Chilime – Trishuli Transmission Line and Substations, Nepal

IEE ADDENDUM

Report

July, 2015

ERM

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Management

IEE Addendum

Chilime – Trishuli Project, Nepal

Prepared for:
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Note: *The epicentre of the 7.8 Gorkha Earthquake that hit Nepal on April 25th, 2015, was located only 50 km away from the Project area. The exact impacts to the Project area are not fully known yet. It is likely that the Project design will have to be amended due to impacts caused by the earthquake and the aftershocks. Any changes concerning this Project will be addressed during the next design stage.*

1 BACKGROUND

The Chilime – Trishuli Transmission Line and Substations Project (hereinafter referred to as "the Project") is being developed by the governmental organization Nepal Electricity Authority (hereinafter referred to as NEA or the Project Developer), and will be financed by the Government of Nepal, NEA, KfW Development Bank (KfW) and the European Investment Bank (EIB). The Project is located in Rasuwa and Nuwakot districts approximately 40 km northwest of Kathmandu. The transmission line (TL) will serve as a connection between hydropower plants in the Upper Trishuli Valley and Kathmandu Valley and runs along the Trishuli River.

In Nepal, the Environment Protection Act (EPA), 1997 (B.S. 2053), and the Environment Protection Rules (EPR), 1997 (B.S. 2053), are the major legislations defining the requirements of environmental impact assessments and public engagement for any development proposal. According to national procedures, the project only requires an Initial Environmental Examination (IEE), and not a full scope Environmental and Social Impact Assessment (ESIA).

The NEA Environmental and Social Studies Department (ESSD) prepared the two following studies:

- IEE of Trishuli 3 B Hub Substation Project (NEA ESSD 2014a)
- IEE Report of 132/220 kV Chilime Substation Hub and Chilime – Trishuli 220 kV TL Project (NEA ESSD 2014b)

Additional documents are needed for the Project to meet international environmental and social requirements. To secure the funding by KfW and EIB, the Project has to comply with the International Finance Corporation (IFC)[1] and EIB Environmental and Social Standards[2]. Environmental Resources Management GmbH (ERM), Germany, was appointed by KfW to

[1] http://www.ifc.org/performancestandards
[2] http://www.eib.org/attachments/strategies/eib_statement_esps_en.pdf &
http://www.eib.org/attachments/strategies/environmental_and_social_practices_handbook_en.pdf

support NEA with improving the IEE documents for the 26.5 km TL and two substations (Chilime and Trishuli).

Prior to this assignment, ERM was appointed by Lahmeyer International GmbH (LI), the technical consultant for the Project, to undertake an independent Gap Analysis (February 2015) of the above mentioned IEE documents.

2 *ABOUT THIS DOCUMENT*

The excisting IEEs (NEA ESSD 2014a & 2014b) are the basis for the approval by the Nepali Ministry of Energy and under Nepali laws the IEEs are sufficient for proceeding with the Project[4]. These documents are no sufficient to cover the environmental and social requirements of EIB and KfW though. Therefore, this IEE Addednum was prepared.

This IEE Addendum provides additional baseline data, impact assessment and mitigation measures to support the Project in managing environmental and social risks during operation and aligning it with the IFC and EIB Standards. The main issues that needed to be addressed are related to biodiversity, vulnerable groups and cumulative impact assessment. To prepare the IEE Addendum, a site visit was conducted in April 2015 to gather the required information. For covering the biodiversity aspects a field survey was conducted and the main issues are summarised in Chapter 4.9; the whole report can be found in Annex A. For the other supporting activities the results are presented in this report as well. Based on the given budget of 10 working days (which includes already 8 days for the site visit), a high level approach was applied.

In addition to the two IEEs and the IEE Addendum on hand the following documents have been prepared:

- a Non-Technical Summary (NTS),
- a Stakeholder Engagement Plan (SEP), and
- an Environmental and Social Management Plan (ESMP).

Furthermore, a Land Acquisition and Compensation Plan (LACP) is currently under preparation by NEA ESSD.

[4] At the time of writing, the permit for Trishuli Substation has already been issued and the permit for Chilime Substation and the Transmission Line is expected to be issued in the near future as well.

3 BRIEF DESCRIPTION OF THE PROJECT

The Project is located in Rasuwa and Nuwakot districts approximately 40 km north northwest of Kathmandu and consisting of the following elements:

- Chilime 220/132 kV GIS[5] substation;
- Trishuli – Chilime 220 kV Transmission Line (TL);
- Trishuli 3B Hub 220/132 kV AIS[6] substation;
- 33/11/0.4 kV neighbourhood electrification component (NEC).

