



CHILIME JALAVIDHYUT COMPANY LIMITED



Chumchet Syar Khola Hydroelectric Project

Location: DoED OFFICE

Date: 2020



1.0 Chumchet Syar Khola Hydroelectric Project

Project Name : Chumchet Syar Khola Hydroelectric Project

License Number : वि. वि. वि. ०७४/७५ वि. उ. स. १९३

License issued date : issued on **2074-12-25** as per decision of GoN

Location of Project : Gandaki Province, Gorkha District

Name of Promoter : Chilime Jalavidhyut Company Limited

Name of Consulting Firm : Chilime Engineering and Services Co. Ltd

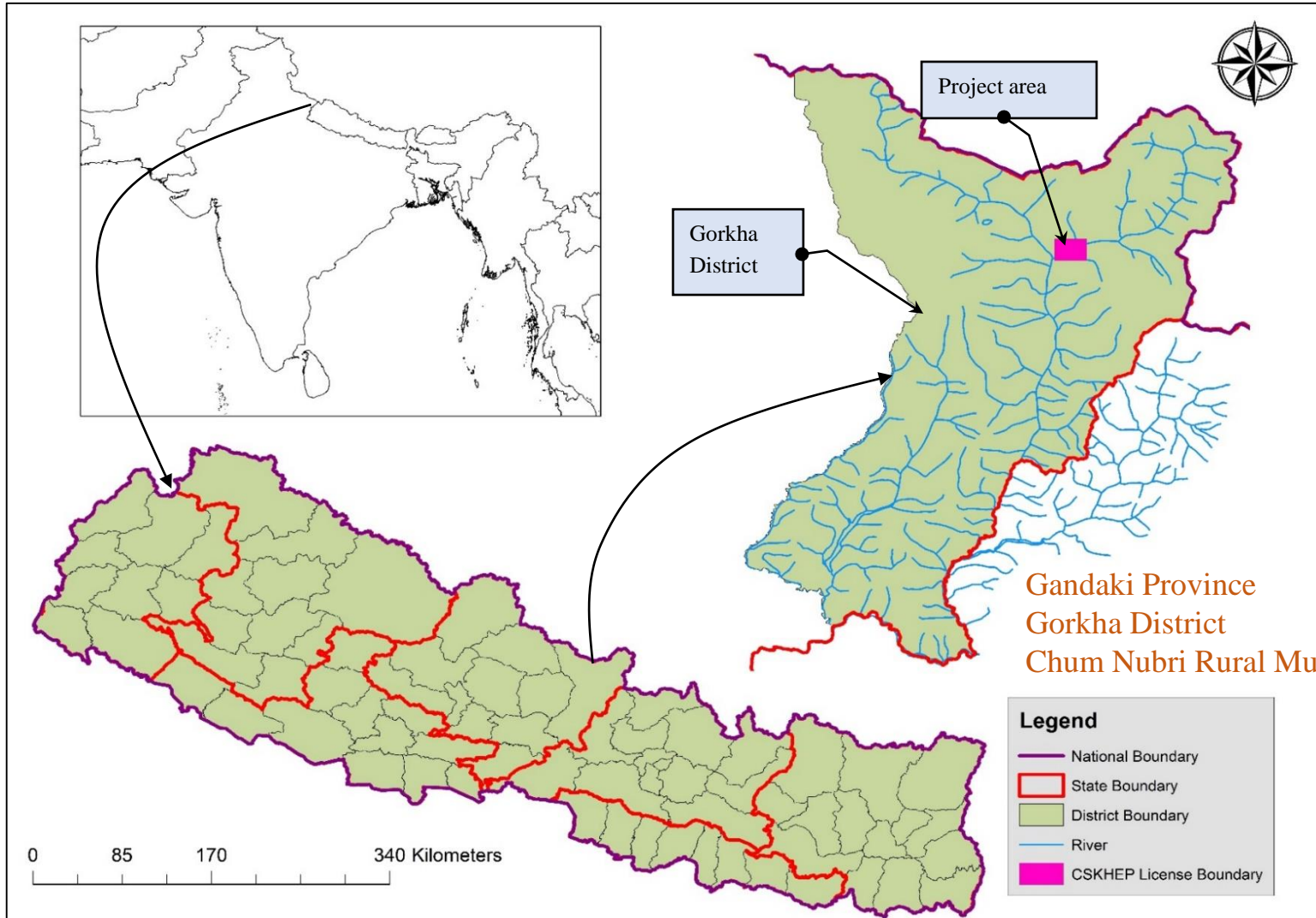


2.0 PROJECT BACKGROUND

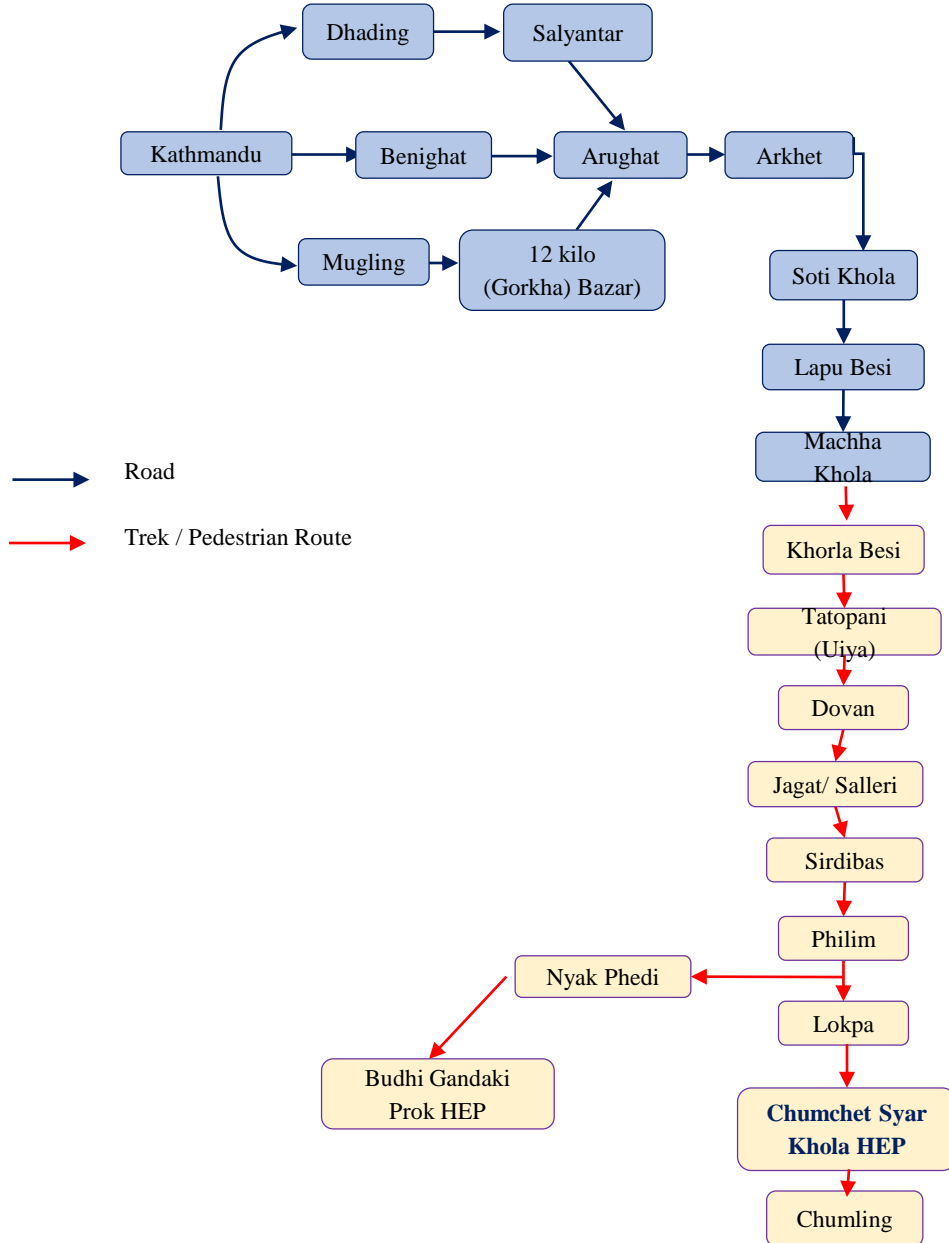
- Chilime Jalavidhyut Company Limited (CJCL) Prepared a Desk Study Report and applied for Survey License of Chumchet Syar Khola Hydroelectric Project on 2074-12-09 B.S.
- Survey license was awarded on 2074-12-25 as per decision of GoN, Ministry of Energy (License Number वि. वि. वि. ०७४/७५ वि. उ. स. १९३)
- Project lies in Chum Nubri Rural Municipality of Gorkha district of Western Nepal.

