental damage to utility lines, causing disruption of services	18.1	Meet construction water demand using water from permitted surface water sources, delivered to sites by water trucks & stored on site in tanks.	All sites	c/o Construction running costs (preliminaries)	Contractor	PMU & PIS Envi Sp/ ADB*
		18.2	Manage SW & stockpiling of aggregates & mitigate sedimentation. (No. 14.2 & 14.3 above)				
		18.3	Contractor to be responsible for hauling wastes to disposal sites (by itself or by a sub-contractor) to avoid competing with City for URENCO's collection services.				
		18.4	Reduce wastes going to the disposal site: - Network with junkshops for the recyclables. - Offer residual soils as free filling materials to interested private individuals or to Government's infrastructure projects.				
		18.5	Immediately coordinate accidental damages to combined drains & other lines) with URENCO/concerned authority.				
19	Traffic and road blocking due to: - movements of construction vehicles/ equipment in narrow access roads - roadside parking of construction vehicles and equipment - stockpiling of aggregates, excavated soils, spoils within access road ROW	19.1	Prepare traffic management scheme, & coordinate implementation with the City traffic control agency & affected wards & communes.	Concerned wards/communes	-		
		19.2	Post billboards on road/lane closure, traffic rerouting plan at strategic places, min. 1 week prior to effectivity.	All affected sites	c/o Construction safety cost (preliminaries)		
		19.3	Post traffic (flag) persons during entire working hours.	Access roads			
		19.4	Provide safe pedestrian access.				
		19.5	Spread out schedule for materials delivery in non-peak hours.	All sites	-		
		19.6	Coordinate with W/CPC for parking of construction trucks.				
		19.7	Manage arrivals/departures of trucks.				
		19.8	Store excavated materials without obstructing traffic flow & safe safe access by affected communities.				
20	Blocking of access to properties	20.1	During IEC, prior to mobilization, inform communities regarding work phasing & schedules, anticipated access blocking, provisions for safe access for blocked properties & temporary car parking for blocked garages/driveways.	Affected wards/communes	c/o PMU's counter-part obligations	PMU with DPH, W/CPC	
		20.2	At least one week prior to access blocking, notify the affected properties. Work together and agree with property owners and village authorities for the alternative access and parking areas.	Affected properties	-	Contractor	

Table I.4 (cont'd)

Potential Environmental Concerns/Impacts	Recommended Mitigation Measures	Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
				Implement	Monitor
	20.3 Provide safe access to blocked properties, e.g., steel planks of adequate grade, width and length, &, if needed, with guide rail.	Affected properties	c/o Construction safety cost (preliminaries)	Contractor	PMU & PIS Envi Sp/ ADB*
21 Local flooding caused by: - impeded routes for surface runoff - pumping out of water from excavations/ working face - blocked/clogged/silted channels	21.1 Apply such measures as, whichever would be appropriate: - prior to excavation, create a diversion route for surface runoff - use silt fence, sediment trap &/or sandbags - stockpile soils & solid wastes away from drainage routes - dispose of excess soil daily. - clear sites of solid waste after day's work. - ensure surface runoff routes stay cleared of blockage 21.2 Lead water pumped from excavations to existing drainage channels., or to a water drum for use in wetting exposed areas.	All sites, as applicable			
22 Accidental damage to utility & service infrastructures, resulting in service interruptions, e.g., water pipes, power poles, telephone lines	22.1 During mobilization, coordinate with relevant utility companies Verify exact locations of underground utility lines, & set contact arrangements in case of damage.	Not applicable	-		
	22.2 Prepare a schedule of crossing of all existing utility lines and ensure that a copy is available on site for reference by workers.	All sites			
	22.3 In case of accidental damage, advise concerned utility company at once. Facilitate quick restoration by clearing obstructions & lending assistance (workers, equipment, tools) in the repair.				
	22.4 Give at least 1 week prior notice on planned service interruption due to relocation of existing utilities, power supply poles, water lines, &/or for interconnection/streamlining.	All villages concerned			
23 Disruption of socio-economic activities due to interruption of infrastructure services, access and road blocking	23.1 Provide safe alternative access for blocked properties.	All sites	c/o Construction safety cost		
	23.2 Issue prior notice on scheduled service interruption, 1 week before effectivity. interruption should not go beyond 2 hours.	All sites	-		
	23.3 Immediately advise utility companies on any accidental damages to existing utility for quick restoration of service.				

Table I.4 (cont'd)

Potential Environmental Concerns/Impacts	Recommended Mitigation Measures	Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
				Implement	Monitor
24 Community health/safety hazard from, among others: - dust, noise, gas emissions, odor, vibration - water resource depletion & deterioration - inadequate waste/wastewater mgnt - spillage of hazardous substances - haphazard movement of construction vehicles/equipment - increased traffic - open excavations - unsafe alternative access provided - rise of communicable/transmittable diseases with entry of workers	24.1 Implement s CEMP that addresses the measures in the Subproject EMP as minimum requirements to mitigate dust, gas emissions, noise, odor, vibration, water depletion and deterioration, traffic, road & access blocking, local flooding. In addition, to ensure that such safety measures as the following are implemented/in place: - Adequate/appropriate lighting, reflectorized barrier (or temporary fences, where applicable) around active work sites - Safe access for pedestrians. - Emergency response preparedness (procedures, trained staff, equipment, tools & supplies), including for fire-fighting. - Posting of billboards about the Subcomponents, informing on the dates of start & finish, names & contact details of contractor, supervising person on site, PMU, route of trucks, layout of Sub-component, etc.	All sites	c/o Construction mobiliz'n & running costs (preliminaries) &/or main Project cost	Contractor	PMU & PIS Envi Sp/ ADB*
	- Coordination with authorities of nearby schools for safety measures. - In case of "chance find" UXO, immediate coordination with the W/CPC & proper authorities for proper handling.	All sites	-		
	- Adequate social preparation regarding construction activities, & associated health & safety risks, grievance redress mechanism, to be conducted at least one month prior to award of Contract.	All villages within construction area of influence	c/o PMU counterpart fund	PMU	PIS Envi Sp/ ADB*
25 Workers' health/safety hazard from, among others: - dust, noise, gas emissions, odor, vibration - inadequate waste/wastewater management - poor sanitation practices	25.1 Orient workers, prior to mobilization, on occupational health & safety hazard and strict observance of safety measures.	All sites	c/o Construction mobiliz'n & running costs (preliminaries)	Contractor	PMU & PIS Envi Sp/ ADB*
	25.2 Strictly enforce use of protective wears, e.g., eye masks, nose masks, ear mufflers, helmets gloves, appropriate footwear.	Not applicable			
	25.3 Implement recommended measures to mitigate dust, gas emission, odor, noise, vibration, traffic.	All sites			
	25.4 Install adequate lighting, safe accesses to & from work areas.				

