Preparation of Two Stage Detailed Project Report (DPR) of Proposed Cluster 2 Inland Waterways

Name: Lohit River (NW-62)
Stretch: Parasuram Kund to Saikhowa Ghat, Sadia (86 km)

Feasibility Report

Inland Waterways Authority of India

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Prepared for Inland Waterways Authority of India
Represented by Hydrographic Chief

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This report has been prepared under the DHI Business Management System certified by Bureau Veritas to comply with ISO 9001 (Quality Management)

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List of Abbreviations

ATF	-	Aviation Turbine Fuel
BM	-	Bench Mark
CEA	-	Central Electricity Agency
CH	-	Chainage
CP	-	Control Point
CPC	-	Calcined Petroleum Coke
Cum	-	Cubic Meter
CWC	-	Central Water Commission
DGPS	-	Differential Global Positioning System
DPR	-	detail Project Report
EGNOS	-	European Geo Stationary Navigation system
G&D	-	Gauge & Discharge
GPs	-	Global Positioning System
HEP	-	Hydroelectric Power
HFL	-	High Flood Level
HSD	-	High Speed Diesel
IHO	-	International Hydrographic Organization
IMD	-	India Meteorological Department
IWAI	-	Inland water authority of India
IWT	-	Inland Water Transport
km	-	Kilo Meter
LAD	-	Least Average Depth
m	-	Meter
MDR	-	Major District Roads
MoWR	-	Ministry of Water Resources
MS	-	Motor Spirit
MW	-	Megawatt
NH	-	National Highway
NRL	-	Numaligarh Refinery Limited
ODC	-	Over Dimensional Cargo
OEM	-	Original equipment manufacturer
PIA	-	Project Influence Area
RFP	-	Request for Proposal
RPC	-	Raw Petroleum Coke
RTK	-	Real Time Kinematic
SBAS	-	Satellite based Augmentation System
SH	-	State Highway
SKO	-	Superior kerosene oil
SONAR	-	SOund Navigation And Ranging
Sq.km	-	Square kilometer
SWOT	-	Strength Weak Opportunity Threat

TOR	-	Terms of Reference
WAAS	-	Wide Area Augmentation System
WGS	-	World Geodetic System
WRIC	-	Western Regional Instrumentation Centre

Salient Features at a Glance

<table>
<tr><th>Sl No</th><th>Particulars</th><th>Details</th></tr>
<tr><td>1.</td><td>Name of Consultant</td><td>DHI (India) Water & Environments Pvt. Ltd.</td></tr>
<tr><td>2</td><td>Cluster number & State(s)</td><td>Cluster- 2, Assam and Arunachal Pradesh</td></tr>
<tr><td>3</td><td>Waterway stretch, NW# (From……to ……Total length……)</td><td>Lohit River NW-62

From Parasuram Kund to Saikhowa Ghat, Sadia; 86 km)</td></tr>
<tr><td>4</td><td colspan="2">Navigability status</td></tr>
<tr><td>a</td><td>Tidal and non-tidal portions (from…… to……. Total length…….. Average tidal variation</td><td>No tidal portions</td></tr>
<tr><td></td><td rowspan="9">LAD status (wrt CD)
<1m (Km)
1-2m(Km)
>2m(Km)</td><td>Date : 21.11.2016 to 29.11.2016</td></tr>
<tr><td>b</td><td>
<table>
<tr><th>Depth (m)</th><th>0-10 km</th><th>10-20 km</th><th>20-30 km</th><th>30-40 km</th><th>40-46 km</th><th>46-48.8 km</th><th>48.8-86.0 km*</th></tr>
<tr><td></td><td colspan="7">Total distance (m)</td></tr>
<tr><td><1.2 m</td><td>3140</td><td>4250</td><td>2330</td><td>2680</td><td>2585</td><td>675</td><td rowspan="5">Topo values w.r.t MSL</td></tr>
<tr><td>1.2 to 1.4 m</td><td>335</td><td>780</td><td>1200</td><td>1480</td><td>200</td><td>125</td></tr>
<tr><td>1.4 to 1.7 m</td><td>1230</td><td>1460</td><td>1850</td><td>1800</td><td>325</td><td>75</td></tr>
<tr><td>1.7 to 2.0 m</td><td>1220</td><td>1320</td><td>720</td><td>1240</td><td>240</td><td>230</td></tr>
<tr><td>>2.0 m</td><td>4075</td><td>2190</td><td>3900</td><td>2800</td><td>2650</td><td>1775</td></tr>
</table>
Total length: 48.8
*After ch. 48.8 km, topo data was collected and hence is not included in the table</td></tr>
<tr><td>c</td><td>Cross structures
i) Dams, wiers, barrages etc. (Total number: with navigation locks or not)
ii) Bridges, Power cables etc</td><td>i) Nil
ii) Bridges 3
• Parasuram Kund
Chainage : 85.82 km
Horizontal clearance: 115 m
Vertical clearance: 3 m
• Alubari
Chainage : 48.43 km</td></tr>
</table>

	[Total number; range of horizontal and vertical clearances]	Horizontal clearance: 100 m Vertical clearance: 3m • Sadia Chainage : 5.37 km Horizontal clearance: 90 m Vertical clearance: 2.5m
d	Avg. discharge and number of days	Avg. Dicharge – 350 to 500 m3/s; No. of. Days – 150-200 days
e	Slope	Parasuramkund WL = 294.0 m Dholla WL = 125.44 m w.r.t MSL Slope = 1.96 m for every 1 km
5	**Traffic potential**	
a	Present IWT operations, ferry services, tourism, cargo if any	i) Sadiya ghat – Cargo & Ferry ii) Alubari ghat – Cargo & Ferry
b	Important industries within 50 km	Entirely based on Agriculture. No major industries. Hydropower projects are proposed upstream of Parasuram Kund.
c	Distance of rail and road from industry	Not applicable
6	Consultant's recommendation for going ahead with stage II (DPR preparation)	The presence of two RCC bridge under construction has a vertical clearance of less than 3 m. NHs are running parallel to the river on both sides. Cross-bank transport will cease to exist once the construction of the bridges are completed. No major industries in PIA
7	Any other information/ comment	Nil

Executive Summary

Government of India intends to explore the potential of additional waterways across the country for year round commercial navigation. This is envisaged to achieve by a two-stage study.

Stage 1: Feasibility study to identify the scope for navigation and potential to develop waterway transport facility.

Stage 2: Preparation of Detailed Project Report (DPR) for feasible waterways. DPR would include detailed hydrographic surveys, traffic survey, proposed location for terminals, cost assessment etc.

This is the report of the feasibility study conducted from Parasuram Kund to Saikhowa Ghat, Sadia (86 km) in the river Lohit (NW-62). Lohit River is part of the proposed Cluster 2 National Waterways in North East India. A part of the proposed river is in Assam and rest is in Arunachal Pradesh.

The major observations of the feasibility study

- 1 m to 1.2 m average depth was available during lean season upto Alubari Ghat (Chainage 48.8). For the remaining stretch, available depth was less than 0.5m.
- The flow channel in the river has meandering properties and availability of waterway portion is not guaranteed after every flood season.
- In the entire stretch of 86 km, the river has huge boulders and there are rocky outcrops in the upstream reach from Alubari Ghat to Parasuram Kund.
- High velocity and the presence of boulders create less opportunity for developing this waterway with supporting IWT infrastructure.
- Two bridges are under construction in the proposed stretch (at Sadia Ghat and Alubari Ghat). The vertical clearance with reference to HFL of these new bridges are only 2.5 and 3 m. This might cause hindrance for the boats especially during flood season.
- The cargo potential identified is construction material for proposed power projects and local cargo. The bridges (under construction) across the river may not permit the ODC movement to HEP construction sites due to poor vertical clearance and lack of required LAD throughout the year in the entire river stretch.
- There are no major industries in the project influential area (PIA). Agricultural produce is the major livelihood option for the local population apart from food/forestry based products.
- National highways are running parallel to the river in both the banks. Hence, the possibilities are remote to attract commercial vessel players who can operate vessel or Ro- Ro services.
- Ro-Ro services, which are currently operating at the Ghats, will also cease its operation once the bridges are open for traffic.
- Considering all the above facts, feasibility for developing this proposed stretch may not be a viable option considering the technical and other conditions of the PIA.

Sec. 1 Introductory Considerations

Transportation is the backbone of the social and economic growth of any country. A well developed and coordinated transportation network is the primary need of it. Industries and cargo companies are looking forward for technologically advanced and economically viable ways of transportation. In the case of a large country like India, this is of prime importance.

From the government bodies to the commercial (cargo handling and transport companies), all are struggling in order to make effective and economic use of the available resources. Their activities are guided by transport costs and the capacities of different transport modes. These considerations lead to one of the main advantages of Inland Water Transport (IWT). Studies have proved that the transport capacity of IWT is high and the costs are relatively low, especially for bulk transport over long distances.

In order to keep in pace with the latest advancements in the navigation and cargo handling systems and to flawlessly operate a state of the art transportation system, timely maintenance and upgradation to the latest technologies and practices are a must.

Government of India intends to develop 111 Inland Rivers on an immediate and long terms basis to bring back its lost glory, and hence planned to conduct a feasibility study and recommending thereafter the possibility of preparing the DPR to achieve navigation and to develop water transport facilities in Cluster regions.

Besides the economic considerations, social and environmental issues are also key issues when developing transport modalities. Hence, an integrated, multi-disciplinary approach has to be adopted in the inland waterway transport development activities.

The steps to be taken in the decision-making process of IWT development depend largely on the level of development already in place. The central challenge for waterway development is finding the optimal balance between adapting the means of transport and the natural physical conditions and changing these in favour of improved navigability for vessels.

This is the report of the feasibility studies conducted in the River Lohit which is a part of the proposed Cluster 2 National Waterways in North East part of India.

1.1 Objective and Scope of Study

IWAI is planned to conduct a Pre-Feasibility Study and recommending thereafter the possibility of preparing the DPR to achieve navigation and to develop water transport facilities in Lohit River under Cluster 2 in North East region, India. The study would consist of 2 stages:

Stage 1 Reconnaissance survey, collection & review of available data and feasibility report

Stage 2 Preparation of detailed project report (DPR) for the feasible river stretches

Stage 1 is carried out now and is aimed for definite objective, which is indicated in the scope of work of the RFP. The specific objective of stage 1 are

1. To analyse the existing data such as topography, bathymetry & hydraulic conditions, geological conditions, water infrastructure, navigation related data, etc.,
2. To carryout situational analysis using the available secondary data with different authorities/stakeholder/line departments and to undertake a single line longitudinal bathymetric/topographic survey for IWAI to identify sustainable river navigation scenarios, and
3. To prepare the Feasibility report based on the above analysis.

1.2 Details of River Stretch & Map

The cluster two waterways proposed for the preparation of DPR are Subansiri, Dhansiri, Lohit and Tizu and zunghi. Among these Subansiri and Dhansiri and a part of Lohit are in the state of Assam, remaining section of Lohit is in Arunachal Pradesh and the Tizu and Zungki are in Nagaland. Figure 1 shows the location of Lohit.

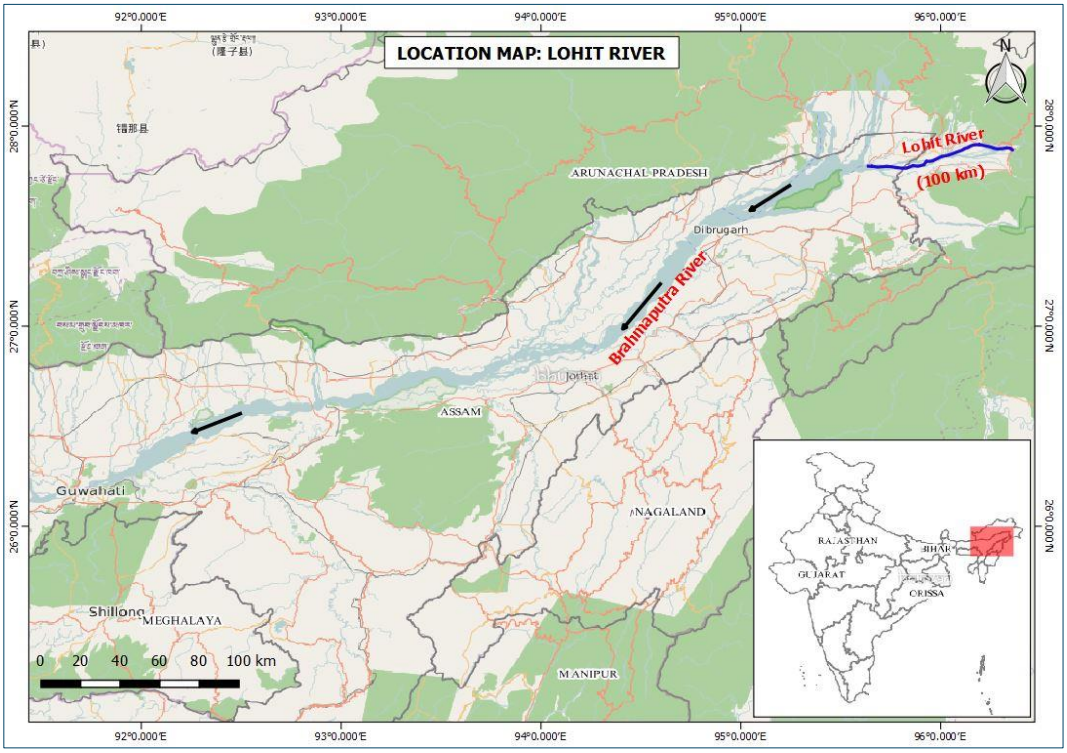


Figure 1 Geographical Locations of the proposed cluster 2 inland waterways

Table 1 provides the details of the river stretch of Lohit, which is analysed in this report.

Table 1 Details of the study region

Name of the River	Description of Inland Waterway	Districts through which River flows
LOHIT RIVER **In Assam and Arunachal Pradesh**	86 km length From Parasuram Kund to Saikhowa Ghat, Sadia (Lat 27°52'40.06"N, Lon 96°21'39.70"E) to (Lat 27°47'49.14"N, Lon 95°38'13.84"E)	Lohit (Arunachal Pradesh) Tinsukia (Assam)

1.3 Characteristics of Lohit River

Lohit River originates at an elevation of about 6190 m from the snow clad peaks of Eastern Tibet and enters Indian Territory through Kibitho area. It has a catchment area of 29,487 Sq.km of which 14,453 Sq.km are in India. Lohit River basin is India's easternmost river basin. In India, the river flows across the states of Arunachal Pradesh and Assam and contributes an average 44,243 MCM of water annually to the Brahmaputra river system.

The catchment area experiences mostly tropical wet season and supports dense mixed forest. The area is characterized by hills with steep gorges and deep rugged valleys of dendritic pattern with streams feeding the tributaries of the Lohit river system. Lohit River has steep gradient which results in turbulent flow at many stretches. Waterfalls and rapids are very common feature in this river.

1.3.1 Tributaries and flow pattern

In its upper reaches, the river flows west and is known as the Krawnaon. After flowing westwards, it joins tributary called Chalum Susning flowing from Indo-Burma Border. The combined flow is known as Tellu or Lohit River. The river flows southwards following its confluence with the Delai and Lang rivers; it then turns westwards and emerges from its gorge at Brahmakunda, entering Lohit District in Arunachal Pradesh and thereafter the fertile plains of Sadiya in Assam, where it is known as the Lohit. On emerging from Sadiya, it is joined by the Dibang. The combined flow meets the Siang at Kobo, where after the combined system flows by the name of the Brahmaputra. The total length of the river is 413 km, of which 243 km are in India. The 132-km stretch of the river in the plains only appears to be navigable during the winter season where small country boats ply at present.

Several Hydroelectric Power (HEP) projects such as Demwe (3,000 megawatts), Kalai (2,600 megawatts), and Hutong (3,000 megawatts) are proposed on the Lohit River basin. Demwe Lower Hydro Electric Project is located on Lohit River at Parasuram Kund in Lohit district of Arunachal Pradesh. Demwe Upper Hydro Electric Project is located on Lohit River near Mompani, Anjaw district of Arunachal Pradesh. The releases from Demwe lower HEP would ensure downstream navigation in Assam reach of river Lohit particularly during lean period. HEPs on the river basin is discussed separately in section 1.3.3 of this report.

The construction material including some Over Dimensional Cargo (ODC) for the above proposed hydropower projects can be transported through the National Waterway No. 2 -the entire waterway system is navigable round the year. There is steady flow during lean period from January to April and the water level rises by about 2 to 2.5 m during flood from June to October. The water level starts falling from November to December. As per previous study of IWAI, the river Lohit is navigable round the year.

The Lohit River stretch considered for study lies in the states of Arunachal Pradesh and Assam having length of 86 Km. The upstream end of proposed waterway lies at Parasuram Kund. The downstream end confluences with Dibang River near Saikhowa Ghat, Sadiya (Figure 2).

There are two CWC gauging stations on the Lohit River stretch under study namely Tezu and Dholabazar as shown in Figure 3.

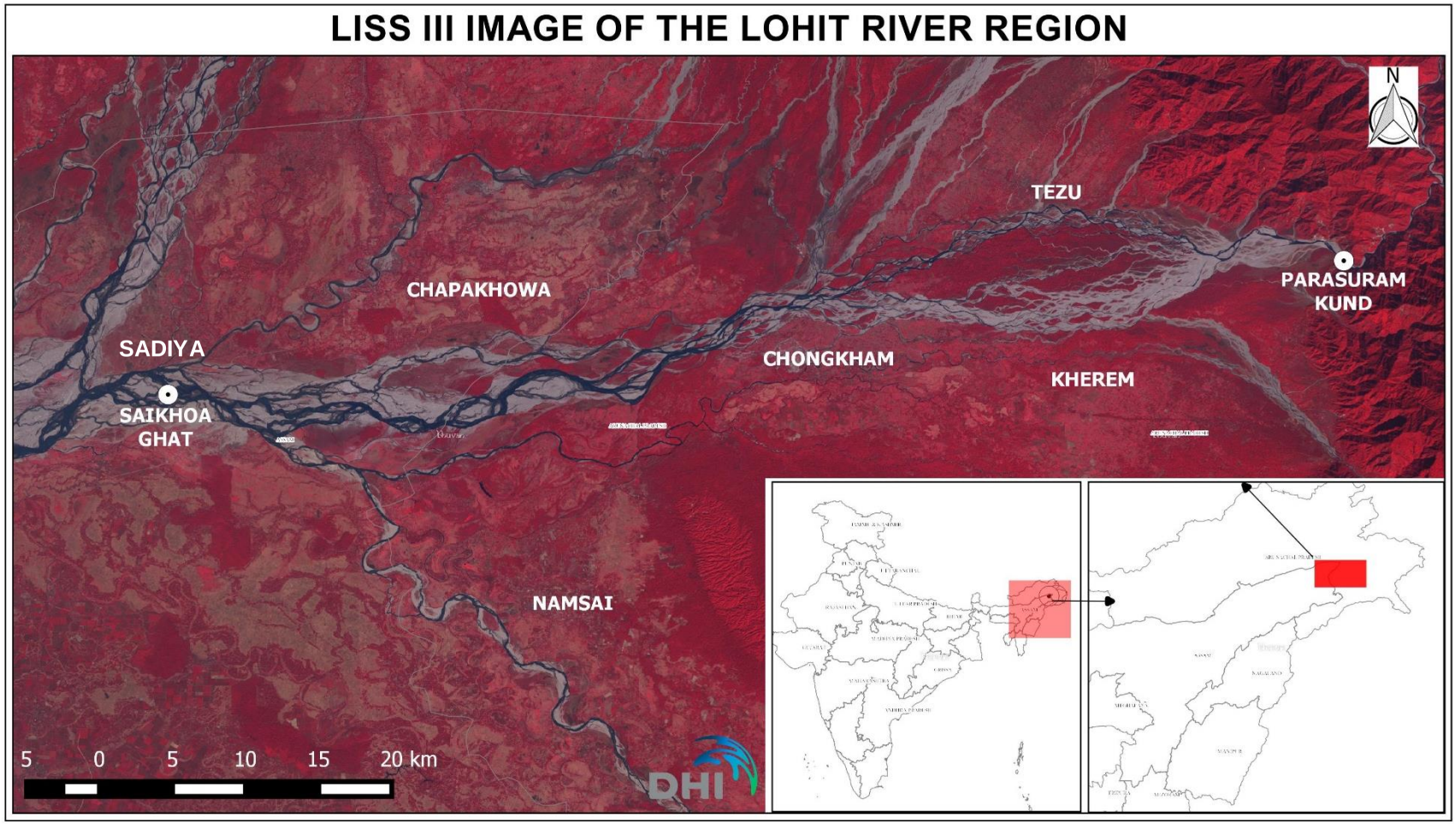


Figure 2 Satellite imagery of the Lohit River stretch proposed for this study

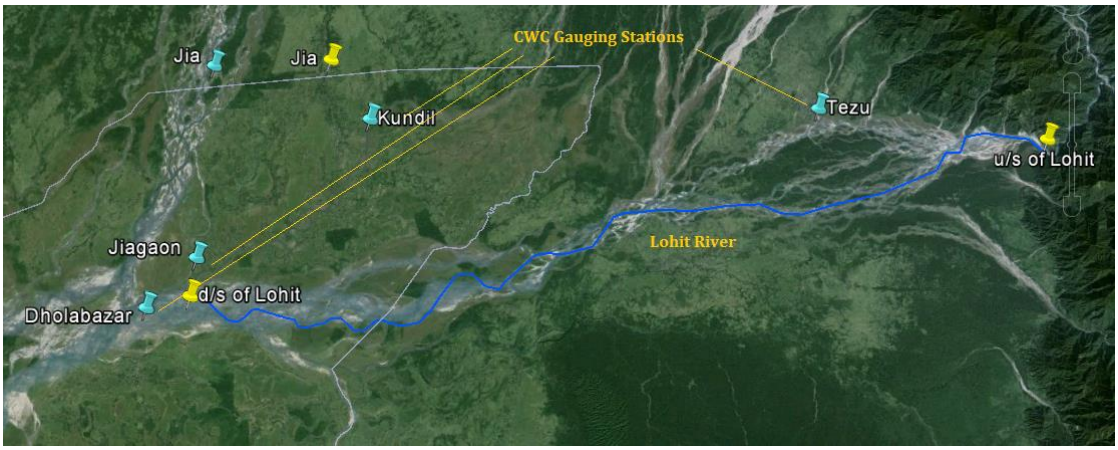


Figure 3 Locations of CWC gauging stations in and near Lohit

1.3.2 Meteorology of the basin

The climate of Lohit basin is characterized by cool and highly humid conditions at lower elevations and in the valleys. Intensive cold weather is observed at higher elevations. The winter season commences from late November and continues up to March followed by monsoon season from May to September.

