

Initial Environmental Examination

Project No: 53189-002
October 2022

India: Himachal Pradesh Subtropical Horticulture, Irrigation, and Value Chain Addition Project (HPSHIVA)

Prepared by Department of Horticulture for the Asian Development Bank

CURRENCY EQUIVALENTS

(as of 8 September 2022)

Currency Unit	=	Indian rupee/s (Rs)
Rs1.00	=	\$0.013
\$1.00	=	Rs 76.67

ABBREVIATIONS

ADB	–	Asian Development Bank
ASI	–	Archaeological Survey of India
BIS	–	Bureau of Indian Standard
CHPMA	–	Community Horticulture Production and Marketing Associations
CITES	–	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	–	Convention on Migratory Species of Wild Animals
CTE	–	Consent to establish
CTO	–	Consent to operate
DFO	–	Divisional Forest Officer
DOH	–	Department of Horticulture
JSV	–	Department of Irrigation and Public Health
DG	–	Diesel Generator
EA	–	Executing Agency
EAC	–	Environmental Appraisal Committee
EARF	–	Environmental Assessment and Review Framework
EC	–	Environmental Clearance
EIA	–	Environmental impact assessment
EMP	–	environmental management plan
FGD	–	Focus Group Discussion
GOI	–	Government of India
GoHP	–	Government of Himachal Pradesh
GRM	–	grievance redress mechanism
GRC	–	Grievance Redressal Committee
IEE	–	initial environmental examination
INR	–	Indian National Rupee
IS	–	Indian Standard
IUCN	–	International Union for the Conservation of Nature
JSV	–	Jal Shakti Vibhag
MoEFCC	–	Ministry of Environment and Forest and Climate Change
NGO	–	Non-Governmental Organization
O&M	–	Operation and Maintenance

PMU	–	Project Management Unit
REA	–	Rapid Environmental Assessment
RP	–	Resettlement Plan
ROW	–	Right-of-way
SAR	–	Subproject Appraisal Reports
SEAC	–	State Environment Assessment Committee
SEIAA	–	State Environmental Impact Assessment Authority
SPCB	–	State Pollution Control Board
WUA	–	Water User Association

WEIGHTS AND MEASURES

cm	-	centimeter
dB	-	decibels
ha	-	hectare
kg	-	kilogram
km	-	kilometer
l	-	liter
m	-	meter
m ²	-	square meter
m ³	-	cubic meter
mg/l	-	milligrams per liter
ml	-	milliliter
MLD	-	million liters per day
mm	-	millimeter
km ²	-	square kilometers
µg/m ³	-	micrograms per cubic meter

NOTES

In this report, "\$" refers to United States dollars.

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TABLE OF CONTENTS

	Pages
I. EXECUTIVE SUMMARY	1
II. INTRODUCTION	4
A. Project Description	4
III. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK	12
A. Applicable National Regulatory Laws and Notifications	12
B. National Environmental Standards	19
B.1. Water Quality Standards for Irrigation Purpose	19
C. International Treaties	20
D. ADB SPS 2009	21
IV. DESCRIPTION OF THE PROJECT	25
A. Rationale	25
B. Cluster Selection and Details	26
C. Proposed Interventions	31
D. Crop Selection	32
E. District-wise Package Details	33
F. Project Implementation Arrangements	45
V. DESCRIPTION OF THE ENVIRONMENT	49
A. Physical Environment	49
B. Climate and Meteorology	52
C. Ambient Air Quality and Noise Level	54
D. Water Resources	55
E. Hydrology	57
F. Biological Environment	71
G. Socio-Economic Profile	73
H. Cultural and Archaeological Resources	74
A. Impacts found in PRF implementation	75
B. Positive Environmental Impacts	75
C. Analysis of Degree of Impact	75
D. Installation of Solar Fencing	76
E. Field Preparation and Horticulture Plantation	79
F. Rehabilitation/ Development of New Irrigation Schemes	81
G. Installation and Operation of Drip Irrigation System	83
VI. ANALYSIS OF ALTERNATIVES	85
VII. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN	87
A. Environmental Monitoring Plan	109
B. Budgetary Cost Provision of EMP Implementation	109
VIII. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE	110
A. Stakeholder Consultations during Project Preparation	110
B. Information Disclosure and Engagement Methods	111
C. Grievance Redress Mechanism (GRM)	112
IX. CONCLUSION	115
Annexure 1: rapid environmental impact assessment checklists	116

annexure 2: location details	199
annexure 3: irrigation design detail – package-wise	215
annexure 4: list of banned pesticides in india	295
annexure 5: national parks and wildlife sanctuaries in himachal pradesh	297
annexure 6: standard construction contract environmental and social safeguard clauses	305
annexure 7: scep framework	306
annexure 8: stakeholder consultations	315
annexure 9: guidance on preparation of muck/ debris disposal plan	332
annexure 10: format for quarterly report on tracking of grievances redressal	333
annexure 11: list of threatened plant and animal species in hp	334
annexure 12: sample water test result	335
annexure 13: sample emr template	338

I. Executive Summary

1. The proposed project, the Himachal Pradesh Subtropical Horticulture, Irrigation, and Value Addition (HPSHIVA) Project (hereinafter called the “Project”) aims to showcase how systematic development of climate resilient horticulture plantation, complemented with climate compatible irrigation facilities, can facilitate enhancing farmers’ income, and return to agriculture sector to contribute to food security for the State and country.

2. The Project targets to increase income of at least 15,000 farmer households within seven districts of Bilaspur, Hamirpur, Kangra, Mandi, Sirmaur, Solan and Una (Project districts) in subtropical areas of Himachal Pradesh (HP) by:

- (i) bringing 6,000 ha of land under climate resilient horticulture production,
- (ii) expand climate-proofed irrigation facilities in a coordinated manner with the horticultural needs for 6,000 ha, and
- (iii) establish market access through value chain development of targeted crops.

3. The three key outputs of the project are:

- (i) **Output 1 – Sustainably-operated irrigation areas expanded** – under this component, it is aimed to extend irrigation facilities to 6,000 ha horticulture plots (termed as horticulture clusters) being developed under Output 2 of this project.
- (ii) **Output 2 – Climate resilient subtropical horticultural production systems adopted** – about 6,000 ha of agricultural land will be transformed to horticulture plots (clusters) of targeted crops.
- (iii) **Output 3 - Market access for subtropical horticulture farmers developed** – farmers will be supported with new collection centres, upgraded (existing) and new processing units, incubation and training centres and other management systems to raise farmers’ profitability and farm gate price of the produce.

4. The project will develop a total of 6,000 ha gradually starting from about 4,000 ha and then into the rest 2,000 ha. This is to ensure that farmers are adequately trained to develop the horticulture clusters and that sufficient quality planting materials are provided. The experience/lessons from the development of 4,000 ha will be applied to the next 2,000 ha of horticulture plot and drip irrigation schemes. The irrigation schemes are being identified in sync with the horticulture clusters. This initial environmental examination (IEE) covers the first 4,000 ha where the project clusters, beneficiary farmers and lift/gravity-based irrigation schemes are specifically identified. More specifically, the following activities will be implemented:

- (i) **Rehabilitation or development of irrigation facilities**- LIS of surface water is being proposed as main source of irrigation water under HPSHIVA. The River Satluj and River Beas, and their tributaries are the main perennial sources of surface water for the subtropical region of the State. These rivers are fed by Himalayan glaciers. Other than these, small rivulets, natural canals, and springs are the next best surface water sources for the State. In some of the clusters, in absence of any nearby surface water source, tube well has been proposed. To irrigate 4,000 ha of horticulture land, 162 LIS schemes will be developed. Out of 162 total schemes, 35 are operational schemes, 20 are existing schemes, but are currently non-operational, and rest 107 are new schemes.
- (ii) **Horticulture field development including solar fencing and drip irrigation** - develop climate resilient high-density horticulture fields irrigated through lift or

gravity-based irrigation schemes connected drip irrigation systems. The fruits that have been identified for horticultural plantation include sweet orange, guava, litchi, mango, pomegranate, persimmon, plum and pecan nut. The Project also allows farmers to undertake intercropping of other water-resilient crops and green pasture of a given hybrid as well as beekeeping. However, intercropping and beekeeping are not part of project funding – it is on farmer's cost. There are 257 clusters that have been identified covering 4,000 ha for board appraisal.

- (iii) **Drip Irrigation** – Installation of drip irrigation system that includes drip lines fitted with emitters/drippers at appropriate length as per plant spacing, and supply of water to the soil at the root zone level of crops in low rates (2-20 litres/hour).

5. **Baseline Environment:** The project districts are located in the subtropical region of State. The climate of the subtropical consist of foothills and valley areas from 350 to 650 meters above mean sea level. There are four major seasons. Winter season lasts from November to February and ends in March; the summer season extends from March to June, followed by the monsoon period extending from July to September. The maximum precipitation occurs during July to September.

6. The target irrigation sites are at remote areas, besides river-banks and Khads (rivulet). Thus, the ambient air quality and noise level are similar to that of rural areas. Similarly, the horticulture fields are at different villages, wherein the main activities are agriculture. Thus, the ambient air quality and noise levels are that of rural areas.

7. The subtropical region of the state is richly endowed with hilly terrain having an enormous volume of water for the catchment areas of Satluj (which covers 30.69% of the state), the Beas (24.5%). As per the Climate Risk and Adaptation (CRA) report, indicates projected increase in water availability in near future but leading reduced availability in the long-term period (by 2050). Thus, irrigation schemes being developed under project HPSHIVA are less likely to experience low/ no water availability from river sources though they may get exposed to extensive flooding.

8. The areas are in absence of piped water source and depend heavily on either groundwater or springs for both domestic and irrigation usage. The recent assessment of groundwater availability by the Central Ground Water Board (CGWB) suggests slight improvement in availability from past overexploitation status. However, the ephemeral sources being tapped by the project have risk of low availability during no rainfall periods, primarily during winter months. Detailed hydrological assessment has been carried out for each source and the results of the same have been presented in the screening reports of the clusters.

9. The clusters are located in agricultural field, and hence, only domesticated animals such as cows and buffalo are seen around the sites, primarily owned by the farmers who own land within cluster. The sites are also frequented by monkeys (*Rhesus macaque*), a native primate in Himachal Pradesh. MoEFCC, through vide notification No. 804, dated 14 February 2019, declared Rhesus Macaque species of monkeys as vermin (pest animals) for a period of a year in 10 districts of Himachal Pradesh which includes all project districts. Consultation with the farmers also suggest presence of Indian Peafowl (*Pavo cristatus*). Indian peafowl is included in Schedule-I of Wildlife Protection Act 1972, indicates the high conservation value of species. Thus, the solar fencing in project will stop human and animal conflict and allow conservation of species.

10. The project districts are predominantly covered under forest (45%), extending about 2578.66 sq km. The list of National Parks and Wildlife Sanctuaries in the state has been attached

in Annexure 5. In general, the vegetation found in the target sites are bamboo, Chir Pine, Oak, Deodar, Kail, Fir and Spruce in private lands.

11. **Impacts.** The supportive plantation of horticulture plants will contribute to soil conservation of the areas, turning many barren lands to cultivable lands, thus protecting them from erosions, and surface runoff, leading to increased infiltration of rain water. The project would also positively lead to the creation of an enhanced carbon sink. Solar fencing will avoid human and animal conflicts and save crops.

12. The significance of impacts during construction and operation will be low to moderate, temporary, and short-term. The project may lead to a reduction in water availability in abundance at downstream during dry spells, especially during winter months when the region experiences low to no rainfall days. While generally agricultural farmland development may increase the application of fertilizers and pesticides, the project could optimize this practice by training farmers in the best practices. This could reduce the current overuse or application of inappropriate fertilizers/pesticides on their land. During the construction period, other than local noise and air pollution from the generation of dust and construction waste, there are risk of workers' safety working at heights, especially during the laying of the rising mains. With the environmental management plan in place, the potential impacts will either be eliminated or minimized to insignificant levels.

13. **Mitigation Measures.** The project is unlikely to cause adverse impacts that are irreversible, diverse, or unprecedented. The environmental management plan will mitigate all anticipated environment impacts during pre-construction, construction, and operation stages for the project components. There will be no biodiversity and habitat related impacts on the natural landscape. The Department of Horticulture will be responsible for environmental monitoring as a central level monitoring agency – the project management unit. Also, Jal Shakti Vibhag (JSV) will be responsible for monitoring all irrigation related activities as a project implementation unit. The semi-annual monitoring reports will be uploaded in the ADB website.

14. **Public Consultation.** Consultations held as part of the project preparation, including safeguards documents, experienced large-scale participation from the communities, and the disadvantaged and vulnerable groups. All responses were positive, and the beneficiaries welcomed the support of the government and ADB.

15. **Conclusion.** The HPSHIVA Project will bring benefits to the local farmers and other people in the locality from the extended irrigation and agricultural income generation benefits. Based on the IEE findings, there are no significant impacts, and the classification of the project as Category B per ADB Safeguard Policy Statement (SPS, 2009) is appropriate. The significance of impacts during construction and operation will be low to moderate, temporary, and short-termed. With the EMP in place, the potential impacts will either be eliminated or minimized to insignificant levels. IEE will be updated when unanticipated impacts occur during the project implementation. EMPs will be updated as well based on the specific conditions of areas when beneficiaries and actual sites are defined. Throughout the implementation, environmental safeguard requirements of ADB SPS (2009) and relevant government policies will be complied by the project through the PMU and PIUs with the support from PISC.

II. INTRODUCTION

A. Project Description

16. About 90% of the population in Himachal Pradesh (hereinafter referred to as State) reside in rural areas and more than 60% of the population are engaged in agriculture¹. But the contribution of agriculture sector to the State's gross value added is only 15%. This has been mainly due to farmers moving away from farming as a result of low financial returns across the agriculture sector, especially in the subtropical region. The subtropical region in the State faces multiple challenges in terms of climate change (i.e., increasing temperature and rainfall uncertainties), developmental issues (i.e., lack of irrigation facilities), and damages caused by wild and stray animals.

17. The proposed project, the Himachal Pradesh Subtropical Horticulture, Irrigation, and Value Addition (HPSHIVA) Project (hereinafter called the "Project") aims to showcase how systematic development of climate resilient horticulture plantation, complemented with climate compatible irrigation facilities, can facilitate enhancing farmers' income, and return to agriculture sector to contribute to food security for the State and country.

18. The Project targets to increase income of at least 15,000 farmer households within seven districts of Bilaspur, Hamirpur, Kangra, Mandi, Sirmaur, Solan and Una in subtropical areas of Himachal Pradesh by:

- i) bringing 6,000 ha of land under climate resilient horticulture production,
- ii) expanding climate-proofed irrigation facilities in a coordinated manner with the horticultural needs for 6,000 ha, and
- iii) establishing market access through value chain development of targeted crops.

Figure 1: Districts covered under the Project



¹ Statistical abstract of HP 2019-20

19. The three key outputs of the project are:

- i. **Output 1 – Sustainably-operated irrigation areas expanded** – under this component, it is aimed to extend irrigation facilities to 6,000 ha horticulture plots (termed as horticulture clusters) being developed under Output 2 of this project.
- ii. **Output 2 – Climate resilient subtropical horticultural production systems adopted** – about 6,000 ha of agricultural land will be transformed to horticulture plots (clusters) of targeted crops.
- iii. **Output 3 - Market access for subtropical horticulture farmers developed** – farmers will be supported with new collection centres, upgraded (existing) and new processing units, incubation and training centres and other management systems to raise farmers' profitability and farm gate price of the produce.

B. Outputs 1 and 2

20. **Cluster-based Approach** - Under the cluster-based approach, willing farmers in villages having adjoining fields can voluntarily agree to integrate land and convert their agricultural fields to horticultural plantations. As per baseline study conducted by the Project, it has been found that, of the land contributed by the farmers for the Project, about 16% is currently barren, as farmers are not able to cope with animal invasions and unmanageable climatic impacts. The rest 84% of the land is rain-fed farmland, wherein the farmers generally cultivate wheat, paddy, and maize, mostly for self-consumption. Only a few can manage commercial production – especially those with large parcel of lands (large farmers).

21. The project will develop a total of 6,000 ha gradually starting from about 4,000 ha and then into the rest 2,000 ha. This is to ensure that farmers are adequately trained to develop the horticulture clusters and that sufficient quality planting materials are provided. The experience/lessons from the development of 4,000 ha will be applied to the next 2,000 ha of horticulture plot and drip irrigation schemes. The irrigation schemes are being identified in sync with the horticulture clusters. This initial environmental examination (IEE) covers the first 4,000 ha where the project clusters, beneficiary farmers and lift/gravity-based irrigation schemes are specifically identified.

22. After agreeing to form clustered lands, farmers formally form a body identified as Community Horticulture Production and Marketing Association (CHPMA) and select common horticulture crop that they agree to grow, maintain, harvest and market collectively. For irrigation support, the Government of Himachal Pradesh either extends already existing irrigation schemes to clustered lands or develops new schemes to support farmers' water needs. Rain-fed agricultural fields and barren land (as observed from the Baseline survey), form part of the Project.

23. Activities undertaken to develop clusters and connect them to the irrigation schemes can be broadly divided into two categories:

- i) Horticulture Fields Development – comprising of sub activities - a) fencing of clusters by solar-powered galvanized iron (GI) fences, b) field preparation, c) plantation, and d) installation of drip-irrigation system at fields.
- ii) Rehabilitation of Existing and Development of New Irrigation Facilities and connecting them to the horticulture fields.

24. **Horticulture Fields Development** - the Department of Horticulture (DOH) continues to identify and assist at least 15,000 farm households to invest and develop climate resilient high-density horticulture fields irrigated through lift irrigation schemes (LIS) connected drip irrigation systems. The fruits that have been identified for horticultural plantation include sweet orange, guava, litchi, mango, pomegranate, persimmon, plum and pecan nut. The Project also allows intercropping of other water-resilient crops and green pasture (of a given hybrid), such as Mung bean, Wild Marigold, Ashwagandha, Turmeric, Urd, Peas, etc., between plantation rows. There are about 400 clusters that have been identified covering 6,000 ha. The clusters will also be fenced by composite solar powered fences to protect the crops from wild and stray animals.

25. **Solar-powered GI fences** - At first, farmers collectively identify contiguous parcels of land (preferably not less than 10 ha). Such area is marked as cluster and later barricaded with solar-powered GI fences, which helps in protecting the cultivation from animal invasions.

Figure 2: Solar Powered Animal Proof Composite fencing



Source: Cluster site visits

26. **Field preparation** - Land is prepared by clearing the ground of any hurdles such as trees, bushes, stones, bricks, structures, etc. Thereafter, rows of raised beds as per given spacing are developed using soil from the same field. Then pits are dug within the rows of raised beds for plantation of crops' saplings. The farmers procure saplings from nurseries being developed and managed under HPSHIVA initiatives.

Figure 3: Sample output for field preparation



Source: Department of Horticulture, Himachal Pradesh

27. **Crop Selection** – Crops of a given variety have been selected based on certain ecological parameters, i.e., altitude of the land, terrain aspects (flat, hilly, and direction against sun-facing), soil characteristics (type, pH, EC, drainage capacity), and climatic factors (temperature range, average rainfall, and frost). The ecological parameters considered were identified in consultation

with the sector experts and the local horticulture university. Also, packages of practices have been developed for the farmers to follow and cultivate the crops free from pests/ diseases. Crops of the following varieties have been selected for cultivation.

Table 1: Selected Crops and their variety

Crop Name	Varieties
Citrus	Valencia, Hamlin, Natal, Pera, Westin, Jaffa, Blood Red, Mosambi
Guava	Shweta, VNR Bihi, Lalit, Hisar Safeda, Thai Pink
Litchi	Dehradun, Calcuttia
Pomegranate	Bhagwa
Persimmon	Fuyu, Jiro, Hachiya
Plum	Black-Amber
Mango	Mallika, Pusa Arunima, Chausa, Ambika
Pecan Nut	Mahan, Nellis

28. **Plantation and Nursery Development** - Every cluster is supplied with the required variety and quantity of planting materials. To support future needs for planting materials under the Project, nursery development is also planned to be strengthened within the State.

Figure 4: Procurement of plant material from nurseries



Source: Visit to nursery at Bhota & Neri, Hamirpur

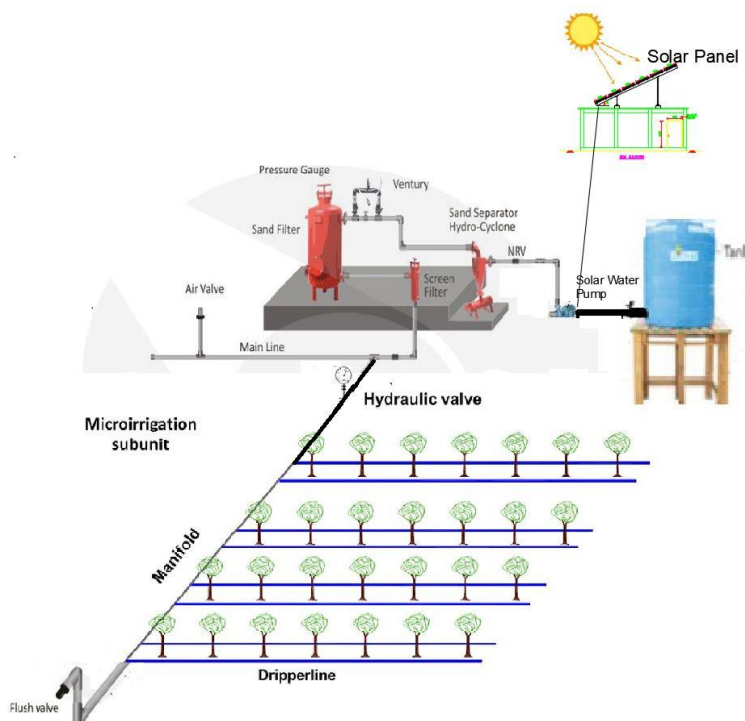
29. **Water requirement for main-crop** – Factors influencing water requirement of crops are species and its variety, soil characteristics and climatic conditions (temperature and rainfall). All these have been mapped per cluster to arrive at total water requirement for the cluster. It is estimated that if a 10-ha land will be cultivated with selected crop varieties (at its maximum demand), it will require approximately 100,000 litre/day of water storage tank at cluster level.

30. **Drip Irrigation** – Through drip lines fitted with emitters/drippers at appropriate length as per plant spacing, this system involves supply of water to the soil at the root zone level of crops in low rates (2-20 litres/hour). The amount of irrigation depends on water percolation rate, soil and crop requirements. Frequency of application of water is adjusted as per crop requirement and season of the year. Major components of drip irrigation system are as follows:

Table 2: Major components of Drip Irrigation system

1	Water Storage Tank	6	By-pass Assembly
2	Pump Station	7	De-silting Tank
3	Control Valves	8	Pressure Regulator
4	Fertilizer tank /Venturi	9	Laterals
5	Mains / Sub-mains	10	Emitters/Micro-tubes

Figure 5: Drip Irrigation system



31. **Mulching** – After installation of drip irrigation, plastic sheets are spread over the ground around plants to cover soil, and specially to protect roots of plants from heat (excessive evaporation) or cold, to keep soil moisture, and control weed growth.

Figure 6: Mulch laying in cluster



32. **Intercropping and Beekeeping:** Since productions of horticultural crops are expected to start after three years of plantation, farmers may require additional source of livelihoods during this period. Hence, to create alternatives for farm income and livelihood for project beneficiaries, concepts of intercropping and beekeeping are introduced. Crops such as onion, ginger, turmeric, wild marigold, pea, cowpea, cabbage, urd, etc. have been recommended by experts, after consultation with DOH. Similarly, beekeeping, also known as apiculture, ensures better pollination by intercrops. Farmers in the project clusters are allowed to carry-out beekeeping for additional source of income. Investment related to intercropping and beekeeping will be carried out by the farmers on their own and does not involve project loan. During growth of intercrops, water will be required for irrigation, which can be provided without any additional provision, as the irrigation infrastructure will already be in place for the main fruit crop.

33. **Rehabilitation of Existing and Development of New Irrigation Facilities (Output 1) –** LIS of surface water is being proposed as main source of irrigation water under HPSHIVA. The River Satluj and River Beas, and their tributaries are the main perennial sources of surface water for the subtropical region of the State. These rivers are fed by Himalayan glaciers. Other than these, small rivulets, natural canals, and springs are the next best surface water sources for the State. In some of the clusters, in absence of any nearby surface water source, tube well has been proposed. To irrigate 4,000 ha of horticulture land, about 162 LIS schemes will be developed. Out of 162 total schemes, 35 are operational schemes, 20 are existing schemes, but are currently non-operational, and rest 107 are new schemes.

- i. **Operational/ Functional schemes** - Functional schemes are those which are in working condition and in which water has reached up to delivery tank and some minor repair/ replacement of infrastructure components are envisaged.
- ii. **Existing/ Non-functional schemes** - Non-functional schemes are those which are not in working condition and some of the components such as pumps, repair/rehabilitation/augmentation of source, rising main replacement are required. The degree of rehabilitation is scheme specific.
- iii. **New Schemes** - In new scheme, entire irrigation system needs to be planned and designed from source to the main distribution tank located at/ near the cluster.

34. **Source Sustainability of Irrigation Water –** The source sustainability of water resources is estimated based on net availability in a water balance – (a) total rainfall in the catchment, (b) evapo-transpiration rate, (c) existing and future water demands in upstream and downstream riparian rights or, in absence of actual data, considered 80% of the flow, (d) water requirement for all clusters taken as 20 m³/day/ha, and (e) environmental flow and future demand at each source are taken as 15% and 20% yield respectively. Based on this, surplus or deficit has been calculated.

35. For sustainable operations and maintenance of irrigation schemes being rehabilitated and/or developed, a farmer-based association called Water User Associations (WUA) is being formalized at each cluster. The WUA will be governed through Water User Act for the State – being enacted as part of the project. The irrigation components of the project are being executed by Jal Shakti Vibhag of the State.

C. Output 3

36. **Development of Post-Harvest Facilities –** These include design and construction of value chain infrastructures required for farmers' marketing organizations, such as collection centres, upgrading existing and building new processing units, establishing incubation and

training centres and other capacity building activities. These infrastructures will be developed by CHPMA through grant support from HPSHIVA. Currently, no land or design requirements have been finalized, thus these are outside the purview of the IEE.

D. Other Project Information

37. **Project Proponent** – The DOH will be the Executing Agency, whereas both DOH and JSV will be the two implementing agencies for the project. A project management unit (PMU) has been established by DOH, led by the Project Director from DOH, who is being supported by one deputy director each from DOH and JSV.

38. **Environmental Categorization** – As first step of identifying environmental impacts, screening of project sites at the district level for environmental sustainability is carried out. This commenced with filling-up the ADB's Rapid Environmental Assessment (REA) checklist for irrigation sector, as maximum adverse impacts of the project are envisaged from civil works for rehabilitation and development of irrigation schemes. Refer to the accomplished checklist under Annexure 1.

39. As concluded from screening exercise, civil works for development of irrigation schemes are likely to cause potential site-specific environmental impacts, but none that have significant adverse environmental impacts, that are irreversible, diverse, or unprecedented in nature. Also, the impacts can be mitigated by applying appropriate design measures and by following the best environmental practices during construction. The activities to be undertaken for the development of horticulture fields including the laying of drip-irrigation systems are likely to cause minimal environmental impacts. ***Hence, the project has been categorized as an environmental "Category B" project.***

40. From the point of view of environmental assessment, neither the project nor any of the activities proposed in the project attract provisions of the Environment Impact Assessment Notification (2006), and none require any prior environmental clearance either from the Union or from the State Government regulators.

E. Purpose of this Report

41. This Initial Environmental Examination (IEE) report follows the requirement of ADB's Safeguard Policy Statement (SPS) of 2009 and its relevant annexures (i.e., Appendix 1 – Safeguard Requirements 1: Environment).

42. **Scope of IEE:** This IEE covers about 4,000 ha of horticulture fields and the associated irrigation schemes, those that have been designed for board appraisal of the ensuing loan. For the upcoming 2,000 ha during project implementation, an environmental assessment and review framework (EARF) has been developed and same should be followed for safeguard screening and assessment of forthcoming subprojects. The project site selection will be in accordance with the environmental project selection criteria, as outlined in the EARF.

43. This IEE captures the environmental setting of all the proposed project sites (for 4,000 ha for board appraisal) including physical, biological, and socioeconomic conditions and the national and local legal setting, as well as international environmental agreements that are relevant to the project.

44. Based on these, the IEE further identifies and analyses potential direct, indirect, cumulative, and induced impacts and risks to physical, biological, socioeconomic, and cultural

resources, in context to project's area of influence. The area, at the radius of 500 m surrounding the target sites, has been considered as the project area of influence. It then suggests mitigation measures including occupation and community health and safety measures (including precautions for COVID-19 infection).

45. **Limitations** – Preliminary engineering designs, the proposed technology, and Bill of Quantities (BOQ), among others, were provided to the safeguard team to document the subprojects' descriptions. However, the information of the actual designs, technological specifications and final cost estimates will be completed by the engineering, procurement, and construction (EPC) contractors. Thus, where applicable, the team has utilized the secondary information of the subproject areas gathered from site visits, consultations, review of relevant ongoing projects in the State,² and elsewhere in India, and professional experiences in similar projects.

² Himachal Pradesh Horticulture Development Project - P151744, Department of Horticulture, Himachal Pradesh, World Bank Funded. Integrated Project for Source Sustainability and Climate Resilient Rain-fed Agriculture in Himachal Pradesh, World Bank-funded, Project Concept Stage.

III. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

46. The implementation of the project's environment safeguards will be governed by relevant national laws and state's environmental rules, regulations, and standards, and social rules as well. These regulations impose restrictions on activities to minimize and mitigate likely impacts on the environment and community and setting standards to regulate the disturbances due to the proposed Project's schemes. Compliance is required in all stages of the project's implementation including design, construction, and maintenance phases. The IEE report has greatly considered the ADB's Safeguards Policy Statement (SPS) 2009 requirements. Provided that the project complies with the national and ADB SPS 2009 requirements, the potential environmental and social implications and risks will be mitigated during the implementation of the project activities.

A. Applicable National Regulatory Laws and Notifications

47. The Ministry of Environment, Forest and Climate Change, Government of India (MoEFCC) has the overall responsibility to set policy and standards for the protection of environment along with the Central Pollution Control Board. Their policies cover air, noise, and water quality standards, and the requirements for preparing environmental impact assessment statements for development projects (if applicable). These standards are of significance for the proposed Project. Salient features of relevant environmental and labour laws and regulations, including their applicability to the subprojects are detailed below. The following table shows the summary of the regulatory laws.

Table 3: Applicability of environmental and labour laws and regulations

Law/Act	Description	Applicability/ Compliance
The Environmental (Protection) Act, 1986, and the Environmental (Protection) Rules, 1987-2002 (various amendments)	Umbrella Act. Protection and improvement of the environment. Establishes the standards for emission and discharge of parameters in the atmosphere. All environmental notifications, rules and schedules are issued under this act	In this Act, unless the context otherwise requires, defines unit "environment" that includes water, air and land and the inter- relationship and further provision the need for Air, Water, Noise and Waste Management Acts. As the project is envisaged to cause air, water, noise pollution and waste generation, hence this Act is relevant to the project.
The EIA Notification, 14th September 2006 and subsequent amendments	To accord environmental clearance to new development activities listed in schedule of EIA notification.	The proposed activities under the project are part of minor irrigation schemes with less than 10 ha CCA, thus prior environmental clearance is not required as per Draft EIA notification 2020 ³ . Hence this notification is not relevant to the project.
Forest (Conservation) Act, 1980 and Forest Conservation	To check deforestation by restricting conversion of forested areas into non-forested areas	Risk of encroachment as many of the proposed clusters are adjacent to forest areas. Permission from Divisional Forest Officer will be required, if trees from protected category will be cut/ felled. Some of the clusters such as Ghattewal, Bassi, and Dulhet (Dhalet) (under Bilaspur Package) are

³ http://environmentclearance.nic.in/writereaddata/Draft_EIA_2020.pdf

Law/Act	Description	Applicability/ Compliance
Rules, 2003 as amended		located at the periphery of the Naina Devi Conservation Reserve. However, no major construction activities will be carried out in these clusters as LIS Changer is an existing irrigation scheme. Hence, only a notification to the forest authority about the project is required. For new subprojects, if identified to pass through forest area (gravity main) then forest clearance would be required.
National Forest Policy 1952 (Revised) 1988 & Biological Diversity Act, 2002	To maintain ecological stability through conservation and restoration of biological diversity. Keeping the forest area intact in the Himalayan States- This policy implies to maintain the 66.7% of land under forest area in HP.	There are 14 wildlife sanctuaries (2 in Bilaspur, 2 in Kangra, 3 in Mandi, 4 in Solan and 3 in Sirmaur) under the project districts. Clusters Ghattewal, Bassi, and Dulhet (Dhalet) (under Bilaspur Package) are located at the periphery of the Naina Devi Conservation Reserve. However, as no major construction activities will be carried out in these clusters as LIS Changer is an existing irrigation scheme. Hence, there will be no adverse impact to the biodiversity of the area.
Himachal Pradesh Fisheries Rules 2020	This rule protects the Trout Species, as same is being cultured by the state, and identifies those stretches of rivers or streams where trout fish is being developed. Hence, no intake points for irrigation water is allowed from these water.	Trout waters to be avoided for irrigation are: - Tirthan streams and its tributaries above its confluence with river Beas in Kullu and Mandi District. - River Uhl and its tributaries in Mandi and Kangra District, including balancing reservoir and feeder channels at Barot. - Neugal stream and its tributaries up streams Mainjha bridge and 10 kms stretch of Baner Khad up stream suspension bridge at Tikker Doli in Kangra District None of the current clusters are tapping water from the Trout waters.
Water (Prevention and Control of Pollution) Act, 1974	Aims to prevent and control water pollution and to maintain/restore the wholesomeness of water by establishing Central and State Pollution Control Boards to monitor and enforce these regulations.	This Act is not applicable to minor irrigation schemes as project like this do not cause pollution to the waters. However, as best horticulture practices, the farmers should use water wisely and undertake all measures to avoid water contamination from use of pesticides.
Air (Prevention and Control of Pollution) Act, 1981	To reduce air pollution by controlling emission of air Pollutants as per the prescribed standards.	The project will involve only minor construction activities at water intake sites, for rising main and field preparation at field level that may led to fugitive emissions. Clusters those that are near to ecological sensitive areas would therefore require to monitor air quality during such construction

Law/Act	Description	Applicability/ Compliance																	
		activities. The standards are provided in section B of this chapter. As mitigation measure the sites should spray water periodically during construction time to prevent air pollution.																	
Noise Pollution (Regulation and Control) rules 2000, Amendment up to 2010	Rule 3 of the act specifies the ambient noise standard with respect to day and night noise for different zones /areas. This act will be applicable to ensure all noise producing activities during the civil works to maintain the applicable standards and necessary protection measure need to be considered in design.	Project activities may lead to minor generation of noise due to construction activities. The project needs to maintain the following level of decibel depending on the area: <table border="1"> <thead> <tr> <th rowspan="2">Area Category</th><th colspan="2">Limits in dB(A) L equivalent</th></tr> <tr> <th>Day Time</th><th>Night Time</th></tr> </thead> <tbody> <tr> <td>Residential Area</td><td>55</td><td>45</td></tr> <tr> <td>Silence Zone</td><td>50</td><td>40</td></tr> <tr> <td>Commercial Area</td><td>65</td><td>55</td></tr> <tr> <td>Industrial Area</td><td>75</td><td>70</td></tr> </tbody> </table>	Area Category	Limits in dB(A) L equivalent		Day Time	Night Time	Residential Area	55	45	Silence Zone	50	40	Commercial Area	65	55	Industrial Area	75	70
Area Category	Limits in dB(A) L equivalent																		
	Day Time	Night Time																	
Residential Area	55	45																	
Silence Zone	50	40																	
Commercial Area	65	55																	
Industrial Area	75	70																	
HP Land Preservation Act, 1978 (Private land not classified as Forest)	An Act to provide for the better preservation and protection of certain portions of the territories of Himachal Pradesh.	For felling of trees, no permission is required up to 5 trees in one financial year in case of broad leave species including Chil (<i>Pinus roxburghii</i>) and Ban Oak (<i>Quercus leucotrichophora</i>), 3 trees in case of coniferous species, up to 10 trees with the written permission of the Range Officer and more than 10 trees with the written permission from Divisional Forest Officer (DFO) Feeling of trees other than Chil, Bak Oak and coniferous species: up to 50 - permission from Divisional Forest Officer (DFO), up to 100 – Chief Conservator of Forests (CCF), up to 200 – Principal Chief Conservator of Forests (PCCF), HP. Felling of exempted species that require no permission – Indian Siris (<i>Albizia lebbeck</i>), Poplar (<i>Populus</i>), Bauhinia (<i>Bauhinia</i>), Eucalyptus (<i>Eucalyptus</i>), Mulberry (<i>Morus alba</i>), Bamboo species (<i>Bambusoideae</i>), Japanese Shahtooot (<i>Morus nigra</i>).																	
National Agriculture Policy 2000	National Agriculture Policy seeks to capture the actual growth potential of Indian Agriculture, strengthen rural infrastructure to support faster agricultural development, promote value addition, accelerate the growth of agro-business,	The project aims to improve agricultural productivity and farm incomes by integrating technology, institutions and market innovations.																	

Law/Act	Description	Applicability/ Compliance
	create employment in rural areas, secure a fair standard of living for farmers and agricultural workers and their families, discourage migration to urban areas and face the challenges arising out of economic liberalization and globalization.	
National Water Policy 2002	To ensure that planning, development, and management of water resources are governed by national perspectives	As project activities will involve development of new minor irrigation systems as well as renovation and augmentation of existing infrastructure.
National Horticulture Mission (NHM) 2005	The NHM's key objective is to develop horticulture to the maximum potential available in the State and to augment production of all horticultural products in the State.	Applicable as the objective of the project is increase in subtropical horticulture crop production.
National Policy for Farmers 2007	Sets goals such as: (i) improve economic viability of farming by substantially increasing the net income of farmers and to ensure that agricultural progress is measured by advances made in this income. (ii) protect and improve land, water, biodiversity and genetic resources essential for sustained increase in the productivity, profitability and stability of major farming systems by creating an economic stake in conservation. (iii) develop support services including provision for seeds, irrigation, power, machinery and implements, fertilizers and credit at affordable prices in adequate quantity for farmers., etc.	Applicable as project would comprise many of the features enunciated in the policy such as increasing farmers income, develop support services including provision for seeds, irrigation, power, machinery and implements, fertilizers and credit at affordable prices in adequate quantity for farmers., etc.
The Building and Other Construction Workers (regulation of employment and conditions of service) Act, 1996	To regulate the employment and conditions of construction workers and to provide for their safety, health and welfare measure and for other matter incidental thereto	A large number of construction workers (skilled, semiskilled or unskilled) will be employed temporarily during construction phase of the project

Law/Act	Description	Applicability/ Compliance
Hazardous Wastes (Management, Handling and Trans boundary Movement) Rules, 2016	Protection to the general public against improper handling and disposal of hazardous wastes	Hazardous wastes such as used oil, batteries, paint residues, etc. will be generated during the project. - Such waste should be recorded in terms of type and quantity generated, - The contractor should store such waste as a dedicated area having appropriate signage of danger, - The waste thus generated to be disposed safely to the government dedicated sites or handed over authorized incinerators, - Open burning of solid wastes, whether hazardous or non-hazardous, is not considered good practice and should be avoided, as the generation of polluting emissions from this type of source cannot be controlled effectively.
Construction and demolition Waste Management Rules, 2016	Rules to manage construction waste resulting from construction, re-modelling, repair, and demolition of any civil structure. Rules define Construction and Demolition waste as waste comprising of building materials, debris resulting from construction, re-modelling, repair, and demolition of any civil structure.	Construction and demolition waste generated from augmentation and renovation of existing infrastructure shall be managed and disposed of as per the rules to the dedicated sites earmarked by the government. Appendix 9 provides with more detailed guidelines.
Plant Quarantine (Regulation of Import into India) Order (2003)	To ensure and regulate the import of plants, root stocks, genetically modified species and its quarantine in India.	The project will involve import and multiplication of root stocks and cultivars, which will be quarantined in govt. owned nurseries being developed under HPSHIVA. - Permits for import of plants and plant products to be obtained, - No consignment of plants and plant products, if found infested or infected with a quarantine pest or contaminated with noxious weed species shall be permitted to be imported, - All nurseries to be registered under DOH, - Head, Division of Plant Pathology, Dr. Y.S. Parmar University of Horticulture and Forestry, Solan, is the dedicated Inspection Authorities for Certification of Post entry quarantine facilities and inspection of growing plants,

Law/Act	Description	Applicability/ Compliance
		- Section IV of the Plant Quarantine (Regulation of Import into India) Order (2003), every application for certification of post-entry quarantine facilities shall be submitted to the inspection authority in Form PQ 18. The inspection authority, if satisfied after necessary inspection and verification of facilities, shall issue a certificate in Form PQ 19.
Protection of Plant Varieties and Farmers' Rights Act (2001)	This act provides the establishment of an effective system for protection of plant varieties, the rights of farmers and plant breeders, and to encourage the development and cultivation of new varieties of plants.	Such protection is likely to facilitate the growth of the seed industry, which will ensure the availability of high-quality seeds and planting material to the farmers.
Insecticide Act 1968; Insecticide Rules 1971 Insecticide (Control) Order 1985 Fertilizer Control Order 1985 Fertilizer Movement Control Order 1973 Essential Commodities Act (Amended - 1986)	The Government of India (GOI) has notified various Acts for the control and Prevention of pollution due to pesticides and fertilizers.	As project investments are likely to involve use of pesticides, fertilizers and insecticides, provisions of some of these would be relevant. The banned list of pesticides is given in Annexure 4.
Himachal Pradesh Fruit Plant Nurseries Regulation and Amendment Act (2015)	An Act to provide for the registration of fruit nurseries in Himachal Pradesh	Nursery owners shall not engage in the production and sale of nursery plants or plant material without getting himself or his firm registered with the competent authority and without obtaining a license.
Environment Master Plan, Himachal Pradesh (2013)	Protection of environment in the State, ensure the sustainability of environmental heritage and natural resources and to develop a long-term perspective of achieving environmentally sustainable Development.	Agriculture and Horticulture sectors are covered under Natural resource management.

Law/Act	Description	Applicability/ Compliance
Himachal Pradesh Non-Biodegradable Garbage (Control) Act (1995)	Ban on non-biodegradable garbage, including plastics	The project may use nonbiodegradable material for crates and packing material, however these will be reused in its life cycle and their applicability for use will also be assessed during project implementation phase.
Occupational Safety, Health And Working Conditions Code, 2020 & Employees State Insurance (ESI) Act 1948 The Workmen's Compensation Act, 1923	Occupational safety and health and working conditions of the persons employed in an establishment including construction site. An Act to provide for the payment by certain classes of employers to their workmen of compensation for injury by accident.	This will be applicable to PMU, PIUs and Contractors employing people for implementation of HPSHIVA project. The daily work hour limit to a maximum of eight hours. Defines an inter-state migrant worker as someone who has come on his/her own from one state and received employment in another state and earns up to INR. 18000 per month. Empowers women to be employed in all kinds of establishments and at night (between 7 PM and 6 AM) subject to their consent and safety. Obligatory for contractors recruiting 50 or more workers. No charge is levied on any employee for maintenance of safety and health at the workplace including the conduct of medical examination and investigation for the purpose of detecting occupational diseases. The ESI Act 1948, encompasses certain health related eventualities that the workers are generally exposed to, such as sickness, maternity, temporary or permanent disablement, Occupational disease or death due to employment injury, resulting in loss of wages or earning capacity-total or partial.
Central Motor Vehicle Act 1988 and Central Motor Vehicle Rules 1989;	The Act and the Rules provides in detail the legislative provisions regarding licensing of drivers/conductors, registration of motor vehicles, control of motor vehicles through permits, special provisions relating to state transport undertakings, traffic regulation, insurance, liability, offences and penalties, etc.	This is an act and rules are applicable as the project will use many vehicles directly or indirectly for project purpose. All vehicles under the project should have appropriate No Objection Certificate.

B. National Environmental Standards

B.1. Water Quality Standards for Irrigation Purpose

48. Generally, salinity, sodicity and toxicity of specific ions are considered for assessing suitability of waters used for irrigation purposes. Use of waters exceeding the maximum permissible limits of these parameters will affect the soil structure and decrease the yield of the crops grown. Based on above considerations, Bureau of Indian Standards (BIS) has prescribed the following concentration ranges for irrigation waters:

Table 4: Water quality standard for irrigation purpose under BIS

S. No.	Parameters	Prescribed limits		Probable effects
		Desirable	Permissible	
1	Salinity/EC in Mmhos/cm at 25°C	Sensitive crops <1500 Semi-tolerant 1500-3000 Tolerant >3000		Plant growth is retarded with stunted fruits, leaves and stem in high salinity
2	SODICITY/SAR	SAR<10 10-18 18-26 >26	Excellent Good Medium Bad	Causes deflocculation of soil, restricting free movement of water
3	R.S.C meq/l	<1.25 1.25-2.5 >2.5	Excellent Good Bad	Result in increase of Sodium causing adverse effects.
4	BORON(B), mg/l	Sensitive crops <1.0 Semi-tolerant 1.0-2.0 Tolerant 2.0-4.0 Unsatisfactory for most crops>4.0		An essential plant nutrient at low concentration but high conc. Is toxic to plant

B.2. Air Quality Standards

49. The revised National Ambient Air Quality Standards, 2009, specifies 24 hours and annual ambient air quality standards. Since the project construction works are minor in nature and neither the operations of horticulture fields will lead to annual emissions, hence 24 hours standards are applicable to the project.

