

PRE-FEASIBILITY REPORT

FOR

**Construction of Adi Badri Dam on Somb
Nadi and its piped link to Sarasvati Nadi
and Sarasvati Reservoir**

**Project Proponent
Irrigation and Water Resources
Department
Punchkula, Haryana**

EXECUTIVE SUMMARY

Sarasvati Nadi is known as the holiest River of India, as much as it has retained its sacred character right from the Rig Vedic age to the present day. The Sarasvati river system in the Vedic period includes the rivers like Ghaggar, Markanda, Chautang, Sutlej and Yamuna. From the studies by the various eminent researchers for the past several years now it has been clear that Yamuna as well as Sutlej were tributaries of Sarasvati River. Around 3700 BC due to tectonic disturbances in the area, Sarasvati's Yamuna Tributary was diverted to its present course and Sutlej deflected to the west from Ropar later causing disappearance of mighty Sarasvati River. Though Adi Badri is located on the bank of Somb Nadi, but it is believed that Sarasvati originates at Adi Badri. Tributaries of Sarasvati Nadi have been captured by river Yamuna in the past and the nearest tributary to Sarasvati is Somb Nadi.

The Somb Nadi rises from the Shiwalik foothills of the Himalayas and meets Yamuna river after travelling about 42 Km. The Somb Nadi source starts from the ridge dividing Markanda and Somb Nadi catchment areas. Markanda catchment lies on the north as well as on the west of Somb Nadi catchment area. Nahan is situated at about 5.0 km from the north-west boundary of the catchment area. A tributary of the Somb Nadi flows to the southward direction up to the proposed dam site. This Nadi is entirely monsoon fed and it has two major tributaries, namely Matar Ki Khol on the east and Bheron Ki Khol on the west and these two join just upstream of the Haryana- Himachal Pradesh border

In order to restore water of Somb Nadi to Sarasvati Nadi, Govt. of Haryana has decided to Construct Adi Badri Dam on Somb Nadi and its piped link to Sarasvati Nadi and Sarasvati Reservoir. Adi Badri Dam Reservoir and Sarasvati Reservoir would help in recharging the ground water in Himachal Pradesh & Haryana. Recharge will also take place along the course of the Sarasvati Nadi. Harvested water would recharge the ground water to a varied extent as per strata along the course of Sarasvati Nadi. The Location Plan covering reservoir of Adi Badri Dam, Somb Barrage, Sarasvati Reservoir and alignment of Water conveyance pipeline is shown in **Figure 1.1**

The Project involves construction of 33.4m height & 160m long dam and a pipe link of length 8.82Km to Sarasvati Reservoir having capacity 861 ha-m. The catchment area of Somb Nadi upto the Adi Badri Dam project is about 29.50 Sq. Kms. 31.16 Ha diversion of forest land is involved. There is no displacement of family in the project and land required for pipelink and sarasvati reservoir is already in possession with irrigation and water resources department, Government of Haryana.

The Kalesar wildlife sanctuary is approximately 8.529 km from the dam site.

The construction cost of the project is Approx. Rs. 108.70 Crores .