The rainfall received in the basin is mainly from the south-west monsoons, which sets in by June and continues up to October. However major portion of the rainfall occurs during the period from June to August. The monsoon season is followed by a dry spell up to January. IMD rainfall data shows that there is a spell of summer rains in the region. High showers are received as part of this during the month of May. The average annual rainfall in the basin ranges from 2500 in lower years and upto 5000 mm in upper basin areas.

The India Meteorological Department has published Normal rainfalls for various important stations in the country. The location nearest to the study area is Pasighat (East Siang district in Arunachal Pradesh) which is about 40 km away (aerially) from the downstream of Lohit. Monthly normal rainfall data based on observed long term rainfall data w.e.f. 1951-2000 has been reported by Indian Meteorological Department (IMD) along with the mean number of rainy days for this station. The average meteorological conditions in the study area as per the data observed at Pasighat meteorological station are given in Table 2 and are graphically represented in Figure 4 , Figure 5 & Figure 6.

Table 2 Average meteorological conditions in the study area (as per the data observed at Pasighat meteorological station)

Month	Mean Monthly Min temperature	Mean monthly Max temperature	Mean Rainfall (mm)	No of Rainy days
January	12.3	22.5	53.1	4.3
February	14	23	93	6.4
March	16.8	26.2	124.2	8.9
April	19	28.1	234.6	11.9
May	21.2	29	400.4	15
June	23	30.4	866.5	18.5

July	23.5	30.5	1002.4	21.5
August	23.7	31.2	780.8	16.8
September	23	30.7	501.8	13.2
October	20.5	29.3	242.5	7.3
November	16.6	26.9	35.3	2.4
December	13.4	24	22	1.9
Total			4356.6	128.1
Average	18.92	27.65		

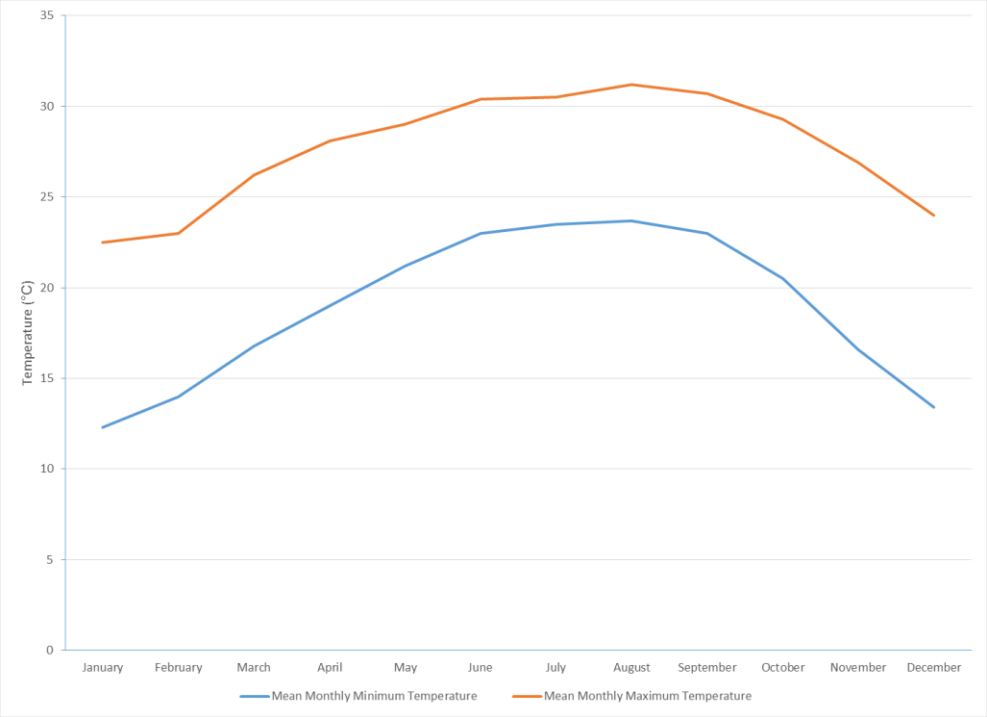


Figure 4 Mean monthly temperature in the study area (as per the data observed at Pasighat meteorological station)

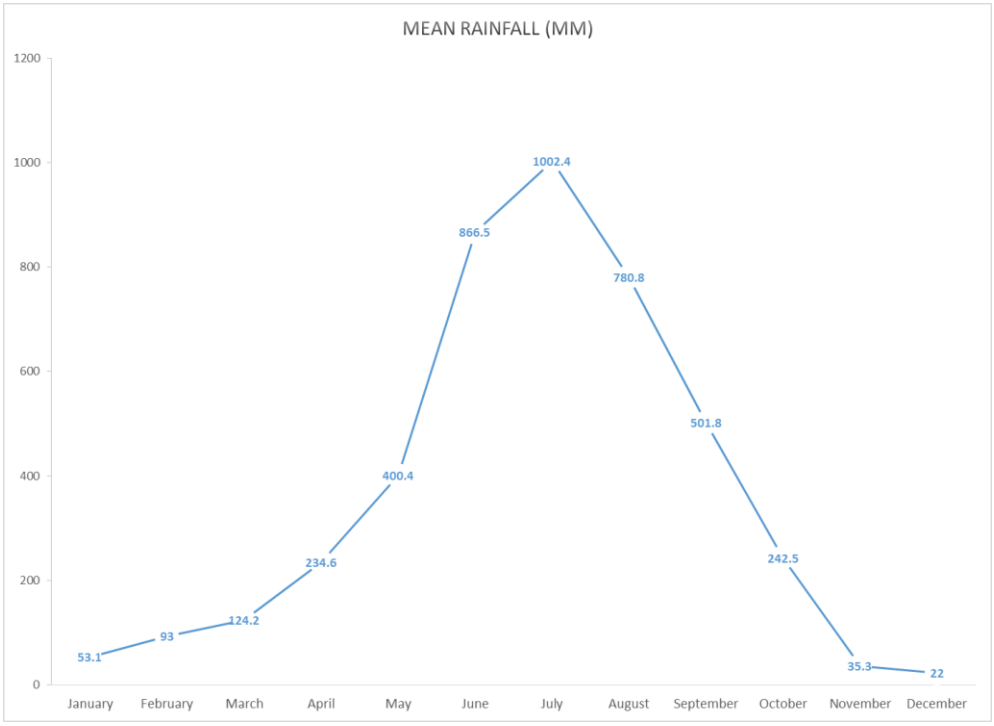


Figure 5 Mean monthly rainfall in the study area (as per the data observed at Pasighat meteorological station)

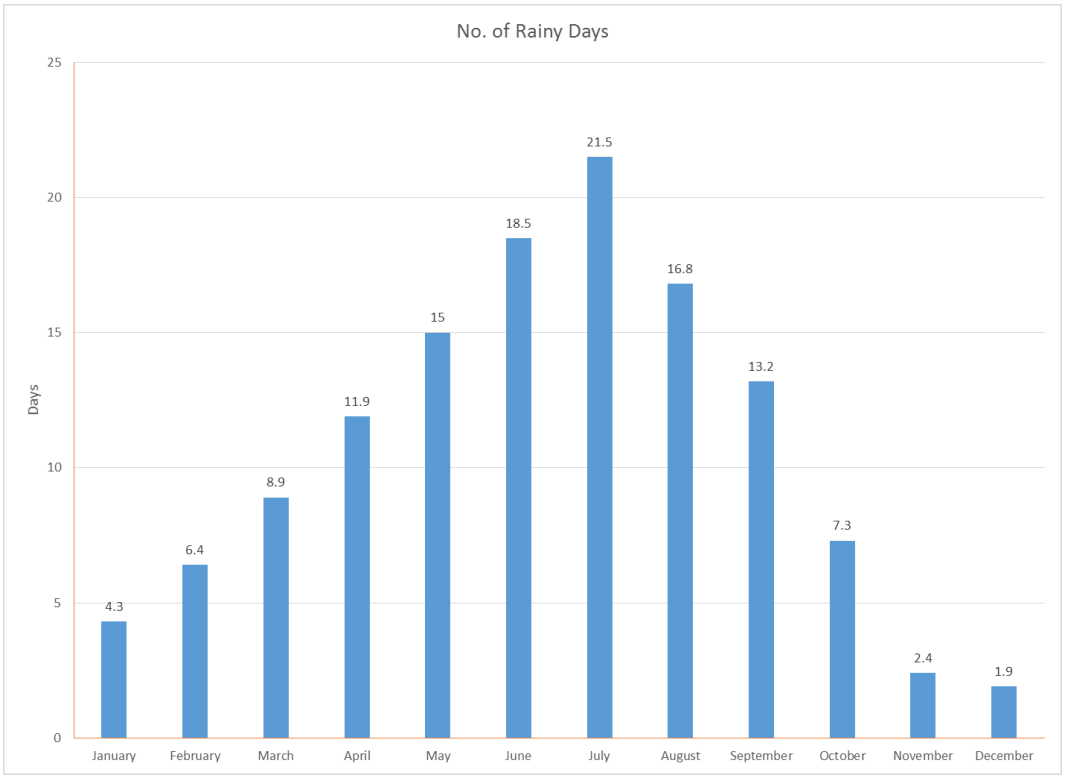


Figure 6 Average number of rainy day per month in the study area (as per the data observed at Pasighat meteorological station)

1.3.3 Hydropower Projects

As per the assessment of Central Electricity Agency (CEA), the country is endowed with hydro potential of 84000 MW at 60% load factor. An estimated potential of 58,971 MW has been assessed from the north-eastern sector of India, out of which about 50,328 MW capacities is assessed in Arunachal Pradesh from basins of Dibang, Siang, Subansiri and Lohit rivers. In Arunachal Pradesh, so far, a capacity of 423.5 MW has been developed which is just 0.84 % of the total potential. Hydro projects of about 2600 MW are being constructed which is about 5.17 % of the total potential.

It is estimated in the prefeasibility studies that the river basin of Lohit has a potential of more than 7500 MW, out of which six projects were proposed for development. Demwe (Near Parasuram Kund), Lower Demwe (Near Mompani), Upper Hutong –II (Near Kholiang), Hutong – I (Near Manjuliang), Kalai-II (Near Shangung) and Kalai– I (Near Kryl) (Figure 7).

As a part of Govt. of India's 50, 000 MW hydro power initiatives, Demwe HEP was envisaged as a 3000 MW hydro power scheme, whereby a concrete gravity dam of about 200 m height was envisaged with its dam top elevation of EL 500m, at a distance of 12 km d/s of confluence of Lohit river with Tidding river. M/s Athena Energy Ventures Private Limited (AEVPL) is entrusted to develop Demwe HEP in one or more schemes in the allotted stretch between EL ±300m and ±589m.

Later environmental constraints were identified due to the presence of Kamlang Wildlife Sanctuary on the left bank of Lohit River and the Expert Appraisal Committee (EAC) for River Valley and Hydro Electric Projects in MoEF was approached with alternatives to utilise the optimal potential of the Demwe HE project. Table 3 presents the list of proposed HEPs in Lohit Basin.

Table 3 List of proposed HEPs in Lohit Basin

Sl. No	Name of HEP	Installed Capacity (MW)
HEPs Proposed in Main River		
1	Kalai HEP Stage 1	1450
2	Kalai HEP Stage 2	1200
3	Hutong HEP Stage 2	1250
4	Demwe HEP Upper	1800
5	Demwe HEP Lower	1750
HEPs Proposed in Tributaries		
6	Gimiliang HEP	99
7	Raigam HEP	96
8	Tidding -1 HEP	98
9	Tidding – 2 HEP	68
10	Kamlang HEP	21
11	Noa Dihing HEP	77
	Total	7909

Demwe Lower HEP which is proposed just upstream of Parasuram Kund bridge envisages construction of concrete gravity dam of 163.12 m height above deepest foundation level, the Full Reservoir Level (FRL) of the project are proposed at an elevation of 424.8 m and the Minimum Drawdown Level will be at elevation 408m with live storage of about 171.20 Mcum. The water after power generation will be discharged at an elevation of 297.9 m in the main course of river through a 130m long tail race channel. The design discharge of the project is 1729 cumecs with a design head of 112.00m (Source: EIA report prepared by centre for inter-disciplinary studies of mountain and hill environment, Univ. of Delhi, 2009).

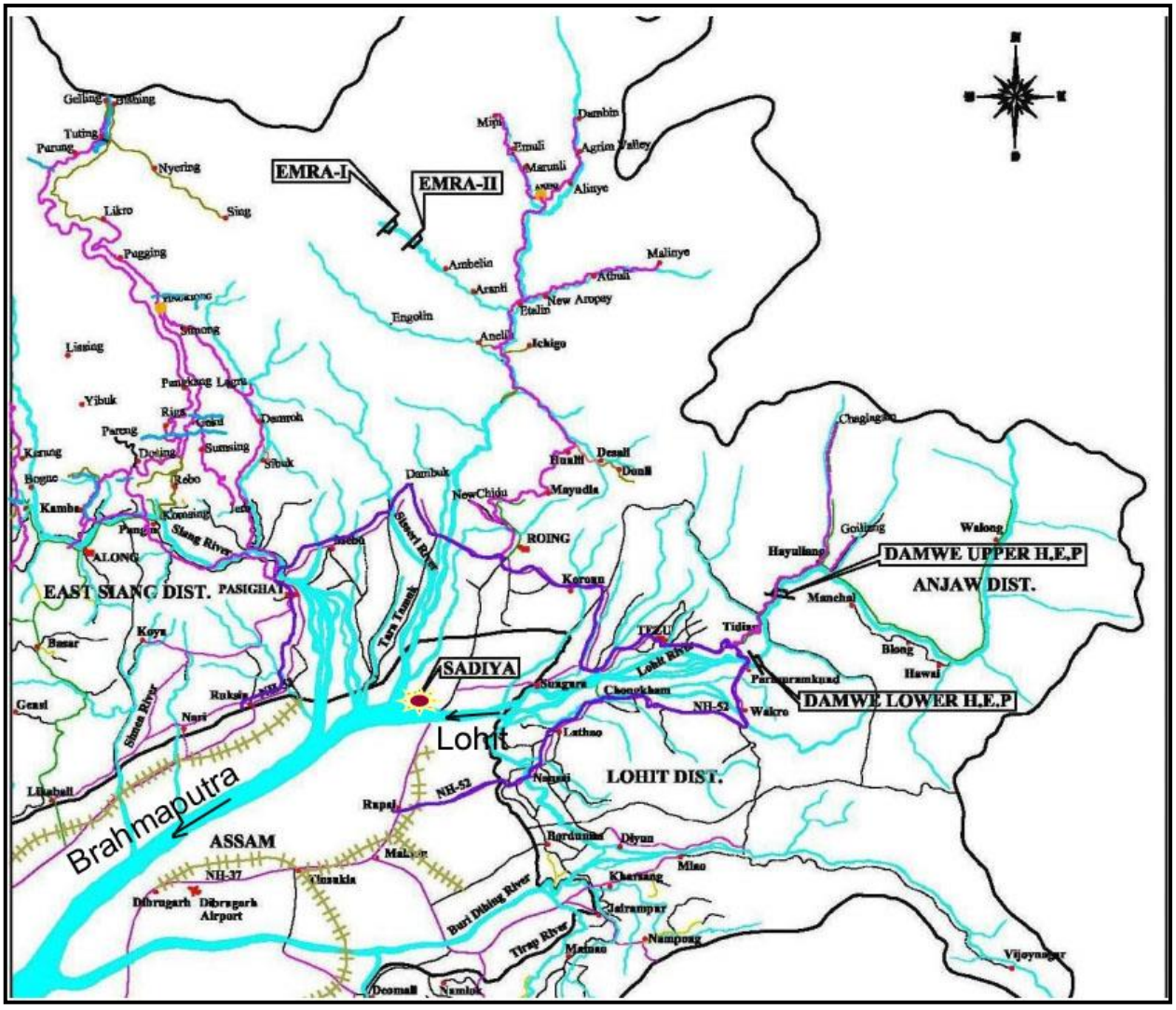


Figure 7 Proposed hydropower projects in the Lohit River basin

1.4 Methodology Adopted to undertake the Stage 1 Study

Primary data was collected through the field survey campaign. Secondary data for the study was collected from various departments and stakeholders in the study area. The methodology adopted for achieving the objectives outlined in the Scope of Work is presented as a flow chart (Figure 8). The proposed activities in Stage 1 is briefly presented below:

Stage 1: Feasibility study would consist of the following activities:

- Reconnaissance Survey including bathymetry/topography
- Collection and Review of Available Data including analyses of existing data.
- Preparation of Inception Report as per the analysis of data
- Preparation of Feasibility Report

A flow chart of the work flow of the stage 1 study is presented in Figure 8.

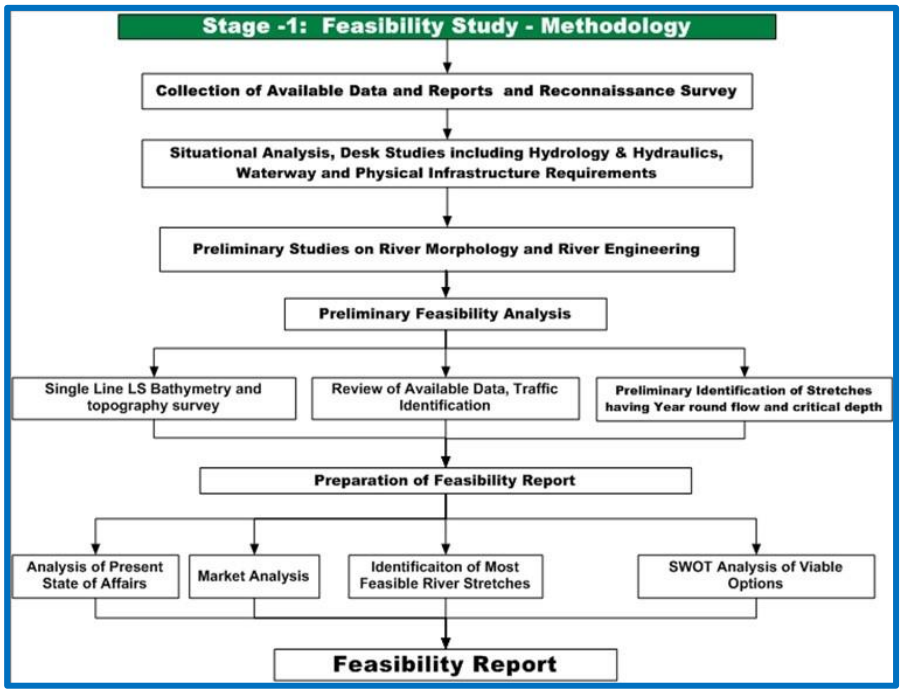


Figure 8 Flow chart of the methodology adopted

1.5 Primary & Secondary Data Sources

To have background knowledge and the historic navigational aspects of the study area, a detailed literature review was conducted on the following aspects.

The following data were collected:

1. Features of River Basin
   a. Climate of the Basin
   b. Physiographic Characteristics of the Basin
   c. Land Use, Land Cover and Agriculture
   d. Development of Hydropower projects in the Lohit river
2. Agriculture Practices in the basin
3. Forests and Protected Areas

1.5.1 List of Secondary Data collected

Apart from the literature survey, preliminary topographic survey and secondary data collection campaign was carried out for the preparation of the feasibility report. Table 4 shows the list of data collected for the analysis and preparation of Feasibility report.

