DETAILED WORKS PROGRAM (DWP)
For Road Construction to Landfill 1.2 km at Houay Soup Resettlement Site on Nam Ngiep 1 Hydropower Project

08 March 2017
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Part I

DETAILED WORKS PROGRAM (DWP)
For Road construction to Landfill 1.2 km at Houay Soup Resettlement Site on Nam Ngiep 1 Hydropower Project

Part I DETAILED WORKS PROGRAM (DWP)

1. General information

Nam Ngiep 1 Power Company Limited (NNP1PC) has received the Concession Agreement from the Government of Lao PDR (GoL) to Build, Operate and Transfer the “Nam Ngiep 1 Hydropower Project (NNP1PC)” in Bolikhambay Province. Among Resettlement Action Plan (RAP) and Social Development Plan (SDP) for Project Affected Peoples (PAPs), PAPs residing at Zone 2LR at Hom District Vientiane Province and Zone 3, Hatsaykham, which is the sub-village of Hat Gniun Village, Bolihan District, Bolikhambay Province needs to be resettled at “Houay Soup” on the opposite bank of Hat Gniun Village.

Under the contract agreement No.: NNP1PC-CF-ESD-SMO-INFRA-2016-46, Vorarath Co., Ltd (the Contractor) shall perform the construction of 1.2 km road connecting between the main road of Houay soup resettlement site and road T8 under the supervision of the Environmental Social Division (ESD) of the NNP1PC. Prior to commencing the Works, the Contractor shall prepare a detailed work program (DWP), site specific environment and social management and monitoring plan (SSESMMP) and construction schedule for approval by the Manager of Social Management Office (SMO) of ESD or his designated representatives(s). The Contractor shall coordinate with ESD to cooperate with Resettlement Management Unit (RMU) of Bolikhambay Province, in order to assure the Works are to be conducted according to the standards and guidelines of Government of Lao PDR (GoL) and Asian Development Bank (ADB).

2. Road Construction of 1.2km to Landfill
The construction of 1.2 km by 4 m width road connecting between Huay Soup Main Road and Road T8 aims to provide the settlers living in Houay Soup resettlement area and Project Affected People (PAP) living at Ban Tha Heau, Ban Hat Ngeun with easy access to Houay Soup Landfill for both dry/wet seasons. Road construction work will be divided into two activities, road improvement will start from station 0+650 of the Main Road to Houay Soup Resettlement Area to station 0+400. Newly road construction will continue from station 0+400 to station 1+200 where it connects to road T8 with a total length of 1,200 m by width of 4m (Figure 1). Two borrow pits are designated along the road alignment at Sta. 0+300 and 0+400. Soil from borrow pit operation will be mainly used as fill-material for the road improvement section while construction of new road section requires more cut and fill activities (Figure 2). Road side drainage line with diversion endings will be constructed, the quantities stated in Bill of quantity (BoQ), and a 150mm thickness of sub base course will be provided as the road surface treatment where CBR>35% (Figure 3).

Figure-1: Construction of road to Landfill
Borrow Pit 1: Soil excavated from the road alignment Sta. 0+300 - 0+400

Borrow Pit 2: Soil excavated from the road alignment Sta. 0+400 - 0+500
Figure 2: Cross Section of Road Alignment

![Cross Section of Road Alignment Diagram]

Figure 3: Cross section of Cut & fill & Roadside Drainage

In performing tasks assigned, the contractor shall refer to contract agreement Ref. No.: NNP1PC- CF-ESD-SMO-INFRA-2016-46 between NNP1PC and Vorarath Co.,Ltd so that the company has received Notice proceed from NNP1PC soon as approved the SS-ESMMP-CP and also the contractor has a document which includes:

1. Notice proceed
2. Construction/work Schedule
3. Payment schedule
4. Scope of work
5. Code of practice

3. Materials

The materials will be used for the construction of 1.2 km road connecting between Huay Soup Main Road and Road T8 are area as below:

Table 1: Materials for the main road construction

<table>
<thead>
<tr>
<th>No</th>
<th>Description</th>
<th>Use for</th>
</tr>
</thead>
</table>

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4. Equipment and manpower

4.1 Equipment and tool

Table 3: List of equipment and Machineries to be used for the Construction on Site

<table>
<thead>
<tr>
<th>Item No</th>
<th>Equipment name</th>
<th>Unit</th>
<th>Quantity</th>
<th>Owner</th>
<th>Transport Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Major Equipment</td>
<td>unit</td>
<td>1</td>
<td>VRC</td>
<td>Trailer</td>
</tr>
<tr>
<td>1</td>
<td>Bulldozer</td>
<td>unit</td>
<td>1</td>
<td>VRC</td>
<td>Trailer</td>
</tr>
<tr>
<td>2</td>
<td>Excavator</td>
<td>unit</td>
<td>4</td>
<td>VRC</td>
<td>Trailer</td>
</tr>
<tr>
<td>3</td>
<td>Motor Grader</td>
<td>unit</td>
<td>1</td>
<td>VRC</td>
<td>Trailer</td>
</tr>
</tbody>
</table>