Boundary point	Easting	Northing
1	84° 54' 30" E	28° 28' 30" N
2	87° 57' 32" E	28° 28' 30" N
3	87° 57' 32" E	28° 26' 25" N
4	84° 54' 30" E	28° 26' 25" N

2.1 PROJECT LOCATION



2.2 ACCESSIBILITY



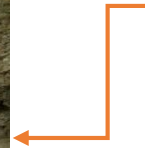
Route (Motorable Road)	Black top Road Length	Earthen/ Gravelled Road Length	Total Motorable Road
Kathmandu – Dhading – Salyantar – Arughat – Machha Khola	90 km	60 km	150 km
Kathmandu – Benighat - Arughat – Arkhet – Machha Khola	76 km	82 km	158 km
Kathmandu – Mugling – 12 Kilo – Arughat – Machha Khola	131 km	75 km	206 km

2.2 ACCESSIBILITY (Cont..)



Underconstruction

Access road near Lapubesi



Track opening near Tatopani



2.2 ACCESSIBILITY (Cont....)



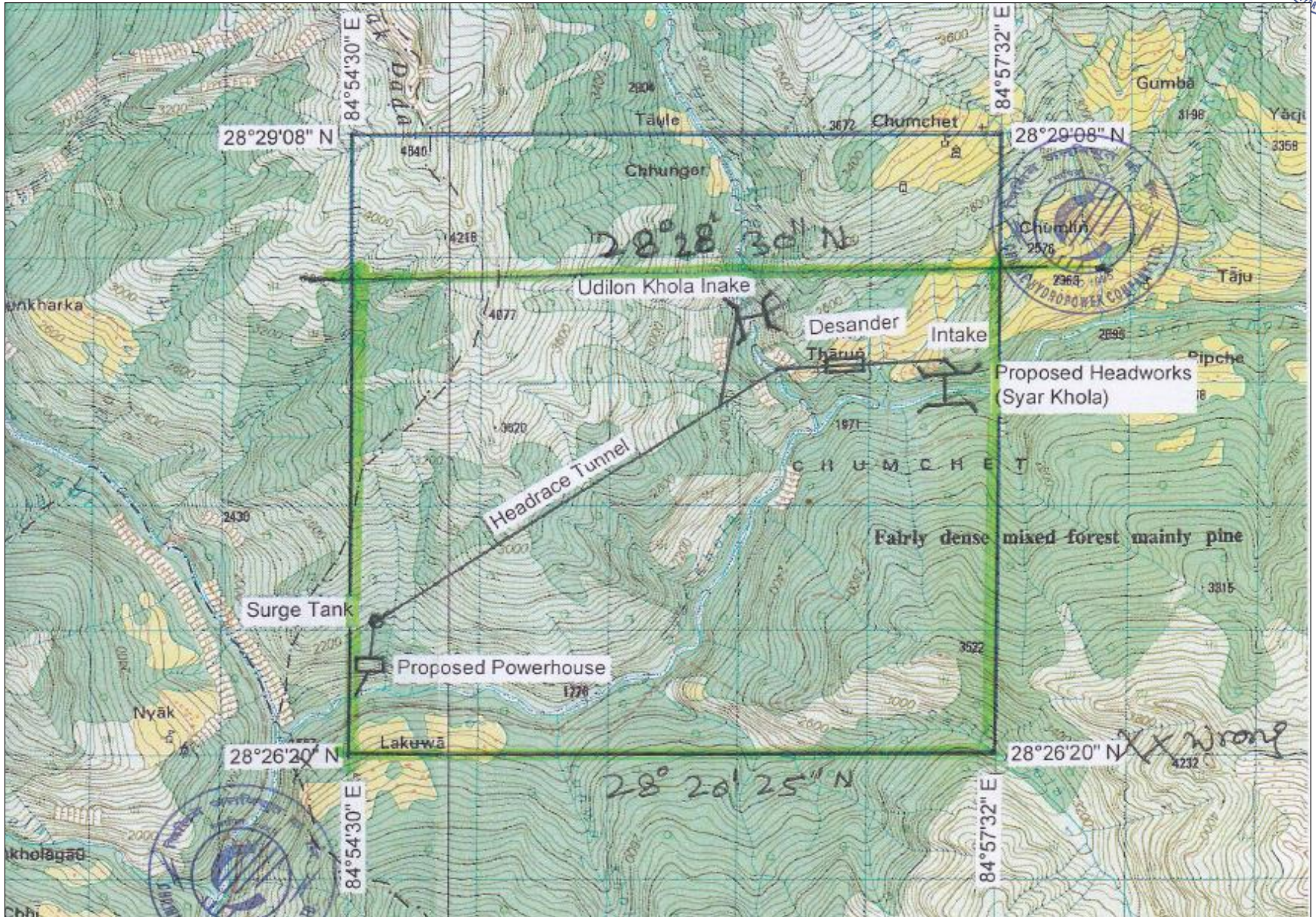
Access to CSKHEP



Trek Route to Chumling

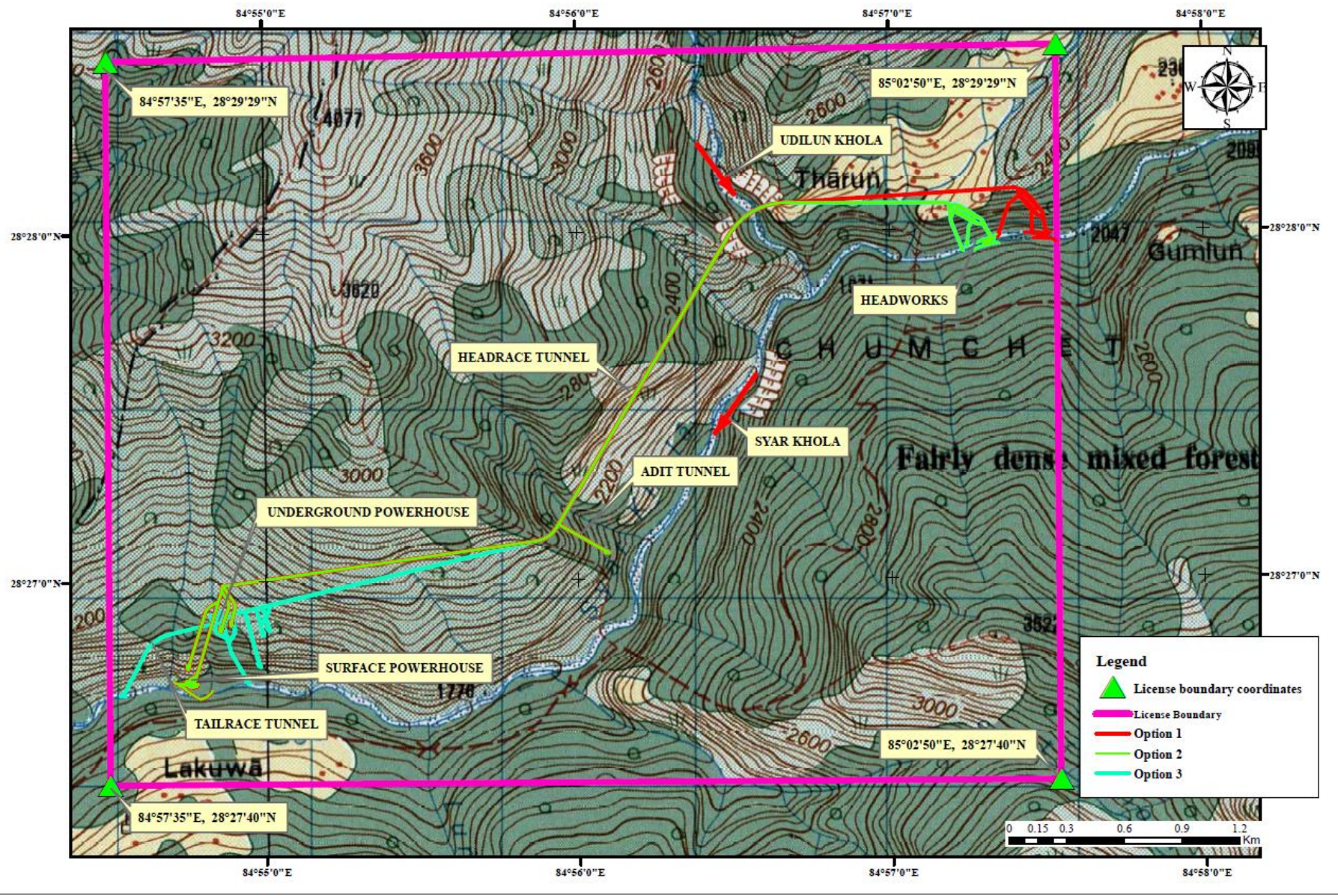
(on the way of Project)

3.0 MAP OF PROJECT AREA



Topographical map of CSKHEP as per Desk Study / ToR.