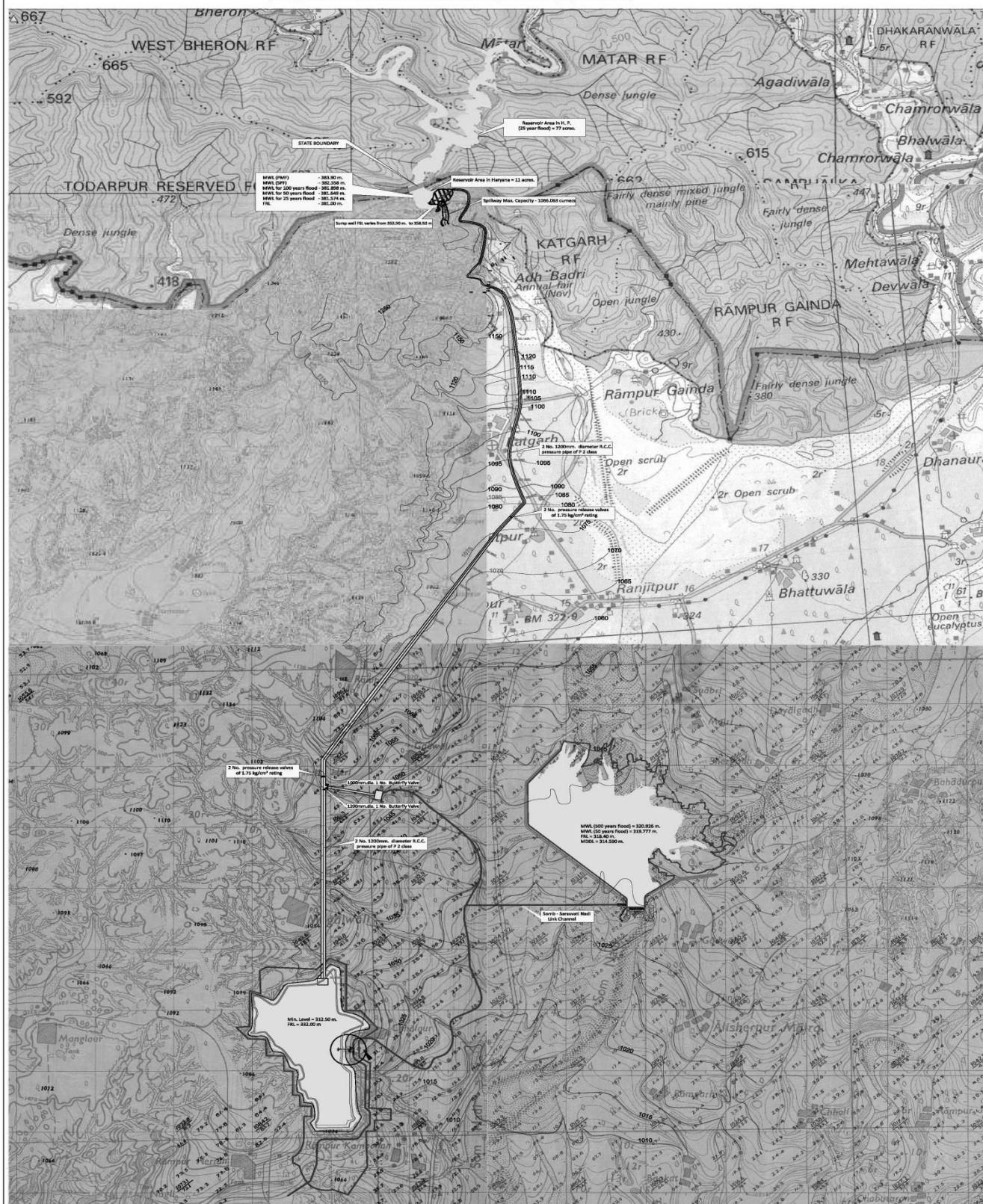


Figure 1.1

1.0 SALIENT FEATURES OF THE PROJECT

Sr. No.	Particular	Details
1	NAME OF PROJECT	Construction of Adi Badri Dam on Somb Nadi and its piped link to Sarasvati Nadi and Sarasvati Reservoir
2	STATE/DIST.	HP-Haryana/Yamuna nagar, Nahan
3	RIVER	Somb River
4	PROJECT SITE	Dam site is proposed in Village Maatar near Haryana-HP Border
5	GEOGRAPHICAL CO- ORDINATES	At Dam Axis
(i)	Latitude	30° 27' 34.8" N
(ii)	Longitude	77° 20' 19.5" E
6	HYDROLOGY	
(i)	Catchment Area	29.50 sq km
(ii)	Annual Rainfall	
	Maximum	2220 mm(In 2010)
	Average	1440mm
7	FLOOD	
	Maximum Discharge	2407.02 Cumecs at Dadupur (Dadupur head works about 34.0 km on downstream side for 509 sq km. catchment area whereas catchment area for this project is only 29.50 Sq km.) (579.47 Cumecs for 29.50 Sq KM catchment area at Adi Badri
8	PRINCIPAL LEVELS	
(i)	SILL LEVEL	El – 360.80 mamsl
(ii)	MDDL	El – 361.80 mamsl
(iii)	Full Reservoir level (FRL)	El - 381.00 mamsl
(iv)	Maximum water level (MWL)	El – 383.9 mamsl
(v)	Top of Dam	EL-385.40 mamsl
9	DAM	
(i)	Total Length	160 m
(ii)	Maximum height above deepest bed	33.40m
(iii)	Top width of dam	6.0m
(iv)	U/S and D/S slope	3:1 and 2.75:1 respectively
(v)	Type of Spillways & Capacity	Chute spillway 1066.063 cum up El. 383.90 m
(v)	Spillway bays	3
(vi)	Top level of gate and gate sizes	381.15 m (3 No. 11 m x 4.65 m each)