Table I.4 (cont'd)

Potential Environmental Concerns/Impacts		Recommended Mitigation Measures		Location	Estimated Cost [a] (USD)	Institutional Responsibilities	
						Implement	Monitor
- exposure to hazardous substances - operating equipment/handling of tools - haphazard movement of construction vehicles/equipment - increased traffic open excavations - rise of communicable/transmittable diseases in Subproject communities - exposure to extreme weather		25.5	Provide safe accommodations with reliable supply of potable water, adequate sanitation facilities.	All sites	c/o Construction mobiliz'n & running costs (preliminaries)	Contractor	PMU & PIS Envi Sp/ ADB*
		25.6	Provide adequate water for washing & safe drinking, and adequate sanitation facilities, in construction sites.				
		25.7	Ensuring that workers' daily exposure limit value (ELV) is kept within standard limit, as specified by manufacturer:				
		25.8	Break up of continuous use of equipment by individual worker, introduce 3 shifts/day in use of the equipment				
		25.9	Pre-construction orientation & training on safe operation/ handling of hazardous equipment/tools				
		25.10	Strict enforcement of wearing protective clothing/gear prescribed when using vibrating equipment.				
		25.11	Arrange with nearest primary & tertiary health institutions for health & emergency care of workers.				
		25.12	Set up emergency response team equipped with adequate staff, equipment, tools & supplies, including for fire-fighting.	All sites	c/o Construction safety cost		
		25.13	In case of "chance find" UXO, immediately coordinate with village concerned & proper authorities for proper handling.	All sites	-		
26	Damage to structures in adjacent properties	26.1	Apply protection measures in agreement with property owner.	All sites, where applicable, e.g., narrow access roads to proposed drainage routes	c/o Construction safety cost		
		26.2	Contractor to compensate damage (actual value) if damage is due to lack of/inadequate protection measures.				
27	Damages to cultural resources, including "chance find" ones	27.1	Prior coordination with relevant villages for the protection of existing PCRs in close proximity, & for the appropriate action to take with "chance finds".	All sites	-		
SUSTAINABILITY CONTRIBUTION							
28	Damages during seismic or extreme weather event	28.1	After every seismic or extreme weather event, conduct engineering investigation of built structures & implement corrective measures without delay.	All sites	c/o Construction insurance cost	Contractor	PMU & PIS Envi Sp/ ADB*
Sub-Total (Prior to Construction and During Construction)				USD	-		

Table I.4 (cont'd)

C. Operation Phase

Potential Environmental Impacts	Recommended Mitigation Measures	Location	Estimated Cost [a] (USD)	Institutional Responsibilities Per Phase				
				Pre-Operation Phases			Operation Phase	
				Det. Design Consultant	PMU	PIS Envi Sp / ADB*	Operator	PMU & ADB*
29 Unsustained effectiveness of operation/services due inefficient O&M/R	29.1 Sufficient budget and technical capacity for operation, maintenance and repair.	Not applicable	c/o Operations running cost	-	-	-	Implement	Monitor
30 Damages during seismic or extreme weather events	30.1 After every seismic or extreme weather event, conduct engineering investigation of built structures & implement corrective measures without delay.	All sites	c/o Operations emergency or contingency cost	-	-	-		
Sub-Total (During Operation)		USD	-					
TOTAL		USD	-					

[a] No marginal costs. During construction, most costs on Contractors are included in preliminaries. During operation, costs are integral part of annual budget of Operator.

* Preliminarily, it is assumed that PIS will be provided by combined man-months of international and national Environmental Specialists only in the first 2-3 years of Project implementation. After PIS period, monitoring assumed to be done thru ADB Review Missions until loan closure.

Table I.5 Environmental Monitoring Plan

I. ENVIRONMENTAL EFFECTS MONITORING

	Aspects/Parameters to be Monitored	Location	Means of Monitoring	Frequency	Estimated Cost (USD)	Responsibility	
						Implement	Compliance Monitoring
A.	**Prior to Construction Phase** During procurement prior to awarding of contract for civil works						
1	**Ambient air quality** TSP, SO_2, CO, NO_2, *Review results against GOV standards & WHO Ambient Air Quality Guidelines, whichever is more stringent. Results as baseline data before mobilization.*	3 for MTL 4 for TQC	Analytical methods outlined in QCVN 05:2009/BTNMT & Cir.No.28/2011/TT-BTNMT	Once	306.00 408.00	PMU	PIS Envi Sp/ADB*
2	**Ambient noise and ground vibration levels** *Review noise levels against GOV standards & WHO Guidelines for Community Noise, whichever is more stringent. Results as baseline data before mobilization.*	3 for MTL 4 for TQC	Analytical methods outlined in QCVN 26:2010/BTNMT & QCVN 27:2010/BTNMT	Once	66.00 88.00		
3	**Groundwater quality** pH, DO, EC, SS, $CaCO_3$, NH_4, Total N, Total P, Fe, Cu, Zn, Mn, Pb, Cd, Hg, As, Cr^{6+}, CN, E-coli, coliform *Review results against GOV standards & current WHO Guidelines for Drinking-water Quality, whichever is more stringent. Results as baseline data before mobilization.*	2 for MTL 3 for TQC	Analytical methods outlined in QCVN 09:2008/BTNMT & Circ.No.30/2011/TT-BTNMT	Once	386.00 579.00		
4	**Surface water quality** pH, DO, EC, SS, $CaCO_3$, NH_4, Total N, Total P, Fe, Cu, Zn, Mn, Pb, Cd, Hg, As, Cr^{6+}, CN, E-coli, coliform *Review results against GOV standards & current WHO Guidelines for Drinking-water Quality, whichever is more stringent. Results as baseline data before mobilization.*	2 for MTL 4 for TQC	Analytical methods outlined in QCVN 08:2008/BTNMT & Circ.No.29/2011/TT-BTNMT	Once	424.00 848.00		
5	**Community health & safety conditions** - Incidence of diseases associated with respiratory, nervous circulatory & digestive systems, skin, cancer, communicable/transmittable diseases - incidence of accidents (vehicular, fire, etc) & crime *Information as baseline data before mobilization.*	Ea Tam, Tu An and Tan Lap Wards	Information from & close coordination with ward/commune health centers, City's Department of Health	Once	-		
	Sub-Total (Prior to Construction for baseline data)				3,105.00		

Table I.5 (cont'd)