4.0 PROJECT LAYOUT



The topographical map with general arrangement plan of Option-1, Option-2 and Option-3



5.0 PROJECT SALIENT FEATURES

1 Project Location

Development Region	: Western
Province	: Province No 4 (Gandaki)
District	: Gorkha

2 General

Name of River	: Syar Khola/ Tributary of Budhi Gandaki River
Type of Scheme	: Run-of-River
Gross Head	: 440 m
Net Head	: 420 m
Average annual energy	: 348.05 GWh

3 Hydrology

Catchment Area	: 531 km ²
Mean Annual Discharge	: 24.49 m ³ /s
Design Discharge	: 17.14 m ³ /s
Design Flood Discharge (100 Yr. flood)	: 1582 m ³ /s

4 Power and Energy

Average annual Energy	: 348.05 GWh
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6.0 PROJECT SALIENT FEATURES (Contd..)

1 Headworks

Diversion Structure	: 40 m high concrete gravity dam from the river foundation
Intake	: Conventional type with vertical lift gates
Undersluice	: Two radial gates of size 6m X 6m

2 Settling Basin

Type	: Underground
Dimension	: 78 m X 12.0 m X 7 m

3 Tunnel

Type	: D shaped
Diameter	: 3.2 m for Headrace Tunnel
Length	: 4.5 km Headrace Tunnel

4 Surge Shaft

Diameter	: 15 m
Height	: 60 m

5 Pressure Shaft

Diameter	: 1.9 m
Length	: 700 m

6 Powerhouse

Type	: Underground
Size	: 80 m X 18 m X 30 m



7.0 POWER EVACUATION ARRANGEMENTS

Nearest Sub Station	: Proposed New Budi Gandaki Prok HEP Sub Station or Purposed Budhi Gandaki Sub-Station.
Transmission Line Length	: 110 km
Capacity of Transmission Line	: 220 kv double circuit



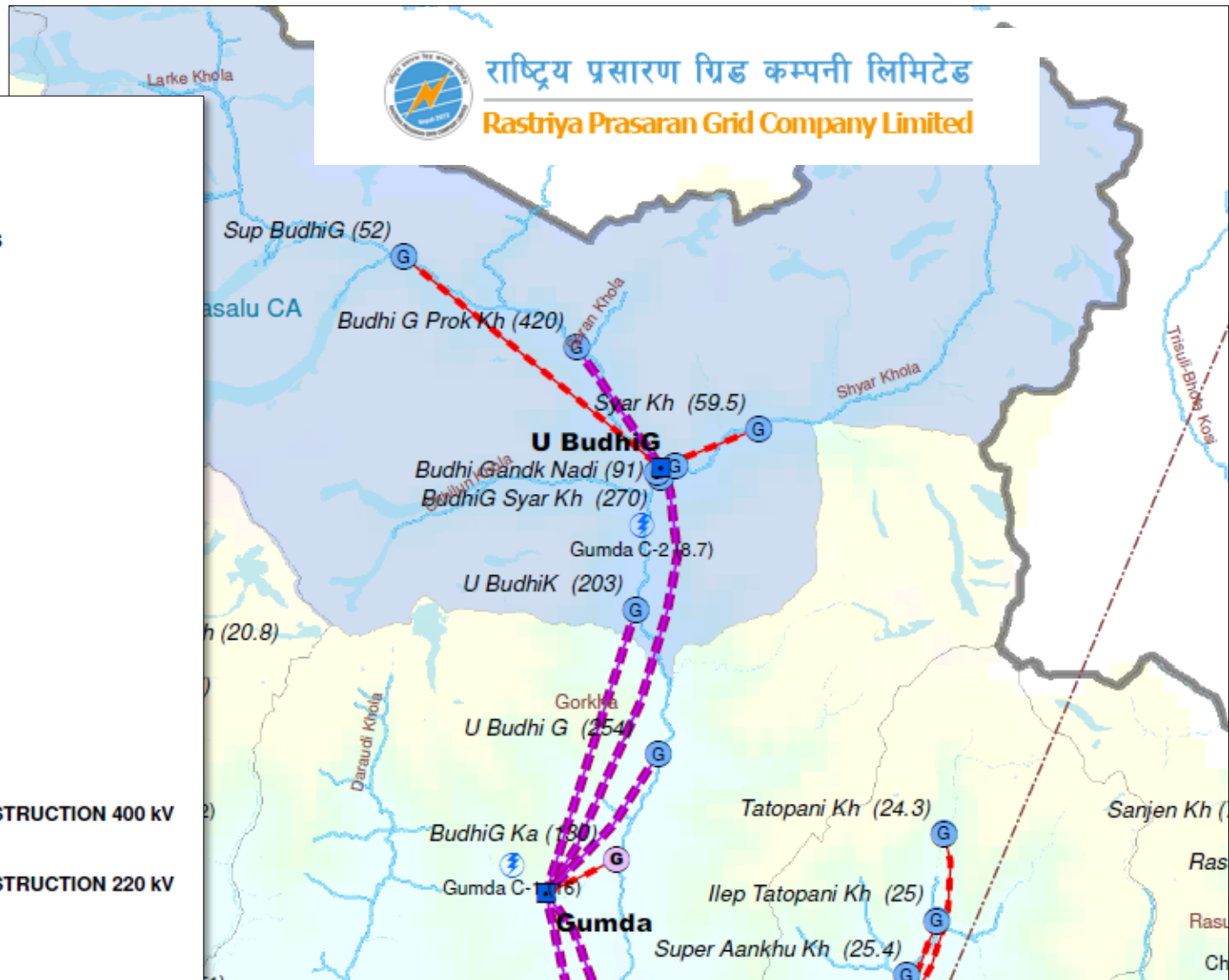
7.0 POWER EVACUATION ARRANGEMENTS

NEPAL SUBSTATIONS

- FUTURE_S/S
- UNDER_CONSTRUCTION_S/S
- EXISTING_S/S

TRANSMISSION LINES

- 132 kV HTLS
- 220 kV HTLS
- PROPOSED 400kV
- PROPOSED 220kV
- PROPOSED 132 kV
- EXISTING/UNDERCONSTRUCTION 400 kV
- EXISTING/UNDERCONSTRUCTION 220 kV
- EXISTING 132 kV





8.0 ENVIRONMENTAL STUDIES

BACKGROUND

- According to Environment Protection Rules (EPR) 2057 Schedule 2- Rule 3, EIA needs to be conducted for Project
- Project lies in Manaslu Conservation Area. So, Approval of MCAP to conduct EIA is required, prior to Preparing Scoping and TOR document

STATUS

- Agreement with Chilime Engineering and Services Co. Ltd to conduct EIA on March 11, 2019
- Application submitted to MCAP to provide approval to conduct EIA on January 22, 2019
- Conducted meetings with official of MCAP on May 11, 2019
- Literature review and collection of Preliminary data on existing physical, Biological and Socio- Economic data of Project area



9.0 MAJOR STUDIES COMPLETED

- Establishments of Control Points, DGPS survey, Detailed Topographical survey and Mapping of Headworks and Powerhouse.
- Establishments of Automatic gauging station, Discharge Measurement, Flood analysis
- Surface Geological Survey and Mapping, Preparation of Geological Map of Project area, Field data collection for discontinuity survey and Rock Mass Classification (Ongoing).