The TL will serve as a connection between hydropower plants in the Upper Trishuli Valley and Kathmandu Valley. The TL has a length of about 26.5 km and runs along the Trishuli River. The substations will require an area of about 5.3 ha (Trishuli) and 4.6 ha (Chilime). The proposed TL will be a double circuit 220 kV system with galvanized steel lattice towers. It will consist of 39 angle towers. Since the detailed design is part of the next planning stage, the final number and exact locations of the suspension towers (in between the angle towers) is not known yet. The TL will have a 15 m right-of-way (RoW) on each side. The average angle tower will have a height of approx. 42.5 m. The tower bases will each have a size of around 15 m x 15 m.

The main aim of the NEC is to have communities in the vicinity of the Project benefit from it by providing electricity to them. It is still in the early planning stage with several different options being considered at the moment.

[5] GIS = Gas Insulated Switchgear
[6] AIS = Air Insulated Switchgear

Figure 1 *Site Location Map*

4 ADDITIONAL INFORMATION

4.1 AREAS OF IMPACT

The IEEs use three different area categories for the assessment.

The "project area" refers to the immediate area of influence, namely the substations and the area of the RoW, including the angle tower locations.

The "surrounding area" is approx. 300 m to either side of the transmission line and in all directions from the boundary of the substations.

The area of influence considered for cumulative impacts includes the HPPs and TLs that can have an impact on areas and communities beyond the footprint of the Project (see also Chapter 4.11).

4.2 NEPALI CALENDAR

The IEEs sometimes use the Nepali calendar (Bikram Sambat) for citing dates and sometimes the Gregorian calendar is used. The following list shows the relation between the Bikram Sambat and the Gregorian calendar.

Nepali	Gregorian	Nepali	Gregorian
Baishakh	April / May	Kartik	October / November
Jestha	May / June	Mangsir	November / December
Ashad	June / July	Poush	December / January
Shrawan	July / August	Magh	January / February
Bhadra	August / September	Falgun	February / March
Ashwin	September / October	Chaitra	March / April

The General Post Office of Nepal[7] also offers an online date converter.

4.3 IEE AND EIA REQUIREMENTS

The amended Environment Protection Rules (EPR, 1997 / B.S. 2053), Schedule 1[8], specify that 132 kV lines and higher as well as substations connecting 220 kV lines only require an IEE, not a full scope ESIA. Concerning felled forest, the EPR amendments[9] state that an IEE is sufficient for TL

[7] http://date.gpo.gov.np/default.aspx
[8] EPR, p. 29 of the Nepali version (the English version does not include the amendments)
[9] See National Gazette (dated B.S. 13-10-2066 /January 27, 2010)

projects regardless of the forest area cleared. The preliminary estimate for felled forest area is approximately 41 ha.[10]

4.4 NEIGHBOURHOOD ELECTRIFICATION COMPONENT

The main aim of the Neighbourhood Electrification Component (NEC) is to have communities affected by the Project benefit from it by providing electricity to them. The NEC is still in the early planning stage (by NEA's department of Distribution & Consumer Services). Several different options are being considered at the moment.

At this time, due to the current uncertainty of the development, impacts cannot be detailed at this stage. However, the potential for adverse environmental or social impacts and the risk potential of local village distribution is very limited and relate mainly to electrical safety aspects which need to be addressed by NEA with good practice.

4.5 ALTERNATIVE ROUTES AND SUBSTATION SITES

Several options have been reviewed for the 220 kV TL and Chilime Substation.

4.5.1 Transmission Line

Initially, three line route options were proposed (see NEA ESSD 2014b, Chapter 7). One of the three line routes presented clear advantages in comparison with the other two alternatives, in terms of better access to the corridor, fewer crossed settlement areas and fewer forest crossings. For these reasons this option was chosen. The chosen line route was then optimized in order to avoid the Langtang National Park and its buffer zone.

Re-routing

In March 2014, it was found that part of the route, near the village of Syo, was within the buffer zone of the Langtang National Park. Therefore, a partial re-routing of the transmission line towards the west was necessary to avoid the buffer zone.

In May 2014, a new re-routing was necessary in order to avoid interference with the transmission line for Upper Trishuli-1 Hydropower Plant. Part of the

[10] This is based on the assumption that the entire RoW will be cleared off forest completely. This is a conservative estimate though, as not all forest areas have to be cleared within the RoW due to the steep terrain.

corridors of the two transmission line projects would have been too close to each other in the area between Mailung to Trishuli Substation. The line was thus re-routed for a section of about 8 km to avoid the RoW already planned to be occupied by the Upper Trishuli-1 transmission line.

4.5.2 Chilime Substation

Three possible sites were considered for Chilime Substation.

Option A:

Option A is located on the right hand side of the river and southeast of Chilime Village. The estimated size of the plot is about 100 m x 60 m. The site can be accessed by an existing road. The site requires flood protection. The plot size could be increased by extending it across the road to the east. Directly west of the proposed site, there are about a dozen buildings under construction for the resettlement for the Sanjen Hydropower Plant. With the original substation design (AIS = Air Insulated Switchgear) these settlements would have to be resettled again due to the bigger footprint. With the change to a GIS (Gas Insulated Switchgear) design, the available space is sufficient to accommodate the proposed substation without resettlement[11].