Table 2: Quantity of materials for the main road construction

<table>
<thead>
<tr>
<th>Item No</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Clearing and Grubbing</td>
<td>Sq.m</td>
<td>7,000</td>
</tr>
<tr>
<td>2</td>
<td>Common excavation including unsuitable soil</td>
<td>cum</td>
<td>9,245</td>
</tr>
<tr>
<td>3</td>
<td>Embankment with Excavated Materials</td>
<td>cum</td>
<td>3,611</td>
</tr>
<tr>
<td>4</td>
<td>Structural Excavation for Pipe Culverts, Inlet/Outlet Structures (Rock)</td>
<td>cum</td>
<td>780</td>
</tr>
<tr>
<td>5</td>
<td>Sub-base 15cm thick, CBR &gt;=30%, Compaction 95%</td>
<td>sqm</td>
<td>814</td>
</tr>
<tr>
<td>6</td>
<td>Concrete Class 15 Mpa</td>
<td>cum</td>
<td>50.00</td>
</tr>
<tr>
<td>7</td>
<td>Concrete Class 25 Mpa</td>
<td>cum</td>
<td>270.00</td>
</tr>
<tr>
<td>8</td>
<td>Steel Reinforcement</td>
<td>ton</td>
<td>30.00</td>
</tr>
<tr>
<td>9</td>
<td>Pipe Culvert, 600 mm diameter</td>
<td>m</td>
<td>10.00</td>
</tr>
<tr>
<td>10</td>
<td>Pipe Culvert, 800 mm diameter</td>
<td>m</td>
<td>74.00</td>
</tr>
<tr>
<td>11</td>
<td>Concrete (Grade 15) for Headwalls and Wing walls</td>
<td>cum</td>
<td>17.00</td>
</tr>
<tr>
<td>12</td>
<td>Concrete (Grade 25) for Headwalls and Wing walls</td>
<td>cum</td>
<td>38.00</td>
</tr>
<tr>
<td>13</td>
<td>Reinforcing Steel in Headwalls and Wing walls</td>
<td>ton</td>
<td>1.00</td>
</tr>
<tr>
<td>14</td>
<td>Ditch lining Concrete (Grade 15) for</td>
<td>cum</td>
<td>30.00</td>
</tr>
<tr>
<td>15</td>
<td>Traffic Signs (single post)</td>
<td>No.</td>
<td>10.00</td>
</tr>
<tr>
<td>16</td>
<td>Edge Marker Posts</td>
<td>No.</td>
<td>40.00</td>
</tr>
</tbody>
</table>
### Note: Transportation Schedule

VORARATH Co., Ltd was recently sub-contracted to perform construction of Houay Soup Main Road phase 1 with a total length of 3.35 km, phase 2 with a length of 1.37 km and a 2.7 km tractor road. The existing labour camp and facilities located at Houy Soup Resettlement Area will be used to support the construction work. With adequate transportation of the equipment of our company (as we have now 2 units of trailers were standby at Company workshop and ready for works), thus all of the machinery and equipment as above listed will be arrived to site not more than 10 days. The priority equipment as: Bulldozers and Excavator for clearing works and earth works cutting will be first consideration for this transportation and will be completed within 7 days, others required will be consequently moving to site after priority equipment were moved.
Flowing figure is our major equipment transportation (TRAILERS)

4.2 Nominated Sub-contractor and Manpower Distribution

Vorarath Co., Ltd is the nominated subcontractor who meets NNPP1’s requirements in following items as listed below:

1. Technical competence
2. Financially stable
3. Administrative competence
4. Past project experience with good references
5. Ability to meet schedule
6. Quality and skill of work
7. Capacity (equipment, staffs, workers) and organization
8. Ability to meet safety and environmental and social requirements

Manpower distribution is shown in table 4 below:

Table 4: Manpower for a 1.2 km Road Construction

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Classification</th>
<th>Unit</th>
<th>Description of Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Project Manager</td>
<td>1</td>
<td>Site management</td>
</tr>
<tr>
<td>2</td>
<td>Site manager</td>
<td>1</td>
<td>Site management</td>
</tr>
<tr>
<td>3</td>
<td>Engineer</td>
<td>3</td>
<td>Site management</td>
</tr>
<tr>
<td>4</td>
<td>QA/QC engineer</td>
<td>1</td>
<td>Site management</td>
</tr>
</tbody>
</table>
4.3 Temporary facility

Temporary facility will be mobilized as part of executing the work. Temporary facilitates to be constructed at site work includes:

1. Field office
2. Camp for field staff
3. Kitchen
4. Fuel station storage area
5. Temporally storage area for equipment
6. Bath room
7. Toilet
8. Waste bins to be provided there

(For more detail information see appendix 4)

5. Construction Procedure

5.1 Works Procedure

Works Procedure Diagram
5.2 Mobilization

Refer to the Scope of the Works (Term of the contract), as soon as we receive the Letter Notice to Proceed, we will closely coordinate with the Client’s Representative about the location of the Camp establishment in Houay Soup, also the transportation of Equipment and Machinery to the Site.

5.3 Setting out Survey and Design

The survey team will start survey and along the road alignment by using Total Station instrument (ADM) in order to marking reference points for elevations, slopes, location of the culverts etc., according to the reference points (BMs) then making the Working drawings submit to the Client’s engineer for approval.

Note: the boundary or right of Way shall be inside the UXO Clearance.