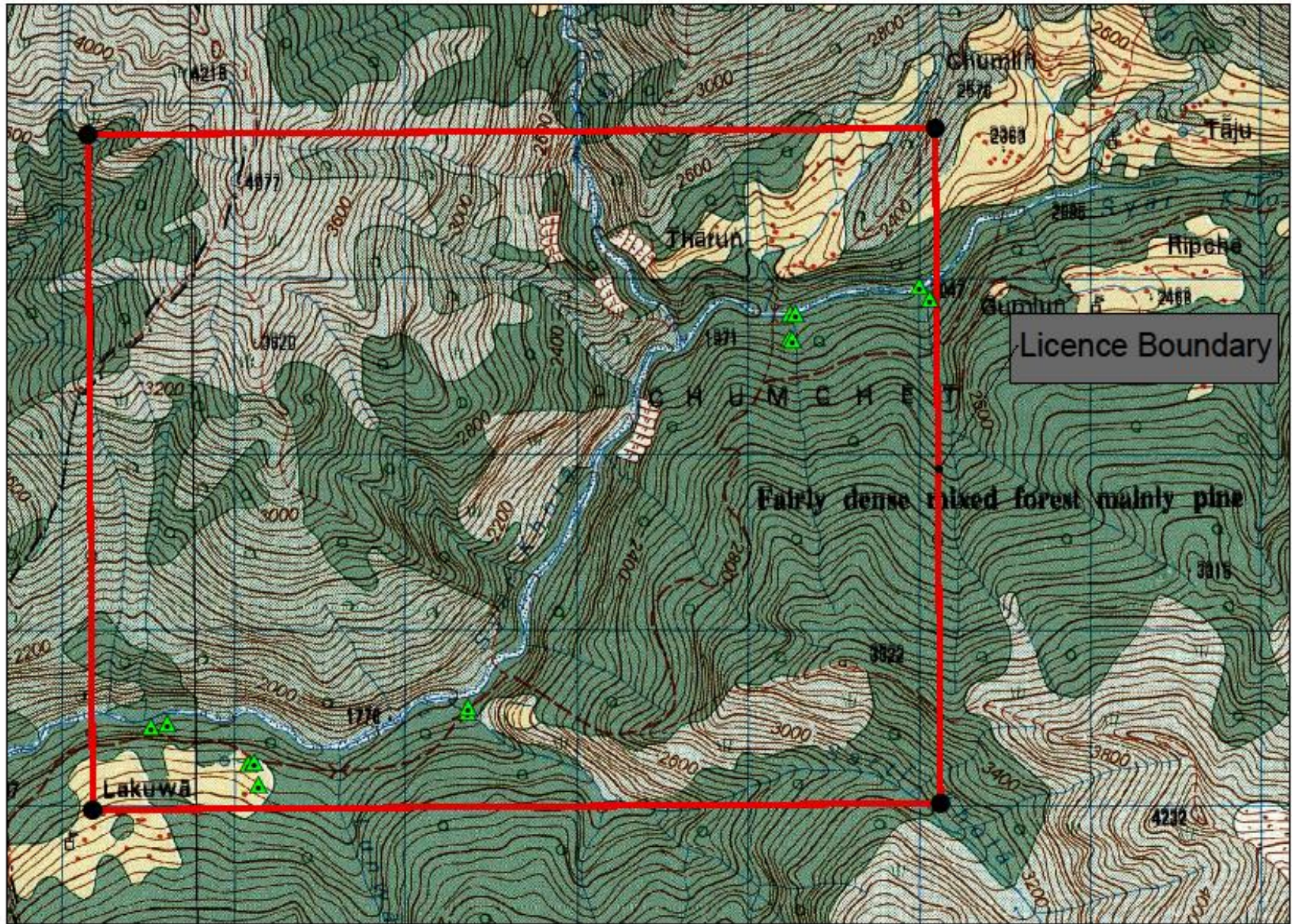
10.0 STUDIES CARRIED OUT IN FIELD

Time Frame	Activities
7 th April 2019 to 14 th April , 2019	Reconnaissance site visit.
1 st May, 2019 to 15 th May, 2019	Establishment of Control Points and DGPS Survey, Installation of Automatic Gauge Station at the project site.
16 th May to 11 th June, 2019	Topographical Survey (ongoing), Surface Geological Mapping of Project area (ongoing)



TOPOGRAPHICAL SURVEY AND MAPPING

- Total 13 Number of Control Points were established at Headworks, adit and Powerhouse Location
- Control Points were monumented by making concrete pillars or by stone carving
- Control Survey using DGPS was conducted to find Coordinates of established control points
- Detailed Topographic survey was conducted at Headworks and Powerhouse location including Adit Tunnel inlet portal.
- Data from survey was plotted to produce a Topographical Map with contour interval of 1 m.



— License Boundary

Distribution of Control Points at different location of Project area



Geomatics Engineer with local People after Locating Geodetic Point No 095-3240 of Survey department at Nyak Village



Monumentation of Control Point near Powerhouse location





Establishment of Camp for carrying out Detailed Topographic Survey at Powerhouse



DGPS observation at Nyak with reference to National Geodetic Control Points



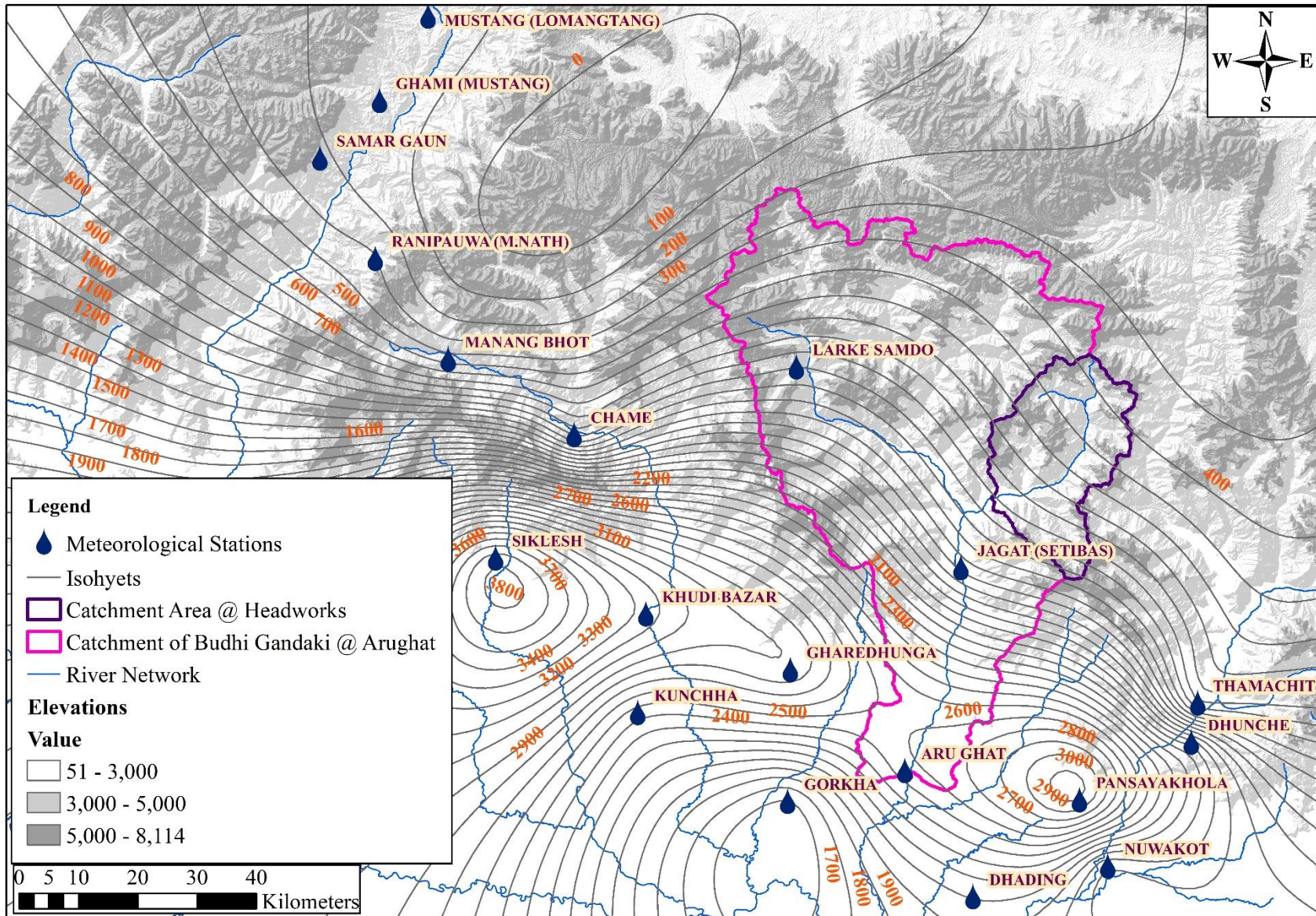
11.0 HYDROLOGICAL STUDY

A. STAFF GAUGE INSTALLATION

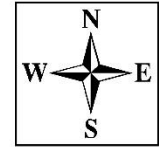
- Automatic Staff gauge is installed at Syar khola within the project area

B. HYDROLOGICAL ANALYSIS

- Computation of Mean Monthly flow, flow duration curves, resulting in the estimation of design discharge and design flood, using different methods of hydrological analysis.