Option B:

Option B is located on the left hand side of the river, about 100 meters east of Option A. This site is smaller than Option A and difficult to access and would require building a bridge. The land lies much lower and thus closer to the river than Option A and would require heightening by several meters, compacting and levelling in order to retain enough space for the substation as well as additional flood protection.

Option C:

Option C is located about 1.2 km downstream (east) of Option A on the right hand side of the river. The current access road would not be sufficient, a new road would be necessary. The site would either require levelling or filling up by several meters in order to retain a plane surface.

Option A was chosen as the location for Chilime Substation as having advantages compared with the other options. Option A provided the easiest access, making use of the access road for Chilime Hydropower Plant. All proposed locations would need flood protection. Options B and C would

[11] The exact area required for a GIS substation at this site is not known yet. The IEE for Chilime Substation still cites a required area of 4.64 ha. This area was needed for the AIS design.

require some degree of heightening, compacting or levelling in order to retain enough space for the proposed substation.

4.5.3 Trishuli Substation

The proposed Trishuli Substation site is located on the right hand side of the Trishuli River, at Champani (Manakamana VDC, Nuwakot District). It has been selected due to its accessibility from Trishuli-Mailung Dobhan Road, the availability of sufficient space and its relatively plane terrain land (currently used for agriculture).

The substation is centrally located for evacuating the electricity from several hydropower projects in the area towards Kathmandu Valley. It will serve as a connection for the 220 kV TL from Chilime Substation and the 220 kV TL to Matatirtha substation (Kathmandu area). Furthermore, it will serve as a substation for the 132 kV lines from the following hydropower plants: Trishuli 3A, Upper Trishuli-1, Trishuli 3B, Ankhu Khola, Upper Mailiung, Upper Mailung A and Samundratar.

For Trishuli Substation, besides the above mentioned location no alternative sites have been considered. The Substation will be realized as an AIS design, as suggested by the technical consultant.[12]

4.6 SOCIAL ISSUES

Approximately 83 % of the population in the six Project affected VDCs belong to Indigenous Peoples (IPS), in this case Tamang, Gurung and Newar, and ca. 3 % to Dalit ("untouchables") groups (Kami, Damai and Sarki). Besides IPs and Dalit groups, the following vulnerable groups have been identified within the Project context: women, disabled, the elderly, displaced persons and landless farmers. Vulnerable groups may be disproportionately affected by the Project and require particular attention (e.g. focus group discussions) when it comes to stakeholder engagement. Furthermore, the process of Free, Prior and Informed Consent (FPIC) has to be applied to the Project since IPs are significantly affected due to the loss of land . Nepal has ratified the ILO (International Labour Organization) Convention of Indigenous and Tribal Peoples (No. 169) and thus agreed to apply FPIC whenever applicable. FPIC is established through good faith negotiation between the Project Developer and the Affected Communities. FPIC requires the documentation of the negotiation process and of the outcome between the parties. This does not

[12] Lahmeyer International (2014): Feasibility Study 220 kV Trishuli Transmission System Project. Final Report.

necessarily mean that all affected individuals or groups within the community need to be in agreement.

The Project will offer employment opportunities during the construction phase (approx. 350 jobs, with ca. 60 skilled, 65 semi-skilled and 225 unskilled labourers). Unskilled workers will be recruited from local communities. Several training programs will be implemented to benefit local communities, such as an Improved Agricultural Farming Program, a Skill Development Program, an Education Support Program and a Health and Sanitation.

NEA considers providing some of the local communities with electricity through the NEC, which will improve livelihood.

4.6.1 Stakeholder Engagament

AStakeholder Engagement Plan (SEP) has been prepared by ERM (2015). The overall aim of the SEP is to ensure that a timely, consistent, comprehensive, coordinated and culturally appropriate approach is applied for stakeholder consultation and Project disclosure. The main groups of stakeholders identified so far can be found in the SEP. The document also includes a list of stakeholder activities that have been undertaken so far and an Action Plan for future stakeholder engagement. The SEP will be amended and updated in the course of project planning and implementation.

4.7 ELECTRIC AND MAGNETIC FIELDS

Transmission lines create electric and magnetic fields (EMFs). EMFs are strongest beneath the lines and diminish rapidly with distance. In order to fulfil international standards, the Project has to be designed to fulfil the following thresholds for electric and magnetic fields (WBG 2007a). These limits are for general public exposure as set out by the International Commission on Non-Ionizing Radiation Protection (ICNIRP 1998).

Frequency	*Electric Field (V/m)*	*Magnetic Field (µT)*
50 Hz	5 000	100

Currently, the RoW is designed to be 15 m to each side of the TL. The "*Abstandserlass NRW 2007*"[13] ("Distance Decree", German state legislation) recommends a general distance of 20 m from 220 kV / 50 Hz transmission lines and 10 m from 110 kV / 50 Hz, demanding a case by case assessment.

