

ENVIRONMENT AND ECOLOGICAL IMPACT & ASPECTS OF SAJLA SHEP (2.00 MW)

SITE SELECTION

The Environmental (Protection) Act 1986 and the Environment Impact Assessment Notification, 1994 stipulate for an Environmental Impact Assessment (EIA) study to be taken up for water resource development projects. The objective of this study is to identify the possible environmental impact which can be anticipated as a result of the proposed activity and to suggest suitable measures to mitigate the expected adverse effect on the environment.

The Sajla SHEP is situated in Distt. Kullu of Himachal Pradesh is proposed to have total cost of Rs.2189lacs. The EIA Notification 1994 amended June13, 2002 is applicable at the Central level to the new projects with total investment greater than Rs.100Crores. For all water resource projects costing less than Rs.100Crores, the EIA Report is cleared by the Environment Department of the State Government.

Baseline information of the project area and Kullu district in general such as data on flora and fauna, demography and human population, health, water resources, water-use, water quality, soil, geology, climate and land-use has been collected and is being analyzed to carry out this study. The details of the study are as follow:

Environmental baseline for pre-project conditions including physical, biological and socio-economic parameters, Potential positive and negative impacts are presented.

Expected negative impacts are listed under the following headings:

- Impacts due to project location;
- Impacts due to project design;
- Impacts due to construction works;
- Impacts due to project operation

These include issue such as loss of land, change in water quality and quantity, change in vegetation profile and socio-economic problem due to the development of the proposed Sajla Small hydro power project.

Based on the expected negative impacts, the project authority has prepared an environmental management strategy and post-project monitoring programme as outlined in later sections of this report. The strategy includes measures and alternatives to reduce or eliminate significant negative impacts. Finally, a summary of the cost of the environmental management and monitoring plans is also presented in this chapter.

Data on the project was collected by on-site survey, consulting local individuals during field visits as well as from literature and survey maps.

The Sajla SHEP falls in the upper Himalayan belt. The basin above the Diversion weir site is located between latitude $32^{\circ}-10'-08.09''$ and longitude $77^{\circ}-13'-00.52''$ and power house at latitude $32^{\circ}-10'-28.54''$ North and longitude $77^{\circ}-11'-57.86''$ East. The total catchment area lies above EL ± 2245.00 m at diversion site is 9.94 Sq.km (including snow fed catchment area).

Practically there will be no adverse impact on forest, wild or aquatic life if this project is implemented. No ecological disturbances and adverse climatologically changes are anticipated. Only a small portion of land will be involved for the construction of this project. Plantation will be done in the project area for which adequate provision has been made in the project cost estimate.

CATCHMENT AREA AND SLOPE STABILITY

The catchment area up to power house location comprises of moderately stable rocks, river-bed material and slopes wash. The catchment area is predominately high altitude above permanent snow line and covered with glacier and in lower elevation rugged hilly terrain with forest covers mainly comprising of Tosh, Deodar and Oak etc. The proposed Sajla Small Hydro Power Project will not have any effect on the catchment area. Apart from forestation in this area other protection measures such as contour drainage and nallah draining etc. would be carried out. Detailed study shall be taken up during construction of the project.

BRIEF OUTLINE OF CONTENTS

The Environment Impact Study of the Sajla Small Hydro Power Project has been carried out in detail and covers studies on hydrology, geotechnical and geological investigations carried out by experienced Geologists & Geotech engineers of Allied Engineers & consultants in collaboration with renowned experts in these fields.

The report encompasses detailed study of environmental baseline data including geology, climate, water availability, vegetation, fauna and seismic studies. As far as the environmental management plan is concerned, measures for environmental management of anti-poaching activity, provision of fuel wood, water supply and sanitation, refuse and muck disposal have been made after due assessment of positive and negative impacts.

ENVIRONMENTAL BASE LINE DATA

General

The information presented in this chapter is collected from various sources. The majority of the data on physiographic, geology and water resources has been taken from various agencies like data on vegetation and fauna was mainly collected from the state forest department and field visits. Meteorological data has been collected from various reports. The methodology adopted for data collection is highlighted wherever necessary. Identification of environmental parameters, data collection

and impact perdition form the core of the impact assessment process. In this report, the environmental impacts due to the project have been predicted on the available baseline data. These have been quantified wherever possible. Negative and positive impacts are also reported in this report.