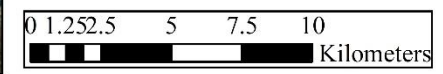
Catchment of Syar Khola along with precipitation stations used for Hydrological Analysis



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

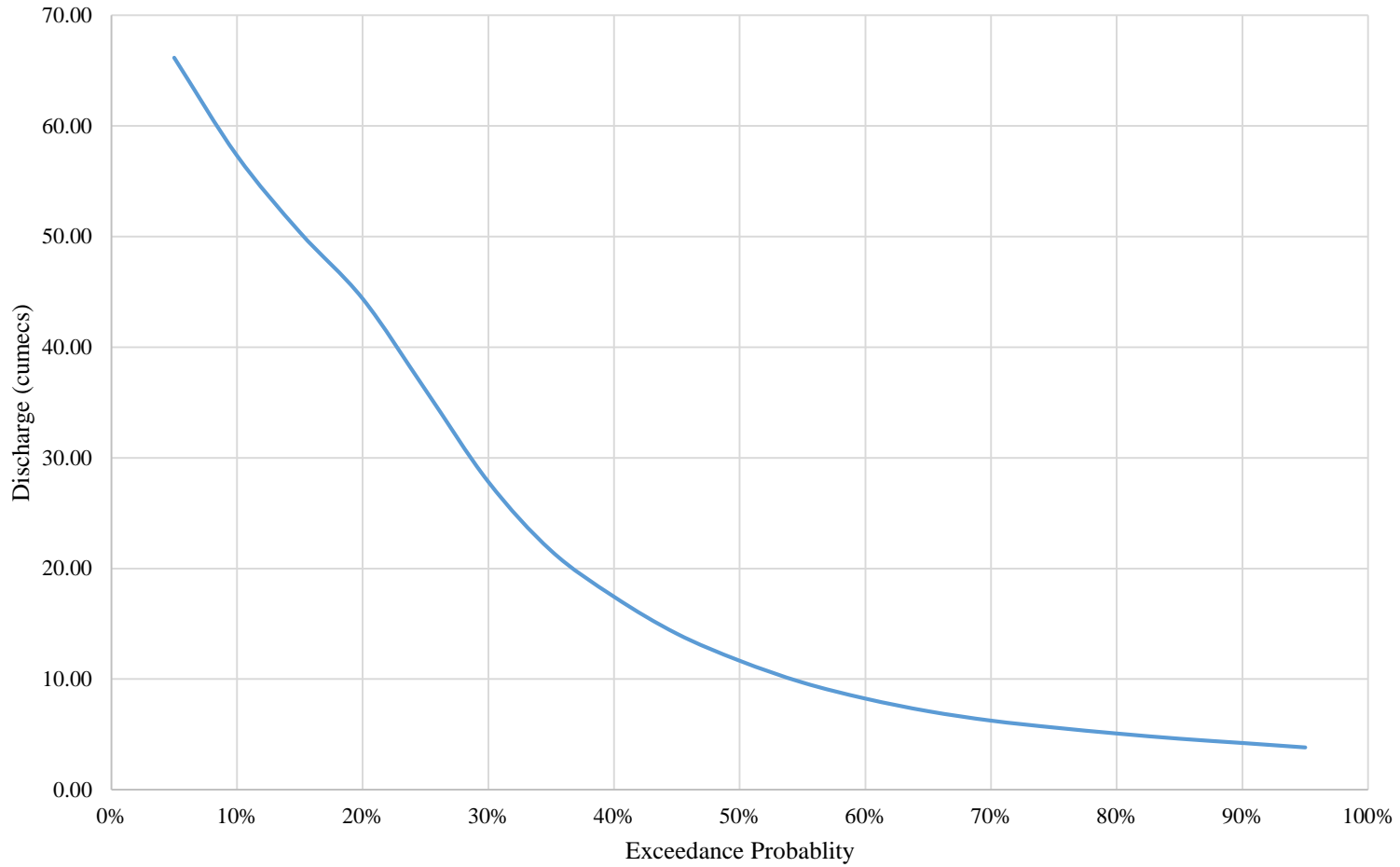
- Catchment Area @ Headworks
- River Network



*Catchment of Syar Khola at Headworks
Site = 574 km²*



FDC of Chumchet Syar Khola HEP



Flow Duration Curve at Headworks site of Syar Khola



FDC	
p	Q
5%	66.16
10%	57.30
15%	50.38
20%	44.38
25%	36.13
30%	27.82
35%	21.59
40%	17.44
45%	14.10
50%	11.65
55%	9.69
60%	8.24
65%	7.09
70%	6.24
75%	5.62
80%	5.08
85%	4.61
90%	4.22
95%	3.82

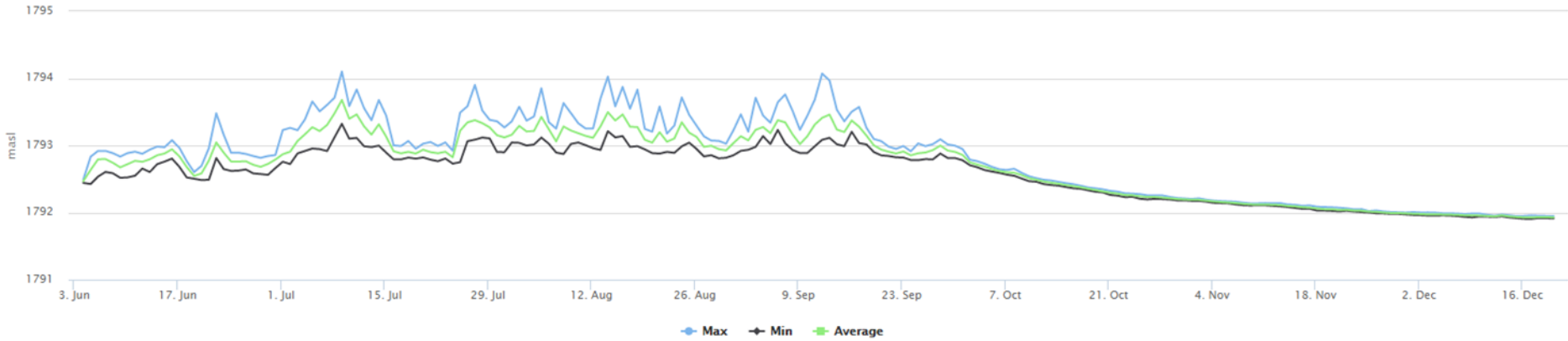
Adopted Monthly Flow	
Month	Flow (cumces)
Jan	4.89
Feb	4.18
Mar	4.86
Apr	7.81
May	14.26
Jun	31.03
Jul	56.65
Aug	60.22
Sep	43.67
Oct	20.92
Nov	10.75
Dec	6.70
Average	22.16

Flow Duration Curve and Adopted monthly flow hydrograph



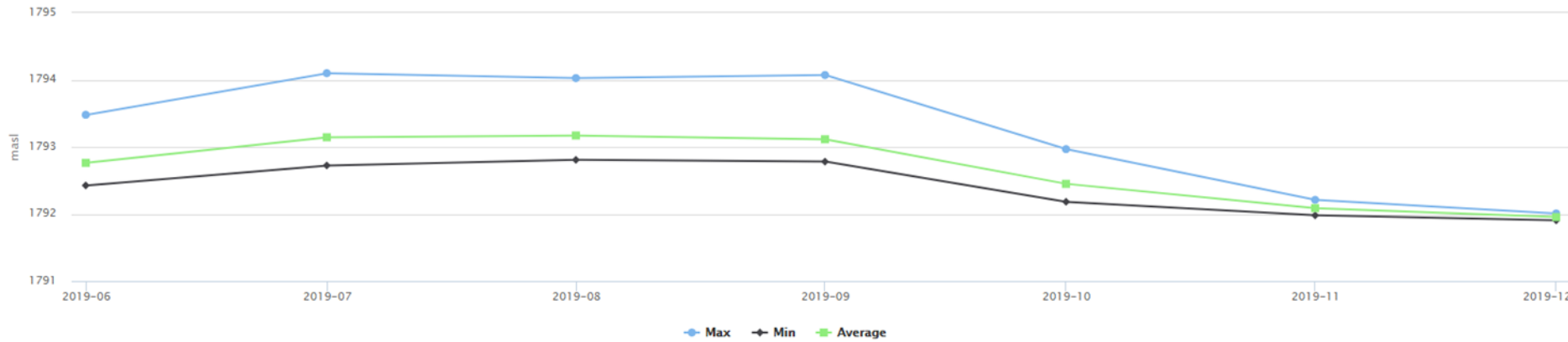
Automatic Gauge Station Setup
near Lokpa

Water Level from 2019-06-05 to 2019-12-20



Stage Hydrograph from Automatic Gauge Station (Daily Data)