Table 5: Ambient air quality standards for rural and eco-sensitive zone

Pollutant	Concentration in Ambient Air			World Health Organization (WHO) Standards
	Industrial, Residential, Rural and Other Area	Ecologically Sensitive Area (government notified)	Methods of Measurement	
SO ₂ , µg/m ³	80	80	Improved West and Gaeke Ultraviolet fluorescence	20
NO ₂ , µg/m ³	80	80	Modified Jacob & Hochheiser (Na-Arsenite) Chemiluminescence	
PM ₁₀ , µg/m ³	100	100	Gravimetric TOEM Beta attenuation	50
PM _{2.5} , µg/m ³	60	60		25
O ₃ , µg/m ³	100 (8 hours) 180 (1 hour)	100 (8 hours) 180 (1 hour)	UV photometric Chemiluminescence Chemical Method	-

Pollutant	Concentration in Ambient Air			
Lead (Pb), µg/m ³	1	1	AAS/ICP method after sampling on EMP 2000 or equivalent filter paper ED-XRF using Teflon filter	-
CO, mg/m ³	2 (8 hours) 4 (1 hour)	2 (8 hours) 4 (1 hour)	Non Dispersive Infra Red (NDIR) spectroscopy	-
Ammonia (NH ₃) µg/m ³	400	400	Chemiluminescence Indophenol blue method	-

B.3. Noise Level Standards

50. Following Noise (ambient) Quality Standards to be followed by the project. However, project is not expected to cause any significant noise pollution.

Table 6: Noise standards

Area Category	Limits in dB(A) L equivalent		WHO Standards	
	Day Time	Night Time	Day Time	Night Time
Residential Area	55	45	55	45
Silence Zone	50	40	-	-
Commercial Area	65	55	70	70
Industrial Area	75	70	70	70

C. International Treaties

51. In addition to national and state rules and regulations, international conventions such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Convention on Migratory Species of Wild Animals (CMS), and the Ramsar Convention on Wetlands of International Importance are applicable for selection and screening of subprojects under restricted/sensitive areas. India is a party to these conventions. Relevance of the international agreements to the project is explained in the following.

52. **International Union for Conservation of Nature (IUCN).** The IUCN Red List of threatened species (also known as the IUCN red list or red data list), founded in 1963, is a comprehensive inventory of the global conservation status of plant and animal species. A series of regional red lists are produced by countries or organizations, which assess the risk of extinction to species within a political management unit. As per Section 38 of the Biological Diversity Act, The Ministry of Environment & Forests and Climate Change, Govt. of India in consultation with the Govt. of Himachal Pradesh, has notified eight species of plants and ten species of animals which are on the verge of extinction in the Gazette notification dated 17th March 2009. The notification on threatened plant and animal species for the state is given in Annexure 11.

53. **Ramsar Convention on Wetlands of International Importance, 1971.** The Convention on Wetlands of International Importance is another intergovernmental treaty that provides framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. According to the Ramsar List of Wetlands of International Importance, there are 25 designated wetlands in India which must be protected, among which, there are three Ramsar sites in the State of Himachal Pradesh (2 under project districts – Pong Dam in Kangra and Renuka in Sirmaur). None of the clusters are within 10 km radius of the wetland area.

D. ADB SPS 2009

54. The key ADB policy guiding environmental safeguards is the ADB Safeguard Policy Statement of June 2009.⁴ ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for environmental assessment are described in ADB SPS, 2009. The statement document requires environmental assessment of all ADB investments. The objective of ADB SPS 2009 is to "ensure the environmental soundness and sustainability of projects and to support the integration of environmental considerations into the project decision-making process." ADB SPS 2009 defines the requirements to be followed with regards to project screening and classification, information disclosure, consultation, and participation, monitoring and reporting, and grievance redress mechanisms. The discussion of the requirements is shown in the following.

55. **Screening and Categorization** - ADB has classified projects under four categories depending on the most environmentally sensitive component, including direct, indirect, cumulative, and induced impacts in the project's area of influence. The categories are:

- (i) Category A – where projects are likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. The impacts may affect an area larger than the sites or facilities subject to physical works. Such projects require an EIA,
- (ii) Category B - where potential adverse impacts are less than those of Category A. Impacts are generally site specific, few if any are irreversible, and in most cases mitigation measures can be designed more readily than for Category A projects. Such projects require an IEE,
- (iii) Category C, which incurs minimal or no adverse environmental impact and thus does not require environmental assessment, although environmental implications need to be reviewed. Environmental Due Diligence will be adequate for such projects, and
- (iv) Category FI refers to projects that involve investment of ADB funds through a financial intermediary and is not applicable to the present Project.

56. ADB's policy on Environment Safeguards (2012) states that "A project's category is determined by the category of its most environmentally sensitive component, including direct, indirect, cumulative, and induced impacts in the project's area of influence" and the policy requires that "environmental impact assessments evaluate transboundary and cumulative impacts of ADB projects or programs".

57. **Environmental assessment.** Category A projects require environmental impact assessment or EIA. Category B projects required initial environmental examination or IEE. Category C projects do not require environmental assessment, but environmental implications are reviewed. Environmental assessment report is required for all environment category A and B projects. Its level of detail and comprehensiveness is commensurate with the significance of potential environmental impacts and risks. A typical outline of an EIA report and IEE⁵ is shown in Appendix C.

58. When the project involves existing activities or facilities, environmental audits will be performed to determine the existence of any areas where the subproject may cause or is causing

⁴ <https://www.adb.org/sites/default/files/institutional-document/32056/safeguard-policy-statement-june2009.pdf>

⁵ May have a narrower scope than EIA report depending on the nature of the target sites.

environmental risks or impacts. If the subproject does not foresee any new major expansion, the audit constitutes the environmental assessment. A typical environmental audit report includes the following major elements: (i) executive summary; (ii) facilities description, including both past and current activities; (iii) summary of national, local, and any other applicable environmental laws, regulations, and standards; (iv) audit and site investigation procedure; (v) findings and areas of concern; and (vi) corrective action plan that provides the appropriate corrective actions⁶ for each area of concern, including costs and schedule. The audit report (including corrective action plan, if any) will be made available to the public in accordance with the information disclosure requirements of ADB SPS.

59. **Environmental Management Plan (EMP).** The project will prepare EMP that addresses potential impacts and risks identified by the environmental assessment. The level of detail and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the project's impact and risks.

60. **Information disclosure.** Information about environmental safeguard issues is to be made available in a timely manner, in an accessible place, and in a form and language(s) understandable to affected people and to other stakeholders, including the public, so they can provide meaningful inputs into project design and implementation. For illiterate people, suitable communication methods are to be used.

61. **Consultation and participation.** Communities, groups, or people affected by proposed projects, and civil society are to be engaged through information disclosure, consultation, and informed participation in a manner commensurate with the risks to and impacts on affected communities. There will be meaningful consultation with affected people and other concerned stakeholders, including civil society, and facilitate their informed participation. Meaningful consultation is a process that:

- i. begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle,
- ii. provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people,
- iii. is undertaken in an atmosphere free of intimidation or coercion,
- iv. is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups, and
- v. enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues.

62. **Monitoring and reporting.** Procedures are to be established and followed to monitor the implementation of environmental management plans, verify compliance with safeguard measures and progress toward intended safeguard outcomes; and prepare and disclose periodic environmental monitoring reports. A sample template of the monitoring report is shown in Appendix 13.

63. **Grievance Redress Mechanisms (GRM).** Projects are to develop and maintain a GRM to receive and facilitate resolution of affected peoples' concerns and grievances on environmental

⁶ Where noncompliance is identified, a corrective action plan will be agreed on by ADB and PMO. The plan will define necessary remedial actions, the budget for such actions, and the time frame for resolution of noncompliance.

and social performance. The GRM is to address concerns and complaints promptly, using understandable and transparent processes that are gender responsive, culturally appropriate, readily accessible to all segments of the affected people, and that do not impede access to the national judicial or administrative remedies.

64. **Unanticipated Environmental Impacts.** Where unanticipated environmental impacts become apparent during project implementation, the PMU will update the environmental assessment and EMP or prepare a new environmental assessment and EMP to assess the potential impacts, evaluate the alternatives, and outline mitigation measures and resources to address those impacts.

65. **Biodiversity Conservation and Sustainable Natural Resource Management.** The PMU will assess the significance of project impacts and risks on biodiversity and natural resources as an integral part of the environmental assessment process. The assessment will focus on the major threats to biodiversity, which include destruction of habitat and introduction of invasive alien species, and on the use of natural resources in an unsustainable manner. The PMU will identify measures to avoid, minimize, or mitigate potentially adverse impacts and risks and, as a last resort, propose compensatory measures, such as biodiversity offsets, to achieve no net loss or a net gain of the affected biodiversity.

66. **Pollution prevention and abatement.** ADB SPS requires the PMU to apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's (i) General Environment, Health and Safety (EHS) Guidelines (ii) Irrigation (ii) Waste Management, and other as may be applicable. These standards contain performance levels and measures that are normally acceptable and applicable to projects. When Government of India regulations differ from these levels and measures, PMU will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the PMU will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS and EHS Guidelines.

67. **Occupational Health and Safety.** The PMU will provide workers with a safe and healthy working environment, taking into account risks inherent to the particular sector and specific classes of hazards in the work areas, including physical, chemical, biological, and radiological hazards. The PMU will take steps to prevent accidents, injury, and disease arising from, associated with, or occurring during the course of work, and apply preventive and protective measures consistent with international good practice such as International Finance Corporation (IFC) EHS Guidelines on Occupational Health and Safety⁷.

68. **Community Health and Safety.** The PMU will identify and assess the risks to, and potential impacts on, the safety of affected communities during the design, construction, operation, and decommissioning of the project, and will establish preventive measures and plans to address them in a manner commensurate with the identified risks and impacts. These measures will favor the prevention or avoidance of risks and impacts over their minimization and reduction. Consideration will be given to potential exposure to both accidental and natural hazards, especially where the structural elements of the project are accessible to members of the affected community or where their failure could result in injury to the community.

⁷ This can be downloaded from International Finance Corporation (IFC), World Bank Groups. [General EHS Guidelines: Occupational Health and Safety](#).

69. **Physical Cultural Resources (PCR).** The PMU is responsible for siting and designing the project to avoid significant damage to PCR⁸. Such resources likely to be affected by the project will be identified, and qualified and experienced experts will assess the project's potential impacts on these resources using field-based surveys as an integral part of the environmental assessment process.

⁸ Defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings and may be above or below ground or under water. Their cultural interest may be at the local, provincial, national, or international level.

IV. DESCRIPTION OF THE PROJECT

A. Rationale

70. **State economy and agriculture.** Himachal Pradesh is a state with more than 50% of its areas in the mountains and less than 10% of the total areas in cultivation. The state's economic growth in the 1990s was largely driven by agriculture but recently has shifted towards industrial and manufacturing, and services sectors, which now make up more than 85% of the state's economy. The agriculture and allied subsectors' contribution to the gross state domestic product was less than 15% in 2015–2016. Still, about 90% of the state's population remains in the rural areas⁹ and 70% continue to rely on the agriculture sector for employment.¹⁰ About 89% of landholding belongs to small and marginal farmers.¹¹

71. **State irrigation.** Almost 75% of the total cultivated areas in the state are rainfed,¹² and only about 12% of the net sown areas are irrigated, increasing the vulnerability of farmers.¹³ Farmers face limited access to water sources as nearly 75% of annual rainfall is concentrated during the 3-month monsoon season and is mostly lost as run-off. Highly skewed distribution of the rainfall over time also leads to high soil erosion in the state. Moreover, the irrigation schemes in nearly half of irrigated areas are estimated to be not functional. Global best practices suggest that the sustainability of irrigation schemes can improved by increasing income from the irrigated areas, simplifying the infrastructure operation technologies, transferring irrigation management to farmers and/or their water user groups, and capacity building in operation and maintenance (O&M).

72. **Climate change in Himachal Pradesh.** The state has high exposure to current and future climate risks of extreme temperature, extreme precipitation and flooding, and drought.¹⁴ There has been an increasing temperature trend and it is projected that a warming condition will lead to more glacier melt, higher evapotranspiration, drought, and heavy precipitation in hilly areas. Although there is no significant change in the current, annual rainfall in the state, it is also projected that increased rainfalls during the monsoon season and decreased rainfalls during the rest seasons will be experienced.

73. **Subtropical horticulture in Himachal Pradesh.** In the state, there is a distinct agricultural income gap between the northern, temperate horticulture areas and the southern, subtropical horticulture areas: The state's northern temperate areas have benefited from investments in apple, which has now become the state's most important fruit crop, making up about 80% if the states fruit production in the fiscal year 2017 and earning its farmers about \$1,550 per month. In comparison, the state's southern, sub-tropical areas have seen little investment and farmers earning less than \$120 per month.¹⁵ The state government also recognizes the need to

⁹ ADB. 2010. *Climate Change Adaptation in Himachal Pradesh: Sustainable Strategies for Water Resources*. Manila.

¹⁰ Economics and Statistics Department of the Government of Himachal Pradesh. 2019. *Economic Survey of Himachal Pradesh 2018–2019*. Shimla.

¹¹ Agricultural Census of India categorizes farmers into five groups by landholding sizes: (i) marginalized farmers with less than 1 ha; (ii) small farmers with 1–2 ha; (iii) small-medium farmers with 2–4 ha; (iv) medium farmers with 4–10 ha; and (v) large farmers with above 10 ha of land.

¹² Department of Agriculture of the Government of Himachal Pradesh. 2016. State Irrigation Plan Himachal Pradesh 2015–2020. Shimla.

¹³ Government of India. Mechanization and Technology Division of the Ministry of Agriculture and Farmers Welfare, *Farmers Guide on Agriculture Machinery – Himachal Pradesh*.

¹⁴ Climate Risk and Adaptation Assessment Report (accessible from the list of linked documents in Appendix 2).

¹⁵ Department of Horticulture of the Government of Himachal Pradesh estimates. Available upon request.

diversify horticulture production because apple production fluctuates due to climate change and changing markets, and the state has a comparative market advantage in off-season subtropical fruits production when the supply from other states are lower.¹⁶

74. Subtropical horticulture in the state is lagging because monkey and other wild animal encroachment on orchards are leading to significant crop losses. This costs the sector over \$70 million annually and discourages farmers to cultivate fruits, vegetables and/or other crops. A survey in the project target areas reveals that limited access to water is another key contributor to abandoning farmland or utilizing it for subsistence farming only. Subtropical horticulture farmers also face economic challenges. Fruit trees are long term crops that require relatively high investments in the initial period, and for some crops, farmers do not receive a financial return for the first 3–5 years after establishment. It is important to identify the right varieties by conducting a crop suitability assessment, including analyzing climate change and agro-climatic conditions.

75. From a social perspective, fragmented landholding, with almost 70% of farming land being owned by marginal farmers, hinders efficient land use, investment for commercial farming, and access to high-return technologies and financing (footnote 4). This difficulty is aggravated by insufficient extension outreach, relying mostly on the government officials to cover large number of small and marginal farmers; and limited farmers' technical knowledge of climate-smart farming and best practices in subtropical horticulture.¹⁷

B. Cluster Selection and Details

76. Potential beneficiary farmer will be informed of the proposed project objective, anticipated outcome, implementation approaches and type of investment/activities. Interested farmers will sign a memorandum of understanding with the government about their roles/responsibilities and which support will be provided. When the cluster water storage tank should be located in one of few farmers' land, this voluntary donation agreement will be signed following the given template. The development of subtropical horticulture orchards will be done on farmers' own land, with no land acquisition nor physical or economic displacement. The PMU will enter into agreements with the farmer beneficiaries, in the form of memorandum of understanding, when voluntary land donation is required for construction of small water tanks or laying of pipelines in their field.

77. The project follows a cluster-based approach for adoption of high-density plantation with active involvement of the community, meeting the following criteria:

(i) Cluster selection criteria (General):

1. Minimum 10 ha of private land with unit size of minimum 5 ha. each, in case of more than one unit and in near vicinity for combined operation.
2. At least ten (10) no. of household farmers involved in the Cluster. Out of the total number of farmers in every cluster, 80% are small and marginal growers with gender equality. Future scope of expansion of plantation (preferred).

¹⁶ Off-season production refers to the cultivation of crops outside the regular cropping calendar when supply is lower and prices are higher. Due to congenial agroclimatic conditions, Himachal Pradesh is the key supplier of vegetables and some fruits during mid-May to September to neighboring states such as Punjab, Haryana, Chandigarh, and New Delhi.

¹⁷ National Bank for Agriculture and Rural Development, Government of India. 2019. [Annual Report 2018–2019](#). Mumbai.

3. Easy accessibility with presence of a perennial water source for development of new irrigation schemes / renovation of existing functional / defunct schemes of Jal Shakti Vibhag or any other Departments (Agriculture, Horticulture, Rural Development, PMKSY)
4. Land should not be in flood line and free of unwanted trees, bushes, and weeds, etc. before the start of project activities.
5. Beneficiaries should be voluntarily ready to organize themselves in CHPMAs and WUAs and willing to participate and take care of their own plants / plantation / other infrastructure, etc.
6. Soil status, soil testing, aspect, altitude etc. should meet crop selection criteria. Selection of fruit crops should be on basis of recommendations of technical advisory committee based on feasibility report in consultation with beneficiary farmers.
7. Satisfactory analysis of the hydrology of the selected schemes, ensuring adequate and reliable supply for the scheme taking account of climate change impacts and downstream water commitments.
- 8.

78. Based on the above-mentioned criteria, 257 clusters, covering about 4,000 ha have been mapped to 162 irrigation schemes, across 28 blocks in the 7 project districts. Out of 162 schemes, 35 schemes are functional, 20 schemes are non-functional, and 107 schemes are new. The details of the irrigation schemes have been given in the table below.

79. **Location Details** – The Latitude and Longitude details of each cluster and its mapped irrigation scheme have been presented in the Annexure 2.

Table 7: Clusters and their mapped irrigation scheme

#	District	Block	No. of Clusters	District wise CCA (ha)	Block wise CCA (ha)	Crop	Irrigation Schemes	Functional		Non-Functional		New	
								Nos.	Area (ha)	Nos.	Area (ha)	Nos.	Area (ha)
1	Solan	Kunihar	8	213.96	122.46	Citrus, Guava, Pomegranate	8					8	122.46
		Nalagarh	5		91.50	Guava	5					5	91.50
2	Sirmour	Nahan	10	197.92	113.96	Guava, Litchi, Mango	10					10	113.96
		Ponta Sahib	6		83.96	Guava	6					6	83.96
3	Hamirpur	Bamsan	2	644.48	26.19	Citrus, Pomegranate	2	1	8.68	1	17.51		
		Bhoranj	6		128.91	Guava	6					6	128.91
		Bijhar	5		64.53	Pomegranate	5			3	39.05	2	25.48
		Hamirpur	5		82.41	Citrus	4			4	82.41		
		Nadaun	18		234.96	Citrus	14	0	0	1	19	13	215.96
		Sujanpur	6		56.51	Citrus, Guava, Pomegranate	4			4	56.51		
4	Bilaspur	Ghumarwin	19	618.57	217.60	Citrus, Guava, Litchi	13	3	75.66	3	58.79	7	83.15
		Jhandutta	8		191.97	Citrus, Guava, Pomegranate	7			2	64.30	5	127.67

#	District	Block	No. of Clusters	District wise CCA (ha)	Block wise CCA (ha)	Crop	Irrigation Schemes	Functional		Non-Functional		New	
								Nos.	Area (ha)	Nos.	Area (ha)	Nos.	Area (ha)
		Sadar-Bilaspur	7		126.25	Citrus, Guava	4	0	0	0	0	4	126.25
		Swarghat	3		70.32	Citrus	1	1	70.32				
5	Mandi	Chauntara	6	1121.75	101.28	Citrus, Guava, Litchi	4					4	101.28
		Dharampur	63		594.08	Citrus, Guava, Plum	9	7	476.71	1	4.37	1	113.00
		Drang	1		14.32	Guava	1	1	14.32				
		Gohar/Balh	7		137.77	Guava, Persimmon, Plum	7	7	137.77				
		Gopalpur	14		158.58	Citrus, Guava, Pomegranate	10	4	70.56			6	88.02
		Sadar	2		25.06	Citrus, Litchi	2	2	25.06				
		Sundarnagar	4		54.57	Citrus, Plum	4	3	44.41			1	10.15
6	Kangra	Bajjnath	5	922.36	44.49	Guava, Pecan Nut	3					3	44.49
		Bhawarna	7		101.80	Citrus, Guava, Litchi	5	0				5	101.80
		Dehra	5		489.50	Citrus	3	2	25.34			1	464.16

#	District	Block	No. of Clusters	District wise CCA (ha)	Block wise CCA (ha)	Crop	Irrigation Schemes	Functional		Non-Functional		New	
								Nos.	Area (ha)	Nos.	Area (ha)	Nos.	Area (ha)
		Lambagoan	6		48.94	Citrus	4	2	33.01			2	15.92
		Panchrukhi	9		85.00	Citrus, Litchi	9					9	85.00
		Sullah	6		119.90	Citrus, Litchi	6					6	119.90
7	Una	Bangana	12	277.97	223.64	Guava, Pomegranate	7	2	93.80	1	11.84	4	118.00
	Total	28	257	3832.77	3832.77		162	35	1075.64	20	353.80	107	2403.33

C. Proposed Interventions

80. The proposed interventions include the various irrigation schemes (Functional, Non-functional, and New) and Solar powered GI fence.

81. **Functional Schemes** – Those are in working condition and in which water for irrigation has reached up to delivery tank and some minor repair or replacement of infrastructure components are envisaged. Additionally, following to be installed:

- **Main delivery tank (MDT) near cluster** – The capacity of the tank was decided based on daily water requirement for each plant within the cluster during peak period. MDT are in RCC M30 grade concrete with inlet, outlet, overflow pipe.
- **Pipeline from MDT to cluster** – The pipelines from MDT to cluster are of GI or HDPE material.
- **Valves on the rising main/gravity main feeding water to MDT** – For controlling the flow into the tank
- **Non-functional Schemes** – Those which are not in working condition and some of the components such as pumps, repair/rehabilitation/augmentation of source, rising main replacement is required.
- **Repair/replacement of pumping machinery** – The pumping machinery details, such as duty point of pump (discharge, head) required for making the scheme functional/working have been worked out and cost for the same is calculated.
- **Repair/replacement of pipeline** – The details of existing rising main/gravity main such as material, diameter etc. to be replaced are finalized and cost for the same have been worked out.
- **Replacement of valves, flow meters, etc.** – The details of valves/flow meter on the delivery side of pumping main are collected and cost of the same has worked out.
- **Augmentation of source of water, such as providing check dam, construction of dyke, etc.** – For existing scheme based on the hydrological study if storage is required, a check dam is proposed on the khad/stream. Similarly for the proposed scheme at source location, if storage is required a check dam is proposed and cost of the same has been worked. Check dam is normally constructed in plum concrete and suitable energy dissipation arrangement on downstream side is proposed.
- **MDT, pipeline from MDT to cluster tanks and valves to be additionally installed.**

82. **New Schemes** – New schemes are those in which the entire irrigation system needs to be planned and designed from source to cluster tank near the cluster. Due to addition of cluster's area on the existing scheme, there will be additional water requirement on the proposed scheme. The sustainability of source for this additional water requirement was also checked. In order to validate sustainability of the source, a hydrological study of the source of water was carried out.

- **Check dam** – As per the hydrological study, if the storage is required on the khad/stream, a check dam of suitable height for storage of required quantity of water has been proposed. Check dam is in plum concrete with energy dissipation arrangement.
- **Percolation well, Infiltration well** – For tapping subsurface water, especially during lean period percolation well, infiltration wells have been proposed.
- **Raw water Pump house, rising main** – For lifting of water from river/ khad/stream submersible pumps have been proposed. Based on discharge, head, length etc. economical diameter of the rising main has been worked out. For rising main Galvanized Mild Steel pipes have been proposed

- **Sedimentation tank** - For horticulture DRIP irrigation system has been proposed. In order that Drippers shall not clog due to silt/sediment particles in the water, same needs to be removed. In order to achieve this, sedimentation tank of suitable size has been proposed. Sedimentation tank is in proposed to be constructed in concrete.
- **Sump and clear water pump house** – The clear water from sedimentation tank is stored into sump. From sump, water is pumped with the help of centrifugal/HSC pump to the main delivery tank.
- **Gravity main** – For Gravity main, up to 150 mm dia GI pipes and above 150 mm dia GMS pipes have been proposed.
- **Solar powered GI fence** – The loss of agricultural produce due to menace of monkeys and wild animals is a major issue and needs to be handled scientifically, without harming the animals. In order to help the farmers in resolving this issue, an innovative solution of Solar Powered Electric Fencing has been proposed. In this modern non-conventional fencing, wires are used to fence the area which carry low voltage current generated by solar equipment which is non-fatal to any animal coming in its contact. Current flowing through these wires act as deterrent for any animal and hence the fenced area gets protected from animal damage. The current does not cause any harm to the animal but acts as a psychological barrier for the animal from intruding into the field and helps in preventing losses.
- The Solar Fencing consists of Energizer, solar panel, battery, insulation material, poles, high tensile conducting wire and Interlink Galvanized Steel chain mesh. The electric impulse is generated by the energizer, which produces high voltage impulses of approximately 8 KV once every 0.9 to 1.2 seconds. The impulse lasts for about 300 millionths of a second to 0.1 second with a current of up to 10 mA. The detailed section drawing of fencing is mentioned below. The major benefit of solar fencing is to protect the crop loss and re-activate the growers in such affected Cluster areas for various agricultural activities. Besides this, the final produce of farmer will increase thus resulting in higher income. Another supplementary benefit is that the provision of fencing will reduce the farmer's mental and physical stress due to constant need of guarding the field, which will lead to improved health and financial well-being.

D. Crop Selection

83. Since the selection and identification of horticultural crops is essential for achieving the desired goals of the Project, a scientific baseline study was conducted to determine the feasibility of different subtropical crops with respect to the climatic conditions. The selection of different fruit crops was done based on the Cluster ecological parameters, learnings from PRF, recommendations by experts hired by PMU and in consultation with PMU.

84. The parameters considered for crop selection included availability of the land, interest of farmers, various soil parameters such as physical and chemical characteristics of soil, nutrient status, water requirement, availability of irrigation facilities, environment and climate risk assessment, orchard management practices, production, and marketing facilities, etc. Climatic conditions of an area play a major role in deciding any agriculture activity, both at macro and micro-level. Hence, all parameters on scientific lines involving all stake holders were taken into consideration while selecting a Cluster and the fruit crop. Most of the selected area is rain-fed and has sub-tropical climatic conditions. The selected fruit crops have been decided on the basis of the agro-climatic suitability of an area. The parameters taken into consideration are summarized below:

Table 8: Parameters for crop selection

Crop	Preferred traits for growth					Plantation Plants/ha	Avg. Yield (MT/ha)
	Altitude (m) amsl ¹⁸	Avg. annual rainfall (mm)	Soil Type	Soil pH	Spacing (m x m)		
Citrus (Sweet Orange)	Up to 900	500 - 775	Deep sandy loam or alluvial	5.5 to 7.5	3 x 3	1111	40-50
Guava	410 - 1200	500 - 1000	Loamy	5 to 7	3 x 3	1111	35-40
Litchi	300 to 900	1000	Deep Loamy	5 to 7	4 x 4	625	60-70
Pomegranate	Up to 1800	1000	Deep Alluvial or Sandy to Sandy Loam	6.5 to 7	3 x 3	1111	40-45
Persimmon	900 - 2000	1500- 2500	Sandy loam or Loamy	6.5 to 7.5	4 x 4	625	70-80
Mango	Up to 1000	750 - 3750	Loamy or Deep Alluvial	5.5 to 7.5	3 x 3	833	50
Pecan Nut	1000-2000	800 - 1500	Deep sandy loam	6.2 to 6.5	6 x 6	278	25
Plum	1000-4000	1000- 1250	Sandy loam	6.5	4 x 4	625	75

E. District-wise Package Details

85. Herein Package-wise details in regard to cluster location, coverage area, irrigation scheme, type of crop to be planted and water demand have been presented. The detailed design of irrigation scheme through flow-diagrams of each cluster has been presented in Annexure 3.

86. Each of the irrigation schemes will have following components: - a check dam / dyke wherever needed, submersible pumps at intake points, followed by a desilting tank to settle down the silt and store water to maintain continuous flow, a pump house with pumps to lift the water through rising main, a main distribution tank (MDT) at the cluster head and modular tanks within the cluster which are then connected with drip-irrigation system.

¹⁸ AMSL – average mean sea level

Package 1 – Solan District – Cluster and Scheme Details

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
Kunihar	Sai	6.74	Functional FIS Sai	Natural Spring	Guava	134.80
	Ser-Delag	21.56	FIS Seri sarla	Spring	Guava	431.20
	Chunad	16.35	LIS from Gumber	Ghumber Khad	Guava	327.00
	Daseran	33.46	LIS from Ali Khad	Ali Khad	Citrus	669.20
	Datti	13.75	Functional FIS Datti	Natural Spring	Pomegranate	275.00
	Giana	6.69	LIS from Jadol Nallah	Jadol Nallah	Pomegranate	133.80
	Jailang	9.65	Functional LIS Jaliayana	parallel scheme – Ghumber Khad	Guava	193.00
	Pajeena	14.26	LIS from Panjeena Nallah	Pajeena Nallah	Citrus	285.20
Nalagarh						
	Batiakh	15.13	Functional LIS Gajedh	Ghamber Khad	Guava	302.60
	Beli khol 1	10.17	LIS from TW-1	TW	Guava	203.40
	Doli	16.91	Functional LIS Gajedh	Ghamber Khad	Guava	338.20
	Palli	12.17	LIS from TW-3	TW	Guava	243.40
	Sour	37.12	LIS Sour Kulh	Ghamber Khad	Guava	742.40

Package 2 – Sirmaur District – Cluster and Scheme Details

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
Nahan	Dungi Sher	9.68	LIS from Jalal Khadd	Jalal Khadd	Guava	193.60
	Bajari (1 & 2)	13.99	LIS Jungla Bhood	Ruhn Khadd	Litchi	279.80
	Rama	6.88	LIS from Doghat Khad	Doghat Khadd	Guava	137.60
	Bhogpur	8.49	Check dam / LIS on Ruhn Khadd	Ruhn Khadd	Guava	169.80
	Simbalwala	9.99	Check dam / LIS on Ruhn Khadd	Ruhn Khadd	Guava	199.80

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
	Kherichandan 1	14.41	LIS on Jalal Khadd	Jalal Khadd	Guava	288.20
	Kherichandan 2	13.81	LIS on Jalal Khadd	Jalal Khadd	Guava	276.20
	Judag	12.61	LIS from Judag Nallah	Judag Nallah	Guava	252.20
	Goant	8.00	LIS from Goant Dam	Existing DAM Goant	Guava	160.00
	Budriyon	16.10	LIS from Tubewell	Tubewell 2	Guava	322.00
Paonta Sahib	Fatehpur	6.61	LIS Fatehpur	Percolation well, Edge of Bata River	Guava	132.20
	Killour	21.88	LIS Killour	Tons River	Guava	437.60
	Upper Bhuddi	21.72	LIS from Tubewell	Tubewell 3	Guava	434.40
	Khara	8.95	LIS Khara Nallah	Khara Nallah	Guava	179.00
	Puruwala	13.93	LIS from Tubewell	Tubewell 4	Guava	278.60
	Gyayaniwala	10.87	LIS from Tubewell	Tubewell 5	Guava	217.40

Package 3 – Hamirpur District – Cluster and Scheme Details

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
Bamsan	Sachuin	8.68	LIS Sachuhi	Beas River	Pomegranate	173.60
	Parol	17.51	LIS Dera Parol	Kunah Khadd	Citrus	350.20
Bhoranj	Balor-Sangrawar	33.45	LIS Balor Nallah	Balor Nallah	Guava	669.00
	Jol	19.72	LIS Jol Nallah	Jol Nallah	Guava	394.40
	Lagmanwin	6.90	LIS Lagmanwin Nallah	Lagmanwin Nallah	Guava	138.00
	Lambagram/Palasi	18.17	LIS JICA dam, Plassi Nallah	JICA dam, Plassi Nallah	Guava	363.40
	Mundkhar tulsi	27.99	LIS Balor Nallah	Balor Nallah	Guava	559.80
	Samlog	22.69	LIS Samlog Nallah	Samlog Nallah	Guava	453.80
Bijhar	Bhalat	11.52	Existing LIS Bhalat Nallah	Bhalat Nallah	Pomegranate	230.40
	Lafran	13.96	LIS over New Source	New Proposed	Pomegranate	279.20

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
	Ghangot	8.42	Existing LIS Ghangot Nallah	Ghangot Nallah	Pomegranate	168.40
	Kalwal	15.75	LIS Kalwal	Rihal Nallah	Pomegranate	315.00
	Seri-Bhakredi	14.88	LIS Bhakreri	Existing check dam on Nallah	Pomegranate	297.60

Package 4 – Hamirpur District – Cluster and Scheme Details

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
Hamirpur	Branda	7.90	LIS Nalti Branda	Kunah Khad	Citrus	158.00
	Bakarti-I	29.97	LIS Bakarti	Kunah Khad	Citrus	599.40
	Jangal Ropa	22.20	LIS Jangal Ropa	Kunah Khad	Citrus	444.00
	Haar	14.90	LIS Jangal Ropa Haar	Kunah Khad	Citrus	298.00
	Neri	7.44	LIS Neri	Kunah Khad	Citrus	148.80
Nadaun	Sadhwan	8.80	MIP Nadaun	MIP Nadaun	Citrus	176.00
	Rail-I	6.20	MIP Nadaun	MIP Nadaun	Citrus	124.00
	Baag Bharmoti	6.10	MIP Nadaun	MIP Nadaun	Citrus	122.00
	Kushiar-I	15.80	LIS Khusiyar Galol	Maan Khadd	Citrus	316.00
	Bhabran 1	11.22	LIS Bhabran	LIS Bhabran	Citrus	224.40
	Bhabran 2	13.90	LIS Bhabran	LIS Bhabran	Citrus	278.00
	Kaloor	9.74	LIS Kola	Maan Khadd	Citrus	194.80
	Kashmir	6.70	LIS Kashmir	LIS Kashmir	Citrus	134.00
	Phal Palsi	28.20	LIS Palsi	LIS Palsi	Citrus	564.00
	Choru (Bhoo-I)	6.20	LIS Bhoo	LIS Bhoo	Citrus	124.00
	Manjot	7.90	LIS Salasi Nallah	Salasi Nallah	Citrus	158.00
	Manjot 2	1.50	LIS Salasi Nallah	Salasi Nallah	Citrus	30.00
	Tung (Baloh)	14.10	LIS Maan Khadd	Maan Khadd	Citrus	282.00

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
	Loharda	5.00	MIP Nadaun Right Bank	MIP Nadaun	Citrus	100.00
	Sai Lower	19.00	MIP Nadaun Left Bank	MIP Nadaun	Citrus	380.00
	Pansai 1	32.20	LIS Pansai	LIS Pansai	Citrus	644.00
	Pansai 2	24.20	LIS Pansai	LIS Pansai	Citrus	484.00
	Bhalana Rei	18.21	LIS Pung Khad	LIS Pung Khad	Guava	364.20
Sujanpur	Kheri	12.80	LIS Kheri	LIS Kheri	Pomegranate	256.00
	Beri-1	9.30	LIS Kudana Beri	LIS Kudana Beri	Pomegranate	186.00
	Beri-2	12.40	LIS Kudana Beri	LIS Kudana Beri	Pomegranate	248.00
	Bhahru (Pour)	7.10	LIS Bhahru Jatour	LIS Bhahru Jatour	Pomegranate	142.00
	Bir Baghera	7.00	LIS Pour	LIS Pour	Pomegranate	140.00
	Kudana	7.90	LIS Bhahru Jatour	LIS Bhahru Jatour	Citrus	158.00

Package 5 – Bilaspur District – Cluster and Scheme Details

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
Ghumarwin	Dehra	17.90	IPH Scheme	Seer Khad	Citrus	358.00
	Kathalag droun	20.57	IPH Scheme	Seer Khad	Guava	411.40
	Lower Lanjhta	11.61	IPH Scheme – Seer Khad	Seer Khad	Litchi	232.20
	Thandora	7.41	IPH Scheme – Seer Khad	Seer Khad	Litchi	148.20
	Upper Talwara	9.35	LIS Talwara	Khad	Citrus	187.00
	Talwara Lower	1.91	LIS Talwara	Khad	Citrus	38.20
	Talwara	6.91	LIS Talwara	Khad	Citrus	138.20
	Kasol	20.53	LIS Kasohal	Seer Khad	Citrus	410.60
	Kasol Balh	8.84	LIS Kasohal	Seer Khad	Citrus	176.80
	Kasol Kanjeen	6.20	LIS Kasohal	Seer Khad	Citrus	124.00
	Mehri Kathla	14.46	LIS Mehri Kathla	Bajrauli Khad	Citrus	289.20
	Nalti Parnal	8.77	LIS Parnal	Seer Khad	Citrus	175.40
	Chharal Daloli	19.29	New Check Dam	Over LIS Talwara	Citrus	385.80
	Sandhiar (Chhat)	18.97	New Scheme Check Dam proposed	Existing DAM – Nearby	Guava	379.40

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
				Nallah Sandhiar -		
	Bhadrog (Seu)	8.88	New Scheme IPH Scheme	Seer Khad	Citrus	177.60
	Bhapral	7.11	New LIS	Seer Khad	Guava	142.20
	Samsai	5.34	New scheme Check Dam / Bore	Borewell	Guava	106.80
	Massour / Maloh	6.57	New Check Dam	Seer Khad	Citrus	131.40
	Chhiber	16.99	New Scheme Check Dam existing and proposed	Nearby Nallah	Citrus	339.80
Sadar Bilaspur -	Kotlu	14.23	New scheme to be developed	Ali Khad	Guava	284.60
	Dugga Har (Manjher)	11.43	Kuhl	Kuhl	Citrus	228.60
	Loharda	23.02	Kuhl	Ali Khad	Citrus	460.40
	Kainthal	6.38	Kuhl	Ali Khad	Citrus	127.60
	Khod ka kyar	21.49	IPH Kuhl	Ali Khad	Citrus	429.80
	Karot	21.92	Existing Kuhl	Ali Khad	Citrus	438.40
	Salnu	27.79	New Scheme	Sutlej River	Citrus	555.80

Package 6 – Bilaspur District – Cluster and Scheme Details

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
Jhandutta	Balh Sinha	32.14	LIS from JICA check dam	JICA dam	Litchi	642.80
	Kosarian-I	30.59	New scheme Perennial Nala	Kosari Nall	Citrus	611.80
	Lehar	25.23	New scheme Perennial Nala	Neri Dam	Guava	504.60
	Tikari Kotlu	23.65	New scheme Perennial Nala	Seer khad	Guava	473.00
	Fagog	12.33	LIS Seerkhad	JICA dam	Citrus	246.60
	Fagog Banjholi	22.83	Sukar Khad	JICA dam	Citrus	456.60
	Jhandu	16.06	Defunct Scheme of MHWDP Perennial Nala	JICA dam	Guava	321.20
	Tihri	29.15	LIS Tihri	LIS Tihri	Pomegranate	583.00
Swarghat	Bassi	12.44	LIS Changer	BBMB Canal	Citrus	248.80
	Dulhet 3	29.62	LIS Changer	BBMB Canal	Citrus	592.40

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
	Ghattewal	28.26	LIS Changer	BBMB Canal	Citrus	565.20

Package 7 – Mandi District – Cluster and Scheme Details

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
Chauntara	Golwan	17.19	LIS Golwan	Ropdi Khad	Guava	343.80
	Kothi – I (Balh)	9.30	LIS from TW 1	Tubewell	Guava	186.00
	Kothi - II	8.30	LIS from TW 2	Tubewell	Citrus	166.00
	Dhelu (Dhog)	9.97	LIS Dhelu	Tubewell	Guava	199.40
	Dol	33.29	LIS from TW 3	Tubewell	Litchi	665.80
	Khadiyal	23.24	LIS from TW 4	Tubewell	Litchi	464.80
Gopalpur	Sulpur	7.50	LIS Sulpur Bahi	Percolation well, Seer Khad	Pomegranate	150.00
	Dhar	10.16	LIS Basantpur	Beas River	Guava	203.20
	Barchwar	10.82		River Beas	Guava	216.40
	Ghadhyani	7.24		River Beas	Guava	144.80
	Kharoh (Kalerka)	17.11		Beas River	Guava	342.20
	Bhadarwar Khobla	9.02	LIS Bhadharwaar, Bhudroli Khad	Rissa Khad	Guava	180.40
	Bahi	8.71	LIS Percolation-Seer Khad	Percolation well, Seer Khad	Guava	174.20
	Bhambhla-I	14.15	LIS from Seer Khad	Seer Khad	Citrus	283.00
	Thouna/Dhalait	8.18	FIS Thouna Kuhal	Local Nallah	Guava	163.60
	Rasher	10.95	LIS Son Khadd	Son Khad	Citrus	219.00
	Batail 2	9.13	LIS from TW 5	Tubewell	Citrus	182.60
	Batal 1	19.70			Plum	394.00
	Bag-chuhku	12.86	LIS from TW 6	Tubewell	Citrus	257.20
	Mataur Tanda	13.05	LIS Infiltration-Seer Khad	Seer Khad	Pomegranate	261.00
Dharampur	Richhli	12.81	LIS Bari Marhi Dhwali	Beas River	Citrus	256.20
	Mannu Dhar (Joh)	13.68			Citrus	273.60
	Haryanal	12.55			Guava	251.00
	Satrehar	12.52			Citrus	250.40
	Ghanswai	8.30			Guava	166.00
	Aarli Paryal	9.87			Citrus	197.40
	Richhali / Dhwali	5.75			Guava	115.00
	Tarohla	8.00			Guava	160.00

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
	Taroon	9.26			Citrus	185.20
	Chhapanu	8.38			Citrus	167.60
	Banwaar Kalaan	13.16			Citrus	263.20
	Dhardi-1	2.67			Citrus	53.40
	Baratpur	7.49			Citrus	149.80
	Balhara 1	1.46			Citrus	29.20
	Balhara 2	2.45			Citrus	49.00
	Dhardi 2	3.55			Citrus	71.00
	Lalana	4.27			Citrus	85.40
	Parli Paryal	1.70			Citrus	34.00
	Sakran Dhar	5.36			Citrus	107.20
	Sherpur	1.24			Guava	24.80
	Chakyana	3.72			Citrus	74.40
	Chunighat	14.14			Citrus	282.80
	Gorat	12.25			Citrus	245.00
	Pakhdol	4.39			Citrus	87.80
	Tourjajar	9.74			Citrus	194.80
	Galloo (Chanouta)	6.19	LIS Baroti-Mandap-Joddan	Beas River	Citrus	123.80
	Siram(Sarskan)	7.05			Citrus	141.00
	Trembala	6.06			Citrus	121.20
	Hiun	3.96			Citrus	79.20
	Kumarhda 2	10.22			Plum	204.40
	Didnu	5.20			Citrus	104.00
	Banerti-2	10.44			Plum	208.80
	Pehad-2	10.04			Plum	200.80
	Chhater	10.86			Guava	217.20
	Drumman	30.76			Citrus	615.20
	Kumahrda	13.84			Plum	276.80
	Giun	27.80			Citrus	556.00
	Cheh	8.67			Guava	173.40
	Bahn	5.63			Citrus	112.60
	Chatroun (Lower)	11.26	LIS Kothua Dhallara	Beas River	Guava	225.20
	Dhalara 1	9.35			Citrus	187.00
	Dhalara 2	8.70			Citrus	174.00
	Lower Balh	6.24			Citrus	124.80
	Single Kuhat	3.70			Citrus	74.00
	Kanohi	1.32	LIS Sandhole	Beas River	Guava	26.40
	Lahsani	1.35			Guava	27.00
	Churu ra Balh	20.88	LIS Churu Balh	Nald Khad	Citrus	417.60
	Seoh II	27.49	LIS Seoh	Beas River	Citrus	549.80
	Seoh (Balh) Nichla Ropa	18.74		Beas River	Citrus	374.80
	Lower (Nichali) Bairi	9.13	LIS Bairi	Beas River	Citrus	182.60
	Upper Bairi	23.98			Citrus	479.60
	Barota	4.37	LIS Brang	Soan Khad	Guava	87.40