✓ Staffs and Instruments to be utilized at full time of the work implementation

- Engineers 2 Persons (Civil and Survey)
- Skill Labor 2-3 Persons
- Total Station Theodolite (EDM) 1 Set
- Auto Level 2 Sets
5.4 Details Design Works

- The details design including quantity calculation shall be started after finish the site survey and collect all the information from the site by contractor’s survey team. The working drawings together the Bill of quantity shall submit to the Client’s engineer for approval.
- As-Built design drawings shall be done and submitted to the Client after the construction completed.

5.5 Clearing and Grubbing

This item work is to start first on site to clearance all obstruction the equipment 1 Bulldozer and 3 Excavator and 4 damp trucks will be used in accordance with the drawing (working drawings) which were approved by the Client’s engineer. This work will be completed within one (01) week. After finishing the clearing and grubbing, the measurement will together check on site by contractor’s and Client’s engineers.

5.6 Common Excavation

Common excavation will be immediately follow up after completed of clearing and grubbing section by sections as per works plan stipulated. It will be executed following to the Working drawings which checked and approved by the Client’s Engineer.

The request for the site inspection are required before any construction site conducted (at least 24 hours before), then survey for setting out by the survey team to marking the construction limit with checked and accepted by the Client’s Engineer; after all finished and proper to the technical specification the equipment can be Construct in strictly control step by step by the supervisory, all shapes will be followed by the working drawings. Some materials from cutting which are accepted quality in according to the
Technical Specification required will be used for Embankment materials and carryout at the same time.
* In case we meet the rock during the excavation which the quantity was not mentioned in the Bill of Quantity, the discussion shall be required between the Client’s Representative and Contractor’s Engineer.

5.7 Embankment Works

Embankment works shall be started after completed the site clearing and grubbing based on the design level on working drawings which was approved by the Client’s Engineer. The thickness of embankment each layer and compaction shall be followed the design and Technical Specification mentioned in the Scope of the Works. The main equipment will be used are includes: Excavator: 4nos, 1 Motor Grader: 1nos, Vibrating Roller: 2nos, Water Truck: 1nos, Dump Truck: 5 nos. Others requirement equipment shall be provided in the list. The quality control works are concerned with the material to be used and compaction test to reach sufficient of the technical Specification, the Laboratory team is required be onsite with their testing instruments and any things involved in the construction specification.

After constructed all of the cross fall shapes will be nearest to the tolerances on working drawings defined, testing will be followed by the Client’s Engineer direction. The measurement quantity will be together checked on site by the Client’s Engineer Representative and Contractor’s Engineer based on the working drawing.

5.8 Gravel Pavement

Refer to the design drawings, the gravel surface pavement is 150mm thickness by 4 m wide. The gravel surface materials shall be mixed together of soil-crushed stone, or natural borrow pit as used in similar works at Site Project. We noted that all of the materials to be used on works will be tested and the California Bearing Ratio (CBR) shall not less than 35% and approved by the Client’s Engineer before transport to the site. After completion all of the road shapes will be proper to the drawing and technical specification with following procedures:

- Request site inspection for each trial with the submission of method construction to the Client’s Engineer for review and approval in advance.
- Survey for setting out to marking the construction limit with checked and accepted by the Client’s Engineer.
✓ After all of the works preparing on site finished and accepted by the Client’s Engineer, the equipment will be used for this works and test instrument set with Laboratory engineer shall be standing on site construction.

✓ Most important concern about materials using, as above mentioned whole materials will be used is to be proper to the Technical Specification as stated in the Contract documents also shall be tested and accepted by the Client’s engineer.

✓ The main equipment to be used for the construction are flowing:

✓ Excavator: 2nos, Motor Grader: 2nos, Vibrating Roller: 1nos, Water Truck: 5nos, Dump Truck and others as works required.

5.9 Road Drainage Works

Refer to the construction drawings approved by the Client’s Engineer, the road sides drain (ditches) will be constructed along the both sides of the road alignment in accordance with the Drawings and Technical Specification mentioned in the Scope of the Works.

✓ The major materials to be used on works shall be tested, checked and accepted by the Client’s Engineer prior any works proceed on site.

✓ Marking the construction limit with by Survey team and accepted by the Client’s Engineer.

✓ All of the construction products shall be accordance with the Technical Specification as stated in the Scope of the Works.

✓ Measurement quantity will be together checked on site by the Contractor and the Client’s Engineer.

6. Safety control

We the Bidder hereby planned to implement a Health and Safety Policy complying with the Clients Health and Safety Plan, which shall be in force throughout the duration of the Contract.

✓ For the purpose of implementing the Health and Safety Policy, we will constitute a duly empowered committee which shall convene weekly under the chairmanship of the Client and which shall include, but not be limited;

✓ We the Bidder hereby to offering, confirmation and ensured during of the Contract implementation the following safeguards are in place, and managed continuously throughout the Project through the subordinate action items. As each item works in the Contract is fully completed;

✓ The Roads safety devices such as warning Signs, Painted lines, Safety bars, Traffic diversion devices etc. will be controlled as to meet the numbers and Standards by the Contracts document;
Traffic Control Services, During Construction of the Project We, the Bidder shall maintain the traffic at all times without any disruption according to the requirements in the contracts document;

Where the Public could be exposed to danger by any of the Site activities, the Contractor shall as appropriate provide suitable flagmen, barriers and/or warning signs in English, Lao and other relevant languages, all to the approval of the Client;

All of our staffs to be resumed to this project have to safeguard for all of the safety during construction periods execution especially for health care including with the welfare to be monitoring by the field nurses and emergency medical (field box medicines have to prepare in each filed camps).