Water Level from 2019-06-05 to 2019-12-20



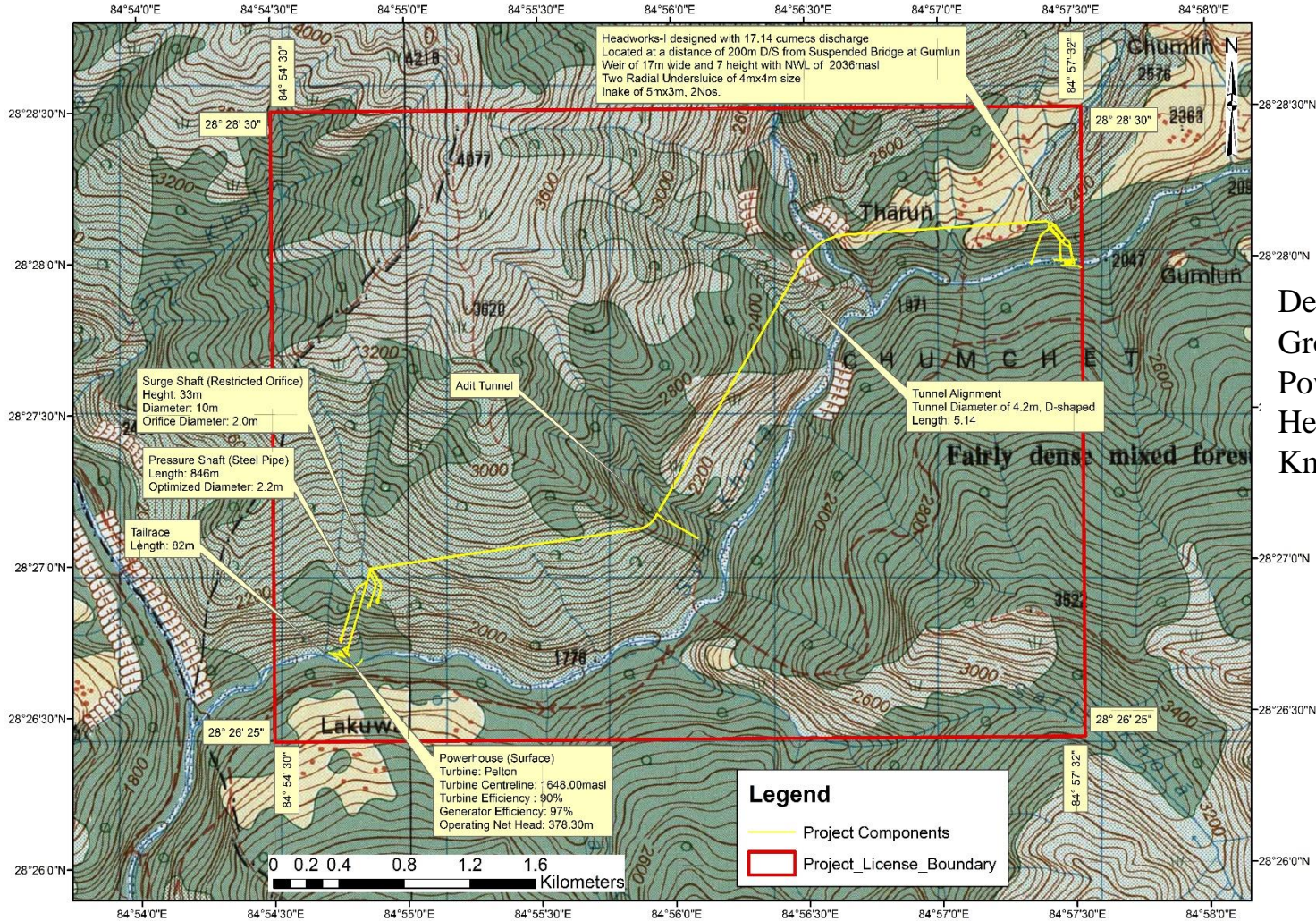
Stage Hydrograph from Automatic Gauge Station (Average Monthly Data)

12.0 STUDY OF ALTERNATIVES

1. Alternative 1



PROJECT LAYOUT OF OPTION-I

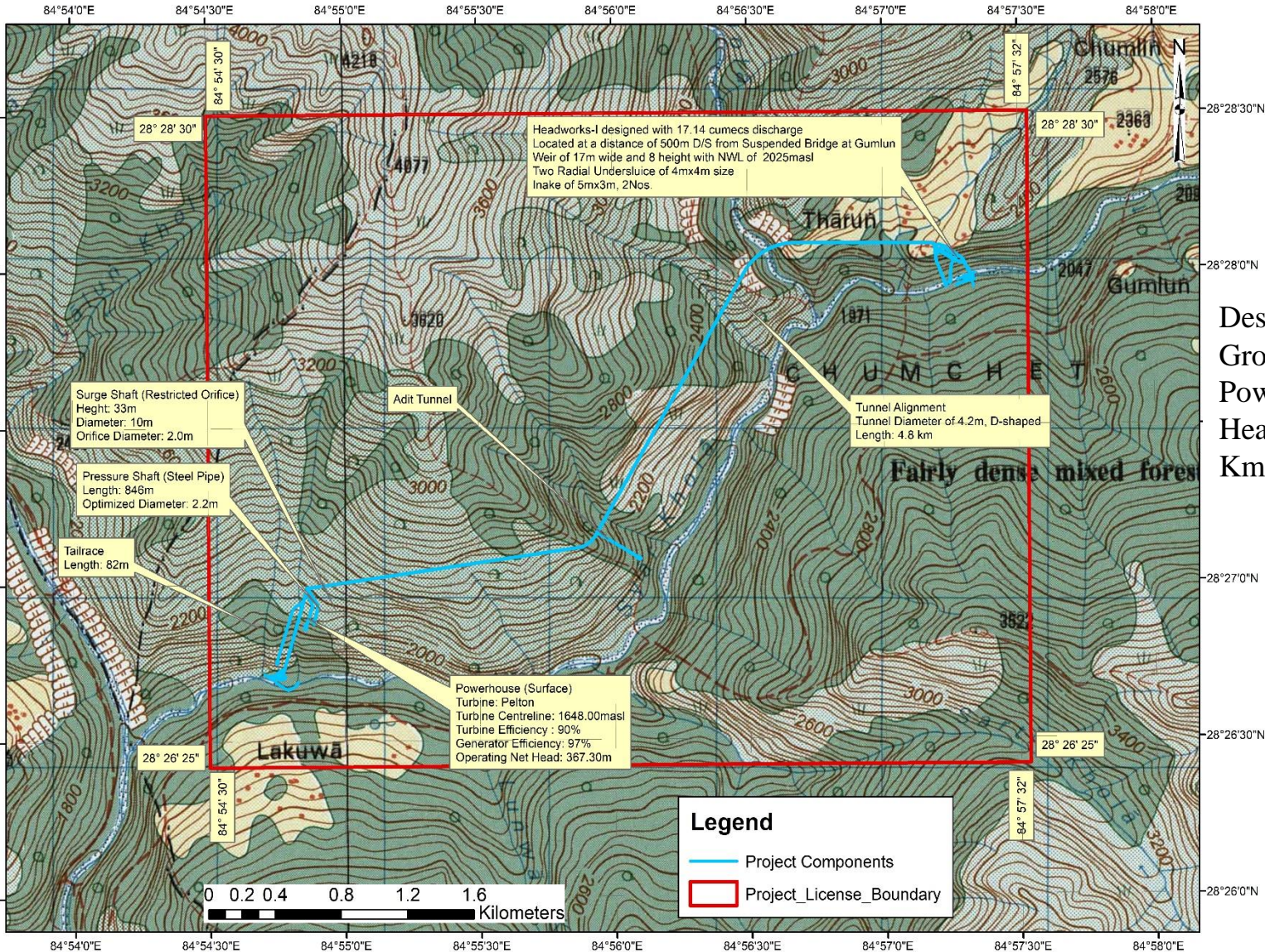


Design $Q_{40} = 17.24 \text{ m}^3/\text{s}$
 Gross Head= 388
 Power = 56 MW
 Headrace Tunnel = 5.14
 Km