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
	Manyoh-Lambri	20.14	LIS Tihra	Beas River	Guava	402.80
	Thanna (Ropari)	8.18			Citrus	163.60
	Patti (Kot)	6.90			Guava	138.00
	Darwaar	9.27			Guava	185.40
	Digho-Baglana (Karyal)	7.28			Guava	145.60
	Skohta	1.82			Citrus	36.40
	Khajurti	5.76			Guava	115.20
	Bandal	10.71			Guava	214.20
	Chandpur	11.98			Citrus	239.60
	Tikri	14.51			Plum	290.20
	Dyol	5.59			Litchi	111.80

Package 8 – Mandi District – Cluster and Scheme Details

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
Drang	Baragaon – I & II	14.32	LIS Baragaon	Baragaon nalla	Guava	286.40
Gohar/Balh	Dharwahan-II (Sehal)	17.39	New LIS 10 Behl-Ksarla	BSL Canal	Guava	347.80
	Sawla	17.46	IPH Chamber	IPH Chamber	Persimmon	349.20
	Bagga Challog	8.63	New LIS – Bagga Challog	Jiuni Khad	Plum	172.60
	Latogali I	26.97	New LIS – Kuklah to Latogali	Bakhli Khad	Persimmon	539.40
	Brikhmani	16.76	FIS Anu Darbehad	Brikhmani Nalla	Plum	335.20
	Darvehad	12.33	LIS Zone no. 5 Balbehli	BSL Canal	Plum	246.60
	Manjhog Dhaniut	9.66	FIS Majhog Dhanyot	Dhaniut nalla	Plum	193.20
	Manjhagan Chudara	28.56	LIS – Manjhagan Chudara	Jiuni Khad	Plum	571.20
Sadar	Dhaniyara	17.85	LIS Dhanyara	Arnodi Khad	Litchi	357.00
	Binol	7.21	LIS Binol Neeyul	Beas River	Citrus	144.20
Sundernagar	Palhota	17.11	Functional Lift Irrigation Scheme, Nehra,	Kansa Khad	Citrus	342.20

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
			Palhota (Kansa Khad)			
	Kuthain	15.45	Piped Irrigation Scheme Chirdi Boudhal Dhar	Kansa Khad	Citrus	309.00
	Bhantraed	11.85	Functional Lift Irrigation Scheme, Bhantrred (Bhantrred Khad)	Bhantrred Khad	Citrus	237.00
	Khagron	10.15	New LIS from Kiyargi Nallah	Kiyargi Nalla source	Plum	203.00

Package 9 – Kangra District – Cluster and Scheme Details

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
Bajjnath	Langhu – 1	6.20	LIS on Binwa Khad	Binwa Khad	Guava	124.00
	Langhu – 2	7.25			Guava	145.00
	Langhu - 3	8.42			Guava	168.40
	Manghota	6.00	LIS Manghota Cluster	Binwa Khad	Guava	120.00
	Kudail	16.61	LIS Kudail Cluster	Dea Nallah	Guava	332.20
Bhawarna	Thandol – 1	16.95	LIS Thandol Cluster	Mol Khad	Guava	339.00
	Ghar	8.21	LIS Ghar Cluster	Mand Khad	Citrus	164.20
	Malahu II	8.46	LIS on Mol Khad	Mol Khad	Litchi	169.20
	Malahu I	5.29			Citrus	105.80
	Sidhpur	30.09	LIS Sidhpur Cluster	Nugal Khad	Citrus	601.80
	Chartkhola	17.71	LIS on Tahl Khad	Tahl Khad	Citrus	354.20
	Ludhran 1 & 2	15.09	LIS on Tahl Khad	Tahl Khad	Litchi	301.80
Lambagaon	Maldoan	10.59	Existing Functional LIS Alampur Extension	Nugal Khad	Citrus	211.80
	Jangal	9.15	LIS Alampur Extension	Nugal Khad	Citrus	183.00

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
	Odri	8.76	LIS Bandhui Extension	Mol Khad	Citrus	175.20
	Kotlu	4.52	LIS Bandhui Extension	Mol Khad	Citrus	90.40
	Kathla	7.59	LIS Kathla Cluster	Beas River	Citrus	151.80
	Thanpal Chambi /	8.34	LIS Thanpal / Chambi Cluster	Beas River	Citrus	166.80
Panchrukhi	Trehal	8.22	LIS Trehal Cluster	Tubewell	Guava	164.40
	Agozar	7.03	LIS Agozar Cluster	Tubewell	Citrus	140.60
	Rajhot 1	17.27	LIS Rajhot – 1 & 2 Cluster	Awah Khad	Citrus	345.40
	Ladoh 1	17.21	LIS Ladoh-1 Cluster	Tubewell	Litchi	344.20
	Ladoh 2	5.53	LIS Ladoh-2 Cluster	Alang Nallah	Litchi	110.60
	Banuri	7.73	LIS Banuri Cluster	Gharuhal Khul	Citrus	154.60
	Saliana	7.33	LIS Saliana Cluster	Nai Khul	Citrus	146.60
	Molichak	6.15	LIS Molichak Cluster	Tubewell	Citrus	123.00
	Jandpur	8.54	LIS Jandpur Cluster	Tubewell	Citrus	170.80
Sullah	Dheera 1 & 2	23.47	LIS Dheera – 1 & 2 Cluster	Nugal Khad	Citrus	469.40
	Dheera 3	10.81	LIS Dheera – 3 Cluster	Nugal Khad	Citrus	216.20
	Chainchadi – Kuthera	10.19	LIS Chainchadi – Kuthera Cluster	Mand Khad	Citrus	203.80
	Purba	15.36	LIS Purba Cluster	Nugal Khad	Citrus	307.20
	Chandar	36.60	LIS Chandar Cluster	Mol Khad	Litchi	732.00
	Gagal Khas	23.47	LIS Gagal Khas Cluster	Tal Khad	Litchi	469.40

Package 10 – Kangra District – Cluster and Scheme Details

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
Dehra	Jakhota	226.98	New Proposed	Beas River	Citrus	4539.60
	Dhanot	205.66	New Proposed	Beas River	Citrus	4113.20

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
	Bhatoli Phakasian	10.88	LIS Dibber Rour (F)	Banner Khad (rivulet)	Citrus	217.60
	Bhatera Bassa	13.90	LIS Bhatera Bassa (F)	Banner Khad (rivulet)	Citrus	278.00
	Lalwada	29.85	New Proposed	Beas River	Citrus	597.00
	Chamba Khas	11.07	LIS Chamba Khas (N/F)	Beas River	Citrus	221.40
	Kuhna	11.31	New Proposed	Beas River	Citrus	226.20

Package 11 – Una District – Cluster and Scheme Details

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
Bangana	Boul – 1	19.32	LIS from RWHS Samoor	RWH	Guava	386.40
	Boul – 2	24.55	LIS from RWHS Samoor	RWH	Guava	491.00
	Dulehri Rajputa	9.11	Dulheri Rajputa and Thana Khurd	Nallah	Pomegranate	182.20
	Sanhal	13.58	LIS from RWHS Samoor	RWH	Guava	271.60
	Thana Khurd	27.24	Dulheri Rajputa and Thana Khurd	Nallah	Pomegranate	544.80
	Balh	14.02	LIS over Check dam	Check Dam	Pomegranate	280.40
	Chadoli	26.75	LIS over RWH-1	RWH	Guava	535.00
	Dumkhar	10.75	RWHS upstream of Khad	RWH	Pomegranate	215.00
	Muchali 1 & 2	21.26	LIS over RWH	RWH	Guava	425.20
	Nalwari	36.52	RWHS upstream of Khad	RWH	Pomegranate	730.40
	Handola	11.84	LIS Handola	River Satluj	Guava	236.80
	Dobad	8.70	LIS over RWH	Check dam	Pomegranate	174.00

F. Project Implementation Arrangements

87. The Nodal agency of the HPSHIVA Project is DOH. A PMU at the State level has been established under DOH. Two separate Project Implementation Units PIUs are established in DOH and Jal Shakti Vibhag (JSV) for implementation of respective project components. The roles and responsibilities of PMU and PIUs are as follows:

PMU (DOH):

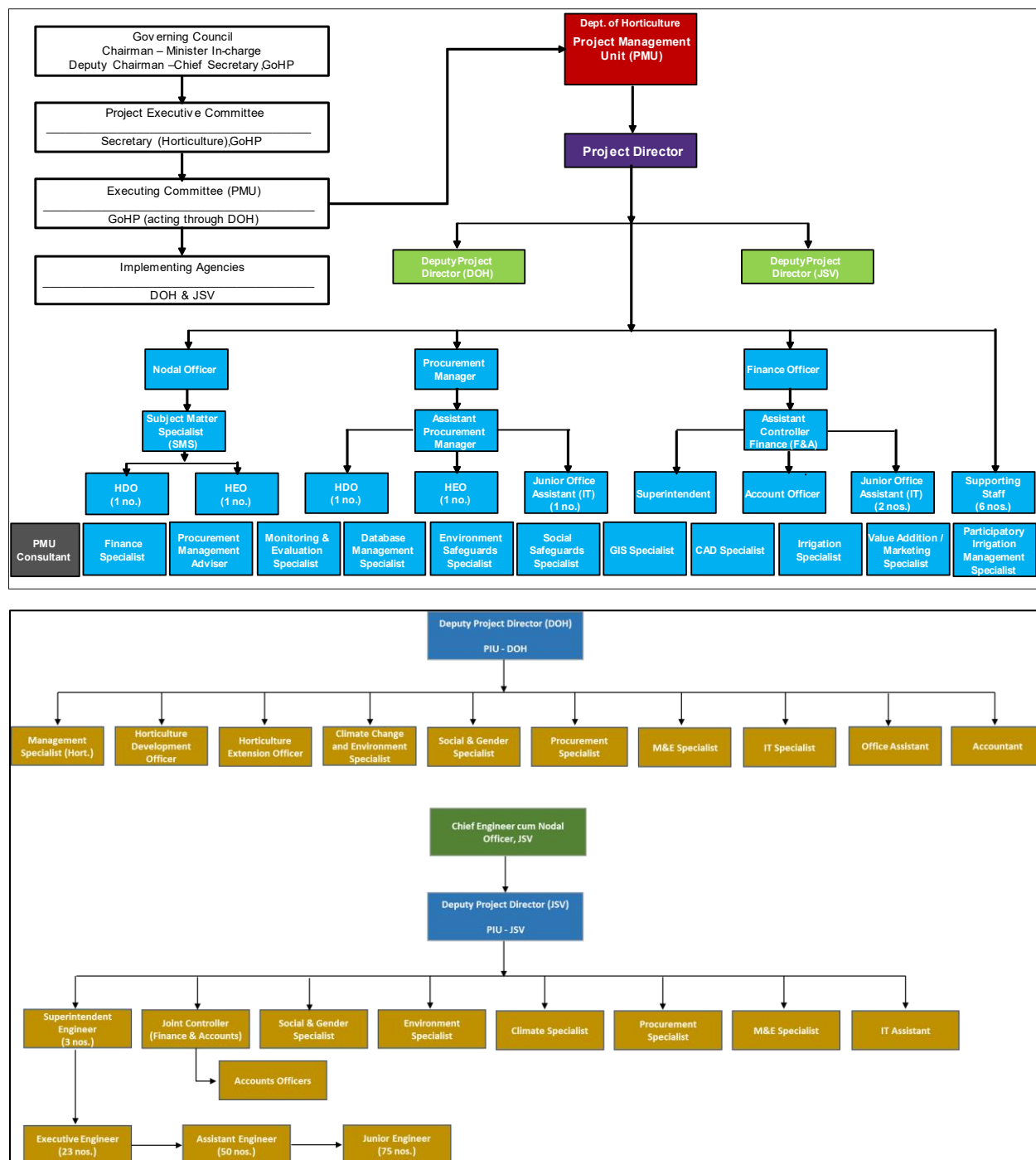
- i. Overall Project execution, supervision, and management,
- ii. Oversee and monitor Project implementation as well as the adequacy of overall Project funding,
- iii. Project account management by establishing and maintaining Project account, submitting withdrawal applications and administer statement-of-expenditure and maintain supporting documents,
- iv. Complete loan financial records,
- v. Monitor and periodically provide updated procurement plan to ADB,
- vi. Oversee procurement of Goods, Works, Consulting services and non-consulting services,
- vii. Project progress reports, and
- viii. Final approval of contract awards, based on recommendations of PIUs (as may be the case).

PIUs (DOH and JSV):

- i. Overall Project execution, supervision, and management,
- ii. Oversee and monitor Project implementation as well as the adequacy of overall Project funding,
- iii. Project account management by establishing and maintaining Project account, submitting withdrawal applications and administer statement-of-expenditure and maintain supporting documents,
- iv. Complete loan financial records,
- v. Monitor and periodically provide updated procurement plan to ADB,
- vi. Oversee procurement of Goods, Works, Consulting services and non-consulting services,
- vii. Project progress reports, and
- viii. Final approval of contract awards, based on recommendations of PIUs (as may be the case).

88. The procurement strategy to be adopted for the HPSHIVA project is being currently formulated as part of the Strategic Procurement Plan (SPP) that will form the basic planning document for developing the Detailed Procurement Plan for the project. The project shall be implemented over a period of 5 years, i.e., from 2022-23 to 2026-27. The following is the structure of PMU, followed by structure at PIUs.

Figure 7: Structure of PMU



89. The PMU will be supported by an Environmental Safeguards Specialist, who will be responsible for overall implementation of environmental safeguards activities. The specialist will be responsible for compiling and preparing all reports for purpose of ADB requirements as well as for any regulatory requirement applicable to the project. The PMU specialist will be supported by Environmental Safeguard Experts at PIU level (both at DOH and JSV). The PIU level experts will be responsible for ensuring implementation of Environmental Management and Monitoring

Plans as delineated in this IEE and guidelines indicated in the EARF. The PIU level experts will be responsible for collating and preparing all field level information and report to PMU.

90. **Training and Capacity Building:** Various training and capacity building programmes related to environmental safeguards will be held as delineated below:

Table 10: Environmental Safeguards Training Detail

Training Detail	Stakeholders	Trainer	Timeline
Applicable Laws, regulations, policies including ADB's Safeguard policies those that are triggered by the project activities and exclusion list, Implementation of Environment Management Plan and Monitoring, Monitoring and reporting format, Institutional arrangements and Grievance Redressal Mechanism	PIU Experts	PMU Environmental Safeguard Specialist	Within 1 month of implementation start date
ADB reporting requirements	PMU and PIU experts	ADB Project team	Within 1 month of implementation start date
Training to the EPC Contractor on Environmental Safeguards Requirement including ADB SPS, 2009 requirement;	ECP Contractor	PMU Environmental Safeguard Specialist PIU Experts, DOH, JSV	Within 1 month of contract awarding
Building Institutional capacity of CHPMA & Apex Body on Environmental Safeguards matters	CHPMA & Apex Body	PMU Environmental Safeguard Specialist PIU Expert, DOH	To be completed covering all CHPMA within 1 year from the start date of implementation
Building Institutional capacity of WUA on Environmental Safeguards matters	CHPMA & Apex Body	PMU Environmental Safeguard Specialist PIU Expert, JSV	To be completed covering all CHPMA within 1 year from the start date of implementation
Screening process and how to screen project sites for the remaining sites selection	PIU Experts	PMU Environmental Safeguard Specialist	Within 6 months of implementation start date

Training Detail	Stakeholders	Trainer	Timeline
Handling and management of Fertilizer, Pesticides and other horticulture plantation material;	CHPMA members	PMU Environmental Safeguard Specialist PIU Expert, DOH With support from external agency as deem fit;	To be completed covering all CHPMA within 1 year from the start date of implementation

V. DESCRIPTION OF THE ENVIRONMENT

A. Physical Environment

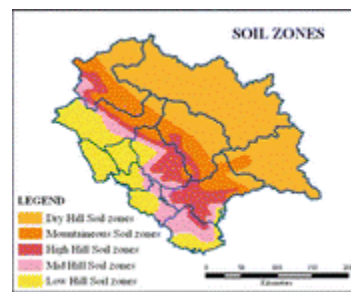
91. Location of the districts:

- Bilaspur district is located in the southwestern part of Himachal Pradesh. The district has a geographical area of 1,167 sq.km and covers 2.1% area of the State. The district lies between the north latitudes 31° 12' 30" and 31° 35' 45" and east longitude 76° 23' 30" and 76° 55' 40". It is bounded on the north by Hamirpur district, on the north-east and east by Mandi district, on the south-east by Solan district, on the west by Una district and towards south-west by the State of Punjab. The district is predominantly located on the lower basin of the Satluj river.
- Hamirpur district is a sparsely populated district that lies in the south-west part of the state and constitutes the central micro region of Himachal Pradesh. The district has a total geographical area of 1,118 km² and covers 1.97 % of the state. The terrain of the district is hilly and occupied by Siwalik Group of rocks. The district lies between 31° 23' 00" and 31° 53' 00" north latitude and 76° 20' 00" and 77° 45' 00" east longitude. It is bounded on the east by Mandi district, on the northwest by Kangra district, on the south & southwest by Bilaspur and Una districts respectively.
- Kangra district is located in the Siwaliks Hills. The district lies in the western part of Himachal Pradesh and located between latitudes 31° 41' 00" and 32° 28' 05" and longitudes 75° 35' 34" and 77° 04' 46" in the low foothills of the Himalayas. The area of the district is 5,739 sq. km, which constitutes 10.31% of geographical area of the state.
- Mandi district is a densely populated and centrally located district of Himachal Pradesh. The district is entirely hilly, except a few isolated patches of small and fertile valleys. The district, with its headquarter at Mandi town, lies between 31° 13' 50" and 32° 04' 30" north latitudes and 76° 37' 20" and 77° 23' 15" east longitudes. The district is bounded by Kangra district on the northwest, Kullu district on the east, Shimla and Solan districts on the south and southwest respectively, Bilaspur and Hamirpur districts on the southwest. The district has a total geographical area of 3,950 sq. km, which constitutes 7.10% of the State.
- Sirmaur is the southernmost district of Himachal Pradesh, having 2,825 sq km geographical area. The district has hilly and mountainous topography with intermontane valleys, prominent being the Paonta valley. The district has its headquarter at Nahan and lies between North latitude 30° 22' 30" to 31° 01' 20" and East longitude 77° 01' 12" to 77° 49' 40". The district is bounded by Shimla district towards north & Solan district towards northwest. The district has an inter-state boundary in the west and south with State of Haryana and with Uttarakhand to the east.
- Solan is one of the south-western districts of Himachal Pradesh, lying in the Outer and Lesser Himalaya and having geographical area of 1,936 sq. km. The district lies between the north latitudes 30° 45' 11" and 31° 21' 10" and east longitude 76° 36' 00" and 77° 15' 20". The district is bounded by Bilaspur district in north-west, Mandi district in the north, Shimla and Sirmaur districts in east and south-east respectively.
- Una district lies in the south-west part of the State and is located between the north latitudes 31° 18' 00" and 31° 55' 40" and east longitude 75° 55' 00" and 76° 28' 00". Una shares its border with the Hoshiarpur and Rupnagar districts of Punjab, and Kangra, Hamirpur and Bilaspur districts of Himachal Pradesh. The district has a total geographical area of 1,540 sq.km. and covers 2.8% of the State.

92. **Geology**

- Bilaspur District is mainly located on the Siwalik ranges and forms a part of the lesser Himalayas. Bilaspur is predominantly a mountainous region in the State, with a diverse landscape of hills and valleys. This part of the State has a rugged and undulating terrain with an elevation ranging from 320 m to 6,975 m. Major physiographic units in the district are structural hills, denudation hills and valley fills. The drainage pattern in the region is generally dendritic.
- Hamirpur district has a mostly hilly and undulating terrain. The surface elevation ranges from 400 m to 600 m above MSL along the Beas river and in lower reaches of Kunah Khad in the northern part of the district. The elevation is more than 900 m above MSL in the eastern part of the district. The altitudinal variation, in general, ranges between 600 m to 900 m above MSL.
- Kangra District presents an intricate mosaic of mountain ranges, hills, and valleys. It is primarily a hilly district, with altitudes ranging from 350 m above Mean Sea Level (MSL) to 4,880 m above MSL in the hills of Dhauladhar. Physiographically, the district can be divided into six units, i.e., (i) high hills, which cover almost 60% of the district, (ii) Fluvio glacial outwash terraces, which is located in the north eastern part of the district, (iii) structural terraces, in the central part, (iv) valley fills, (v) piedmont plain, and (vi) floodplain.
- Mandi district is primarily a hilly district with altitudes ranging from 550 m near Sandhole where the Beas River leaves the district, to about 3960 m above MSL near Kullu border. There is a general increase in elevation from west to east and from south to north. Master slope is south- westerly. The southwestern part consists of Siwalik ranges having scarped slopes. There are few small intermontane valleys; prominent among them is the Balh valley, located in the lesser Himalayan ranges, having an average altitude of about 790 m amsl and have a general slope towards NNE. The valley floor is undulating and is marked by low hillocks and terraces fringing the hills and intervening low alluvial plain.
- Sirmaur district presents an intricate mosaic of high mountain ranges, hills and valleys with altitude ranging from 300 to 3000 m above MSL. There is general increase in elevation from south to north and from east to west. In general trance, Giri terrain exhibits highly rugged mountain terrain. The highest peaks in Chaur dhar remain snow bound throughout the year. Low denuded hill ranges of Siwalik represent the southwestern part of the district. In the areas underlain by high hill ranges of Himalayas, the valleys are narrow and deep with steep slopes. The terrain is moderately to highly dissected with steep slopes. Paonta valley, trending NWSE, has an area of about 276 sq. km and lies between the main Himalayan ranges on the north and outer Siwaliks hill range in the south.
- Solan District has a range of mountains, hills and valleys with altitudes ranging from 300 to 3,000 m above msl. The altitude of the hill ranges is higher in northern parts, whereas the south-western part of the district is represented by low denudational/structural hill ranges of Siwalik. In the areas underlain by high hill ranges of Himalayas, the valleys are narrow and deep with steep slopes trending in NW-SE direction. The terrain is moderate to highly dissected with steep slopes.
- Una District nestles between Siwalik ranges and forms a part of the lesser Himalayas. It has a diverse landscape of hills, valleys with piedmont zone, and terraces. The elevations of the land surface in the district vary from 320 m in the south-eastern part to 1,041 m above msl in the eastern part of the district. There are four hill ranges in Una district – Chamukha Dhar, Solah Singhi Dhar, Dhionsar Dhar, and Ramgarh Dhar with an elevation of 1041 m, 1063 m, 950 m, and 997 m above MSL respectively.

93. **Soil** - As presented in the figure below, the project districts are in soil zone Low hill, Mid hill and High hill. The soil characterises of these zones are as follow.¹⁹



- Low hill soil – Covers entire districts of Una and Hamirpur and parts of Bilaspur, Kangra, Mandi, Sirmour, and Solan. The texture of the soil is sandy loam, embedded with pebbles, stones and boulders. Soil colour is light grey to brown. The soil reaction is mostly neutral and the carbon to nitrogen ratio is 10:1. It is suitable for stone fruits like mango, litchi, guava, citrus varieties, etc.
- Mid hill soil – Covers parts of Bilaspur, Kangra, Mandi, Sirmour, and Solan. The texture of the soil varies between loam to silt-loam. Soil colour is greenish to brown. The soil reaction is slightly acidic and the carbon to nitrogen ratio widens compared to low hill soil. It is suitable for stone fruits like peach, plum, apricot, persimmon, pomegranate, etc.
- High hill soil - Covers a few parts of Kangra and Mandi. The texture of the soil varies between silt-loam to clay loam. Soil colour is light to dark brown. Fertility of the soil type is quite high as compared to low and mid hills. The soil reaction is slightly acidic and the carbon to nitrogen ratio widens compared to mid hill soil. It is suitable for walnut, chestnuts, cherry, etc.

94. **Physiography** – The four general physiographic divisions from south to north are:

- **The outer Himalayas (Shivaliks):** Shivaliks range consists of lower hills (600 m above sea level). The hills of the region are composed of highly unconsolidated deposits which results in high rates of erosion and deforestation.
- **The lesser Himalayas (central zone):** The lesser Himalayas have a gradual elevation towards the Dhauladhar and the Pir Panjal ranges. The rise is more rapid in the Shimla hills, to the south of which is the high peak of Churdhar (3647 m). North of the river Sutlej, the rise is steady. The Kangra valley is a longitudinal trough which is at the foot of the Dhauladhar range. Dhauladhar (which means the 'White Peak') has a mean elevation of nearly 4,550 m. It has a rapid rise of 3,600 m above the Kangra valley.
- **The Great Himalayas (northern zone):** The Great Himalayan range (5,000 to 6,000 metres) runs along the eastern boundary and is slashed across by the Sutlej.
- **Zaskar range (Shilla Peak (6,132 m) in kinnaur, Pangl in Chamba):** The Zaskar Range, the easternmost range, separates Kinnaur and Spiti from Tibet and Pangl Chamba from Leh Ladakh UT. It has peaks up to 6816 m high.

95. **Seismicity** - As per the Bureau of Indian Standards (BIS) seismic zonation map, Himachal Pradesh falls in Zone IV (High Damage Risk Zone) and V (Very High Damage Risk Zone), making it more susceptible to landslides. Table 11 list the project districts in order of their vulnerability to an earthquake. As per events of occurrence, the districts of Kangra and Mandi stand out to be highly prone to earthquakes and of higher magnitude.

¹⁹ Source: HP Biodiversity Board, <https://hpbiodiversity.gov.in/Pdf/Soil%20types%20of%20HP.pdf>

Table 7: District-wise area under Seismic Zones V and IV

District	Area under Zone V (%)	Area under Zone IV (%)	Occurrence between 1800-2008	
			Numbers (<=4)	magnitude (Richter scale) ²⁰
Kangra	98.80	01.20	39	4 – 7.8
Mandi	97.40	02.60	53	4 – 6
Hamirpur	90.90	09.10	2	4–5
Una	37.00	73.00	0	<=4
Bilaspur	25.30	74.70	1	4–5
Solan	01.06	98.94	4	5–6
Sirmaur	Nil	100	8	4–7

B. Climate and Meteorology

- The climate of Bilaspur district is temperate to sub-tropical. The summer is invariably hot. The winter season starts from November and continues till mid-March. The minimum and maximum temperature varies from 1.3 °C in January to 34.7 °C in May. For three months in winter, a thick mist surrounds the Sutlej. The places situated at higher elevations such as Swarghat and Nambhol have a bracing climate, while the hills and valleys along the khads are quite dry in summer. In rainy season, the humidity increases, and the weather becomes hot and sultry. The area receives rainfall during the monsoon period extending from June to September and during the non-monsoon period (winter). The average annual rainfall in the district is about 1,200 mm and about 81.5% rainfall occurs during the monsoon period.
- The climate of Hamirpur district depends primarily on the elevation, which varies from less than 200 meters to more than 1000 meters above mean sea level. The climate can broadly be divided into three broad seasons viz., winters from October to March, summer season from April to June and monsoon season from July to September. The district receives moderate rainfall and bulk of it is received during the months of July and August. The normal annual rainfall in the district is 1361 mm, out of which 82% occurs during June to Sept.
- The climate of Kangra district is classified as warm and temperate. The average annual temperature is 21.8 °C and the average annual rainfall is 2500 mm. The climate of the districts varies from sub-tropical to sub-humid. Winter extends from December to February and summer extends from March to June while July to September are the rainy months. The average annual rainfall of the district is 1,751 mm, out of which 83% occurs during June to Sept. Snow fall is received in the higher reaches of Dhauladhar ranges. The landscape of the district during monsoon period becomes fresh/green and the small water channels in the beds of hill streams begins to swell which had dried up in the summer.
- The climate of Mandi district is sub-tropical in the valleys and tends to be temperate near the hilltops. In the higher region, the climate remains cold throughout the year. In winter, snow often comes down to 1300 m above MSL. Normally, it starts melting from the end of March from places lying below 3300 m. In summer, the whole Balh valley and other low altitudes are quite hot. The winter starts from the middle of November and continues till

²⁰ As per Hazard Vulnerability & Risk Analysis Atlas of HP, powered by TARU Leading Edge Pvt. Ltd.

the middle of March. Thereafter, the mercury continues to rise till the onset of the monsoon, which starts from the last week of June or early July and continues till the middle of September. During October and November, the nights are pleasant, whereas the days are a little bit hot. Average minimum and maximum temperature in the district vary from 3.1° C in January to 37.6° C in June. The district receives precipitation in the form of rainfall, mainly during the monsoon period from July to September. The annual normal rainfall of the district is 1442 mm. Annual average rainfall is highly variable from place to place in the district and ranges from 700 to more than 2000 mm at Jogindernagar. During winters, snow fall often occurs down to elevation of 1300 m above MSL.

- The climate of the Sirmaur district is sub-tropical to temperate, depending upon the elevation. The three major seasons are the winter season from November to February; summer season from March to June followed by the monsoon period extending from July to September end. Maximum precipitation in the form of rain occurs during July to September. Annual normal rainfall in the district is about 1626 mm, out of which 90% occurs during monsoon season. In the non-monsoon season, precipitation as snowfall also occurs in the higher reaches. During winter period, rainfall also occurs in lower hills and valleys parts. Mean maximum and minimum temperature of 30°C and 0°C respectively.
- The climate of the Solan district is sub-tropical in the valley and tend to be temperate on the hilltops. There are four major seasons. Winter season lasts from November to February and ends in March; the summer season extends from March to June, followed by the monsoon period extending from July to September. The maximum precipitation occurs during July to September. Annual normal rainfall in the district is about 1306 mm, of which 80 to 85% rainfall occurs during June to September. In the winter season, precipitation in the form of snowfall occurs in the higher reaches up to 1,000 m elevation, and in the form of rainfall in the low hills and valleys of the district. The mean maximum and minimum temperature ranges between 32.2 °C (May) and 0.6 °C (January).
- The climate of Una district is tropical to temperate in nature, as the terrain varies from plains to high hills. Temperature varies from a minimum of 4 °C in winter to a maximum of 46 °C in summer. The area receives rainfall during the monsoon period, extending from June to September and during the non-monsoon period (winter). The average annual rainfall in the area is about 1051 mm, with about 55 average rainy days. The winter season starts from November and continues till mid-March. Thereafter, the summer months last till end of June, after which the monsoon season lasts till mid-September.

96. Figure 8 illustrates the trend analysis of observed average annual mean temperature between 1901 to 2020 and Figure 9 illustrates the trend analysis of observed average annual rainfall between 1901 to 2020.

Figure 8: Observed Average Annual Mean Temperature, 1901-2020

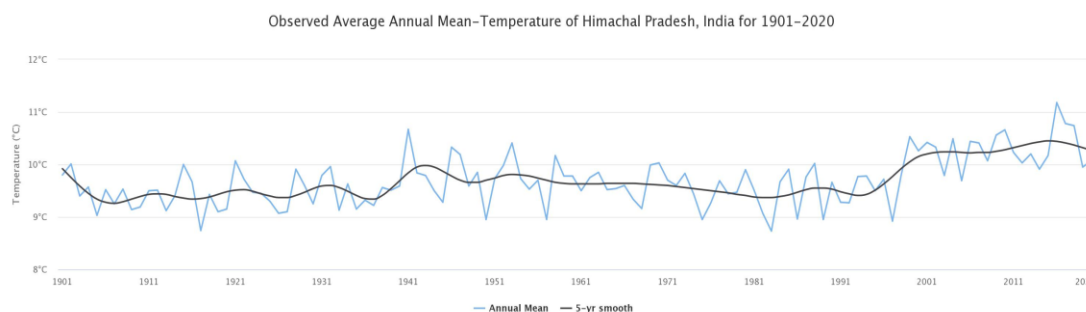
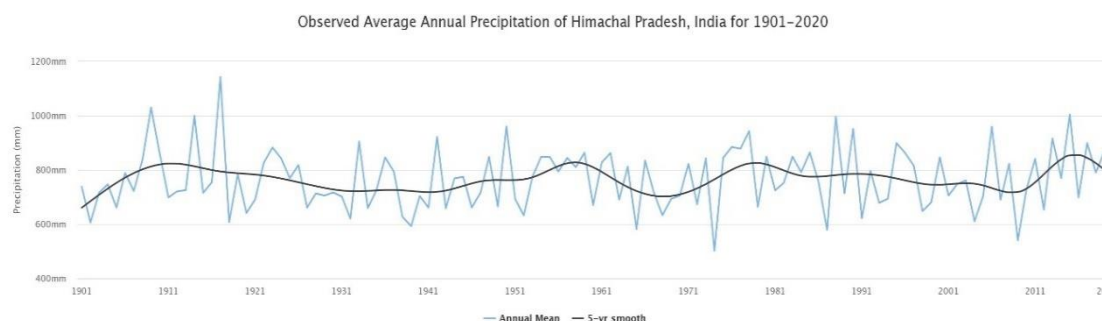


Figure 8: Observed Average Annual Mean Precipitation (1901 - 20202)



C. Ambient Air Quality and Noise Level

97. The target irrigation sites are at remote areas, besides river banks and Khads (rivulet). Thus, the ambient air quality and noise level are similar to that of rural areas. Similarly, the horticulture fields are at different villages, wherein the main activities are agriculture. Thus, the ambient air quality and noise levels are that of rural areas.

98. Himachal Pradesh State Pollution Control Board regularly conducts ambient noise monitoring for different areas / zones at 87 selected locations in the State on weekly basis. Those locations where ambient noise has exceeded the prescribed limit up to 5 times (day/night) during the year are not treated as hot spots from ambient noise pollution point of view. It is noted from the report²¹ that the rural areas are within the prescribed limit of noise level for residential zone – 55 dB (A) day time and 45 dB (A) night time – standard prescribed limit. However, in the Project district of Bilaspur, for one residential zone location, 06 values in day time and 07 values in night time were found to be above the standard prescribed limits.

99. Ambient air quality is also monitored in 10 towns/cities at Shimla, Parwanoo, Jassur, Paonta Sahib, Kala Amb, Baddi, Nalagarh, Sunder Nagar, Manali and Una under National

²¹ Report on findings of Noise monitoring conducted by HP State Pollution Control Board for the year 2021 - <http://hppcb.nic.in/NMR.pdf>

Ambient Air Quality Monitoring Program. Air quality standards are fixed for 24 hours average and the annual average standard for residential and eco-sensitive area is estimated. According to the latest report of the Himachal Pradesh State Pollution Control Board, the ambient air quality in the residential places is within the prescribed limit, as follows:

Table 8: Ambient air quality in Himachal Pradesh

Standard for	Particulate Matter (PM10) (size less than 10 micron) ($\mu\text{g}/\text{m}^3$)	Particulate Matter (PM2.5) (size less than 2.5 micron) ($\mu\text{g}/\text{m}^3$)	Carbon Monoxide (CO) (mg/m^3)	Sulphur Dioxide ($\mu\text{g}/\text{m}^3$)	Nitrogen Dioxide ($\mu\text{g}/\text{m}^3$)
Residential	100 (24 hrs)	40 (annual)	4 (1 hour)	80 (24 hrs)	80 (24 hrs)
Eco-sensitive	100 (24 hrs)	40 (annual)	4 (1 hour)	80 (24 hrs)	80 (24 hrs)

D. Water Resources

D.1. River Discharge

100. The state is richly endowed with hilly terrain having an enormous volume of water for the catchment areas of Satluj (which covers 30.69% of the state), the Beas (24.5%), the Chenab (14.2%), the Yamuna (10.6%), the Ravi (9.9%) and the Indus (2.6%). For project districts, the catchment areas of rivers Beas and Satluj is of importance.

101. Satluj one of the main tributaries of Indus enters Himachal Pradesh at Shipki (altitude of 6,608 metres) and flows in the south-westerly direction through Kinnaur, Shimla, Kullu, Solan, Mandi and Bilaspur districts. Its total catchment area in Himachal Pradesh is 20,000 sq. km. Satluj river is fed by the glacier melt, snowmelt and rain. The important tributaries of the Satluj River at Himachal Pradesh are the Soel khud, Alseed khud, Ali khud, Gamrola khud, Ghambhar khud, Seer khud, Sukhar khud, Sarhali khud, and Lunkar khud. The world's largest dam, Bhakhra Dam, has been constructed on the Sutlej River.

102. The Beas rises in the Pir Panjal glacial range near the Rohtang Pass and flows some 256km in Himachal through Kullu, Mandi, Kangra, and Hamirpur districts. The tributaries that form River Beas are Parbati, Spin, Hurla, Malna, Chakki, Sainj, Uhl, Phung, Binwa, Banganga and Man khud. The northern and eastern tributaries of the Beas are snow-fed and perennial, while the southern affluent are seasonal. The Alseed khud, Ali khud, Gamrola khud, Ghambhar khud, Seer khud of Satluj and Binwa Khud of River Beas and River Beas itself are few of the sources of project's irrigation water.

103. As per the Climate Change Risk and Vulnerability Assessment (CRVA) report, indicates projected increase in water availability in near future but leading reduced availability in the long-term period (by 2050). Thus, irrigation schemes being developed under project HPSHIVA are less likely to experience low/ no water availability from river sources; though they may get exposed to extensive flooding. The report recommends that the design of the schemes should consider longer return periods and the alignment of the intake structure, the pumping main and the gravity canal system and the number of lifts and pumps be planned judiciously.

D.2. Groundwater Table

104. Most of the areas of Himachal Pradesh are hilly except for some intermountain valleys and groundwater occurs under unconfined to confined conditions in these intermountain valleys and submontane tract. Areas in absence of piped water source depends heavily on either groundwater or springs for both domestic and irrigation usage.

105. The Central Ground Water Board (CGWB) assess the availability of groundwater every year across each state. The recent assessment (i.e., 2020), compares with the past assessment (2017) (refer to Table 3) showing slight improvement in availability. This is because of the action taken by the State to move from groundwater sources to surface water by enhancing minor and medium irrigation schemes at the khuds as well as using water from the River Beas and River Sutlej.

Figure 9: Assessment of Ground Water - Central Ground Water Board (Year 2020, 2017)

S. No	Name of District	Name of Assessment Unit	Stage of Ground Water Extraction (%) in 2017	Categorization 2017	Name of District	Name of Assessment Unit	Stage of Ground Water Extraction (%) in 2020	Categorization 2020	Remark
Improved									
1	Kangra	Indaura Valley	119.00	Over-Exploited	Kangra	Nurpur Indaura Valley	29.27	Safe	Improved
2	Sirmour	Kala Amb Valley	385.11	Over-Exploited	Sirmour	Kala Amb Valley	27.51	Safe	Improved
3	Nalagarh Valley	Solan	110.80	Over-Exploited	Nalagarh Valley	Solan	58.41	Safe	Improved
4	Una Valley	Una	108.37	Over-Exploited	Una Valley	Una	60.99	Safe	Improved
3	Hum valley	Una	75.50	Semi-Critical	Hum valley	Una	58.12	Safe	Improved

106. All past assessments of CGWBs²² shows overexploitation of the sources and a few of them are identified at the Critical stage as well. The State has been working on artificial recharging initiatives as well. The Departments of Agriculture and Rural Development is constructing concrete check dams in some tributary creeks to improve groundwater recharge.²³

107. The annual measurement of groundwater table by CGWB concludes as follow:

- Annual Water Level Fluctuation for May 2019 to May 2020 (post-monsoon level) shows fall in water level in majority of monitoring areas. Fall of 0-2m is shown in Kangra-Palampur valley of Kangra & Kullu district, major part of Nurpur and Indaura Valley and some pockets of Una Valley. Fall >4 m is noticed in some pockets of Nurpur valley and Indaura Valley. Rise in water level is noticed in a few pockets of Kangra Palampur valley, Una valley, northern part of Kullu valley and southern of part of Balh valley.
- Annual fluctuation of water level post monsoon (November 2019 - November 2020) indicates, out of the 101 stations, only 10 stations (9.90%) have shown rise in water level ranging from 0.08m (Kangra district) to 1.72 m (Una district) whereas 90 stations (89.10%) have shown fall ranging from 0.02 m (Kangra and Mandi district) to 3.19 m (Solan district).
- Decadal Variation indicates (average of May (2010 - 2019) with May 2020) reveals fall less than 2m, in all the valleys of Kullu district, Mandi district & Una district except

²² <http://cgwb.gov.in/Dynamic-GW-Resources.html>

²³ Climate change adaptation in Himachal Pradesh: Sustainable strategies for water resources, ADB, 2010

at some places in Indaura valley, Balh valley & Kangra-Palampur valley and Nurpur valley. A fall is 2-4m and >4 m is shown in Nurpur valley, central part of Kullu valley.

108. Rainwater is the main source of replenishment and a very small percentage is contributed through infiltration from spring water. However, since the project districts are in subtropical region having mixed of plains and hilly areas with significantly lumpy and rocky surfaces, a larger percentage of the precipitation flows away as runoff. This results in less water getting infiltrated from subsurface to groundwater bodies. Additionally, since climate change projections suggest heavy and concentrated rainfall with increased surface run-off, groundwater sources are a less sustainable source with the chance of getting overexploited very soon.

D.3. Water Quality

109. Water quality has been tested by established laboratories of JSV, one at each district. The water quality has been tested against drinking water quality standard as followed by JSV for drinking water supply. In most the cluster the water is slightly alkaline and within limit for irrigation purpose. Some of the clusters have traces of high nitrate and sulphate, however within tolerance limits of the horticulture plants. Water quality is periodically tested by JSV as same water sources are also tapped for drinking water purpose. Sample test reports are presented in Annex 12.

D.4. Assessment of Groundwater Quality

110. The latest assessment of GW quality by CGWB suggests that the following districts are above the safe limits of either nitrate or arsenic contain or both. Thus, it is concluded that GW resources may not be a sustainable and safe alternative source for purpose of horticulture use.

Pollutants	Nitrate (above 1.5mg/l)	Arsenic (above 0.01mg/l)
Districts	Una, Solan, Hamirpur, Kangra, Mandi	Kangra

E. Hydrology

111. For source water sustainability analysis (estimation at 75% dependable yield), following exercise have been carried out:

- Estimation of Crop Water Demand – standardised at 20 m³/day/ha
- Analysis of hydro-meteorological data extending to recent 30 years
 - Observed rainfall stations near and within the Cluster area.
 - Observed discharges at the gauging stations on different khads.
 - Evaporation data that is representative of the Cluster area.
- Estimation of existing and future water demand along the source.
- Catchment area analysis
- Pumping test carried out to determine the yield from open well or bore well or tube well.