Physiography

The Kullu district in which the project is proposed is bound by districts Mandi, Lahaul & Spiti, Shimla, Kangra and Kinnaur, project area lies between latitude $32^{\circ}-10'-08.09''$ and longitude $77^{\circ}-13'-00.52''$ and power house at latitude $32^{\circ}-10'-28.54''$ North and longitude $77^{\circ}-11'-57.86''$ East.

Sajla Hydro Power Project is accessible through Mandi-Kullu- Sajla SHEP. The village Sajla is at 1.00 km from proposed powerhouse of Sajla SHEP. It is 35km from Kullu. The nearest railway station having Narrow gauge line is at Jogindernagar.

Soil

Detailed analytical soil survey scheme has been undertaken in the proposed project. In general, characteristics of the soil vary from place to place between clay, loam, gravel, sandy loam, and clayey loam. In most of the places minerals like calcium, phosphorous and ferrous minerals like iron and mica are present.

The soil is very fertile and is good for the growth of vegetation the project area shows a dense growth of vegetation.

Climate

Climate of the project area is cool and dry. In general, three seasons are prevailing in the area; winter (October to March); summer (April to June) and monsoon (July to September). Snowfall generally occurs in December and January at high elevations and most of the region gets cut off from the district headquarters. The Catchment area as a whole reaches a minimum ambient temperature as low as -30°C in winter. Temperatures recorded at Kullu show variations between 0°C to 22°C . In winter, the area gets covered with thick snow and temperatures further falls down in high altitude (Rohtang glacier) the temperature dips too down to -30°C in winter. Rain fall is very heavy during monsoon and very little in the winter and spring seasons.

The major portion of the monsoon rainfall in lower reaches of the catchment finds its way as surface run off due to steep slopes, contributing to high river discharge in this season. The winter precipitation is either as rain or snow depending upon the altitude and other meteorological conditions. It does not contribute directly to the stream discharge significantly and mostly feeds the snow/glacier bound area of the Catchment.

Water Resources and Water Quality

Kanoi is a perennial stream. Kanoi Nallah traverses a stretch of around merges with the water of Beas River. However, it carries appreciable quantity of silt during rainy season.

Hydrometeorology of the Catchment Area

Kanoi nallah is a tributary of Beas River. Kanoi Nallah originates at an altitude of 4428 meters at peak and has a total catchment above weir site is 9.94 Sq. Km including snow fed Catchment area. The area on right and left side of the nallah is predominantly Forest. There is no population in or around proposed project site.

Precipitation in the Kanoi nallah catchment during winter season and monsoon is in the form of snow and rainfall respectively. Snowfall is heavy to moderate depending upon the altitude and season. During monsoon months, the basin receives rainfall at lower elevations which in combination with snowmelt results into quite high inflow during this period. There is no rain gauge station in the project catchment but rain gauge stations are installed in the adjoining catchment areas.

Vegetation

The forests of Himachal Pradesh are known for their grandeur and majesty and are like a green pearl in the Himalayan crown. According to the National Forest Policy (1988), at least two thirds (66%) of the geographical area should be under forest in the hilly states like Himachal Pradesh. However, keeping in view that land is a limiting factor and other factors are also not congenial, the State Government has decided to bring at least 50% of the geographical area under forest cover.

Himachal Pradesh has a diversified and rich flora because of diverse physio-climate. With the variation in altitudes, the eco-zone also varies in terms of their vegetative cover, land use and land capabilities. The forest around project site could be broadly classified as dense mixed deciduous type with an abundance of Pine and broad-leaved poplar. Some medicinal trees are also in abundance.

Out of total of 45,000 species of plants found in the country, as many as 3295 species (7.32%) are reported in the State. The state has legally classified 37591 Km² under forests. About 8911 Km² dense forest and 2869 Km² open forest is reported in Himachal Pradesh.

The Forebay site, power pipe, Penstock and powerhouse sites were visited to assess the flora of the area. The vegetation in the project area is forest but it will not be affected by the project as the water conductor is proposed as open MS pipe. The species observed around project site are summarized in Table below:

SPECIES FOUND IN THE DISTRICT

Scientific Name	Vernacular Name
Quercus Semicarpifolia	Kharsu (Red Rhododendron)
Taxusbaccata	Barmi
Cedrus deodara	Diyar (Deodar)
Abiespindrow	Rai (Silver Fir)
Picea smithiana	Tosh (Chilgroza Pine)
Cupressustorulosa	Devidiyar (Cyrprus)

Fauna

The mountains, forests, streams, abundant food availability, large stretches of inhabitation in the upper reaches provide some favorable factors for sheltering of wildlife. Geographical area of the catchment is large and human population is low in the higher reaches, which provides a good harbour for the wild life.