	Aspects/Parameters to be Monitored	Location	Means of Monitoring	Frequency	Estimated Cost (USD)	Responsibility	
						Implement	Compliance Monitoring
B.	**Construction Phase**						
6	**Ambient air quality** TSP, SO_2, CO, NO_2 *Review results against GOV standards & WHO Ambient Air Quality Guidelines, EPA Guidelines, whichever is more stringent.*	3 for MTL 4 for TQC	Analytical methods outlined in QCVN 05:2009/BTNMT & Cir.No.28/2011/TT-BTNMT	Once monthly (peak) Once quarterly (rest of period)	1,836.00 2,448.00	Contractor	PMU / PIS Envi Sp/ADB*
7	**Ambient noise and ground vibration levels** *Review noise levels against GOV standards & WHO Guidelines for Community Noise, whichever is more stringent.*	3 for MTL 4 for TQC	Analytical methods outlined in QCVN 26:2010/BTNMT & QCVN 27:2010/BTNMT	Once monthly (peak) Once quarterly (rest of period)	396.00 528.00		
8	**Groundwater quality** pH, DO, EC, SS, $CaCO_3$, NH_4, Total N, Total P, Fe, Cu, Zn, Mn, Pb, Cd, Hg, As, Cr^{6+}, CN, E-coli, coliform *Review results against GOV standards & current WHO Guidelines for Drinking-water Quality, whichever is more*	2 for MTL 3 for TQC	Analytical methods outlined in QCVN 08:2008/BTNMT & Circ.No.29/2011/TT-BTNMT	Once monthly (peak) Once quarterly (rest of period)	1,546.00 2,319.00		
9	**Surface water quality** pH, DO, EC, SS, $CaCO_3$, NH_4, Total N, Total P, Fe, Cu, Zn, Mn, Pb, Cd, Hg, As, Cr^{6+}, CN, E-coli, coliform *Review results against GOV standards & current WHO Guidelines for Drinking-water Quality, whichever is more stringent. Results as baseline data before mobilization.*	2 for MTL 4 for TQC	Analytical methods outlined in QCVN 08:2008/BTNMT & Circ.No.29/2011/TT-BTNMT	Once monthly (peak) Once quarterly (rest of period)	1,694.00 3,388.00		
10	**Community health & safety conditions** - Incidence of diseases associated with respiratory, nervous circulatory & digestive systems, skin, cancer, communicable/transmittable diseases - incidence of accident, fire & crime	Ea Tam, Tu An and Tan Lap Wards	Information from & close coordination with ward/commune health centers, City's Department of Health	Once, monthly (peak) Once quarterly (rest of period)	-		
11	**Workers' health & safety** - Incidences of illness due to work - Incidences of work-related accident, injuries/deaths to emergencies, crime involving workers	Construction sites	Records of Safety Engineer	Once, monthly (peak) Once quarterly (rest of period)	-		
	Sub-Total (Construction)			USD	14,155.00		
	TOTAL (Prior to Construction and During Construction)			USD	17,260.00		

Table I.5 (cont'd)

	Aspects/Parameters to be Monitored	Location	Means of Monitoring	Frequency	Estimated Cost (USD)	Responsibility	
						Implement	Compliance Monitoring
C.	**Operation Phase**						
12	Ambient air quality TSP, SO_2, CO, NO_2 *Review results against GOV standards & WHO Ambient Air Quality Guidelines, EPA Guidelines, whichever is more stringent.*	3 for MTL 4 for TQC	Analytical methods outlined in QCVN 05:2009/BTNMT & Cir.No.28/2011/TT-BTNMT	Once quarterly	1,224.00 1,632.00	URENCO	PMU / PIS Envi Sp/ADB*
13	Ambient noise and ground vibration levels *Review noise levels against GOV standards & WHO Guidelines for Community Noise, whichever is more stringent.*	3 for MTL 4 for TQC	Analytical methods outlined in QCVN 26:2010/BTNMT & QCVN 27:2010/BTNMT	Once quarterly	264.00 352.00		
	TOTAL Annually (During Operation)			USD	3,472.00		

II. PERFORMANCE MONITORING

	Aspects/Parameters to be Monitored	Location	Means of Monitoring	Frequency	Responsibility		Estimated Cost[3] (USD)
					Implement	Compliance Monitoring	
A.	**Prior to Construction Phase**						
	A.1 Detailed Design Preparation						
1	Climate conditions and seismicity factors considered in detailed designs.	Not applicable	Review of detailed design documents.	Once, prior to finalization Once, prior to approval	Design Consultants	PMU & PIS Envi Sp/ADB*	-
	A.2 Obtaining Clearance						
2	EIA Report approval obtained	For the Subproject	Presence of EIAR approval document.	Once, at least 30 days prior to contract award	PMU	PIS Envi Sp/ADB*	
3	Intensive awareness program on health and safety hazards, communicable/transmittable diseases, on the grievance redress mechanism	Ea Tam, Tu An and Tan Lap Wards	Review of relevant report of the PMU's Social, Environmental & Communication Teams.	Once, at least 30 days prior to contract award			
	A.3 Procurement						
4	Procurement process complied with EMP requirements: SPS compliant EMP part of bidding documents.	Not applicable	Verifying EMP in bidding document.	Once, prior to procurement			-
	CEMP/EMP compliance stipulated in Contract Contract stipulates some tie up of progress payment & collection of performance bond with performance in CEMP/EMP implementation.	Not applicable	Review of Draft & Final Contract.	Once, during draft Once, prior to signing			

Table I.5 (cont'd)

	Aspects/Parameters to be Monitored	Location	Means of Monitoring	Frequency	Responsibility		Estimated Cost[3] (USD)
					Implement	Compliance Monitoring	
	A.4 Post-Procurement Prior to Mobilization						
5	Preparation by selected Contractor its CEMP, addressing Subproj. EMP requirements as minimum, & includes (but not limited to) plans for: aggregates mgnt; excavation mgnt (linked to removed soil mgnt); dust, noise & vibration controls; gas emission mitigation; solid & hazardous waste mgnt; traffic mgnt (to be coordinated with authorities); occupational health & safety; grievance redress; emergency response; environmental monitoring & reporting.	Not applicable	Verifying existence of CEMP. Evaluating CEMP against Subproj EMP.	Once prior to mobilization	Contractor	PMU/ PIS Envi Sp/ADB*	-
6	CEMP reviewed/cleared as fully responsive to the SEMP.	Not applicable	Verifying review/clearing report.	Once prior to mobilization	PMU	PIS Envi Sp/ADB*	
7	Environmental effects monitoring for baseline data	As prescribed in the EMP.	As prescribed in the EMP.	Once prior to mobilization			
	B. Construction Phase						
8	Environmental mitigation implemented according to the CEMP/EMP.	All sites	Field observations. Consulting affected residents. Review of lodged grievances. Review of records of workers accidents & sick leave.	Regular & random Random At least once a week. Once a month	Contractor	PMU/ PIS Envi Sp/ADB*	-
9	Environmental effects monitoring	As prescribed in the EMP.	As prescribed in the EMP.	As prescribed in the EMP	Contractor	PMU/ PIS Envi Sp/ADB*	
					PMU	PIS Envi Sp/ADB*	
10	Monthly EMR submitted promptly using prescribed outline	All sites	Review of Contractor's monthly EMR.	Once a month	Contractor	PMU/ PIS Envi Sp/ADB*	
11	Informally lodged grievances acted on promptly and successfully &/or Grievance Redress Mechanism observed.	All sites	Review of lodged grievances. Consulting W/CPCs.	Regular and random At least once a week	Contractor & PMU	PIS Envi Sp/ADB*	
12	Engineering investigation after each seismic &/or extreme weather event, and, if applicable, remediation works taken.	All sites	Review of investigation & remediation works report.	At least 1 week after each event			
13	Semi-Annual EMR submitted promptly following prescribed outline.	For the SWM Component	Review of semi-annual EMR.	Semi-annually			

Table I.5 (cont'd)

	Aspects/Parameters to be Monitored	Location	Means of Monitoring	Frequency	Responsibility		Estimated Cost[a] (USD)
					Implement	Compliance Monitoring	
C.	**Operation Phase**						
14	Informally lodged grievances acted on promptly and successfully &/or Grievance Redress Mechanism observed.	Subproject	Review of lodged grievances. Consulting village authorities.	Regular and random At least once a week	Operator & PMU	ADB	-
15	Engineering investigation after each seismic &/or extreme weather event, and, if applicable, remediation works taken.	All sites	Review of investigation & remediation works report.	At least 1 week after each event			
16	Annual EMR submitted promptly following prescribed outline.	For the Subproject	Review of the annual EMR.	Annually			
TOTAL COST						USD	-

Notes:

3) Applied unit costs approve4d by HTPPC on March 2011. Could not obtain Dak Lak's unit cost.
4) The minimum set of parameters to be monitored after establishing the baseline will be that observed quarterly by the DONRE.