112. Following are the conclusions for respective sources:

Solan District

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Source Sustainability
Kunihar	Sai	6.74	Sai	Natural Spring	From analysis, it is concluded that the gross demand can satisfactorily be made by the source with surplus quantity available throughout the year, except for the months of May, November and December.
	Ser-Delag	21.56	Seri Sarla	Spring	
	Chunad	16.35	New Proposed	Ghumber Khad	The clusters proposed on Ghumber and Ali Khads have perennial water source. The structures proposed are Percolation well on Ghumber khad and Check dam on Ali khad. The expected discharge of the percolation well is around 15 to 25 lps. The water source of remaining clusters requires detailed hydrological study since the khads/nallahs seem to be ephemeral and not perennial.
	Daseran	33.46	New Proposed	Ali Khad	
	Datti	13.75	New Proposed	Natural Spring	
	Giana	6.69	New Proposed	Jadol Nallah	
	Jailang	9.65	New Proposed	Ghumber Khad	
	Pajeena	14.26	New Proposed	Pajeena Nallah	
Nalagarh	Batiakh	15.13	New Proposed	Ghumber Khad	The khad is perennial in nature and has sufficient catchment area. The khad has good discharge in lower reaches and is adequate to meet the water requirement.
	Doli	16.91	New Proposed	Ghumber Khad	
	Sour	37.12	New Proposed	Ghumber Khad	
	Beli khol 1	10.17	New Proposed	Tubewell	The source of the clusters is ground water. Two sites have been identified for the construction of tubewells to meet the irrigation demand.
	Palli	12.17	New Proposed	Tubewell	

Sirmaur District

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Source Sustainability
	Dungi Sher	9.68	LIS from Jalal Khadd	Jalal Khadd	Water demand of Dungi Sher and Kherichandan 1 & 2 clusters is presently satisfied from the available
	Kherichandan 1	14.41	LIS on Jalal Khadd	Jalal Khadd	

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Source Sustainability
	Kherichandan 2	13.81	LIS on Jalal Khadd	Jalal Khadd	water in Jalal Khad and excess water is likely to be available as per the scenarios considered Maximum shortage / excess is noticed majority of times in November and May followed by single event in May. Maximum shortage of 0.0080 Mm3 is noticed for Bhogpur & Simbalwala cluster having catchment area of 75.47 km2 while serving irrigation area of 13.99 ha. Minimum shortage of 0.0009 Mm3 is noticed for Khara cluster having catchment area of 8.705 km2 while watering irrigation area of 8.95 ha. Storage structures with capacity ranging from 0.0015 Mm3 at Khara cluster to 0.0120 Mm3 at Bhogpur Simbalwala clusters are proposed to make these clusters workable with water available in proposed source.
	Bajari (1 & 2)	13.99	LIS Jungla Bhood	Ruhn Khadd	
	Rama	6.88	LIS from Doghat Khad	Doghat Khadd	
	Bhogpur	8.49	Check dam / LIS on Ruhn Khadd	Ruhn Khadd	
	Simbalwala	9.99	Check dam / LIS on Ruhn Khadd	Ruhn Khadd	
	Judag	12.61	LIS from Judag Nallah	Judag Nallah	
	Goant	8.00	LIS from Goant Dam	Existing DAM Goant	
	Budriyon	16.10	LIS from Tubewell	Tubewell 2	
Paonta Sahib	Fatehpur	6.61	LIS Fatehpur	Percolation well, Edge of Bata River	
	Killour	21.88	LIS Killour	Tons River	
	Upper Bhuddi	21.72	LIS from Tubewell	Tubewell 3	
	Khara	8.95	LIS Khara Nallah	Khara Nallah	
	Puruwala	13.93	LIS from Tubewell	Tubewell 4	
	Gyayaniwala	10.87	LIS from Tubewell	Tubewell 5	

Hamirpur District

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Source Sustainability
Bamsan	Sachuin	8.68	LIS Sachuhi	Beas River	Maximum shortage / excess is noticed majority of times in December, followed by October and one single event each in April and November. All
	Parol	17.51	LIS Dera Parol	Kunah Khadd	
Bhoranj	Balor-Sangrawar	33.45	LIS Balor Nallah	Balor Nallah	
	Jol	19.72	LIS Jol Nallah	Jol Nallah	

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Source Sustainability
	Lagmanwin	6.90	LIS Lagmanwin Nallah	Lagmanwin Nallah	clusters in Package P3 have shortages. Maximum shortage of 0.0207 mm ³ is noticed for Balor-Sangrawar cluster in Bhoranj block having catchment area of 4.65 km ² while serving irrigation for an area of 33.45 ha. Minimum shortage of 0.0040 mm ³ is noticed for Bhalat cluster in Bijhar block having catchment area of 9.0970 km ² while watering irrigation area of 11.52 ha. Storage structures with capacity ranging from 0.0060 to 0.0315 mm ³ are proposed to make these clusters workable with water available in proposed source.
	Lambagram / Palasi	18.17	LIS JICA dam, Plassi Nallah	JICA dam, Plassi Nallah	
	Mundkhar tulsu	27.99	LIS Balor Nallah	Balor Nallah	
	Samlog	22.69	LIS Samlog Nallah	Samlog Nallah	
Bijhar	Bhalat	11.52	Existing LIS Bhalat Nallah	Bhalat Nallah	
	Lafran	13.96	LIS over New Source	New Proposed	
	Ghangot	8.42	Existing LIS Ghangot Nallah	Ghangot Nallah	
	Kalwal	15.75	LIS Kalwal	Rihal Nallah	
	Seri-Bhakredi	14.88	LIS Bhakreri	Existing check dam on Nallah	

Hamirpur District

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Source Sustainability
Hamirpur	Branda	7.90	LIS Nalti Branda	Kunah Khad	Maximum shortage / excess is noticed majority of times in November, followed by October. Except for Manjot / Manjot 2 cluster that has excess storage, shortage is noticed for other clusters.
	Bakarti-I	29.97	LIS Bakarti	Kunah Khad	
	Jangal Ropa	22.20	LIS Jangal Ropa	Kunah Khad	
	Haar	14.90	LIS Jangal Ropa Haar	Kunah Khad	
	Neri	7.44	LIS Neri	Kunah Khad	
Nadaun	Sadhwan	8.80	MIP Nadaun	MIP Nadaun	Maximum shortage of 0.0163 mm ³ is noticed for Jangal Ropa cluster in Hamirpur block having catchment area
	Rail-I	6.20	MIP Nadaun	MIP Nadaun	
	Baag Bharmoti	6.10	MIP Nadaun	MIP Nadaun	
	Kushiar-I	15.80	LIS Khusiyar Galol	Maan Khadd	
	Bhabran 1	11.22	LIS Bhabran	LIS Bhabran	
	Bhabran 2	13.90	LIS Bhabran	LIS Bhabran	

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Source Sustainability
	Kaloor	9.74	LIS Kola	Maan Khadd	of 182.94 km ² while serving irrigation for an area of 22.20 ha. Minimum shortage of 0.0026 mm ³ is noticed for Bakarti cluster in Hamirpur block having catchment area of 148.90 km ² while watering irrigation area of 29.90 ha and Kashmir cluster with irrigation area of 6.70 ha and catchment area of 14.65 km ² in Nadaun Block.
	Kashmir	6.70	LIS Kashmir	LIS Kashmir	
	Phal Palsi	28.20	LIS Palsi	LIS Palsi	
	Choru (Bhoo-I)	6.20	LIS Bhoo	LIS Bhoo	
	Manjot	7.90	LIS Salasi Nallah	Salasi Nallah	
	Manjot 2	1.50	LIS Salasi Nallah	Salasi Nallah	
	Tung (Baloh)	14.10	LIS Maan Khadd	Maan Khadd	
	Loharda	5.00	MIP Nadaun Right Bank	MIP Nadaun	
	Sai Lower	19.00	MIP Nadaun Left Bank	MIP Nadaun	
	Pansai 1	32.20	LIS Pansai	LIS Pansai	
	Pansai 2	24.20	LIS Pansai	LIS Pansai	Storage structures with capacity ranging from 0.0040 to 0.0455 mm ³ are proposed to make these clusters workable with water available in proposed source.
	Bhalana Rei	18.21	LIS Pung Khad	LIS Pung Khad	
Sujanpur	Kheri	12.80	LIS Kheri	LIS Kheri	
	Beri-1	9.30	LIS Kudana Beri	LIS Kudana Beri	
	Beri-2	12.40	LIS Kudana Beri	LIS Kudana Beri	
	Bhahru (Pour)	7.10	LIS Bhahru Jatour	LIS Bhahru Jatour	
	Bir Baghera	7.00	LIS Pour	LIS Pour	
	Kudana	7.90	LIS Bhahru Jatour	LIS Bhahru Jatour	

Bilaspur District

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Source Sustainability
Ghumarwin	Dehra	17.90	IPH Scheme	Seer Khad	Source of the khads indicates shortages in supplying water to irrigated area. Storage structures with capacity ranging from 0.0050 Mm ³ at Talwara cluster to 0.0750 Mm ³ at Kasol and Bhadrog cluster are proposed to make these
	Kathalag droun	20.57	IPH Scheme	Seer Khad	
	Lower Lanjhata	11.61	IPH Scheme	Seer Khad	
	Thandora	7.41	IPH Scheme	Seer Khad	
	Upper Talwara	9.35	LIS Talwara	Khad	

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Source Sustainability
	Talwara Lower	1.91	LIS Talwara	Khad	clusters workable with water available in proposed source.
	Talwara Phase - 2	6.91	LIS Talwara	Khad	
	Kasol	20.53	LIS Kasohal	Seer Khad	
	Kasol Balh	8.84	LIS Kasohal	Seer Khad	
	Kasol Kanjeen	6.20	LIS Kasohal	Seer Khad	
	Mehri Kathla	14.46	Mehri Kathla	Bajrauli Khad	
	Nalti Parnal	8.77	LIS Parnal	Seer Khad	
	Chharal Daloli	19.29	New Check Dam	Over LIS Talwara	The source is based on surface water of Seer khad and other local nallahs, therefore, hydrological study of Seer khad and local nallahs is crucial and the recommendation of Hydrologist is mandatory for sustainable development of the resource in the area. It is further added that hydrological study of Seer khad is utmost important as the discharge of Seer khad is falling every year, particularly in the upper reaches
	Sandhiar (Chhat)	18.97	New Scheme Check Dam proposed	Existing DAM – Nearby Nallah - Sandhiar	
	Bhadrog (Seu)	8.88	New Scheme IPH Scheme	Seer Khad	
	Bhapral	7.11	New LIS	Seer Khad	
	Massour / Maloh	6.57	New Check Dam	Seer Khad	
	Chhiber	16.99	New Scheme Check Dam existing and proposed	Nearby Nallah	
	Samsai	5.34	New scheme Check Dam / Bore	Borewell	The source is based on ground water. Hydrogeological conditions in the area of these clusters are not conducive for large drawl ground water development as indicated above. Hence, not recommended for drilling and alternate suitable source for both the clusters be investigated accordingly for successful

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Source Sustainability
					functioning of New Schemes.
Sadar Bilaspur -	Kotlu	14.23	New scheme	Ali Khad	Water demand is presently satisfied from the available water in Ali Khad and excess water is likely to be available as per the scenarios considered.
	Karot	21.92	Existing Kuhl	Ali Khad	
	Dugga Har (Manjher)	11.43	Kuhl	Kuhl	
	Loharda	23.02	Kuhl	Ali Khad	The source of these clusters is single borewell. Based on existing hydrogeological conditions at/or near the surrounding area of these clusters, it is not feasible for construction of borewell to provide discharge/water to these clusters. Therefore, the source identified by the JSV shall be reviewed and rainwater harvesting structure/or any suitable structure nearby these clusters be considered/identified for successful functioning of the scheme. Opinion of Hydrologist is mandatory.
	Kainthal	6.38	Kuhl	Ali Khad	
	Khod ka kyar	21.49	IPH Kuhl	Ali Khad	
	Salnu	27.79	New Scheme	Sutlej River	Source is hydrologically assessed feasible for providing LIS to cluster Salnu.

Bilaspur District

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Source Sustainability
Jhandutta	Balh Sinha	32.14	New Proposed	JICA Dam	The source is sustainable for all months, except for shortages in January and December, with shortage volume ranging from a maximum of 0.0193 mm ³ for Balh Sinha cluster with catchment area of
	Kosarian-I	30.59	New Proposed	Kosari Nalla	
	Jhandu	16.06	Defunct scheme of	JICA Dam	

			MHWDP Perennial Nallah (NF)		303 ha to a minimum of 0.0096 mm ³ for Jhandu with catchment area of 170 ha. Storage structures with capacity ranging from 0.015 to 0.030 mm ³ are proposed to make the clusters workable.
	Tihri	29.15	LIS Tihri (NF)	LIS Tihri	
	Lehar	25.23	New Proposed	Neri Dam	
	Tikkari Kotlu	23.65	New Proposed	Seer Khad	
	Fagog	12.33	LIS Seer khad (NF)	JICA Dam	Water demand is likely to be satisfied from the available water and excess water is likely to be available.
	Fagog Banjholi	22.83	Sukar Khad (NF)	JICA Dam	
Swarghat	Bassi	12.44	BBMB Canal	Anand Sahib Hydel Channel (ASHC)	Govt of Punjab agreed to release 25 Cusec of water regularly from ASHC for irrigation and drinking water purpose. Separate gravity main to be proposed from existing Zone 1B and Zone 2B tank to connect the proposed cluster tanks
	Dulhet 3	29.62			
	Ghattewal	28.26			

Mandi District

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Source Sustainability
Chauntara	Golwan	17.19	LIS Golwan	Ropdi Khad	The source of Golwan cluster, i.e., Ropdi Khad does not have an adequate catchment area. Thus, hydrological study and recommendation of Hydrologist is mandatory.
	Kothi – I (Balh)	9.30	TW 1	Tubewell	The borewells lie on the Govt. land along the right bank of Beas river. However, the source of these five clusters is also feasible from surface water of Beas river. The borewells have been taken as source, because the area has already been explored as no. of borewells have been drilled in the vicinity.
	Kothi - II	8.30	TW 2	Tubewell	
	Dhelu (Dhog)	9.97	LIS Dhelu	Tubewell	
	Dol	33.29	TW 3	Tubewell	
	Khadiyal	23.24	TW 4	Tubewell	

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Source Sustainability
Gopalpur	Sulpur	7.50	LIS Sulpur Bahi	Seer Khad	The Sulpur cluster have their source from functional scheme. The hydrogeological set up of the Seer khad is not conducive for construction of tubewells. Therefore, to tap base flow of Seer khad 4 Infiltration Galleries are recommended across the Seer khad at suitable locations identified / suggested by the Hydrogeologist
	Bhambhla-I	14.15	Seer Khad	Seer Khad	
	Batail 2	9.13	TW 5	Tubewell	
	Mataur Tanda	13.05	LIS Infiltration-Seer Khad	Seer Khad	
	Dhar	10.16	LIS Basantpur	Beas River	The Beas River is perennial in nature
	Barchwar	10.82		River Beas	
	Ghadhyani	7.24		River Beas	
	Kharoh (Kalerka)	17.11		Beas River	
	Bhadarwar Khobla	9.02	LIS Bhadharwaar, Bhudroli Khad	Rissa Khad	Source is perennial in nature
	Bahi	8.71	LIS Percollation-Seer Khad	Percollation well, Seer Khad	Functional scheme; to improve the health of the source i.e., Pwell for cluster Bahi, subsurface dyke cum check dam of height 1 to 2 m d/s of Pwell is recommended for long term sustainable development of the resource.
	Thouna/Dhalait	8.18	FIS Thouna Kuhal	Local Nallah	It is observed that the catchment area of the nallah is not adequate. Therefore, hydrological study and opinion of hydrologist is mandatory.
	Rasher	10.95	LIS Son Khadd	Rissa Khad	Source is perennial in nature
	Batial 1	19.70	TW 5	Tubewell	Infiltration galleries are recommended across the Seer Khad
	Bag-chuhku	12.86	TW 6	Tubewell	
Dharampur	Richhli	12.81		Beas River	

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Source Sustainability
	Mannu Dhar (Joh)	13.68	LIS Bari Marhi Dhwali		The Beas River is perennial in nature and is having sufficient discharge
	Haryanal	12.55			
	Satrehar	12.52			
	Ghanswai	8.30			
	Aarli Paryal	9.87			
	Richhali / Dhwali	5.75			
	Tarohla	8.00			
	Taroon	9.26			
	Chhapanu	8.38			
	Banwaar Kalaan	13.16			
	Dhardi-1	2.67			
	Baratpur	7.49			
	Balhara 1	1.46			
	Balhara 2	2.45			
	Dhardi 2	3.55			
	Lalana	4.27			
	Parli Paryal	1.70			
	Sakran Dhar	5.36			
	Sherpur	1.24			
	Chakyana	3.72			
	Chunighat	14.14			
	Gorat	12.25			
	Pakhdol	4.39			
	Tourjajar	9.74	LIS Baroti-Mandap-Joddan	Beas River	
	Galloo (Chanouta)	6.19			
	Siram(Sarskan)	7.05			
	Trembala	6.06			
	Hiun	3.96			
	Kumarhda 2	10.22			
	Didnu	5.20			
	Banerti-2	10.44			
	Pehad-2	10.04			
	Chhater	10.86			
	Drumman	30.76			
	Kumahrda	13.84			
	Giun	27.8			
	Cheh	8.67			
	Bahn	5.63	LIS Kothua Dhallara	Beas River	
	Chatroun (Lower)	11.26			
	Dhalara 1	9.35			
	Dhalara 2	8.70			

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Source Sustainability
	Lower Balh	6.24	LIS Sandhole	Beas River	
	Single Kuhat	3.70			
	Kanohi	1.32			
	Lahsani	1.35			
	Churu ra Balh	20.88	LIS Churu Balh	Nald Khad	The behaviour of the khad is ephemeral
	Seoh II	27.49	LIS Seoh	Beas River	The Beas River is perennial in nature and is having sufficient discharge
	Seoh (Balh) Nichla Ropa	18.74		Beas River	
	Lower (Nichali) Bairi	9.13	LIS Bairi	Beas River	
	Upper Bairi	23.98			
	Barota	4.37	LIS Brang	Soan Khad	The khad goes dry during lean period
	Manyoh-Lambri	20.14	LIS Tihra	Beas River	The Beas River is perennial in nature and is having sufficient discharge
	Thanna (Ropari)	8.18			
	Patti (Kot)	6.90			
	Darwaar	9.27			
	Digho-Baglana (Karyal)	7.28			
	Skohta	1.82			
	Khajurti	5.76			
	Bandal	10.71			
	Chandpur	11.98			
	Tikri	14.51			
	Dyol	5.59			

Mandi District

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Source Water Sustainability
Drang	Baragaon – I & II	14.32	LIS Baragaon	Baragaon nalla	Maximum shortage / excess is noticed majority of times in October and December, followed by February. Except for Baragaon, Latogali and Khargaon clusters, rest have shortage. Maximum shortage of 0.0119 mm ³ is noticed for Palhota cluster in Sundernagar block having catchment area of
Gohar/Balh	Dharwahan-II (Sehal)	17.39	New LIS 10 Behl-Ksarla	BSL Canal	
	Sawla	17.46	IPH Chamber	IPH Chamber	
	Bagga Chalog	8.63	New LIS – Bagga Chalog	Jiuni Khad	
	Latogali I	26.97	New LIS – Kuklah to Latogali	Bakhli Khad	

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Source Water Sustainability
	Brikhmani	16.76	FIS Anu Darbehad	Brikhmani Nalla	42.073 km ² while serving irrigation for an area of 17.11 ha. Minimum shortage of 0.0008 mm ³ is noticed for Manjhagan Chudara cluster in Gohar Block having catchment area of 178.18 km ² while watering irrigation area of 37.19 ha.
	Darvehad	12.33	LIS Zone no. 5 Balbehli	BSL Canal	
	Manjhog Dhaniut	9.66	FIS Majhog Dhanyot	Dhaniut nalla	
	Manjhagan Chudara	28.56	LIS – Manjhagan Chudara	Jiuni Khad	
Sadar	Dhaniyara	17.85	LIS Dhanyara	Arnodi Khad	Storage structures with capacity ranging from 0.0180 to 0.0012 mm ³ are proposed to make these clusters workable with water available in proposed source.
	Binol	7.21	LIS Binol Neeyul	Beas River	
Sundernagar	Palhota	17.11	Functional Lift Irrigation Scheme, Nehra, Palhota	Kansa Khad	Two clusters on BSL Canal (Sundernagar Hydrel Channel) have water demand of less than 1% of design discharge of canal. Therefore, water demand of both the clusters is likely to be sustainable except for the period of canal closure.
	Kuthain	15.45	Piped Irrigation Scheme Chirdi Boudhal Dhar	Kansa Khad	
	Bhantraed	11.85	Bhantred Khad	Bhantred Khad	
	Khagron	10.15	New LIS from Kiyargi Nallah	Kiyargi Nalla source	

Kangra District

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Source Water Sustainability
Bajinath	Langhu – 1	6.20	LIS on Binwa Khad	Binwa Khad	Except for Manghota cluster, rest have shortage.
	Langhu – 2	7.25			
	Langhu - 3	8.42			
	Manghota	6.00	LIS Manghota Cluster	Binwa Khad	Maximum shortage of 0.03022 mm ³ is
	Kudail	16.61	LIS Kudail Cluster	Dea Nallah	
Bhawarna	Thandol – 1	16.95	LIS Thandol Cluster	Mol Khad	
	Ghar	8.21	LIS Ghar Cluster	Mand Khad	

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Source Water Sustainability
	Malahu II	8.46	LIS on Mol Khad	Mol Khad	noticed for Jangal Malodha cluster in Lambagaon block having catchment area of 379.541 km ² while serving irrigation for an area of 19.7346 ha. Minimum shortage of 0.0062 mm ³ is noticed for Malahu 1 & 2 cluster in Bhawarna Block having catchment area of 20.947 km ² while watering irrigation area of 13.75 ha as well as Chainchadi Kuthera cluster in Sullah Block having catchment area of 50.125 km ² while watering irrigation area of 10.19 ha.
	Malahu I	5.29			
	Sidhpur	30.09	LIS Sidhpur Cluster	Nugal Khad	
	Chartkhola	17.71	LIS on Tahl Khad	Tahl Khad	
	Ludhran 1 & 2	15.09	LIS on Tahl Khad	Tahl Khad	
Lambagaon	Maldoan	10.59	Existing Functional LIS Alampur Extension	Nugal Khad	
	Jangal	9.15	LIS Alampur Extension	Nugal Khad	
	Odri	8.76	LIS Bandhui Extension	Mol Khad	
	Kotlu	4.52	LIS Bandhui Extension	Mol Khad	
	Kathla	7.59	LIS Kathla Cluster	Beas River	
	Thanpal / Chambi	8.34	LIS Thanpal / Chambi Cluster	Beas River	
Panchrukhi	Trehal	8.22	LIS Trehal Cluster	Tubewell	
	Agozar	7.03	LIS Agozar Cluster	Tubewell	
	Rajhot 1	17.27	LIS Rajhot – 1 & 2 Cluster	Awah Khad	
	Ladoh 1	17.21	LIS Ladoh-1 Cluster	Tubewell	
	Ladoh 2	5.53	LIS Ladoh-2 Cluster	Alang Nallah	
	Banuri	7.73	LIS Banuri Cluster	Gharuhal Khul	
	Saliana	7.33	LIS Saliana Cluster	Nai Khul	
	Molichak	6.15	LIS Molichak Cluster	Tubewell	
	Jandpur	8.54	LIS Jandpur Cluster	Tubewell	
Sullah	Dheera 1 & 2	23.47	LIS Dheera – 1 & 2 Cluster	Nugal Khad	Storage structures with capacity ranging from 0.0065 to 0.0455 Mm ³ are proposed to make these clusters workable with water available in proposed source. The Beas River is perennial in nature and is having sufficient discharge
	Dheera 3	10.81	LIS Dheera – 3 Cluster	Nugal Khad	
	Chainchadi – Kuthera	10.19	LIS Chainchadi – Kuthera Cluster	Mand Khad	
	Purba	15.36	LIS Purba Cluster	Nugal Khad	
	Chandar	36.60	LIS Chandar Cluster	Mol Khad	
	Gagal Khas	23.47	LIS Gagal Khas Cluster	Tal Khad	

Kangra District

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Source Sustainability
Dehra	Lalwada	30.41	New Proposed	Beas River	The total demand of Jhakota, Dhanot and Lalwada clusters together with 20% for environmental releases and 15% for future demands would be $1.35 \times 0.031 \sim 0.042 \text{ m}^3/\text{s}$. This demand is about 1.3% of the minimum release during low flow season viz $3.12 \text{ m}^3/\text{s}$. Thus, it can be concluded that the proposed source on river Beas would be sustainable under post project scenario.
	Jakhota	227.54	New Proposed	Beas River	
	Dhanot	206.21	New Proposed	Beas River	
	Bhatoli Phakasian	11.44	LIS Dibber Rour (F)	Banner Khad (rivulet)	From analysis, it is concluded that the gross demand can satisfactorily be made by the source with surplus quantity available throughout the year, except for the months of May, November and December. Thus, storage capacity of 0.03 mm^3 is proposed.
	Bhatera Bassa	13.90	LIS Bhatera Bassa (F)	Banner Khad (rivulet)	From analysis, it is concluded that the gross demand can be satisfactorily be made by the source with surplus quantity available throughout the year, except for the months of May, November and December. Thus, storage capacity of 0.05 mm^3 is proposed.
Pragpur	Chamba Khas	10.44	LIS Chamba Khas (N/F)	Beas River	The intake structures for Kuhna and Chamba Khas Clusters are situated about 24.5 km and 28.778 km downstream of proposed dam site for Dhaulasidh HEP. Few of tributaries join river Beas downstream of Dhaulasidh dam that would add to the release. Study of HEP project water release suggest that even at 10% release, there will be surplus water available for the horticulture clusters after maintaining environmental flow.
	Kuhna	11.86	New Proposed	Beas River	

Una District

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Source Sustainability
Bangana	Boul-1	19.32	RWHS Samoor (F)	Samoor Khad	The estimation of yield from surface water of khads/nallahs as the
	Boul-2	24.55	RWHS Samoor (F)	Samoor Khad	
	Dulehri Rajputa	9.11	Dulheri Rajputa & Thana Khurd	Dulheri Nallah	

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Source Sustainability
	Sanhal	13.58	LIS from RWHS Samoor (F)	Samoor Khad	source has been carried out using 12-year rainfall data. The annual yield from 75% dependable rainfall is estimated. The estimated yield on monthly time steps and assumed data on demands indicate adequacy of surface water from Khads/nallahs as source to meet these demands after providing storages with adequate capacity to meet future demands in fair weather season. The results indicate a maximum shortage of 0.0453 mm ³ in the month of January.
	Thana Khurd	27.24	Dulheri Rajputa & Thana Khurd	Dulheri Nallah	
	Balh	14.02	New Proposed	Balh Khad	
	Chadoli	26.75	New Proposed	Chplah Khad	
	Dumkhar	10.75	New Proposed	Chplah Khad	
	Muchali 1 & 2	21.26	New Proposed	Muchali Nallah	
	Nalwari	36.52	New Proposed	Chplah Khad	Water availability would be dependent on releases from Bhakra dam and is likely to be available majority of the time.
	Handola	11.84	LIS Handola (NF)	River Satluj	

F. Biological Environment

113. Fauna - The clusters are located in agricultural field hence only domesticated animals such as cows and buffalo are seen around the sites, primarily owned by the farmers who own land within cluster. The sites are also frequented by monkeys (Rhesus Macaque), a native primate in Himachal Pradesh. MoEFCC, through vide notification No. 804, dated 14 February 2019, declared Rhesus Macaque species of monkeys as vermin (pest animals) for a period of a year in 10 districts of Himachal Pradesh (which includes project districts of Kangra, Bilaspur, Una, Sirmour, Solan, Mandi, Hamirpur)²⁴ for necessary balance of local population of the species and

²⁴ https://hpforest.nic.in/files/Notification_Himachal_1.pdf

mitigate damage to human life, crops, and other properties of State while conserving wildlife. The notification has been further extended for two years. As a measure the state government has been sterilizing the species to reduce their population.

114. Consultation with the farmers also suggest presence of Indian Peafowl (*Pavo cristatus*). Indian peafowl is included in Schedule-I of Wildlife Protection Act 1972, indicates the high conservation value of species. Thus, the solar fencing in project will stop human and animal conflict and allow conservation of species.

115. **Forest and Wildlife Protected Areas** – The project districts are predominantly covered under forest (45%), extending about 2578.66 sq. km. The list of National Parks and Wildlife Sanctuaries in the state has been attached in Annexure 5. Since none of the clusters are within forest area, there is no apparent conflict between farmers and wildlife.

116. **Aquatic fauna** - A variety of fish such as Mahaseer, Katla, Rahoo, Mirgal, Malli, Singhara, Carps, Mirror Carps, etc. are found in the lake and its tributaries. A total of 27 fish species belonging to five families have been recorded in the project districts. However, none of the sites fall under protected water or trout water.

117. **Vegetation on private lands** – In general, the vegetation found in the target sites are bamboo, Chir Pine, Oak, Deodar, Kail, Fir and Spruce in private lands.

- a. Many of the clusters at Solan recorded Khair trees (*Acacia catechu*) that are counted as Non-Forest Timber Products and their harvesting is regulated by the forest department (noted during field discussions).
- b. Sal (*Shorea robusta*) is the dominant species found in Una and Sirmaur districts.
- c. In Bilaspur - The natural vegetation consists of Sal (*S. robusta*), Toona (*Cedra toona*), Eucalyptus (*E. glohulus*), Babool (*Acacia arubica*), Dhaman (*Ghrewia optiva*) and Mango (*Mangifera indica*), mostly found on lower slopes. On steep slopes, Forest species like Pine: (*pinus roxburghii*) and bushes are dominant (noted during field discussion).
- d. At Hamirpur, project area comprises of tree species of Khair (*Acacia catechu*), Siris (*Albizia lebbeck*), Shisham (*Dalbergia sissoo*), Mulberry (*Morus alba*), etc. are found planted along the boundary of the agricultural lands and along the road sides (noted during field visits).
- e. Mandi – Bel (*Aegle marmelos*), Peepal (*Ficus religiosa*), Arjuna (*Terminalia arjuna*), Bahera (*Terminalia bellerica*), Bahera Kinnu (*Diospyros Chloroxylon*), Babool (*Acacia nilotica*), Neem (*Azadirachta indica*), Sagon (*Tectona grandis*), Mahwa (*Madhuca indica*) Shisham (*Dalbergia sissoo*), Shimbali (*Bombax ceiba*), Mango (*M. indica*) (noted during field visits)
- f. Kangra - Shisham (*D. sissoo*), Shimbali (*Bombax ceiba*), Mango (*M. indica*), Bel (*Aegle marmelos*), Peepal (*Ficus religiosa*), Arjuna (*Terminalia arjuna*), Bahera (*Terminalia bellerica*), Bahera Kinnu (*Diospyros Chloroxylon*), Babool (*Acacia nilotica*), Neem (*Azadirachta indica*), Sagon (*Tectona grandis*) and Mahwa (*Madhuca indica*)

G. Socio-Economic Profile

118. Bilaspur District consists of 4 Sub-Divisions, 4 Tehsils, 3 Sub-Tehsils and 4 Development Blocks. As per the 2011 census, Bilaspur district has a population of 381,956 persons, with a population density of 327 persons per sq. km. The sex ratio is 981 females per thousand males. The rural and urban population in the district is 356,827 and 25,129 respectively.

119. Hamirpur district is divided into 5 Sub-Divisions, 8 Tehsils, 2 Sub-Tehsils and 6 Development Blocks. As per 2011 census, the district has a population of 4,54,768 persons with a population density of 407 persons per sq. km. The male and female population in the district is 2,17,070 and 2,37,698 respectively, with a sex ratio of 1,095 females per 1,000 males.

120. As per 2011 census, the Kangra District has a population of 15,10,075 persons with a population density of 263 persons per sq. km. Population wise it ranks first in the state. The male and female population in the district is 7,50,591 and 7,59,484 respectively, with a sex ratio of 1,012 females per 1,000 males. The schedule caste population in the district is 21.15 % and the schedule tribe population is 5.6%. There are 3,908 villages in the district. The district has been divided into 14 Sub-divisions, 19 Tehsils, 15 Sub-Tehsil and 16 Development Blocks.

121. Mandi district has been divided into 12 Sub-divisions, 17 tehsils, 14 sub-tehsils and 13 Development Blocks. As per 2011 census, the district has a population of 9,99,777 persons with a population density of 253 persons per sq. km. The male and female population in the district is 4,98,065 and 5,01,712 respectively, with a sex ratio of 1007 females per 1000 males.

122. Sirmaur district has been divided into 7 Sub- divisions, 9 Tehsils, 5 Sub-Tehsils and 7 Development Blocks. As per 2011 census, the district has a population of 5,29,855 persons with a population density of 188 persons per sq. km. The male and female population in the district is 2,76,289 and 2,53,566 respectively, with a sex ratio of 918 females per 1000 males.

123. Solan District has been divided into 4 Sub-divisions, 7 Tehsils, 5 Sub-Tehsils and 5 development blocks. There are 2,614 villages and 240 Gram Panchayats in the district. It is well developed in the industrial sector due to close proximity to Punjab State. As per 2011 census, the district has a population of 580,320 persons with a population density of 300 persons per sq. km. The male and female population in the district is 308,754 and 271,566 respectively, with a sex ratio of 880 females per 1,000 males. The rural and urban population is 81.78% and 18.22% respectively.

124. Una District is divided into 5 Sub-Divisions, 5 Tehsils, 7 Sub-Tehsils and 5 development blocks. There are 5 towns, 866 villages and 245 Gram Panchayats in the district. As per 2011 census, the population of Una district is 521,173 persons with a population density of 338 persons per sq. km. The sex ratio is 976 females per thousand males.

125. About 1,016 farmers surveyed²⁵ as a part of the baseline survey. It was found that the contribution of agricultural income from the parcel of land that the farmer is willing to part with for the project, was substantially less (6%) as compared to the family income from other sources (94%). One of the main reasons for this difference is that the agricultural income is meagre and not sufficient for the farmer to manage his/her regular family expenses. On the basis of the survey,

²⁵ Baseline survey conducted in January – February 2022 (1016 farmers surveyed across all 28 blocks in the 7 Project districts)

it was estimated that 67.5% and 22.2% of the surveyed farmers are marginal and small farmers, respectively. In other words, almost 90% of the farmers are small and marginal. Also, of the 1,016 farmers surveyed, 25 farmers (2.5%) are such who are parting with 100% of their agricultural land holding and have no other source of family income. Of the 25 farmers, 24 belong to the marginal category and 1 belongs to the small category, as per farmer land holding. It was observed that wheat is the most cultivated crop in the region, with more than 80% households cultivating the crop. Wheat is followed by maize and paddy, in terms of number of households cultivating a particular crop. The survey data is in line with the assumptions, given that Wheat, Maize and Paddy form a major part of the staple diet in the region.

126. Only 4% of Himachal Pradesh's population is classified as scheduled tribes, according to the 2011 census, a mere 5% Indigenous People (IP) population was recorded during the baseline. Moreover, scheduled tribes in Himachal Pradesh are not distinct tribal groups but are mainstreamed considering the culture, language, economic activities, and source of livelihood. These groups may not be considered Indigenous Peoples as per the ADB SPS. They have access to infrastructure facilities such as roads, electricity, schools, and hospitals. No particular impact or discrimination is expected on minorities. Instead, the IP farmers part of the CHPMA and WUAs (if any) participating in the project activities will benefit- this benefit will be related to improved knowledge and skills on post-harvest practices, increased production, and improved income, and better access to markets.

H. Cultural and Archaeological Resources

127. No that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significant resource has been found within the project sites.

VI. ANTICIPATED ENVIRONMENTAL IMPACTS

128. Environmental assessment is required to consider all potential direct, indirect, cumulative and induced impacts and risks to physical, biological, socioeconomic (including impacts on livelihoods through environmental media, health and safety, vulnerable groups and gender issues), and physical cultural resources in the project's area of influence.

129. As the project will involve civil works for expansion, rehabilitation and development of new scheme irrigation, it is anticipated that impacts will be site-specific, temporary in nature and of short duration. Project environmental screening checklist has been developed to screen the project activities and identify any significant environmental impacts during implementation of subproject and site selection. Careful site selection and engineering design of project components, coupled with clearly defined construction, operation and maintenance procedures can avoid and reduce environmental impacts to a minimal level. The table below list out the environmental impacts against the project activities and recommends mitigation measures to avoid, reduce and mitigate impacts.

A. Impacts found in PRF implementation

130. Following impacts found in PRF Implementation:

- Felling of trees were not duly archived; however, farmers were found to be aware of tree felling regulation of the state and assured same has been followed during the field preparation; DOH agreed to record felling of tree henceforth by type and number;
- Construction wastes were found unmanaged in few of the sites;
- Few of the sites did not have adequate water head pressure from MDT to modular tank and from modular tank to end of the field. Thus, even after all system in place water could not reach to the fields and farmers continued to be in distress;
- Water quality is not being monitored in regular basis and communicated to farmers;
- Some of the sites were observed to be on flood prone zones (Mator Tanda);
- Schedule cleaning of RCC tank and other machinery and safe disposal of waste have not been thought through;
- In some of the clusters solar fencing was found nonfunctional due to solar panel not placed at right position;

B. Positive Environmental Impacts

131. Following are the positive environmental impacts envisaged from the project:

- The plantation of horticulture crops will lead to conservation of soil and turning many of the barren land into cultivable land;
- The plantation will lead to creation of carbon sink, prevent soil erosion, and surface runoff and increase infiltration of rainwater;
- Solar fencing will avoid human and animal conflicts;

C. Analysis of Degree of Impact

132. The assessment has been made on site basis and based on local condition. While it is difficult to ascertain degree of impact, however, severity of anthropogenic disturbances of the

environment is assessed on the following parameters - Spatial scale; Temporal Scale and Intensity. All these parameters can be combined and rated under the scale of – high, medium and low; and define as follow:

- Negligible/ no impact (N) - Environmental changes are within the existing limits of natural variations, temporary in nature and is site-specific;
- Low (L) - Environmental changes exceed the existing limits of natural variation, however is temporary in nature and is site-specific;
- Medium (M) - Environmental changes exceed the existing limits of natural variations and result in damage to any of the environmental components, but remains self-recoverable;
- High (H) - Environmental changes result in significant disturbance to environmental components and ecosystems. Certain environmental components lose self-recovering ability.
- Similarly, for positive impact, High (Hp), Medium (Mp) and Low (Lp) reflects same degree of positivity.

D. Installation of Solar Fencing

Table 9: List of anticipated impacts from Installation of Solar Fencing

Activities	Additional Explanation	Potential Impacts (positive or negative)	Degree of Impact
Design of the fencing posts, roads, and seeking the necessary approvals and licenses	Final designing of the post (nos. & positioning), fencing (wire), positioning of solar panels, battery, electric wiring, warning sign boards, earthing system, etc.	Installation of solar-power fencing has positive impacts on the cluster members as it will protect both horticulture and other produce through intercropping.	Hp
	Informing farmers and panchayat (village administration) on the construction activities and benefits of solar-power fencing.	No environmental impact.	N
Assembling and sourcing of materials.	The key materials to be sourced are GI posts, GI wire mesh, solar panels, lithium batteries, electrical wires, cement, sand and aggregates.	Indirect adverse impacts of air pollution due to vehicular movements.	L
Clearing of vegetation for about a 1m wide strip at the periphery of the cluster including the uprooting of rank	The fencing will be laid out at the periphery of plantations.	Loss of vegetation could lead to loss of topsoil.	L
		If work is carried out in the rainy season, it may trigger local erosion.	L

Activities	Additional Explanation	Potential Impacts (positive or negative)	Degree of Impact
vegetation, grass, brushwood, saplings etc.		May come across threatened plant species.	L
		Occupational health and safety risks	L
Excavation of earth up to for installation of GI post.	Earth needs to be excavated for the installation of GI posts (corner posts, support posts and intermediate posts) of various diameters.	Dust pollution	L
		Increased soil erosion	L
		Loss of topsoil	L
		Occupational health and safety risks	L
Grouting of GI posts with PCC cement sand & stone ballast.	Use of plain concrete cement, sand and stone ballast for fixing the GI posts in their dedicated position.	Dust and land pollution from the mixing of concrete and from the use of sand & stone ballast.	L
		Occupational health and safety risks due to dust pollution.	L
Installing wires and strainers.	Installation of pre-tested standard aluminium conductor steel-reinforced (ACSR) cable for high tensile (HT) electric conduction up to 15kV. 05 Nos through each post supported through Polypropylene (PP) insulators (UV Stabilized) on each post. The electric shock is completely safe and non-lethal for humans and animals. As the current is pulsating (not live) and passing every 1 to 1.2 seconds and only for a 0.3 millisecond (1000th of second) of time, the animal gets enough time to get away from the fence. The pulsating current will not grab the animal which generally happens in the continuous current.	Accidental shock to animals, birds and humans in case the safety systems fail to act.	M
		On failure of the solar power system, if farmers energize the wires through live and continuous current – any living being coming in contact with the wire will be electrocuted leading to contraction of muscles/cramps and preventing the body from moving away from the fence	M
		Occupational health and safety risks for probable shock.	M

Activities	Additional Explanation	Potential Impacts (positive or negative)	Degree of Impact
Installing Solar-panels with lithium battery storage and energizers.	An appropriate location for the solar panel to get abundant sunlight can ensure the successful working of the fencing. This project is using a very little amount of non-renewable resources and the lifetime of the panels and batteries is for 5 year. Battery should always be kept in upright position.	Generation of e-waste.	L
		Indirect impact of the use of non-renewable resources such as Silicon and Lithium.	L
		Occupational health and safety risks	L
Disposal of construction waste.	Construction waste such as concrete, aggregates, electrical wires, e-waste, etc. are likely to be generated and needs a disposal plan.	The waste that may get generated if left at the site could lead to land and water pollution.	M
		Occupational health and safety risks	L
Operation of solar fences	Solar fencing will be operated by the farmers on regular basis;	Fencing may increase the animal menace in the neighbouring fields.	L
Annual maintenance and skill development among cluster members.	The EPC contractor will train the trainer on the operation and maintenance of the entire system, especially on the aspects of health and safety, maintenance of solar panels from dust, routine checks on energizers, hotter alarm, shock stop, lightning diverters, etc.	This will have positive impacts on the participating farmers as follow: - -development of new skill sets. -development of a sense of ownership, leading to responsible behaviour. -training and convincing other farmers to participate. -protection of horticulture produces and other intercropping produces.	H
		Generation of e-waste.	N
		Occupational health and safety risks from	L

Activities	Additional Explanation	Potential Impacts (positive or negative)	Degree of Impact
		handling of lithium battery.	

E. Field Preparation and Horticulture Plantation

Table 10: List of anticipated impacts from Field Preparation for Horticulture Plantation

Activities	Additional Explanation	Potential Impacts (positive or negative)	Degree of Impact
Planning of layouts the plantation	Each crop has a different set of spacing and bed requirements, drawn out as per the type of soil, humidity range, sun aspects and annual temperature range. As HPSHIVA aims for high-density plantation, the position of the plants is to be specified on the ground specifically at: i) point where plant to be planted, and ii) at the mid of the rows on two sides	Planning of the plantation plots has positive impacts such as: -enhance the efficiency of drip irrigation and soil drainage. -allow usage of mini-agro machinery. -enhance farmers' productivity. -reduce soil erosion.	Hp
Site Clearance	Trees, shrubs, rank vegetation, grass, brushwood, roots of trees and saplings of girth up to 30cm measured at a height of 1m above ground level to be cleared. The roots of trees and saplings shall be removed to a depth of 60cm below ground level or 30 cm below formation level or 15 cm below subgrade level, whichever is lower.	Loss of vegetation could lead to loss of topsoil.	L
		If work is carried out in the rainy season, it may trigger local erosion.	L
		May come across threatened plant species.	L
		Muck generation, mainly plant and stone waste.	N
		Occupational health and safety risks.	L
Land Development (terracing, where needed)	In case of slanty terrain, terraces would need to be created such that crops can be planted at raised beds and beds are protected from erosion;	Dust pollution	L
		Increased soil erosion due to loss of vegetation cover	L
		Loss of topsoil	L

Activities	Additional Explanation	Potential Impacts (positive or negative)	Degree of Impact
	It should be noted that subtropical region of the State is expected to experience more torrential rains concentrated in a few days.	Occupational health and safety risks from dust pollution	L
Dressing with bed-making	Preparing raised bed along plant rows of width 1.20m and height 0.3 m above natural ground level by way of excavating the top orchard soil along the planting row.	Local dust pollution from handling of soil	L
		Occupational health and safety risks	L
Pit digging	Digging of pits at the planting site as per dimensions and spacing.	Generation of additional soil	L
		Occupational health and safety risks	L
Disposal of waste	Additional soil, stones, shrubs and herbs as waste will be generated from site clearance and land development activities.	The waste that may get generated if left at the site could lead to land degradation, increased soil erosion and water pollution	L
Cultivation activities and maintenance of the plantation	DOH along with the support from the CHPMA facilitator should train the farmers on how to maintain the field, carry out mulching, weeding, and intercropping between the beds.	This will have positive impacts on the participating farmers as follow: - -development of new skill sets; -development of a sense of ownership, leading to responsible behaviour; -training and convincing other farmers to participate; - increased production of horticulture and other intercropping produces;	Hp
		Land and soil pollution from use of pesticides/ insecticides	M
		Occupational health and safety risks from use of pesticides/ insecticides	M

F. Rehabilitation/ Development of New Irrigation Schemes

Activities	Additional Explanation	Potential Impacts (positive or negative)	Degree of Impact
Planning the layout of the irrigation scheme	Final designs of intake wells, siting of control structures and rising main alignments will be completed after taking into account the provisions of the environmental management plan.	Positive impact	Hp
Site Clearance	Sites preparation for intake well, desilting tank, pump-house, rising main and main distribution tank (MDT) will have to be cleared before start of construction; Some of the clusters are in the buffer zones of eco-sensitive zone (refer to the detail checklist of the packages). For those sites, Forest and Wildlife state authorities should be duly informed before starting any activity. There no formal clearance required.	Impacts to surface water quality may include increased siltation and turbidity from site preparatory work.	M
		Impact on aquatic life – flowing surface water will be temporarily diverted from the bank side where intake wells will be constructed.	L
		Clearing project sites may cause permanent or temporary disturbance to vegetation, although no known protected flora species have been identified on the project sites.	L
		Occupational health and safety risk from snake/ insect bites. Although no poisonous species have been noted in project sites;	L
Installation of submersible pump	Two numbers of submersible pumps will be installed at the intake well.	Impact on surface water quality from soil erosion, leading to more siltation and water quality deterioration	L
		Occupational health and safety risks due to spillage from height	M
Construction of de-silting tank	One number of desilting tanks will be installed at each scheme to help settle the silt in river water. This will help in prolonging the life of the pumps which may get clogged otherwise.	Impact on air and noise quality at the site	L
		Occupational health and safety risks due to spillage from height	M
Construction of pumping station	One number of pumping station has been designed at each scheme level, such that water can be lifted from the desilting tank to the	Soil erosion and silt run-off	L
		Contamination due to inappropriate transfer, storage and disposal of petroleum products, chemicals, hazardous materials, liquids and solid waste.	L

Activities	Additional Explanation	Potential Impacts (positive or negative)	Degree of Impact
	main distribution tanks through raising main.	Spoils from earthwork during construction	L
		Occupational health and safety risks due to spillage from height	M
Laying of rising main	GI pipes of various sizes will be used. Pipes are proposed with welded joints instead of flanged joints to take care of.	Change in land use and loss of agricultural land, impact on forest area, and settlement areas during construction of MDT and pipe laying activities	M
		May case landslide if poorly managed, undertaken during heavy rainfall or strong winds.	M
		Laying of distribution system has the potential to increase erosion and nutrient loss if poorly managed, undertaken during heavy rainfall or strong winds.	H
		Dust generated by excavation and dust from aggregate preparation has the potential to impact local air quality	M
		Occupational health and safety risk of slippage from height for the construction workers;	H
Construction of reinforced concrete (RCC) MDT	The tank will be either ground storage reservoir (GSR) or Elevated service reservoir (ESR) as per the topography of the cluster. It will be circular RCC tank in M30 grade concrete and will be a pre-fabricated structure.	Degradation in ambient air quality during construction of MDT, hauling of materials, material stock piling, pipe-laying activity, land clearance for horticulture area development	L
		Occupational health and safety risk of slippage from height for the construction workers;	L
Use of machinery and vehicles		Dust generated hauling, loading, and unloading; movement of vehicles and heavy machinery on unpaved access and haul roads has the potential to impact local air quality.	L
		Heavy machinery operation has the potential to result in noise impacts. Noise volume of construction machinery is generally between 80 dB and 110 dB, while vehicle noise intensity is generally about 90 dB. As some of the construction areas may be adjacent to villages, noise will	L

Activities	Additional Explanation	Potential Impacts (positive or negative)	Degree of Impact
		have some impacts on nearby residents.	
		Occupational health and safety risk from accidental injury from use of machinery and vehicles	L
Generation of construction and demolition wastes		Disposal of excavated materials will lead to air, water and soil pollution	L
		Occupational health and safety risk	L

G. Installation and Operation of Drip Irrigation System

Activities	Additional Explanation	Potential Impacts (positive or negative)	Degree of Impact
Planning the layout of the drip irrigation system	- The main components of the drip irrigation system are: - Screen filter - Sand filter - Fertigation tank with assembly - Ventury and manifold - Pipes - Valves - Water solar-power pumps with an electric motor To ensure all plants receive adequate water and excess water is drained out properly without contamination of any source - Survey, planning, designing and installation including trench work is carried out	Positive impact	Hp
Installation of Drip irrigation system along with solar pumps	Installation and testing of the system and training of the farmers to be carried out by the system provider	This could lead to the generation of solid waste such as leftover pipes and other materials;	L
	Solid waste is often generated from this activity;	Occupational health and safety risk	L
Operation of drip irrigation system	Operation of irrigation system by the farmers and periodic maintenance	Soil contamination from unmanaged use of fertilizer through fertigation system	M
		Unmanaged disposal of sand filters, screen filters could lead to soil contamination	L

Activities	Additional Explanation	Potential Impacts (positive or negative)	Degree of Impact
		Clogging of emitters/ dripper with soil leading to inefficient use of water	L
		Occupational health and safety risk	L

VI. ANALYSIS OF ALTERNATIVES

133. The State also enjoys a rich diversity of agroclimatic conditions, topographical variations, and altitudinal differences, which favors the cultivation of temperate to sub-tropical fruits and exotic vegetables. Among the temperate fruits, the State produces apples, peaches, plums, pears, citrus, kiwi fruits and apricots along with many other exotic fruits. The State also produces a range of sub-tropical fruits, including citrus, pomegranate, litchi, guava, mango, etc. Majority of agricultural activities in the State are dependent on rainfall with 80% of the area under rain-fed. Even though there is a large volume of water available in the State, only a part of its cultivated area is irrigated because of physiographic constraints. While crop diversification is increasing in the State, for fruits and vegetables, this is mostly concentrated in districts of the mid-hills and high hills and valley zone, leaving a substantial income gap between temperate and sub-temperate producers and those producing sub-tropical crops. The sub-tropical region (Bilaspur, Hamirpur, Kangra, Mandi, Sirmour, Solan, and Una districts) in the State face multiple challenges in terms of climate change, rainfall uncertainties, water availability and low productivity of horticulture produce and income disparity, etc. Thus, project alternative with no support of developed and rehabilitated minor irrigation scheme would not have met the objectives of HPSHIVA.