10	Water Conveyance Pipeline & Sarasvati Reservoir Capacity	
(i)	No. and type	Two No. RCC pressure pipes of P-2 class with internal dia as 1200 mm
(ii)	Length	8.820 Km from sump well of the Dam to the stilling basis of Sarasvati Reservoir
(iii)	Discharge Capacity	55 cs for each pipe (Total 110 cs or 3.115 cumecs)
(iv)	Branch pipeline	One branch pipe line of 450.0 m length & of the 1000 mm dia. will off take from one of the conveyance pipe line to feed Sarasvati Nadi directly near village Rulaheri.
(v)	Invert level at the start	349.0 m
(vi)	Invert level at tail	312.50 m (bed level of the Sarasvati Reservoir)
(vii)	Sarasvati Reservoir Capacity	861 Ha-m

1.1 PROPOSED PLANNING

Somb Nadi meet WJC canal at Dadupur where along with Pathrala Nadi, it crosses WJC through a level crossing known as Pathrala Dam. However, Somb Nadi runoff mainly gets used in WJC system except in flood days when supplies from Yamuna are otherwise sufficient. As per the 1994 interstate agreement, water at Tajewala (now Hathnikund) and Okhla is measured for distribution. Thus, uses of Somb Nadi water into the WJC system from Pathrala Dam at Dadupur are entirely available to the Haryana State. Whenever, water is released in to Yamuna from Pathrala Dam, the river Yamuna is already in floods and release of Somb water further worsens the flood situation in river Yamuna.

In view of above, present uses/ non uses from Somb Nadi are in two ways:-

- When the river Yamuna is not flooded, the water of Somb Nadi will be used in WJC system by the Haryana State.
- When the river Yamuna is in floods, discharge from Somb Nadi adds to the flood furry, which is needed to be checked through construction of a storage dam.

In view of above, the water that could be stored in the proposed Adi Badri Dam reservoir belongs to Haryana during non flood days of the river Yamuna due to existing uses by the State of Haryana ever since WJC canal was constructed and during flood days in river Yamuna, there is a necessity to store Somb Nadi water to avoid flooding on downstream areas in Haryana, UP and NCR of Delhi. In order to restore water of Somb Nadi to Sarasvati Nadi Govt. of Haryana has decided to Construct Adi Badri Dam on Somb Nadi and its piped link to Sarasvati Nadi and Sarasvati Reservoir . Adi Badri Dam Reservoir and Sarasvati Reservoir would help in recharging the ground water Himachal Pradesh & Haryana. Recharge will also take place along the course of the Sarasvati Nadi. Harvested water would

recharge the ground water to a varied extent as per strata along the course of Sarasvati Nadi.

2.0 INTRODUCTION OF THE PROJECT/ BACKGROUND INFORMATION

2.1 Identification of Project and Project Proponent

The Irrigation & Water resource Department of Haryana represented through the Sub Divisional Officer, Sarasvati Heritage Sub- Division No 2, Canal Colony, Jagadhri, Haryana, is the project Proponent.

2.2 Brief Information about the Project

The Project involves construction of 33.4m height & 160m long dam and a pipe link of length 8.82Km to Sarasvati Reservoir with proposed capacity 861 ha-m.