2. Alternative 2



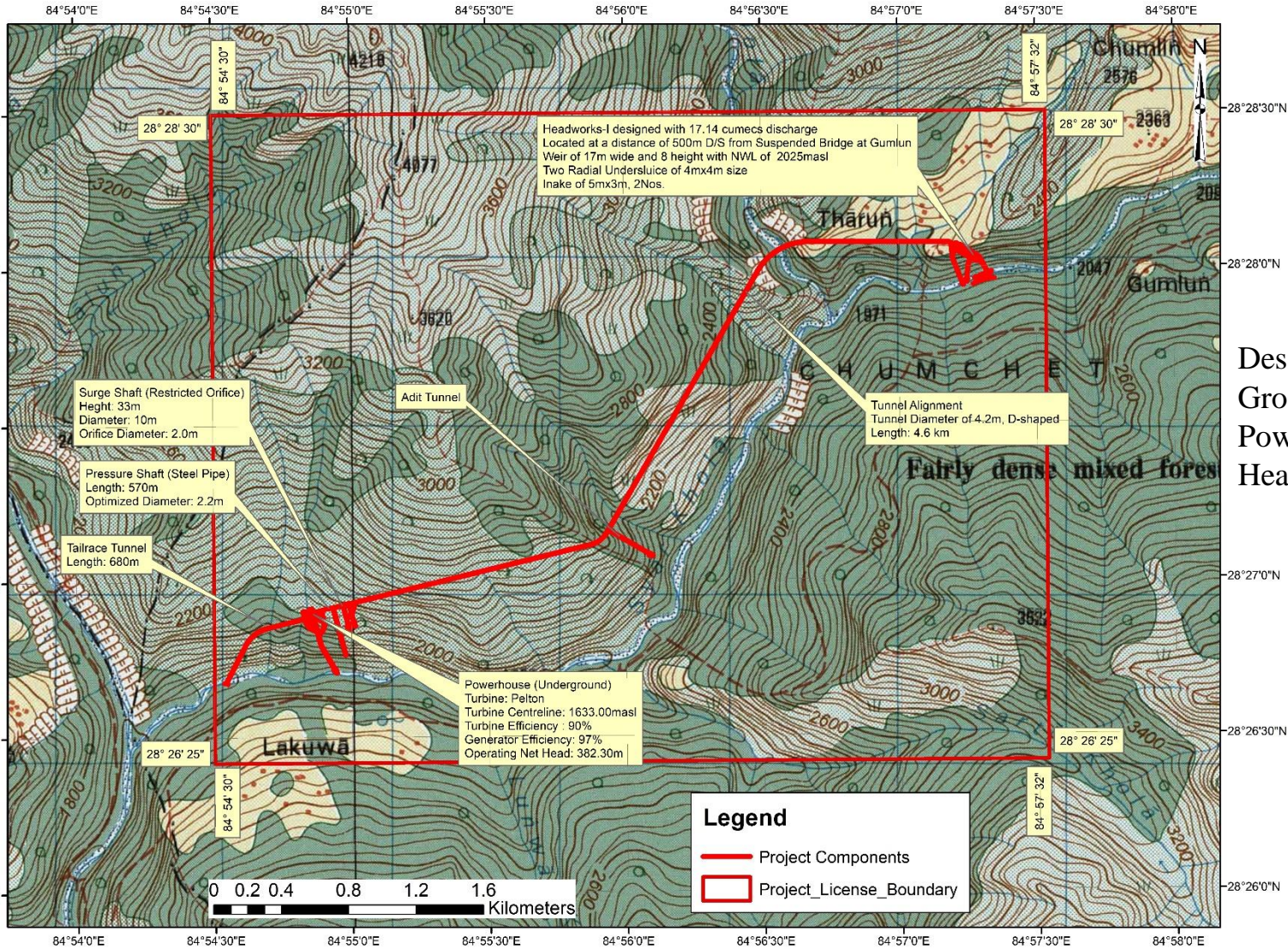
PROJECT LAYOUT OF OPTION-II



3. Alternative 3



PROJECT LAYOUT OF OPTION-III



Design Q = 17.24 m³/s
 Gross Head = 392 m
 Power = 56.5 MW
 Headrace Tunnel = 4.6 Km

Comparative Study of Options

S. No	Description	Desk Study	Option-1	Option-2	Option-3
1	Headwork Location	.....	Located at a distance of 200 m d/s from the Suspended Bridge at Gumlung.	Located at a distance of 500 m d/s from the Suspended Bridge at Gumlung.	Located at a distance of 500 m d/s from the Suspended Bridge at Gumlung.
2	Catchment area at intake	531 km ²	565 km ²	565 km ²	565 km ²
3	Cultivation land	0.1 km ²	.....	.....	.....
4	Gross head (m)	440 m	388 m	377 m	392 m
5	Scheme	RoR	RoR	RoR	RoR
6	Design discharge (as per preliminary calculation) (m ³ /s)	17.14 m ³ /s at Q40	17.24 m ³ /s at Q40	17.24 m ³ /s at Q40	17.24 m ³ /s at Q40
7	100 years flood	1582 m ³ /s	486 m ³ /s at headworks 529 m ³ /s at powerhouse	486 m ³ /s at headworks 529 m ³ /s at powerhouse	486 m ³ /s at headworks 529 m ³ /s at powerhouse

S. No.	Description	Desk Study	Option-1	Option-2	Option-3
8	Diversion Structure	40 m high concrete gravity dam from the river foundation	Concrete Weir of 17 m wide and height of 7 m with pond level 2036 masl.	Concrete Weir of 17 m wide and height of 8 m with pond level 2025 masl.	Concrete Weir of 17 m wide and height of 8 m with pond level 2025 masl.
9	Headworks elevation	2040 masl	2036 masl	2025 masl	2025 masl
10	Headrace Tunnel length	4.5 km	5.14 km	4.79 km	4.60 km
11	Intake	Conventional type with Vertical lift gate	Conventional type with Vertical lift gate 5 m x 3 m, 2 no.s	Conventional type with Vertical lift gate 5 m x 3 m, 2 no.s	Conventional type with Vertical lift gate 5 m x 3 m, 2 no.s
12	Undersluice	Two radial gates of size 6 m x 6 m	Two radial gates of size 4 m x 4 m	Two radial gates of size 4 m x 4 m	Two radial gates of size 4 m x 4 m
12	Headrace Tunnel Diameter	3.2 m	4.2 m Excavation diameter	4.2 m Excavation diameter	4.2 m Excavation diameter
13	Adit number and Length	.....	3 nos. (287+213+ 395) m	3 nos. (287+213+ 395) m	3 nos. , (287+130+ 290) m
14	Pressure shaft	length: 700 m Diameter: 1.9 m	Steel pressure shaft length: 846 m Diameter: 2.2 m	Steel pressure shaft length: 846 m Diameter: 2.2 m	Steel pressure shaft length: 570 m Diameter: 2.2 m
15	Surge Shaft	Height: 60 m Diameter: 15 m Type: Restricted orifice, orifice diameter: 2.5 m	Height: 33 m Diameter: 10 m Type: Restricted orifice Orifice diameter: 2.0 m	Height: 33 m Diameter: 10 m Type: Restricted orifice Orifice diameter: 2.0 m	Height: 33 m Diameter: 10 m Type: Restricted orifice Orifice diameter: 2.0 m
16	Powerhouse type	Underground	Surface	Surface	Underground
17	Turbine	Pelton	Pelton	Pelton	Pelton
18	Tailrace length	50 m	About 82 m	About 82 m	About 680 m tailrace tunnel
19	Turbine Center line	.....	1648 masl	1648 masl	1633 masl

S. No.	Description	Desk Study	Option-1	Option-2	Option-3
20	Net Head	420 m	378.30 m	367.30 m	382.30 m
21	Efficiency	.....	Turbine efficiency: 90 % Generator efficiency: 97 %	Turbine efficiency: 90 % Generator efficiency: 97 %	Turbine efficiency: 90 % Generator efficiency: 97 %
22	Installed Capacity (Preliminary calculation)	60 MW	56 MW at Q40 48 MW at Q43	54 MW at Q40 46.5 MW at Q43	56.5 MW at Q40 48.5 MW at Q43
22	Power and Energy Calculation (Preliminary Calculation)	Average annual energy: 348.05 GWh	Q40 percentile 82.45 GWh dry (27.77%) and 214.48 GWh Wet Q43 percentile 82.29 GWh dry (30.54%) and 187.16 GWh Wet	Q40 percentile 80.10 GWh dry (27.78%) and 208.26 GWh Wet Q43 percentile 79.94 GWh dry (30.55%) and 181.73 GWh Wet	Q40 percentile 83.31 GWh dry (27.76%) and 216.75 GWh Wet Q43 percentile 83.15 GWh dry (30.54%) and 189.13 GWh Wet



13.0 SURFACE GEOLOGICAL MAPPING

1. GEOLOGICAL MAPPING

- Project area lies within the Himal Group (hx) of Pre-Cambrian rock sequences of Higher Himalayan crystalline of central Nepal.
- Geological route traverse in project area was done to find rock type and its orientation.
- Discontinuity survey was conducted to find bedding/ foliation plane, lithological contact and faults
- Major Rock units found at site were which consists of high-grade metamorphic rocks comprising gneiss, quartzite, marble, Migmatite and granitic gneiss



14.0 GEOTECHNICAL INVESTIGATION

- Due to difficulty of road access drilling work was not started
- Planning and Preparation is going on to carry out drilling work after monsoon

Geological
and
Geotechnical
Investigations
(rock outcrop
on the way to
Chumling
from Lokpa-
left bank of
Syar Khola)



SHOT ON REDMI NOTE 7
MI DUAL CAMERA

Geological and Geotechnical Investigations at proposed powerhouse area (left bank)