XII. EMERGENCY RESPONSE PROCEDURES

E. Emergency Response Roles and Responsibilities

196. Considering the nature of the Sub-component, emergency response procedure will be necessary only during construction. The key players in emergency response will include the: (i) Safety Team (ST) of the Contractor as initial responder; and (ii) City fire and police departments, emergency medical services (City and Provincial General Hospitals), collectively referred to as the External Emergency Response Team (EERT), as ultimate responders.

Table I.6 Roles and Responsibilities in Emergency Response

Entity	Responsibilities
Safety Team (ST)	- Communicates/alerts EERT. - Prepares the emergency site to facilitate response action by EERT, e.g., vacating and clearing site, restricting entry to site. - Applies first aid. - When necessary & requested by EERT, lends support/provides assistance during EERT's response operations.
External Emergency Response Team (EERT)	- Solves the emergency.
Contractor	- Provide & sustain ST staff, equipment, tools, supplies & funds. - Maintain good communication lines with EERT to ensure prompt help response & adequate protection, by keeping them informed of work progress.

197. The ST will be led by a Safety Coordinator (SC). He/she will be assisted by a Deputy SC, who will be authorized to act in behalf of the SC, when necessary. Trained first-aiders and security crew will be the core members of the ST. Supervising engineers and foremen will also be assigned supporting roles during initial response, especially in evacuation, and will, therefore, undergo orientation and training in proper initial response procedures. Volunteers from the work force will be encouraged and properly trained for their role. The Contractor will ensure that ST members and volunteers are physically, technically and psychologically fit for doing their emergency response roles and responsibilities.

198. To ensure effective emergency response, prior to mobilization of civil works, the Contractor shall have: (i) set up the ST and its station/s with support equipment and facilities in working conditions; (ii) made arrangements with the EERT; (iii) conducted proper training of ST members, and encouraged and trained volunteers from the work force; (iv) conducted orientation to all construction workers on the emergency response procedures and facilities, particularly evacuation procedures, evacuation routes, evacuation assembly points, and self-first response, among others; and (vi) conducted drills for different possible situations.

199. To sustain effective emergency response throughout Sub-component implementation: (i) adequate budget shall be provided to sustain the capabilities and efficiency of the emergency response mechanism; (ii) emergency response equipment, tools and facilities shall be inspected weekly and supplies (as that for first aid kits) replenished as necessary; and (iii) drills and reminders to be done regularly, the former at least ever quarter and the latter at least every month.

F. Communicating and Alerting

200. Means of reporting and alerting an emergency situation may be any combination of: (i) siren, bell and/or gong as audible alarm; (ii) blinking/rotating red light and/or orange safety

flag as visual alarm; (iii) telephone (landline); (iv) mobile phone; (v) two-way radio; and (vi) public address system/loud speakers.

Table I.7 Rules on Communicating & Alerting

Item	Rule
On alerting	Upon detecting an emergency situation: - call the attention of other people in the emergency site, - sound the nearest alarm, and/or - communicate the emergency situation to the SC.
Authority to communicate with the EERT	- Only the SC and, if SC is not available, the Deputy SC are authorized to communicate with the EERT. - Exceptional cases to this rule may be necessary, e.g., during fire, & should be defined in the Emergency Management Plan.
Communicating/alerting an emergency to the EERT	- Provide EERT with at least the: - type of emergency situation; - correct location of the emergency; - estimated magnitude of the situation; - estimated persons harmed, if applicable; - time it happened; - in case of a spill, which hazardous substance spilled; - in case of fire and explosion, what caused it.

201. For an effective reporting/alerting of an emergency situation, the names and contact details of key ST members and EERT institutions should be readily available in, or near to, all forms of communication equipment, and strategically posted (at legible size) in all work sites and vehicles. Work sites should have good access to any communication/alerting equipment. Contractor's construction vehicles should also be equipped with the appropriate communication facilities.

G. Emergency Response Procedures

202. The subsequent paragraphs suggest general procedures that will be finalized in the final EMP during detailed design, and described in more detail in the Emergency Management Plans of the CEMP.

5. Evacuation

203. The aim of the evacuation procedure should be to "safely move all workers/staff, sub-contractors, site visitors/the public concerned out from the emergency site and its influence area immediately to safe grounds." Foremen of every construction sub-group shall lead evacuation accordingly. (Table I.8)

6. Medical Emergency

204. A medical emergency is a situation when a person is seriously ill or injured and his/her situation poses an immediate risk to his/her life or long-term health. (Table I.9)

7. Fire

205. The immediate aim of fire response should be to move out all workers/staff, sub-contractors, site visitors/the public concerned out to safe grounds. (Table I.10)

Table I.8 Evacuation Procedure

Procedure	Remarks
▪ Move out as quickly as possible as a group, but avoid panic.	▪ All workers/staff, sub-contractors, site visitors to move out, guided by the ST.
▪ Evacuate through the directed evacuation route.	▪ The safe evacuation shall have been determined fast by the ST/Deputy ST & immediately communicated to ST members.
▪ Keep moving until everyone is safely away from the emergency site and its influence area.	▪ A restricted area must be established outside the emergency site, all to stay beyond the restricted area.
▪ Once outside, conduct head counts.	▪ Foremen to do head counts of their sub-groups; SC/Deputy SC of the ST.
▪ Report missing persons to EERT immediately.	▪ SC/Deputy SC to communicate with the EERT.
▪ Assist the injured in evacuation & hand them over to the ST first-aiders or EERT medical group.	▪ ST to manage injured persons to ensure proper handling.
▪ If injury warrants special care, DO NOT MOVE them, unless necessary & instructed/directed by the EERT.	▪ SC/Deputy SC communicates with EERT to get instructions/directions in handling the injured.