134. There are different methods to supply water in farmlands for crop yield - such as surface irrigation (which is currently being practiced in few of the project cluster by taking water from khul; sprinklers, or drip irrigation). Surface irrigation/ flood irrigation – a) is unsuitable for horticulture crops as standing water can destroy their root system; b) it is an inefficient way of irrigation, leading to methane generation from the fields. Sprinklers are also not suitable for horticulture crops as when they would attain mature height sprinklers would not be able to reach to every end. Hence drip irrigation is the only suitable method of irrigation.

135. Drip irrigation is a smart and innovative solution for the horticulture plantation. It is significantly proven to be effective in case of hilly areas and for small farmers. It can increase the production by 50% and limits topsoil erosion, pest infestation and evaporation from the soil surface. The advantages of the drip irrigation system are as follows:

- Improves quality and ensure early maturity of the crops.
- Water Saving up to 40% – 70%.
- Controls weed growth, saving of fertilizer (30%) and labour cost (10%).
- High Water Use Efficiency
- Reduces greenhouse emission

136. Fencing of horticulture fields - To help the farmers in resolving the issue of animal predation, an innovative solution of Solar Powered Electric Fencing has been proposed. In this modern, non-conventional fencing, wires carry solar energy produced current, delivering a fierce but non-fatal shock to an animal coming in its contact, causing a suitable deterrent effect on the animal. The current does not cause any harm to the animal, but it acts as a psychological barrier for the animal from intruding into the field and helps in preventing losses. Thus, without this component project would not have been successful.

137. Crop selection was carried out based on various research studies carried out under the TA activities of HPSHIVA. Crop mapping for every identified Cluster is a pre-requisite to identify the suitable crop. For the said purpose Cluster matrix for each crop was developed on the basis

of ecological parameters needed for optimal yield and good production. The parameters included altitude and slope of the land, soil and climatic factors. Similarly, for each Cluster soil testing was conducted to gather information regarding the Cluster parameters. Based on the parameters, the best fit crops (1-3 nos.) were mapped for the Cluster. Hence, the most suitable crops for the given clusters have been selected.

VII. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

138. The principal purpose of an EMP is to provide a guide in the formulation of appropriate management systems, plans and procedures to ensure compliance with national and ADB safeguards requirements. The requirements set out in this section should be included within contractual documentation with the relevant parties, as appropriate, to ensure there is clarity and commitment regarding contractor obligations related to environmental, health and safety management of the Project.

139. The EMP contains the arrangements on the implementation of mitigation measures, monitoring program, cost estimates, and institutional set-up to ensure that no significant adverse impacts results from the proposed projects. The plan covers the pre-construction, construction and operations stages. The basic objectives of the EMP are to:

- establish the roles and responsibilities of all parties involved in the project's environmental management;
- ensure implementation of recommended actions aimed at environmental management and its enhancement; and
- ensure that the environment and its surrounding areas are protected and developed to meet the needs of the local communities including other stakeholders and safeguard and the interests of the common people.

140. Mitigation measures required to address the impacts identified by this IEE have been consolidated in the following EMP. For all construction activities awarded on contractual terms, the Contractor to submit Contractor Environment Management Plan (CEMP) detailing out how each of the activities will be carried out and how mitigation measures mentioned in the following EMP and otherwise proposed by the contractor will be implemented. The CEMP should be site specific and CEMP should be approved by PMU before allowing start of any construction activities. All NOCs such as regulatory clearances, insurances, licences, should be in place before contractor is allowed to move to the site. PMU will be responsible for assurance of these points.

Table 11: EMP for Development of Irrigation and Horticulture Production Systems

Activity and Potential Adverse Environmental Impacts	Mitigation Measures	Reference to laws /guideline	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
OUTPUT 1 - Irrigation Systems								
[COMPONENT– LIFT IRRIGATION]								
Design and Pre-construction Phase – Lift Irrigation								
Activity: Site preparation and felling of trees for intake well, desilting tank, pump-house, rising main (all on government land), and main distribution tank (MDT) (could be on donated private land) Impact: Likely to cause air and water pollution.	Felling of trees for development work in non-forest government land in rural areas, which are not forming part of 5 ha compact wooded block - permission from Principal Chief Conservator of Forests (PCCF), if necessary, after a proper survey by DFO. Feeling of trees on private/ agricultural land is allowed and no permission is required (i) up to – 5 trees per owner per financial year for broad leaf species (i.e., Chil, Ban and Oak), (ii) up to 3 trees for coniferous trees, and (iii) up to 10 trees with written permission from Range Officer and for more than 10 trees written permission from DFO required. No civil work should be carried out until permission is in place. Cutting trees at the proposed sites will be kept to an absolute minimum and only be permitted when it is obstructing necessary project activity. For control of dust pollution sites should be sprinkled with water. No debris should be allowed to flow into the water sources. Clearance waste if containing only biodegradable substances should be disposed of at a site that will not be frequented by humans, or animals and not lead to any land or water pollution.	HP Land Preservation Act, 1978 (Private land not classified as Forest)	Irrigation sites and Clusters	Species-wise number of trees felled for preparation of irrigation sites/ related to irrigation components including MDT. The farmer felling tree will give an undertaking that all regulations under HP Land Preservation Act, 1978 (Private land not classified as Forest) are followed.	Environmental expert in PIU JSV to record during field preparation All data collated at PMU Level	NA	Contractor	Environment Specialist in PIU of JSV Environment Safeguards Specialist in PMU of DOH Project Implementation and Support Consultants (PISC)
Activity: Procurement and transportation of construction materials Impact: may lead to associated	Contractor to source materials from authorized sources by the government. Use construction vehicles having proper pollution NOCs. Cover construction materials with a tarpaulin sheet while not in use.	Central Motor Vehicle Act	Project Districts	Pollution Certificates	Submission of Pollution Certificates along with claims on the use of vehicles/	NA	Contractor	Environment Specialist in PIU of JSV Environment Safeguards Specialist in PMU of DOH

Activity and Potential Adverse Environmental Impacts	Mitigation Measures	Reference to laws /guideline	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
impacts and vehicular emissions					transportation/ machinery			PISC
Activity: Preparation of sites Impact: Dust pollution, increased soil erosion, and loss of topsoil.	Minimization of dust pollution by sprinkling water on excavated earth and borrowing pits. This activity should be avoided during the rainy season to avoid mudslide conditions.	NA	Project clusters Irrigation scheme sites	Visual site verification	Regular field audits by PIU experts Periodic site visits by PMU specialist	NA	Contractor	Environment Specialist in PIU of JSV Environment Safeguards Specialist in PMU of DOH PISC
Construction Phase – Lift Irrigation								
Activity: Construction of weir/dyke and construction of percolation tank within the watercourse. Impact: water pollution, low availability of water downstream due to diversion and occupational health and safety risks	Mixing of concrete must be done at least 500 meters away from the source of water Only one of half of the stream width should be closed and water should be diverted at least 20 m ahead of the site using local river/ stream bed materials. The banks of watercourse should not be disturbed to avoid any possibility of erosion and slope disturbance. Construction work to be carried out only in the lean season when the possibility of water contamination is low. Environmental flow should be maintained for the survival of aquatic life and availability of water downstream. Appropriate personal protective equipment such as harness belts, safety shoes protecting from water submergence, gloves etc. should be provided. Weather should be monitored. Days with possible rainfall should be avoided for construction works.	Water (Prevention and Control of Pollution) Act, 1974 The Building and Other Construction Workers (regulation of employment and conditions of service) Act, 1996 The Workmen's Compensation Act, 1983	Irrigation water source sites	Contractor Environment Management Plan (CEMP) Grievance Redressal Mechanism	Visual site verification	NA	Contractor;	Environment Specialist in PIU of JSV Environment Safeguards Specialist in PMU of DOH PISC

Activity and Potential Adverse Environmental Impacts	Mitigation Measures	Reference to laws /guideline	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	Authorities regulating any of the upstream structures such as dams/ sluice gates if any should be informed before the start of any construction activity such that water flow is regulated and there is no unwarranted extreme flow of water at the site. All workmen to be covered under Workmen's Compensation Act and for any injury caused to any labor should be paid as per the compensation rate stated in the act. Assess downstream water users carefully and ensure that their rights are protected, also ensure international water rights are not violated. Meaningful consultation with the stakeholders and potentially affected people (AP) will be undertaken on the potential environmental and social impacts.							
Activity: Installation of submersible pump Impact: Impact on surface water quality and occupational health and safety risks.	Environmental flow should be maintained for the survival of aquatic life and availability of water downstream. Appropriate personal protective equipment such as harness belts, safety shoes protecting from water submergence, gloves etc. should be provided. All workmen to be covered under Workmen's Compensation Act and for any injury caused to any labor should be paid as per the compensation rate stated in the act; Select a construction methodology that is least disturbing, and appropriate for the in-situ site condition, and able to complete the construction work in minimum time. Schedule the construction works during the lean period only and ensure that works is completed before onset of monsoon.	Water (Prevention and Control of Pollution) Act, 1974 The Building and Other Construction Workers (regulation of employment and conditions of service) Act, 1996 The Workmen's Compensation Act, 1983	Irrigation water source sites	CEMP	Visual site verification	NA	Contractor;	Environment Specialist in PIU of JSV Environment Safeguards Specialist in PMU of DOH PISC

Activity and Potential Adverse Environmental Impacts	Mitigation Measures	Reference to laws /guideline	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	Erect temporary barriers/ coffer dam to form enclosed construction area with least disturbance. Allow adequate time to settle the solids prior to pumping out water. Only clear water will be pumped into the water reservoir. Any silt laden water should be pumped to a silt pond only. Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies. Avoid/minimize use of fuels, chemicals and lubricants, ensure no spillage, and have an <u>equipment spill and containment plan on-site.</u>							
Activity: Construction of pumping station Impact: Air, water and noise pollution	For dust suppression, water sprinkling at dust-prone sites. Mixing of concrete must be done at least 500 meters away from the source of water. Hazardous materials such as diesel oil and grease and other contaminated materials should be safely handled, avoid contamination of water sources, and should be disposed at designated sites.	Water (Prevention and Control of Pollution) Act, 1974 Air (Prevention and Control of Pollution) Act, 1981 Hazardous Wastes (Management, Handling and Trans boundary Movement) Rules, 2016	Irrigation water source sites	CEMP	Visual site verification	NA	Contractor;	Environment Specialist in PIU of JSV Environment Safeguards Specialist in PMU of DOH PISC
Activity: Laying of rising main, and construction of reinforced concrete (RCC) MDT Impact: Air pollution,	Mixing of concrete must be done at least 500 meters away from the source of water and households. If pipes to be laid by the side of the roads, then a <u>traffic management plan</u> to be submitted by the contractor.	Water (Prevention and Control of Pollution) Act, 1974 Air (Prevention and Control of	Irrigation water source sites	CEMP	Visual site verification	NA	Contractor;	Environment Specialist in PIU of JSV Environment Safeguards Specialist in PMU of DOH

Activity and Potential Adverse Environmental Impacts	Mitigation Measures	Reference to laws /guideline	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
noise level increase, potential of soil erosion and occupational health and safety risk.	The pavement of the carriageway, hill slopes and valley side should not be disturbed to avoid any possibility of erosion and slope disturbance. Should there be any sensitive area along the alignment, appropriate barricades for noise abatement and air pollution measures should be implemented during construction. Appropriate personal protective equipment such as harness belts, safety shoes, gloves etc. should be provided. Weather should be monitored. Days with possible rainfall should be avoided for construction work. All workmen to be covered under Workmen's Compensation Act and for any injury caused to any labor should be paid as per the compensation rate stated in the act. Any construction and demolition waste thus generated during the construction time should be disposed at dedicated sites only.	Pollution) Act, 1981 Construction and Demolition Waste Act						PISC
Activity: earthworks Impact: (i) Soil erosion, (ii) silt runoff, (iii) contamination due to inappropriate transfer, storage, and disposal of petroleum products, chemicals, hazardous materials, liquids and spoils/solid waste.	Stabilize surface soils where loaders, support equipment and vehicles will operate with water. To mitigate soil erosion, contractors should prepare and implement a <u>Soil Erosion Management Plan</u> as part of the contractor site-specific EMP. The EMP should include proper transport and storage requirements for such materials. Measures such as settling ponds or sedimentation basins should be provided to prevent surface runoff. Petroleum or other products to be kept upon the impervious floor with secondary containment.	Water (Pollution and Prevention) Act	Irrigation Sites	Visual verification site	Regular field audits by PIU expert from JSV Periodic site visits by PMU specialist	Cost to be borne by the contractor as part of the overall contract	Contractor	Environment Specialist in PIU of JSV Environment Safeguards Specialist in PMU of DOH PISC

Activity and Potential Adverse Environmental Impacts	Mitigation Measures	Reference to laws /guideline	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
Activity: Construction of MDT and pipe laying activities due to laying of rising main Impact: Change in land use and loss of agricultural land, impact on forest area, and settlement areas	Select government land for construction of Main Delivery Tank or MDT to the extent possible. Minimize use of fertile land, forest, private properties, and settlement areas during pipe laying activity. Project sites with involuntary resettlement will not be eligible for funding. Barricade the construction area using hard barricades on both sides and provide dust/wind screen. Initiate site clearance and excavation work only after barricading of the site is done. Confine all the material, excavated soil, debris, equipment, machinery (excavators, cranes etc.), to a barricaded area. Limit the stock piling of excavated material at the site. Remove the excess soil from the site immediately to the designated disposal area. Undertake the work section wise: 100 – 200 m section should be demarcated and barricaded.	NA	Irrigation Sites	Visual verification site	Regular field audits by PIU expert from JSV Periodic site visits by PMU specialist	Cost to be borne by the contractor as part of the overall contract	Contractor	Environment Specialist in PIU of JSV Environment Safeguards Specialist in PMU of DOH PISC
Activity: Hauling of material, material stock piling and pipe-laying activity. Impact: Degradation in ambient air quality during construction of MDT	Damp down the soil and any stockpiled material on site by water sprinkling. Use tarpaulins to cover the loose material (soil, sand, aggregate etc.) when transported by trucks. Control dust generation while unloading the loose material (particularly aggregate, soil) at the site by sprinkling water and unloading inside the barricaded area. Apply water and maintain soils in a visible damp or crusted condition for temporary stabilization. Apply water prior to levelling or any other earth moving activity to keep the soil moist throughout the process. Avoid open burning during land preparation, weed control, and post-harvest treatments.	Air (Pollution and Prevention) Act	Irrigation Sites	Visual verification site	Regular field audits by PIU expert from JSV Periodic site visits by PMU specialist	Cost to be borne by the contractor as part of the overall contract	Contractor	Environment Specialist in PIU of JSV Environment Safeguards Specialist in PMU of DOH PISC

Activity and Potential Adverse Environmental Impacts	Mitigation Measures	Reference to laws /guideline	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	Check PUC status of construction vehicles and machineries. Prohibit burning of pesticide-treated agricultural wastes and by-products.							
Occupation health and safety	Construction works such as pump house, rising main and MDT may require worker to work at height and therefore there will be risk of slippage from height Wear appropriate protective clothing, such as a long-sleeved shirt, long pants, hat, gloves, and boots. On-site first-aid equipment and trained personnel should be available. Train personnel on hazardous product management and storage. Include training on how to read labels and to understand the risks associated with all hazardous products. Monitor and proactively manage all stages of chemical purchase, storage, mixing, usage, and disposal. Protocols should include requirements on wearing masks PPE, physical distancing, hand washing, disinfection, checking body temperature, ventilation, management of waste, awareness, and morning briefings. Contractor will prepare COVID-19 health and safety plan in reference with WHO's Considerations for public health and social measures in the workplace in the context of COVID-19 (who.int) Implement COVID-19 health and safety plan in all worksites/lots.	Building and Construction worker safety	Irrigation Scheme sites and project clusters	Availability of all PPE kit to workers, especially safety belts and nets	Periodic site visits by PMU specialist	Covered by EPC Contractor	Contractor	Environment Specialist in PIU of JSV Environment Safeguards Specialist in PMU of DOH PISC
Operation Phase – Lift Irrigation								
Activity: Maintenance of submersible pumps.	Hazardous materials such as diesel oil and grease and other contaminated materials should be safely handled, avoid contamination of water sources, and should be disposed at designated sites.	Hazardous Wastes (Management, Handling and Trans	Irrigation water source sites	Maintenance records	Visual site verification	NA	JSV	Environment Specialist in PIU of JSV

Activity and Potential Adverse Environmental Impacts	Mitigation Measures	Reference to laws /guideline	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
Impact: Generation of Hazardous waste		boundary Movement) Rules, 2016						Environment Safeguards Specialist in PMU of DOH PISC
Activity: Maintenance of any civil structure. Impact: Generation of construction and demolition waste	Any construction and demolition waste thus generated during the construction time should be disposed at dedicated sites only.	Construction and Demolition Waste Act.	Irrigation water source sites	Maintenance records	Visual site verification	NA	JSV	Environment Specialist in PIU of JSV Environment Safeguards Specialist in PMU of DOH PISC
OUTPUT 2 - Horticultural Production Systems [COMPONENT– SOLAR FENCING]								
Design and Pre-construction Phase – Solar Fencing								
Activity: Clearing vegetation for about a 1 m wide strip at the periphery of the cluster and within the cluster including the uprooting of trees, rank vegetation, grass, brushwood, saplings etc.	Farmer should not uproot any endangered tree species as listed in Annexure 11. Farmer should not uproot more trees than permitted under the HP Land Preservation Act, 1978. For any additional requirements farmers, with the support of PIU, to seek permission as per the rule. Felling of trees on private/ agricultural land is allowed and no permission is required (i) up to – 5 trees per owner per financial year for broad leaf species (i.e., Chil. Ban, Oak,), (ii) up to 3 trees for coniferous trees, and (iii) up to 10 trees with written permission from Range Officer and for more than 10 trees written permission from DFO required. No civil work should be carried out until the permission is in place.	HP Land Preservation Act, 1978 (Private land not classified as Forest)	Clusters	CHPMA to record during field preparation how many trees and species per farmer have been felled. The farmer felling tree will give an undertaking that all regulations under HP Land Preservation Act, 1978 (Private land not classified as Forest), have been followed. Farmer to submit NOC as and when required.	CHPMA recording during field; Archives to be collected by Environmental Experts at PIU DOH; All data collated at PMU Level	NA	By the farmers at their cost	Climate Change and Environment Specialist at PIU DOH Environment Safeguards Specialist in PMU of DOH PISC
Impact: Felling of trees	Felling of trees on private/ agricultural land is allowed and no permission is required (i) up to – 5 trees per owner per financial year for broad leaf species (i.e., Chil. Ban, Oak,), (ii) up to 3	HP Land Preservation Act, 1978	Clusters	Environmental Expert at PIU, DOH will prepare documentation and	CHPMA recording;	NA	Farmers Climate Change and Environment	Environment Safeguards Specialist in PMU of DOH

Activity and Potential Adverse Environmental Impacts	Mitigation Measures	Reference to laws /guideline	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	trees for coniferous trees, and (iii) up to 10 trees with written permission from Range Officer and for more than 10 trees written permission from DFO required. No civil work should be carried out until the permission is in place. Cutting trees at the proposed sites will be kept to an absolute minimum and only be permitted when it is obstructing necessary project activity.	(Private land not classified as Forest) Dept. Forest, HP, notification # FFE-B-A(3)-4/ 99-1, dated 15th Mar, 2017		secure permission before the start of civil works	Archives to be collected by Environmental Experts at PIU DoH; All data collated at PMU Level		Specialist at PIU DOH	PISC
Activity: Procurement of construction materials Impact; Increase of vehicular emissions	Contractor to source materials from authorized sources by the government. Use construction vehicles having proper pollution NOCs.	Central Motor Vehicle Act	Project Districts	Pollution Certificates	Submission of Pollution Certificates along with claims on the use of vehicles/ transportation/ machinery	NA	Contractor	Climate Change and Environment Specialist at PIU DOH Environment Safeguards Specialist in PMU of DOH PISC
Activity: Site preparation – excavation of earth for pole installation. Impact: Air (dust) pollution, increase of soil erosion, and loss of topsoil during the preparation of sites.	Minimization of dust pollution by sprinkling water on excavated earth and borrowing pits. This activity should be avoided during the rainy season to avoid mudslide conditions;	NA	Project clusters Irrigation scheme sites	Visual verification site	Regular field audits by PIU experts Periodic site visits by PMU Environmental specialist	NA	Contractor	Climate Change and Environment Specialist at PIU DOH Environment Safeguards Specialist in PMU of DOH PISC
Construction Phase – Solar Fencing								
Activity: Installation of poles, wires, and strainers	Cover construction materials with a tarpaulin sheet while not in use.	Construction and Demolition Waste Rules	Project clusters	Visual verification site	Regular field audits by PIU experts	Cost to be borne by the contractor as part of	Contractor	Climate Change and Environment

Activity and Potential Adverse Environmental Impacts	Mitigation Measures	Reference to laws /guideline	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
Impact: Air pollution - from the mixing of concrete and use of sand and stone ballast	Mixing of concrete must be done at least 500 meters away from the household area and source of water. Ensure no waste of fencing materials on the field and avoid soil contamination and killing of plants or injure anyone. For solar fencing, the entire laying of GI pipes and fencing should be completed in a day's time and topsoil be compacted;				Periodic site visits by PMU specialist	the overall contract		Specialist at PIU DOH Environment Safeguards Specialist in PMU of DOH PISC
Activity: Installation activities Impact: Accidental shock/ injuries from exposed fencing wires	The electric shock is completely safe and non-lethal for humans and animals. As the current is pulsating (not live) and passing every 1 to 1.2 seconds and only for a 0.3 millisecond (1000th of second) of time, the animal gets enough time to get away from the fence. The pulsating current will not grab the animal which generally happens in the continuous current. Wearing of appropriate personal protective equipment	ADB's Community Health and Safety – SPS, 2009 Occupational Health and Safety Code, 2020 IFC Occupational, Health and Safety Guidelines ²⁶	Project clusters.	Visual verification site	Regular field audits by PIU experts Periodic site visits by PMU specialist	Cost to be borne by the contractor as part of the overall contract	Contractor	Climate Change and Environment Specialist at PIU DOH Environment Safeguards Specialist in PMU of DOH PISC
Operation Phase – Solar Fencing								
Solar fencing may increase animal menace in neighboring fields	DOH and CHPMA facilitators to actively encourage other farmers to participate in HPSHIVA initiative such that this kind of conflict can be minimized.	NA	Clusters	Recorded through the GRM Recorded in the monthly meetings of the CHPMA members	GRM recording and resolution	NA	Farmers Climate Change and Environment Specialist at PIU DOH PISC	Environment Safeguards Specialist in PMU of DOH
Generation of e-waste	All e-waste generated at sites should be collected and disposed of E-Waste (Management) Amendment Rules, 2018	E-waste management rules 2016	Project clusters	Maintenance registered to be maintained by CHPMA on handling,	Audit of maintenance register	NA	Farmers Climate Change and Environment	Environment Safeguards Specialist in PMU of DOH

²⁶<https://www.ifc.org/wps/wcm/connect/1d19c1ab-3ef8-42d4-bd6b-cb79648af3fe/2%2BOccupational%2BHealth%2Band%2BSafety.pdf?MOD=AJPERES&CVID=nPtqxyx>

Activity and Potential Adverse Environmental Impacts	Mitigation Measures	Reference to laws /guideline	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods	Mitigation Costs	Institutional Responsibility	
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	Farmers should be trained to maintain the solar panels and batteries such that the lifetime of the equipment can be enhanced and disposed of in an adequate manner as per rules.			management and disposal of solar-based electric fencing			Specialist at PIU DOH PISC	
Accidental shock to animals, birds and humans in case the safety systems fail to act	Following safety units to be installed: - Shock stops should be coupled to the energizer to enable maintenance staff to switch the fence off during any event and on during maintenance. They are to be mounted on a panel located in an energizer house; - Fencing alarm: solar house to have an in-built hooter system of 118 decibel (DB) that will get triggered when any animal, bird or human gets trapped in the fencing; - Lightning Diverters: V-shaped, water-proofed lightning diverters to be installed between wires and earthing system; - Earthing: 3 for each panel & one at every 200m to be installed. These should be at least 10m from any water supply, earthing rods, underground telephone or power cable. - Warning Boards: of size 30cm x 18cm, with yellow background and black writing to be installed at every 50m; - Contractor to implement and train all farmers on do's and don't's;	Occupational Health and Safety Code, 2020 IFC Occupational, Health and Safety Guidelines	Project clusters;	Completion certificate to the contractor to be released only after satisfactory closure of safety audit(s) finding(s).	PIU DOH Environmental expert to conduct a safety audit of the installed system and confirm total safety performance;	Cost of training to be borne by the contractor as part of the overall contract	CHPMA facilitators to monitor and ensure each farmer is trained on cluster safety measures;	Climate Change and Environment Specialist at PIU DOH Environment Safeguards Specialist in PMU of DOH PISC
OUTPUT 2 - Horticultural Production Systems								
COMPONENT- HORTICULTURE FIELD PREPARATION								
Designing and Pre-construction Phase – Horticulture Field Preparation								
Activity: Planning of layout of plantations	To enhance the positivity of the impacts, the farmers should also participate during the planning and understand the requirements of plant spacing, bed spacing, bed heights and land preparation.		Project Clusters	To check all mitigation measures have been followed	Environmental Expert at PIU DOH and PMU to visit site and confirm all mitigation measures have been followed	NA	CHPMA Facilitator along with farmers to implement;	Climate Change and Environment Specialist at PIU DOH Environment Safeguards Specialist in PMU of DOH PISC

Activity and Potential Adverse Environmental Impacts	Mitigation Measures	Reference to laws /guideline	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
Activity: Planning to form clusters	Following points should be kept while forming clusters: 1. It should be a contiguous land. 2. In case any access points or corridor passes through the cluster and requires to be closed, alternative pathway should be provided. 3. Cluster should not encompass any social infrastructure including places of religious interest, schools, health care facilities, water supply or electricity structures. 4. If structures are unavoidable, then appropriate provision should be made for access to the structures – at no point in time, access to the structures can be eliminated. 5. Sites near to flood line, landslide zones, edge of the forest and or eco-sensitive zone should be avoided. 6. Permission from the relevant authority should be taken should there be any village which is part of conservation site is included in the project.		Project Clusters	To check all mitigation measures have been followed	Environmental Expert at PIU DOH and PMU to visit site and confirm all mitigation measures have been followed	NA	CHPMA Facilitator along with farmers to implement;	Climate Change and Environment Specialist at PIU DOH Environment Safeguards Specialist in PMU of DOH PISC
Construction Phase – Horticulture Field Preparation								
Activity: Land development (terracing, where needed), dressing with plot bed-preparation, pit digging and disposal of agriculture waste; Impact: Dust pollution, increased soil erosion and loss of topsoil.	As much as possible, terracing activity should be avoided during the rainy season; The new terraces should be protected at their risers and outlets and should be carefully maintained, especially during the first two years. After cutting a terrace, its riser should be shaped and protected using local stones, soil and planted with grass as soon as possible (grass turfing). Sod-forming grasses with extensive rhizomes or rhizome-type grasses are better than those of the tall or bunch-type. The outlet for drainage-type terraces is the point where the run-off leaves the terrace and goes into the waterway or safe outlets. Its gradient is usually steep and should be protected by the sods of earth. A piece of rock, a brick, or a	NA	Project clusters	Completion certificate to the contractor to be released only after satisfactory closure of site audit(s) finding(s).	PIU DOH Environmental Expert to conduct site audits and ensure all protection work has been appropriately implemented.	At contractors cost as part of overall work contract	Contractor to implement CHPMA facilitators to monitor DOH to award work contracts according to the season	Climate Change and Environment Specialist at PIU DOH Environment Safeguards Specialist in PMU of DOH PISC

Activity and Potential Adverse Environmental Impacts	Mitigation Measures	Reference to laws /guideline	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods	Mitigation Costs	Institutional Responsibility	
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	cement block, is sometimes needed to check the water flow on steeper channels. Similar checks on water flow are required for level bench terraces where the water falls from the higher terraces onto those below. A piece of rock should be placed on the lower terrace to dissipate the energy of the flowing water. Grasses should also be established on the area of the bench crossed by the waterway. The contractor should dispose of all waste to community land or any valley side that needs protection or compaction with more soil. Such sites should be selected in consultation with the farmer community and should be at least 50m away from the site. This activity should be avoided during the rainy season. Minimize soil compaction, damage, or disturbance by using appropriate land preparation machinery at the right time of year as recommended by the DOH. Employ erosion control management practices (e.g., terracing) in sloping areas. The labourers should be provided with mask to protect their nasal system from localised dust pollution. The additional soil from pit digging should be reused in pit filling when planting, terracing if need be or for bed-making or to fill in any holes/ hollows that get created from site clearance or land development activity. The contractor should dispose of all such waste away from community land or any valley side that needs protection or compaction with more soil.							

Activity and Potential Adverse Environmental Impacts	Mitigation Measures	Reference to laws /guideline	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	Such sites should be selected in consultation with the farmer community and should be at least 50m away from the site. Recycle residues and other organic materials by leaving the materials on site or through composting (and spreading). Avoid open burning for land preparation and weed control.							
Activity: Site clearance Impact: Loss of vegetation (i.e. felling of tree), loss of top-soil, may come across threatened plant species, and muck generation	Farmer should not uproot any endangered tree species as listed in Annexure 11. Farmer should not uproot more trees than permitted under the HP Land Preservation Act, 1978. For any additional requirements farmers, with the support of PIU, to seek permission as per the rule. Felling of trees on private/ agricultural land is allowed and no permission is required (i) up to – 5 trees per owner per financial year for broad leaf species (i.e. Chil, Ban and Oak), (ii) up to 3 trees for coniferous trees, and (iii) up to 10 trees with written permission from Range Officer and for more than 10 trees written permission from DFO required. No field preparations should be carried out until the permission is in place.	HP Land Preservation Act, 1978 (Private land not classified as Forest)	Clusters	CHPMA to record during field preparation how many trees and species per farmer have been felled; The farmer felling tree will give an undertaking that all regulations under HP Land Preservation Act, 1978 (Private land not classified as Forest), have been followed; Farmer to submit NOC as and when required;	CHPMA recording during field Archives to be collected by Environmental Experts at PIU DOH All data collated at PMU Level	NA	Contractor to implement CHPMA facilitators to monitor DOH to award work contracts according to the season	Climate Change and Environment Specialist at PIU DOH Environment Safeguards Specialist in PMU of DOH PISC
Occupational health and safety	Wear appropriate protective clothing, such as a long-sleeved shirt, long pants, hat, gloves, and boots. Inspect and shake out any clothing, shoes, or equipment (including personal protective equipment) before use. Use insect repellent. On-site first-aid equipment and trained personnel should be available.	Occupational Health and Safety Code, 2020	Project clusters	Completion certificate to the contractor to be released only after satisfactory closure of site audit(s) finding(s).	PIU DOH Environmental Expert to conduct site audits and ensure all protection work has been appropriately implemented	At contractors cost as part of overall work contract	Contractor to implement CHPMA facilitators to monitor DOH to award work contracts according to the season	Climate Change and Environment Specialist at PIU DOH Environment Safeguards Specialist in PMU of DOH PISC

Activity and Potential Adverse Environmental Impacts	Mitigation Measures	Reference to laws /guideline	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	Train personnel on hazardous product management and storage. Include training on how to read labels and to understand the risks associated with all hazardous products. Monitor and proactively manage all stages of chemical purchase, storage, mixing, usage, and disposal. Protocols should include requirements on wearing masks PPE, physical distancing, hand washing, disinfection, checking body temperature, ventilation, management of waste, awareness, and morning briefings. Contractor will prepare COVID-19 health and safety plan in reference with WHO's Considerations for public health and social measures in the workplace in the context of COVID-19 (who.int) Implement COVID-19 health and safety plan in all worksites/lots.							
Operation Phase – Horticulture Field Preparation								
Activity: Cultivation and maintenance of the plantation Impact: Contamination of land and water and health impacts of farmers due to increased exposure to pesticides.	Encourage farmers to opt for organic fertilizers and pesticides and better crop management practices Conduct bench-mark survey and prepare checklist of pests/pathogens and develop package of practices (POP) for pest control and best practices in application, handling and disposal of pesticides and containers. Training farmers according to POP on handling and management of fertilizers, Pesticides and other horticulture plantation materials. Provide relevant training in storing, handling, application and disposal of fertilizers and pesticides. Circulation of banned list of pesticides and insecticides as well as guidelines for pesticide management as given in Annexure 4.	Hazardous Waste Management Rules, 2016	Project Clusters	Training to a CHPMAs to be completed within 1 year from the implementation start date	Training records	INR 10,00,000	Climate Change and Environment Specialist at PIU DOH to ensure all farmers has been trained on pest control and pesticide management (if need be with support from external agency as deem fit) To be completed covering all CHPMAs within 1 year from the start date of	Environment Safeguards Specialist in PMU of DOH PISC

Activity and Potential Adverse Environmental Impacts	Mitigation Measures	Reference to laws /guideline	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	Chemical spray should be adopted as last resort and that too after observing pest defender ratios and economic threshold level (ETL). Crop rotation and inter-cropping also help in conservation of defenders. Root dip/seedling treatment for termite prone areas. Optimum use of fertilizers at appropriate time. High doses of nitrogen fertilizers increase pest incidence. Proper water management (alternative wetting and drying to avoid water stagnation).						project implementation PISC	
OUTPUT 2 - Horticultural Production Systems [COMPONENT- DRIP IRRIGATION]								
Designing and Pre-construction Phase – Drip Irrigation – No adverse impact. System provider to ensure adequate head pressure is maintained with or without solar-power water pumps so that every plant in the field receives water.								
Activity: Sites preparation and felling of trees Impact: Likely to cause air and water pollution.	Feeling of trees for development work in non-forest government land in rural areas, which are not forming part of 5 ha compact wooded block - permission from Principal Chief Conservator of Forests (PCCF), if necessary, after a proper survey by DFO. Feeling of trees on private/ agricultural land is allowed and no permission is required (i) up to – 5 trees per owner per financial year for broad leaf species (i.e., Chil, Ban and Oak), (ii) up to 3 trees for coniferous trees, and (iii) up to 10 trees with written permission from Range Officer and for more than 10 trees written permission from DFO required. No civil work should be carried out until permission is in place. Cutting trees at the proposed sites will be kept to an absolute minimum and only be permitted when it is obstructing necessary project activity.	HP Land Preservation Act, 1978 (Private land not classified as Forest)	Irrigation sites and Clusters	Species-wise number of trees felled for preparation of irrigation sites/ related to irrigation components including MDT. The farmer felling tree will give an undertaking that all regulations under HP Land Preservation Act, 1978 (Private land not classified as Forest) are followed.	Environmental expert in PIU JSV to record during field preparation All data collated at PMU Level	NA	Contractor's responsibility	Environment Specialist in PIU of JSV Environment Safeguards Specialist in PMU of DOH PISC

Activity and Potential Adverse Environmental Impacts	Mitigation Measures	Reference to laws /guideline	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	For control of dust pollution sites should be sprinkled with water. No debris should be allowed to flow into the water sources. Clearance waste if containing only biodegradable substances should be disposed of at a site that will not be frequented by humans, or animals and not lead to any land or water pollution.							
Activity: Procurement and transportation of construction materials Impact: may lead to associated impacts and vehicular emissions	Contractor to source materials from authorized sources by the government. Use construction vehicles having proper pollution NOCs. Cover construction materials with a tarpaulin sheet while not in use.	Central Motor Vehicle Act	Project Districts	Pollution Certificates	Submission of Pollution Certificates along with claims on the use of vehicles/ transportation/ machinery	NA	Contractor	Environment Specialist in PIU of JSV Environment Safeguards Specialist in PMU of DOH PISC
Activity: Preparation of sites Impact: Dust pollution, increased soil erosion, and loss of topsoil.	Minimization of dust pollution by sprinkling water on excavated earth and borrowing pits. This activity should be avoided during the rainy season to avoid mudslide conditions.	NA	Project clusters Irrigation scheme sites	Visual verification site	Regular field audits by PIU experts Periodic site visits by PMU specialist	NA	Contractor	Environment Specialist in PIU of JSV Environment Safeguards Specialist in PMU of DOH PISC
Construction Phase – Drip Irrigation								
Activity: Laying of pipes Impact: Air pollution, noise level increase, potential of soil erosion and occupational health and safety risk.	If pipes to be laid by the side of the roads, then a <u>traffic management plan</u> to be submitted by the contractor. Should there be any sensitive area along the alignment, appropriate barricades for noise abatement and air pollution measures should be implemented during construction. Appropriate personal protective equipment such as harness belts, safety shoes, gloves etc. should be provided.	Water (Prevention and Control of Pollution) Act, 1974 Air (Prevention and Control of Pollution) Act, 1981	Irrigation water source sites	CEMP	Visual site verification	NA	Contractor	Environment Specialist in PIU of JSV Environment Safeguards Specialist in PMU of DOH PISC

Activity and Potential Adverse Environmental Impacts	Mitigation Measures	Reference to laws /guideline	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	Any construction and demolition waste thus generated during the construction time should be disposed at dedicated sites only.	Construction and Demolition Waste Act						
Activity: Earthworks Impact: (i) Soil erosion, (ii) silt runoff, (iii) contamination due to inappropriate transfer, storage, and disposal of petroleum products and other chemicals.	Stabilize surface soils where loaders, support equipment and vehicles will operate with water. To mitigate soil erosion, contractors should prepare and implement a <u>Soil Erosion Management Plan</u> as part of the contractor site-specific EMP. The EMP should include proper transport and storage requirements for such materials. Measures such as settling ponds or sedimentation basins should be provided to prevent surface runoff. Petroleum or other products to be kept upon the impervious floor with secondary containment.	Water (Pollution and Prevention) Act	Irrigation Sites	Visual verification site	Regular field audits by PIU expert from JSV Periodic site visits by PMU specialist	Cost to be borne by the contractor as part of the overall contract	Contractor	Environment Specialist in PIU of JSV Environment Safeguards Specialist in PMU of DOH PISC
Activity: Pipe laying activities Impact: Change in land use and loss of agricultural land	Initiate site clearance and excavation work only after barricading of the site is done. Confine all the material, excavated soil, debris, equipment, machinery (excavators, cranes etc.), to a barricaded area. Limit the stock piling of excavated material at the site. Remove the excess soil from the site immediately to the designated disposal area.	NA	Irrigation Sites	Visual verification site	Regular field audits by PIU expert from JSV Periodic site visits by PMU specialist	Cost to be borne by the contractor as part of the overall contract	Contractor	Environment Specialist in PIU of JSV Environment Safeguards Specialist in PMU of DOH PISC
Activity: Hauling of material, material stock piling and pipe-laying activity. Impact: Degradation in ambient air quality during construction of MDT	Damp down the soil and any stockpiled material on site by water sprinkling. Use tarpaulins to cover the loose material (soil, sand, aggregate etc.) when transported by trucks. Control dust generation while unloading the loose material (particularly aggregate, soil) at the site by sprinkling water and unloading inside the barricaded area. Apply water and maintain soils in a visible damp or crusted condition for temporary stabilization.	Air (Pollution and Prevention) Act	Irrigation Sites	Visual verification site	Regular field audits by PIU expert from JSV Periodic site visits by PMU specialist	Cost to be borne by the contractor as part of the overall contract	Contractor	Environment Specialist in PIU of JSV Environment Safeguards Specialist in PMU of DOH PISC

Activity and Potential Adverse Environmental Impacts	Mitigation Measures	Reference to laws /guideline	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	Apply water prior to levelling or any other earth moving activity to keep the soil moist throughout the process. Avoid open burning during land preparation, weed control, and post-harvest treatments. Check PUC status of construction vehicles and machineries. Prohibit burning of pesticide-treated agricultural wastes and by-products.							
Occupation health and safety	Construction works such as pump house, rising main and MDT may require worker to work at height and therefore there will be risk of slippage from height Wear appropriate protective clothing, such as a long-sleeved shirt, long pants, hat, gloves, and boots. On-site first-aid equipment and trained personnel should be available. Train personnel on hazardous product management and storage. Include training on how to read labels and to understand the risks associated with all hazardous products. Monitor and proactively manage all stages of chemical purchase, storage, mixing, usage, and disposal. Protocols should include requirements on wearing masks PPE, physical distancing, hand washing, disinfection, checking body temperature, ventilation, management of waste, awareness, and morning briefings. Contractor will prepare <u>COVID-19 health and safety plan</u> in reference with WHO's Considerations for public health and social measures in the workplace in the context of COVID-19 (who.int) Implement COVID-19 health and safety plan in all worksites/lots.	Building and Construction worker safety	Irrigation Scheme sites and project clusters	Availability of all PPE kit to workers, especially safety belts and nets	Periodic site visits by PMU specialist	Covered by EPC Contractor	Contractor	Environment Specialist in PIU of JSV Environment Safeguards Specialist in PMU of DOH PISC

Activity and Potential Adverse Environmental Impacts	Mitigation Measures	Reference to laws /guideline	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
Operation Phase – Drip Irrigation								
Generation of contaminated silt waste, screen filters; sand filters; Waste greasing oil; contaminated land during pump maintenance;	The system provider(s), CHPMA and PIU DOH Environmental expert should ensure all farmers have been trained on handling and maintenance of drip irrigation systems along with solar-based water pumps;	Hazardous Waste Management Rules;	Project clusters	Visual verification site	Regular field audits by PIU DOH Environmental expert Periodic site visits by PMU environmental specialist	NA	CHPMA	Environment Specialist in PIU of JSV Environment Safeguards Specialist in PMU of DOH PISC
Declining/ shortage of water in the ephemeral sources such as khuds and springs	PIU JSV, CHPMA members, and Water User Association will ensure compliance with government policies on the use of water for drip irrigation systems. CHPMA to report any leaks or damage on the drip irrigation to PIU PIU DOH will perform periodic monitoring and maintenance of the drip irrigation system; Provide soil, water and nutrient management periodic orientations to the CHPMAs;	National Water Policy	Project clusters	Visual verification site	Regular field audits by PIU DOH and PIU JSV Environmental experts Periodic site visits by PMU environmental specialist	NA	CHPMA	Environment Specialist in PIU of JSV Environment Safeguards Specialist in PMU of DOH PISC
OUTPUT 2 - Horticultural Production Systems [COMPONENT– Nursery Development]								
Site Development for New Nurseries may lead to air pollution of insignificant level and will be local as well as temporary in nature.								
Operation Phase Risk of a pest or disease outbreak in the nursery; Risk of the release of diseased material from nurseries to orchards;	- Register all nurseries under Himachal Pradesh Fruit Nurseries Registration and Regulation Act, 2015; - Follow Plant Quarantine Order (Regulation of Import into India), 2003; - All imported plant to the state should be placed under quarantine as per regulation and species; - Imported plants will be inspected by a designated inspection authority (DIA), to ensure that no new pests or diseases are imported into the state/ country; - The Dr. YS Parmar University of Horticulture & Forestry, Nauni, Solan (HP) is currently the registered DIA for carrying out these inspections;	Plant Quarantine Order (Regulation of Import into India), 2003; Himachal Pradesh Fruit Nurseries Registration and Regulation Act, 2015;	Nurseries to be developed under the project	Nursery records	Periodic audits	NA	DOH	Climate Change and Environment Specialist at PIU DOH Environment Safeguards Specialist in PMU of DOH PISC

Activity and Potential Adverse Environmental Impacts	Mitigation Measures	Reference to laws /guideline	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	- Undertaking from Professor & Head, Plant Pathology, UHF Nauni, Solan (Designated PEQ Authority for HP) that they will conduct (PEQ) at the specified locations; - For imports from outside the country - Apply to Secretary MOA, GOI for import permit along with Pro forma Invoice of the material and the consent of Professor & Head, Plant Pathology to conduct PEQ.- plants to be distributed only after Issue of Import Permits by Directorate of Plant Protection, Quarantine & Storage, Faridabad (MOA, GOI).							