Table 4 Data collected for the preparation of the feasibility report

Sl. No	Data type	Source/ Agency
1	Data pertaining to demographic particulars and local developments in study area	Various state govt. agencies
2	Goods Traffic flows by various transportation modes such as rail, road and IWT	Collected from various Govt. Agencies such as Railways, Economics & Statistics, Transport Department, Local Logistics and Freight Agents, and based on Local enquiry with Public.
3	Soil type, Landuse/land cover erosional depositional features	Liss III imagery, Published literature
4	Satellite imagery	NRSC

Sec. 2 Analysis of the Present State of Affair

Figure 9 shows the region and Lohit river stretch in North East India being considered for feasibility study and thereafter for preparing DPR for inland navigation if found feasible. The proposed study stretch of the river is located in the states of Arunachal Pradesh and Assam in northeast India is presented in Figures 9 and 10.

2.1 Details of NH/SH/MDR along and/or in the Vicinity

As per the reconnaissance survey completed for the proposed reach in Lohit River, the following details of the road network were collected. The same are shown in Figure 11.

The major road that is present in the region is NH 52 and NH 37. This NH run almost parallel to the river in both the banks. A sub road connects the NH with the Alubari Ghat from both the sides of the river. Road distance and NH/SH number connecting Dibrugarh with prominent locations along Lohit River is given in Table 5.

Table 5 Road distance and NH/SH number connecting Dibrugarh with prominent locations along Lohit River

From	To	Road distance (km)	Name of the road	Approximate time taken to travel (hours)	Remarks
Dibrugarh	Tinsukia	47	NH 37	1	
	Saikhowa	93	NH 37	2.5	
	Sadia	101	NH 37	3	Have to use a ferry service
	Warko	182	NH 37 NH 52	4.5	
	Parasuram kund	199	NH 37 NH 52	5	
	Demwe	180	NH 37 NH 52	5	Have to use a ferry service
	Tezu	166	NH 37 NH 52	4.75	Have to use a ferry service
	Chapakhowa	123	NH 37	3.75	Have to use a ferry service

2.2 Details of cross structures

Along the 86 km long stretch of the river under consideration, three bridges were noticed. The details of the bridges are given in Table 6.

Figure 9 Lohit River Stretch being considered for feasibility study

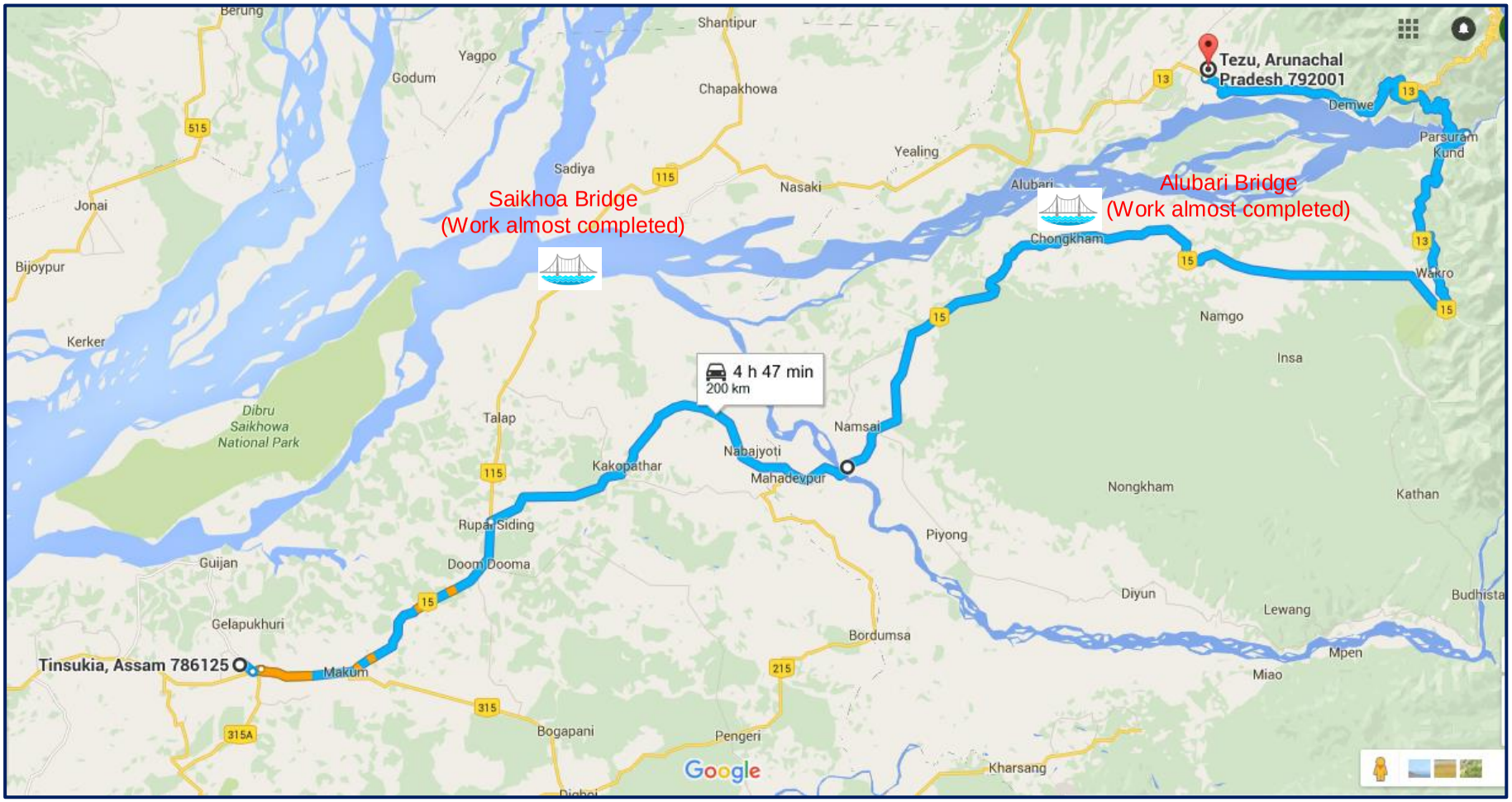


Figure 10 Project Influence Area from Tinsukia in Assam to Tezu in Arunachal Pradesh (NH 52 & 37; Highlighted part is from Tinsukia to Tezu)

Figure 11 Major roads in the vicinity of Lohit River (NH 37 and 52; highlighted part from Saikhoa to parasuram Kund)

Table 6 Details of cross structures in Lohit River

Sl No	Structure Name and for road / rail	Chainage (km)	Type of Structure	Location	Horizontal clearance (m)	Vertical clearance w.r.t. HFL (m)	Remarks
1	National Highway (Road Bridge)	85.82 km	RCC Highway Road (NH 52)	Parasuram Kund	115	3.0	Completed in Use
2	National Highway (Road Bridge)	48.43 km	RCC Highway Road	Alubari Ghat	100	3.0	Under Construction
3	National Highway (Road Bridge)	5.37 km	Highway Road	Sadiya	90	2.5	Under Construction

2.3 Airport and Railway Stations/ Lines in the Vicinity

It was noticed that there are no railway lines in the near vicinity of the river Lohit. The nearest railway station that is in operation is Dangari Railway station in Tinsukia district of Assam. This is about 12 km (areal distance) away from the downstream end (Saikhoa Ghat) of the proposed waterway. It is to be noted that NH 15 has direct connection from Saikhoa Ghat to Dangari railway station. There is another railway station at the right side of the river as well. The meter gauge line that end at Murkong Selelek (approximately 40 km areally) (Figure 12) is a part of North-east frontier railway network and is presently undergoing gauge conversion.

Though the above mentioned is the present situation of public transport in the study region, there are a lot of expansion that is planned especially in this region by the northeast frontier railway. Surveys are in progress to connect Parasuram Kund with the north eastern frontier railway network. A general idea about the expansions that is happening in the region can be obtained from the map of the northeast frontier railway that is given as Annexure I.

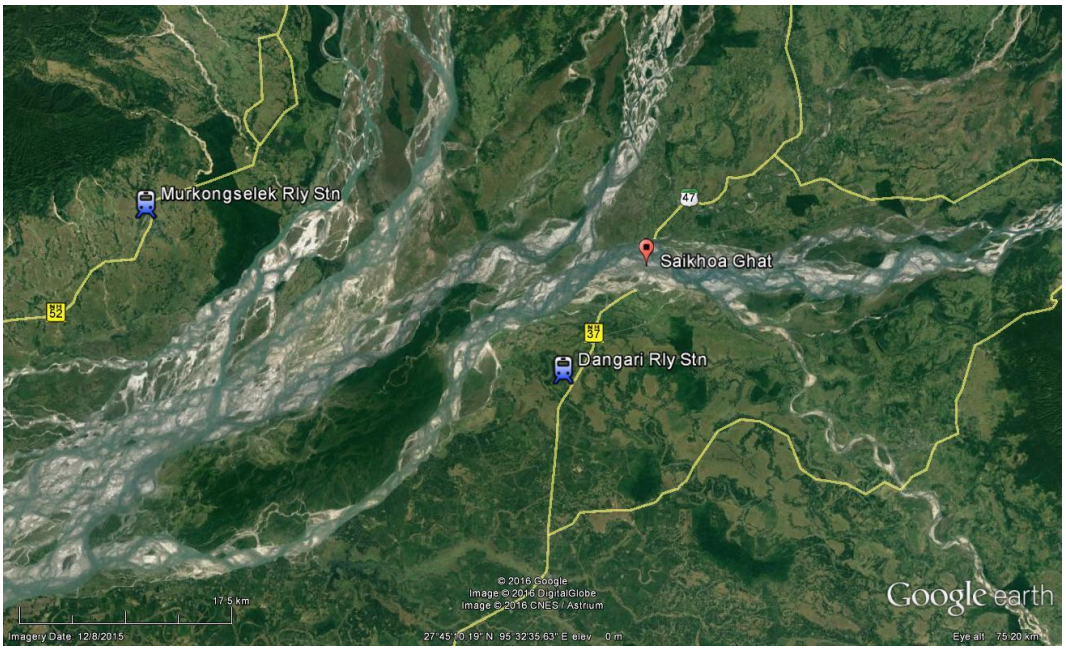


Figure 12 Locations of nearest railway stations in the vicinity of the proposed Lohit River

As mentioned above, this region is undergoing rapid progress. The first civilian airport in this region of Arunachal Pradesh is proposed at Tezu. The runway, terminal building and the air traffic control tower of the airport were completed in 2014. The airport, if completed, will have the handling capacity of ATR 72 types of aircrafts. This airport is 5 to 10 km away from Parasuram Kund as shown in figure 13. The construction work for this airport is in progress.

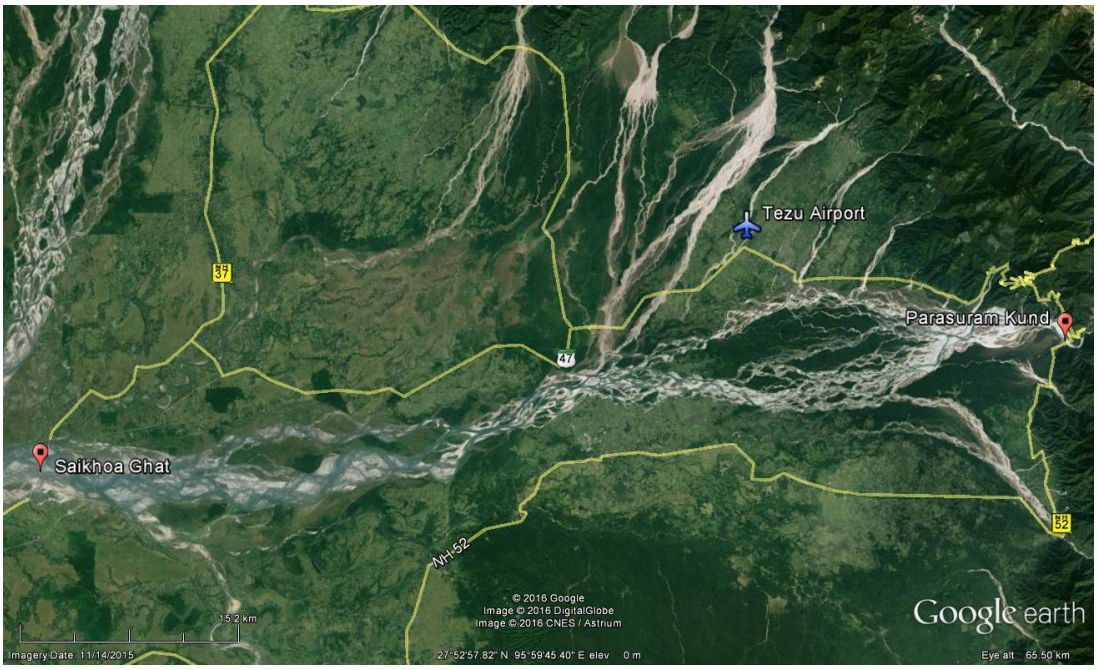


Figure 13 Location of Tezu airport from Parasuram Kund

2.3.1 Impact of Post Demwe Hydro Electric Project Scenario

Being executed jointly by Athena Energy Ventures and the Arunachal Pradesh government, the project was granted environment clearance in 2010. The design discharge of the project is 1729 cumecs with a design head of 112.00 m. The discharge which is anticipated post Demwe HEP scenario would definitely play a major role in the development of required IWT infrastructure which is considered in this study. This need an elaborate assessment of rule curves approved for the Demwe HEP by the Central Water Commission (CWC) and Central Electricity Authority (CEA). The same shall be carried out if the proposed waterway is found feasible for navigation.

2.3.2 Condition of River Bank and Bank Protection

It is observed from various literature that some major bank protection works have been carried out in the Lohit River in earlier times shown in Figure 14 and 15.

Figure 14 Spur in Lohit river before and during construction near Suparna (Source: North Eastern Council (NEC) Evaluation of NEC funded projects in Arunachal Pradesh report)

Figure 15 A deflector and plugging structure under construction near Suparna (Source: North Eastern Council (NEC) Evaluation of NEC funded projects in Arunachal Pradesh report)

As per the reconnaissance survey, the latest condition of the river banks and the protection measures taken were observed from Saikhoa ghat to Parasuram Kund. The banks at many places were eroded due to the high velocity of flow during peak flood. It was also noticed that the river carries enormous amount of boulders and silt during flood and other seasons.

2.3.3 Environmental impacts

Preliminary analysis of the river shows that no severe environmental impact will be there due to the development of IWT. In order to have a clear idea of the impact, detailed survey is necessary and the same is not a part of this Stage I study.

2.3.4 Border issue

The river crosses the border of the States of Assam and Arunachal Pradesh. Minor issues related to intra-border activities were noticed during the discussion with local stakeholders.

2.3.5 Slope of the region

Along with the primary data, remote sensing data was used to assess the slope of the stretch under investigation. Figure 16 shows the elevation profile of the region. It can be seen that initial stretch of about 30 km is steep. The remaining section of the region have relatively medium slope. It was observed that the average velocity during flood seasons throughout the reach would be more than 3 m/s, which is not conducive for manoeuvring of vessels. The velocity during other season is also in the range of 1.5 to 3 m/s owing to the steep slope of the riverbed. Further, rock outcrops and boulders varying from bigger to smaller sizes was also observed as hindrance for vessel movement in this proposed reach of Lohit River.

Figure 16 Slope of the region under consideration

2.3.6 Discharge in Lohit River

The Lohit river basin is the easternmost river basin of India in Arunachal Pradesh with its catchment spreading across international border covering part of Tibet and India. The basin is bounded by China and part of Dibang valley district of Arunachal Pradesh in the north, Changlang district (Burhi Dibang sub basin) in the south, China and hills of Myanmar in the east and Assam state in the west. The Lohit basin is situated between latitude 27˚ 34' 00" N and 29 36' 00" N and longitude 95˚ 38' 00" E and 97˚ 44' 00" E. Lohit river passes through deep valleys, narrow gorges and deep green lush forest with high hydropower potential. It is a major component of the Brahmaputra river system. It rises from the snow covered peaks in the eastern Tibet at elevation of 6190 m above MSL and has a total length of about 413 km from its source in Tibet to its confluence point with Siang/Dihang near Kobo (Reference: WAPCOS, 2005). The following reports/ documents were reviewed and the data as reported in these reports was used as basis for the present report.

1) Lohit River Basin Study carried out by M/s WAPCOS during 2014 – 15.

2) Copies of Prefeasibility Reports accepted for development of HEPs upstream of Parasuram Kund.

Mompani and Tezu G& D sites are available upstream of Parasuram Kund Bridge and same is considered for studying the discharge characteristics of Lohit River for this proposed study. The impact on hydrologic regime change on account of change in the free flowing condition of the river due to the construction of HEPs was also reviewed. As per the Lohit basin study report, the maximum and minimum discharge at 90% dependable year was estimated as 2085 Cumec and 325 Cumec respectively for Demwe Lower HEP which is just upstream of Parasuram Kund. This was projected post dam construction of Demwe Lower HEP.

The details of number of hours of availability of peaking power for Demwe Lower hydroelectric project were also observed from the report by M/s WAPCOS. The number of peaking power availability in monsoon and lean season shall be 7.3 to 24 hours and 4.5 to 13.9 hours respectively. As a result in lean season the river will remain dry for a period of 10 to 19 hours followed by 5 to 14 hours of design discharge (1729 cumec).

Sec. 3 Reconnaissance Survey – Stretch wise with photographs

The detailed field reconnaissance survey was taken up after the analysis of available data. The primary tasks accomplished during the surveys include;

I. Single line longitudinal survey (Bathymetric survey) in the deepest depths with the help of DGPS using Automatic Hydrographic Survey System. Deepest route was accessed with the help of experienced pilots who involved in the study reach of river with local boats.
II. Details (horizontal and vertical clearances above spot water level of bridges and electric line en route will be collected and indicated on the chart and also in the report along with their co-ordinates and location.
III. Topographical features of the proposed Inland Waterways.
IV. Typical physical features along the alignment e.g. land use pattern.
V. Preliminary identification of stretches having year round flow and critical depth for navigational purpose.
VI. Preliminary Traffic identification on the proposed Inland Waterways.
VII. Inventory of major aspects including proposed Inland Waterway width, Terrain, Bridges and structures across the proposed Inland Waterways (Type, size and location), urban areas (location extent). Geologically sensitive areas environmental features and hydrological features
VIII. Critical areas requiring detailed investigations
IX. Requirements for carrying out supplementary investigations
X. Drainage conditions.
XI. Type and extent of existing utility services along the alignment.
XII. Identification of various agencies of the govt. from whom the concerned project clearances for implementation are to be sought.

The data derived from the reconnaissance surveys were utilized for planning and programming the detailed surveys and investigations. All field studies including the traffic surveys taken up on the basis of information derived from the reconnaissance surveys.

3.1 Methodology including Resources and Equipment

The technical details of the approach and methodology proposed for the present study is provided in the following section.

3.1.1 Reconnaissance Survey (for traffic potential)

The main objective of this reconnaissance survey is to carry out Preliminary Traffic study, analysis of present state of traffic, collect data and to analyze the market and potential usage of proposed Inland Waterways in Assam and Arunachal Pradesh states with their connectivity to main hinder land for the development of stretches as national waterways.

Various data and sources used for this are:

a. Basic data from state Agencies, central water commission, River authorities, railways, IWAI.
b. Data of industrial, commercial / agro clusters in the hinterland of the proposed riverine ports from secondary sources like reports available in public domain were collected for further analysis
c. Data of number of barges, ships, ferries and speed boats, cargo and passenger vehicles plying on the rivers were collected from State and district level Govt. agencies and by visual observations

d. Data regarding present IWT facilities, Interstate and Intra state traffic serviced along the routes & passenger movement.
e. Data regarding commodities presently plying on the identified route and potential commodities which could be transported in future.
f. Collection of data on all aspects of transportation, trade, economics, natural resources, and the environment.
g. The rail and road connectivity to the present ports on the stretches of the rivers to derive the costs of transport.
h. The data regarding future canal and dam projects were collected in order to identify future potential routes in the given cluster.
i. Type of crops (in different seasons) and industries along the waterway.

3.1.2 Hydrographic Survey for Phase 1

The longitudinal bathymetric survey was carried out by using Automated Hydrographic Survey System (using digital Echo sounder for depth measurement, GPS for position fixing and Hypackmax data logging). The survey was conducted in WGS'84 datum.

Main objectives of the survey are

a. To assess the navigability of the waterway and to assess the shoal lengths
b. Topographical survey mainly to understand the details of the permanent structures located within this corridor.
c. To identifying cross structures which are obstructing navigation.

3.1.2.1 Horizontal and Vertical Control

Importance was given for maintaining accuracy of the horizontal controls throughout the survey. The following methods were used to achieve the below objectives:

i. Transfer of positions from CWC Bench Marks.
ii. Using High precision RTK DGPS in fix mode using UHF Radio Modem with IHO accuracy standards, with more than 24 hours observations at a permanent platform/base.
iv. DGPS receiving direct Satellite corrections were used.

Benchmarks (BM) present at the CWC office at Dhola (Figure 17) was considered for the current survey. Details of the BM is given in the table below. This was transferred to the river bank using RTK instruments.