Table I.9 Response Procedure During Medical Emergency

Procedure	Remarks
▪ Administer First Aid regardless of severity immediately.	▪ Fundamentals when giving First Aid: - Safety first of both the rescuer and the victim. - Do not move an injured person unless: - victim is exposed to more danger when left where they are, e.g., during fire, chemical spill - it would be impossible for EERT to aid victims in their locations, e.g., under a collapsed structure - instructed or directed by the EERT. ▪ First AID to be conducted only by a person who has been properly trained in giving First Aid.
▪ Call the EERT emergency medical services &/or nearest hospital.	▪ By SC/Deputy SC or authorized on-site emergency communicator.
▪ Facilitate leading the EERT to the emergency site.	▪ Designated ST member on- site to meet EERT at access road/strategic location. He/she shall hold orange safety flag to get their attention & lead them to site. ▪ Other ST members and volunteer crew to clear access road for smooth passage by the EERT.
▪ If applicable, vacate site & influence area at once, restrict site, suspend work until further notice.	▪ Follow evacuation procedure.

Table I.10 Response Procedure In Case of Fire

Procedure	Remarks
▪ Alert a fire situation.	▪ Whoever detects the fire shall immediately - call the attention of other people in the site, - sound the nearest alarm, - contacts the fire department, &/or - report/communicate the emergency situation to the SC/Deputy SC.
▪ Stop all activities/operations and evacuate.	▪ All (non-ST) workers/staff sub-contractors, site visitors and concerned public to move out to safe grounds following the evacuation procedure.
▪ Activate ST to contain fire/control fire from spreading.	▪ Guided by the training they had, ST members assigned to mitigate fire shall assess their own safety situation first before attempting to control fire spread.
▪ Call the nearest fire & police stations &, if applicable, emergency medical services.	▪ When alerting the EERT, to give the location, cause of fire, estimated fire alarm rating, any injuries.
▪ Facilitate leading the EERT to the emergency site.	▪ Designated ST member to meet EERT at access road or strategic location. He/she shall hold the orange safety flag to get their attention and lead them to the site. ▪ Other ST members/volunteers to stop traffic in, & clear, the access road to facilitate passage by EERT.
▪ SERT to vacate the site as soon as their safety is assessed as in danger.	▪ Follow appropriate evacuation procedure.

8. Explosion

206. Explosion may be caused by unsuitable mix of hazardous substances. It may result in physical injuries and fire. The explosion itself will be the alarm. The immediate aim is to safely move out all workers/staff, sub-contractors, site visitors/the public concerned following the evacuation procedure.

Table I.11 Response Procedure In Case of Explosion

Procedure	Remarks
▪ Take shelter and be prepared for further explosion/s &/or fire.	▪ From where he/she is, SC/Deputy SC will quickly determine the following to give proper directions: - Where the explosion occurred, - What caused it, - If a fire has resulted, or if further explosions are expected.
▪ Evacuate as soon as possible, when no further explosion is expected.	▪ All workers/staff sub-contractors, site visitors and concerned public to move out to safe grounds following the evacuation procedure.
▪ Call the nearest fire & police stations &, if applicable, emergency medical services.	▪ When alerting EERT, SC/Deputy SC to give location, cause of explosion. If fire has resulted, provide the estimated fire alarm rating, any injuries.
▪ If fire has resulted, DO NOT ATTEMPT to do any fire control activity.	▪ Possibility of further explosion will put ST members' lives in danger.
▪ Facilitate leading the EERT to the emergency site.	▪ SC/Deputy SC to instruct: - a SERT member to meet EERT at access road or strategic location & lead them to the site. He/she shall hold the orange safety flag to get their attention and lead them to the site. - some SERT members to stop traffic in, & clear, the access road to facilitate passage of the EERT.

H. Post-emergency Follow-Up

207. After every emergency event, the SC/Deputy SC shall prepare a report that will not only will document the incident but also present a post-evaluation of the response, assessing its overall adequacy and effectiveness, i.e., in terms of organizational set up and capacity (human resources, skills, equipment, communication and alerting, initial response procedures, recovery). Lessons learned from each response experience shall be highlighted to correct mistakes, cite inadequacies and gaps in the procedures and systems, and/or enhance strengths. First Aid kits shall be replenished. Changes that will be introduced into the emergency response procedures/system and improvements in preparedness must be relayed to the workers/staff. Appropriate training and drills incorporating the changes shall have to be conducted.

XIII. IMPLEMENTATION ARRANGEMENTS

E. Implementation Schedule

208. Environmental management will be implemented from the detailed design phase through to procurement, construction and operation. Table I.12 presents the indicative time frame of key EMP activities in relation to Subproject implementation schedule.

Table I.12 Environmental Management Implementation Schedule

Activity	Indicative Time Frame
SUBCOMPONENT IMPLEMENTATION	
Detailed Design & Bidding Documents	Q1 Y1 – Q4 Y1
Procurement	Q4 Y1 – Q2 Y2
Construction	Q3 Y2 – Q2 Y5
Defects Liability Period	Q3 Y5 – Q2 Y6
ENVIRONMENTAL MANAGEMENT	
Overall	
1. Q2 Y2 – Q1 Y6	Q1 2015-Q4 2018
2. PMU's submission of Environmental Monitoring Report (EMR)	
- Monthly EMR for Subproject's Monthly Progress Report	- 1st week after effective month
- Semi-annual EMR during construction for submission to ADB	- 1st week after effective 6-mos period
- Annual EMR during operation for submission to ADB	- 1st week after effective year
Prior to Construction Mobilization	
1. Finalization/revision of IEE & EMP, as necessary	Q2 Y1 - Q3 Y1
2. ADB review & approval of revised IEE & EMP.	Q4 Y1
3. Obtaining EIA approval	Q3 Y1 (at the latest)
4. Community preparation (including disclosure of Final IEE & its EMP)	Q2 Y2
5. Establishment of baseline data of ambient water quality, air quality, noise & vibration levels in subproject sites & incidence of diseases (communicable, transmittable, water-borne, etc) at commune level	Q1 2015 (shall have been done prior to award of contract)
6. Compensation/replacements due to land/ ROW acquisition	c/o Resettlement Plan
7. Preparation of CEMP by selected Contractor, review of CEMP against Subproject EMP.	Q3 Y2, before start of works on site or establishment of construction- related facilities.
Construction Period	
Mobilization to Demobilization	
1. Implementation of mitigation measures and conduct of environmental effects monitoring following the SPS compliant CEMP	Q3 Y2 – Q2 Y5
2. Submission of Contractor's Envi'l Monitoring Report (CEMR)	Q3 Y2 – Q2 Y5
- Monthly CEMR for Monthly Construction Progress Report	- Last week of each effective month
- Semi-Annual CEMR for Semi-Annual Subproj.EMR to be submitted to ADB	- 4th week of every 6th month
Operation Period (potentially could start even before DLP is over)	
1. Implementation of mitigation measures & monitoring activities as specified in the Subproject EMP	Starting Q4 Y5/Q1 Y6
2. Submission of Operator's Envi'l Monitoring Report (OEMR)	Starting Q4 Y5/Q1 Y6
- Monthly OEMR for Monthly Operational Report	- Last week of each effective month
- Annual OEMR Annual Subproject EMR to be submitted to ADB	- Mid of last month of effective year (until Project Completion or as agreed)

F. Institutional Responsibilities

209. The Dak Lak Province People's Committee (DLPPC) will be the executing agency. The BMT City People's Committee, as implementing agency, will be responsible for the detailed preparation and implementation of the Component. The Project Steering Committee (PSC), headed by the vice-chairman of the DLPPC, will be responsible for deciding on environmental management matters that will require action from the senior-management level. It will ensure the allocation and timely disbursement of adequate resources for the processing of the necessary environmental assessment approval/s, monitoring of EMP implementation and conduct of environmental monitoring activities required from the implementing agency in the Environmental Monitoring Plan.