[13] https://recht.nrw.de/lmi/owa/br_text_anzeigen?v_id=10000000000000000301 (only available in German)

The technical consultant recommended a RoW with 20 m on each side (40 m in total) in the Feasibility Study[14] for the planned 132 kV TL. Nevertheless, as requested by NEA, a RoW of 30 m (15 m on each side) has been considered in the Feasibility Study and applied for the IEEs in order to cope with the actual environmental regulation in Nepal.

At the time of writing this report, only the survey for the angle towers was completed, but not for the RoW. The details of the RoW survey will be given in the LACP. Nevertheless, a preliminary assessment was done using the AP locations given in the Feasibility Study and OpenStreetMap[15] as a basemap in ArcGIS. Buildings that might not meet the 15 m distance criteria are located around AP-10, between AP-10 and AP-11, between AP-11 and AP-12, between AP-16 and AP-17, between AP-22 and AP-23, between AP-26 and AP-27, between AP-28 and AP-29, between AP-30 and AP-31, and between AP-33 and AP-34. Without knowledge of the detailed technical design it cannot be predicted if the WBG thresholds for EMF are met at these buildings.

The next stage of the Project is the detailed design phase, when the final route including the locations of the suspension towers and the hight- and arrangement of cables[16] will be determined. *In the process of detailed planning NEA shall provide evidence that the technical design and RoW of the transmission line ensures the adherence to the ICNIRP limits at the buildings close to the Project. If this cannot be proven, a conservative approach shall be selected in form of a wider ROW than 30 m.*

4.8 NOISE

Noise impacts from the transmission line, the substations and construction activities should not exceed the following levels to be conform with IFC requirements (WBG 2007b), or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

	One Hour L_{Aeq} (dBA)	
Receptor	**Daytime 07:00 - 22:00**	**Nighttime 22:00 - 07:00**
Residential, institutional, educational	55	45
Industrial, commercial	70	70

[14] Lahmeyer International (2014): Feasibility Study 220 kV Trishuli Transmission System Project. Final Report, pages 3 & 111.

[15] OpenStreetMap does not provide information on residential or non-residential buildings.

[16] The hight and arrangemnent of cables are an important factor for EMF

Impacts due to noise emissions from the construction sites will only be short term at each tower location. Only the settlements close to the towers and access roads will be impacted by noise during construction. Most tower locations are relatively far from the settlements as about half of the TL route passes through areas without any settlements. In sensitive areas (e.g. near settlements) working hours will be limited to daytime work. The areas where residential buildings are close to the Project can be found in Chapter 4.7.

The substations will emit a humming sound. The transmission line also emits some noise, especially during wet weather conditions, due to the so-called corona effect.

As pointed out in Chapter 4.7, in general, residential buildings should be located at least 20 m away from the TL. This will usually not only ensure that the thresholds for EMF are met during operation, but also the ones for noise. NEA decided to apply a minimum distance of 15 m. The areas where residential buildings are close to the Project can be found in Chapter 4.7. At the residential buildings that might be located closer to the TL than 15-20 m a change of the TL route shall be considered to protect the inhabitants from nuisance through noise.

During the detailed design phase measures will be considered to reduce the noise levels from the substations, if necessary, to ensure that the above mentioned WBG thresholds will be met.

4.9 BIODIVERSITY

This Chapter is only a summary of the full Biodiversity Assessment which can be found in Annex A of this document.

The Project area is located within Nepal's Midhills zone (600-3500 m), which hosts the highest diversity of ecosystems and species in Central Nepal. The Project is located just west of Langtang National Park. There are two Endemic Bird Area (EBAs) within the vicinity of the Project area, the Western Himalayas and the Central Himalayas. 39 species were identified that could be present in the Project area that are Globally Threatened (CR, EN, VU), Near Threatened (NT) or listed as Data Deficient (DD). About 45 % of the area affected by the Project is Natural Habitat, the rest is Modified Habitat.

There are two forest types identified within the Project area. The *Pinus wallichiana* dominated forest which grows only above 1,500 m supports the higher species diversity with *Rhododendron arboretum*, *Lyonia ovalifolia* and *Quercus glauca* also all present in the canopy. This forest habitat is relatively

natural and also fragile (due to the presence of ancient trees) and has many montane species associated with it. The other forest habitat which is dominated by *Pinus roxburghii* is present only up to 1,500 m. It is often a forest with extremely low diversity which is heavily managed by local communities. However, quality stands are still present within the RoW where diversity is higher.