The state has 2 National Park, 3 Game Reserves and 30 Wild Life Sanctuaries. The area under National Parks and sanctuaries is 1295 Sq. Km and 3267 sq km respectively. About 8.2% of State area is covered by wild life conservation sites against 4% fixed by the Government of India.

Fauna Found in Kullu Forest Division

Scientific name	Local name	English name
Nemorthaedus goral	Ghoral	-
Muntiacusmuntjak	Kakkar	Barking deer
Moschusmoschiferus	Kastura	Musk deer
Pantherapardus	Baghera	Leopard
Selenarciosthibetanus	Kala Bhallu	Himalayan Black Bear
Ursusarctos	LalBhallu	Himalayan Brown Bear
MartesFlavigula	Gorthu	Himalayan Pine Martin
HystixIndica	-	Indian Porupine
Hylopetes	Ean	Flying Squirrel

Birds found in Kullu forest Division

Scientific name	Local Name	English Name
Lophophorousimpejanus	Monal	-
Alectorisgraeca	Chukor	-
Gallus Gallus	JungleenMurga	Red Jungle Fowl
Geniousalbicaudatus	Kalesha	-
Cateruswallichi	-	Chir pheasant
Varacismacrolopha	Koklas	Koklas pheasant
Francolinusfrancolinus	Titar	Black Partridge
Chalcuphapsindica	Ghugi	Dove
Coturnixcoturnix	Koyal	Grey Quail

Since this project is hydro power project, it is contemplated over small stretch Kanoi Nallah. Therefore, the loss to Flora and Fauna is negligible as compared to large hydro power project. This project has been contemplated keeping in mind the philosophy that small is beautiful, there is least disturbance to Flora and Fauna in the Project area.

Seismicity

Kullu region shows active and prolonged seismic history. The project area fall in Zone-V of the seismic zoning map of India. As per the seismicity studies carried out by the Geological Survey of India (GSI) within the Himalayan Belt, the northernmost conspicuous structural element is the Main Central Thrust.

The area has experienced the Kangra earthquake of 1905 having a magnitude of 8.6. This earthquake was one of the four great earthquakes of the Himalayan region, which took a toll of 20,000 human lives and caused colossal loss in the form of complete damage to buildings and generation of numerous landslides and earth fissures. The other important earthquake is the Lahaul & Spiti earthquake of 22nd June, 1945 having magnitude 6 on the Richter scale and located about 50 Km north of the project area. Recently, the area had experienced micro-earthquake activity in the Dharamshala earthquakes of 1978 and 1986, having magnitudes 5 and 5.7 respectively. The next Chamba earthquake occurred in 1995 and caused partial collapse and development of cracks in the buildings.

Detailed geological investigations have been carried out at the project site including borehole investigations and seismic traverse etc. based on the available data and the studies that were carried out, the applicable safety factors are being adopted in the design of the project structures.