7. Quality assurance

All the documents and drawings shall be reviewed by the contractor prior to issuing to the Client’s engineer to ensure with the quality standards.

To ensure that all of our works item construction are checked by the contractor to conform the technical specification and standard assure that all of the executed quantities are in good quality and completion on time as schedule planned;

The inspection of quality control will be strictly checked and followed to the Technical Specification descriptions in the Contract such as Embankment materials and Pavement materials will be tested Sieve analysis, Compaction, Liquid limit, Plastic Index and CBR, Concrete will be completed first the mix design in according to specification required and Steel bar must be pass tensile strengths testing and certify by the capable laboratory in Vientiane before bring to site.

Part II SITE SPECIFIC ENVIRONMENT AND SOCIAL MANAGEMENT AND MONITORING PLAN (SS-ESMMP)
8. Introduction

This Site Specific Environmental and Social Monitoring and Management (SSES MMP) Plan has been prepared to highlight environmental and social conditions prior to the beginning of each construction activity and will be used as a tool to ensure the particular activity follows the correct management and mitigation procedures. Sub-Plans will be used to detail mitigation methods for each of the activities associated with the construction or excavation works. This SSES MMP will cover environmental and social mitigations related to the road construction connecting between Houay Soup Main Road to road T8. Table below shows the referential linkages of documents regarding environmental matters in the NNP1 Project. The Owners (NNP1) documents use references and information from the Concession Agreement. This SSES MMP (Contractor) uses references and information from Owners EIA/ESMMP and Owners ESMMP-CP.

Table 5: List of Main Documents and Approving Authority

<table>
<thead>
<tr>
<th>Item</th>
<th>Hierarchy of Documents</th>
<th>Approving Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Concession Agreement</td>
<td>GOL</td>
</tr>
<tr>
<td>2</td>
<td>NNP1 EIA/ESMMP</td>
<td>GOL</td>
</tr>
<tr>
<td>3</td>
<td>ESMMP-CP</td>
<td>GOL</td>
</tr>
<tr>
<td>4</td>
<td>SSES MMP</td>
<td>NNP1</td>
</tr>
</tbody>
</table>

The Contractor document is the SSES MMP (Item4) which have used applicable information extracted from the Owners documents which are Concession Agreement (Item 1), NNP1 EIA/ESMMP (Item 2) and ESMMP-CP (Item 3).

All obligations of the contractor are stated in the Contract and is the only governing document for the Contractor No: NNP1PC-CF-ESD-SMO-INFRA-2016-46.

9. Environmental Assessment Checklist for pre-Construction

Land and Water Use in the Area
Area to be developed as the road construction with a total 1.2 km length by 4m was mainly and previously used for agricultural practices including shifting cultivation and seasonal cropping (rain-fed-rice, corn and other clash crops. Recently, the land was compensated and handed over completely to the Owner. There are seasonal streams flowing through the proposed road alignment.

Proximity to Village and Cultural Site
The construction site is located about 3km from Hat Nguyen village and about 2.5 km from Houay Soup Resettlement village. With these distances, it is expected less likely environmental and social impacts to the near-by villages. There was no report on the nearby cultural sites, thus no impact is expected. However, a “chance find procedures” is provided
in this SSESMMP to ensure that NNP1 is notified if any chance-find cultural objects are identified in the construction site.

**Environmental Assessment Checklist**

Table 6 below is a checklist used to assess pre-construction description of the working area. After the checklist has been completed, the Sub-Plans can be selected accordingly.

Table 6: Environmental Assessment Checklist - for Pre Construction

<table>
<thead>
<tr>
<th>Site Location</th>
<th>Road Construction of 1.2 km to Landfill</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS Coordinate</td>
<td>Point1, N= 348440.505, E= 2062048.493  point 2, N=349548.880, E= 2062140.789</td>
</tr>
<tr>
<td>Date</td>
<td>27 January 2017</td>
</tr>
<tr>
<td>Estimated area / Length</td>
<td>1.2 km</td>
</tr>
<tr>
<td>Prepared by</td>
<td>Mr. Thanongxay PHONVIXAY</td>
</tr>
<tr>
<td>Checked by:</td>
<td>Mr Phoukanha VONGSOMPHOU</td>
</tr>
<tr>
<td>Site Description</td>
<td>Part of the road construction of 1.2 km by 4 m (length x Width) will follows the existing 0.4km villager track. The rest of 0.8 km will be developed through vegetation area which covered by bamboos, young fallow, shifting cultivation including upper rice, bananas, corn and other crops. Recently the land was already compensated by NNP1PC.</td>
</tr>
<tr>
<td>Project Setting</td>
<td></td>
</tr>
<tr>
<td>Will the site require UXO clearance?</td>
<td>☑</td>
</tr>
<tr>
<td>Is there surface water located in close proximity to the site?</td>
<td>☑</td>
</tr>
<tr>
<td>Is there a village or community area located in close proximity to the site?</td>
<td>☑</td>
</tr>
<tr>
<td>Is the site located in a vegetated area?</td>
<td>☑</td>
</tr>
<tr>
<td>Is the site located in agricultural land?</td>
<td>☑</td>
</tr>
<tr>
<td>Is the site located in NPA/PPA?</td>
<td>☑</td>
</tr>
</tbody>
</table>