For biodiversity, the main significant impacts during construction relate to direct loss of Natural Habitat along the RoW and at the tower locations totalling 40.9 ha (for the current footprint, prior to mitigation[17]). Indirect loss of Natural Habitat (improved access to forest areas for locals, wind throw) will also occur during construction, although the exact extent likely to be affected is difficult to predict. With the implementation of mitigation such as the use of hand tools, spacing towers ridge to ridge and minimising forest clearance, the total area of Natural Habitat to be lost will be significantly reduced. In addition, compensation planting will be implemented to achieve an overall 'no net loss' to biodiversity[18] for the loss of all Natural Habitat. The plantation sites in community forest areas will be finalized after discussion with the members of concerned forest users group. The compensation numbers will be adapted shortly before construction in cooperation with the District Forest Office. Following the above mitigation the residual impacts for forest loss and degradation during construction are considered to be of minor significance.

Direct loss of flora (e.g. forest areas withing the RoW) and fauna (e.g. accidental vehicle strikes, illegal poaching) will also occur during construction, although mitigation measures including provision of conservation awareness training and employment of a dedicated Project Environment Officer (either from NEA or engaged by Contractor) will be implemented reducing the residual impacts to a level that is considered not significant.

During operation, impacts on habitats and species (other than those for birds and bats from collision with transmission lines) will largely be indirect, from improved access to forest which could then cause further exploitation of these resources. Mitigation, including provision of awareness training and management of the compensation planting area, will be implemented reducing the residual impacts to a level considered to be of minor significance for habitats and not significant for species.

[17] The 40.9 ha is based on the assumption that the entire RoW will be cleared of forest (as outlined in the IEE). This is a conservative estimate though, as not all forest areas have to be cleared within the RoW due to the steep terrain.

[18] 'No net loss' is a requirement for Natural Habitats addressed in IFC PS 6 Biodiversity

During the field survey (April 5-9, 2015), 12 raptor species were recorded, including one protected species (Peregrine Falcon). Direct loss of bats and birds as a result of collisions with transmission lines will be significant, particularly for all bat species and bird species that are susceptible to transmission line collisions (such as raptors, geese, cranes, storks and some waders). Mitigation measures in the form of incorporating nest boxes into tower designs for raptors and the use of bird flappers along the earth wire will significantly reduce impacts and for low risk species, the residual impacts will be not significant. However, for species which are of high sensitivity (Protected / IUCN Red Listed species, e.g. Peregrine Falcon) residual impacts will remain of moderate significance. Monitoring is essential for identifying any blackspot areas where bird collisions or electrocutions occur. Additional mitigation measures can then be applied if necessary.

A Biodiversity Action Plan will be developed covering all phases of the Project.

4.10 CULTURAL HERITAGE

There are several small stone stupas ("*mahne*") scattered across the Project area. Based on present knowledge, no archaeological, historical or cultural important sites are affected by the Project. An archaeological Chance Finds Procedure (CFP) will be implemented. It is a key measure for addressing the associated risks during the construction phase of the Project. NEA is responsible for the overall implementation of the CFP. The CFP will include:

- Training of all site personnel in the recognition and proper handling and custody of archaeological finds;
- establishment of protocols for responding to chance finds including cessation of work for finds and notification of NEA, who will advise the appropriate authorities; and
- expedited procedures for evaluation and treatment of significant chance finds in order to limit impacts to important resources while limiting construction delays. This may include, for example, recording and removal or more detailed investigation by excavation; decisions on further actions will in any case be made in agreement with the appropriate authorities.

4.11 CUMULATIVE IMPACT ASSESSMENT

The IFC Performance Standard 1 defines the area of influence to encompass, as appropriate "*Cumulative impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted.*"

The Cumulative Impact Assessment (CIA) on hand is mainly based on desktop review. The uncertainty associated with anticipated developments, and the absence of strategic regional, sectoral, or integrated resource planning schemes as well as limited information regarding the hydropower plants (HPPs) and especially the planned TLs and access roads only allow for a high level assessment of cumulative impacts. This chapter considers the cumulative impacts that result from the combination of the Chilime – Trishuli Transmission Line with the two Substations and other existing or proposed developments in the area.

Cumulative impacts can be a critical issue in an area where many projects by different developers are realised and planned as it is the case along the Trishuli River. NEA should coordinate the projects they realize themselves and liaise with the IPPs to understand their plans for construction activities and jointly define measures to minimise disturbances. A Strategic Environmental Assessment is highly recommended for the area. A first step might be for NEA to review the EIAs amd cumulative impact assessments of the other considered projects (see Table 4.1 below) to better understand the environmental and scial risks of those projects and potential impßlications for Chilime – Trishuli.

4.11.1 Other considered Projects in the Area

The Upper Trishuli River Basin is currently subject to the planning of several run-of-river HPPs. They are either in planning, under construction or in operation. To evacuate the energy, several new TLs will be required. The approximate locations of the HPPs are known, whereas the routes of the transmission lines and access roads are not known at the time of writing.

The relevant projects that might cause cumulative impacts due to their geographical proximity to the Project are shown in the below Figure 2[19] and listed in Table 4.1.