M/s Seraj Hydro Power Devt

 Authorized Sign

POWER GENERATION CAPACITY OF THE KANOI NALA

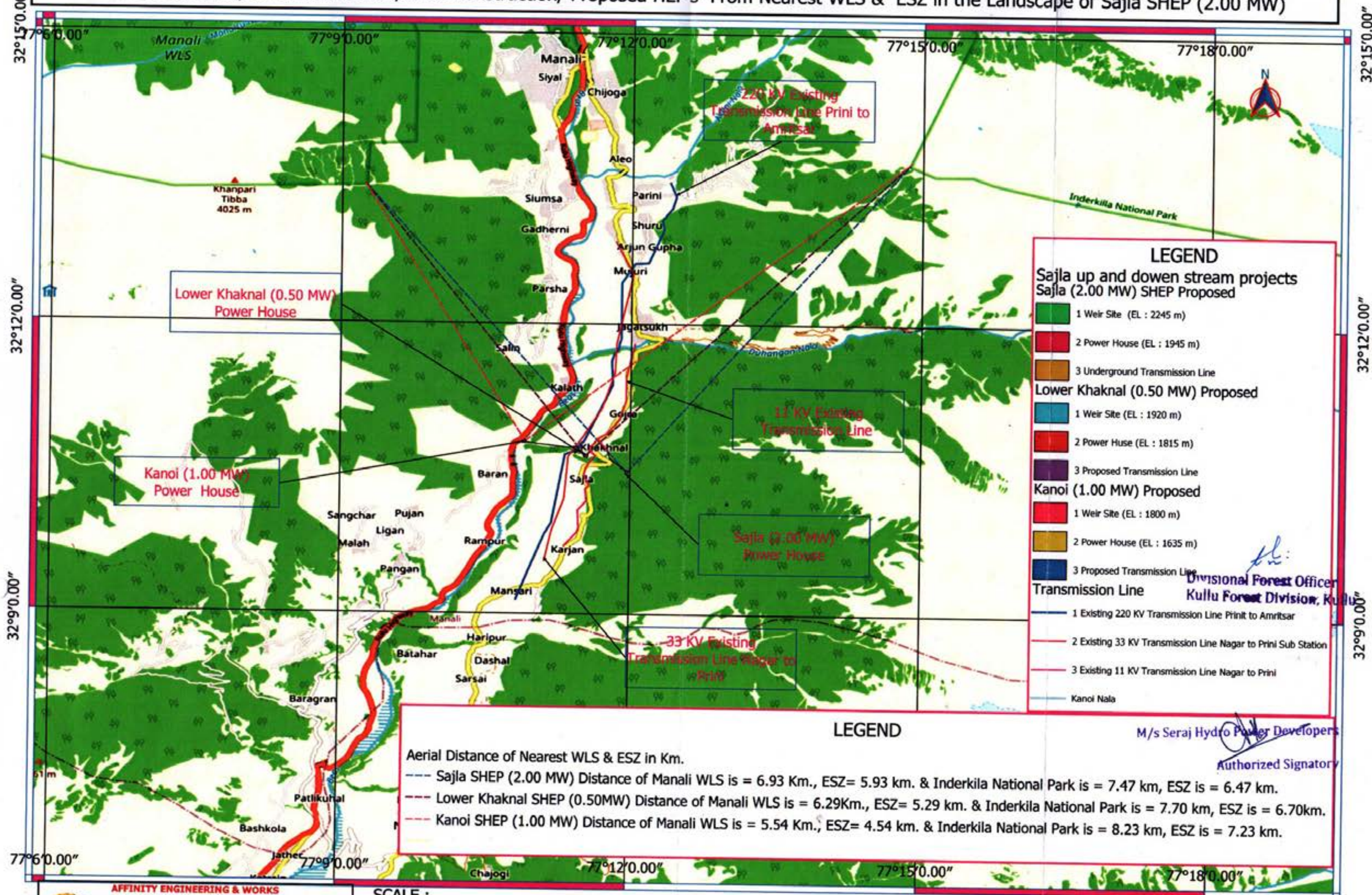
This is to certify that there are three Projects allotted in the stream/ Nallah with their capacity as given below:

Sr. No.	Name of the Project	Capacity of the Project in MW	River Basin	Stream/ Nallah	Elevation in Meter	
					Weir Site	Power House
1	Sajla SHEP	2.00	Beas	Kanoi	2245	1945
2	Lower Khaknal	0.50	Beas	Kanoi	1920	1815
3	Kanoi	1.00	Beas	Kanoi	1800	1635

Total Capacity of the Stream/Nallah is 3.50 MW


Sr. Project Officer
HIMURJA Kullu
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20/07/2022

Aerial Distance Map of Commissioned/under construction/ Proposed HEP's From Nearest WLS & ESZ in the Landscape of Sajla SHEP (2.00 MW)



LEGEND

Sajla up and down stream projects Sajla (2.00 MW) SHEP Proposed

- 1 Weir Site (EL : 2245 m)
- 2 Power House (EL : 1945 m)
- 3 Underground Transmission Line

Lower Khaknal (0.50 MW) Proposed

- 1 Weir Site (EL : 1920 m)
- 2 Power Huse (EL : 1815 m)
- 3 Proposed Transmission Line

Kanoi (1.00 MW) Proposed

- 1 Weir Site (EL : 1800 m)
- 2 Power House (EL : 1635 m)
- 3 Proposed Transmission Line