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| **Are there any PCR sites in the area?** | √ | There was no report on the nearby cultural sites, thus no impact is expected. However, a “chance find procedures” is provided in this SSESMMP to ensure that NNP1 is notified if any chance-find cultural objects are identified in the construction site. |
| **Is there an existing access road to the site?** | √ | The construction site connects to the Main Road to Houay Soup Resettlement Area (HSRA) |
| **Can the site be viewed from public viewpoints?** | √ | Hat Ngeun village is located about 3 km from the construction site. Therefore, No viewpoint from public |
| **Is the site located within an existing Construction Area?** | √ | The construction site is inside Houay soup resettlement area |
| **Will site development require the construction of a sub-camp, office and storage?** | √ | The existing workers’ camp and facilities is located at Station 2+775 of the Main Road to Houay Soup Resettlement Area. The sub-camp and facilities layout is provided in Annex 5 |

**Others Comment:**

**Environmental Impacts**

<table>
<thead>
<tr>
<th><strong>Likelihood</strong> (likely/unlikely)</th>
<th>N/A</th>
<th><strong>Mitigation measure to be Implemented</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Will site development result in increased dust generation at near-by villages?</td>
<td>Unlikely</td>
<td>The closest village is 3 km away from the construction activities.</td>
</tr>
<tr>
<td>Will site development result in increased noise generation at near-by villages?</td>
<td>Unlikely</td>
<td>It is less likely cause noise impact to the near-by villages because the site is located about 3 km from the village closest village.</td>
</tr>
<tr>
<td>Will site development result in surface water contamination?</td>
<td>Likely</td>
<td>There is no main watercourses flowing through or nearby the construction site. However, Construction activities need to take care when disposing of any waste materials. Waste collection points must be away from any water sources.</td>
</tr>
<tr>
<td>Will site development result in changes to drainage patterns?</td>
<td>Likely</td>
<td>Vegetation clearance, borrow area’s pits, cutting road section and disposal area will change drainage pattern.</td>
</tr>
<tr>
<td>Will the site result in soil erosion?</td>
<td>Likely</td>
<td>Borrow pits will be operated and...</td>
</tr>
</tbody>
</table>
landscaped properly, sensitive road embankment and drainage will be properly shaped. Where feasible, waste vegetation will be mounted to reduce soil erosion.

Vegetation clearing required? Likely Bush/vegetation clearing will require during clearing work

Will the site be setting up hazardous components? (storage and workshop) Likely Hazardous components such as solvents and oil will be kept in a well-designed Storage workshop, with impermeable flooring, away from rain

Will the site generate waste? Likely Sufficient waste bins will be placed around the construction site. A main collection point should be designated with all waste separated into general/ recycle/ hazardous

Table 7 below identifies the relevant list of Sub-Plans required for the road construction of 1.2 km from Houay Soup Main Road to Landfill. The Sub-Plans were selected after a review of following:

- Detailed Works Program (DWP)
- Environmental Assessment for Pre-Construction (Table 6)
- NNP1/EIA and ESMMP

Table 7: Relevant Sub-Plans for the road construction of 1.2 km from Houay Soup Main Road to Landfill.

<table>
<thead>
<tr>
<th>Sub-Plan</th>
<th>Item</th>
<th>Environmental</th>
<th>Social</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP01</td>
<td>Erosion and Sediment Control</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>SP02</td>
<td>Water Availability and Pollution Control</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>SP03</td>
<td>Emission and Dust Control</td>
<td></td>
<td>X</td>
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<td>SP04</td>
<td>Noise and Vibration</td>
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<td>SP05</td>
<td>Waste Management</td>
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<td>SP06</td>
<td>Hazardous Material Management</td>
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<td>SP07</td>
<td>Vegetation Clearing</td>
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<tr>
<td>SP08</td>
<td>Landscaping and Re-vegetation</td>
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<td>SP09</td>
<td>Biodiversity Management</td>
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<td>SP10</td>
<td>Spoil Disposal</td>
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<td>SP11</td>
<td>Quarry and Construction Layout</td>
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</tr>
<tr>
<td>SP13</td>
<td>Construction of Work Camps</td>
<td></td>
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Detailed descriptions are found in the relevant sections relating to Environmental or Social Management and Monitoring Plans.

10. Sub-plan Detail for Road Construction of 1.2 km—environmental

All Sub-Plans in this section refer to construction activities unless otherwise mentioned.