The most up to date and comprehensive data concerning hydropower and transmission line projects can be found on the website of the Department of Electricity Development (under the Ministry of Energy)[20] and were provided by NEA on request. The EIAs and CIAs mentioned in the below table were not provided for review.

One of the projects listed below, the Upper Trishuli 1 HPP project, is considered by WBG/IFC for financing. A project information document dated March 2015 provides information on the project.[21] The project includes the construction of a 19-km road from Mailung Dhovan to the intake site along the right (west) bank of the river, and other supporting infrastructure for construction and operation of the facility. For power transmission, the project will need to construct an approximately 8-km long 220kV double circuit transmission line to the Trishuli-3B substation located at Champani. An ESIA was completed and currently under preparation are several additional documents, e.g. Environmental Flows Management Plan, Land Acquisition and Livelihood Restoration Plan, Vulnerable and Indigenous Peoples Plan, Cumulative Impacts Management Plan, Biodiversity and Wildlife Conservation Management Plan, and comprehensive Environmental and Social Management Plan (ESMP). With respect to the Transmission Line, an Initial Environmental Evaluation (IEE) has been completed in accordance with national standards, based on the preliminary alignment. None of the documents were available for review at the time of writing.

[19] The map was produced by using the GPS data provided on the website of the Department of Electricity Development. The lines connect the water intake (upstream) and the powerhouse (downstream) locations, following the course of the rivers. As the GPS data was found to be inaccurate at times, the map only shows the approximate locations of the HPPs. The map is intended to give an overview of the ongoing development in the area, not accurate locations for the projects.

[20] http://www.doed.gov.np/application-construction_license_for_generation.php [accessed July 13, 2015; last updated: July 6, 2015]

[21] http://documents.worldbank.org/curated/en/2015/03/24206786/nepal-first-upper-trishuli-hydropower-project [accessed July 13, 2015]