Figure 17 Bench mark from CWC office at Dhola

Latitude	Longitude	Elevation
27°45'36.14" N	95°35'44.51" E	128.445 m

3.1.2.2 Equipment

Selection of equipment and other accessories are important in determining the accuracy of the survey. Hence, only highly accurate instruments will be selected for this study. The following sections give the details of the equipment used for the current study

3.1.2.3 Positioning system

Charting the bathymetry and topography requires locating and measuring the geographic position (horizontal), and then referencing those measurements to a standard reference frame or datum (control). In modern times with the latest advancements in technology, high accurate GPS systems are used for horizontal positioning. For the current survey A Trimble DGPS (SPS361) system (Figure 18) was used.

Trimble DGPS system (SPS361)

SPS361(Figure 18) is a flexible, modular, GPS Heading receiver that delivers precise heading and sub-meter horizontal positioning accuracy for marine and OEM applications. It has an integrated Bluetooth wireless technology for cable-free configuration and operation with a computer or cell phone. It is compatible with 4-channel WAAS (Wide Area Augmentation System), EGNOS (European Geo-Stationary Navigation System), and MSAS Satellite-Based Augmentation System (SBAS).

Figure 18 Trimble SPS 361

Echo Sounder System

Echo sounding is a type of SONAR used to determine the depth of water by transmitting sound pulses into water. The time interval between emission and return of a pulse is recorded, which is used to determine the depth of water along with the speed of sound in water at the time. This information is then typically used for navigation purposes or in order to obtain depths for charting purposes. For the current study Bathy 500 MF multi frequency echo sounder (Figure 19) was used

Bathy 500 MF multi frequency echo sounder

The Bathy-500MF Survey Echo Sounder (Figure 19) provides a high-contrast thermal chart record complete with alphanumeric annotation of important parameters such as geographic position, depth, speed of sound and offset for draft/tide. Real-time viewing of all parameters via front panel liquid-crystal display. Position input can be from either a standard C/A GPS receiver or differential GPS system. Depth data is available to external devices in digital form, via a versatile interface, whose format can be selected using the front panel keypad. Digital depth data output is available in various industry standard RS-232/422 formats or NMEA-0183. The ability to accept external annotation input from various PC-based hydrographic software is standard in the Bathy-500MF. A transducer with 210 kHz frequency along with a mounting bracket & base plate was also used for the current hydrographic survey.

Figure 19 Bathy 500 MF multi frequency echo sounder

3.1.2.4 Topographic Survey

Topographic survey is an integral part of the current survey and for that South RTK surveying instruments were used. Photographs of conducting topographic survey along Lohit River using RTK instruments are given in Figure 20.

Figure 20 Topographic survey using RTK along Lohit River

3.1.2.5 Calibration of the equipment

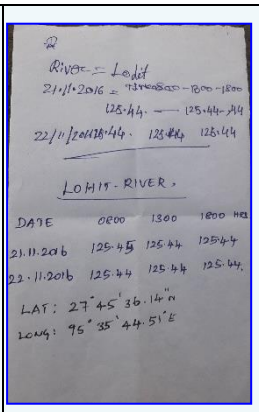
The equipment to be used for the survey was calibrated by the equipment supplier.

3.1.2.6 Data Processing

The topographic and hydrographic data collected were processed and analyzed using the proprietary data processing software i.e. HYPACK and AUTOCAD. Figure 21 is a flowchart that explaining the sequence and process of digital data processing

3.1.2.7 Chart Datum / Sounding Datum and Reductions Details

The water availability in Lohit River is moderate and the spot leveling by topographic method was attempted for the entire survey stretch from Parasuram kund to Alubari using RTK & DGPS survey. Remaining stretch from Alubari to Saikhowa ghat was attempeted by using Echo sounder. The Water level details are obtained from CWC office at Dholla site was given in table below.

Location	Dholla Gauge Site					
Date	Latitude (N)	Longitude (E)	Water Level w.r.t. MSL (m)		
			0800 hrs	1300 hrs	1800 hrs
21.11.2016	27◦45’36.14” N	95◦35’44.51” E	125.45	125.44	125.44
22.11.2016			125.44	125.44	125.44
SD at Dholla gauge site is 125.55 m					

Corrections

Sl. No.	Tide Gauges	Chainage (km)	Stretch for corrected soundings and topo levels (km)	Established Sounding Datum w.r.t. MSL (m) at col. A.	Sounding Datum of Tide Gauge wrt MSL (m)	Correction in WL data for Bathymetric survey (m)	Topo level data to be converted as depth for volume calculation wrt SD (m)
	A	B	C (50% stretch is to be selected on both side of tide gauge)	D +ve indicates above MSL -ve indicates below MSL	E	F = (E- WL data in MSL)	G = ((E- Topo Levels in MSL)
1	CWC Data	10	0-10	125.55	125.45 (Water Level)	(+)0.1	Reduced_Level.xyz
2		20	10-20			(+)0.2	
3		30	20-30			(+)0.3	
4		40	30-44.6			(+)0.4	

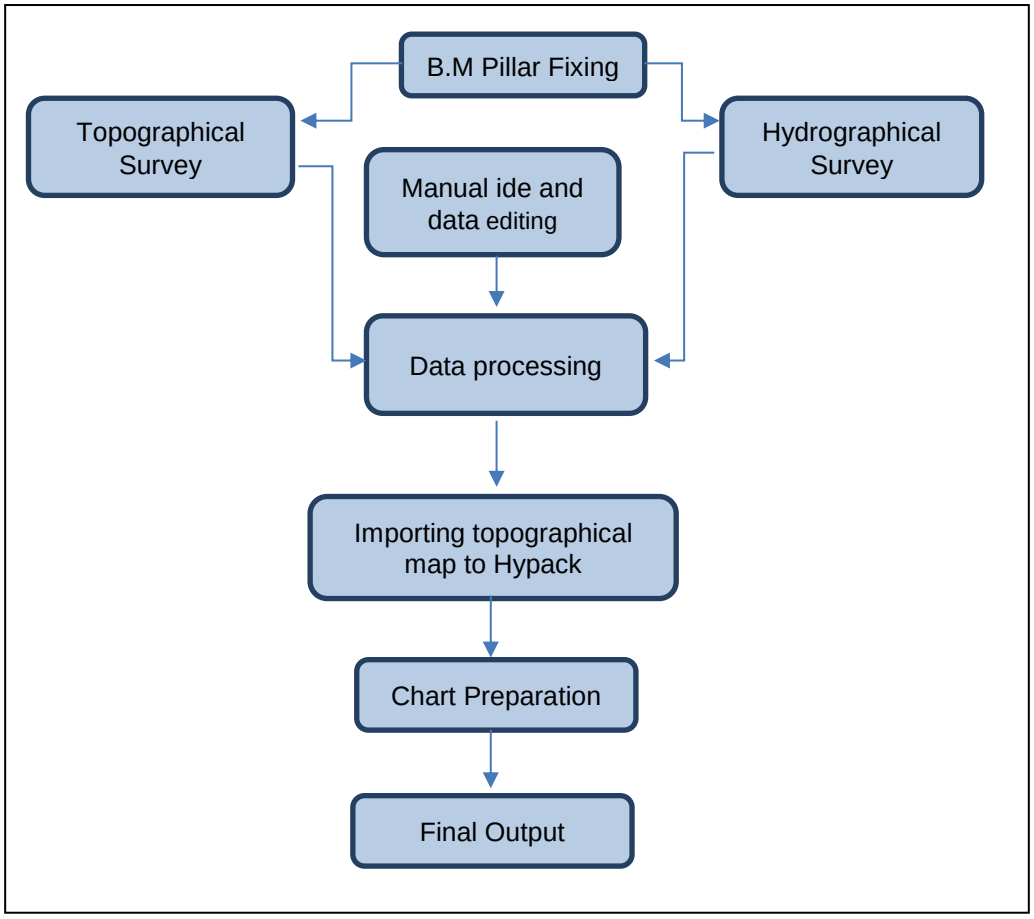


Figure 21 Flowchart showing the sequence and process of digital data processing

3.2 Hydrographic/Topographic Survey

Longitudinal survey was conducted for the proposed stretch of Lohit River. The survey started on 21 November 2016 and ended on 29th November 2016. Based on this survey the Maximum and minimum depths of the deepest channel, length of shoals, details of cross structures, land use pattern, villages at the bank etc. were obtained. The results of the survey is provided in the following sections. Detailed bathymetric chart for the entire study area is submitted separately.

In order to understand the details of the shoals, available maximum depths and the condition of the banks, the entire survey region was divided into 10 km chainages and the results of the same are present in the following sections. Chainage 0 is fixed at the downstream end (i.e. confluence point with Brahmaputra) and chainage 86.00 is set at the upstream end (Parasuramkund).

3.2.1 Chainage 00.00 – 10.00 km (From Purana Sadia to No.1 Boiragimath)

The stretch of Lohit River from ch 0 to ch 10 km is shown in Figure 22.

Figure 22 Chainage 0.00 – 10.00 km (From Purana Sadia to No.1 Boiragimath)

Cross structure(s)

One bridge was noticed along this stretch of the river, the details are discussed in Section 2.2

Depth and Shoal Details

Table 7 provides the details of the shoal noticed along this section of the river based on the single line longitudinal survey. This stretch is comparatively deeper where most of the region the depth was above 0.5 m.

Table 7 Details of the shoals from Chainage 0.00 – 10.00 km (From Purana Sadia to No.1 Boiragimath)

Depth (m)	Length (m)
<1.2 m	3140
1.2 to 1.4 m	335
1.4 to 1.7 m	1230
1.7 to 2.0 m	1220
>2.0 m	4075

Land Use

It was noticed that the left bank of the river in this section is used majorly for paddy cultivation.

Villages

Left bank: Purana Sadia, Saikhoa Ghat, Miri Chapori, Kundil, Lakhimpuria nepali

Right bank: 2 No. Muluk Chapori, Miri Chapori, Purana Sadiya, 1 No.Kundil, Lakhimpuriya Nepali, Saikhoa Ghat, Lawpani N.C

3.2.2 Chainage 10.00 – 20.00 km (From No.1 Boiragimath to Eka Basti)

The stretch of Lohit River from ch 10 to ch 20 km is shown in Figure 23.

Figure 23 Chainage 10.00 – 20.00 km (From No.1 Boiragimath to Eka Basti)

Depth and Shoal Details

Table 8 provides details of the shoal noticed along this section of the river based on the single line longitudinal survey. More than 6 km of this stretch of the river is observed to have depth more than 1 m.

Table 8 Details of the depth of the shoals from Chainage 10.00 – 20.00 km (From No.1 Boiragimath to Eka Basti)

Depth (m)	Length (m)
<1.2 m	4250
1.2 to 1.4 m	780
1.4 to 1.7 m	1460
1.7 to 2.0 m	1320
>2.0 m	2190

Land Use

The land that is close to the river is basically the flood plain of Lohit River and mainly is barren or is used for seasonal farming during lean season.

Villages

Left bank: Bacha Gaon

Right bank: Padumphull, 1 No.Bacha Gaon, 2 No. Bacha Gaon, Bhobola, Sonowal Gaon, Holong Pathar, Kukuramora N.C, Halow Bananchal, Na-Bacha Gaon, 2 No.Boiragimath,

Kukuramora . Kundil Kinar, Halow Gaon, Doom Pathar, Telikola Gaon, Changchap N.C, Changchap

3.2.3 Chainage 20.00 – 30.00 km (From Eka Basti to Sunpura H.Q)

The stretch of Lohit River from ch 20 to ch 30 km is shown in Figure 24. The state border of Arunachal Pradesh and Assam is in this section (at chainage 22.52 km).

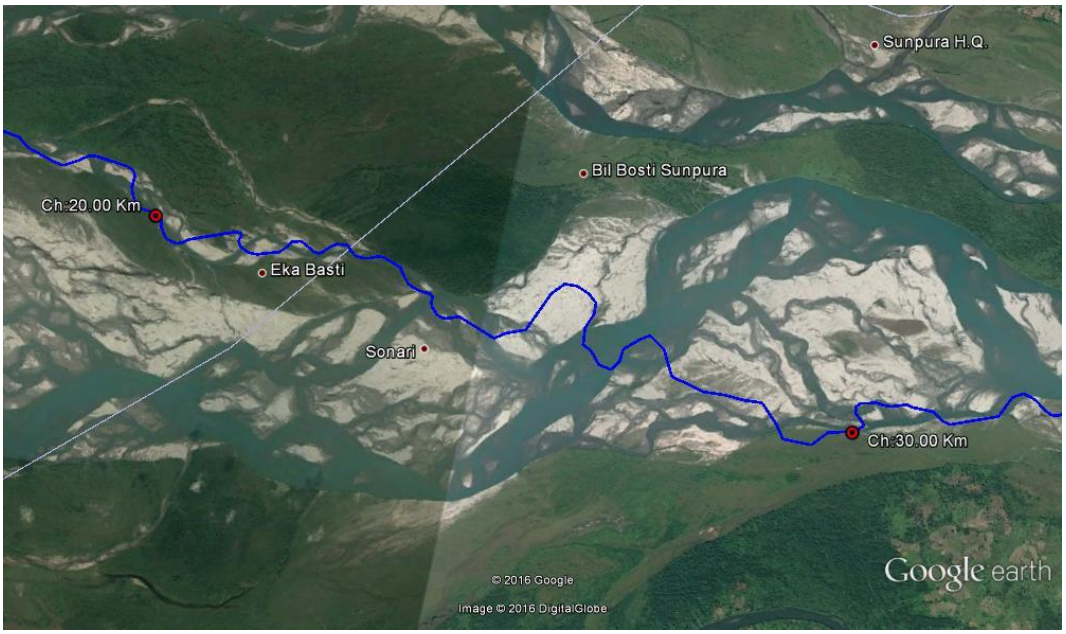


Figure 24 Chainage 20.00 – 30.00 km (From Eka Basti to Sunpura H.Q). state border can be seen as white line.

Depth and Shoal Details

Table 9 provides the details of the shoal noticed along this section of the river based on the single line longitudinal survey. More than 7 km of the river is having depth more than 8 m.

Table 9 Details of the shoals from Chainage 20.00 – 30.00 km (from)

Depth (m)	Length (m)
<1.2 m	2330
1.2 to 1.4 m	1200
1.4 to 1.7 m	1850
1.7 to 2.0 m	720
>2.0 m	3900

Land Use

Left bank: Hilaguri Chapari N.C, Eka Basti, Sonari, Jona – IV, Jona Kachari Kuli, Jona – III, Jona – II, Jona – I, Munglang, Dadum Jona, Mengkenmiri

Right bank: Sonowal Gaon, Bhim Chapari, Bil Bosti Sunpura, Sunpura H.Q., Nasaki, Bor Dhania, Natun Balijan, Dhaniapur

3.2.4 Chainage 30.00 – 40.00 km (From Sunpura H.Q to Mazgoan)

The stretch of Lohit River from ch 0 to ch 10 km is shown inFigure 25.

Figure 25 Chainage 30.00 – 40.00 km (From Sunpura H.Q to Mazgoan)

Depth and Shoal Details

Table 10 provides details of the shoal noticed along this section of the river based on the single line longitudinal survey.

Table 10 Details of the shoals from Chainage 30.00 – 40.00 km (From Sunpura H.Q to Mazgoan)

Depth (m)	Length (m)
<1.2 m	2680
1.2 to 1.4 m	1480
1.4 to 1.7 m	1800
1.7 to 2.0 m	1240
>2.0 m	2800

Villages

Left bank: Morapat, Tenga Pani, Modhuban

Right bank: Jeko, Naptiya Ahom

3.2.5 Chainage 40.00 – 50.00 km (From Mazgaon to Chakma – I)

The stretch of Lohit River from ch 40 to ch 50 km is shown in Figure 26. Bathymetric survey could only be conducted upto ch 48.80 km as there was not enough water after that. Topographic survey was carried out from there as per TOR.

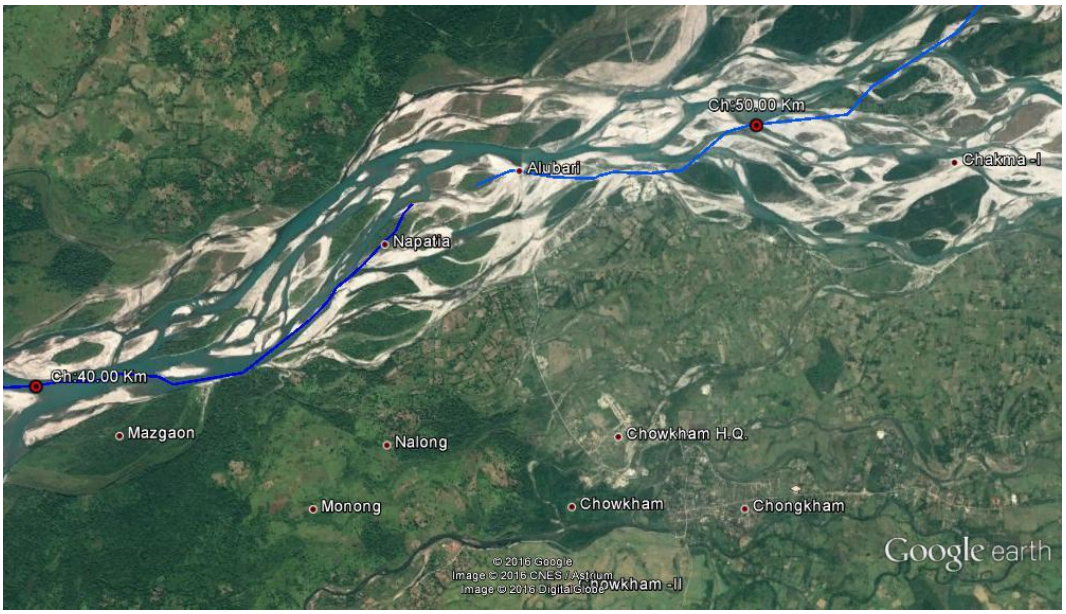


Figure 26 Chainage 40.00 – 50.00 km (From Mazgaon to Chakma – I)

Depth and Shoal Details

Table 11 provides details of the shoal noticed along this section of the river based on the single line longitudinal survey.

Table 11 Details of the shoals from Chainage 40.00 – 48.80 km (From Mazgaon to Napatia)

Depth (m)	Length (m)
<1.2 m	3260
1.2 to 1.4 m	325
1.4 to 1.7 m	400
1.7 to 2.0 m	470
>2.0 m	4425

Villages

Left bank: Mazgaon, Alubari, Monong, Nalong, Chowkham, Chowkham –II, Chowkham H.Q., Chongkham, Chowkham – I

Right bank: Alubari, Alubari Ghat, 19th Mile, 20th Mile, Hati Duba, New Hati Duba, 27th Mile, Paya

After chainage 48.8, there was not enough water in the river to do bathymetric survey. Hence, from here topographic survey was carried out as per the TOR.

3.2.6 Chainage 50.00 – 60.00 km (From Chakma – I to Temporary L / Camp)

Figure 27 Chainage 50.00 – 60.00 km (From Chakma – I to Temporary L / Camp)

Villages

Left bank: Chakma –I, Chakma –II, Chakma-III, Guna Nagar - II West, Guna Nagar – I, Pankhao

Right bank: Lohit ferry ghat, Temporary L / Camp, Danglat, Jhalukbari

3.2.7 Chainage 60.00 – 70.00 km (From Temporary L / Camp to Dhurah Nallah)

Figure 28 Chainage 60.00 – 70.00 km (From Temporary L / Camp to Dhurah Nallah)

Villages

Right bank: Panbari, Khoraliang, Tezu, Tindolong, Telluliang, Parasuram Cement Plant

3.2.8 Chainage 70.00 – 80.00 km (From Dhurah Nallah to Mawaai – I)

Figure 29 Chainage 70.00 – 80.00 km (From Dhurah Nallah to Mawaai – I)

Villages

Left bank: Mawai – I, New Phukari

Right bank: Demwe , Chikdom Labour camp, New Duraliang

3.2.9 Chainage 80.00 – 86.00 km (From Mawaai – I toParasuram Kund)

Figure 30 Chainage 80.00 – 86.00 km (From Mawaai – I to Parasuram Kund)

Villages

Left bank: Parsuram Kund, Mawai - I

Right bank: Kathan New, Lamliang, Tinali Brahma Kund, 10th Nallah L/Camp, Hawa Camp

Sec. 4 Market Analysis

4.1 Land use Pattern along Waterway

In order to have a better understanding of the land utilisation of the region, a Land use land cover map was produced using NRSC data and is presented in Figure 31 . The classification of land use pattern was done based on the “Natural Resource Census: Land use Land Cover Database” of NRSC.

From the classification it can be seen that near the river, the left bank of Lohit have more cultivated land than in the right bank. The island that is present in the middle of the river is identified to be covered with evergreen/semi evergreen forest. This has to be confirmed by checking the ground truth. This will be achieved during the reconnaissance survey.

The urban built up area that is seen in the right bank of the river is the only urbanised town in the Lohit district, Tezu. A couple of small urbane built-up area was also noticed in the southern part of the river. This is Chongkham, another developing town in Arunachal Pradesh.

Large area in the upstream of Parasurama Kunda is observed to be covered with thick forest as per satellite derived data. This is true for a large area in the left hand side of the river as well. These regions will also be checked in detail for getting the ground truth.