**SP01 Erosion and Sediment Control**

- Erosion and sedimentation control will be executed by installation of drainage, concrete pipes/box culverts and open ditches. The location of box/concrete pipes culvert will follow natural watercourse flow and the size and number concrete pipe/box culvert will be determined by the catchment area;
- Backfilling shall be carried out with material free from rubbish, vegetable matter or other deleterious material and as indicated on the drawings. Special care shall be taken to ensure that backfill shall be brought up evenly on both side of the concrete pipes/box culverts;
- The sensitive area shall be taken appropriate corrective action and follow owner recommendation accordingly;
- Topsoil shall be spread along both sides of the road, it shall be compacted by bucket of excavator to support natural growth;

**SP02 Water Availability and Pollution Control**

- The existing fuel station at the workers’ camp will be used. The fuel designed Storage has proper roof, slab and concrete bund clear label/sign, and materials safety data sheet (MSDS), and fire extinguishers.
- Fuel drums and other hazardous waste shall be will be kept in a separate storage facility with a permanent roof, slab and bund. A clear label of hazardous material and waste will be installed.
- The temporary worker camp yard shall be kept on safety and health condition, no permit wastewater discharge to outside, and prohibit dump solid waste in the natural watercourse;
- Implementation of septic/wastewater treatment system, solid waste management, such as proper location, containment and construction worker camp trash, and appropriate location (at least 30 m from drainage courses or other sensitive areas) and containment of septic systems;
- An open ditch will be installed at sub- camp to collect runoff from the sub-camp area to sediment pond and also divert rain water from outside the sub-camp.

**SP03 Emission and Dust Control**

- Speed limits (30 km/h or less) will be imposed at time of mobilizing machine to
minimize dust;
- The access road will be watered to suppress dust generation from transporting construction materials.
- All construction equipment and machinery will be regularly maintained to ensure no emission generation;
- The burning of waste materials on site shall not be allowed. Construction and general waste will be managed in accordance to the Owner’s instructions and recommendations.

SP05 Waste Management
- Sufficient number of waste containers or similar ones will be made available at construction site and workers’ camp;
- Waste containers will be marked clearly for “Hazardous Waste” and for “Non-Hazardous Waste” for separation and sorting of waste;
- Undertake regular collection, separation of Non-hazardous wastes generated from the construction site and camp and dispose at the Owner’s Landfill (Houay Soup Landfill). Dumping of wastes into watercourses, agricultural land and surrounding areas is prohibited;
- Hazardous waste will be kept in a hazardous storage area waiting for Owner’s instruction for proper disposal to minimise the impact on the environment.

SP06 Hazardous Material Management
- All chemicals and waste considered as potentially hazardous materials will be registered in order to follow up type, quantities stored, quantities used or generated. Movements from storage and to waste disposal site will be registered;
- The list of hazardous substances to be used in the house construction of 07 Unit for 2LR resettlement area including paint, solvents, oils, fuels and grease;
- Personal protective equipment (PPE) will be provided to concerned workers and the use of such equipment will be enforced;
- All refueling of equipment, machinery and truck will be undertaken by a service vehicle, with appropriate safeguards and protection measures to prevent any oil spillage or contamination;
- “No Smoking” labels and posters will be placed wherever fuel is handled or stored;
- All the fuel and hazardous material storage will be adequately bounded to prevent any spillage problem;
- Dry sand will be located where hazardous materials are being stored and used such as oil storage, machinery maintaining area and also at the refueling point. If spills or leaks do occur, undertake immediate clean up;
- Firefighting equipment will be kept available next to each storage facility.

SP07 Vegetation Clearing
- Prior to clearing, wooden pegging which shows the clearance area will be installed after inspection by the Owner on the clearance area and after that clearing work shall be started on construction site;
The area to be cleared will be marked with peg and shall be confirmed and approved by the Owner on site. Clearing area is basically set with 2 m offset from the foot of embankment slope and top of cutting slope;

Clearing will be done by bulldozer and excavator to remove and dispose stumps, bush, under growth and grass. Waste vegetation will be mounted on the sensitive road side slopes to protect form soil erosion. Therefore, it is not expected for designated waste vegetation stockpile from vegetation clearing work;

Basically it is confirmed by Owner that commercial trees along the road has been already cleared by the Lao government. If commercial timber is found on site, the branch shall be trimmed, and it shall be cut into a suitable size and stored in the vicinity of the site, then inform the Owner;

**SP13 Construction Work Camps**

The existing workers camp and facilities located at Station 2+ 775 will be used to support the road construction of 1.2 km to landfill. Layout can be referred to in appendix 4. Layout for temporary camp includes:

9. Field office
10. Camp for field staff
11. Kitchen
12. Fuel station storage area
13. Temporarily storage area for equipment
14. Bath room
15. Toilet
16. Waste bins to be provided there

*(For more detail information see appendix 4)*

A set of rules and regulations applicable to camps and sub-camps will be developed. The rules and regulations will include: Prohibitions on hunting and poaching of wildlife, purchasing wildlife meat, fishing, gathering and harvesting medicinal or valued plants and trees, and possessing firearms, snares, traps and other hunting equipment; housecleaning and waste management requirements;

Kitchen and washing/bathing rooms will be excavated sediment pond to retain wastewater on there and also septic tanks will be installed as part of each toilet facility, these will be closed systems, with no effluent being discharged into the environment;

The worker camp will be surrounded by an open ditch, which will collect rain water runoff and treated waste water from kitchens and washrooms. All will drain into a sediment pond before being discharged.

Waste bins will be distributed around the camp site at main locations such as; kitchen and lunch areas, accommodation building and wash rooms.

A minimum of two bins will be provided for each location; (1) recycling (2) general waste. A central point will then be used to collect all waste for later
disposal at landfill. Dumping of waste into watercourses, agricultural land and surrounding areas is highly prohibited.