2.3 Need for the Project and its Importance to the Country or Region

Adi Badri Dam Reservoir and Sarasvati Reservoir would help in recharging the ground water in Himachal Pradesh & Haryana. Recharge will also take place along the course of the Sarasvati Nadi. Harvested water would recharge the ground water to a varied extent as per strata along the course of Sarasvati Nadi. Conjunctive use of Adi Badri Dam and Sarasvati Reservoir make availability of water almost same upto 45 years and even upto 100 years after some de-silting of the Adi Badri Reservoir. Thus performance of the project upto 45 years will be good. However, after some de-silting, its performance can be made satisfactory even upto 100 years. Project will revive Sarasvati Nadi by providing perennial flow. It will attract tourists along the course of Sarasvati Nadi.

2.4 Demand-Supply Gap

Adi Badri Dam Reservoir and Sarasvati Reservoir would help in recharging the ground water Himachal Pradesh & Haryana and helps in increasing depleting ground water levels along the recharge area.

2.5 Imports vs. Indigenous Production

Not applicable in the present project.

2.6 Export Possibility

Not applicable in the present project.

2.7 Domestic/ Export Markets

Not applicable in the present project.

2.8 Employment Generation

The implementation of project shall employment opportunities in the project area. The employment shall be associated with improved farming practices due to ground water recharge as well as the construction activities. About 200 skilled, semi-skilled and un-skilled labour shall be deployed during peak construction activity period

3.0 PROJECT DESCRIPTION

3.1 Type of Project Including Interlinked and Interdependent Projects, If any

it is not interlinked with any other project.

3.0 Location

The dam location is at latitude 30° 27' 34.8" and longitude 77° 20' 19.5" in village Maatar, Tahsil Nahan, District –Sirmour, Himachal Pradesh and pipeline to sarasvati reservoir & sarasvati reservoir is located in Yamunanagar district of Haryana.

3.1 Details of Alternate Sites

Alternate sites were examined and present site has been selected based on GSI recommendations.

3.2 Size or Magnitude of Operation

Categorization of Irrigation projects has been prescribed by the Central Water Commission, New Delhi, on the basis of the culturable command area (CCA). All projects having CCA less than 2000 ha belong to minor; above 2000 to less than 10000 ha as medium and above this threshold limit major irrigation projects. The current project is not a direct irrigation project. The outcome of project is rejuvenation of Sarasvati nadi, flood control and ground water recharge.

3.3 Project Description with Process Details

The Project involves construction of 33.4m height & 160m long dam and a pipe link of length 8.82km to Sarasvati Reservoir having capacity of 861 ha-m.

3.4 Raw Material Required along with Estimated Quantity, Likely Source, Marketing area of Final Product/S, Mode of Transport of Raw Material and Finished Product

The total raw material requirement for coarse and fine aggregate and boulder shall be met from the approved stone crushers in nearby area. The details quantity will be presented in EIA report.

3.5 Resource Optimization/ Recycling and Reuse

Resource Optimization / recycling and reuse is envisaged in this project as the surface excavation in the reservoir and other components of project shall result in generation of excavated muck. The excavated material shall be consumed in formation of dam, guide bunds/marginal/ afflux bunds.

3.6 Availability of Water Its Source, Energy / Power Requirement and Source

3.6.1 Water Requirement

The water requirement (100kld) for construction shall be mainly met from the river water and the domestic/drinking water from underground sources from nearby private tube well.

3.6.2 Power

Electrical power shall be required for illumination of project area specially dam and appurtenant works for facilitating the regulation and from the point of view of safety of structures and vigil during night, besides for operation of hydrodynamic structure i.e., vertical gates.

3.7 Quantity of Wastes to be Generated (Liquid and Solid) and Scheme for their Management/ Disposal

3.7.1 Solid Waste Generation& its Disposal

The solid municipal waste shall be generated from labour camps. The collected bio-degradable waste shall be disposed at suitable landfill sites, organic waste will be suitably processed to for compost while the non-bio-degradable waste shall be incinerated. Commercial waste shall be stored and periodically disposed by auction.

3.7.2 Liquid Effluent

There will be no waste water generation from project activities as regulation of dam involves no effluent per se. The surplus water from the pond during flood shall be passed through by opening the gate and under sluice bays into the river course. The liquid effluent resulting through the labour camp shall be treated through septic tank and soak pit.