A. Environmental Monitoring Plan

141. Since no major civil work will be carried out, ambient air quality and noise level will not be required to be monitored. However, the PIUs should keep checking the following:

- a) For clusters near to the eco-sensitive zones, informs the relevant forest/ wildlife authority before starting any activities in those clusters/ sites;
- b) CHPMA are properly trained on water and soil conservation, proper handling, management and disposal of insecticides/ pesticides containers;
- c) EPC Contractor provides safe working environment to all workers and migrant work be registered with the state;

B. Budgetary Cost Provision of EMP Implementation

142. The budgetary cost for the implementation of EMP is as follows:

Table 12: Budgetary costs for implementation of EMP

Sr. No.	Environmental Management Measure	Budget (INR)	
		Cost per package	One Time (Initial)
1	Environmental Safeguard Staff	Included as project management cost	
2.	Training and capacity building (DOH, staffs, JSV staffs, CHPMAs, WUAs)	5,00,000	3,00,000 (ADB first implementation mission)
3.	Site Audits	5,00,000	
4.	Monitoring and Reporting	2,00,000	
5.	Screening and site audits for the remaining 2000 ha		5,00,000
6.	Miscellaneous		2,00,000
	Sub-total	12,00,000	10,00,000 (B)
	Total for all packages	12,00,000 * 11 (packages) = 132,00,000 (A)	
	Total Environmental Safeguard Budget (A + B) =		INR 142,00,000

VIII. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

143. The Project engaged with multiple and variety of stakeholders for different activities under the project components through the approach of Stakeholder Consultation and Engagement Plan (SCEP). It outlines general principles and collaborative strategy to identify stakeholders for all outputs under the Project, identify appropriate modes of engagement and prepare plans for engagement and meaningful consultation throughout the project cycle, while ensuring transparency. The goal is to improve and facilitate decision-making and create an atmosphere of understanding that actively involves project beneficiaries and other stakeholders promptly and that these groups are provided sufficient opportunity to voice their opinions and concerns that may influence Project decisions. The SCEP will act as a guiding tool and framework for managing communications and engagement between DOH and its stakeholders for the Project. The SCEP has been adapted to the nature and scale of the Project and its potential environmental and social risks and impacts and considers the existing institutional and regulatory frameworks/acts of the Government of India (GOI) and the Government of Himachal Pradesh (GoHP).

144. The SCEP includes multiple channels and mechanisms of engaging with the stakeholders, including website, telephone, public consultations and meetings, participatory assessments and surveys, participatory planning, and existing channels of citizen engagement of the GoHP. Differentiated measures will be adopted to engage with vulnerable and disadvantaged households, including focus group discussions, inclusive beneficiary identification in the cluster, and inclusion amongst beneficiary groups. Other project-related information will be shared with the primary stakeholders in locally understood languages, where necessary. All safeguards related plans and documents will be disclosed on the project's websites. The details of SCEP framework have been mentioned in Annexure 7.

A. Stakeholder Consultations during Project Preparation

145. The Project Preparation Team and the DOH teams engaged in extensive consultations with all relevant stakeholders during each visit in the project preparation process, including the Department of Forest, Irrigation (now JSV), Public Works, and National Bank for Agriculture and Rural Development (NABARD). The objective of these consultations was to understand the scope of stakeholder's participation and sectoral interventions under the Project, and the potential social and environmental risks and issues involved. Since the focus of the Project is on marginalized communities, the Project also consulted the disadvantaged and vulnerable people: (i) small and marginal farmers, (ii) scheduled caste households, (iii) scheduled tribes, (iv) women-headed households as well as (v) households designated below the poverty line. These households are more constrained than others to access benefits from the Project and participate more fully in the planning and consultations. Consultations held as part of the project preparation, including safeguards documents, saw large-scale participation from the communities and these disadvantaged and vulnerable groups.

146. Before the consultations, relevant information in the local language is shared with the communities to give them information on the project objectives/activities and seek their feedback and concerns/issues related to project components.

147. As part of stakeholder consultations, a number of meetings and discussions were carried out with farmers and other stakeholders. Additionally, a baseline survey was also carried out to estimate the income and demographic profile of the cluster sites. During the baseline survey (part of stakeholder consultation), about 1,016 farmers were surveyed. Out of which, 67.5% and 22.2% of the surveyed farmers are marginal and small farmers, respectively. According to the baseline survey, 5% of the people consulted belong to indigenous people group. Women were also consulted and the same is reflected in the stakeholder attendance records. The details of the consultations are shown in Annexure 8.

148. The issues highlighted during the consultations with people are stated below:

149. Majority of the farmers who are enrolled in cluster farming are either small or marginal farmers and perform subsistence farming on their respective farmlands. During implementation of the project, farmers will have to buy food from market due to the diversification of crops. During consultations, the following options were raised to support farmers during the gestation period of the horticultural crops (i.e., before farmers receive benefits from the project).

- Linking the farmers with Mahatma Gandhi National Rural Employment Guarantee Act 2005 or (MNREGA) Scheme.
- Provide support and technical assistance for undertaking intercropping and bee keeping.²⁷
- Giving farmers priority in employment during civil construction.

150. During consultations, beneficiary farmers were complaining on pests such as termites and nematodes. Pest control measures were applied, however, in unsustainable manner in terms of disposal of used containers. It was agreed that as a mitigation measure, beneficiary farmers will be trained on integrated pest management practices including handling and disposal of hazardous waste by PIU in the DOH.

151. Farmers suggested that calculation for water demand for crops and drinking water should include amount for livestock management. To have sufficient water, there was 10% buffer as part of the water sustainability computation to cover for different farmland activities.

152. During previous construction of rising mains, roads were often damaged and without any repairs. It was explained that repairing road is outside the scope of the project. However, this concern will be shared with Public Works Department. PIU will provide the department with appropriate information and notification to rehabilitate any damaged assets.

B. Information Disclosure and Engagement Methods

153. The final draft of the IEE and EARF will be disclosed on the project's website and shared with all the District and Block Development Offices and the targeted clusters/CHPMA. All updated versions will also be re-posted on the project portal. HPSHIVA will use various engagement methods that the implementing agencies will operate as part of their continuous interaction with

²⁷ Mitigating measure - Beekeeping and intercropping has been integrated with Beneficiary Training and leveraging convergence to be initiated by DOH.

the stakeholders. The method of engagement will be constantly reviewed for its appropriateness, outreach, impact, and inclusivity.

C. Grievance Redress Mechanism (GRM)

154. The project stakeholders have the - right to information, right against inappropriate intervention and right to a project free of fraud, corruption and coercion. In case of any deviation, the stakeholders have the right to register complaints, and DOH is bound to redress them and resolve these at the earliest. The Government has issued a gazette notification for formation of Grievance Redressal Committees (GRC) for all levels. The GRM will continue to function throughout the project life along with existing state government portal titled E-Samadhan²⁸, also available to lodge complaints.

155. The DOH has constituted a Grievances Redressal Mechanism (GRM) under the PRF to support the environmental and social safeguards of the HPSHIVA project; the same mechanism shall be functional under the sovereign Project. The project GRM shall be accessible to aggrieved stakeholder before or post involvement with the project. Stakeholder's feedback will be received, and the GRM will facilitate resolution including concerns, complaints, and grievances about the social and environmental performance of the level of the Project. The GRM will aim to provide a time-bound and transparent mechanism to voice suggestions and appreciation and resolve social and environmental concerns linked to the Project. The Project-specific GRM is not intended to bypass the government's redress process; instead, it is designed to promptly address stakeholders' concerns and complaints, making it readily accessible to all community segments, and is scaled to the risks and impacts of the Project. An aggrieved person shall have access to the country's legal system at any stage and accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM.

156. GRM as formed for the project and its mechanisms/procedures, contact numbers of members, etc. will be posted for easy access at the field level (at WUA and CHPMA notice boards/offices) and also in websites, project portal, brochures, pamphlets, etc. Different channels will be designed and provided for accessing the GRM mechanisms and will be widely shared and documented so as to make these user-friendly and easily accessible to the beneficiaries. As the GRM works within existing legal and cultural frameworks, it is recognized that the GRM will comprise project level and Himachal Pradesh judiciary level redress mechanisms. The mechanism will be free of charge, confidentiality/security will be maintained as desired by the beneficiaries.

157. Four focal levels of redress mechanism have been outlined with the first one being informal where minor issues will be resolved at the cluster level verbally. Pre-designed formats have been provided for the three formal levels. Specific attention will be given towards the vulnerable complainants. PMU is the highest authority to resolve grievances.

158. Anonymous complaints/grievances/feedbacks will not be entertained in order to ensure genuineness. All complainants will provide contact details. All out measures will be taken to resolve grievances at the ground zero level. Serious issues will be referred to higher authorities. All grievances will be stored in the central database for monitoring, sorting, and preparing FAQs.

²⁸ E-Samadhan portal <https://esamadhan.nic.in/>

It should be mandated to resolve grievances within a maximum of 60 days. And any feedback will be answered within maximum of 15 days. The first level of feedback will be at the WUA/CHPMA level which should be sorted out within a maximum of 2 days. Beyond this it will be handled at the district level within a maximum of 15 days and if not resolved then it will be handled at PMU level and resolved within a maximum of 60 days.

159. Level 1: Cluster (immediate): At the Cluster level, CHPMA would form the core GRC (Grievance Redress Committee) at the ground level for feedback at the Clusters which would generally be verbal and are expected to be resolved almost immediately through discussions where the complainant will be physically present or be represented with a letter of authority from the complainant. The cluster farmer will place his grievances during CHPMA meetings or individually to the Cluster in Charge or the CHPMA's Chairperson. Representative of farmers will be inducted into the GRC which will also have a female farmer. The GRC will have five members which will include the Cluster in Charge. Grievance can be lodged anytime at the GRC in CHPMA. The GRC at the cluster level will handle the issues immediately and resolve. If the complainant disagrees with the decision of the GRC then he/she shall register grievance in writing to the first formal level of GRM i.e., Block Level. At this stage the CHPMA Facilitator/Cluster in charge would document what is necessary.

160. Level 2: Block (maximum of 7 days): The formal process of GRM will begin at the Block level. The GRC will be formed with the Subject Matter Specialist (SMS of DOH) as the Chairperson along with SDO/AE (JSV) and concerned AHDO/HDO/HEO and a representative from the farmer's member in the cluster. The GRC will either resolve the matter which will have full gratification of the complainant or inform him/her of the action taken and proceedings done with a definite timeline for resolution and fed into the centralized MIS. At this level the complaint will need to be filed in writing in a predesigned format with the following information –

- Date of grievance
- Complaint number
- Location details (Cluster, Gram Panchayat)
- Name of complainant, address and contact details
- Description of grievance
- Category of the Grievance

161. A copy of the redressal will be made available to the complainant through post/web/email. If the complainant is not satisfied with the decision, then on the consent of the complainant it would be referred to level above this with reference to the reason for disagreement and with the resolution/decision provided earlier. The Cluster in Charge will be responsible for documentation.

162. Level 3: District (maximum of 10 days): The grievances unsolved in the earlier level will be placed with the District Level GRC along with all previous documents where the GRC will be chaired by Deputy Commissioner or his/her designated representative, Deputy Director DOH, Executive Engineer JSV, District Coordinator of DOH. For transparency, it will also include as member/s a representative from the farmers. The GRC will either resolve the matter which will have full gratification of the complainant or inform him/her of the action taken, proceedings done with a definite timeline and update into the Central MIS data base. If he/she disagrees then the complaint along with the specified solution will be marked to the next appellant authority for redressal. Similar format as in the earlier level will be used at this level also with additional information on the reason for refiling grievance and description of grievance. The documentation will be maintained by the Deputy Director of DOH.

163. **Level 4: PMU (maximum of 15 days):** PMU is the highest level for project GRC. The grievances unresolved in the earlier levels will be placed with the PMU. The GRC here will consist of the Project Director (PD) of HPSHIVA; Deputy Project Director JSV; Project Nodal Officer of PMU, Safeguards Specialist and M&E Specialist of PMU. The PD will chair the GRC. The relevant field level staff will be involved as necessary. The GRC will either resolve the matter which will have full gratification of the beneficiary complainant or inform him/her of the action taken and proceedings done with a definite timeline and updated into the MIS database. If he/she disagrees then the complainant along with the specific solution has the right to go to any other level for registering a grievance. Frivolous re-appeals will be handled strongly, carefully and conscientiously. The Nodal Officer of HPSHIVA will be responsible for documentation at this level. The judicial system is accessible to the aggrieved farmer at any time, prior or posts involvement with Project GRM.

164. The respective key persons at the four levels to file, sort and maintain complaint records would be - CHPMA Facilitators/Cluster in charge at the Cluster level, Cluster in charge at Block level, Deputy Director of DOH at District level and the Nodal Officer at PMU level. These are the personnel and the four focal points at the respective levels.

165. The nature of grievances that are envisaged for grievance redressal at the ground zero, block, district or PMU levels can be perceptually enlisted as below. The complaints may relate to but not restricted to the following:

- Land records and land fragmentation and ownership issues
- Irrigation schemes and their functioning
- Timely supply of plants and saplings
- Package of Practices (PoP)
- Expert services required in PoP
- Post-Harvest Management and Marketing Issues
- Logistics – storage, transportation, access roads, etc.
- Services provided through outsourcing
- Policy, Legal and Revenue matters
- Community health and safety risks
- Any other

166. Where an affected person is not satisfied with the outcomes of all the levels of the project GRM, the affected person should make good faith efforts to resolve issues working with the South Asia Regional Department (through ADB's India Resident Mission/SAER Division). As a last resort, the affected person can access ADB's Accountability Mechanism (ADB's Office of Special Project Facility or Office of Compliance Review). The ADB Accountability Mechanism information will be included in the project-relevant information to be distributed to the affected communities, as part of the project GRM.

IX. CONCLUSION

167. The IEE study of the proposed infrastructural interventions under HPSHIVA Project has minimal environmental impact with respect to air, water, land, biodiversity and waste management. Most of the adverse impacts predicted are of low significance, short term and localized. All expected adverse impacts could be mitigated with appropriate measures suggested in this report.

168. It is expected that there will be an overall positive cumulative environmental effect of the project if it succeeds in creating efficient value chain linkages between the agricultural commodity producer and the consumer. The beneficial impacts will be manifold. Following are the overall long-term impacts from the project:

- a. The farmers' income in the subtropical region of the state will increase,
- b. There will be reduction in water losses that occur due to poor infrastructure facilities and flood irrigation,
- c. There will be improvement in the overall environment of production areas and handling of harvested produce, and
- d. The employment opportunities of both temporary and permanent nature will get generated for local population.

169. Due to increase in employment opportunities, trade, business and agricultural income, a considerable amount of money may be channeled to the local economy in the area. This will increase the income level of the individual households and the local community of the area.

170. This IEE and EMP is based on conditions of the target sites and design of schemes, however, may need to be further updated by the PMU of HPSHIVA during the implementation stage when unanticipated impacts occur. As of this stage, all the recommended mitigation measures and environmental monitoring plan should be followed.

Annexure 1: RAPID ENVIRONMENTAL IMPACT ASSESSMENT CHECKLISTS

Questionnaire

Instructions:

This checklist is to be prepared to support the environmental classification of a project. It is to be attached to the environmental categorization form that is to be prepared and submitted to the Chief Compliance Officer of the Regional and Sustainable Development Department.

This checklist is to be completed with the assistance of an Environment Specialist in a Regional Department.

This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on

- (i) involuntary resettlement,
- (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development.

Answer the questions assuming the “without mitigation” case. The purpose is to identify potential impacts. Use the “remarks” section to discuss any anticipated mitigation measures.

PACKAGE-01 (CWJ/IRG/SLN-01) of SOLAN DISTRICT

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
Kunihar	Sai	6.74	Functional FIS Sai	Natural Spring	Guava	134.80
	Ser-Delag	21.56	FIS Seri sarla	Spring	Guava	431.20
	Chunad	16.35	LIS from Gumber	Ghumber Khad	Guava	312.80
	Daseran	33.46	LIS from Ali Khad	Ali Khad	Citrus	658.00
	Datti	13.75	Functional FIS Datti	Natural Spring	Pomegranate	275.00
	Giana	6.69	LIS from Jadol Nallah	Jadol Nallah	Pomegranate	133.80
	Jailang	9.65	Functional LIS Jaliayana	Ghumber Khad	Guava	193.00
	Pajeena	14.26	LIS from Panjeena Nallah	Pajeena Nallah	Citrus	274.00
Nalagarh	Batiakh	14.42	Functional LIS Gajedh	Ghamber Khad	Guava	288.40
	Beli khol 1	10.17	LIS from TW-1	Tube Well	Guava	203.40
	Doli	16.91	Functional LIS Gajedh	Ghamber Khad	Guava	324.00

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
	Palli	12.17	LIS from TW-3	TW	Guava	200.40
	Sour	37.12	LIS Sour Kulh	Ghamber Khad	Guava	728.20

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting Is the Project area adjacent to or within any of the following environmentally sensitive areas?			The proposed subproject sites/ clusters are located under Kunihar and Nalagarh blocks in Solan district in Himachal Pradesh. There are no environmentally sensitive areas nearby to project sites.
Protected Area		√	The Chail Wildlife Sanctuary is about 15km away.
▪ Wetland		√	
▪ Mangrove		√	
▪ Estuarine		√	
▪ Buffer zone of protected area		√	
▪ Special area for protecting biodiversity		√	
B. Potential Environmental Impacts Will the Project cause...			
▪ loss of precious ecological values (e.g. the result of encroachment into forests/swamplands or historical/cultural buildings/areas, disruption of hydrology of natural waterways, regional flooding, and drainage hazards)?		√	Most of the sites are undergoing augmentation of capacity. The intake points have an existing system however very old hence rehabilitation is possible. Thus, no additional impact is expected.
▪ conflicts in water supply rights and related social conflicts?		√	As per the hydrological assessment of the sources, the project sites are expected to experience water shortages during the winter months (Oct to Feb) due to a lack of rainfall during the period. The shortages have been estimated on the net availability after deducting the following environmental flows (E-flow) – • data on existing and future water

SCREENING QUESTIONS	Yes	No	REMARKS
			demand on upstream and downstream riparian rights – in absence of actual data considered 80% of the flow; • water requirement for all clusters is taken as 20 m³/day/ha; • E-flow and future demand at each source were taken as 15% and 20% yield respectively of net available; • There is a shortage of water at all source locations. The majority of sources have a small catchment area as compared to irrigation and other demands due to the location being very close to the origin of the stream. (detail is given at the end of the assessment). Except for sources on Ghamber Khad, all other sources on other khads/ nallas indicate shortages in supplying water to irrigated area. However, since the calculation has considered E-flows and Future consumption as well as 80% for upstream and downstream consumption, it is expected that there will be no conflict in water supply rights and related social conflicts due to project activities. Additionally, the CHPMA and WUA members will be adequately trained to be able to manage water in a sustainable manner.
▪ impediments to movements of people and animals?	√		Temporary disruption of the movement of people and animals is anticipated during the construction phase only. Appropriate work scheduling and temporary access arrangements will be discussed and agreed upon with local communities during the construction phase.
▪ potential ecological problems due to increased soil erosion and siltation, leading to decreased		√	Not anticipated.

SCREENING QUESTIONS	Yes	No	REMARKS
stream capacity?			
▪ Insufficient drainage leading to salinity intrusion?		√	Not anticipated.
▪ Over-pumping of groundwater, leading to salinization and ground subsidence?		√	Groundwater will be abstracted at three sites namely – Palli and Beli Khol 1 & 2. These are existing tube wells.
impairment of downstream water quality and therefore, impairment of downstream beneficial uses of water?		√	A detailed hydrological study has been carried out considering the catchment area, historical rainfall data, population growth and water demand in the area and discharge data. A 15% environmental flow has also been considered to maintain the downstream water supply. It is concluded that during the peak demand period, most of the sites are likely to face shortages. Thus, CHPMA and WUA members will be trained to maintain downstream flow and sustainably manage available water.
▪ Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√	Not anticipated.
▪ dislocation or involuntary resettlement of people?		√	The project will not cause any displacement of people.
potential social conflicts arising from land tenure and land use issues?		√	No private land will be involved for the project purpose.
▪ soil erosion before compaction and lining of canals?	√		Protection of embankment will be included in the design option to avoid soil erosion. Measures such as temporary silt rap, stoking of soil away from water course, etc. will be adopted during construction phase.
▪ noise from construction equipment?	√		A temporary increase in noise level is anticipated during the construction phase only. All the construction machinery employed will comply with the noise standards of the Central Pollution Control Board (CPCB). Consultation will be held with local communities for work scheduling at sensitive areas (school, health centers, etc.)

SCREENING QUESTIONS	Yes	No	REMARKS
▪ dust from construction?	√		Temporary increase in dust generation is anticipated during construction phase due to movement of vehicles, hauling of materials and earth. Dust suppression measures such as water sprinkling, covering all trucks/ dumpers carrying dispersible etc. will be employed.
labor-related social problems especially if workers from different areas are hired?		√	No such social conflict is anticipated as maximum number of local labors will be employed during construction phase only. Only few outside skilled labors will be temporarily deployed for specific job.
▪ waterlogging and soil salinization due to inadequate drainage and farm management?		√	The clusters are located on natural slope, no waterlogging is anticipated during farming. Natural drainage pattern will not be altered.
▪ leaching of soil nutrients and changes in soil characteristics due to excessive application of irrigation water?	√		Measures such as training farmers for rational usage of water resources will be ensured during implementation.
▪ reduction of downstream water supply during peak seasons?		√	A detailed hydrological study has been carried out considering the catchment area, historical rainfall data, population growth and water demand in the area and discharge data. A 15% environmental flow has also been considered to maintain the downstream water supply. It is concluded that during the peak demand period, most of the sites are likely to face shortages. Thus, CHPMA and WUA members will be trained to maintain downstream flow and sustainably manage available water.
▪ soil pollution, polluted farm runoff and groundwater, and public health risks due to excessive application of fertilizers and pesticides?	√		Contamination to groundwater and soil is anticipated due to excessive application of fertilizers and pesticides. Measures for safe handling, storage and usage of fertilizers and pesticides will be followed.
▪ soil erosion (furrow, surface)?		√	Construction work during monsoon shall be carried out with due care so that silt runoff due to construction operation is prevented. No construction will be allowed during rains.

SCREENING QUESTIONS	Yes	No	REMARKS
▪ scouring of canals?		√	Regular maintenance activities such as removal of sediments and clogging will be involved.
▪ logging of canals by sediments?		√	Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be allowed during rains.
clogging of canals by weeds?		√	Regular cleaning activities will be involved.
▪ seawater intrusion into downstream freshwater systems?		√	Not Applicable
▪ introduction of increase in incidence of waterborne or water related diseases?		√	No such probable incidence is anticipated.
▪ dangers to a safe and healthy working environment due to physical, chemical and biological hazards during project construction and operation?	√		Occupational health and safety issues will not be significant. These will be managed through EMPs per subproject and environmental clauses in the construction contract.
▪ social conflicts if workers from other regions or countries are hired?		√	Not anticipated.
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	Local labour is to be recruited as much as possible.
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?	√		The proposed project is unlikely to result in significant risks. The specific provision in the contracts together with monitoring of EMP implementation will ensure minimizing such risks.
▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., irrigation dams) are accessible to members of the affected community or where their failure could result in injury to the		√	The proposed project is unlikely to result in significant risks. The specific provision in the contracts together with monitoring of EMP implementation will ensure minimizing such risks.

SCREENING QUESTIONS	Yes	No	REMARKS
community throughout project construction, operation and decommissioning?			

Water Shortage Calculation

S No	Name of Cluster	Catchment Area km ²	Catchment Area ha	Proposed Irrigation Area ha	Minimum Excess / Maximum Shortage Vol (Mm ³)	Month of Occurrence
1	Pajeena	1.054	105.4	14.26	-0.0082	Oct
2	Giana	5.236	523.6	06.69	-0.0010	Oct
3	Ser-Delang	2.955	295.5	21.56	-0.0116	Oct
4	Sai	0.542	542.0	6.74	-0.0041	Dec
5	Jailang	0.18	18.0	9.65	-0.0060	Dec
6	Daseran	2.161	216.1	33.46	-0.0206	Dec
7	Chunad	4.311	431.1	16.35	-0.0063	Nov
8	Kosri	1.890	189.0	21.87	-0.0132	Mar
9	Baduan Bharmana	8.39	839.0	17.00	-0.0098	Apr
10	Kohla	1.74	174.0	6.26	-0.0036	Dec
11	Badhal	0.14	14.0	6.00	-0.0037	Mar
12	Batiakh	536.64	53664.0	15.00	+0.0763	Nov
13	Doli	544.20	54420.0	16.91	+0.0662	Nov
14	Sour	551.02	55102.0	25.00	+0.0512	Nov

PACKAGE-02 (CWJ/IRG/SMR-01) of SIRMAUR DISTRICT

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
Nahan	Dungi Sher	9.68	LIS from Jalal Khadd	Jalal Khadd	Guava	193.60
	Bajari (1 & 2)	13.99	LIS Jungla Bhood	Ruhn Khadd	Litchi	279.80
	Rama	6.88	LIS from Doghat Khad	Doghat Khadd	Guava	137.60
	Bhogpur	8.49	Check dam / LIS on Ruhn Khadd	Ruhn Khadd	Guava	169.80
	Simbalwala	9.99	Check dam / LIS on Ruhn Khadd	Ruhn Khadd	Guava	199.80
	Kherichandan 1	14.41	LIS on Jalal Khadd	Jalal Khadd	Guava	288.20
	Kherichandan 2	13.81	LIS on Jalal Khadd	Jalal Khadd	Guava	276.20
	Judag	12.61	LIS from Judag Nallah	Judag Nallah	Guava	252.20
	Goant	8.00	LIS from Goant Dam	Existing DAM Goant	Guava	160.00
	Budriyon	16.10	LIS from Tubewell	Tubewell 2	Guava	322.00
Paonta Sahib	Fatehpur	6.61	LIS Fatehpur	Percolation well, Edge of Bata River	Guava	132.20
	Killour	21.88	LIS Killour	Tons River	Guava	437.60
	Upper Bhuddi	21.72	LIS from Tubewell	Tubewell 3	Guava	434.40
	Khara	8.95	LIS Khara Nallah	Khara Nallah	Guava	179.00
	Puruwala	13.93	LIS from Tubewell	Tubewell 4	Guava	278.60
	Gyayaniwala	10.87	LIS from Tubewell	Tubewell 5	Guava	217.40

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting			
Is the Project area adjacent to or within any of the following environmentally sensitive areas?			The proposed subproject sites/ clusters are located under Nahan and Paonta Sahib blocks in Sirmaur district in Himachal Pradesh.
Protected Area		√	The Simbalbara National Park, Churdhar Wildlife Sanctuary and Renuka Wildlife

SCREENING QUESTIONS	Yes	No	REMARKS
▪ Wetland		√	Sanctuary are located in the Sirmaur district.
▪ Mangrove		√	The Simbalbara National Park is located in the Paonta valley. The project sites in Paonta Sahib block are located in the buffer zone of the conservation area. The National Park is covered with Sal trees and grassy glades. The commonly found animals include Goral, Sambhar, Spotted Deer, Chittal, Himalayan black bear, Hanuman langurs, and Indian muntjacs. Renuka Wildlife Sanctuary is more than 30 km away from the project sites, while Churdhar Wildlife Sanctuary is more than 100 km away from the project sites.
▪ Estuarine		√	
▪ Buffer zone of protected area	√		
▪ Special area for protecting biodiversity		√	
B. Potential Environmental Impacts			
Will the Project cause...			
▪ loss of precious ecological values (e.g., result of encroachment into forests/swamplands or historical/cultural buildings/areas, disruption of hydrology of natural waterways, regional flooding, and drainage hazards)?		√	Under this package, there are 2 functional (existing) and 14 new irrigation schemes that will be developed. Of the 10 clusters in Nahan block, one cluster (Budriyon) has its source based on tubewell. Of the remaining 9 clusters, 6 clusters have their source from surface water of various khads/nallahs, while 3 clusters have their source from already constructed check dam. Of the 6 clusters in Paonta Sahib block, 2 clusters are taken under functional scheme and 4 clusters are covered under new proposed scheme. The sources for the functional schemes are well developed. 3 of the 4 new schemes will have tubewells as their source while for cluster Khara, the source is surface water of Khara nallah. Thus, there will be no disruption of

SCREENING QUESTIONS	Yes	No	REMARKS
			waterways or regional flooding expected.
conflicts in water supply rights and related social conflicts?		√	Estimation of annual yield from surface water of khads / nallahs as the source has been carried out for 15 khads / nallahs using available rainfall data of 12 years. Except for Dungi Sher and Kherichandan 1 & 2 clusters with source on Jalal Khad, sources of all other khads indicate shortages in supplying water to irrigated area. Storage structures with capacity ranging from 0.0015 Mm³ at Khara cluster to 0.0120 Mm³ at Bhogpur Simbalwala clusters are proposed to make these clusters workable with water available in proposed source. Thus, it is expected that there will be no conflict in water supply rights and related social conflicts due to project activities. Additionally, the CHPMA and WUA members will be adequately trained to be able to manage water in a sustainable manner.
impediments to movements of people and animals?	√		Temporary disruption of the movement of people and animals is anticipated during the construction phase only. Appropriate work scheduling and temporary access arrangements will be discussed and agreed upon with local communities during the construction phase.
potential ecological problems due to increased soil erosion and siltation, leading to decreased stream capacity?		√	Not anticipated
Insufficient drainage leading to salinity intrusion?		√	Not anticipated.
Over-pumping of groundwater, leading to salinization and ground subsidence?		√	In Nahan block, of the 10 clusters under new proposed schemes, Budriyon cluster has its source based on tubewell. The tubewell lies in Kala Amb valley, where the stage ground water

SCREENING QUESTIONS	Yes	No	REMARKS
			development is under safe category. Hydrogeological conditions are assessed conducive for construction of tubewell. In Paonta Sahib block, of the 4 clusters proposed under new scheme, JSV has proposed tubewells for 3 clusters. The tubewells proposed for 2 clusters, Puruwala and Gyayanwala, are assessed hydrogeologically feasible for construction, however, the tubewell proposed for cluster Upper Bhuddi lies on the periphery of Paonta valley, where the hydrogeological conditions are not conducive for large drawl ground water extraction.
Impairment of downstream water quality and therefore, impairment of downstream beneficial uses of water?		√	The net yield has been estimated after deducting upstream and downstream demands from monthly yield values. Additionally, CHPMA and WUA members will be trained to maintain downstream flow and sustainably manage available water.
▪ Dislocation or involuntary resettlement of people?		√	The project will not cause any displacement of people.
potential social conflicts arising from land tenure and land use issues?		√	No private land will be involved for the project purpose.
▪ soil erosion before compaction and lining of canals?	√		Protection of embankment will be included in the design option to avoid soil erosion. Measures such as temporary silt rap, stoking of soil away from water course, etc. will be adopted during the construction phase.
▪ noise from construction equipment?	√		Temporary increase in noise level is anticipated during construction phase only. All the construction machineries employed will comply with noise emission standards of Central Pollution Control Board (CPCB). Consultation will be held with local communities for work scheduling at sensitive areas (school, health centers, etc.).

SCREENING QUESTIONS	Yes	No	REMARKS
▪ dust?	√		Temporary increase in dust generation is anticipated during construction phase due to movement of vehicles, hauling of materials and earth. Dust suppression measures such as water sprinkling, covering all trucks/ dumpers carrying dispersible, etc. will be employed.
labor-related social problems especially if workers from different areas are hired?		√	No such social conflict is anticipated as maximum number of local labors will be employed during construction phase only. Only few outside skilled labors will be temporarily deployed for specific job.
▪ waterlogging and soil salinization due to inadequate drainage and farm management?		√	The clusters are located on natural slope, no waterlogging is anticipated during farming. Natural drainage pattern will not be altered.
▪ leaching of soil nutrients and changes in soil characteristics due to excessive application of irrigation water?	√		Measures such as training of farmers for rational usage of water resource will be ensured during implementation.
▪ reduction of downstream water supply during peak seasons?		√	A detailed hydrological study has been carried out considering the catchment area, historical rainfall data, population growth and water demand in the area and discharge data. Downstream demands have been accounted for while calculating the net yield. It is concluded that during the peak demand period, most of the sites are likely to face shortages. Thus, CHPMA and WUA members will be trained to maintain downstream flow and sustainably manage available water.
▪ soil pollution, polluted farm runoff and groundwater, and public health risks due to excessive application of fertilizers and pesticides?	√		Contamination to ground water and soil are anticipated due to excessive application of fertilizers and pesticides. Measures for safe handling, storage and usage of fertilizers and pesticides will be followed.
▪ soil erosion (furrow, surface)?		√	Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be

SCREENING QUESTIONS	Yes	No	REMARKS
			allowed during rains.
▪ scouring of canals?		√	Regular maintenance activities such as removal of sediments and clogging will be involved.
▪ logging of canals by sediments?		√	Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be allowed during rains.
clogging of canals by weeds?		√	Regular cleaning activities will be involved.
▪ seawater intrusion into downstream freshwater systems?		√	Not Applicable
▪ introduction of increase in incidence of waterborne or water related diseases?		√	No such probable incidence is anticipated.
▪ dangers to a safe and healthy working environment due to physical, chemical and biological hazards during project construction and operation?		√	Occupational health and safety issues will not be significant. These will be managed through EMPs per subproject and environmental clauses in the construction contract.
▪ social conflicts if workers from other regions or countries are hired?		√	Not anticipated.
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	Local labor is to be recruited as much as possible.
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		√	The proposed project is unlikely to result in significant risks. Specific provision in the contracts together with monitoring of EMP implementation will ensure minimizing such risks.

SCREENING QUESTIONS	Yes	No	REMARKS
community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., irrigation dams) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?		√	The proposed project is unlikely to result in significant risks. Specific provision in the contracts together with monitoring of EMP implementation will ensure minimizing such risks.

Water Shortage Calculation

Block Name	Irrigation Scheme	Cluster Name	Catchment Area (km ²)	Proposed Irrigation Area (ha)	Minimum Excess / Maximum Shortage Vol (mm ³)	Month of Occurrence
Nahan	LIS from Jalal Khadd	Dungi Sher	147.168	9.68	0.0331	Nov
	LIS Jungla Bhood	Bajari (1 & 2)	73.57	13.99	-0.0053	May
	LIS from Doghat Khad	Rama	3.65	6.88	-0.0027	Nov
	Check dam / LIS on Ruhn Khadd	Bhogpur & Simbalwala	75.47	18.48	-0.0080	May
	LIS on Jalal Khadd	Kherichandan 1 & 2	170.30	28.22	0.0108	Nov
	LIS from Judag Nallah	Judag	2992	12.61		
	LIS from Goant Dam	Goant	18.13	8.00	-0.0041	May
	LIS from Tubewell	Budriyon	N/A	16.10		
Paonta Sahib	LIS Fatehpur	Fatehpur	N/A	6.61		
	LIS Killour	Killour	3065.17	21.88		
	LIS from Tubewell	Upper Bhuddi	N/A	21.72		
	LIS Khara Nallah	Khara	8.705	8.95	-0.0009	Feb

Block Name	Irrigation Scheme	Cluster Name	Catchment Area (km ²)	Proposed Irrigation Area (ha)	Minimum Excess / Maximum Shortage Vol (mm ³)	Month of Occurrence
	LIS from Tubewell	Puruwala	N/A	13.93		
	LIS from Tubewell	Gyayaniwala	N/A	10.87		

PACKAGE-03 (CWJ/IRG/HMR-01) of HAMIRPUR DISTRICT

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
Bamsan	Sachuin	8.68	LIS Sachuhi	Beas River	Pomegranate	173.60
	Parol	17.51	LIS Dera Parol	Kunah Khadd	Citrus	350.20
Bhoranj	Balor-Sangrawar	33.45	LIS Balor Nallah	Balor Nallah	Guava	669.00
	Jol	19.72	LIS Jol Nallah	Jol Nallah	Guava	394.40
	Lagmanwin	6.90	LIS Lagmanwin Nallah	Lagmanwin Nallah	Guava	138.00
	Lambagram/ Palasi	18.17	LIS JICA dam, Plassi Nallah	JICA dam, Plassi Nallah	Guava	363.40
	Mundkhar tushi	27.99	LIS Balor Nallah	Balor Nallah	Guava	559.80
	Samlog	22.69	LIS Samlog Nallah	Samlog Nallah	Guava	453.80
Bijhar	Bhalat	11.52	Existing LIS Bhalat Nallah	Bhalat Nallah	Pomegranate	230.40
	Lafran	13.96	LIS over New Source	New Proposed	Pomegranate	279.20
	Ghangot	8.42	Existing LIS Ghangot Nallah	Ghangot Nallah	Pomegranate	168.40
	Kalwal	15.75	LIS Kalwal	Rihal Nallah	Pomegranate	315.00
	Seri-Bhakredi	14.88	LIS Bhakreri	Existing check dam on Nallah	Pomegranate	297.60

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting			The proposed subproject sites/ clusters are located under Bamsan, Bhoranj, and Bijhar blocks in Hamirpur district in Himachal Pradesh. There are no Wildlife Sanctuaries or National Parks located in Hamirpur district. Hence, the Project sites are not adjacent to or within any environmentally sensitive area.
Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
Protected Area		√	
▪ Wetland		√	
▪ Mangrove		√	
▪ Estuarine		√	

SCREENING QUESTIONS	Yes	No	REMARKS
▪ Buffer zone of protected area		√	
▪ Special area for protecting biodiversity		√	
B. Potential Environmental Impacts Will the Project cause...			
▪ loss of precious ecological values (e.g., result of encroachment into forests/swamplands or historical/cultural buildings/areas, disruption of hydrology of natural waterways, regional flooding, and drainage hazards)?		√	Under this package, there are 1 functional, 4 non-functional (defunct) and 8 new irrigation schemes that will be developed. For the functional scheme, the source has been assessed as hydrologically feasible for LIS Sachuhi. For the non-functional schemes, the sources are based on the local nallahs, where check dams have already been constructed as intake to the irrigation schemes. For the new schemes, check dams have already been constructed across the respective nallahs. For Lafran cluster, the proposed site has been found to be not conducive for construction of percolation well. Thus, a suitable rainwater harvesting structure will be constructed for LIS Lafran. Any loss of precious ecological values is not anticipated.
▪ conflicts in water supply rights and related social conflicts?		√	Estimation of annual yield from surface water of khads / nallahs as the source has been carried out for 12 khads / nallahs using available rainfall data of 12 years. All khads indicate shortages in supplying water to irrigated area. Maximum shortage of 0.0207 mm³ is noticed for Balor-Sangrawar cluster in Bhoranj block, while minimum shortage of 0.0040 mm³ is noticed for Bhalat cluster in Bijhar block. Storage structures with capacity ranging from 0.0060 to 0.0315 mm³ are proposed to make these clusters workable with water available in proposed

SCREENING QUESTIONS	Yes	No	REMARKS
			source. Thus, it is expected that there will be no conflict in water supply rights and related social conflicts due to project activities. Additionally, the CHPMA and WUA members will be adequately trained to be able to manage water in a sustainable manner.
impediments to movements of people and animals?	√		Temporary disruption of the movement of people and animals is anticipated during the construction phase only. Appropriate work scheduling and temporary access arrangements will be discussed and agreed upon with local communities during the construction phase.
potential ecological problems due to increased soil erosion and siltation, leading to decreased stream capacity?		√	Not anticipated
Insufficient drainage leading to salinity intrusion?		√	Not anticipated.
Over-pumping of groundwater, leading to salinization and ground subsidence?		√	In Bamsan block, the cluster Parol has its source on surface water of Kunah khad. Kunah khad near the source is not perennial in nature and thus, hydrological study of the Kunah khad is essential and recommendations of Hydrologist are mandatory. In Bhoranj block, the catchment area and CCA of every cluster does not commensurate. Since these clusters are covered under New Proposed Schemes, detailed hydrological study of each cluster is necessary and recommendations of Hydrologist are mandatory. In Bijhar block, for Lafran cluster, percolation well has been proposed by JSV. The hydrogeological conditions assessed in the area are not conducive for construction of percolation well for LIS Lafran. Therefore, the proposed site is not recommended for construction of percolation well. It has been agreed that a suitable rainwater harvesting structure will be constructed for LIS Lafran. The detailed study reveals that the catchment

SCREENING QUESTIONS	Yes	No	REMARKS
			area as well as CCA of every cluster does not commensurate, except Lafran to some extent. Therefore, detailed hydrological study of each cluster is requisite for smooth functioning of irrigation schemes to be constructed and recommendations of Hydrologist are mandatory.
Impairment of downstream water quality and therefore, impairment of downstream beneficial uses of water?		√	The net yield has been estimated after deducting upstream and downstream demands from monthly yield values. Additionally, CHPMA and WUA members will be trained to maintain downstream flow and sustainably manage available water.
▪ Dislocation or involuntary resettlement of people?		√	The project will not cause any displacement of people.
potential social conflicts arising from land tenure and land use issues?		√	No private land will be involved for the project purpose.
▪ soil erosion before compaction and lining of canals?	√		Protection of embankment will be included in the design option to avoid soil erosion. Measures such as temporary silt rap, stoking of soil away from water course, etc. will be adopted during the construction phase.
▪ noise from construction equipment?	√		Temporary increase in noise level is anticipated during construction phase only. All the construction machineries employed will comply with noise emission standards of Central Pollution Control Board (CPCB). Consultation will be held with local communities for work scheduling at sensitive areas (school, health centers, etc.).
▪ dust?	√		Temporary increase in dust generation is anticipated during construction phase due to movement of vehicles, hauling of materials and earth. Dust suppression measures such as water sprinkling, covering all trucks/ dumpers carrying dispersible, etc. will be employed.
labor-related social problems especially if workers from different areas are hired?		√	No such social conflict is anticipated as maximum number of local labors will be employed during construction phase only. Only few outside skilled labors will be

SCREENING QUESTIONS	Yes	No	REMARKS
			temporarily deployed for specific job.
▪ waterlogging and soil salinization due to inadequate drainage and farm management?		√	The clusters are located on natural slope, no waterlogging is anticipated during farming. Natural drainage pattern will not be altered.
▪ leaching of soil nutrients and changes in soil characteristics due to excessive application of irrigation water?	√		Measures such as training of farmers for rational usage of water resource will be ensured during implementation.
▪ reduction of downstream water supply during peak seasons?		√	CHPMA and WUA members will be trained to maintain downstream flow and sustainably manage available water.
▪ soil pollution, polluted farm runoff and groundwater, and public health risks due to excessive application of fertilizers and pesticides?	√		Contamination to ground water and soil are anticipated due to excessive application of fertilizers and pesticides. Measures for safe handling, storage and usage of fertilizers and pesticides will be followed.
▪ soil erosion (furrow, surface)?		√	Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be allowed during rains.
▪ scouring of canals?		√	Regular maintenance activities such as removal of sediments and clogging will be involved.
▪ logging of canals by sediments?		√	Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be allowed during rains.
clogging of canals by weeds?		√	Regular cleaning activities will be involved.
▪ seawater intrusion into downstream freshwater systems?		√	Not Applicable
▪ introduction of increase in incidence of waterborne or water related diseases?		√	No such probable incidence is anticipated.
▪ dangers to a safe and healthy working environment due to physical, chemical and biological hazards during project construction and operation?		√	Occupational health and safety issues will not be significant. These will be managed through EMPs per subproject and environmental clauses in the construction contract.