Transmission Line

- 1 Existing 220 KV Transmission Line Prini to Amritsar
- 2 Existing 33 KV Transmission Line Nagar to Prini Sub Station
- 3 Existing 11 KV Transmission Line Nagar to Prini
- Kanoi Nala

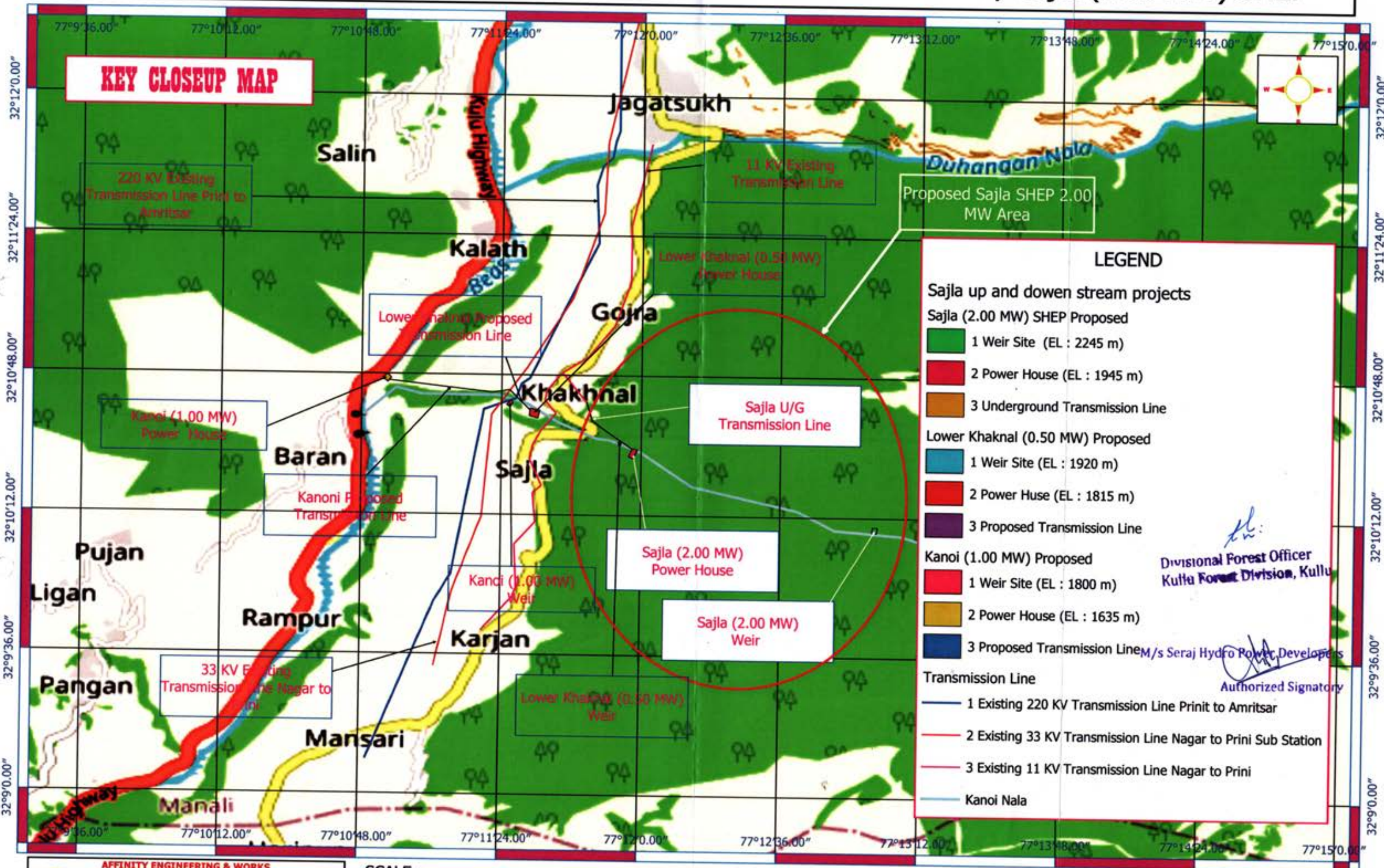
LEGEND

Aerial Distance of Nearest WLS & ESZ in Km.