210. The PMU shall undertake and manage the day-to-day activities of the Component. Its full-time Environmental Engineer/Scientist shall oversee and monitor the implementation of

Subproject EMPs. The Project Implementation Support (PIS) Team shall include Environmental Specialists, who will impart technical advice, guidance support and "hands-on training" to the PMU, particularly its Environmental Engineer/Scientist, in Subproject environmental management, at least in the first three years of Subproject implementation. The ADB shall undertake reviews and approvals of relevant documents, and carry out annual environmental review missions.

211. The specific responsibilities are presented in Table I.13. "Prior to construction" period covers the detailed design period until prior to awarding of civil works contract. Construction period covers the period from the effective start date of the Notice to Proceed until commissioning for operation. Operation period commences at commissioning of the Sub-component.

G. Capacity Development

212. Capacity development on environmental management will be implemented through: (i) conduct of lectures and seminars; and (ii) through "learning-by-doing". Lectures/seminars will range from "overview and key points for managers" to "specifics of environmental management of urban infrastructure projects." The preliminarily identified subjects include: (i) GOV legal framework vis-a-vis ADB safeguard policy; (ii) environmental management systems including challenges and strategies in developing and implementing them; (iii) environmental management plan (including mitigation, monitoring and reporting); (iv) grievance redress mechanism; (v) meaningful public consultation; (vi) climate change impacts and adaptation; and (vii) other subjects of interest to the PMU that might arise during detailed design stage. The requirement for the conduct of the courses and seminars is integrated in the overall budget for the Subproject capacity development.

213. The Environmental Specialist of the Project Implementation Support (PIS) Team shall conduct his/her technical assistance to the PMU as capacity development in itself All institutions involved in the Project/Subproject environmental management will be encouraged and invited to participate. However, training will be focused on the PMU, especially its Environmental Engineer/Scientist. Training shall be highly "hands-on" or adopting the "learning while doing" approach. The draft outline ToR for the Environmental Specialist is presented as End Note I.2.

H. Preliminary Costs

214. The marginal costs for implementing the EMP are initially estimated to involve:

(i) USD 17,260.00 (or VND 359 million) of fixed costs to cover environmental effects monitoring for the two sub-components prior to, and during, construction; and
(ii) USD 3,472 (or VND 72.2 million) annually for environmental monitoring of the two sub-components during operation. Table I.14

215. The estimated costs: (i) include taxes and contingencies for deficiencies in assumed unit costs, but exclude inflation; (ii) exclude the salary of the Environmental Engineer/Scientist as he/she will be existing PPC or CPC staff seconded/assigned to the PMU for the environmental management of the Subproject; (iii) exclude the costs spent by PMU for compliance with GOV safeguard requirements in March 2013; and (iv) exclude the cost for technical assistance and "hands-on" training" by Environmental Specialists that will be engaged as part of the PIS Team, a total of USD 21,300 for all three Subprojects under the SCDP.

XIV. PERFORMANCE INDICATORS

216. This Section presents the preliminary set of environmental performance indicators to evaluate the effect of Subproject implementation on the environment, i.e., whether or not the Urban Roads Component (or “Component”) is enhancing, sustaining or deteriorating the state of the environment. The indicators are directed on two environmental areas that will be impacted by Component implementation: (i) natural resources; and (ii) health and safety of the concerned people. The selected indicators are limited to only those that can be measured/gauged from activities during subproject implementation and that can be tracked over a defined period. Table I.15

Table I.13 Institutional Responsibilities

Prior to Construction	During Construction	During Operation
PMU Environmental Engineer/Scientist With technical advice, guidance, support from the PIS Environmental Specialists, will: - oversee incorporation of EMP recommendations into the design/bid documents, the finalization of the Subproject IEE & EMP - ensure the procurement of an environmentally responsible contractor - ensure that an EIA Report approval has been secured prior to the awarding of civil works contract - set up baseline ambient air quality, noise & vibration levels, ground- & surface water quality & baseline statistics on incidence of diseases & accidents/crimes in the concerned wards/communes - conduct intensive awareness campaign on health and safety impacts of Subproject implementation and on the existence of a grievance redress mechanism - review the Final CEMP of the selected Contractor - prepare monthly inputs for incorporation into the Det. Design Monthly Progress Report, and semi-annual EMR for the ADB	PMU Environmental Engineer/Scientist With technical advice, guidance, support from the PIS Environmental Specialists, will: - conduct inspections and spot checks to monitor the performance of the Contractor in implementing the SPS compliant CEMP - review results of groundwater quality, air quality, noise & vibration monitoring done by Contractor - oversee & monitor the management of grievances & effectiveness of the grievance redress mechanism - collect monthly EMRs from the Contractor, and prepare and submit semi-annual EMR to ADB	PMU Environmental Engineer/Scientist - conduct inspections and spot checks to monitor the environmental performance of the completed Subproject and DAKURENCO - prepare executing agency's EMR, incorporate the DAKURENCO EMR, and submit an annual EMR to ADB until loan closure, or as agreed.
PIS Environmental Specialist - provide the PMU, particularly its Environmental Engineer/Scientist, technical advice, guidance, support and capacity strengthening in Subproject environmental management		
ADB - review & approve/clear IEE & EMP - review submitted semi-annual EMRs	ADB - review semi-annual EMRs - carry out annual environmental review missions	ADB - review submitted annual EMRs - carry out annual environmental review missions
Design Consultant - incorporate all EMP requirements/ recommendations into the design and bidding documents - finalize the IEE & EMP - if applicable, prepare/finalize the GOV EIA based on the Subproject IEE and its EMP		

Table I.13 (cont'd)

Prior to Construction	Construction Period	Operation Period
DONRE - review EIA Report/s for PPC's approval	DONRE - conduct random monitoring in line with EIA Report approval - conduct validation and provide technical guidance on environmental effects monitoring, when necessary	
PPC - approve EIA Report/s based on the review conclusion of the DONRE		
Concerned W/CPCs - actively participate in public disclosure of Subproject IEE, EMP & EMRs, and in the community awareness program on health and safety impacts of Subproject implementation and in the establishment of health and safety baseline data prior to construction	Concerned W/CPCs - review EMRs and results of environmental monitoring by the Contractor - disseminate EMR highlights & findings of environmental effects monitoring to communities	Concerned W/CPCs - review EMRs and results of environmental monitoring by the Contractor - disseminate EMR highlights & findings of environmental effects monitoring to communities
DPH - spearhead the conduct of intensive awareness campaign on the health and safety impacts of Subproject implementation		
	Contractor - prior to mobilization prepare a CEMP, addressing as minimum the requirements of the Subproject EMP - engage an Engineer to manage the CEMP implementation & reporting - implement all environmental mitigation measures - conduct all environmental monitoring activities; - ensure preparedness for emergency response as provided in the CEMP - observe the grievance redress mechanism in addressing complaints - prepare monthly and semi-annual Contractor's EMRs (CEMRs).	
		DAKURENCO - set up a team to manage the EMP implementation and reporting - implement mitigation and protection measures that will ensure sustained effectiveness of the completed Sub-component - prepare monthly and annual EMRs