With the help of remote sensing data it was observed that a few rivers/streams were joining Lohit at various locations. These locations were identified and will be cross checked during the reconnaissance survey.

4.2 Crops and Agriculture in the Area

Agriculture is the mainstay of the people of the district of Lohit. Major food crops produced in this district are Paddy, Maize, Millet, Wheat and pulses, and a total of 17905 ha area cultivated under different crops. Because of limited surface water source, the agricultural practice is basically mono cropped.

As per the data collected from Krishi Vigyan Kendra of Lohit district, established under the administrative control of ICAR - NRC, general agricultural practices of the district can be compiled as Table 12 and Table 13 .

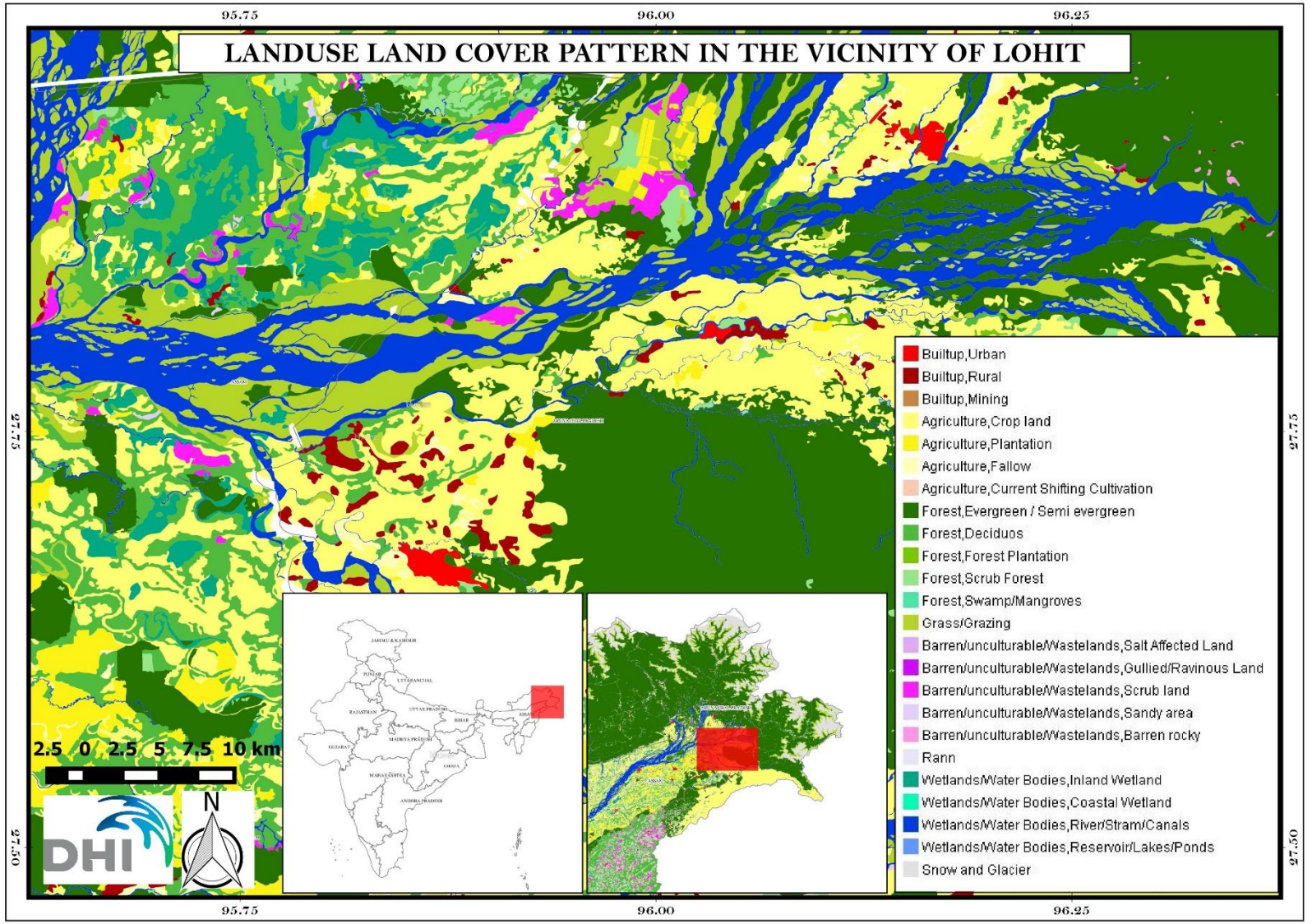


Figure 31 Land use land cover pattern in the vicinity of Lohit River

Table 12 General Agricultural statistics of Lohit District

Net area sown	**41298 ha**
Cropping intensity	1.03
Area coverage under HYV	1464 ha
Govt agriculture farm	1
Area under irrigation	4360 ha
Per capita net area sown	1.8 ha
Area brought under fertilizer (NPK)	1500 ha
Consumption of fertilizer	708 qt
Area coverage under plant protection measures	1300 ha
Land development under permanent cultivation	3945 ha
Total area under cereals (2007-08)	19377 ha
Total area under pulses (2007-08)	1865 ha
Total area under oilseeds (2007-08)	11423 ha
Total production of cereals (2007-08)	34847 MT
Total production of pulses (2007-08)	2100 MT
Total production of Oilseeds (2007-08)	8930 MT

Table 13 Crops cultivated in Lohit District

Sl. No	Principle Crops	Area (in ha)	Production (in tones)	Productivity (q/ha)
Cereals				
1	Paddy (Irrigated)	2595	8356	32.2
2	Paddy (Rainfed)	7150	16302	22.8
3	Paddy-Jhum	800	592	7.4
4	Maize(Improved	520	738	14.2
5	Maize-Local	7805	8117	10.4
6	Millet	92	78	8.5
7	Wheat	415	664	16
Pulses				
1	Black gram	635	610	9.6

Sl. No	Principle Crops	Area (in ha)	Production (in tones)	Productivity (q/ha)
2	Green gram	215	194	9
3	Pea	560	750	13.4
4	Other (Local)	455	546	12
Oil Seeds				
1	Mustard	10778	8191	7.6
2	Sesamum	160	80	5
3	Soyabean	265	411	15.5
4	Local Soyabean	180	198	11
Others				
	Potato	620	5704	92
	Sugarcane	20	130	65

4.3 Existing Industries along Waterway

Lohit district of Arunachal Pradesh, through which the major part of the proposed IWT waterway is passing, is not a region which is highly industrialised. No major industries were noticed during the initial field visit. Tezu is the only partially industrialised town in the district. As per the district administration, a few minor industries are present in the region. They can be classified as

- Agro based
- Wood/wooden based (mainly furniture)
- Mineral based
- Metal based (steel fabrication) and
- Repairing and servicing

4.4 Availability of passenger ferry services

Ferry services on River Lohit are observed in the following locations:

- Saikhowa Ghat to Parsuram Kund via Alubari Ghat for connecting Tezu to Dimwe.
- Tezu to Medo
- Digaru to Alubari
- Shivaji nagar to Tezugham

- Passenger ferry services were noticed at Alubari ghat and Saikhoa ghat.
- Non-availability of required number of ferries and restriction for servicing/repairing facilities for vessels are major constraints.

- Ferries are used to cross the river from left bank to right bank which will avoid circuitous road travel to reach Tezu and other areas in right bank.

Alubari ghat ferry service- Chainage 46.6 km

Figure 32 Ro-Ro Ferry Service at Alubari Ghat in Lohit River Chainage 46.6 km

4.5 Historical and tourist places

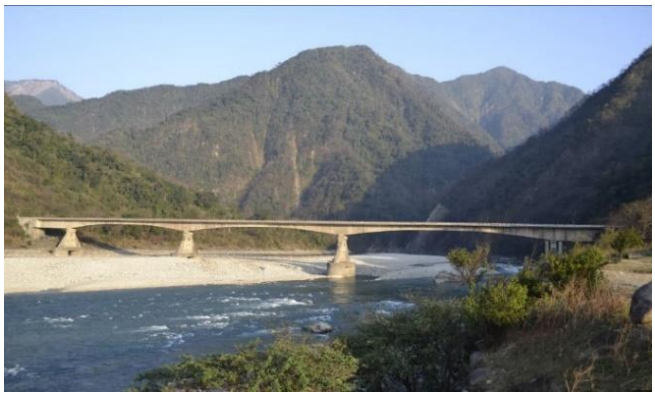
Parasuram Kund is situated within the Kamlang Reserve Forest area. This place is on the Left bank of Lohit River carries a strong mythological link with the legend of Parsurama, a Hindu

sage. Parshuam Kund Mela is an annual religious fair which is celebrated near Parshuram Kund. The popular site attracts pilgrims from Nepal, from across India, and from nearby states of Manipur and Assam. Over 70,000 devotees take holy dip its water each year on the occasion of Makar Sankranti, in the month of January

Kamlang Wildlife Sanctuary, a tourist destination is observed on the left bank of Lohit river near Wakro.

4.6 Selected photographs taken during the field visit

Parshuram Kund 85.83



Lohit Bridge at Parshuaram Kund 85.5

View of from Parasuram Kund Bridge Ch 86.00

View of from Parasuram Kund Bridge Ch 86.00

Gravels in the Alubari ghat Ch. 46.50

Alubari ghat :unload the vehicles Ch. 46.60

Alubarighat Ferry Service Ch.46.50

Alubari Bridge across Lohit River Ch. 47.0 km

Group discussion with IWAI staff at Dibrugarh

Showing HFL level at Lohit River Bridge at Dhola Ch. 5.36

Ro Ro service in Lohit River (Ch. 4.8 km)

CWC office Dhola (Ch. -6 km approximately)

Alubhari down stream ch: 46.32

Sudden elevation/slope near Alubari Ch: 46

Bench mark area (Ch. -6 km approximately)

Bench mark at CWC office, Dhola(Ch. -6 km approximately)

Gauge point at Dhola (Ch. -6 km approximately)

Gauge site at Dhola (Ch. -6 km approximately)

Sec. 5 Observations and Inferences

The proposed waterway of a length of 86 km from Parasuram Kund to Saikhoa ghat in Lohit River was studied based on following parameters.

1. Field visit made to the study area
2. Single line longitudinal survey
3. Various reports, articles
4. Published scientific papers and
5. Remote sensing

5.1 LAD/Flow Depths

Summary of the shoals observed at Lohit River during longitudinal survey, based on the field data collection campaign is given in Table 14.

Table 14 Summary of the depths observed at Lohit River during the survey

Depth (m)	0-10 km (m)	10-20 km (m)	20-30 km (m)	30-40 km (m)	40-48.8 km (m)
<1.2 m	2600	3790	1850	2300	3260
1.2 to 1.4 m	3325	4020	4250	4900	325
1.4 to 1.7 m	3185	1320	3550	2650	405
1.7 to 2.0 m	550	520	350	150	473
>2.0 m	340	350	Nil	Nil	4425

5.2 Classification of Waterway

IWAI have identified the primary details that is to be addressed while developing an inland waterway and based on that the waterways are classified into five classes. The classification of waterways by Inland Waterway Authority of India is given in Table 15.

Table 15 Classification of waterways

Sl No	Class	Description
1	Class I	Waterways with navigable channel of minimum depth 1.2 m, bottom width 30 m (in case of rivers) and depth 1.5 m, bottom width 20 m (in case of canals) with minimum radius at bends 300 m, minimum vertical clearance 4 m, and horizontal clearance between piers 30 m, (in case of rivers) and 20 m, (in case of canals)
2	Class II	Waterways with navigable channel of minimum depth 1.4 m, bottom width 40 m, (in case of rivers) and depth1.8 m, bottom width 30 m, (in case of canals) with minimum radius at bends` 500m, in minimum vertical clearance 5 m, and horizontal clearance between piers 40 m, (in case of rivers) and 30 m, (in case of canals)

3	Class III	Waterways with navigable channel of minimum depth 1.7m, bottom. Width 50, m, (in case of rivers) and depth 2.2 m bottom width 40 m, (in case of canals) with minimum radius at bends 700m minimum. vertical clearance 7 m, and horizontal clearance between piers 50 m, (in case of rivers) and 40 m, (in case of canals)
4	Class IV	Waterways with navigable channel of minimum depth 2.0 m, bottom width 50 m, (in case of rivers) and depth 2.5m, bottom width 50 m, (in case of canals) with minimum radius at bends 800m, minimum vertical clearance 10 m, and horizontal clearance between piers 50 m, (in case of rivers) and 50 m, (in case of canals)
5	Class IV(A)	Waterways on rivers only with navigable channel of minimum depth 2.0 m, bottom width 80 m, with minimum radius at bends 800 m, minimum vertical clearance 10 m, and horizontal clearance between piers 80 m
6	Class V	Waterways with navigable channel of minimum depth 2.75m, bottom width 60 m, (in case of rivers) and depth 3.5 m bottom width 60 m, (in case at canals) with minimum radius at bends 900m, minimum vertical clearance 10 m, and horizontal clearance between piers 60 m, (both in case of rivers and canals)
7	Class V (A)	Waterways on rivers only with navigable channel of minimum depth 2.75 m, bottom width 100 m, with minimum radius of bends 900 m, minimum vertical clearance 10 m, and horizontal clearance between piers 100 m

5.3 SWOT Analysis

Strength	Weakness	Opportunities	Threat
Possibility of Interconnecting with NW -2	Availability of road network	Huge potential for Industrial Investment	Risk Natural calamities such as Floods
Water Availability during Post Flood Season	Lack of Financial Strength for local vessel operators and monopoly.	Availability of new technologies and farming practices.	Local and Political Support and Unrest
Development of Large Hydropower Projects in the basin	Lack of Marketing Strategies	Rising demand for diversified agriculture and horticulture product.	High cost of Operation
	Local Unrest and Agitations for various reasons	Focused area of Central and State Govt. Schemes	Competition from other Modes
	Flood uncertainties	Commercialization and globalization of agriculture and other market	Shortage of skilled labor
	Inadequate credit for agricultural operations.		Timely implementation of projects
	High cost of infrastructure maintenance due to recurring floods.		.
	No assured return on investment.		

	No Repairing and other ancillary facilities for Vessels		
	Presence of NHs on both banks of the river		

5.4 Conclusions

Lohit River is fed with both snowmelt and rainwater, offering the possibility of perennial availability of water. Based on the data collected from the study reach of Lohit River upto Parasuram Kund, the following conclusions are made.

- 1 m to 1.2 m average water depth could be available during lean season flow upto Alubari Ghat (Chainage 48.8). For the remaining stretch, available depth was less than 0.5m.
- The flow channel in the river has meandering properties and availability of waterway portion is not guaranteed after every flood season.
- In the entire stretch of 86 km, the river has huge boulders and there are rock outcrops in the upstream reach from Alubari Ghat to Parasuram Kund.
- High velocity and the presence of boulders create less opportunity for developing this waterway with supporting IWT infrastructure.
- Two bridges are under construction in the proposed stretch (at Sadia Ghat and Alubari Ghat). The vertical clearance with reference to HFL of these new bridges are only 2.5 and 3 m. This might cause hindrance for the boats especially during flood season.
- The cargo potential identified is construction material for proposed power projects and local cargo. The bridges (under construction) across the river may not permit the ODC movement to HEP construction sites due to poor vertical clearance and lack of required LAD throughout the year in the entire river stretch.
- There are no major industries in the project influential area (PIA). Agricultural produce is the major livelihood option for the local population apart from food/forestry based products.
- National highways are running parallel to the river in both the banks. Hence, the possibilities are remote to attract commercial vessel players who can operate vessel or Ro- Ro services.
- Ro-Ro services, which are currently operating at the Ghats, will also cease its operation once the bridges are open for traffic.
- Considering all the above facts, feasibility for developing this proposed stretch may not be a viable option considering the technical and other conditions of the PIA.

Annexures

Annexure 1. Map of the North East Frontier Railway Network

REFERENCE :

B.G. — DOUBLE | SINGLE; M.G.; N.G. — GC

1. EXISTING RAILWAY LINES
2. WORKS IN PROGRESS
   a. NEW LINE
   b. GAUGE CONVERSION
   c. DOUBLING
   3. SURVEYS
   4. SUGGESTED RLY. LINE
   5. ELECTRIFICATION
   6. OTHERS RLY.

NEPAL
SIKKIM
BHUTAN
ARUNACHAL PRADESH
ASSAM
NAGALAND
MEGHALAYA
MYANMAR
BANGLADESH
WEST BENGAL

GANGTOK, SINGTAM, RANGPO, Kglimpong, Jhalakaka, SAMTSE, NAYAL, DARJEELING (Mirik), GIELLEKHOLE, CHALSA, SUKNA, NEW DOMOHANI, PHUENTSHOLING, SIVOK, NEWMAL, SILIGURI, NEW JALPAIGURI, KAKRABITTA, GALGALIA, BANARHAT, LATAGURI, NEW MAYAGURI, HASIMARA, Falkata, Raninagar, BIRATNAGAR, JOGBANI, FORBESGANJ, ARARIA, KISHANGARH, HALDIBARI, JALUABARI RD., GUNJARIA, MEKHLIGANJ, CHANGRABANDHA, NEW COOCH BEHAR, BAMANHAT, GITALDAHA, JALALGARH, Dalkhola, PURNIA, SAHARSA, BARSOI, KATIHAR, Raigarj, KALIAGANJ, RADHIKAPUR, CHANCHAL, ITHAR, BUNIYADPUR, TEJNARYANPUR, HARISHCHANDRAPUR, BHALUKA RD., SAMSI, GAZOL, HILLI, BALURGHAT, EKLAKHI, OLD MALDA, MALDA, MALDA TOWN, SINGHABAD

ALIPUR DUAR, SAMUKTALA ROAD, NEW ALIPUR DUAR, FAKIRAGRAM, DHUBRI, GOALPARA, GELEPHU, SANDRUPJONGKHAR, NANGLAM, BONGAIGAON, BARPETA ROAD, PATHSALA, Tihu, RANGIYA, JOGIGHOPA, Barpeta, Sarthebari, AGTHORI, PANDU AZRA, DUDHNOI, Mendhipathar, BARNIHAT, DARRANGA, TAWANG, KALAKTANG, BHALUK PONG, GAMINI, ROWTA, BAGA, SESSAMUR, BALIPARA, NORTH TEZPUR, RANGAPARA, CHANGSARI, KAMAKHYA, GUWAHATI, DIGARU, TETELIA, MAIRABARI, HAIBERGAON, SALNA, SILGHAT. TN, SENCHOA, CHAPARMUKH, JAGI ROAD, LANKA, DIMAPUR, DIPHU, LUMDING, SHILONG, DITOKCHERRA, MIGRENDISA, HALFLONG HILL, KARONG, BADARPUR, KARIMGANJ, Maishashan, SILCHAR, JIRIBAM, JIRIGHAT, MAKRU, TUPUL, IMPHAL, MANIPUR, MOREH, MANDALAY CITY, BARAIGRAM, DULLAB CHERRA, KATAKHAL, LALBAZAR, ALGHAT, VAIRENGTEE, BHAIRABI, DHARMANAGAR, Cheraji, PENCHARTHAL, KUMARGHAT, MANU, AKHAURA, AGARTALA, BELONIA, SABROOM, SAIRANG, AIZAWL, LAWANGTLAI, SITTWE PORT, Naharlagun, ITANAGAR, HARMUTI, BEDETI, NORTH LAKHIMRUR, Along, PASIGHAT, TEZU, PARSURAMKUND, DHOLA GHAT, SHIKHO, MURKONG SELEK, SILAPATHAR, ST. SIBARGAON, DANGRI, DIBRUGARH TOWN, RUPAI MAKUM, LEKHAPANI, KHARSANG, TIRAP, BOGIBIL, CHALKHOI, TINSUKIA, MORANHAT, SIBSAGAR TOWN, NAGINIMORA, AMGURI, MARIANI, TULI, TULI TOWN, Tezit, FURKATING, KHUMTAI, CHUMUKEDIMA, KOHIMA, NAGALAND

S21 includes S48
S18 includes S49
S22 includes S55
S51 includes S64

NORTHEAST FRONTIER RAILWAY

DRAWING OFFICE/PLANNING DIRECTORATE

Annexure 2.Calibration certificates of the instruments

ثوت ميدل ايست لتجارة أجهزة الحاسب الألي ش ذ م م

Thought Middle East Computer Equipment Trading LLC

CALIBRATION CERTIFICATE

Date: 07-Jan-17

Manufacturer:	TRIMBLE
Type:	GPS
Model:	SURVEY RECEIVER
Serial No:	4744140731
Customer Detail:	Al Warqa Survey Engineering

Description

The mentioned instrument has been tested according to service procedure and found to be performing satisfactorily against rated specifications.

Tested by	: Engr. Javed Khan
Calibration Date	: 12-Dec-16
Expiry Date	: 12-Nov-17

For : Thought Middle East LLC

Damascus ST, AL Qusais, P O BOX 29340. Ph +971 4 2640089, Fax +971 4 2640067
WEBSITE – www.thoughtme.com, EMAIL ID – thought@thoughtme.com

ثوت ميدل ايست لتجارة أجهزة الحاسب الألي ش ذ م م

Thought Middle East Computer Equipment Trading LLC

CALIBRATION CERTIFICATE

Date: 07-Jan-17

Manufacturer:	TRIMBLE
Type:	GPS
Model:	SURVEY RECEIVER
Serial No:	4811148091
Customer Detail:	Al Warqa Survey Engineering

Description

The mentioned instrument has been tested according to service procedure and found to be performing satisfactorily against rated specifications.