SCREENING QUESTIONS	Yes	No	REMARKS
▪ social conflicts if workers from other regions or countries are hired?		√	Not anticipated.
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	Local labor is to be recruited as much as possible.
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		√	The proposed project is unlikely to result in significant risks. Specific provision in the contracts together with monitoring of EMP implementation will ensure minimizing such risks.
▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., irrigation dams) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?		√	The proposed project is unlikely to result in significant risks. Specific provision in the contracts together with monitoring of EMP implementation will ensure minimizing such risks.

Water Shortage Calculation

Block Name	Irrigation Scheme	Cluster Name	Proposed Irrigation Area (ha)	Minimum Excess / Maximum Shortage Vol (mm ³)	Month of Occurrence
Bamsan	LIS Sachuhi	Sachuin	8.68		
	LIS Dera Parol	Parol	17.51	-0.0108	Dec
Bhoranj	LIS Balor Nallah	Balor-Sangrawar	33.45	-0.0207	Oct
	LIS Jol Nallah	Jol	19.72	-0.0122	Dec
	LIS Lagmanwin Nallah	Lagmanwin	6.90	-0.0041	Dec
	LIS JICA dam, Plassi Nallah	Lambagram/Palasi	18.17	-0.0104	Nov
	LIS Balor Nallah	Mundkhar tulsu	27.99	-0.0171	Oct
	LIS Samlog Nallah	Samlog	22.69	-0.0135	Oct
	Existing LIS Bhalat Nallah	Bhalat	11.52	-0.0040	Dec

	LIS over New Source	Lafran	13.96	-0.0059	Apr
	Existing LIS Ghangot Nallah	Ghangot	8.42	-0.0046	Dec
	LIS Kalwal	Kalwal	15.75	-0.0086	Dec
	LIS Bhakreri	Seri-Bhakredi	14.88	-0.0089	Dec

PACKAGE-04 (CWJ/IRG/HMR-02) of HAMIRPUR DISTRICT

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
Hamirpur	Branda	7.90	LIS Nalti Branda	Kunah Khad	Citrus	158.00
	Bakarti-I	29.97	LIS Bakarti	Kunah Khad	Citrus	599.40
	Jangal Ropa	22.20	LIS Jangal Ropa	Kunah Khad	Citrus	444.00
	Haar	14.90	LIS Jangal Ropa Haar	Kunah Khad	Citrus	298.00
	Neri	7.44	LIS Neri	Kunah Khad	Citrus	148.80
Nadaun	Sadhwan	8.80	MIP Nadaun	MIP Nadaun	Citrus	176.00
	Rail-I	6.20	MIP Nadaun	MIP Nadaun	Citrus	124.00
	Baag Bharmoti	6.10	MIP Nadaun	MIP Nadaun	Citrus	122.00
	Kushiar-I	15.80	LIS Khusiyar Galol	Maan Khadd	Citrus	316.00
	Bhabran 1	11.22	LIS Bhabran	LIS Bhabran	Citrus	224.40
	Bhabran 2	13.90	LIS Bhabran	LIS Bhabran	Citrus	278.00
	Kaloor	9.74	LIS Kola	Maan Khadd	Citrus	194.80
	Kashmir	6.70	LIS Kashmir	LIS Kashmir	Citrus	134.00
	Phal Palsi	28.20	LIS Palsi	LIS Palsi	Citrus	564.00
	Choru (Bhoo-I)	6.20	LIS Bhoo	LIS Bhoo	Citrus	124.00
	Manjot	7.90	LIS Salasi Nallah	Salasi Nallah	Citrus	158.00
	Manjot 2	1.50	LIS Salasi Nallah	Salasi Nallah	Citrus	30.00
	Tung (Baloh)	14.10	LIS Maan Khadd	Maan Khadd	Citrus	282.00
	Loharda	5.00	MIP Nadaun Right Bank	MIP Nadaun	Citrus	100.00
	Sai Lower	19.00	MIP Nadaun Left Bank	MIP Nadaun	Citrus	380.00
	Pansai 1	32.20	LIS Pansai	LIS Pansai	Citrus	644.00
	Pansai 2	24.20	LIS Pansai	LIS Pansai	Citrus	484.00
	Bhalana Rei	18.21	LIS Pung Khad	LIS Pung Khad	Guava	364.20
Sujanpur	Kheri	12.80	LIS Kheri	LIS Kheri	Pomegranate	256.00
	Beri-1	9.30	LIS Kudana Beri	LIS Kudana Beri	Pomegranate	186.00
	Beri-2	12.40	LIS Kudana Beri	LIS Kudana Beri	Pomegranate	248.00
	Bhahru (Pour)	7.10	LIS Bhahru Jatour	LIS Bhahru Jatour	Pomegranate	142.00
	Bir Baghera	7.00	LIS Pour	LIS Pour	Pomegranate	140.00
	Kudana	7.90	LIS Bhahru Jatour	LIS Bhahru Jatour	Citrus	158.00

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting			
Is the Project area adjacent to or within any of the following environmentally sensitive areas?			The proposed subproject sites/ clusters are located under Hamirpur, Nadaun, and Sujanpur blocks in Hamirpur district in Himachal Pradesh.
Protected Area		√	There are no Wildlife Sanctuaries or National Parks located in Hamirpur district. Hence, the Project sites are not adjacent to or within any environmentally sensitive area.
▪ Wetland		√	
▪ Mangrove		√	
▪ Estuarine		√	
▪ Buffer zone of protected area		√	
▪ Special area for protecting biodiversity		√	
B. Potential Environmental Impacts			
Will the Project cause...			
▪ loss of precious ecological values (e.g., result of encroachment into forests/swamplands or historical/cultural buildings/areas, disruption of hydrology of natural waterways, regional flooding, and drainage hazards)?		√	Under this package, there are 12 non-functional (defunct) and 18 new irrigation schemes that will be developed. There are a total of 5 clusters in Hamirpur block that are covered under Non-Functional Schemes. The sources of 4 clusters are based on ground water, i.e., percolation wells already constructed by JSV. However, one cluster named Branda have their source based on surface water of Kunah khad. It is proposed that subsurface dyke cum check dam of optimum height be constructed on each source of LIS Nalti Branda, Jangal Ropa and Neri across the Kunah khad. This can cause disruption of the hydrology of natural waterways and disruption to the bed of the stream at the project site. Of the clusters in Nadaun block, the

SCREENING QUESTIONS	Yes	No	REMARKS
			sources based on surface water of river Beas are assessed feasible, since river Beas is perennial in nature and has sufficient discharge. For the remaining clusters with sources based on Maan khad, Salasi nallah and Dugh nallah, it is proposed to construct subsurface dyke cum check dam of optimum height across the khad/nallah, which can cause disruption of the hydrology of natural waterways and disruption to the bed of the stream at the project site. For the clusters in Sujampur block, the clusters covered under Non-functional Schemes have their sources as percolation wells, which have been constructed by JSV on the left side of Beas river. These percolation wells have been assessed hydrologically feasible for ground water development.
conflicts in water supply rights and related social conflicts?		√	Estimation of annual yield from surface water of khads / nallahs as the source has been carried out for 13 khads / nallahs using available rainfall data of 12 years. Except for Manjot / Manjot 2 cluster that has excess storage, sources of all other khads indicate shortages in supplying water to the irrigated area in November and October months. Maximum shortage of 0.0163 mm³ is noticed for Jangal Ropa cluster, while minimum shortage of 0.0026 mm³ is noticed for Bakarti cluster. Storage structures with capacity ranging from 0.0040 mm³ to 0.0455 mm³ are proposed to make these clusters workable with water available in proposed source. Thus, it is expected that there will be no conflict in water supply rights and related social conflicts due to project activities. Additionally, the CHPMA and WUA members will be adequately trained to be able to manage water in a sustainable

SCREENING QUESTIONS	Yes	No	REMARKS
			manner.
▪ impediments to movements of people and animals?	√		Temporary disruption of the movement of people and animals is anticipated during the construction phase only. Appropriate work scheduling and temporary access arrangements will be discussed and agreed upon with local communities during the construction phase.
▪ potential ecological problems due to increased soil erosion and siltation, leading to decreased stream capacity?		√	Not anticipated
▪ Insufficient drainage leading to salinity intrusion?		√	Not anticipated.
▪ Over-pumping of groundwater, leading to salinization and ground subsidence?		√	In Hamirpur block, the cluster Branda has its source on the surface of Kunah khad. During peak summer, the Kunah khad has intermittent or negligible flow at some places of upper reaches. A number of percolation wells have been constructed by the Jal Shakti Vibhag, Hamirpur on this khad. Therefore, for future development of the resource of Kunah khad, comprehensive hydrological study of the khad is utmost important and opinion of Hydrologist is mandatory. In Nadaun block, the source of 3 clusters is based on surface water of Mann khad as well as ground water. During peak summer, the Maan khad has intermittent or negligible flow at some places. Therefore, for future development of the resource of Maan khad, comprehensive hydrological study of the khad is utmost important and opinion of Hydrologist is mandatory. For the new clusters, hydrological study of Salasi and Dugh nallahs is obligatory because both have inadequate catchment area and recommendations of Hydrologist is mandatory. In Sujapur block, the source for the new cluster Bhalana Rei is Hard nallah. The Hard nallah is not have adequate

SCREENING QUESTIONS	Yes	No	REMARKS
			catchment area. Therefore, hydrological study of Hard nallah is obligatory and recommendations of Hydrologist is mandatory.
Impairment of downstream water quality and therefore, impairment of downstream beneficial uses of water?		√	The net yield has been estimated after deducting upstream and downstream demands from monthly yield values. Additionally, CHPMA and WUA members will be trained to maintain downstream flow and sustainably manage available water.
▪ Dislocation or involuntary resettlement of people?		√	The project will not cause any displacement of people.
potential social conflicts arising from land tenure and land use issues?		√	No private land will be involved for the project purpose.
▪ soil erosion before compaction and lining of canals?	√		Protection of embankment will be included in the design option to avoid soil erosion. Measures such as temporary silt rap, stoking of soil away from water course, etc. will be adopted during the construction phase.
▪ noise from construction equipment?	√		Temporary increase in noise level is anticipated during construction phase only. All the construction machineries employed will comply with noise emission standards of Central Pollution Control Board (CPCB). Consultation will be held with local communities for work scheduling at sensitive areas (school, health centers, etc.).
▪ dust?	√		Temporary increase in dust generation is anticipated during construction phase due to movement of vehicles, hauling of materials and earth. Dust suppression measures such as water sprinkling, covering all trucks/ dumpers carrying dispersible, etc. will be employed.
labor-related social problems especially if workers from different areas are hired?		√	No such social conflict is anticipated as maximum number of local labors will be employed during construction phase only. Only few outside skilled labors will

SCREENING QUESTIONS	Yes	No	REMARKS
			be temporarily deployed for specific job.
▪ waterlogging and soil salinization due to inadequate drainage and farm management?		√	The clusters are located on natural slope, no waterlogging is anticipated during farming. Natural drainage pattern will not be altered.
▪ leaching of soil nutrients and changes in soil characteristics due to excessive application of irrigation water?	√		Measures such as training of farmers for rational usage of water resource will be ensured during implementation.
▪ reduction of downstream water supply during peak seasons?		√	A detailed hydrological study has been carried out considering the catchment area, historical rainfall data, population growth and water demand in the area and discharge data. Downstream demands have been accounted for while calculating the net yield. It is concluded that during the peak demand period, most of the sites are likely to face shortages. Thus, CHPMA and WUA members will be trained to maintain downstream flow and sustainably manage available water.
▪ soil pollution, polluted farm runoff and groundwater, and public health risks due to excessive application of fertilizers and pesticides?	√		Contamination to ground water and soil are anticipated due to excessive application of fertilizers and pesticides. Measures for safe handling, storage and usage of fertilizers and pesticides will be followed.
▪ soil erosion (furrow, surface)?		√	Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be allowed during rains.
▪ scouring of canals?		√	Regular maintenance activities such as removal of sediments and clogging will be involved.
▪ logging of canals by sediments?		√	Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be

SCREENING QUESTIONS	Yes	No	REMARKS
			allowed during rains.
clogging of canals by weeds?		√	Regular cleaning activities will be involved.
▪ seawater intrusion into downstream freshwater systems?		√	Not Applicable
▪ introduction of increase in incidence of waterborne or water related diseases?		√	No such probable incidence is anticipated.
▪ dangers to a safe and healthy working environment due to physical, chemical and biological hazards during project construction and operation?		√	Occupational health and safety issues will not be significant. These will be managed through EMPs per subproject and environmental clauses in the construction contract.
▪ social conflicts if workers from other regions or countries are hired?		√	Not anticipated.
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	Local labor is to be recruited as much as possible.
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		√	The proposed project is unlikely to result in significant risks. Specific provision in the contracts together with monitoring of EMP implementation will ensure minimizing such risks.
▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., irrigation dams) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?		√	The proposed project is unlikely to result in significant risks. Specific provision in the contracts together with monitoring of EMP implementation will ensure minimizing such risks.

Water Shortage Calculation

Block Name	Irrigation Scheme	Cluster Name	Catchment Area (km ²)	Proposed Irrigation Area (ha)	Minimum Excess / Maximum Shortage Vol (mm ³)	Month of Occurrence
Hamirpur	LIS Nalti Branda	Branda	200.93	7.90	-0.0114	Nov
	LIS Bakarti	Bakarti-I	148.90	29.97	-0.0026	Oct
	LIS Jangal Ropa	Jangal Ropa	182.94	22.20	-0.0163	Oct
	LIS Jangal Ropa Haar	Haar	185.04	14.90	-0.0255	Oct
	LIS Neri	Neri	227.69	7.44	-0.0158	Nov
Nadaun	MIP Nadaun	Sadhwan		8.80		
	MIP Nadaun	Rail-I		6.20		
	MIP Nadaun	Baag Bharmoti		6.10		
	LIS Khusiyar Galol	Kushiar-I	115.18	15.80	-0.0138	Nov
	LIS Bhabran	Bhabran 1		11.22		
	LIS Bhabran	Bhabran 2		13.90		
	LIS Kola	Kaloor	2.70	9.74	-0.0051	Nov
	LIS Kashmir	Kashmir	14.65	6.70	-0.0026	Nov
	LIS Palsi	Phal Palsi	75.15	28.20	-0.0207	Nov
	LIS Bhoo	Choru (Bhoo-I)		6.20		
	LIS Salasi Nallah	Manjot	39.08	7.90	0.0103	Nov
	LIS Salasi Nallah	Manjot 2		1.50		
	LIS Maan Khadd	Tung (Baloh)	148.74	14.10	-0.0138	Nov
	MIP Nadaun Right Bank	Loharda		5.00		
	MIP Nadaun Left Bank	Sai Lower		19.00		
	LIS Pansai	Pansai 1	11.20	32.20	-0.0308	Nov
	LIS Pansai	Pansai 2		24.20		
	LIS Pung Khad	Bhalana Rei	3.15	18.21	-0.0103	Oct
Sujanpur	LIS Kheri	Kheri		12.80		

Block Name	Irrigation Scheme	Cluster Name	Catchment Area (km ²)	Proposed Irrigation Area (ha)	Minimum Excess / Maximum Shortage Vol (mm ³)	Month of Occurrence
	LIS Kudana Beri	Beri-1		9.30		
	LIS Kudana Beri	Beri-2		12.40		
	LIS Bhahru Jatour	Bhahru (Pour)		7.10		
	LIS Pour	Bir Baghera		7.00		
	LIS Bhahru Jatour	Kudana		7.90		

PACKAGE-05 (CWJ/IRG/BLS-01) of BILASPUR DISTRICT

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
Ghumarwin	Dehra	17.90	IPH Scheme	Seer Khad	Citrus	358.00
	Kathalag droun	20.57	IPH Scheme	Seer Khad	Guava	411.40
	Lower Lanjhta	11.61	IPH Scheme – Seer Khad	Seer Khad	Litchi	232.20
	Thandora	7.41	IPH Scheme – Seer Khad	Seer Khad	Litchi	148.20
	Upper Talwara	9.35	LIS Talwara	Khad	Citrus	187.00
	Talwara Lower	1.91	LIS Talwara	Khad	Citrus	38.20
	Talwara Phase-2	6.91	LIS Talwara	Khad	Citrus	138.20
	Kasol	20.53	LIS Kasohal	Seer Khad	Citrus	410.60
	Kasol Balh	8.84	LIS Kasohal	Seer Khad	Citrus	176.80
	Kasol Kanjeen	6.20	LIS Kasohal	Seer Khad	Citrus	124.00
	Mehri Kathla	14.46	LIS Mehri Kathla	Bajrauli Khad	Citrus	289.20
	Nalti Parnal	8.77	LIS Parnal	Seer Khad	Citrus	175.40
	Chharal Daloli	19.29	New Check Dam	Over LIS Talwara	Citrus	385.80
	Sandhiar (Chhat)	18.97	New Scheme Check Dam proposed	Existing DAM – Nearby Nallah Sandhiar	Guava	379.40
	Bhadrog (Seu)	8.88	New Scheme IPH Scheme	Seer Khad	Citrus	177.60
	Bhapral	7.11	New LIS	Seer Khad	Guava	142.20
	Samsai	5.34	New scheme Check Dam / Bore	Borewell	Guava	106.80
	Massour Maloh /	6.57	New Check Dam	Seer Khad	Citrus	131.40
	Chhiber	16.99	New Scheme Check Dam existing and proposed	Nearby Nallah	Citrus	339.80
Sadar - Bilaspur	Kotlu	14.23	New scheme to be developed	Ali Khad	Guava	284.60
	Dugga Har (Manjher)	11.43	Kuhl	Kuhl	Citrus	228.60
	Loharda	23.02	Kuhl	Ali Khad	Citrus	460.40
	Kainthal	6.38	Kuhl	Ali Khad	Citrus	127.60
	Khod ka kyar	21.49	IPH Kuhl	Ali Khad	Citrus	429.80
	Karot	21.92	Existing Kuhl	Ali Khad	Citrus	438.40

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
	Salnu	27.79	New Scheme	Sutlej River	Citrus	555.80

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting			
Is the Project area adjacent to or within any of the following environmentally sensitive areas?			The proposed subproject sites/ clusters are located under Ghumarwin and Sadar-Bilaspur blocks in Bilaspur district in Himachal Pradesh.
Protected Area		√	The Naina Devi and Gobind Sagar Wildlife Sanctuaries are located in the Swarghat tehsil of Bilaspur District. Both the sanctuaries are at a location of more than 50 km from the Project sites in the above blocks. Hence, the Project sites are not adjacent to or within any environmentally sensitive area.
▪ Wetland		√	
▪ Mangrove		√	
▪ Estuarine		√	
▪ Buffer zone of protected area		√	
▪ Special area for protecting biodiversity		√	
B. Potential Environmental Impacts			
Will the Project cause...			
▪ loss of precious ecological values (e.g., result of encroachment into forests/swamplands or historical/cultural buildings/areas, disruption of hydrology of natural waterways, regional flooding, and drainage hazards)?		√	Under this package, there are 8 functional (existing), 7 non-functional (defunct) and 13 new irrigation schemes that will be developed. The functional schemes in Ghumarwin block have the components in good working condition and can be operated with minor modifications. LIS Kotlu in Sadar Bilaspur block has been listed under Functional scheme, but as per site data, the existing borewell is on a private land and thus, a new scheme needs to be developed. A percolation well with RCC dyke structure has been proposed. For LIS Kasol, a new pump house is

SCREENING QUESTIONS	Yes	No	REMARKS
			proposed since the existing pump house was affected due to floods. For LIS Chhiber, LIS Massour/Malloh, LIS Sandhihar, LIS Meri Kathla (Ghumarwin block) and LIS Karot (Sadar Bilaspur block), a check dam is proposed to be constructed, which can cause disruption of the hydrology of natural waterways and disruption to the bed of the stream at the project site.
conflicts in water supply rights and related social conflicts?		√	Estimation of annual yield from surface water of khads / nallahs as the source has been carried out for 15 khads / nallahs using available rainfall data of 12 years. Except for Kothlu and Karot clusters with source on Ali Khad, sources of all other khads indicate shortages in supplying water to the irrigated area in November and December months. Storage structures with capacity ranging from 0.0050 mm³ at Talwara cluster to 0.0750 mm³ at Kasol and Bhadrog clusters are proposed to make these clusters workable with water available in proposed source. Thus, it is expected that there will be no conflict in water supply rights and related social conflicts due to project activities. Additionally, the CHPMA and WUA members will be adequately trained to be able to manage water in a sustainable manner.
impediments to movements of people and animals?	√		Temporary disruption of the movement of people and animals is anticipated during the construction phase only. Appropriate work scheduling and temporary access arrangements will be discussed and agreed upon with local communities during the construction phase.
potential ecological problems due to increased soil erosion and siltation, leading to decreased stream capacity?		√	Not anticipated
Insufficient drainage leading to		√	Not anticipated.

SCREENING QUESTIONS	Yes	No	REMARKS
salinity intrusion?			
Over-pumping of groundwater, leading to salinization and ground subsidence?		√	In Ghumarwin block, 2 clusters, i.e., Samsai and Feori (Kothi) have their source based on ground water. JSV has proposed borewell near each cluster. Since hydrogeological conditions in the area are not conducive for large drawl ground water development, it has been recommended to investigate an alternate suitable source. Similarly, in Sadar Bilaspur block, the source of clusters Kotlu, Dugga Har, Loharda/Deoth, Kanithal (Manjher) and Khod ka kyar is borewell. Since the sites are not conducive for construction of borewell, the source should be reviewed and rainwater harvesting structure or any suitable structure near the cluster area be identified.
Impairment of downstream water quality and therefore, impairment of downstream beneficial uses of water?		√	The net yield has been estimated after deducting upstream and downstream demands from monthly yield values. Additionally, CHPMA and WUA members will be trained to maintain downstream flow and sustainably manage available water.
Dislocation or involuntary resettlement of people?		√	The project will not cause any displacement of people.
potential social conflicts arising from land tenure and land use issues?		√	No private land will be involved for the project purpose.
soil erosion before compaction and lining of canals?	√		Protection of embankment will be included in the design option to avoid soil erosion. Measures such as temporary silt rap, stoking of soil away from water course, etc. will be adopted during the construction phase.
noise from construction equipment?	√		Temporary increase in noise level is anticipated during construction phase only. All the construction machineries employed will comply with noise emission standards of Central Pollution Control Board (CPCB). Consultation will be held with local communities for work scheduling at sensitive areas (school, health centers,

SCREENING QUESTIONS	Yes	No	REMARKS
			etc.).
▪ dust?	√		Temporary increase in dust generation is anticipated during construction phase due to movement of vehicles, hauling of materials and earth. Dust suppression measures such as water sprinkling, covering all trucks/ dumpers carrying dispersible, etc. will be employed.
labor-related social problems especially if workers from different areas are hired?		√	No such social conflict is anticipated as maximum number of local labors will be employed during construction phase only. Only few outside skilled labors will be temporarily deployed for specific job.
▪ waterlogging and soil salinization due to inadequate drainage and farm management?		√	The clusters are located on natural slope, no waterlogging is anticipated during farming. Natural drainage pattern will not be altered.
▪ leaching of soil nutrients and changes in soil characteristics due to excessive application of irrigation water?	√		Measures such as training of farmers for rational usage of water resource will be ensured during implementation.
▪ reduction of downstream water supply during peak seasons?		√	A detailed hydrological study has been carried out considering the catchment area, historical rainfall data, population growth and water demand in the area and discharge data. Downstream demands have been accounted for while calculating the net yield. It is concluded that during the peak demand period, most of the sites are likely to face shortages. Thus, CHPMA and WUA members will be trained to maintain downstream flow and sustainably manage available water.
▪ soil pollution, polluted farm runoff and groundwater, and public health risks due to excessive application of fertilizers and pesticides?	√		Contamination to ground water and soil are anticipated due to excessive application of fertilizers and pesticides. Measures for safe handling, storage and usage of fertilizers and pesticides will be followed.

SCREENING QUESTIONS	Yes	No	REMARKS
▪ soil erosion (furrow, surface)?		√	Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be allowed during rains.
▪ scouring of canals?		√	Regular maintenance activities such as removal of sediments and clogging will be involved.
▪ logging of canals by sediments?		√	Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be allowed during rains.
clogging of canals by weeds?		√	Regular cleaning activities will be involved.
▪ seawater intrusion into downstream freshwater systems?		√	Not Applicable
▪ introduction of increase in incidence of waterborne or water related diseases?		√	No such probable incidence is anticipated.
▪ dangers to a safe and healthy working environment due to physical, chemical and biological hazards during project construction and operation?		√	Occupational health and safety issues will not be significant. These will be managed through EMPs per subproject and environmental clauses in the construction contract.
▪ social conflicts if workers from other regions or countries are hired?		√	Not anticipated.
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	Local labor is to be recruited as much as possible.
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		√	The proposed project is unlikely to result in significant risks. Specific provision in the contracts together with monitoring of EMP implementation will ensure minimizing such risks.

SCREENING QUESTIONS	Yes	No	REMARKS
community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., irrigation dams) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?		√	The proposed project is unlikely to result in significant risks. Specific provision in the contracts together with monitoring of EMP implementation will ensure minimizing such risks.

Water Shortage Calculation

Sr. No.	Cluster Name	Source of Water	Catchment Area (km ²)	Proposed Irrigation Area (ha)	Minimum Excess / Maximum Shortage Vol (mm ³)	Month of Occurrence
1	Chhiber	Chhiber Nallah	4.62	16.99	-0.0102	Dec
2	Dehra	Seer Khad	208.71	38.47	-0.0236	Oct
3	Nalti Parnal		226.94	8.77	-0.0053	Nov
4	Talwara		307.70	18.17	-0.0034	Nov
5	Chharal		311.00	19.29	-0.0132	Nov
6	Bhapral		315.37	7.11	-0.0169	Nov
7	Lajanta		316.68	19.02	-0.0292	Nov
8	Kasol		331.76	35.56	-0.0468	Nov
9	Bhadrog		381.30	8.88	-0.0490	Dec
10	Massour / Maloh	Massour Nallah	1.57	6.57	-0.0040	Dec
11	Sandhihar	Soyed Nallah	8.67	18.97	-0.0115	Dec
12	Mehri Kathla	Bakrauli Khad	23.66	14.46	-0.0083	Dec
13	LIS Percolation Well – Jarad Khad	Percolation well on Jarad Khad	12.00	62.32	-0.0365	Dec
14	Kothlu	Ali Khad	144.65	14.23	0.0255	Dec
15	Karot		159.44	21.90	0.0111	Dec

PACKAGE-06 (CWJ/IRG/BLS-02) of BILASPUR DISTRICT

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
Jhandutta	Balh Sinha	32.14	LIS from JICA check dam	JICA dam	Litchi	642.80
	Kosarian-I	30.59	New scheme Perennial Nala	Kosari Nall	Citrus	600.60
	Lehar	25.23	New scheme Perennial Nala	Neri Dam	Guava	490.20
	Tikari Kotlu	23.65	New scheme Perennial Nala	Seer khad	Guava	458.80
	Fagog	12.33	LIS Seerkhad	JICA dam	Citrus	445.60
	Fagog Banjholi	22.83	Sukar Khad	JICA dam	Citrus	235.40
	Jhandu	16.06	Defunct Scheme of MHWDP Perennial Nala	JICA dam	Guava	307.00
	Tihri	29.15	LIS Tihri	LIS Tihri	Pomegranate	583.00
Swarghat	Bassi	12.44	LIS Changer	BBMB Canal	Citrus	248.80
	Dulhet 3	29.62	LIS Changer	BBMB Canal	Citrus	592.40
	Ghattewal	28.26	LIS Changer	BBMB Canal	Citrus	565.20

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting			The proposed project sites/clusters are located under Swarghat and Jhandutta blocks in Bilaspur district in Himachal Pradesh. The Naina Devi Wildlife Sanctuaries is located in the Swarghat tehsil of Bilaspur District. It extends over 17.1sq. km, in two Parts I, II, as it is at the valley side of Naina Devi Mountain range. The project villages in the Swarghat Block are in the buffer zone of the conservation reserve and are excluded from the conservation area. (refer - https://hpforest.nic.in/files/SriNainaDeviConservationReserve_A1b_1.pdf) The conservation reserve is covered by northern dry mixed deciduous forest. The commonly found animals in the sanctuary include langur, leopard, jungle cat, Bengal
Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
Protected Area	√		
▪ Wetland		√	
▪ Mangrove		√	
▪ Estuarine		√	
▪ Buffer zone of protected area	√		
▪ Special area for protecting biodiversity		√	

SCREENING QUESTIONS	Yes	No	REMARKS
			fox, Indian hare, yellow-throated marten, cobra and common giant flying squirrel.
B. Potential Environmental Impacts Will the Project cause...			
loss of precious ecological values (e.g. result of encroachment into forests/swamplands or historical/cultural buildings/areas, disruption of hydrology of natural waterways, regional flooding, and drainage hazards)?		√	There are 3 functional (existing), 4 non-functional (defunct) and 4 new irrigation schemes that will be developed. There are few existing irrigation schemes such as LIS Changer in the Swarghat block (water extracted from Anand Sahib Hydel channel), LIS Tihri and JICA Dam. The rest of the new schemes are planned from other few local Nallah or Khud. The construction of a small-scale LIS scheme will not cause any disruption of hydrology/ local flooding/ drainage hazards. While the three clusters namely, Ghattewal, Bassi, and Dulhet (Dhalet) are located at the periphery of the Naina Devi Conservation Reserve, no major construction activities will be carried out in these clusters as LIS Changer is an existing scheme. Only Separate gravity main is being proposed from the existing Zone 1B and Zone 2B tanks to connect the proposed cluster tanks of Ghattewal, Bassi and Dulhet 3. Since the intake well is on the other side of the valley of the conservation reserve, the ecology of the reserve will not get disturbed.
conflicts in water supply rights and related social conflicts?		√	The proposed project will not create any water rights related social conflict. Farmers and water users will be organized and trained.
impediments to movements of people and animals?	√		Temporary disruption of the movement of people and animals is anticipated during the construction phase only. Appropriate work scheduling and temporary access arrangements will be discussed and agreed upon with local communities during the construction phase.

SCREENING QUESTIONS	Yes	No	REMARKS
▪ potential ecological problems due to increased soil erosion and siltation, leading to decreased stream capacity?		√	The intake is on the man-made channel and is dredged periodically.
▪ Insufficient drainage leading to salinity intrusion?		√	Not anticipated.
▪ Over-pumping of groundwater, leading to salinization and ground subsidence?		√	No groundwater abstraction.
Impairment of downstream water quality and therefore, impairment of downstream beneficial uses of water?		√	Consultation has been conducted with downstream water users. No such potential impact is anticipated.
▪ Dislocation or involuntary resettlement of people?		√	The project will not cause any displacement of people.
▪ Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√	Not anticipated.
potential social conflicts arising from land tenure and land use issues?		√	No private land will be involved for the project purpose.
▪ soil erosion before compaction and lining of canals?	√		Protection of embankment will be included in the design option to avoid soil erosion. Measures such as temporary silt trap, stoking of soil away from water course etc will be adopted during the construction phase.
▪ noise from construction equipment?	√		Temporary increase in noise level is anticipated during construction phase only. All the construction machineries employed will comply with noise emission standards of Central Pollution Control Board (CPCB). Consultation will be held with local communities for work scheduling at sensitive areas (school, health centers etc).
▪ dust during construction?	√		Temporary increase in dust generation is anticipated during construction phase due to movement of vehicles, hauling of materials and earth. Dust suppression measures such as water sprinkling, covering all trucks/ dumpers carrying dispersible etc. will be employed.

SCREENING QUESTIONS	Yes	No	REMARKS
labor-related social problems especially if workers from different areas are hired?		√	No such social conflict is anticipated as maximum number of local labors will be employed during construction phase only. Only few outside skilled labors will be temporarily deployed for specific job.
▪ waterlogging and soil salinization due to inadequate drainage and farm management?		√	The clusters are located on natural slope, no waterlogging is anticipated during farming. Natural drainage pattern will not be altered.
▪ leaching of soil nutrients and changes in soil characteristics due to excessive application of irrigation water?	√		Measures such as training of farmers for rational usage of water resource will be ensure during implementation.
▪ reduction of downstream water supply during peak seasons?		√	The source of water are perennial, having much higher water flow throughout the year. Therefore, reduction of downstream water supply is not anticipated during peak summer season.
▪ soil pollution, polluted farm runoff and groundwater, and public health risks due to excessive application of fertilizers and pesticides?	√		Contamination to ground water and soil are anticipated due to excessive application of fertilizers and pesticides. Measures for safe handling, storage and usage of fertilizers and pesticides will be followed.
▪ soil erosion (furrow, surface)?		√	Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be allowed during rains.
▪ scouring of canals?		√	Regular maintenance activities such as removal of sediments and clogging will be involved.
▪ logging of canals by sediments?		√	Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be allowed during rains.
clogging of canals by weeds?		√	Regular cleaning activities will be involved.
▪ seawater intrusion into downstream freshwater systems?		√	Not Applicable

SCREENING QUESTIONS	Yes	No	REMARKS
▪ introduction of increase in incidence of waterborne or water related diseases?		√	No such probable incidence is anticipated.
▪ dangers to a safe and healthy working environment due to physical, chemical and biological hazards during project construction and operation?	√		Occupational health and safety issues will not be significant. These will be managed through EMPs per subproject and environmental clauses in the construction contract.
▪ social conflicts if workers from other regions or countries are hired?		√	Not anticipated.
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	Local labor is to be recruited as much as possible.
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?	√		The proposed project is unlikely to result in significant risks. Specific provision in the contracts together with monitoring of EMP implementation will ensure minimizing such risks.
▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., irrigation dams) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?		√	The proposed project is unlikely to result in significant risks. Specific provision in the contracts together with monitoring of EMP implementation will ensure minimizing such risks.

PACKAGE-07 (CWJ/IRG/MANDI-01) of MANDI DISTRICT

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
Chauntara	Golwan	17.19	LIS Golwan	Ropdi Khad	Guava	343.80
	Kothi – I (Balh)	9.30	LIS from TW 1	Tubewell	Guava	186.00
	Kothi - II	8.30	LIS from TW 2	Tubewell	Citrus	166.00
	Dhelu (Dhog)	9.97	LIS Dhelu	Tubewell	Guava	199.40
	Dol	33.29	LIS from TW 3	Tubewell	Litchi	665.80
	Khadiyal	23.24	LIS from TW 4	Tubewell	Litchi	464.80
Gopalpur	Sulpur	7.50	LIS Sulpur Bahi	Percollation well, Seer Khad	Pomegranate	150.00
	Dhar	10.16	LIS Basantpur	Beas River	Guava	203.20
	Barchwar	10.82		River Beas	Guava	216.40
	Ghadhyani	7.24		River Beas	Guava	144.80
	Kharoh (Kalerka)	17.11		Beas River	Guava	342.20
	Bhadarwar Khobla	9.02	LIS Bhadharwaar, Bhudroli Khad	Rissa Khad	Guava	180.40
	Bahi	8.71	LIS Percollation-Seer Khad	Percollation well, Seer Khad	Guava	174.20
	Bhambhla-I	14.15	LIS from Seer Khad	Seer Khad	Citrus	283.00
	Thouna/Dhalait	8.18	FIS Thouna Kuhal	Local Nallah	Guava	163.60
	Rasher	10.95	LIS Son Khadd	Son Khad	Citrus	219.00
	Batail 2	9.13	LIS from TW 5	Tubewell	Citrus	182.60
	Batial 1	19.70			Plum	394.00
	Bag-chuhku	12.86	LIS from TW 6	Tubewell	Citrus	257.20
	Mataur Tanda	13.05	LIS Infiltration-Seer Khad	Seer Khad	Pomegranate	261.00
Dharampur	Richhli	12.81	LIS Bari Marhi Dhwali	Beas River	Citrus	256.20
	Mannu Dhar (Joh)	13.68			Citrus	273.60
	Haryanal	12.55			Guava	251.00
	Satrehar	12.52			Citrus	250.40
	Ghanswai	8.30			Guava	166.00
	Aarli Paryal	9.87			Citrus	197.40
	Richhali / Dhwali	5.75			Guava	115.00
	Tarohla	8.00			Guava	160.00
	Taroon	9.26			Citrus	185.20
	Chhapanu	8.38			Citrus	167.60
	Banwaar Kalaan	13.16			Citrus	263.20

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
	Dhardi-1	2.67			Citrus	53.40
	Baratpur	7.49			Citrus	149.80
	Balhara 1	1.46			Citrus	29.20
	Balhara 2	2.45			Citrus	49.00
	Dhardi 2	3.55			Citrus	71.00
	Lalana	4.27			Citrus	85.40
	Parli Paryal	1.70			Citrus	34.00
	Sakran Dhar	5.36			Citrus	107.20
	Sherpur	1.24			Guava	24.80
	Chakyana	3.72			Citrus	74.40
	Chunighat	14.14			Citrus	282.80
	Gorat	12.25			Citrus	245.00
	Pakhdol	4.39			Citrus	87.80
	Tourjajar	9.74			Citrus	194.80
	Galloo (Chanouta)	6.19	LIS Baroti-Mandap-Joddan	Beas River	Citrus	123.80
	Siram (Sarskan)	7.05			Citrus	141.00
	Trembala	6.06			Citrus	121.20
	Hiun	3.96			Citrus	79.20
	Kumarhda 2	10.22			Plum	204.40
	Didnu	5.20			Citrus	104.00
	Banerti-2	10.44			Plum	208.80
	Pehad-2	10.04			Plum	200.80
	Chhater	10.86			Guava	217.20
	Drumman	30.76			Citrus	615.20
	Kumahrda	13.84			Plum	276.80
	Giun	27.80			Citrus	556.00
	Cheh	8.67			Guava	173.40
	Bahn	5.63			Citrus	112.60
	Chatroun (Lower)	11.26	LIS Kothua Dhallara	Beas River	Guava	225.20
	Dhalara 1	9.35			Citrus	187.00
	Dhalara 2	8.70			Citrus	174.00
	Lower Balh	6.24			Citrus	124.80
	Single Kuhat	3.70			Citrus	74.00
	Kanohi	1.32	LIS Sandhole	Beas River	Guava	26.40
	Lahsani	1.35			Guava	27.00
	Churu ra Balh	20.88	LIS Churu Balh	Nald Khad	Citrus	417.60
	Seoh II	27.49	LIS Seoh	Beas River	Citrus	549.80
	Seoh (Balh) Nichla Ropa	18.74		Beas River	Citrus	374.80
	Lower (Nichali) Bairi	9.13	LIS Bairi	Beas River	Citrus	182.60
	Upper Bairi	23.98			Citrus	479.60
	Barota	4.37	LIS Brang	Soan Khad	Guava	87.40

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
	Manyoh-Lambri	20.14	LIS Tihra	Beas River	Guava	402.80
	Thanna (Ropari)	8.18			Citrus	163.60
	Patti (Kot)	6.90			Guava	138.00
	Darwaar	9.27			Guava	185.40
	Digho-Baglana (Karyal)	7.28			Guava	145.60
	Skohta	1.82			Citrus	36.40
	Khajurti	5.76			Guava	115.20
	Bandal	10.71			Guava	214.20
	Chandpur	11.98			Citrus	239.60
	Tikri	14.51			Plum	290.20
	Dyol	5.59			Litchi	111.80

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting			
Is the Project area adjacent to or within any of the following environmentally sensitive areas?			The proposed oject sites/ clusters are located under Chauntara, Gopalpur and Dharampur blocks in Mandi district in Himachal Pradesh.
Protected Area		√	Bandli wildlife sanctuary is located in the Sundernagar block in Mandi district. Nargu wildlife sanctuary lies on the east side of the Uhl River in Mandi district and lies majorly in the Kullu district. Shikari Devi wildlife sanctuary is located near the Karsog valley in Mandi district.
▪ Wetland		√	
▪ Mangrove		√	
▪ Estuarine		√	
▪ Buffer zone of protected area		√	
▪ Special area for protecting biodiversity		√	All the sanctuaries are at a location of more than 30 km from the Project sites in the above blocks. Hence, the Project sites are not adjacent to or within any environmentally sensitive area.
B. Potential Environmental Impacts			

SCREENING QUESTIONS	Yes	No	REMARKS
Will the Project cause...			
loss of precious ecological values (e.g., result of encroachment into forests/swamplands or historical/cultural buildings/areas, disruption of hydrology of natural waterways, regional flooding, and drainage hazards)?		√	Under this package, there are 56 functional (existing), 3 non-functional (defunct) and 24 new irrigation schemes that will be developed. For the clusters in Chauntara block, no major civil work is proposed as the sources of majority of the clusters are existing borewells. For the clusters in Gopalpur block, a check dam of height 3 m is proposed across Rissa khad for the clusters Bhadarwar Khobla (functional) and Rasher (new). Also, for the clusters Bhamla-1, Batail 2, Bag-Chuhku, Matour Tanda and Sulpur, 4 Infiltration Galleries are recommended across Seer Khad. For cluster Bahi, a subsurface dyke cum check dam of height 1 to 2 m is recommended. The proposed construction can cause disruption of the hydrology of natural waterways and disruption to the bed of the stream at the project site. For the clusters in Dharampur block, majority of them have their source from river Beas. The river Beas is perennial and presently has sufficient discharge.
conflicts in water supply rights and related social conflicts?		√	The adequacy of water source has been tested for two types of proposed sources, viz. water supplied from Khads and water supplied from river Beas. The estimation of adequacy of yield from Khads has been done for 10 clusters and maximum shortage has been observed in October for Golwan, Bahi and Bhambla I clusters. The maximum shortage of 0.0080 Mm³ is noticed for Bhambla I cluster, while minimum shortage of 0.0028 Mm³ is noticed for Bahi cluster. It is expected that there will be no conflict in water supply rights and related social conflicts due to project activities.

SCREENING QUESTIONS	Yes	No	REMARKS
			Additionally, the CHPMA and WUA members will be adequately trained to be able to manage water in a sustainable manner.
▪ impediments to movements of people and animals?	√		Temporary disruption of the movement of people and animals is anticipated during the construction phase only. Appropriate work scheduling and temporary access arrangements will be discussed and agreed upon with local communities during the construction phase.
▪ potential ecological problems due to increased soil erosion and siltation, leading to decreased stream capacity?		√	Not anticipated
▪ Insufficient drainage leading to salinity intrusion?		√	Not anticipated.
▪ Over-pumping of groundwater, leading to salinization and ground subsidence?		√	In Chauntara block, 5 clusters have their source based on groundwater (borewells). The hydrogeological survey for these borewells has been conducted by JSV. Since the CCA area of the clusters is minimal, there will not be over-pumping of groundwater. In Gopalpur block, the source of 5 clusters is Seer khad, of which Sulpur cluster has its source from a functional scheme. For the other 4 clusters, Infiltration Galleries are proposed across the Seer khad since the hydrogeological setup is not conducive for construction of tubewells. No tubewells are proposed for Dharampur block.
Impairment of downstream water quality and therefore, impairment of downstream beneficial uses of water?		√	The net yield has been estimated after deducting upstream and downstream demands from monthly yield values. Additionally, CHPMA and WUA members will be trained to maintain downstream flow and sustainably manage available water.
▪ Dislocation or involuntary resettlement of people?		√	The project will not cause any displacement of people.

SCREENING QUESTIONS	Yes	No	REMARKS
potential social conflicts arising from land tenure and land use issues?		√	No private land will be involved for the project purpose.
▪ soil erosion before compaction and lining of canals?	√		Protection of embankment will be included in the design option to avoid soil erosion. Measures such as temporary silt rap, stoking of soil away from water course, etc. will be adopted during the construction phase.
▪ noise from construction equipment?	√		Temporary increase in noise level is anticipated during construction phase only. All the construction machineries employed will comply with noise emission standards of Central Pollution Control Board (CPCB). Consultation will be held with local communities for work scheduling at sensitive areas (school, health centers, etc.).
▪ dust?	√		Temporary increase in dust generation is anticipated during construction phase due to movement of vehicles, hauling of materials and earth. Dust suppression measures such as water sprinkling, covering all trucks/ dumpers carrying dispersible, etc. will be employed.
labor-related social problems especially if workers from different areas are hired?		√	No such social conflict is anticipated as maximum number of local labors will be employed during construction phase only. Only few outside skilled labors will be temporarily deployed for specific job.
▪ waterlogging and soil salinization due to inadequate drainage and farm management?		√	The clusters are located on natural slope, no waterlogging is anticipated during farming. Natural drainage pattern will not be altered.
▪ leaching of soil nutrients and changes in soil characteristics due to excessive application of irrigation water?	√		Measures such as training of farmers for rational usage of water resource will be ensured during implementation.
▪ reduction of downstream water supply during peak seasons?		√	A detailed hydrological study has been carried out considering the catchment area, historical rainfall data, population growth and water demand in the area and discharge data. Downstream demands

SCREENING QUESTIONS	Yes	No	REMARKS
			have been accounted for while calculating the net yield. It is concluded that during the peak demand period, most of the sites are likely to face shortages. Thus, CHPMA and WUA members will be trained to maintain downstream flow and sustainably manage available water.
▪ soil pollution, polluted farm runoff and groundwater, and public health risks due to excessive application of fertilizers and pesticides?	√		Contamination to ground water and soil are anticipated due to excessive application of fertilizers and pesticides. Measures for safe handling, storage and usage of fertilizers and pesticides will be followed.
▪ soil erosion (furrow, surface)?		√	Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be allowed during rains.
▪ scouring of canals?		√	Regular maintenance activities such as removal of sediments and clogging will be involved.
▪ logging of canals by sediments?		√	Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be allowed during rains.
clogging of canals by weeds?		√	Regular cleaning activities will be involved.
▪ seawater intrusion into downstream freshwater systems?		√	Not Applicable
▪ introduction of increase in incidence of waterborne or water related diseases?		√	No such probable incidence is anticipated.
▪ dangers to a safe and healthy working environment due to physical, chemical and biological hazards during project construction and operation?		√	Occupational health and safety issues will not be significant. These will be managed through EMPs per subproject and environmental clauses in the construction contract.
▪ social conflicts if workers from other regions or countries are hired?		√	Not anticipated.