Table I.14 Preliminary Costs for EMP Implementation

Activity	Estimated Cost (USD) & Funding Source			
	Integrated in Construction Cost	PMU Budget (Counterpart Cost)	DAKURENCO Annual Budget	Technical Assistance for PIS
Environmental Mitigation				
A. Pre-Construction Phase				
A.1 Preparation and appraisal/approval of GOV EIAR	-	c/o PMU FS preparation	-	-
A.2 Intensive community awareness campaign	-	c/o social cost	-	-
A.3 Resettlement, compensation	-	c/o resettlement cost	-	-
B. Construction Phase				
B.1 Implementation of environmental mitigation plan	c/o construction preliminaries & running costs	-	-	-
C. Operation Phase				
C.1 Implementation of environmental mitigation plan	-	-	c/o operations running cost	-
Sub-Total USD	-	-	-	-
(thousand) VND	-	-	-	-
Environmental Effects Monitoring				
A. Pre-Construction Phase				
A.1 Establishment of baseline environmental data	-	3,100.00	-	-
B. Construction Phase				
B.1 Monitoring of air, noise, vibration, ground & surface water	14,155.00	-	-	-
B.2 Monitoring of community & workers' health and safety	-	-	-	-
C. Operation Phase				
C.1 Monitoring of air, noise, vibration	-	-	3,472.00	-
Sub-Total USD	14,155.00	3,100.00	-	-
(thousand) VND	294,424.00	64,480.00	-	-
Performance Monitoring				
Environmental Engineer *	-	-	-	-
Sub-Total USD	-	-	-	-
VND	-	-	-	-
Technical Assistance				
Environmental Specialist ^ USD	-	-	-	21,300.00
Total USD	14,155.00	3,100.00	-	-
Grand Total USD		17,255.00	-	-
(thousand) VND		358,904.00	-	-

1 US$ = 20,800 VND (as of April 2013)

* It is expected that an Environmental Engineer/Scientist (EE/S) will be PPC or CPC staff seconded/assigned to the PMU.

^ Assumed 4 months (spread in 2-3 years) of combined international & national consultant inputs, includes fees, per diem, visa, transport. USD 21,300 covers technical assistance for all 3 SCDP Subprojects.

Table I.15 Environmental Performance Indicators

Indicator			Data Source
Output & Impact	Performance	Target Outcome	
During Construction			
1 Emission of dust/particulates			
1.1 Ambient concentrations of dust/ particulates	- % excess of level over the more stringent limit between GoV & WHO Guidelines	- Level should be below the more stringent limit between GoV & WHO Guidelines.	- Result of air quality monitoring by Contractor - Result of pre-construction air quality monitoring by PMU
	- % excess of level over the pre-construction ambient level (if latter has exceeded the more stringent limit between GoV & WHO Guidelines)	- If pre-construction ambient level has exceeded the more stringent limit between GoV & WHO Guidelines, level during construction should not exceed pre-construction level.	
	- % of the total HHs in construction influence area that lodged complaint on health impact &/or nuisance due to severe dust	- No community complaint lodged regarding health impact or nuisance from severe	- Grievance Redress Mechanism Record & Report (Construction influence area to be the area within 50 m from the edges of construction sites.)
2 Emission of gases			
2.1 Ambient concentrations of CO, SO_2, NO_2	- % excess of levels over the pre-construction ambient levels	- Levels should not be more than 5% higher than pre-construction levels AND should be below the more stringent limits between GoV & WHO Guidelines.	- Results of air quality monitoring by Contractor - Results of pre-construction air quality monitoring by PMU
	- % of the total HHs in construction influence area that lodged complaint on health impacts &/or nuisance due to gas emissions	- No community complaint lodged regarding health impact or nuisance from gas emissions.	- Grievance Redress Mechanism Record & Report (Construction influence area to be the area within 50 m from the edges of construction sites.)
3 Emission of noise			
3.1 Ambient noise level	- % excess of level over the more stringent limit between GoV & WHO Guidelines	- Levels should be below the more stringent limits between GoV & WHO Guidelines.	- Result of noise monitoring by Contractor - Result of pre-construction noise monitoring by PMU
	- % excess of level over the pre-construction ambient level (if latter has exceeded the more stringent limit between GoV & WHO Guidelines)	- If pre-construction ambient noise level has exceeded the more stringent limit between GoV & WHO Guidelines, increase in ambient noise level should not be more than 3 dB at the nearest reception location off-site.	
	- % of the total HHs in construction influence area that lodged complaint on health impacts &/or nuisance due to severe noise	- No community complaint lodged on health impact or nuisance from severe noise.	- Grievance Redress Mechanism Record & Report (Construction influence area to be the area within 50 m from the edges of construction sites.)

Table I.15 (cont'd)

Indicator			Data Source
Output & Impact	Performance	Target Outcome	
4 Generation of vibration 4.1 Intensity of ground vibration	- % excess of level over WHO Guidelines	- Ground vibration should not exceed the limits set in WHO Guidelines.	- Result of ground vibration monitoring by Contractor - Result of pre-construction noise monitoring by PMU
	- % of the total HHs in construction influence area that lodged complaint on health impact, nuisance &/or adverse effect on structures due to ground vibration	- No community complaint lodged regarding health impact, nuisance or adverse effects on structures from ground vibration.	- Grievance Redress Mechanism Record & Report (Construction influence area to be the area within 50 m from the edges of construction sites.)
5 Water resource problem 5.1 Concentrations of pollutants in groundwater resources	- % excess of levels over the pre-construction ambient levels	- For parameters with pre-construction levels equal to or exceeding the more stringent limits between GoV & WHO guidelines for drinking water quality, their levels during construction should not be higher than pre-construction levels.	- Results of ground water quality monitoring by Contractor - Results of pre-construction ground water quality monitoring by PMU
		- For parameters with pre-construction levels below the more stringent limits between GoV & WHO guidelines for drinking water quality, their levels during construction should not be more than 3% higher than pre-construction levels AND should be below the more stringent guideline limits.	
	- % of the total HHs in immediate vicinity of construction area that lodged complaint on health impacts due to deteriorating ground water quality	- No community complaint lodged regarding health impacts due to deteriorating ground water quality	- Grievance Redress Mechanism Record & Report
5.2 Concentrations of pollutants in surface water in the vicinity	- % excess of levels over the pre-construction ambient levels	- For parameters with pre-construction levels equal to or exceeding the more stringent limits between GoV & WHO guidelines for drinking water quality, their levels during construction should not be higher than pre-construction levels.	- Results of surface water quality monitoring by Contractor - Results of pre-construction ground water quality monitoring by PMU
		- For parameters with pre-construction levels below the more stringent limits between GoV & WHO guidelines for drinking water quality, their levels	