Tested by	: Engr. Javed Khan
Calibration Date	: 12-Dec-16
Expiry Date	: 12-Nov-17

For : Thought Middle East LLC

Damascus ST, AL Qusais, P O BOX 29340. Ph +971 4 2640089, Fax +971 4 2640067
WEBSITE – www.thoughtme.com, EMAIL ID – thought@thoughtme.com

Annexure 3.Observed and Reduced Depths

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
1	785991.43	3078660.98	1.97	2.07	0.10
2	786006.04	3078694.96	1.94	2.04	0.10
3	785990.77	3078743.01	0.40	0.50	0.10
4	785990.77	3078743.01	0.40	0.50	0.10
5	785895.95	3078787.16	0.40	0.50	0.10
6	785895.95	3078787.16	0.40	0.50	0.10
7	785848.90	3078832.94	0.40	0.50	0.10
8	785848.90	3078832.94	0.40	0.50	0.10
9	785839.01	3078906.36	1.16	1.26	0.10
10	785839.01	3078906.36	1.16	1.26	0.10
11	785849.58	3078958.92	1.31	1.41	0.10
12	785849.58	3078958.92	1.31	1.41	0.10
13	785935.05	3079031.61	1.41	1.51	0.10
14	785935.05	3079031.61	1.41	1.51	0.10
15	786166.84	3079222.06	1.40	1.50	0.10
16	786244.10	3079285.55	1.40	1.50	0.10
17	786321.37	3079349.03	1.53	1.63	0.10
18	786341.09	3079365.24	1.60	1.70	0.10
19	786408.24	3079384.46	1.39	1.49	0.10
20	786408.24	3079384.46	1.39	1.49	0.10
21	786464.28	3079375.11	1.46	1.56	0.10
22	786464.28	3079375.11	1.46	1.56	0.10
23	786517.53	3079384.34	1.93	2.03	0.10
24	786517.53	3079384.34	1.93	2.03	0.10
25	786593.99	3079448.79	2.65	2.75	0.10
26	786668.76	3079511.80	2.09	2.19	0.10
27	786668.76	3079511.80	2.09	2.19	0.10
28	786768.54	3079505.20	1.63	1.73	0.10
29	786804.09	3079502.85	1.92	2.02	0.10
30	786804.09	3079502.85	1.92	2.02	0.10
31	786770.94	3079467.37	0.40	0.50	0.10
32	786789.03	3079460.08	0.40	0.50	0.10
33	786789.03	3079460.08	0.40	0.50	0.10
34	786826.54	3079465.22	0.40	0.50	0.10
35	786826.54	3079465.22	0.40	0.50	0.10
36	786909.17	3079486.45	1.63	1.73	0.10
37	786909.17	3079486.45	1.63	1.73	0.10
38	786963.92	3079503.69	2.05	2.15	0.10
39	786963.92	3079503.69	2.05	2.15	0.10
40	787038.71	3079570.07	1.06	1.16	0.10
41	787046.20	3079576.71	1.05	1.15	0.10

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
42	787075.84	3079638.08	1.43	1.53	0.10
43	787075.84	3079638.08	1.43	1.53	0.10
44	787126.78	3079665.18	1.21	1.31	0.10
45	787126.78	3079665.18	1.21	1.31	0.10
46	787176.04	3079690.31	0.40	0.50	0.10
47	787176.04	3079690.31	0.40	0.50	0.10
48	787222.40	3079693.29	0.40	0.50	0.10
49	787222.40	3079693.29	0.40	0.50	0.10
50	787307.41	3079745.96	0.40	0.50	0.10
51	787347.48	3079770.79	0.40	0.50	0.10
52	787347.48	3079770.79	0.40	0.50	0.10
53	787404.91	3079852.66	0.40	0.50	0.10
54	787410.33	3079860.39	0.40	0.50	0.10
55	787429.91	3079906.35	0.40	0.50	0.10
56	787429.91	3079906.35	0.40	0.50	0.10
57	787524.71	3079976.48	0.40	0.50	0.10
58	787524.71	3079976.48	0.40	0.50	0.10
59	787582.28	3080057.76	2.25	2.35	0.10
60	787582.28	3080057.76	2.25	2.35	0.10
61	787580.24	3080108.60	0.82	0.92	0.10
62	787580.24	3080108.60	0.82	0.92	0.10
63	787666.48	3080182.39	0.40	0.50	0.10
64	787666.48	3080182.39	0.40	0.50	0.10
65	787722.70	3080265.09	1.21	1.31	0.10
66	787778.93	3080347.79	1.61	1.71	0.10
67	787845.74	3080446.06	2.29	2.39	0.10
68	787845.74	3080446.06	2.29	2.39	0.10
69	787896.79	3080532.05	1.91	2.01	0.10
70	787947.84	3080618.03	1.36	1.46	0.10
71	787998.90	3080704.02	0.88	0.98	0.10
72	788039.71	3080772.76	0.40	0.50	0.10
73	788039.71	3080772.76	0.40	0.50	0.10
74	788112.88	3080840.93	0.40	0.50	0.10
75	788196.19	3080918.55	0.40	0.50	0.10
76	788196.19	3080918.55	0.40	0.50	0.10
77	788280.01	3080973.09	0.40	0.50	0.10
78	788353.82	3081021.13	0.40	0.50	0.10
79	788353.82	3081021.13	0.40	0.50	0.10
80	788411.39	3081102.90	0.40	0.50	0.10
81	788476.35	3081195.17	0.40	0.50	0.10

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
82	788506.54	3081295.44	2.26	2.36	0.10
83	788506.54	3081295.44	2.26	2.36	0.10
84	788606.53	3081294.29	1.88	1.98	0.10
85	788706.53	3081293.13	1.94	2.04	0.10
86	788806.52	3081291.98	2.00	2.10	0.10
87	788906.51	3081290.83	2.07	2.17	0.10
88	789006.51	3081289.67	2.16	2.26	0.10
89	789106.50	3081288.52	2.29	2.39	0.10
90	789139.35	3081288.14	2.20	2.30	0.10
91	789139.35	3081288.14	2.20	2.30	0.10
92	789239.22	3081283.06	2.44	2.54	0.10
93	789339.09	3081277.98	1.85	1.95	0.10
94	789438.96	3081272.90	1.74	1.84	0.10
95	789478.97	3081270.86	0.40	0.50	0.10
96	789478.97	3081270.86	0.40	0.50	0.10
97	789544.54	3081195.36	0.55	0.65	0.10
98	789584.53	3081149.31	0.40	0.50	0.10
99	789584.53	3081149.31	0.40	0.50	0.10
100	789640.16	3081066.21	2.04	2.14	0.10
101	789670.86	3081020.34	1.10	1.20	0.10
102	789670.86	3081020.34	1.10	1.20	0.10
103	789770.51	3081028.67	0.40	0.50	0.10
104	789870.16	3081037.01	0.40	0.50	0.10
105	789969.82	3081045.34	2.22	2.32	0.10
106	790069.47	3081053.67	2.70	2.80	0.10
107	790106.03	3081056.73	2.84	2.94	0.10
108	790106.03	3081056.73	2.84	2.94	0.10
109	790204.29	3081075.32	2.56	2.66	0.10
110	790302.54	3081093.91	1.36	1.46	0.10
111	790378.83	3081108.34	2.34	2.44	0.10
112	790378.83	3081108.34	2.34	2.44	0.10
113	790478.73	3081112.90	2.00	2.10	0.10
114	790578.62	3081117.45	1.77	1.87	0.10
115	790678.52	3081122.01	1.77	1.87	0.10
116	790778.41	3081126.57	2.09	2.19	0.10
117	790867.64	3081130.64	2.60	2.70	0.10
118	790867.64	3081130.64	2.60	2.70	0.10
119	790962.97	3081160.86	2.86	2.96	0.10
120	791058.29	3081191.07	3.09	3.19	0.10
121	791153.62	3081221.29	3.32	3.42	0.10
122	791213.54	3081240.28	3.49	3.59	0.10

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
123	791213.54	3081240.28	3.49	3.59	0.10
124	791313.41	3081235.11	3.18	3.28	0.10
125	791413.27	3081229.94	1.55	1.65	0.10
126	791513.14	3081224.76	0.77	0.87	0.10
127	791613.00	3081219.59	0.40	0.50	0.10
128	791723.25	3081213.88	0.40	0.50	0.10
129	791723.25	3081213.88	0.40	0.50	0.10
130	791812.82	3081169.41	0.48	0.58	0.10
131	791920.49	3081115.96	0.40	0.50	0.10
132	791920.49	3081115.96	0.40	0.50	0.10
133	792018.72	3081134.71	1.85	1.95	0.10
134	792116.94	3081153.46	1.98	2.08	0.10
135	792215.17	3081172.21	2.52	2.62	0.10
136	792313.40	3081190.96	2.52	2.62	0.10
137	792411.62	3081209.71	2.12	2.22	0.10
138	793078.51	3081483.74	0.44	0.54	0.10
139	793155.65	3081547.38	0.55	0.65	0.10
140	793232.79	3081611.01	0.65	0.75	0.10
141	793309.93	3081674.65	0.75	0.85	0.10
142	793387.07	3081738.28	0.69	0.79	0.10
143	793464.21	3081801.92	0.63	0.73	0.10
144	793541.35	3081865.55	0.58	0.68	0.10
145	793618.49	3081929.19	0.52	0.62	0.10
146	793695.63	3081992.82	0.46	0.56	0.10
147	793716.31	3082009.88	0.83	0.93	0.10
148	792992.61	3081418.68	0.40	0.50	0.10
149	792903.37	3081341.08	0.40	0.50	0.10
150	792528.97	3081232.45	1.55	1.65	0.10
151	792664.76	3081263.49	0.85	0.95	0.10
152	792806.38	3081288.71	0.85	0.95	0.10
153	788485.66	3081230.46	1.35	1.45	0.10
154	786052.94	3079131.47	1.35	1.45	0.10
155	776942.68	3077947.65	1.45	1.65	0.20
156	776942.68	3077947.65	1.45	1.65	0.20
157	776977.16	3077925.22	1.46	1.66	0.20
158	776977.16	3077925.22	1.46	1.66	0.20
159	777042.9	3077918.83	1.46	1.66	0.20
160	777042.9	3077918.83	1.46	1.66	0.20
161	777080.52	3077943.52	1.25	1.45	0.20
162	777080.52	3077943.52	1.25	1.45	0.20
163	777153.18	3078025.12	1.52	1.72	0.20

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
164	777153.18	3078025.12	1.52	1.72	0.20
165	777206.6	3078058.75	2.13	2.33	0.20
166	777206.6	3078058.75	2.13	2.33	0.20
167	777305.86	3078070.92	1.47	1.67	0.20
168	777319.36	3078072.57	1.46	1.66	0.20
169	777355.36	3078027.25	0.3	0.5	0.20
170	777355.36	3078027.25	0.3	0.5	0.20
171	777421.82	3077980.19	1.77	1.97	0.20
172	777421.82	3077980.19	1.77	1.97	0.20
173	777502.47	3077979.67	2.12	2.32	0.20
174	777502.47	3077979.67	2.12	2.32	0.20
175	777578.06	3077998.77	1.24	1.44	0.20
176	777578.06	3077998.77	1.24	1.44	0.20
177	777656.89	3078035.49	1.85	2.05	0.20
178	777656.89	3078035.49	1.85	2.05	0.20
179	777710.22	3078037.36	1.93	2.13	0.20
180	777710.22	3078037.36	1.93	2.13	0.20
181	777805.66	3078007.49	1.62	1.82	0.20
182	777900.82	3077977.71	1.29	1.49	0.20
183	777900.82	3077977.71	1.29	1.49	0.20
184	777961.44	3077898.18	1.14	1.34	0.20
185	777963.23	3077895.83	1.06	1.26	0.20
186	777963.23	3077895.83	1.06	1.26	0.20
187	778015.23	3077834.85	1.05	1.25	0.20
188	778015.23	3077834.85	1.05	1.25	0.20
189	778081.46	3077807.17	0.86	1.06	0.20
190	778081.46	3077807.17	0.86	1.06	0.20
191	778160.19	3077789.54	0.3	0.5	0.20
192	778160.19	3077789.54	0.3	0.5	0.20
193	778259.96	3077782.78	2.63	2.83	0.20
194	778262.58	3077782.6	2.6	2.8	0.20
195	778299.81	3077764.03	2.5	2.7	0.20
196	778299.81	3077764.03	2.5	2.7	0.20
197	778302.31	3077705.23	0.3	0.5	0.20
198	778302.31	3077705.23	0.3	0.5	0.20
199	778320.36	3077653.12	1.05	1.25	0.20
200	778320.36	3077653.12	1.05	1.25	0.20
201	778361.34	3077616.09	1.16	1.36	0.20
202	778361.34	3077616.09	1.16	1.36	0.20
203	778391.11	3077588.73	1.25	1.45	0.20
204	778391.11	3077588.73	1.25	1.45	0.20

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
205	778445.31	3077569.96	1.34	1.54	0.20
206	778445.31	3077569.96	1.34	1.54	0.20
207	778491.92	3077574.11	0.77	0.97	0.20
208	778491.92	3077574.11	0.77	0.97	0.20
209	778585.64	3077608.99	0.52	0.72	0.20
210	778623.43	3077623.05	0.3	0.5	0.20
211	778623.43	3077623.05	0.3	0.5	0.20
212	778718.46	3077591.9	1.73	1.93	0.20
213	778813.48	3077560.76	1.39	1.59	0.20
214	778908.51	3077529.61	1.28	1.48	0.20
215	779025.1	3077491.4	0.95	1.15	0.20
216	779025.1	3077491.4	0.95	1.15	0.20
217	779133.54	3077570.57	0.3	0.5	0.20
218	779133.54	3077570.57	0.3	0.5	0.20
219	779225.51	3077609.84	0.65	0.85	0.20
220	779317.47	3077649.11	0.97	1.17	0.20
221	779327.23	3077653.28	1.89	2.09	0.20
222	779327.23	3077653.28	1.89	2.09	0.20
223	779364.06	3077746.25	2.35	2.55	0.20
224	779400.89	3077839.22	2.8	3	0.20
225	779437.72	3077932.19	3.12	3.32	0.20
226	779474.55	3078025.16	2.86	3.06	0.20
227	779495.87	3078078.97	2.46	2.66	0.20
228	779495.87	3078078.97	2.46	2.66	0.20
229	779560.79	3078155.04	2.31	2.51	0.20
230	779608.59	3078211.05	2.91	3.11	0.20
231	779608.59	3078211.05	2.91	3.11	0.20
232	779742.29	3078220.65	1.69	1.89	0.20
233	779742.29	3078220.65	1.69	1.89	0.20
234	779836.1	3078186.02	2.01	2.21	0.20
235	779877.16	3078170.87	1.53	1.73	0.20
236	779877.16	3078170.87	1.53	1.73	0.20
237	779972.27	3078096.82	1.68	1.88	0.20
238	779972.27	3078096.82	1.68	1.88	0.20
239	779980.53	3077973.73	1.69	1.89	0.20
240	779980.53	3077973.73	1.69	1.89	0.20
241	779945.3	3077880.14	0.3	0.5	0.20
242	779922.3	3077819.06	2.52	2.72	0.20
243	779922.3	3077819.06	2.52	2.72	0.20
244	779934.75	3077719.84	2.29	2.49	0.20
245	779944.49	3077642.28	2.37	2.57	0.20

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
246	779944.49	3077642.28	2.37	2.57	0.20
247	780036.79	3077603.8	1.47	1.67	0.20
248	780037.62	3077603.45	1.43	1.63	0.20
249	780037.62	3077603.45	1.43	1.63	0.20
250	780106.15	3077530.62	2.69	2.89	0.20
251	780153.82	3077479.95	1.97	2.17	0.20
252	780153.82	3077479.95	1.97	2.17	0.20
253	780252.64	3077464.61	2.45	2.65	0.20
254	780284.63	3077459.64	3.22	3.42	0.20
255	780284.63	3077459.64	3.22	3.42	0.20
256	780354.16	3077560.9	0.3	0.5	0.20
257	780354.16	3077560.9	0.3	0.5	0.20
258	780363.11	3077696.66	1.57	1.77	0.20
259	780363.11	3077696.66	1.57	1.77	0.20
260	780435.28	3077765.89	2.08	2.28	0.20
261	780501.07	3077829	1.97	2.17	0.20
262	780501.07	3077829	1.97	2.17	0.20
263	780582.08	3077887.63	2.76	2.96	0.20
264	780598.66	3077899.63	2.85	3.05	0.20
265	780684.65	3077848.58	1.6	1.8	0.20
266	780770.64	3077797.53	1.51	1.71	0.20
267	780776.52	3077794.04	1.59	1.79	0.20
268	780776.52	3077794.04	1.59	1.79	0.20
269	780824.96	3077706.55	1.91	2.11	0.20
270	780853.03	3077655.85	2.19	2.39	0.20
271	780853.03	3077655.85	2.19	2.39	0.20
272	780904.26	3077569.97	2.53	2.73	0.20
273	780924.59	3077535.89	2.91	3.11	0.20
274	781022.91	3077517.62	2.78	2.98	0.20
275	781121.22	3077499.35	2.36	2.56	0.20
276	781225.84	3077475.69	3.06	3.26	0.20
277	781283.38	3077462.51	3.3	3.5	0.20
278	781283.38	3077462.51	3.3	3.5	0.20
279	781382.99	3077471.29	2.18	2.38	0.20
280	781482.61	3077480.07	1.76	1.96	0.20
281	781503.77	3077481.93	1.95	2.15	0.20
282	781503.77	3077481.93	1.95	2.15	0.20
283	781603.72	3077478.73	2.57	2.77	0.20
284	781702.4	3077475.57	3.21	3.41	0.20
285	781702.4	3077475.57	3.21	3.41	0.20
286	781801.98	3077484.75	2.25	2.45	0.20

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
287	781902.04	3077493.98	2.86	3.06	0.20
288	781902.04	3077493.98	2.86	3.06	0.20
289	781975.19	3077425.79	0.82	1.02	0.20
290	782048.33	3077357.6	1.09	1.29	0.20
291	782105.16	3077304.63	1.29	1.49	0.20
292	782105.16	3077304.63	1.29	1.49	0.20
293	782165.48	3077224.87	1.84	2.04	0.20
294	782200.19	3077178.97	2.95	3.15	0.20
295	782200.19	3077178.97	2.95	3.15	0.20
296	782300.12	3077182.6	3.62	3.82	0.20
297	782567.67	3077266.41	1.34	1.54	0.20
298	782645.46	3077358.62	2.54	2.74	0.20
299	782645.46	3077358.62	2.54	2.74	0.20
300	782742.14	3077384.19	1.47	1.67	0.20
301	782838.81	3077409.76	1.99	2.19	0.20
302	782913.99	3077429.65	1.23	1.43	0.20
303	782913.99	3077429.65	1.23	1.43	0.20
304	782980.08	3077504.7	1.36	1.56	0.20
305	782992.06	3077518.31	1.45	1.65	0.20
306	782916.18	3077583.44	0.42	0.62	0.20
307	782873.25	3077620.29	0.3	0.5	0.20
308	782873.25	3077620.29	0.3	0.5	0.20
309	782863.44	3077684.53	1.44	1.64	0.20
310	782863.44	3077684.53	1.44	1.64	0.20
311	782902.68	3077731.9	1.78	1.98	0.20
312	782902.68	3077731.9	1.78	1.98	0.20
313	782983.33	3077749.24	1.32	1.52	0.20
314	782983.33	3077749.24	1.32	1.52	0.20
315	783033.46	3077766.88	1.26	1.46	0.20
316	783068.81	3077770.59	1.39	1.59	0.20
317	783068.81	3077770.59	1.39	1.59	0.20
318	783168.72	3077766.25	2.38	2.58	0.20
319	783216.19	3077770.24	2.5	2.7	0.20
320	783216.19	3077770.24	2.5	2.7	0.20
321	783309.78	3077805.47	1.98	2.18	0.20
322	783369.18	3077827.83	1.93	2.13	0.20
323	783369.18	3077827.83	1.93	2.13	0.20
324	783441.59	3077815.99	1.45	1.65	0.20
325	783441.59	3077815.99	1.45	1.65	0.20
326	783541.56	3077818.26	1.52	1.72	0.20