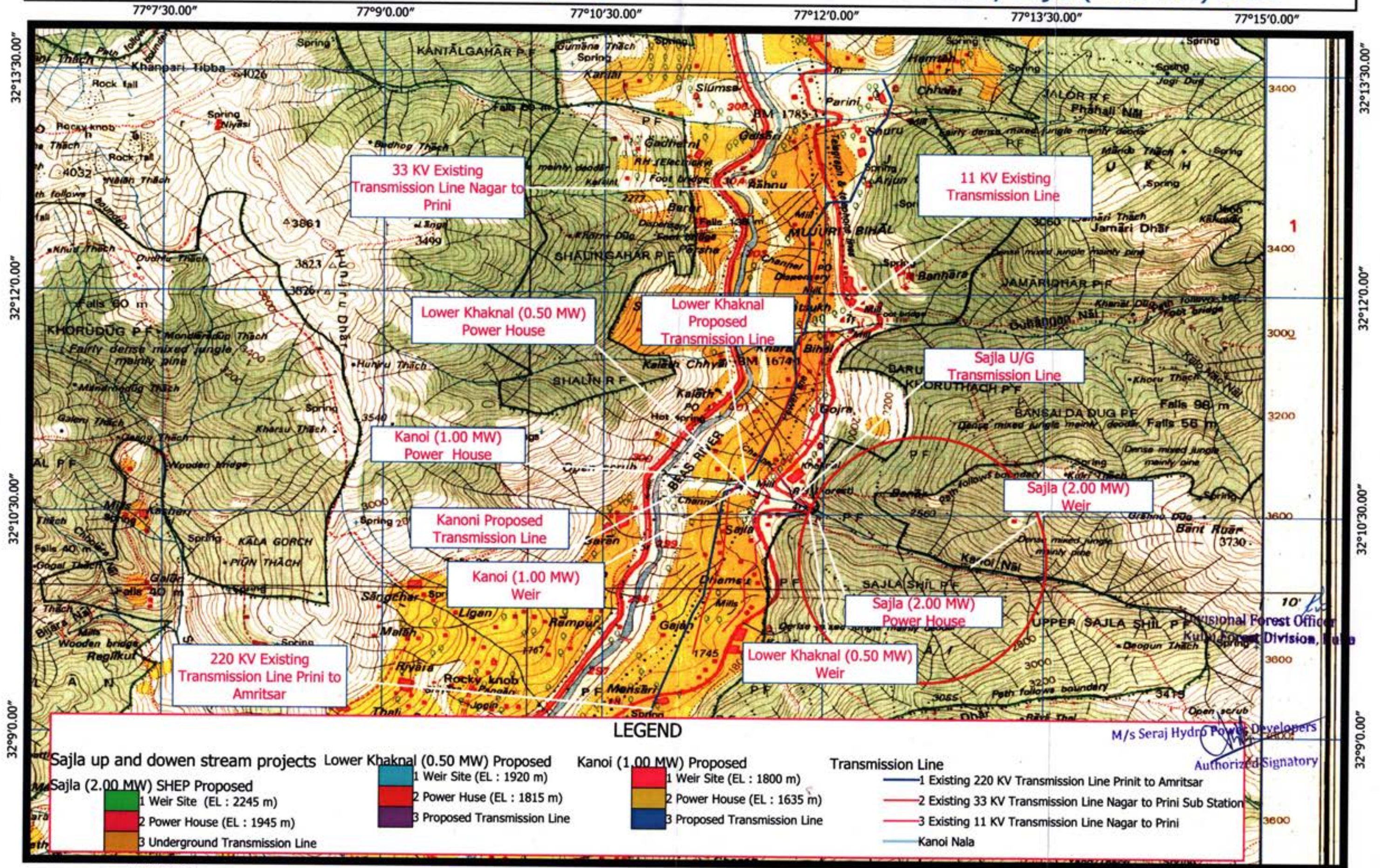
- Sajla SHEP (2.00 MW) Distance of Manali WLS is = 6.93 Km., ESZ= 5.93 km. & Inderkila National Park is = 7.47 km, ESZ is = 6.47 km.
- Lower Khaknal SHEP (0.50MW) Distance of Manali WLS is = 6.29Km., ESZ= 5.29 km. & Inderkila National Park is = 7.70 km, ESZ is = 6.70km.
- Kanoi SHEP (1.00 MW) Distance of Manali WLS is = 5.54 Km., ESZ= 4.54 km. & Inderkila National Park is = 8.23 km, ESZ is = 7.23 km.