4.0 SITE ANALYSIS

4.1 Connectivity:

The project site can be reached from Jagadhri by a 40 km long all-weather road via Bilaspur Haryana. The nearest village is Kathgarh, which is situated 2 km southwest from Adi Badri.

4.2 Landform, Landuse and Land Ownership

4.2.1 Landform

The project area lies in Shivalik region.

4.2.2 Land Use

The predominant land use of the area is agriculture land followed by forests, river body and water body (ponds).

4.2.3 Land Ownership

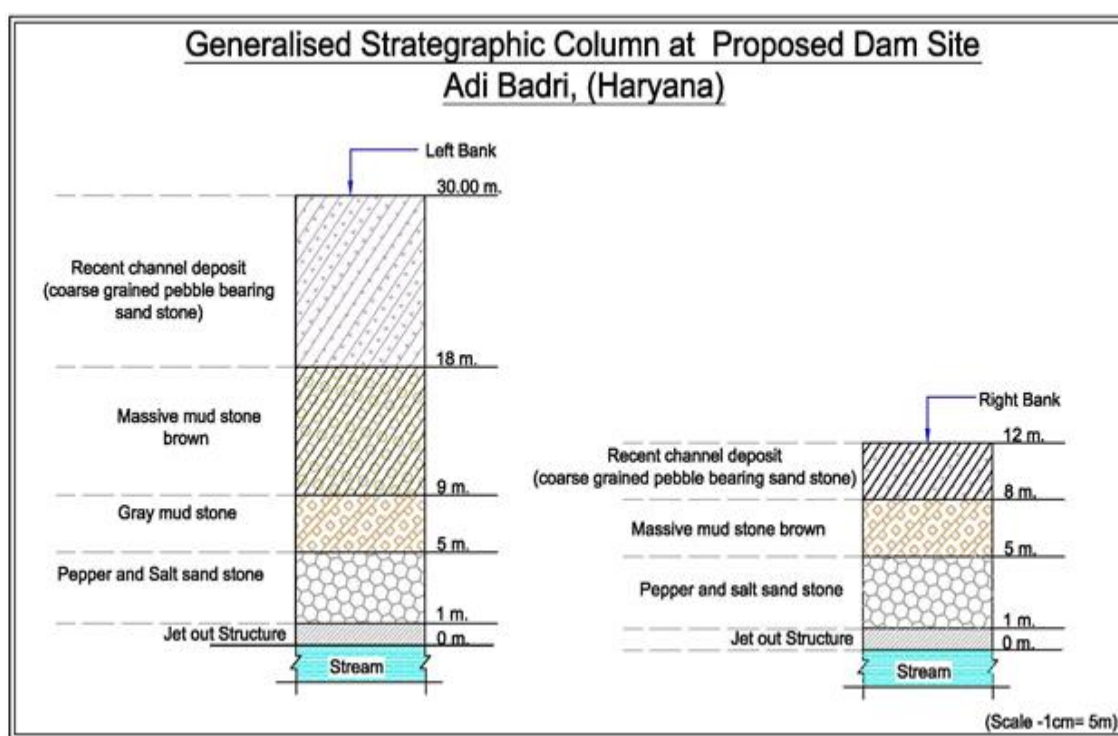
The land required for pipe linkage & sarasvati reservoir is in possession with department and 31.16 Ha forest land diversion is under progress.

4.3 Topography

The topographic analysis of the project area comprises of sub- mountainous zone where middle Shivalik rocks are exposed in the shape of low hills. The project area lies in the Survey of India (SOI) topographic sheet 53F6 and 53F7. The altitude of the area varies from the lowest 318 m. In the Somb river bed to the highest 580 m. at the top of water divide. The topography sheet indicates that the Sarasvati river originates from the Shivalik hills. The source of river is underground water dipping from small hillock which is now snow fed. It contributes to its ephemeral character. The Adi Badri and its immediate surroundings are also drained by some other small first and second order tributaries which join the Somb river, a right bank tributary from Yamuna river. All the stream/ nallas/ gullies follow the local slope of the area.