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
327	783641.54	3077820.54	1.59	1.79	0.20
328	783659.63	3077820.95	1.76	1.96	0.20
329	783659.63	3077820.95	1.76	1.96	0.20
330	783744.85	3077768.63	1.17	1.37	0.20
331	783776.54	3077749.17	1.5	1.7	0.20
332	783856.85	3077732.2	2.88	3.08	0.20
333	783856.85	3077732.2	2.88	3.08	0.20
334	783948.95	3077771.16	3.44	3.64	0.20
335	784041.05	3077810.12	3.87	4.07	0.20
336	784133.14	3077849.08	3.9	4.1	0.20
337	784225.24	3077888.04	2.62	2.82	0.20
338	784317.34	3077927	1.43	1.63	0.20
339	784331.33	3077932.92	1.38	1.58	0.20
340	784370.57	3078024.9	2.14	2.34	0.20
341	784409.81	3078116.88	1.68	1.88	0.20
342	784427.27	3078157.8	1.7	1.9	0.20
343	784427.27	3078157.8	1.7	1.9	0.20
344	784510.96	3078212.54	2.37	2.57	0.20
345	784526.64	3078222.8	2.54	2.74	0.20
346	784586.4	3078213.49	1.4	1.6	0.20
347	784586.4	3078213.49	1.4	1.6	0.20
348	784666.67	3078190.06	1.45	1.65	0.20
349	784666.67	3078190.06	1.45	1.65	0.20
350	784750.6	3078135.7	1.87	2.07	0.20
351	784794.1	3078107.53	1.87	2.07	0.20
352	784794.1	3078107.53	1.87	2.07	0.20
353	784864.67	3078076.35	2.18	2.38	0.20
354	784864.67	3078076.35	2.18	2.38	0.20
355	784942.46	3078090.76	2.57	2.77	0.20
356	784942.46	3078090.76	2.57	2.77	0.20
357	785034.36	3078146.32	1.41	1.61	0.20
358	785034.36	3078146.32	1.41	1.61	0.20
359	785090.16	3078190.04	1.19	1.39	0.20
360	785090.16	3078190.04	1.19	1.39	0.20
361	785163.53	3078292.56	2.02	2.22	0.20
362	785163.53	3078292.56	2.02	2.22	0.20
363	785233.07	3078329.63	1.83	2.03	0.20
364	785233.07	3078329.63	1.83	2.03	0.20
365	785311.75	3078391.35	2.95	3.15	0.20
366	785349.47	3078420.95	2.86	3.06	0.20

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
367	785349.47	3078420.95	2.86	3.06	0.20
368	785434.34	3078473.84	2.91	3.11	0.20
369	785436.51	3078475.19	2.94	3.14	0.20
370	785535.5	3078461.03	1.6	1.8	0.20
371	785572.24	3078455.77	1.47	1.67	0.20
372	785572.24	3078455.77	1.47	1.67	0.20
373	785670.29	3078436.13	1.19	1.39	0.20
374	785718.45	3078426.48	2.4	2.6	0.20
375	785718.45	3078426.48	2.4	2.6	0.20
376	785778.83	3078453.96	1.73	1.93	0.20
377	785778.83	3078453.96	1.73	1.93	0.20
378	785883.17	3078536.21	0.92	1.12	0.20
379	785883.17	3078536.21	0.92	1.12	0.20
380	785951.93	3078569.11	1.79	1.99	0.20
381	785951.93	3078569.11	1.79	1.99	0.20
382	785972.74	3078619.59	1.25	1.55	0.30
383	785831.45	3078496.19	1.25	1.55	0.30
384	785125.49	3078244.03	1.25	1.55	0.30
385	783145.94	3077768.24	1.25	1.55	0.30
386	782605	3077311.57	1.25	1.55	0.30
387	782470.16	3077191	1.25	1.55	0.30
388	780358.51	3077628.76	1.25	1.55	0.30
389	780321.31	3077513.16	1.25	1.55	0.30
390	779674.18	3078216.09	2.25	2.55	0.30
391	777113.54	3077982.32	1.25	1.55	0.30
392	768366.53	3076578.15	0.2	0.5	0.30
393	768366.53	3076578.15	0.2	0.5	0.30
394	768465.86	3076566.63	0.54	0.84	0.30
395	768565.2	3076555.11	1.9	2.2	0.30
396	768600.11	3076551.06	1.93	2.23	0.30
397	768693.52	3076579.66	2.01	2.31	0.30
398	768693.52	3076579.66	2.01	2.31	0.30
399	768788.33	3076547.87	1.2	1.5	0.30
400	768883.14	3076516.07	1.38	1.68	0.30
401	768936.94	3076498.03	1.56	1.86	0.30
402	768936.94	3076498.03	1.56	1.86	0.30
403	769020.82	3076443.58	1.88	2.18	0.30
404	769104.69	3076389.13	2.11	2.41	0.30
405	769151.76	3076358.57	2.06	2.36	0.30
406	769151.76	3076358.57	2.06	2.36	0.30

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
407	769271.04	3076366.47	2.51	2.81	0.30
408	769271.04	3076366.47	2.51	2.81	0.30
409	769352.9	3076423.9	1.72	2.02	0.30
410	769363.65	3076431.44	1.86	2.16	0.30
411	769441.2	3076494.58	2.67	2.97	0.30
412	769518.75	3076557.71	3.35	3.65	0.30
413	769576.33	3076604.59	4.66	4.96	0.30
414	769576.33	3076604.59	4.66	4.96	0.30
415	769655.63	3076665.51	2.82	3.12	0.30
416	769692.1	3076693.52	3.03	3.33	0.30
417	769692.1	3076693.52	3.03	3.33	0.30
418	769733.73	3076784.44	1.39	1.69	0.30
419	769733.79	3076784.58	1.39	1.69	0.30
420	769733.79	3076784.58	1.39	1.69	0.30
421	769739.83	3076884.4	1.47	1.77	0.30
422	769741.89	3076918.41	1.87	2.17	0.30
423	769741.89	3076918.41	1.87	2.17	0.30
424	769795.53	3077002.81	2.44	2.74	0.30
425	769800.87	3077011.22	2.49	2.79	0.30
426	769866.99	3077046.59	1.65	1.95	0.30
427	769866.99	3077046.59	1.65	1.95	0.30
428	769966.57	3077037.39	1.32	1.62	0.30
429	769968.84	3077037.18	1.33	1.63	0.30
430	770064.72	3077008.78	1.82	2.12	0.30
431	770139.06	3076986.77	1.71	2.01	0.30
432	770139.06	3076986.77	1.71	2.01	0.30
433	770220.69	3077035.32	2.41	2.71	0.30
434	770220.69	3077035.32	2.41	2.71	0.30
435	770275.76	3077049.34	2.17	2.47	0.30
436	770275.76	3077049.34	2.17	2.47	0.30
437	770321.16	3077057.6	1.81	2.11	0.30
438	770321.16	3077057.6	1.81	2.11	0.30
439	770340.15	3077072.31	1.76	2.06	0.30
440	770340.15	3077072.31	1.76	2.06	0.30
441	770324.08	3077111.56	2.32	2.62	0.30
442	770324.08	3077111.56	2.32	2.62	0.30
443	770317.31	3077121.55	0.4	0.7	0.30
444	770317.31	3077121.55	0.4	0.7	0.30
445	770330.08	3077166.64	0.4	0.7	0.30
446	770330.08	3077166.64	0.4	0.7	0.30

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
447	770372.39	3077231.88	0.4	0.7	0.30
448	770372.39	3077231.88	0.4	0.7	0.30
449	770453.5	3077279.57	0.4	0.7	0.30
450	770453.5	3077279.57	0.4	0.7	0.30
451	770545.12	3077319.64	1.39	1.69	0.30
452	770552.65	3077322.93	1.28	1.58	0.30
453	770629.23	3077387.24	3.24	3.54	0.30
454	770655.54	3077409.33	3.74	4.04	0.30
455	770655.54	3077409.33	3.74	4.04	0.30
456	770754.9	3077420.27	1.39	1.69	0.30
457	770754.9	3077420.27	1.39	1.69	0.30
458	770854.18	3077408.27	1.45	1.75	0.30
459	770905.31	3077402.09	1.56	1.86	0.30
460	770905.31	3077402.09	1.56	1.86	0.30
461	770964.73	3077396.85	2.57	2.87	0.30
462	770964.73	3077396.85	2.57	2.87	0.30
463	771054.88	3077440.13	3.12	3.42	0.30
464	771145.03	3077483.4	3.71	4.01	0.30
465	771235.18	3077526.68	1.45	1.75	0.30
466	771325.33	3077569.96	2.03	2.33	0.30
467	771341.04	3077577.5	2.69	2.99	0.30
468	771355.53	3077612.51	0.4	0.7	0.30
469	771355.53	3077612.51	0.4	0.7	0.30
470	771342.63	3077686.7	0.4	0.7	0.30
471	771342.63	3077686.7	0.4	0.7	0.30
472	771308.89	3077724.63	0.4	0.7	0.30
473	771308.89	3077724.63	0.4	0.7	0.30
474	771294.56	3077805.88	0.4	0.7	0.30
475	771294.56	3077805.88	0.4	0.7	0.30
476	771290.78	3077878.26	0.4	0.7	0.30
477	771290.78	3077878.26	0.4	0.7	0.30
478	771376.8	3077929.26	0.33	0.63	0.30
479	771462.81	3077980.26	0.3	0.6	0.30
480	771523.66	3078016.34	0.45	0.75	0.30
481	771523.66	3078016.34	0.45	0.75	0.30
482	771622.74	3078029.85	0.54	0.84	0.30
483	771721.83	3078043.37	0.7	1	0.30
484	771820.91	3078056.88	1.36	1.66	0.30
485	771919.99	3078070.39	1.87	2.17	0.30
486	771920.77	3078070.5	1.88	2.18	0.30

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
487	771920.77	3078070.5	1.88	2.18	0.30
488	771972.24	3078131.17	1.46	1.76	0.30
489	771972.24	3078131.17	1.46	1.76	0.30
490	771987.74	3078219.99	0.4	0.7	0.30
491	771987.74	3078219.99	0.4	0.7	0.30
492	772049.69	3078299.84	1.3	1.6	0.30
493	772049.69	3078299.84	1.3	1.6	0.30
494	772113.48	3078336.67	1.64	1.94	0.30
495	772113.48	3078336.67	1.64	1.94	0.30
496	772173.12	3078396.23	1.57	1.87	0.30
497	772173.12	3078396.23	1.57	1.87	0.30
498	772234.61	3078415.88	1.78	2.08	0.30
499	772234.61	3078415.88	1.78	2.08	0.30
500	772320.08	3078384.07	1.68	1.98	0.30
501	772320.08	3078384.07	1.68	1.98	0.30
502	772413.32	3078279.29	1.61	1.91	0.30
503	772413.32	3078279.29	1.61	1.91	0.30
504	772479.15	3078204.01	1.79	2.09	0.30
505	772520.69	3078156.51	1.28	1.58	0.30
506	772520.69	3078156.51	1.28	1.58	0.30
507	772568.39	3078068.62	1.06	1.36	0.30
508	772603.01	3078004.84	0.4	0.7	0.30
509	772603.01	3078004.84	0.4	0.7	0.30
510	772702.7	3077996.93	0.47	0.77	0.30
511	772802.38	3077989.03	3.32	3.62	0.30
512	772879.91	3077982.88	4.55	4.85	0.30
513	772879.91	3077982.88	4.55	4.85	0.30
514	772986.69	3077963.23	1.93	2.23	0.30
515	772986.69	3077963.23	1.93	2.23	0.30
516	773122.85	3077998.75	2.47	2.77	0.30
517	773122.85	3077998.75	2.47	2.77	0.30
518	773209.43	3078080.12	3.4	3.7	0.30
519	773278.55	3078152.39	2.53	2.83	0.30
520	773347.66	3078224.66	1.24	1.54	0.30
521	773359.54	3078237.08	1.22	1.52	0.30
522	773380.79	3078334.8	0.8	1.1	0.30
523	773383.8	3078348.66	0.4	0.7	0.30
524	773480.34	3078374.73	0.96	1.26	0.30
525	773520.79	3078385.65	0.86	1.16	0.30
526	773520.79	3078385.65	0.86	1.16	0.30

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
527	773620	3078373.12	2.06	2.36	0.30
528	773717.32	3078360.83	0.2	0.5	0.30
529	773717.32	3078360.83	0.2	0.5	0.30
530	773796.33	3078299.53	0.2	0.5	0.30
531	773867.6	3078266.05	1.22	1.52	0.30
532	773867.6	3078266.05	1.22	1.52	0.30
533	773948.02	3078249.39	1.24	1.54	0.30
534	773948.02	3078249.39	1.24	1.54	0.30
535	773983.41	3078233.87	1.49	1.79	0.30
536	773983.41	3078233.87	1.49	1.79	0.30
537	774068.97	3078215.13	2.12	2.42	0.30
538	774110.92	3078202.13	1.78	2.08	0.30
539	774110.92	3078202.13	1.78	2.08	0.30
540	774208.68	3078184.21	1.61	1.91	0.30
541	774208.68	3078184.21	1.61	1.91	0.30
542	774254.04	3078192.92	1.3	1.6	0.30
543	774254.04	3078192.92	1.3	1.6	0.30
544	774329.22	3078242.18	0.2	0.5	0.30
545	774329.22	3078242.18	0.2	0.5	0.30
546	774393.89	3078282.92	0.2	0.5	0.30
547	774393.89	3078282.92	0.2	0.5	0.30
548	774468.76	3078341.33	0.2	0.5	0.30
549	774468.76	3078341.33	0.2	0.5	0.30
550	774542.52	3078356.66	0.2	0.5	0.30
551	774542.52	3078356.66	0.2	0.5	0.30
552	774642.22	3078348.96	0.2	0.5	0.30
553	774741.93	3078341.26	0.99	1.29	0.30
554	774878.74	3078330.7	2.11	2.41	0.30
555	774878.74	3078330.7	2.11	2.41	0.30
556	774945.46	3078310.32	0.84	1.14	0.30
557	774945.46	3078310.32	0.84	1.14	0.30
558	774971	3078285.55	0.69	0.99	0.30
559	774971	3078285.55	0.69	0.99	0.30
560	774987.47	3078241.15	0.2	0.5	0.30
561	774987.47	3078241.15	0.2	0.5	0.30
562	774983.83	3078141.22	0.22	0.52	0.30
563	775006.73	3078065.6	1.21	1.51	0.30
564	775006.73	3078065.6	1.21	1.51	0.30
565	775047.29	3077999.58	3.72	4.02	0.30
566	775047.29	3077999.58	3.72	4.02	0.30

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
567	775125.24	3077936.94	0.2	0.5	0.30
568	775203.73	3077934.44	0.2	0.5	0.30
569	775203.73	3077934.44	0.2	0.5	0.30
570	775298.24	3077915.37	0.2	0.5	0.30
571	775298.24	3077915.37	0.2	0.5	0.30
572	775362.13	3077869.64	0.2	0.5	0.30
573	775362.13	3077869.64	0.2	0.5	0.30
574	775382.51	3077795.19	0.2	0.5	0.30
575	775382.51	3077795.19	0.2	0.5	0.30
576	775423.9	3077737.21	0.2	0.5	0.30
577	775423.9	3077737.21	0.2	0.5	0.30
578	775464.63	3077695.21	0.2	0.5	0.30
579	775464.63	3077695.21	0.2	0.5	0.30
580	775539.1	3077676.77	0.2	0.5	0.30
581	775539.1	3077676.77	0.2	0.5	0.30
582	775569.52	3077671.16	0.2	0.5	0.30
583	775624.07	3077690.34	0.2	0.5	0.30
584	775624.07	3077690.34	0.2	0.5	0.30
585	775683.63	3077739.48	1.25	1.55	0.30
586	775683.63	3077739.48	1.25	1.55	0.30
587	775775.78	3077778.32	1.48	1.78	0.30
588	775867.93	3077817.15	2.14	2.44	0.30
589	775960.08	3077855.99	1.89	2.19	0.30
590	776074.87	3077904.36	2.9	3.2	0.30
591	776074.87	3077904.36	2.9	3.2	0.30
592	776154.88	3077934.03	2.01	2.31	0.30
593	776154.88	3077934.03	2.01	2.31	0.30
594	776200.93	3077929.98	1.82	2.12	0.30
595	776214.33	3077912.39	1.15	1.45	0.30
596	776214.33	3077912.39	1.15	1.45	0.30
597	776199.2	3077866.53	0.2	0.5	0.30
598	776199.2	3077866.53	0.2	0.5	0.30
599	776201.84	3077838.63	0.2	0.5	0.30
600	776201.84	3077838.63	0.2	0.5	0.30
601	776235.03	3077797.75	0.2	0.5	0.30
602	776235.03	3077797.75	0.2	0.5	0.30
603	776268.26	3077780.2	0.2	0.5	0.30
604	776268.26	3077780.2	0.2	0.5	0.30
605	776332.64	3077755.31	0.2	0.5	0.30
606	776332.64	3077755.31	0.2	0.5	0.30

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
607	776421.54	3077760.67	1.75	2.05	0.30
608	776421.54	3077760.67	1.75	2.05	0.30
609	776490.46	3077787.57	2.81	3.11	0.30
610	776490.46	3077787.57	2.81	3.11	0.30
611	776585.45	3077818.83	3.29	3.59	0.30
612	776634.87	3077835.1	1.29	1.59	0.30
613	776634.87	3077835.1	1.29	1.59	0.30
614	776695.53	3077900.87	0.88	1.18	0.30
615	776695.53	3077900.87	0.88	1.18	0.30
616	776740.89	3077971.71	1.24	1.54	0.30
617	776740.89	3077971.71	1.24	1.54	0.30
618	776826.22	3077997.19	2.48	2.78	0.30
619	776826.22	3077997.19	2.48	2.78	0.30
620	776869.1	3077984.09	1.93	2.23	0.30
621	776869.1	3077984.09	1.93	2.23	0.30
622	752907.24	3073796.14	3.92	4.32	0.40
623	752942.44	3073836.33	3.24	3.64	0.40
624	752942.44	3073836.33	3.24	3.64	0.40
625	752994.62	3073877.03	3.41	3.81	0.40
626	752994.62	3073877.03	3.41	3.81	0.40
627	753063.65	3073940.79	2.87	3.27	0.40
628	753063.65	3073940.79	2.87	3.27	0.40
629	753102.33	3074003.06	2.09	2.49	0.40
630	753102.33	3074003.06	2.09	2.49	0.40
631	753125.7	3074070.22	1.21	1.61	0.40
632	753125.7	3074070.22	1.21	1.61	0.40
633	753150.2	3074164.46	1.23	1.63	0.40
634	753150.2	3074164.46	1.23	1.63	0.40
635	753188.61	3074208.77	1.19	1.59	0.40
636	753188.61	3074208.77	1.19	1.59	0.40
637	753255.53	3074262.75	1.26	1.66	0.40
638	753255.53	3074262.75	1.26	1.66	0.40
639	753317.31	3074341.38	1.42	1.82	0.40
640	753330.4	3074358.04	1.38	1.78	0.40
641	753372.43	3074401.15	1.49	1.89	0.40
642	753372.43	3074401.15	1.49	1.89	0.40
643	753416.65	3074438.15	1.53	1.93	0.40
644	753416.65	3074438.15	1.53	1.93	0.40
645	753478.83	3074507.01	1.72	2.12	0.40
646	753478.83	3074507.01	1.72	2.12	0.40

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
647	753543.55	3074570.72	1.59	1.99	0.40
648	753543.55	3074570.72	1.59	1.99	0.40
649	753588.85	3074623.53	1.51	1.91	0.40
650	753588.85	3074623.53	1.51	1.91	0.40
651	753609.84	3074662.32	1.22	1.62	0.40
652	753609.84	3074662.32	1.22	1.62	0.40
653	753646.26	3074703.19	0.95	1.35	0.40
654	753646.26	3074703.19	0.95	1.35	0.40
655	753678.72	3074727.34	0.87	1.27	0.40
656	753678.72	3074727.34	0.87	1.27	0.40
657	753733.74	3074760.29	0.96	1.36	0.40
658	753733.74	3074760.29	0.96	1.36	0.40
659	753777.54	3074806.08	1.05	1.45	0.40
660	753777.54	3074806.08	1.05	1.45	0.40
661	753851.7	3074873.16	1.35	1.75	0.40
662	753905.21	3074921.57	1.63	2.03	0.40
663	753905.21	3074921.57	1.63	2.03	0.40
664	753989.29	3074975.7	1.95	2.35	0.40
665	754038.38	3075007.3	2.27	2.67	0.40
666	754038.38	3075007.3	2.27	2.67	0.40
667	754112.22	3075074.24	2.55	2.95	0.40
668	754112.22	3075074.24	2.55	2.95	0.40
669	754193.6	3075132.36	2.55	2.95	0.40
670	754266.01	3075184.08	2.15	2.55	0.40
671	754266.01	3075184.08	2.15	2.55	0.40
672	754348.01	3075241.31	1.89	2.29	0.40
673	754371.73	3075257.86	1.83	2.23	0.40
674	754439.46	3075331.43	2.72	3.12	0.40
675	754450.72	3075343.67	2.96	3.36	0.40
676	754525.64	3075409.91	4.2	4.6	0.40
677	754555.59	3075436.39	4.06	4.46	0.40
678	754555.59	3075436.39	4.06	4.46	0.40
679	754636.57	3075495.06	3.05	3.45	0.40
680	754691	3075534.5	3.21	3.61	0.40
681	754691	3075534.5	3.21	3.61	0.40
682	754782.96	3075573.78	2.18	2.58	0.40
683	754787.07	3075575.54	2.16	2.56	0.40
684	754884.58	3075597.74	1.84	2.24	0.40
685	754982.08	3075619.93	2.88	3.28	0.40
686	755015.99	3075627.65	3.67	4.07	0.40