Table I.15 (cont'd)

Indicator			Data Source
Output & Impact	Performance	Target Outcome	
		during construction should not be more than 3% higher than pre-construction levels AND should be below the more stringent guideline limits.	
	- % of the total HHs in immediate vicinity of construction area that lodged complaint on impacts on fish resources due to polluted rivers, on disturbing odor from rivers, etc.	- No community complaint lodged regarding health impacts due to deteriorating ground water quality	- Grievance Redress Mechanism Record & Report
6 Generation of construction-associated traffic, especially of big trucks 6.1 Public safety hazard/risks	- % of total construction days when construction-associated trucks encountered road accidents	- None or 0%.	- Contractor's ST and PMU's progress & monitoring reports - Grievance Redress Mechanism Record or Report - Record & report of the Safety Team
	- % of total construction days with accident that caused serious injuries &/or fatalities	- No accident or emergency should result in permanent/long-term injury or fatality.	- Record & report of district police &/or traffic authorities - Hospital records
During Operation 7 Local flooding incidence due to surface drainage being impeded by completed Sub-component	- % of days in a year when flooding occurred due to surface drainage impeded by road	- No such incidence.	- W/CPC reports - Grievance Redress Mechanism Record or Report
	- % of HHs in influence area that lodged complaint on surface drainage being impeded by the road	- None or 0%.	- Field reconnaissance during flooding event in catchment

End Note I.1 Draft Outline for the Environmental Monitoring Report

11. Introduction

(Purpose of report; order of submission of the report e.g., first, second….nth report; period covered**;** preparer; and structure of the report)

12. Component Description

(Briefly describes the component, its sub-component activities and their sizes/scales, locations, costs and implementation schedules. Remains the same in every reporting, unless there are changes in scope, size or details, locations. Include map showing locations of components.)

13. Physical Progress of the Component

13.1 Previous Reporting Period

13.2 Current reporting period

(target and actual, for each Sub-component, and for Component overall)

14. Compliance with GoV Environmental Requirements

GoV Environmental Regulatory Requirements	Compliance Status

15. Loan Agreement's Environmental Requirements (other than EMP compliance)

Loan Agreement Reference No. & Provision	Compliance Status

16. Compliance with the EMP

16.1 Implementation of Mitigation Measures

From EMP		Measures Undertaken				Necessary Corrective Action	Results
Impacts	Measures	What	When	How often	Effectiveness		

16.2 Conduct of Environmental Effects Monitoring

Monitoring Activity Stated in EMP	Undertaken?			Results	Remarks
	Yes	No	Date		

16.3 Observance of the Grievance Redress Mechanism

Complaint		Complainant		Action Taken	Result	Remarks
When Filed	What	Name	Address			

17. Performance Monitoring

17.1 Effectiveness of Instituted Mitigation Measures (suggested)

Assessment	Description	Scoring
Very Good	96-100% fully effective	5
Good	76-95% effective	4
Fair	51-75% effective	3
Poor	26-50% effective	2
Very Poor	0-25% effective	1

17.2 Performance in EMP Implementation (suggested assessment levels, descriptions & scoring)

C. Environmental Impact Mitigation

Assessment	Description	Scoring
Very Good	96-100% of the required mitigations carried out accordingly	5
Good	76-95% of the required mitigations carried out accordingly	4
Fair	51-75% of the required mitigations carried out accordingly	3
Poor	26-50% of the required mitigations carried out accordingly	2
Very Poor	0-25% of the required mitigations carried out accordingly	1

D. Environmental Effects Monitoring

Assessment	Description	Scoring
Very Good	96-100% of the required effects monitoring carried out accordingly	5
Good	76-95% of the required effects monitoring carried out accordingly	4
Fair	51-75% of the required effects monitoring carried out accordingly	3
Poor	26-50% of the required effects monitoring carried out accordingly	2
Very Poor	0-25% of the required effects monitoring carried out accordingly	1

17.3 Overall Environmental Performance of the Subproject

Impact (EMP)	Performance		Met Target Outcome?			Basis of Info	Remarks
	Indicator (EMP)	Value	Met	Failed			
				Frequency	Date/s		

18. Summary of Corrective/Follow Up Actions to be Taken

19. Lessons Learned

20. Conclusion

End Note I.2 Draft Outline Terms of Reference for PIS Environmental Specialist

4. This ToR applies to a collective effort of the international and national local environmental specialists, for at least 4 months spread over two-three years of Project implementation.

5. The Environmental Specialist will provide the PMU: (i) technical assistance and advice in supervision of EMP implementation; and (ii) capacity development in environmental monitoring and reporting. Capacity development shall be highly focused in the training of the PMU's Environmental Engineer/Scientist (EE/S). Training shall be highly "hands-on" or adopting the "learning while doing" approach.

6. The Environmental Specialist shall have at least a Master's degree in Environmental Science or Environmental Engineering, and at least 10 years of experience in the management of environmental performance of infrastructure projects (preferably for basic urban services) including environmental monitoring and environmentally responsible procurement. He/she shall ensure that his/her engagement of (at least) 4 months, spread over two-three years, will allow the EE/S to operate effectively on his/her own after two-three years until loan closure. His/her responsibilities include, but not limited to, the following:

Prior to construction

i. Finalization of the IEEs and EMPs.
ii. Monitoring of the incorporation of relevant mitigation measures in the detailed designs.
iii. Ensuring conduct of integrated social-environmental public consultations and disclosure.
iv. Ensuring GOV EA requirements will not cause delay in the commencement of the construction phase.
v. Preparation for procurement, i.e., ensuring that the SPS compliant Subproject EMP is part of the bidding documents; incorporation of environmental criteria, scoring and weight in the evaluation of bids.
vi. Preparations for the activation of the grievance redress mechanism, e.g., materials for dissemination and posting, documentation and communication systems, among others.
vii. Partially conduct the training lectures/seminars.
viii. Implementation of pre-construction environmental monitoring as recommended in the EMP.

During construction

ix. Review of the Contractor's EMP against the SPS compliant SEMP.
x. Provision of guidance to the EE/S on the supervision of EMP implementation, and advice on any actions required to ensure EMP compliance.
xi. Assessment of the implementation of the grievance redresses mechanism and identification of improvement/s in the mechanism.
xii. Review of the results of Contractor's environmental effects monitoring.
xiii. Guidance in the preparation of environmental monitoring report.

During the Entire Engagement Period

xiv. Review monthly and Semi-annual EMRs prepared by the EE/S. Together with the EE/S finalize EMRs for submission to the PMU. Identify necessary improvement/s in monitoring.
xv. Prepare the necessary report that will be required from him/her as part of the PIS Team, e.g. progress report on his/her technical assistance.
xvi. Perform other tasks that are relevant to his position and are not mentioned above.