4.4 Geology and Seismicity

The project area is located in the middle Shivalik consist of the dominantly off sandstone embedded with inner clays. The calcareous matter occurs in segregated in the form of nodules, which cuts across lamination. The sandstone are arkose, coarse grained soft and pebbly. The sand stone for the area observed specific features typically salt and pepper structure both along left and right bank of the stream up to 30m whereas below this jet out structure is seen below this sand stone. This is further over- lain by mud stone and massive mud stone of grey to brown colour. The top of the hills from both sides are covered with recent channels deposited coarse grained pebble bearing sandstone varying its thickness from 4 to 12 m. The generalized stratigraphic column at left and right bank of the stream is shown in **Figure** below



4.5 Seismicity

As per seismic zoning map of India (IS: 1893:2000), the area of the project falls within Zone-IV.

4.6 EXISTING LAND USE PATTERN

The predominant land use of the area is agriculture land followed by forests/plantation, river body and water body (ponds).

4.7 EXISTING INFRASTRUCTURE & SENSITIVE ECOLOGICAL LOCATIONS

S. No.	Areas	Name/ Identity	Aerial distance (within 15 km.) Proposed project location boundary
1.	Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or	i) Kalesar Wildlife Sanctuary ii) Simbalbara	Kalesa WLS ,8.529 Km. from submergence periphery of the proposed project. Simbalbara WLS ,11.5 Km from

	other related value	WLS	dam site.
2.	Areas which are important or sensitive for ecological reasons - Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests	Matar Reserve Forest	31.16 ha of Matar Reserve Forest Land get sub-merged.
3.	Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration	No	The land is not used by any important or sensitive species of flora or fauna for breeding, nesting, migration however, further study will be conducted during EIA report.
4.	Inland, coastal, marine or underground waters	No	-
5.	State, National boundaries	Haryana- HP	Adjacent to the project.
6.	Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas	Adi-Badri	Adi-Badri archaeological Site & Religious tourist place approx. 500m away from the dam site.
7.	Defense installations	No	There are no defense installations in or around the project area.
8.	Densely populated or built-up area	No	The project area is not densely populated or built-up area
9.	Areas occupied by sensitive man-made land uses (<i>hospitals, schools, places of worship, community facilities</i>)	Adi-Badri	Adi-Badri archaeological Site & Religious tourist place approx. 500m away from the dam site.
10.	Areas containing important, high quality or scarce resources (<i>ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals</i>)	No	No
11.	Areas already subjected to pollution or environmental damage. (<i>those where existing legal environmental standards are exceeded</i>)	No	None
12.	Areas susceptible to natural hazard which could cause the project to present environmental problems (<i>earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions</i>)	No	-

4.7 Soil Classification

The soils of the study area belong to the i) **Eutrochrepts/ Udorthents** - These are shallow and loamy sands to fine sandy loams, except in depressions, well-drained, non-saline, non-

alkali, non-calcareous, mostly base saturated and are classified as loamy skeletal typic, lithyic, eutrochrepts/ udorthents. These soils are found in the Siwalik range. li) **Udipsamments/ udorthents** - These are loamy sand to sandy loam deep, excessively or well-drained, non-saline, non-alkali. These are placed under the associations of transitional tract between Siwaiks hills and alluvial plains.

4.8 Climatic Data from Secondary Sources

The climate of Yamuna Nagar district can be classified as subtropical monsoon, mild & dry winter, hot summer and sub-humid which is mainly dry with hot summer and cold winter except during monsoon season when moist air of oceanic origin penetrates into the district. There are four seasons in a year. The hot weather season starts from mid March to last week of the June followed by the southwest monsoon which lasts up to September. The transition period from September to November forms the post monsoon season. The winter season starts late in November and remains up to first week of March. The normal annual rainfall of the district is 1107 mm, which is unevenly distributed over the area in 43 days. The south west monsoon sets in from last week of June and withdraws in end of September, contributed about 81% of annual rainfall. July and August are the wettest months. Rest 19% rainfall is received during non-monsoon period in the wake of western disturbances and thunderstorms. Temperature varies from Mean Maximum 48.8°C (May & June) to Mean Minimum 6.8 °C .