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
687	755015.99	3075627.65	3.67	4.07	0.40
688	755073.31	3075678.33	3.9	4.3	0.40
689	755073.31	3075678.33	3.9	4.3	0.40
690	755105.64	3075680.54	3.82	4.22	0.40
691	755126.43	3075677.28	3.12	3.52	0.40
692	755126.43	3075677.28	3.12	3.52	0.40
693	755135.02	3075693.37	2.84	3.24	0.40
694	755126.62	3075730.64	3.83	4.23	0.40
695	755126.62	3075730.64	3.83	4.23	0.40
696	755157.45	3075795.45	3.76	4.16	0.40
697	755157.45	3075795.45	3.76	4.16	0.40
698	755188.74	3075890.43	1.55	1.95	0.40
699	755198.55	3075920.22	1.41	1.81	0.40
700	755190.67	3075988.98	1.37	1.77	0.40
701	755190.67	3075988.98	1.37	1.77	0.40
702	755136.14	3076072.81	0.85	1.25	0.40
703	755115.7	3076104.23	0.1	0.5	0.40
704	755115.7	3076104.23	0.1	0.5	0.40
705	755064.82	3076173.77	2.7	3.1	0.40
706	755064.82	3076173.77	2.7	3.1	0.40
707	755048.67	3076248.5	2.74	3.14	0.40
708	755048.67	3076248.5	2.74	3.14	0.40
709	755000.46	3076342.66	1.96	2.36	0.40
710	755000.46	3076342.66	1.96	2.36	0.40
711	754961.96	3076433.64	2.18	2.58	0.40
712	754961.96	3076433.64	2.18	2.58	0.40
713	754961.84	3076478.22	2.69	3.09	0.40
714	755000.99	3076557.22	3.74	4.14	0.40
715	755000.99	3076557.22	3.74	4.14	0.40
716	755066.36	3076600.99	2.81	3.21	0.40
717	755066.36	3076600.99	2.81	3.21	0.40
718	755128.46	3076632.84	2.61	3.01	0.40
719	755128.46	3076632.84	2.61	3.01	0.40
720	755216.73	3076653.92	3.24	3.64	0.40
721	755216.73	3076653.92	3.24	3.64	0.40
722	755304.42	3076701.99	4.31	4.71	0.40
723	755319.52	3076710.27	4.5	4.9	0.40
724	755319.52	3076710.27	4.5	4.9	0.40
725	755377.89	3076734.41	5.49	5.89	0.40
726	755377.89	3076734.41	5.49	5.89	0.40

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
727	755406.34	3076761.09	4.72	5.12	0.40
728	755425.81	3076792.41	2.91	3.31	0.40
729	755425.81	3076792.41	2.91	3.31	0.40
730	755438.33	3076891.62	3.47	3.87	0.40
731	755449.45	3076979.67	3.16	3.56	0.40
732	755449.45	3076979.67	3.16	3.56	0.40
733	755473.84	3077060.53	2.25	2.65	0.40
734	755473.84	3077060.53	2.25	2.65	0.40
735	755461.82	3077125.67	2.14	2.54	0.40
736	755445.69	3077164.12	2.19	2.59	0.40
737	755445.69	3077164.12	2.19	2.59	0.40
738	755466.92	3077261.84	2.3	2.7	0.40
739	755473.17	3077290.63	2.31	2.71	0.40
740	755473.17	3077290.63	2.31	2.71	0.40
741	755537.02	3077361.38	2.07	2.47	0.40
742	755537.02	3077361.38	2.07	2.47	0.40
743	755568.55	3077408.39	2.16	2.56	0.40
744	755568.55	3077408.39	2.16	2.56	0.40
745	755553.7	3077507.28	2.43	2.83	0.40
746	755550.87	3077526.12	2	2.4	0.40
747	755550.87	3077526.12	2	2.4	0.40
748	755505.16	3077615.06	2.13	2.53	0.40
749	755496.91	3077631.1	2.25	2.65	0.40
750	755520.06	3077700.69	2.02	2.42	0.40
751	755520.06	3077700.69	2.02	2.42	0.40
752	755565.82	3077753.95	0.95	1.35	0.40
753	755565.82	3077753.95	0.95	1.35	0.40
754	755602.19	3077833.52	1.32	1.72	0.40
755	755602.19	3077833.52	1.32	1.72	0.40
756	755606.57	3077869.25	2.37	2.77	0.40
757	755620.53	3077875.34	2.24	2.64	0.40
758	755620.53	3077875.34	2.24	2.64	0.40
759	755710.92	3077840.41	1.22	1.62	0.40
760	755710.92	3077840.41	1.22	1.62	0.40
761	755795.61	3077787.24	0.89	1.29	0.40
762	755880.3	3077734.06	0.78	1.18	0.40
763	755885.19	3077730.99	0.82	1.22	0.40
764	756029.08	3077747.29	0.33	0.73	0.40
765	756029.08	3077747.29	0.33	0.73	0.40
766	756125.6	3077721.15	0.91	1.31	0.40

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
767	756141.87	3077716.74	1.15	1.55	0.40
768	756228.83	3077667.36	1.67	2.07	0.40
769	756265.29	3077646.66	1.62	2.02	0.40
770	756302.44	3077646.42	1.51	1.91	0.40
771	756302.44	3077646.42	1.51	1.91	0.40
772	756397.81	3077676.51	1.48	1.88	0.40
773	756440.69	3077690.04	1.58	1.98	0.40
774	756440.69	3077690.04	1.58	1.98	0.40
775	756524.86	3077744.03	1.08	1.48	0.40
776	756554.82	3077763.25	1.17	1.57	0.40
777	756554.82	3077763.25	1.17	1.57	0.40
778	756620.83	3077838.37	1.96	2.36	0.40
779	756678.52	3077904.03	2.16	2.56	0.40
780	756678.52	3077904.03	2.16	2.56	0.40
781	756755.86	3077967.42	1.3	1.7	0.40
782	756833.2	3078030.81	1.35	1.75	0.40
783	756833.94	3078031.41	1.38	1.78	0.40
784	756833.94	3078031.41	1.38	1.78	0.40
785	756928.99	3078062.48	1.62	2.02	0.40
786	757022.23	3078092.95	2.28	2.68	0.40
787	757022.23	3078092.95	2.28	2.68	0.40
788	757091.43	3078165.14	2.47	2.87	0.40
789	757111.97	3078186.57	2.58	2.98	0.40
790	757151.6	3078278.38	1.91	2.31	0.40
791	757191.22	3078370.2	1.75	2.15	0.40
792	757224.54	3078447.4	1.66	2.06	0.40
793	757224.54	3078447.4	1.66	2.06	0.40
794	757283.2	3078528.39	2.18	2.58	0.40
795	757341.42	3078608.76	3.66	4.06	0.40
796	757341.42	3078608.76	3.66	4.06	0.40
797	757425.58	3078642.96	3.59	3.99	0.40
798	757425.58	3078642.96	3.59	3.99	0.40
799	757490.27	3078621.75	1.72	2.12	0.40
800	757490.27	3078621.75	1.72	2.12	0.40
801	757565.17	3078555.49	2.2	2.6	0.40
802	757647.04	3078483.07	1.7	2.1	0.40
803	757647.04	3078483.07	1.7	2.1	0.40
804	757742.75	3078454.08	2.34	2.74	0.40
805	757838.45	3078425.1	1.55	1.95	0.40
806	757893.76	3078408.35	1.56	1.96	0.40

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
807	757893.76	3078408.35	1.56	1.96	0.40
808	757955.18	3078414.58	2.59	2.99	0.40
809	757955.18	3078414.58	2.59	2.99	0.40
810	757969.76	3078315.65	1.38	1.78	0.40
811	757970.3	3078312	1.32	1.72	0.40
812	758024.96	3078228.26	1.97	2.37	0.40
813	758065.31	3078166.46	1.71	2.11	0.40
814	758065.31	3078166.46	1.71	2.11	0.40
815	758069.41	3078036.11	2	2.4	0.40
816	758069.41	3078036.11	2	2.4	0.40
817	758134.07	3077959.83	2.44	2.84	0.40
818	758198.74	3077883.55	2.61	3.01	0.40
819	758223.65	3077854.16	2.98	3.38	0.40
820	758223.65	3077854.16	2.98	3.38	0.40
821	758318.14	3077886.91	1.79	2.19	0.40
822	758392.77	3077912.77	2.13	2.53	0.40
823	758392.77	3077912.77	2.13	2.53	0.40
824	758492.17	3077901.82	1.7	2.1	0.40
825	758588.37	3077891.22	1.4	1.8	0.40
826	758588.37	3077891.22	1.4	1.8	0.40
827	758665.34	3077827.38	2.77	3.17	0.40
828	758689.76	3077807.12	4.53	4.93	0.40
829	758740.59	3077818.72	5.19	5.59	0.40
830	758740.59	3077818.72	5.19	5.59	0.40
831	758822.35	3077892.95	2.43	2.83	0.40
832	758822.35	3077892.95	2.43	2.83	0.40
833	758880.2	3077974.52	1.66	2.06	0.40
834	758938.05	3078056.09	1.62	2.02	0.40
835	758938.85	3078057.22	1.6	2	0.40
836	759003.57	3078142.39	2.38	2.78	0.40
837	759003.57	3078142.39	2.38	2.78	0.40
838	759124.46	3078187.51	2.13	2.53	0.40
839	759124.46	3078187.51	2.13	2.53	0.40
840	759223.95	3078197.61	2.69	3.09	0.40
841	759300.35	3078205.36	2.78	3.18	0.40
842	759300.35	3078205.36	2.78	3.18	0.40
843	759382.95	3078261.73	1.79	2.19	0.40
844	759445.42	3078304.37	2.54	2.94	0.40
845	759445.42	3078304.37	2.54	2.94	0.40
846	759482.62	3078421.8	1.11	1.51	0.40

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
847	759482.62	3078421.8	1.11	1.51	0.40
848	759523.72	3078512.96	1.25	1.65	0.40
849	759564.82	3078604.13	1.54	1.94	0.40
850	759605.92	3078695.29	1.74	2.14	0.40
851	759647.02	3078786.45	2.5	2.9	0.40
852	759648.28	3078789.25	2.55	2.95	0.40
853	759748.27	3078790.58	2.39	2.79	0.40
854	759829.86	3078791.66	1.05	1.45	0.40
855	759829.86	3078791.66	1.05	1.45	0.40
856	759895.18	3078715.94	0.87	1.27	0.40
857	759896.01	3078714.97	0.9	1.3	0.40
858	759947.21	3078629.07	1.24	1.64	0.40
859	759951.02	3078622.68	1.17	1.57	0.40
860	760031.47	3078563.29	1.7	2.1	0.40
861	760069.29	3078535.37	1.72	2.12	0.40
862	760069.29	3078535.37	1.72	2.12	0.40
863	760133.91	3078459.05	2.69	3.09	0.40
864	760169.91	3078416.54	3.32	3.72	0.40
865	760169.91	3078416.54	3.32	3.72	0.40
866	760259.77	3078372.67	2.87	3.27	0.40
867	760349.64	3078328.8	2.28	2.68	0.40
868	760421.48	3078293.73	2.15	2.55	0.40
869	760421.48	3078293.73	2.15	2.55	0.40
870	760517.08	3078323.07	1.56	1.96	0.40
871	760572.25	3078340.01	1.49	1.89	0.40
872	760572.25	3078340.01	1.49	1.89	0.40
873	760751.4	3078460.73	2.28	2.68	0.40
874	760751.4	3078460.73	2.28	2.68	0.40
875	761157.51	3078616.01	2.68	3.08	0.40
876	761157.51	3078616.01	2.68	3.08	0.40
877	761256.62	3078629.33	2.47	2.87	0.40
878	761355.73	3078642.64	2.38	2.78	0.40
879	761426.32	3078652.13	2.73	3.13	0.40
880	761426.32	3078652.13	2.73	3.13	0.40
881	761512.4	3078601.24	3.3	3.7	0.40
882	761598.48	3078550.34	4.67	5.07	0.40
883	761611.07	3078542.9	5.06	5.46	0.40
884	761637.91	3078446.57	1.5	1.9	0.40
885	761664.76	3078350.24	1.41	1.81	0.40
886	761679.99	3078295.57	1.56	1.96	0.40

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
887	761679.99	3078295.57	1.56	1.96	0.40
888	761653.74	3078199.08	1.43	1.83	0.40
889	761627.48	3078102.59	1.84	2.24	0.40
890	761611.65	3078044.4	2.76	3.16	0.40
891	761611.65	3078044.4	2.76	3.16	0.40
892	761643.77	3077940.21	3.14	3.54	0.40
893	761643.77	3077940.21	3.14	3.54	0.40
894	761705.58	3077861.6	2.87	3.27	0.40
895	761710.31	3077855.58	2.87	3.27	0.40
896	761767.38	3077773.46	2.88	3.28	0.40
897	761824.44	3077691.34	3.06	3.46	0.40
898	762011.1	3077422.74	3.09	3.49	0.40
899	762011.1	3077422.74	3.09	3.49	0.40
900	762072.86	3077344.09	3.09	3.49	0.40
901	762134.61	3077265.44	2.86	3.26	0.40
902	762196.37	3077186.79	1.61	2.01	0.40
903	762348.23	3077128.43	0.12	0.52	0.40
904	762356.81	3077129.13	0.1	0.5	0.40
905	762356.81	3077129.13	0.1	0.5	0.40
906	762436.69	3077189.29	0.37	0.77	0.40
907	762518.49	3077250.91	1.54	1.94	0.40
908	762518.49	3077250.91	1.54	1.94	0.40
909	762617.45	3077265.27	0.36	0.76	0.40
910	762798.39	3077248.4	1.1	1.5	0.40
911	762856.76	3077230.56	1.66	2.06	0.40
912	762856.76	3077230.56	1.66	2.06	0.40
913	762964.48	3077167.66	1.29	1.69	0.40
914	762964.48	3077167.66	1.29	1.69	0.40
915	763077.47	3077137.11	1.4	1.8	0.40
916	763077.47	3077137.11	1.4	1.8	0.40
917	763176.67	3077149.75	2.18	2.58	0.40
918	763191.57	3077151.65	2.18	2.58	0.40
919	763278.6	3077200.91	2.17	2.57	0.40
920	763282.27	3077202.99	2.22	2.62	0.40
921	763339.51	3077284.99	1.81	2.21	0.40
922	763396.75	3077366.99	1.34	1.74	0.40
923	763440.85	3077430.17	1.35	1.75	0.40
924	763440.85	3077430.17	1.35	1.75	0.40
925	763505.16	3077451.11	0.1	0.5	0.40
926	763505.16	3077451.11	0.1	0.5	0.40

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
927	763600.2	3077433.35	0.48	0.88	0.40
928	763600.2	3077433.35	0.48	0.88	0.40
929	763677.49	3077369.9	1.15	1.55	0.40
930	763754.79	3077306.46	1.81	2.21	0.40
931	763803.04	3077266.85	2.52	2.92	0.40
932	763803.04	3077266.85	2.52	2.92	0.40
933	763887.66	3077213.56	2.27	2.67	0.40
934	763971.4	3077160.82	3.88	4.28	0.40
935	763971.4	3077160.82	3.88	4.28	0.40
936	764070.48	3077174.38	1.45	1.85	0.40
937	764107.59	3077179.46	1.92	2.32	0.40
938	764107.59	3077179.46	1.92	2.32	0.40
939	764170.12	3077207.65	2.84	3.24	0.40
940	764170.12	3077207.65	2.84	3.24	0.40
941	764229.51	3077288.1	1.28	1.68	0.40
942	764236.55	3077297.63	0.97	1.37	0.40
943	764387.16	3077292.56	0.1	0.5	0.40
944	764387.16	3077292.56	0.1	0.5	0.40
945	764459.79	3077288.58	0.1	0.5	0.40
946	764459.79	3077288.58	0.1	0.5	0.40
947	764574.72	3077326.79	0.1	0.5	0.40
948	764574.72	3077326.79	0.1	0.5	0.40
949	764674.69	3077329.37	1.53	1.93	0.40
950	764727.86	3077330.74	0.1	0.5	0.40
951	764727.86	3077330.74	0.1	0.5	0.40
952	764818.41	3077288.3	1.08	1.48	0.40
953	764908.96	3077245.86	1.2	1.6	0.40
954	764975.77	3077214.55	1.09	1.49	0.40
955	764975.77	3077214.55	1.09	1.49	0.40
956	765040.64	3077290.66	0.2	0.6	0.40
957	765071.19	3077326.51	0.1	0.5	0.40
958	765071.19	3077326.51	0.1	0.5	0.40
959	765157.2	3077377.53	0.61	1.01	0.40
960	765223.8	3077417.03	2.04	2.44	0.40
961	765223.8	3077417.03	2.04	2.44	0.40
962	765317.16	3077452.85	2.52	2.92	0.40
963	765399.64	3077484.5	2.51	2.91	0.40
964	765399.64	3077484.5	2.51	2.91	0.40
965	765478.28	3077546.27	1.67	2.07	0.40
966	765556.92	3077608.04	1.19	1.59	0.40

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
967	765585.58	3077630.55	1.64	2.04	0.40
968	765585.58	3077630.55	1.64	2.04	0.40
969	765630.39	3077621.07	1	1.4	0.40
970	765630.39	3077621.07	1	1.4	0.40
971	765696.58	3077549.32	0.1	0.5	0.40
972	765696.58	3077549.32	0.1	0.5	0.40
973	765788.68	3077510.38	0.98	1.38	0.40
974	765880.79	3077471.43	0.42	0.82	0.40
975	765947.91	3077443.05	0.1	0.5	0.40
976	765947.91	3077443.05	0.1	0.5	0.40
977	765990.95	3077352.78	0.1	0.5	0.40
978	765996.04	3077342.1	0.1	0.5	0.40
979	766077.61	3077284.25	0.1	0.5	0.40
980	766144.5	3077236.82	0.1	0.5	0.40
981	766144.5	3077236.82	0.1	0.5	0.40
982	766209.15	3077160.53	1.25	1.65	0.40
983	766214.1	3077154.68	1.25	1.65	0.40
984	766305.5	3077114.1	1.36	1.76	0.40
985	766396.9	3077073.53	1.54	1.94	0.40
986	766402.91	3077070.86	1.53	1.93	0.40
987	766501.48	3077054.01	1.11	1.51	0.40
988	766600.05	3077037.16	2.38	2.78	0.40
989	766698.62	3077020.3	1.6	2	0.40
990	766710.23	3077018.32	1.57	1.97	0.40
991	766710.23	3077018.32	1.57	1.97	0.40
992	766769.67	3076937.91	2.25	2.65	0.40
993	766812.57	3076879.88	4.25	4.65	0.40
994	766812.57	3076879.88	4.25	4.65	0.40
995	766903.83	3076920.76	4.14	4.54	0.40
996	766923.29	3076929.48	2.24	2.64	0.40
997	767018.04	3076961.47	1.44	1.84	0.40
998	767060.69	3076975.87	0.82	1.22	0.40
999	767060.69	3076975.87	0.82	1.22	0.40
1000	767087.72	3077047.65	2.45	2.85	0.40
1001	767087.72	3077047.65	2.45	2.85	0.40
1002	767146.23	3077073.76	2.96	3.36	0.40
1003	767146.23	3077073.76	2.96	3.36	0.40
1004	767273.33	3077025.57	1.08	1.48	0.40
1005	767273.33	3077025.57	1.08	1.48	0.40
1006	767365.93	3077063.33	1.83	2.23	0.40

Sl. No.	Easting X(m)	Northing (m)	Observed Depth (m)	Reduced Depth (m)	Reduced depth (m)
1007	767389.75	3077073.04	2.18	2.58	0.40
1008	767488.11	3077055	2.57	2.97	0.40
1009	767586.47	3077036.96	1.81	2.21	0.40
1010	767644.81	3077026.26	1.07	1.47	0.40
1011	767644.81	3077026.26	1.07	1.47	0.40
1012	767695.87	3076990.94	1.49	1.89	0.40
1013	767695.87	3076990.94	1.49	1.89	0.40
1014	767777.6	3077002.27	0.72	1.12	0.40
1015	767777.6	3077002.27	0.72	1.12	0.40
1016	767875.34	3077023.42	0.1	0.5	0.40
1017	767910.98	3077031.13	1.46	1.86	0.40
1018	767910.98	3077031.13	1.46	1.86	0.40
1019	767999.3	3076995.61	2.51	2.91	0.40
1020	767999.3	3076995.61	2.51	2.91	0.40
1021	768050.86	3076940.4	2.54	2.94	0.40
1022	768050.86	3076940.4	2.54	2.94	0.40
1023	768148.17	3076917.37	2.75	3.15	0.40
1024	768180.07	3076909.82	2.94	3.34	0.40
1025	768180.07	3076909.82	2.94	3.34	0.40
1026	768192.84	3076819.62	0.8	1.2	0.40
1027	768192.84	3076819.62	0.8	1.2	0.40
1028	768232.73	3076727.92	0.1	0.5	0.40
1029	768272.62	3076636.22	0.1	0.5	0.40
1030	768280.11	3076618.99	0.1	0.5	0.40