Figure 2 *HPP developments in the Project's vicinity*

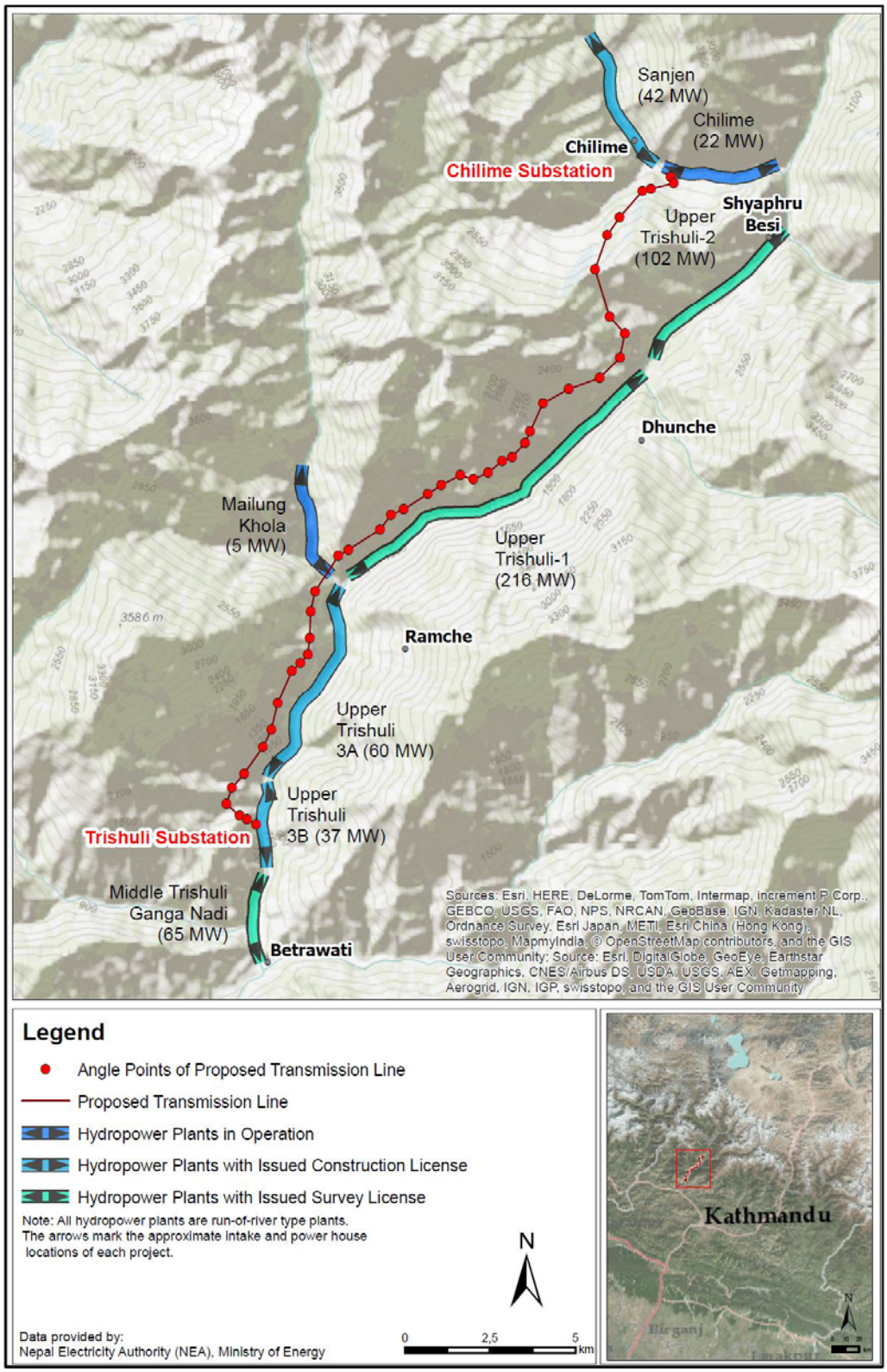

Table 4.1 ***Other HPPs Considered in the CIA***

Project	*Developer*	*Capacity (MW)*	*Current Status*	*Status EIA and Land acquisition*	*CIA**
HPPs in Operation					
Chilime HPP	Chilime Hydropower Company Limited	22	In operation	EIA and Land acquisition completed	While construction of Chilime HPP, no other HPPs were present so no CIA was conducted
Mailung Khola HPP	IPP	5	In operation	EIA and Land acquisition completed	No CIA conducted
HPPs with Construction Licence					
Upper Trishuli 3A	NEA	60	Commissioning planned for 2016; Construction ongoing	EIA and Land acquisition completed	No CIA conducted
Sanjen	Sanjen Jalvidyut Company Limited	42	Commissioning planned for 2016; PPA (power purchase agreement) concluded	EIA and Land Acquisition completed	No CIA conducted but few paragraphs about CIA included in EIA Report.
Upper Trishuli 3B	Trishuli Jalvidyit Company Ltd	37/42[24]	Commissioning planned for 2016; PPA at the last stage,	EIA and Land acquisition completed	No CIA was conducted but brief report regarding Cumulative Impact Assessment

[24] Different information provided by NEA and available online

Project	*Developer*	*Capacity (MW)*	*Current Status*	*Status EIA and Land acquisition*	*CIA**
			but not yet agreed.		was included in EIA report
HPPs with Survey Licence					
Upper Trishuli-1	Nepal Water and Energy Development Company Ltd.	216	No information provided	EIA completed, Land acquisition completed except for RoW of transmission line and tower pads. IEE for transmission line is completed.	CIA conducted as per requirement of WBG.
Upper Trishuli-2	Hydrochina Corporation	102	Under study	Not completed	CIA not done yet
Middle Trishuli Ganga Nadi	Perfect Energy Developmnet Pvt. Ltd	65	Under study	Not completed	CIA not done yet

***** *In Nepal it is yet not mandatory to conduct cumulative impact assessment as per existing law. The mentioned CIAs and EIA reports were not provided for review.*

4.11.1.1 Transmission lines associated with the HPPs

Chilime and Trishuli Substations will serve as a connection for several HPPs in the Upper Trishuli Valley to the national grid and especially Kathmandu area. Most of the TLs associated with these HPPs will have a capacity of 132 kV. A 132 kV TL is planned for the Upper Trishuli-1 Hydropower Plant between Mailung and Trishuli Substation, also at the western bank of the river, in parallel to the Chilime-Trishuli TL. Furthermore, middle voltage TLs are present in the area (e.g. a 66 kV transmission line on the eastern bank of the Trishuli River). Digital data on the exact location of these TLs is not available. NEA considers providing some of the local communities with electricity. Additional TLs will be constructed for that purpose. No information on the scale and location of those TLs is available.

4.11.1.2 Roads required for accessing HPPs and TLs

According to the existing IEE (2014b) the primary site access for the Project construction will be gained from the Pasang Lhyamu Highway, the Syapru Besi - Chilime HPP Road and Betrawati - Mailung Road. No permanent access roads will be constructed to tower sites from an existing road. Existing feeder roads and tracks will be used for construction and maintenance where available. Some trails might be upgraded wherever necessary. The construction material will be transported by vehicle as far as possible and where necessary manually to the individual tower locations. The Upper Trishuli 1 project includes the construction of a 19-km road from Mailung Dhovan to the intake site along the right (west) bank of the river; i.e. the same bank as the TL subject of this assessment.

4.11.2 Cumulative Impacts

Cumulative impacts may arise due to:

- Construction activities of the Project and other considered projects in the area (Section 0);
- Land requirements of the Project and other considered projects in the area (TL towers, construction areas, substations, HPPs);
- Spatial demand of the towers and other facilities at height.

4.11.2.1 Construction Activities

There are currently three HPPs under construction (Trishuli 3A, Sanjen, Trishuli 3B) in the Project area. Thus it cannot be excluded that the construction activities for the Project will overlap with the construction activities for other projects (TLs, HPPs, roads) and therewith contribute to cumulative impacts.