- The workshop and hazardous storage areas need to be undercover and should include adequate flooring and roofing. Hazardous storage areas will have concrete or similar flooring with bundling to minimize the risk of spillage. All items will be accompanied with relevant documents or MSDS;
- After completing construction activities, the workers’ camp will be demobilized properly by following the Owner’s recommendations.

11. Sub-plan Detail for Road Construction of 1.2 km – Social

**SP04 Noise and Vibration Control**

- Avoid use of compactor near vibration level sensitive structures;
- Hearing protection will be provided for all construction personnel working in the vicinity of noisy construction activities.

**SP14 Traffic and Access**

- Employ flag persons to control traffic when mobilizing of machines into or leaving the work area to guide vehicles to regulate traffic movements, and to lead traffic through potentially hazardous areas;
- Provide sufficient lighting at night within and in the vicinity of construction sites;
- Implement suitable safety measures to minimize risk of adverse interactions between construction works, traffic flows and pedestrians/public through provision of temporary signals or flag controls, adequate lighting, fencing, signage and road diversions, traffic cones, and barricades to alert vehicle and pedestrian traffic of potential hazards including lane closures, equipment use or crossing areas, and excavations;
- Safety issues and regulations regarding traffic and site access will be included in the training plan for construction personnel (refer to SP16);
- To reduce materials falling onto the road, trucks may use tarpaulins or sheets to cover their loads;
- Speed limits will be 30km/h outside villages and 10km/h in the vicinity of each villages.

**SP15 Training and Awareness**

- All new employees will be required to complete Induction Training from local contractor and NNP1 prior to commencing any work on site. In this training, the Contractor will highlight site regulation/rule, and safety &environmental issues especially prohibit hunting, eating, and selling wildlife including fishing in the natural watercourse also do not damage habitats of wildlife;
A register of induction training will be maintained and can be provided to NNP1 on request;

Monthly safety and environment mass meetings will be conducted with all employees, and will cover all relevant health and safety issues on site;

Weekly meetings are also conducted to bring further awareness to environmental, health and safety issues.

**SP16 Project Personnel Health Program**

- Health and safety related posters covering; disease, drug use, waste disposal, PPE, use of toilet facilities and site rules will be provided in visible locations around the construction site;
- First aid kits will be provided and will be appropriately located at the construction site;
- The Project ambulance will be contacted when an accident occurs;
- Vector control of mosquitoes and other pests will be managed according to the following actions:
  i. Storm water drains and borrow pits will be kept free of vegetation;
  ii. Minimizing the presence stagnant water within containers and other pools of water;
- Training in general housekeeping and sanitation facilities for all workers at the workers’/construction camps will be provided;
- Reliable supply of water for drinking, cooking and washing purposes at the workers’ camps;
- Ensure proper collection and disposal of solid wastes within the workers’/construction camps consistent with local regulations;
- Provide fire-fighting equipment at the work areas;
- Appropriate safety equipment such as safety boots, helmets, gloves, protective clothes, breathing mask, goggles, ear protection, etc. must be worn when required.

**SP17 Emergency Preparedness**

- Emergency response procedures, emergency contact numbers and communication and reporting procedures will be clearly displayed and each staff always carry it;
- Hazardous materials will be stored in the permitted area only and according to the instruction by the authorities;
- Facilities and equipment for firefighting shall be prepared for the construction site (locations of fire extinguishers, smoke detectors, emergency exits and assembly areas will detailed separately in the architectural design reports);
- Hazardous materials will be stored on-site with the MSDS in accordance with the requirements of SP06;
- In the event of a spill of any hazardous materials, work will be ceased in the immediate vicinity and the area will be cleared of all construction personnel except those involved in the clean-up activities, if necessary;
- In the event of a spill of any hazardous material, the following response hierarchy will apply and will be used at development of the detailed emergency response procedures:
i. Seek medical attention for any injured personnel;
ii. Prevent further injury to personnel;
iii. Prevent environmental damage;
iv. Clean-up spill;
v. Remediate area of spill;
vi. Complete reposting requirements.

- At each construction site, information on emergency response procedures, including fire prevention, emergency contact numbers and communication procedures will be clearly displayed on notice boards;
- All construction workers should be trained in basic emergency response procedures including communication and reposting procedures to be implemented in case of an emergency situation;
- In the event of a personnel emergency implement the Emergency Response Procedure. All staff will be made aware of the procedure during project induction;
- The communication processes will include the following information in relation to accidental releases or spills:
  i. Location of spill;
  ii. Nature of material spilt;
  iii. Amount of material spilt;
  iv. Clean-up processes to be implemented;
  v. Any injuries to personnel;
  vi. Need for emergency or external assistant;
  vii. Any safety/evacuation requirements to be implemented on the construction site.
- Within 48 hours of the completion of a spill clean-up, a report will be submitted to the Owner. The report will be used to identify any required corrective or preventive actions and emergency response procedures and training programs will be modified accordingly;
- First aid kits will be readily accessible by workers;
- Prior to the rainy season, all construction site will be reviewed for slope stability and stability of infrastructure and management measures identified to prepare for incidents that may arise as a result of flash flooding for example machinery being dislodged or landslip;
- Include clearly marked exclusion barriers around hazardous areas around construction site required to exclude access from non-working staff and the public.