4.9 Social Infrastructure

The social infrastructure like educational facilities (primary and higher secondary schools), drinking water supply, post and telegraph, public transportation and hospitals are by and large are available in the study area.

5.0 PLANNING BRIEF

5.1 Planning Concept

Based on the criterion fixed by the Central Water Commission, New Delhi, for design of hydraulic structure on permeable foundation, the proposed dam has been designed. For planning and design all relevant code of practices as laid down under various BIS codes and guidelines fixed for hydrological studies by the CWC were followed. The principal levels were fixed based on detail studies for various past floods at the site and other nearby structures and governing levels of the command area etc., keeping in mind the least submergence area and the least displacement principle.

5.2 Assessment of Infrastructure Demand (Physical & Social)

The socio-economic assessment will be made at the time of socio economic survey during EIA study.

5.3 Amenities/Facilities

Residential/Non-residential buildings

The offices of the Executive Engineers and other engineers have been functional at Jagadhari and other places since long. A well planned project colony exists at Jagadhari. Besides, a control cabin, inspection house-cum-meeting hall, a temporary small site office and stores shall be developed at other location near project site.

Water Supply

Potable water shall be supplied for human consumption.

Power Supply

Domestic power/ lighting arrangement shall be made in the labour camps.

Transport of Men and Material

Most of the employee shall stay put in the nearby residential areas which shall be located very near to the project site.

Communication

Land line and Mobile phones shall be used for communication.

6.0 PROPOSED INFRASTRUCTURE

6.1 Industrial Area (Processing Area)

Arrangements like site office, control cabin, project road from existing road to new dam site shall be provided.

6.2 Residential Area (Non Processing Area)

A well planned project colony exists at Jagadhari. Besides, site office shall be developed at headwork for the staff looking after the operation and maintenance of the works created.

6.3 Green Belt

The green belt shall be developed in area around headwork and vacant government land.. The spoil banks have stabilized with vegetal cover. The places where the vegetal cover is less, avenue plantation shall be carried out along service roads and on spoil banks.

6.4 Social Infrastructure

As there shall be no displacement of people no social infrastructure needs to be created, and thus no Resettlement and Rehabilitation site shall be warranted.

6.5 Connectivity

Project site is well connected to existing road.

6.6 Drinking Water Management

Water requirement for drinking in office and at site shall be met from ground water resource (bore well)

6.7 Sewerage System

The sewage shall be disposed through septic tank .

6.8 Industrial Waste Management

Not applicable, as the operation and maintenance of the completed project components shall not generate any effluent and industrial waste.

6.9 Solid Waste Management

The excavated material from excavation of foundation of Dam and appurtenant works in river bed shall be consumed in project, guide bunds/marginal/ afflux bunds etc.

6.10 Power Requirement & Supply/ Source

Electrical power requirement for operation of vertical gates, lighting in the head work area and bunds; construction power and power in office shall be met from the Haryana Electricity department.

7.0 Rehabilitation and Resettlement (R&R) Plan

The land required for the project is in possession with department. No R & R plan is proposed.

8.0 PROJECT SCHEDULE & COST ESTIMATES

8.1 Likely Date of Start of Construction and Likely Date of Completion

The work of construction of dam and its appurtenant works under the project will be undertaken in 2019,. All the works are likely to be completed within 3 years, after the grant of statutory environmental clearance.

8.2 Estimated Project Cost along with Analysis in terms of Economic Viability of The Project

The estimated cost of the project is 108.70 Crore.

9.0 ANALYSIS OF PROPOSAL

9.1 Financial and Social Benefits with Special Emphasis on the Benefit to the Local People, If any, In the Area

Adi Badri Dam Reservoir and Sarasvati Reservoir would help in recharging the ground water Himachal Pradesh & Haryana. Recharge will also take place along the course of the Sarasvati Nadi. Harvested water would recharge the ground water to a varied extent as per strata along the course of Sarasvati Nadi. Locals get benefitted due to increase in tourism and better availability of water in the area.