Construction activities, especially in mountainous areas pose a risk for erosion. Erosion may lead to loss of habitats and livelihood resources of the affected communities. The towers for the planned TL are erected along the Upper Trishuli river in the valley of the river. They will be situated at steep slopes. There is one planned TL situated at the same side of the valley in the southern part of the Project area. A 19-km road is planned to be constructed for the Upper Trisuli 1 project at the same side of the valley in the mid part of the Project (Mailung Dhovan to intake of Upper Trishuli 1). These activities may cause erosion during construction. *NEA shall apply the erosion protection measures as outlined in the ESMP and liaise with the other project developers in the area to apply the same measures in case those footprints are close to each other or overlap.*

Increased traffic due to construction activities of the considered projects in the area cannot be excluded. *NEA shall prepare a traffic management plan in collaboration with the other projects in the area.*

4.11.2.2 Land Requirements

Approximately 11 ha land will be required permanently for the Project. In a worst case scenario it is expected that 40 ha of forest will be cleared. This is a small area of land compared to the assumed land needed for other proposed projects in the area.

Land acquisition for the Upper Trishuli 1 project (WBG), excluding the transmission line, is estimated to be around 96 ha, including 76 ha government-owned land, ~5 ha of private land, and 15ha of Guthi/trust land. This land acquisition will affect about 40 households or project affected families, including physical displacement.

It is assumed that altogether a significant amount of agricultural and forestry land was and will be converted due to the planned projects in the Upper Trishuli Valley. Land survey has been completed for the two substations; land acquisition for Trishuli Substation has been completed, whereas land acquisition for Chilime Substation is still in process but close to being

finalized. For the TL this process is still under way. NEA is currently preparing a Land Acquisition and Compensation Plan (LACP). The land acquisition for the other considered HPPs in the Project area that have a construction license is completed. Land acquisition for the Upper Trishuli 1 project is under way. *NEA should check if land owners impacted by the Project are also impacted by other projects in the area. Protection and support measures shall be defined for those persons.*

4.11.2.3 Spatial Demand/ Impact on habitat

Given the large number of other transmission lines and HPPs present within the Upper Trishuli Valley, the potential for cumulative impacts due to the land requirements and spatial demand at height of all these projects on biodiversity is given. This includes loss of habitats and collision risk for birds and bats. The Project area is located within Nepal's Midhills zone (600-3500 m), which hosts the highest diversity of ecosystems and species in Central Nepal. Mitigation and compensation measures are defined to reduce collision risk and loss of biodiversity due to the Project. Bird flappers and reforestation are foreseen in the ESMP aiming at having 'no net loss' to biodiversity. Thus, if measures are applied properly, there are no cumulative impacts expected from the Project. *However, NEA should evaluate if the Chilime – Trishuli Transmission Line and the planned TL between Mailung and Trishuli Substation can be bundled. If this is not feasible, NEA should try to influence the project developer of the Mailung-Trishuli TL to apply similar mitigation measures, especially with regard to collision risk (e.g. bird flappers).*

4.11.2.4 Visual Impact

The towers for the Project are on average 42.5 m high. There is at least one existing 66 kV TL and one planned 132 kV TL in the same valley. Also a road is planned for the Upper Trishuli 1 project. It is expected that all these projects together with the weirs, intake structures and power houses of the existing and planned HPPs will have a visual impact on the Trishuli valley, especially if observed from an elevated point. There are populated areas along the TL and Langtang National Park, a popular hiking destination, is located just east of the Project. The area is hilly which reduces severe impacts from direct visibility and also the location of the towers at a hillside with forest vegetation will reduce the visibility of the towers. *To further reduce the visibility NEA should consider painting the towers in green colour in forest areas.*

4.11.2.5 Mitigation Measures

To address above identified cumulative impacts the following mitigation measures should be implemented by NEA, partly in collaboration with the other IPPs in the Project area.

- Apply the erosion protection measures as outlined in the ESMP and liaise with the other project developers in the area to apply the same measures in case those footprints are in the same area.
- Develop a traffic management plan in collaboration with the other IPPs to coordinate traffic routes and define rules for drivers (speed limits, dust mitigation).
- During the land inventory for the TL and substations, NEA should check if land owners are also affected by other projects. If this is the case those landowners should receive special assistance to secure their livelihoods, e.g. by support in finding new land. This aspect shall also be considered in the LACP.
- Evaluate if bundling with the Mailung and Trishuli is feasible, install bird flappers along the entire TL (earth wire) and try to influence other IPPs to do the same.
- NEA should paint the towers in green colour to reduce the visibility of the TL in the forest areas of the valley.

5 LITERATURE

NEA ESSD (Nepal Electricity Authority, Environmental and Social Studies Department) (2014a): Initial Environmental Examination of Trishuli 3 B Hub Substation Project. Final Report. October 2014.

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ANNEXES