### SP18 Cultural Resources

- If the Contractor is to find any new physical or cultural resources during construction activities, the Contractor shall stop the works and inform the Owner immediately and follow the Chance Find Procedures outlined below;
- The Environmental mitigation plan will be changed and revised in accordance with the occurrence of adverse impact to the surrounding environment and social environment and the Owner’s comments;
- **Chance find procedures**

  Objectives of Chance Find Procedures are to; (1) minimize impacts to resources from all NNP1 related activities and (2) to ensure that any artifacts uncovered are appropriately recorded, documented and reported to the appropriate line agencies. If any fossil or cultural item of significance is found the Contractor will promptly give notice to the owner. This follows the guidelines stated in the Civil Works Contract “CWC” Clause 4.25 regarding...
Fossil and Artifacts. The Contractor will work with Owner to ensure safe removal of the artifacts, as directed by the Owner who will implement Chance Finds Procedures with a variation order. Chance Find Procedures mentioned in the Contractors SSESMMP, Sub-Plan for Civil Works contract, “18: Cultural Resources” also states the following steps will be implemented in the event that previously unidentified artifacts are identified:

✓ The contractor shall immediately cease operations on main road construction on Houay soup resettlement area where artifacts/archaeological finds are unearthed and immediately inform NNP1 Site Manager;

✓ The Owner will consult the Head of Village and Culture and Tourism Administration Office to obtain advice regarding the next steps;

✓ The contractor to recommence work only after the Culture and Tourism Office has provided official notification accordingly.
APPENDICES

1. Working Drawing (Reference)
2. Organizational Chart
3. Construction Schedule
4. Workers’ Camp-General Layout
5. Emergency Action Plan
6. Construction Machinery
7. Equipment and Materials
Appendix 1 Working Drawing (Reference)

Cross section of road construction of 1.2 km
Borrow Pit 1:
Soil excavated from the road alignment Sta. 0+300 + 0+400

Borrow Pit 2:
Soil excavated from the road alignment Sta. 0+400 + 0+500

Cross section of borrow pit
Drawing of borrow pit No. 1

Drawing of borrow pit No. 2
Appendix 2 Organization chart

**PROJECT MANAGER**
Mr Phoukanha VONGSOMPHOU

**Site Manager**
Mr. Thanongxay PHONVIXAY

**Mechanic & Electric**
1. Mr. Sonxay M
2. Mr. Senchan P

**Administration**
1. Mr Sonsouphan
2. Mr Chanpheng

**Cooker**
1. Mrs Khamlao
2. Labor
3. Labor

**Survey & Design Team**
1. Mr. Doza H
2. Mr. Thonkeo IN

**Road Engineers**
1. Mr. Khanty P

**Road Engineers**
1. Mr. Khampholn D
2. Forman 1 Person

**QA/QC Control**
1. Mr Visounli (Qa&QC engineer)

**Administration**
1. Mr Sonsouphan
2. Mr Chanpheng
3. Cooker

**Structure Teams**
1. Skill Labor
2. Skill Labor
3. Labor 20 Persons
Appendix 3 Construction schedule,
Appendix 4 Workers’ Camp-General Layout
VRC
VORARATH Road-Bridge and Building Construction Co., Ltd

Site Kitchen Left view

Site Kitchen Right view

Donekoy Village, Sisattanak, Vientiane Capital, Lao P.D.R Tel: 021 330113, 020 55519061 / 020 22514584, E-mail: bounlithvrc@hotmail.com / kvongsomphou@yahoo.com
VRC

VORARATH Road-Bridge and Building Construction Co., Ltd

Donekoy Village, Sisattanak, Vientiane Capital, Lao P.D.R Tel: 021 330113, 020 55519061 / 020 22514584, E-mail: bounlithvrc@hotmail.com/kvongsomphou@yahoo.com
Appendix 5 Emergency Action Plan

**VRC**

**VORARATH Road-Bridge and Building Construction Co., Ltd**

Donekoy Village, Sisattanak, Vientiane Capital, Lao P.D.R Tel: 021 330113, 020 55519061 / 020 22514584, E-mail: bounlithvrc@hotmail.com / kvongsomphou@yahoo.com
Appendix 6 Construction Machinery

<table>
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<tr>
<th>Item No</th>
<th>Equipment name</th>
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<th>Quantity</th>
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<td>VRC FDT Instrument</td>
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<td>VRC Testing Lab-room</td>
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Donekoy Village, Sisattanak, Vientiane Capital, Lao P.D.R Tel: 021 330113, 020 55519061 / 020 22514584, E-mail: bounlithvrc@hotmail.com / kvongsomphou@yahoo.com
### I.V.) Office Equipment

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Appendix 7 Equipment Materials

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<td>Excavated Soil</td>
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<td>Common excavation including unsuitable soil</td>
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<td>Embankment with Excavated Materials</td>
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<td>4</td>
<td>Structural Excavation for Pipe Culverts, Inlet/Outlet Structures (Rock)</td>
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<td>Sub-base 20cm thick, CBR &gt;=30%, Compaction 95%</td>
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<td>Concrete Class 25 Mpa</td>
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<td>Steel Reinforcement</td>
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<tr>
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<td>Reinforcing Steel in Headwalls and Wing walls</td>
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<td>Kilometer Posts</td>
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