Dam Site And Headrace Tunnel alignment



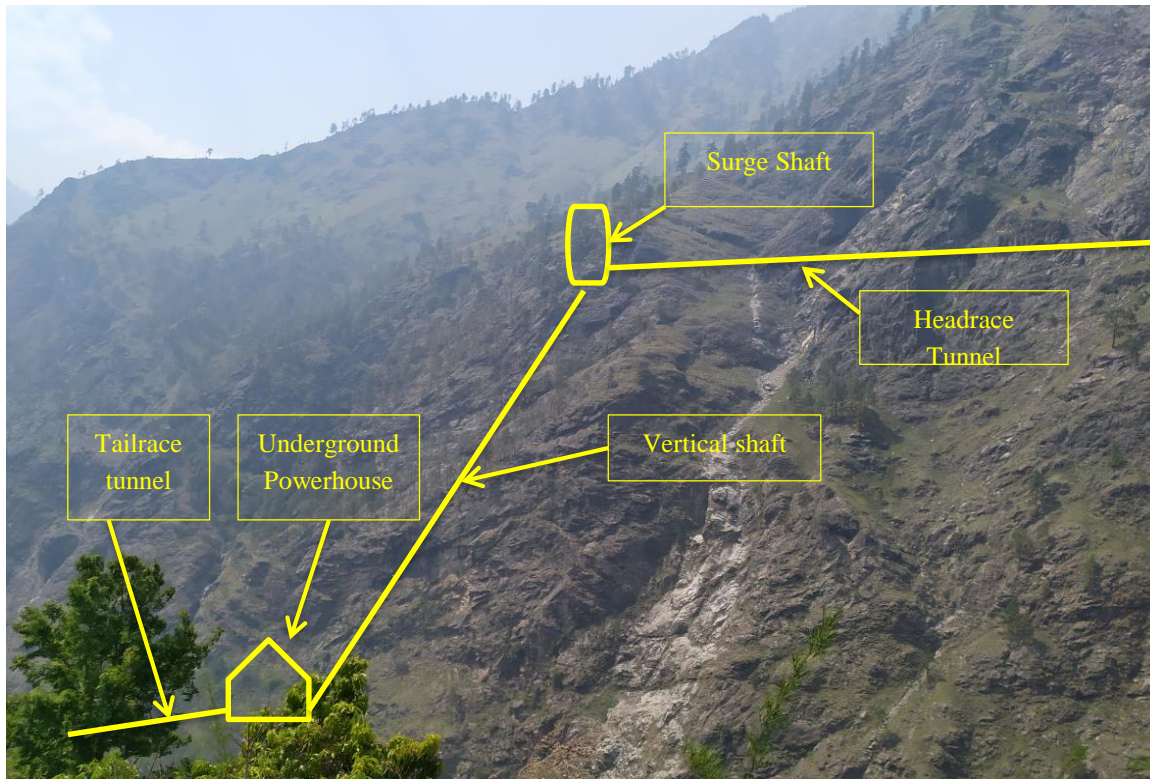
Proposed Weir area



*Middle Portion of
Headrace Tunnel*



Powerhouse Site and Surge Shaft Up hill slope



Powerhouse Site and Surge Shaft Up hill slope



Proposed surface powerhouse area with adequate switchyard area



15.0 CONSTRUCTION MATERIAL STUDY

- Preliminary location of quarry site
 - For sand nearest available location is at Philim (7 km d/s of Proposed Powerhouse)
 - For rock quarry nearest location is at Nyak Phedi (both bank of the Syar khola)
 - Further Budhi Gandaki River bank at Yaru Bagar and Jagat (12 km d/s of Powerhouse) has been located for sand
- Planning for field work for construction material study
- Field work is planned for April, 2020



River deposit at powerhouse region

River deposit at Bank near adit portal area



16.0 OTHER STUDIES

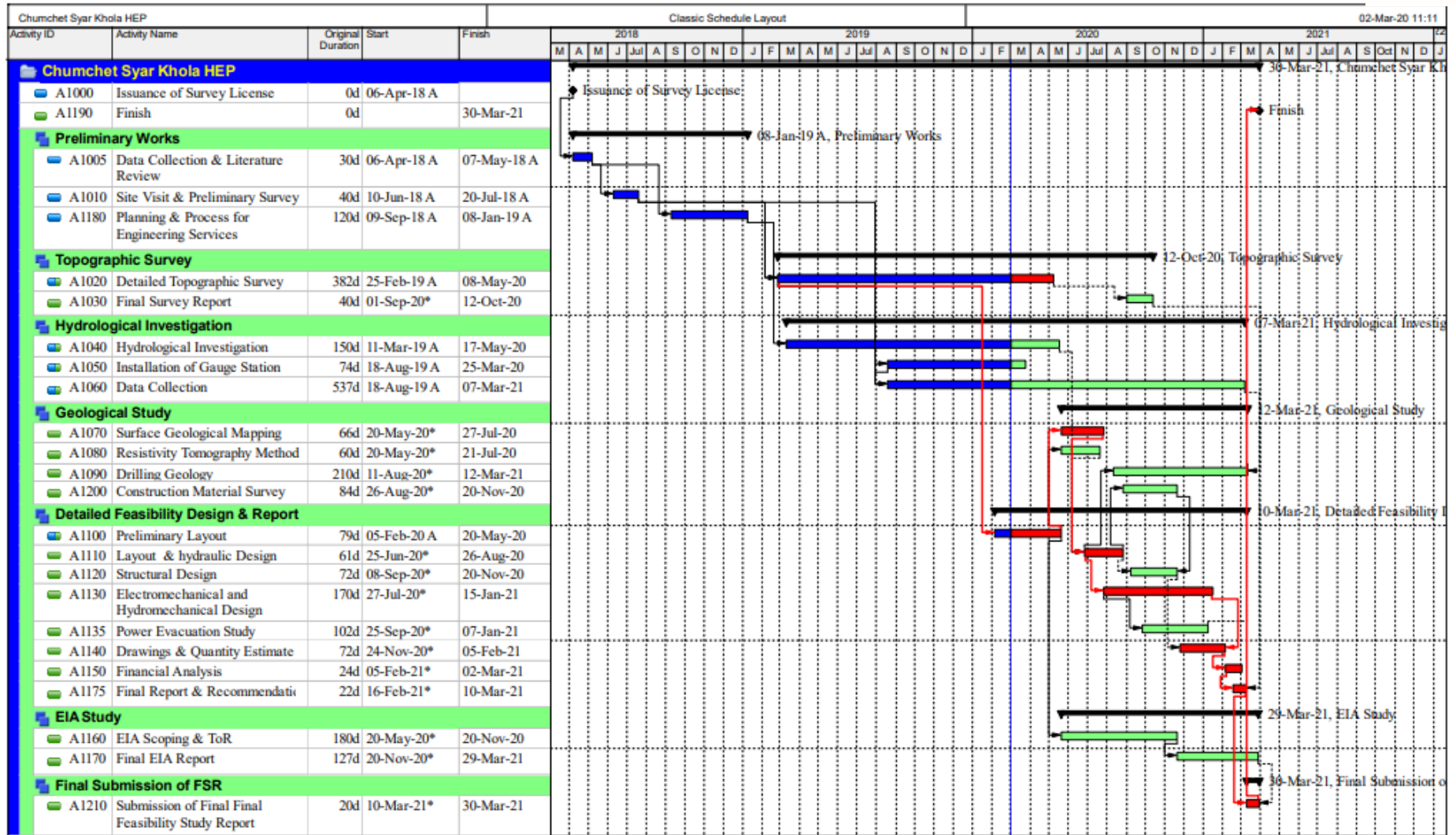
1. Seismological Study : Seismic Study is being carried out using available literature and regional maps. Final outcome/result is not yet achieved.
2. Rate analysis : Ongoing
3. Hydraulic Design : Ongoing



17.0 FUTURE PROGRAMME IN FEASIBILITY STUDY

- Access Road, River Cross Section Survey and strip survey for Tunnel Alignment
- Discontinuity survey and Rock mass classification, Construction Material
- Complete Seismological Study
- Survey and Laboratory analysis of soil and rock.
- ERT and core drilling.
- Finalize hydraulic and structural design of components.
- Finalize rate analysis, prepare cost estimate, financial and sensitivity analysis.
- Prepare final EIA report.

18.0 WORK SCHEDULE FOR NEXT YEAR



■ Remaining Level of Effort
 ■ Actual Work
 ■ Critical Remaining ...
■ Actual Level of Effort
 ■ Remaining Work
 ◆ Milestone



19.0 PROBLEM ENCOUNTERED AND CAUSES OF DELAY

1. Accessibility

- No motorable access is available up to Project site (Headworks and Powerhouse) site. It needs to be accessed by 3 days of walking along Manaslu Trekking Route.

2. Project at Conservation Area

- Approval of MCAP is required to conduct EIA. Proponent has already submitted the application for approval but has not been obtained yet.

3. Topography

- Very steep and difficult Topography at Headworks, Surge Shaft and Powerhouse Area. So, the field work on Topographic survey, Geological survey, ERT and hydrology took more time than expected
- Study team needed additional time to explore other possible options for development of project and carry the study forward which caused delay in overall progress of work



20.0 RELEVANT COMMENTS

- The discharge $17.14 \text{ m}^3/\text{s}$ proposed in desk study is not actually available. The detailed hydrological analysis shows discharge available at $Q_{40} = 17.24 \text{ m}^3/\text{s}$.
- Topographic Survey at Headworks and Surge shaft could not be carried out because of inaccessible terrain.
- Consultant is working at analyzing different alternatives and selecting a best one that utilizes the flow of Syar Khola in most efficient way.
- The consultant is fully committed and shall use its best possible effort to complete the remaining works of feasibility study within the time period of Next one year.



THANK YOU