M/s Seraj Hydro Power Developers
Authorized Signatory

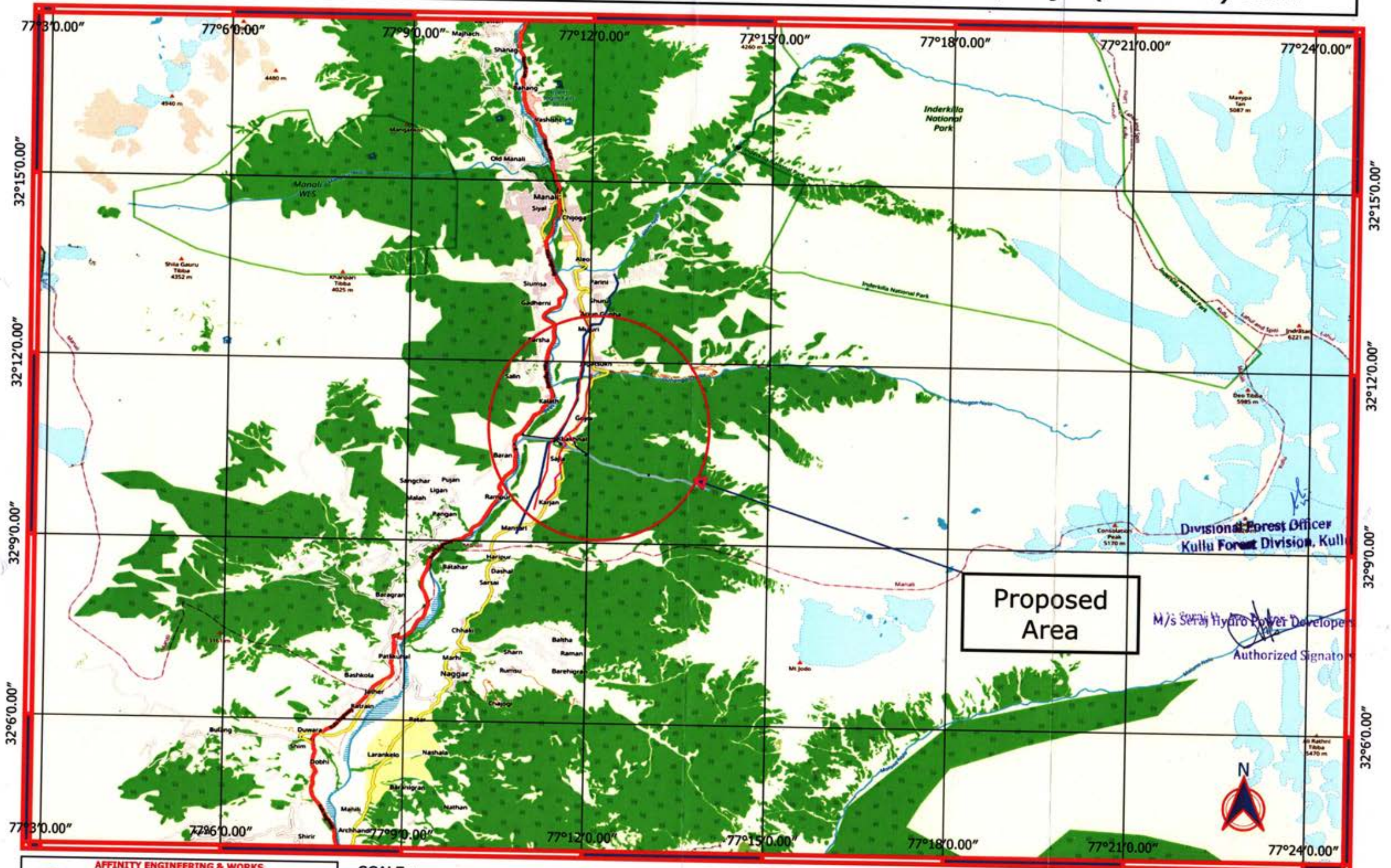
Digital Map of Proposed/ Existing Projects & Transmission Line nearby Sajla (2.00 MW) SHEP



Toposheet Map of Proposed/ Existing Projects & Transmission Line nearby Sajla (2.00 MW) SHEP



Digital Map of Proposed/ Existing Projects & Transmission Line nearby Sajla (2.00 MW) SHEP



Google Earth Map of Proposed/ Existing Projects & Transmission Line nearby Sajla (2.00 MW) SHEP