SCREENING QUESTIONS	Yes	No	REMARKS
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	Local labor is to be recruited as much as possible.
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		√	The proposed project is unlikely to result in significant risks. Specific provision in the contracts together with monitoring of EMP implementation will ensure minimizing such risks.
▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., irrigation dams) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?		√	The proposed project is unlikely to result in significant risks. Specific provision in the contracts together with monitoring of EMP implementation will ensure minimizing such risks.

Water Shortage Calculation

Sr. No.	Cluster Name	Source Name	Catchment Area (km ²)	Proposed Irrigation Area (ha)	Minimum Excess / Maximum Shortage Vol (Mm ³)	Month of Occurrence
1	Golwan	Ropdi Khad	3.08	17.19	-0.0038	Oct
2	Sulpur	Percolation well, Seer Khad	93.91	7.50	0.0055	Oct
3	Bhadarwar Khobla	Rissa Khad	30.74	12.92	0.0075	Oct

4	Bahi	Percolation well, Seer Khad	24.60	8.71	-0.0028	Oct
5	Bhambhla - I	Seer Khad	3.08	14.15	-0.0080	Jan
6	Thouna / Dhalait	Local Nallah	22.90	8.18	0.0058	Nov
7	Rasher	Son Khad	28.74	10.95	0.0077	Oct
8	Mataur Tanda	Seer Khad	200.87	13.05	0.0171	Oct
9	Barota	Son Khad	135.84	4.37	0.0046	Oct
10	Churu Balh ka	Nald Khad		20.88		

PACKAGE-08 (CWJ/IRG/MANDI-02) of MANDI DISTRICT

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
Drang	Baragaon – I & II	14.32	LIS Baragaon	Baragaon nalla	Guava	286.40
Gohar/ Balh	Dharwahan-II (Sehal)	17.39	New LIS 10 Behl-Ksarla	BSL Canal	Guava	347.80
	Sawla	17.46	IPH Chamber	IPH Chamber	Persimmon	349.20
	Bagga Chalog	8.63	New LIS – Bagga Chalog	Jiuni Khad	Plum	172.60
	Latogali I	26.97	New LIS – Kuklah to Latogali	Bakhli Khad	Persimmon	539.40
	Brikhmani	16.76	FIS Anu Darbehad	Brikhmani Nalla	Plum	335.20
	Darvehad	12.33	LIS Zone no. 5 Balbehli	BSL Canal	Plum	246.60
	Manjhog Dhaniut	9.66	FIS Majhog Dhanyot	Dhaniut nalla	Plum	193.20
	Manjhagan Chudara	28.56	LIS – Manjhagan Chudara	Jiuni Khad	Plum	571.20
Sadar	Dhaniyara	17.85	LIS Dhanyara	Arnodi Khad	Litchi	357.00
	Binol	7.21	LIS Binol Neeyul	Beas River	Citrus	144.20
Sundernagar	Palhota	17.11	Functional Lift Irrigation Scheme, Nehra, Palhota (Kansa Khad)	Kansa Khad	Citrus	342.20
	Kuthain	15.45	Piped Irrigation Scheme Chirdi Boudhal Dhar	Kansa Khad	Citrus	309.00
	Bhantraed	11.85	Functional Lift Irrigation Scheme, Bhantraed (Bhantraed Khad)	Bhantraed Khad	Citrus	237.00
	Khagron	10.15	New LIS from Kiyargi Nallah	Kiyargi Nalla source	Plum	203.00

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting			
Is the Project area adjacent to or within any of the following environmentally sensitive areas?			The proposed oject sites/ clusters are located under Drang, Gohar/Balh, Sadar, and Sundernagar blocks in Mandi district in Himachal Pradesh.
Protected Area		√	Bandli wildlife sanctuary is located in the Sundernagar block in Mandi district. Nargu wildlife sanctuary lies on the east side of the Uhl River in Mandi district and lies majorly in the Kullu district.
▪ Wetland		√	Shikari Devi wildlife sanctuary is located near the Karsog valley in Mandi

SCREENING QUESTIONS	Yes	No	REMARKS
▪ Mangrove		√	district.
▪ Estuarine		√	The clusters in Sundernagar block are located at a distance of about 15 km from Bandli wildlife sanctuary, while those in Sadar block are located at a distance of about 30 km from the sanctuary. Thus, these Project sites lie in the buffer zone of the protected area. All other Project sites are not adjacent to or within any environmentally sensitive area.
▪ Buffer zone of protected area	√		
▪ Special area for protecting biodiversity		√	
B. Potential Environmental Impacts			
Will the Project cause...			
▪ loss of precious ecological values (e.g., result of encroachment into forests/swamplands or historical/cultural buildings/areas, disruption of hydrology of natural waterways, regional flooding, and drainage hazards)?		√	Under this package, there are 13 functional (existing) and 2 new irrigation schemes that will be developed. For the functional irrigation schemes, no major civil work is proposed. For the new schemes, the proposed construction can cause disruption of the hydrology of natural waterways and disruption to the bed of the stream at the project site.
▪ conflicts in water supply rights and related social conflicts?		√	The adequacy of water source has been tested for two types of proposed sources, viz. water supplied from Khads and water supplied from river Beas. Maximum shortage/excess is noticed majorly in the months of October to December, followed by February. Except for Baragaon, Latogali and Khargaon clusters, the rest have shortages. The maximum shortage of 0.0119 mm³ is noticed for Palhota cluster, while minimum shortage of 0.0008 mm³ is noticed for Manjhagan Chudara cluster. Storage structures

SCREENING QUESTIONS	Yes	No	REMARKS
			with capacity ranging from 0.0180 to 0.0012 mm³ are proposed to make these clusters workable with water available in proposed source. It is expected that there will be no conflict in water supply rights and related social conflicts due to project activities. Additionally, the CHPMA and WUA members will be adequately trained to be able to manage water in a sustainable manner.
▪ impediments to movements of people and animals?	√		Temporary disruption of the movement of people and animals is anticipated during the construction phase only. Appropriate work scheduling and temporary access arrangements will be discussed and agreed upon with local communities during the construction phase.
▪ potential ecological problems due to increased soil erosion and siltation, leading to decreased stream capacity?		√	Not anticipated
▪ Insufficient drainage leading to salinity intrusion?		√	Not anticipated.
▪ Over-pumping of groundwater, leading to salinization and ground subsidence?		√	Since all the clusters in the 4 blocks of Mandi district use surface water from khad / nallah / river / canal, no over-pumping of groundwater is anticipated.
Impairment of downstream water quality and therefore, impairment of downstream beneficial uses of water?		√	The net yield has been estimated after deducting upstream and downstream demands from monthly yield values. Additionally, CHPMA and WUA members will be trained to maintain downstream flow and sustainably manage available water.
▪ Dislocation or involuntary resettlement of people?		√	The project will not cause any displacement of people.
potential social conflicts arising from land tenure and land use issues?		√	No private land will be involved for the project purpose.

SCREENING QUESTIONS	Yes	No	REMARKS
▪ soil erosion before compaction and lining of canals?	√		Protection of embankment will be included in the design option to avoid soil erosion. Measures such as temporary silt rap, stoking of soil away from water course, etc. will be adopted during the construction phase.
▪ noise from construction equipment?	√		Temporary increase in noise level is anticipated during construction phase only. All the construction machineries employed will comply with noise emission standards of Central Pollution Control Board (CPCB). Consultation will be held with local communities for work scheduling at sensitive areas (school, health centers, etc.).
▪ dust?	√		Temporary increase in dust generation is anticipated during construction phase due to movement of vehicles, hauling of materials and earth. Dust suppression measures such as water sprinkling, covering all trucks/ dumpers carrying dispersible, etc. will be employed.
labor-related social problems especially if workers from different areas are hired?		√	No such social conflict is anticipated as maximum number of local labors will be employed during construction phase only. Only few outside skilled labors will be temporarily deployed for specific job.
▪ waterlogging and soil salinization due to inadequate drainage and farm management?		√	The clusters are located on natural slope, no waterlogging is anticipated during farming. Natural drainage pattern will not be altered.
▪ leaching of soil nutrients and changes in soil characteristics due to excessive application of irrigation water?	√		Measures such as training of farmers for rational usage of water resource will be ensured during implementation.

SCREENING QUESTIONS	Yes	No	REMARKS
▪ reduction of downstream water supply during peak seasons?		√	A detailed hydrological study has been carried out considering the catchment area, historical rainfall data, population growth and water demand in the area and discharge data. Downstream demands have been accounted for while calculating the net yield. It is concluded that during the peak demand period, most of the sites are likely to face shortages. Thus, CHPMA and WUA members will be trained to maintain downstream flow and sustainably manage available water.
▪ soil pollution, polluted farm runoff and groundwater, and public health risks due to excessive application of fertilizers and pesticides?	√		Contamination to ground water and soil are anticipated due to excessive application of fertilizers and pesticides. Measures for safe handling, storage and usage of fertilizers and pesticides will be followed.
▪ soil erosion (furrow, surface)?		√	Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be allowed during rains.
▪ scouring of canals?		√	Regular maintenance activities such as removal of sediments and clogging will be involved.
▪ logging of canals by sediments?		√	Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be allowed during rains.
clogging of canals by weeds?		√	Regular cleaning activities will be involved.
▪ seawater intrusion into downstream freshwater systems?		√	Not Applicable
▪ introduction of increase in incidence of waterborne or water related diseases?		√	No such probable incidence is anticipated.

SCREENING QUESTIONS	Yes	No	REMARKS
▪ dangers to a safe and healthy working environment due to physical, chemical and biological hazards during project construction and operation?		√	Occupational health and safety issues will not be significant. These will be managed through EMPs per subproject and environmental clauses in the construction contract.
▪ social conflicts if workers from other regions or countries are hired?		√	Not anticipated.
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	Local labor is to be recruited as much as possible.
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		√	The proposed project is unlikely to result in significant risks. Specific provision in the contracts together with monitoring of EMP implementation will ensure minimizing such risks.
▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., irrigation dams) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?		√	The proposed project is unlikely to result in significant risks. Specific provision in the contracts together with monitoring of EMP implementation will ensure minimizing such risks.

Water Shortage Calculation

Sr. No.	Cluster Name	Source Name	Catchment Area (km ²)	Proposed Irrigation Area (ha)	Minimum Excess / Maximum Shortage Vol (Mm ³)	Month of Occurrence
1	Baragaon – I & II	Baragaon nalla	28.128	14.32	0.00254	
2	Dharwahan-II (Sehal)	BSL Canal		17.39	NA	NA

Sr. No.	Cluster Name	Source Name	Catchment Area (km ²)	Proposed Irrigation Area (ha)	Minimum Excess / Maximum Shortage Vol (Mm ³)	Month of Occurrence
3	Sawla	IPH Chamber	190.466	17.46	-0.0106	October
4	Bagga Chalog	Jiuni Khad	13.329	8.63	-0.0038	December
5	Latogali I	Bakhli Khad	266.201	26.97	0.0060	
6	Brikhmani	Brikhmani Nalla	4.080	16.76	-0.0098	December
7	Darvehad	BSL Canal		12.33	NA	NA
8	Manjhog Dhaniut	Dhaniut nalla	8.522	9.66	-0.0032	February
9	Manjhagan Chudara	Jiuni Khad	178.180	28.56	-0.0008	December
10	Dhaniyara	Arnodi Khad	14.697	17.85	-0.0105	October
11	Binol	Beas River		7.21	NA	NA
12	Palhota	Kansa Khad	42.073	17.11	-0.0119	February
13	Kuthain	Kansa Khad	35.085	15.45	-0.0025	February
14	Bhantraed	Bhantred Khad	36.308	11.85	-0.0030	October
15	Khagron	Kiyargi Nalla source	14.517	10.15	0.0077	

PACKAGE-09 (CWJ/IRG/KNG-01) of KANGRA DISTRICT

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
Bajnath	Langhu – 1	6.20	LIS on Binwa Khad	Binwa Khad	Guava	124.00
	Langhu – 2	7.25			Guava	145.00
	Langhu - 3	8.42			Guava	168.40
	Manghota	6.00	LIS Manghota Cluster	Binwa Khad	Guava	120.00
	Kudail	16.61	LIS Kudail Cluster	Dea Nallah	Guava	332.20
Bhawarna	Thandol – 1	16.95	LIS Thandol Cluster	Mol Khad	Guava	339.00
	Ghar	8.21	LIS Ghar Cluster	Mand Khad	Citrus	164.20
	Malahu II	8.46	LIS on Mol Khad	Mol Khad	Litchi	169.20
	Malahu I	5.29			Citrus	105.80
	Sidhpur	30.09	LIS Sidhpur Cluster	Nugal Khad	Citrus	601.80
	Chartkhola	17.71	LIS on Tahl Khad	Tahl Khad	Citrus	373.40
	Ludhran 1 & 2	15.09	LIS on Tahl Khad	Tahl Khad	Litchi	301.80
Lambagaon	Maldoan	10.59	Existing Functional LIS Alampur Extension	Nugal Khad	Citrus	211.80
	Jangal	9.15	LIS Alampur Extension	Nugal Khad	Citrus	183.00
	Odri	8.76	LIS Bandhui Extension	Mol Khad	Citrus	175.20
	Kotlu	4.52	LIS Bandhui Extension	Mol Khad	Citrus	90.40
	Kathla	7.59	LIS Kathla Cluster	Beas River	Citrus	151.80
	Thanpal / Chambi	8.34	LIS Thanpal / Chambi Cluster	Beas River	Citrus	166.80
Panchrukhi	Trehal	8.22	LIS Trehal Cluster	Tubewell	Guava	164.40
	Agozar	7.03	LIS Agozar Cluster	Tubewell	Citrus	140.60
	Rajhot 1	17.27	LIS Rajhot – 1 & 2 Cluster	Awah Khad	Citrus	345.40
	Ladoh 1	17.21	LIS Ladoh-1 Cluster	Tubewell	Litchi	344.20
	Ladoh 2	5.53	LIS Ladoh-2 Cluster	Alang Nallah	Litchi	110.60
	Banuri	7.73	LIS Banuri Cluster	Gharuhal Khul	Citrus	154.60
	Saliana	7.33	LIS Saliana Cluster	Nai Khul	Citrus	146.60
	Molichak	6.15	LIS Molichak Cluster	Tubewell	Citrus	123.00
	Jandpur	8.54	LIS Jandpur Cluster	Tubewell	Citrus	170.80
Sullah	Dheera 1 & 2	23.47	LIS Dheera – 1 & 2 Cluster	Nugal Khad	Citrus	469.40

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
	Dheera 3	10.81	LIS Dheera – 3 Cluster	Nugal Khad	Citrus	216.20
	Chainchadi Kuthera –	10.19	LIS Chainchadi – Kuthera Cluster	Mand Khad	Citrus	203.80
	Purba	15.36	LIS Purba Cluster	Nugal Khad	Citrus	307.20
	Chandar	36.60	LIS Chandar Cluster	Mol Khad	Litchi	732.00
	Gagal Khas	23.47	LIS Gagal Khas Cluster	Tal Khad	Litchi	469.40

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting			
Is the Project area adjacent to or within any of the following environmentally sensitive areas?			The proposed oject sites/ clusters are located under Baijnath, Bhawarna, Lambagaon, Panchrukhi, and Sullah blocks in Kangra district in Himachal Pradesh.
Protected Area		√	Dhauladhar wildlife sanctuary is located in the Gopalpur block in Kangra district. Pong Dam Lake wildlife sanctuary is located across Beas river, in the wetland of Shivalik hills of Kangra district.
▪ Wetland		√	
▪ Mangrove		√	The clusters covered in this package are located at a distance of more than 30 km from Dhauladhar wildlife sanctuary and more than 100 km from Pong Dam Lake wildlife sanctuary.
▪ Estuarine		√	
▪ Buffer zone of protected area		√	Thus, the Project sites are not adjacent to or within any environmentally sensitive area.
▪ Special area for protecting biodiversity		√	
B. Potential Environmental Impacts			
Will the Project cause...			
▪ loss of precious ecological values (e.g., result of encroachment into forests/swamplands or historical/cultural buildings/areas, disruption		√	Under this package, there are 9 functional (existing) and 23 new irrigation schemes that will be developed. For the functional irrigation schemes, no major

SCREENING QUESTIONS	Yes	No	REMARKS
of hydrology of natural waterways, regional flooding, and drainage hazards)?			civil work is proposed. For the new schemes, the proposed construction can cause disruption of the hydrology of natural waterways and disruption to the bed of the stream at the project site.
▪ conflicts in water supply rights and related social conflicts?		√	The adequacy of water source has been tested for two types of proposed sources, viz. water supplied from Khads and water supplied from river Beas. Maximum shortage is noticed majority of times in November followed by October. Except for Manghota cluster, rest of the clusters, who have their source based on a khad, have shortage. The maximum shortage of 0.03022 mm ³ is noticed for Jangal Malodha cluster in Lambagaon block, while minimum shortage of 0.0062 mm ³ is noticed for Malahu 1 & 2 cluster in Bhawarna Block as well as Chainchadi Kuthera cluster in Sullah Block. Storage structures with capacity ranging from 0.0065 to 0.0455 mm ³ are proposed to make these clusters workable with water available in proposed source. It is expected that there will be no conflict in water supply rights and related social conflicts due to project activities. Additionally, the CHPMA and WUA members will be adequately trained to be able to manage water in a sustainable manner.
▪ impediments to movements of people and animals?	√		Temporary disruption of the movement of people and animals is anticipated during the construction phase only. Appropriate work scheduling and temporary access arrangements will be discussed and agreed upon with local communities during the construction phase.
▪ potential ecological problems due to increased soil erosion and siltation, leading to decreased stream capacity?		√	Not anticipated
▪ Insufficient drainage leading to salinity intrusion?		√	Not anticipated.

SCREENING QUESTIONS	Yes	No	REMARKS
Over-pumping of groundwater, leading to salinization and ground subsidence?		√	In Baijnath block, of the 6 clusters covered under New Proposed Scheme, the sources of 3 clusters are based on surface water of Binwa Khad, which is perennial in nature and assessed to be hydrologically feasible for providing irrigational schemes. The sources of remaining 3 clusters i.e., Kundail, Utrala, -Langhu 3 are based on local nallahs namely Dea, Manai and Punn respectively. Of these, 2 nallahs, i.e., Manai and Punn seem to be perennial in nature as their origin is snow fed. For cluster Kundail, the source is based on Dea nallah which is not perennial in nature. The source is not feasible for providing irrigation scheme to Kundail cluster. The site is also not assessed to be hydrogeologically feasible for ground water development. In Bhawarna block, there are 6 clusters. Out of these, 4 clusters covered under new proposed scheme and 2 clusters taken under functional scheme. Out these 4 clusters (NPS), the source of 3 clusters are tubewells and one cluster named Khara have source - surface water proposed from Khara Nallah. The sources of 6 clusters, i.e., Thandol-I and Malahu I & II, Ghar, Chartkhola and Ludhran 1&2 are based on surface water of various khads namely Mol khad, Mand khad and Tahl khad respectively. Hydrological study of Mol and Mand khad is essential and recommendations of Hydrologist is mandatory. The behavior of Tahl khad near source of cluster Chartkhola and Ludhran 1&2 is ephemeral. The hydrogeological conditions assessed in the cluster area or nearby are not conducive for large scale ground water development. In Lambagaon block, the source of 2 clusters, i.e., Maldoan and Jangal with single location is based on surface water of Neugal khad, which is perennial in nature and have sufficient discharge. The source of clusters Oderi and Kotlu is not perennial near area of the clusters. Therefore, keeping in view, the behavior of Mol khad, which is tributary of Neugal khad, hydrological study of the khad is indispensable and recommendations of Hydrologist are mandatory. In Panchrukhi block, the sources of all 10 clusters are based on ground water as per field survey

SCREENING QUESTIONS	Yes	No	REMARKS
			team. Out of 10 clusters, the sources of 8 clusters including functional scheme as intimated by the field team are assessed hydrogeologically feasible for ground water development. However, Agozar cluster has close proximity towards Siwalik rocks. The hydrogeological conditions are not favorable for large scale ground water development. Hence, the site is not recommended for construction of tubewells. Therefore, for site Agozar, surface water of the local nallah, which is perennial and flowing adjoining to the proposed location of Agozar tubewell site. However, the tubewell site Tatehal may be shifted to nearby hydrogeologically favourable location. In Sullah block, the sources of 3 clusters, i.e., Dheera 1&2, Dheer 3 and Purba are based on surface water of Neugal khad, which is perennial in nature. The sources of clusters Chainchandi Kuthera and Chandar are based on Mand khad and Mol khad respectively. Both khads are perennial in nature near the source area. The source of Gagal Khas is based on surface water of Tal khad, which is not perennial in nature. The hydrological study of Tal khad is essential and recommendations of Hydrologist are mandatory.
Impairment of downstream water quality and therefore, impairment of downstream beneficial uses of water?		√	The net yield has been estimated after deducting upstream and downstream demands from monthly yield values. Additionally, CHPMA and WUA members will be trained to maintain downstream flow and sustainably manage available water.
▪ Dislocation or involuntary resettlement of people?		√	The project will not cause any displacement of people.
potential social conflicts arising from land tenure and land use issues?		√	No private land will be involved for the project purpose.
▪ soil erosion before compaction and lining of canals?	√		Protection of embankment will be included in the design option to avoid soil erosion. Measures such as temporary silt rap, stoking of soil away from water course, etc. will be adopted during the construction phase.

SCREENING QUESTIONS	Yes	No	REMARKS
▪ noise from construction equipment?	√		Temporary increase in noise level is anticipated during construction phase only. All the construction machineries employed will comply with noise emission standards of Central Pollution Control Board (CPCB). Consultation will be held with local communities for work scheduling at sensitive areas (school, health centers, etc.).
▪ dust?	√		Temporary increase in dust generation is anticipated during construction phase due to movement of vehicles, hauling of materials and earth. Dust suppression measures such as water sprinkling, covering all trucks/ dumpers carrying dispersible, etc. will be employed.
labor-related social problems especially if workers from different areas are hired?		√	No such social conflict is anticipated as maximum number of local labors will be employed during construction phase only. Only few outside skilled labors will be temporarily deployed for specific job.
▪ waterlogging and soil salinization due to inadequate drainage and farm management?		√	The clusters are located on natural slope, no waterlogging is anticipated during farming. Natural drainage pattern will not be altered.
▪ leaching of soil nutrients and changes in soil characteristics due to excessive application of irrigation water?	√		Measures such as training of farmers for rational usage of water resource will be ensured during implementation.
▪ reduction of downstream water supply during peak seasons?		√	A detailed hydrological study has been carried out considering the catchment area, historical rainfall data, population growth and water demand in the area and discharge data. Downstream demands have been accounted for while calculating the net yield. It is concluded that during the peak demand period, most of the sites are likely to face shortages. Thus, CHPMA and WUA members will be trained to maintain downstream flow and sustainably manage available water.
▪ soil pollution, polluted farm runoff and groundwater, and public health risks due to excessive application of fertilizers and pesticides?	√		Contamination to ground water and soil are anticipated due to excessive application of fertilizers and pesticides. Measures for safe handling, storage and usage of fertilizers and

SCREENING QUESTIONS	Yes	No	REMARKS
			pesticides will be followed.
▪ soil erosion (furrow, surface)?		√	Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be allowed during rains.
▪ scouring of canals?		√	Regular maintenance activities such as removal of sediments and clogging will be involved.
▪ logging of canals by sediments?		√	Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be allowed during rains.
clogging of canals by weeds?		√	Regular cleaning activities will be involved.
▪ seawater intrusion into downstream freshwater systems?		√	Not Applicable
▪ introduction of increase in incidence of waterborne or water related diseases?		√	No such probable incidence is anticipated.
▪ dangers to a safe and healthy working environment due to physical, chemical and biological hazards during project construction and operation?		√	Occupational health and safety issues will not be significant. These will be managed through EMPs per subproject and environmental clauses in the construction contract.
▪ social conflicts if workers from other regions or countries are hired?		√	Not anticipated.
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	Local labor is to be recruited as much as possible.
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials		√	The proposed project is unlikely to result in significant risks. Specific provision in the contracts together with monitoring of EMP

SCREENING QUESTIONS	Yes	No	REMARKS
such as explosives, fuel and other chemicals during construction and operation?			implementation will ensure minimizing such risks.
▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., irrigation dams) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?		√	The proposed project is unlikely to result in significant risks. Specific provision in the contracts together with monitoring of EMP implementation will ensure minimizing such risks.

Water Shortage Calculation

Sr. No.	Cluster Name	Source Name	Catchment Area (km ²)	Proposed Irrigation Area (ha)	Minimum Excess / Maximum Shortage Vol (Mm ³)	Month of Occurrence
1	Langhu – 1	Binwa Khad	226.957	6.20	-0.0103	Oct
2	Langhu – 2			7.25		
3	Langhu - 3			8.42		
4	Manghota	Binwa Khad	124.920	6.00	0.0264	Jun
5	Kudail	Dea Nallah	1.092	16.61	-0.0097	Oct
7	Thandol – 1	Mol Khad	0.096	16.95		
8	Ghar	Mand Khad	7.973	8.21	-0.0042	Nov
9	Malahu II	Mol Khad	20.947	8.46	-0.0062	Nov
10	Malahu I			5.29		
11	Sidhpur	Nugal Khad	0.362	30.09	-0.01854	Oct
12	Chartkhola	Tahl Khad	2.676	18.67	-0.0201	Oct

Sr. No.	Cluster Name	Source Name	Catchment Area (km ²)	Proposed Irrigation Area (ha)	Minimum Excess / Maximum Shortage Vol (Mm ³)	Month of Occurrence
13	Ludhran 1 & 2	Tahl Khad		15.09		
14	Maldoan	Nugal Khad	379.541	10.59	-0.03022	Nov
15	Jangal	Nugal Khad		9.15		
16	Odri	Mol Khad	64.527	8.76	-0.0250	Nov
17	Kotlu	Mol Khad		4.52		
18	Kathla	Beas River		7.59		
19	Thanpal / Chambi	Beas River		8.34		
20	Trehal	Tubewell		8.22		
21	Agozar	Tubewell		7.03		
22	Rajhot 1	Awah Khad	45.431	17.27	-0.0128	Oct
23	Ladoh 1	Tubewell		17.21		
24	Ladoh 2	Alang Nallah	1.591	5.53	-0.0032	Nov
25	Banuri	Gharuhal Khul	0.452	7.73	-0.00468	Oct
27	Saliana	Nai Khul	0.642	7.33	-0.004335	Oct
28	Molichak	Tubewell		6.15		
29	Jandpur	Tubewell		8.54		
30	Dheera 1 & 2	Nugal Khad	158.480	23.47	-0.0182	Nov
31	Dheera 3	Nugal Khad		10.81		
32	Chainchadi – Kuthera	Mand Khad	50.125	10.19	-0.0062	Nov
33	Purba	Nugal Khad	50.103	15.36	-0.0243	Nov
34	Chandar	Mol Khad	47.157	36.60	-0.0257	Nov

Sr. No	Cluster Name	Source Name	Catchment Area (km ²)	Proposed Irrigation Area (ha)	Minimum Excess / Maximum Shortage Vol (Mm ³)	Month of Occurrence
35	Gagal Khas	Tal Khad		23.47		

PACKAGE-10 (CWJ/IRG/KNG-02) of KANGRA DISTRICT

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
Dehra	Jakhota	227.54	New Proposed	Beas River	Citrus	4539.60
	Dhanot	205.21	New Proposed	Beas River	Citrus	4113.20
	Bhatoli Phakasian	11.44	LIS Dibber Rour	Banner Khad (rivulet)	Citrus	217.60
	Bhatera Bassa	13.90	LIS Bhatera Bassa	Banner Khad (rivulet)	Citrus	278.00
	Lalwada	30.41	New Proposed	Beas River	Citrus	597.00
	Chamba Khas	10.44	LIS Chamba Khas	Beas River	Citrus	221.40
	Kuhna	11.86	New Proposed	Beas River	Citrus	226.20

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting			
Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
Protected Area		▪	25.32 km from Dhauladhar Reserve Forest
Mangrove		▪	NA
Estuarine		▪	NA
Buffer zone of protected area		▪	NA
Special area for protecting biodiversity		▪	There are only two wild-life sanctuaries in Kangra – Dhauladhar and Pong-dam Lake, and the project sites are far away from these.
B. Potential Environmental Impacts			
Will the Project cause...			
loss of precious ecological values (e.g., result from encroachment into forests/swamplands or historical/cultural buildings/areas, disruption of	▪		About 4 new sites will be developed under this package. Thus, there is likely to be some disruption of the hydrology of natural waterways during the construction period. However, since all of them will be developed on Beas River, which is a glacial-fed perennial

SCREENING QUESTIONS	Yes	No	REMARKS
the hydrology of natural waterways, regional flooding, and drainage hazards)?			river, and 90% & 75% dependable flow at lean period suggest surplus availability.
conflicts in water supply rights and related social conflicts?		▪	Farmers water user communities will be organized and trained.
impediments to movements of people and animals?	▪		Some disruption of movement of people and animals is expected during construction phase. Appropriate works scheduling and temporary access arrangements will be discussed and agreed with the communities during construction phase.
potential ecological problems due to increased soil erosion and siltation, leading to decreased stream capacity?		▪	Not anticipated
Insufficient drainage leading to salinity intrusion?		▪	Not anticipated
over pumping of groundwater, leading to salinization and ground subsidence?		▪	No groundwater pumping, it's a surface irrigation project
impairment of downstream water quality and therefore, impairment of downstream beneficial uses of water?	▪		The construction work will be carried out at the bank of the river. Construction measures will be applied to avoid significant pollution of river water. Some additional turbidity may be rendered to river water. No Hazardous Waste will be used in construction. Pre-fabricated structures will be installed.
dislocation or involuntary resettlement of people?		▪	No IR is triggered in this project
disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		▪	No IP is triggered in this project
potential social conflicts arising from land tenure and land use issues?		▪	No project is beneficial to the local farmers
soil erosion before compaction and lining of canals?	▪		Soil erosion may happen during the installation of Raising Main GI pipes. No major impact is expected.

SCREENING QUESTIONS	Yes	No	REMARKS
			Mitigation measures include: (i) diversion drains and bunds, and temporary silt traps/ponds; and (ii) stockpiling of soil in flat areas and far from drainage routes; (iii) followed by soil compaction
noise from construction equipment?	▪		No major impact is expected as there is no sensitive receptor at the construction sites Mitigation Decibel limits to be followed to the extent possible. Discussions will be held with communities to agree on schedules and duration of noisy construction activities. All construction vehicles and equipment must be well maintained. Contractors must be licensed to carry out their work.
Dust during construction?	▪		Dust pollution likely to happen during field preparation. Mitigation Adequate water sprinkling will be carried out during field preparation
labour-related social problems especially if workers from different areas are hired?	▪		Migrated labours maybe used during construction period. However, these workers commonly migrate to the State for civil and other works. Thus, project will not induce any additional migration. Mitigation EPC Contractor shall provision necessary work and stay support to such workers and engage with them to avoid any social conflicts.
waterlogging and soil salinization due to inadequate drainage and farm management?		▪	Fields will be supplied with drip irrigation facilities thus no water logging situation will arise.
leaching of soil nutrients and changes in soil		▪	Fields will be supplied with drip irrigation facilities thus there will be no excessive application of irrigation water which may lead

SCREENING QUESTIONS	Yes	No	REMARKS
characteristics due to excessive application of irrigation water?			to leaching of soil nutrients and changes in soil characteristics
reduction of downstream water supply during peak seasons?		▪	Water demand and water budgeting has been appropriately carried out during the design of the subprojects.
soil pollution, polluted farm runoff and groundwater, and public health risks due to excessive application of fertilizers and pesticides?	▪		Fertigation will be carried out through drip irrigation system, thus there will be control over amount of fertilizer being used. Only prescribed level as per SOPs will be applied by the farmers. Further, farmers will be trained on application of organic farming and development of such value chain.
soil erosion (furrow, surface)?	▪		Adequate terracing and bed compaction will be carried out during field preparation. Additionally, intercropping will also help in avoiding soil erosion from the furrows.
scouring of canals?		▪	Not Applicable
logging of canals by sediments?		▪	Not Applicable
clogging of canals by weeds?		▪	Not Applicable
seawater intrusion into downstream freshwater systems?		▪	Not Applicable
introduction of increase in incidence of waterborne or water related diseases?		▪	Not anticipated.
dangers to a safe and healthy working environment due to physical, chemical and biological hazards during project construction and operation?		▪	Not anticipated.
social conflicts if workers from other regions or countries are hired?		▪	Not anticipated.
large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?			Local labor is to be recruited as much as possible.

SCREENING QUESTIONS	Yes	No	REMARKS
risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?			The proposed project is unlikely to result in significant risks. Specific provision in the contracts together with monitoring of EMP implementation will ensure minimizing such risks.
community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., irrigation dams) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?			The proposed project is unlikely to result in significant risks. Specific provision in the contracts together with monitoring of EMP implementation will ensure minimizing such risks.

Climate Change and Disaster Risk Assessment

Climate Change and Disaster Risk Questions	Yes	No	Remarks
The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.			
Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes?	Yes		Irrigation facilities are subjected to flood and landslides and Horticulture fields are subjected to heavy rain and hailstorm
Could changes in temperature, precipitation, or extreme storm surges over the Project lifespan affect technical or financial sustainability (e.g., changes in rainfall patterns disrupt reliability of water supply; sea level rise creates salinity intrusion into proposed water supply source)?	Yes		Water availability in Baner Khad is likely to reduce during lean periods (month of May, Oct – Jan) – go below 75% dependable flow.
Are there any demographic or socio- economic aspects of the Project area that are already vulnerable (e.g., high incidence of		No	Project-based Poverty, Social and Gender assessment does not suggest any

Climate Change and Disaster Risk Questions	Yes	No	Remarks
marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?			significant adverse impact on such a population.
Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by using water from a vulnerable source that is relied upon by many user groups, or encouraging settlement in earthquake zones)?		No	Following data components have been used for estimation of sustainable or 75% dependable yield of the source: - Hydro-meteorological data extending to recent 30 years • Observed rainfall stations near and within the cluster area • Observed discharges at the gauging stations on different khads - Evaporation data that is representative of the cluster area - Existing and future water demand along with the proposed cropping pattern to be grown in each cluster - Map showing catchment area of the khad in case water is being drawn from surface water in the respective khad. - Results of pumping test carried out to determine the yield from open well or bore well or tube well Thus, all adequate measures have been taken to ensure source sustainability.

PACKAGE-11 (CWJ/IRG/UNA-02) of UNA DISTRICT

Block Name	Cluster Name	Cluster Area (ha)	Irrigation Scheme	Source of Water	Crop	Water Demand (cu. m. per day)
Bangana	Boul – 1	19.32	LIS from RWHS Samoor	RWH	Guava	386.40
	Boul – 2	24.55	LIS from RWHS Samoor	RWH	Guava	491.00
	Dulehri Rajputa	9.11	Dulheri Rajputa and Thana Khurd	Nallah	Pomegranate	182.20
	Sanhal	13.58	LIS from RWHS Samoor	RWH	Guava	271.60
	Thana Khurd	22.24	Dulheri Rajputa and Thana Khurd	Nallah	Pomegranate	444.80
	Balh	14.02	LIS over Check dam	Check Dam	Pomegranate	280.40
	Chadoli	26.75	LIS over RWH-1	RWH	Guava	535.00
	Dumkhar	10.75	RWHS upstream of Khad	RWH	Pomegranate	215.00
	Muchali 1 & 2	21.26	LIS over RWH	RWH	Guava	425.20
	Nalwari	36.52	RWHS upstream of Khad	RWH	Pomegranate	730.40
	Handola	11.84	LIS Handola	River Satluj	Guava	236.80
	Dobad	8.70	LIS over RWH	Check dam	Pomegranate	174.00

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting			The proposed project sites/ clusters are located under Bangana block in the Una district in Himachal Pradesh. There are no environmentally sensitive areas nearby to project sites.
Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
Protected Area		√	
▪ Wetland		√	
▪ Mangrove		√	
▪ Estuarine		√	
▪ Buffer zone of protected area		√	

SCREENING QUESTIONS	Yes	No	REMARKS
▪ Special area for protecting biodiversity		√	
B. Potential Environmental Impacts Will the Project cause...			
▪ loss of precious ecological values (e.g., the result of encroachment into forests/swamplands or historical/cultural buildings/areas, disruption of the hydrology of natural waterways, regional flooding, and drainage hazards)?		√	Under this package, there are 4 functional (existing) schemes out of which 1 is non-functional (defunct) and 10 new irrigation schemes are proposed. The existing and in working conditions are being well operated and do not require any civil work. The LIS Handola is proposed for rehabilitation as it has lived its design life of 20 years. This is over River Satluj is one of the main perennial rivers of the state and therefore no disruption of the hydrology of the natural waterway is expected. However, there could be flood hazards. Scheme over Chaplah Khad – there is an existing check dam based on which the scheme will be developed. Thus, this is not going to cause, disruption of the hydrology of natural waterways. For other new schemes, check dams are proposed this is likely to cause disruption of the hydrology of natural waterways and disruption to the bed of the stream at the project site. There are no ecologically sensitive features nearby.
▪ conflicts in water supply rights and related social conflicts?	√		As per the hydrological assessment of the sources, the project sites are expected to experience water shortages during the winter months (Oct to Feb) due to a lack of rainfall during the period. The shortages have been estimated on the net availability after deducting the following environmental flows (E-flow) – existing and future water demand on upstream and downstream riparian

SCREENING QUESTIONS	Yes	No	REMARKS
			rights – in absence of actual data considered 80% of the flow; • water requirement for all clusters is taken as 20 m³/day/ha; • E-flow and future demand at each source were taken as 15% and 20% yield respectively of net available; There is likely to be shortage of water at all source locations in the winter months due to no rain (detail is given at the end of the assessment). However, since the calculation has considered E-flows and Future consumption as well as 80% for upstream and downstream consumption, it is expected that there will be no conflict in water supply rights and related social conflicts due to project activities. Additionally, the CHPMA and WUA members will be adequately trained to be able to manage water in a sustainable manner.
▪ impediments to movements of people and animals?	√		Temporary disruption of the movement of people and animals is anticipated during the construction phase only. Appropriate work scheduling and temporary access arrangements will be discussed and agreed upon with local communities during the construction phase.
▪ potential ecological problems due to increased soil erosion and siltation, leading to decreased stream capacity?		√	Not anticipated.
▪ Insufficient drainage leading to salinity intrusion?		√	Not anticipated.
▪ Over-pumping of groundwater, leading to salinization and ground subsidence?		√	No groundwater abstraction is proposed in this package.
impairment of downstream water quality and therefore, impairment of downstream beneficial uses of	√		15% of the required environmental flow will be maintained. However, during lean water flow, and to avoid such impact CHPMA and WUA members will be adequately trained

SCREENING QUESTIONS	Yes	No	REMARKS
water?			to be able to manage water in a sustainable manner.
▪ dislocation or involuntary resettlement of people?		√	The project will not cause any displacement of people.
▪ Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√	Not anticipated.
potential social conflicts arising from land tenure and land use issues?		√	No private land will be involved for the project purpose.
▪ soil erosion before compaction and lining of canals?	√		Protection of embankment has been included in the design option to avoid soil erosion. Measures such as temporary silt rap, stoking of soil away from watercourse etc. will be adopted during the construction phase.
▪ noise from construction equipment?	√		A temporary increase in noise level is anticipated during the construction phase only. All the construction machinery employed will comply with the noise standards of the Central Pollution Control Board (CPCB). Consultation will be held with local communities for work scheduling at sensitive areas (school, health centers etc).
▪ dust during construction?	√		Temporary increase in dust generation is anticipated during the construction phase due to the movement of vehicles, hauling of materials and earth. Dust suppression measures such as water sprinkling, covering all trucks/ dumpers carrying dispersible etc. will be employed.
labor-related social problems especially if workers from different areas are hired?		√	No such social conflict is anticipated as maximum number of local labors will be employed during construction phase only. Only few outside skilled labors will be temporarily deployed for specific job.
▪ waterlogging and soil salinization due to inadequate drainage and farm management?		√	The clusters are located on a natural slope, no waterlogging is anticipated during farming. Natural drainage patterns will not be altered.

SCREENING QUESTIONS	Yes	No	REMARKS
leaching of soil nutrients and changes in soil characteristics due to excessive application of irrigation water?	√		Measures such as training farmers for rational usage of water resources will be ensured during implementation.
reduction of downstream water supply during peak seasons?	√		A detailed hydrological study has been carried out considering the catchment area, historical rainfall data, population growth and water demand in the area and discharge data. A 15% environmental flow has also been considered to maintain the downstream water supply. It is concluded that during the peak demand period, most of the sites are likely to face shortages. Thus, CHPMA and WUA members will be trained to maintain downstream flow and sustainably manage available water.
soil pollution, polluted farm runoff and groundwater, and public health risks due to excessive application of fertilizers and pesticides?	√		Contamination to groundwater and soil are anticipated due to excessive application of fertilizers and pesticides. Measures for safe handling, storage and usage of fertilizers and pesticides will be followed.
soil erosion (furrow, surface)?		√	Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be allowed during rains.
scouring of canals?		√	Regular maintenance activities such as removal of sediments and clogging will be involved.
logging of canals by sediments?		√	Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be allowed during rains.
clogging of canals by weeds?		√	Regular cleaning activities will be involved.
seawater intrusion into downstream freshwater systems?		√	Not Applicable
introduction of an increase in the incidence of waterborne or water-related diseases?		√	No such probable incidence is anticipated.

SCREENING QUESTIONS	Yes	No	REMARKS
▪ dangers to a safe and healthy working environment due to physical, chemical and biological hazards during project construction and operation?	√		Occupational health and safety issues will not be significant. These will be managed through EMPs per subproject and environmental clauses in the construction contract.
▪ social conflicts if workers from other regions or countries are hired?	√		Migrant laborer for construction work is common in the state. The project may hire them. The contractor will be guided by the best labour laws to ensure no social conflict arises. The social specialist in the PMU and PISC team will monitor and report in this issue.
▪ large population influx during project construction and operation that causes an increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	Local labour is to be recruited as much as possible. Labour flux due to the project is not expected.
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		√	The proposed project is unlikely to result in significant risks. The specific provision in the contracts together with monitoring of EMP implementation will ensure minimizing such risks.
▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., irrigation dams) are accessible to members of the affected community or where their failure could result in injury to the community throughout the project construction, operation and decommissioning?		√	The irrigation schemes are far away from local settlements. The proposed project is unlikely to result in significant risks. The specific provision in the contracts together with monitoring of EMP implementation will ensure minimizing such risks.

Water Shortage Calculation

#	Cluster Name	Source	Catchment Area (km ²)	Irrigation Area (ha)	Month	Shortage Volume million m ³ (million lit)
1	Sanhal	Samoor Khad	13.00	57.45	Nov	-0.0312, (31.2)
2	Boul1					
3	Boul 2					
4	Dulheri Raj	Dulheri Nallah	00.29	31.35	Jan	-0.0193 (19.3)

#	Cluster Name	Source	Catchment Area (km ²)	Irrigation Area (ha)	Month	Shortage Volume million m ³ (million lit)
5	Thana Khu					
6	Handola	Handola (River Sa	Perennial source	11.84		No shortage
7	Nalwari	Chapla Khad	1.00	74.03	Jan	-0.0453 (45.3)
8	Dumkhar					
9	Charoli					
10	Muchali 1&	Muchali Nallah	5.83	21.25	Nov	-0.0113 (11.3)
14	Balh	Balh Khad	6.19	14.03	Nov	-0.0067 (6.7)

Source: DETAILED PROJECT REPORT ON IRRIGATION SYSTEM DESIGN FOR PACKAGE-11 (CWJ/IRG/UNA-02) of UNA DISTRICT, June 2022

Annexure 2: LOCATION DETAILS

#	District	Block Name	Cluster Name	Area (Ha)	Latitude (°N)	Longitude (°E)	Irrigation Source	Latitude (°N)	Longitude (°E)
1	Solan	Kunihar	Sai	6.74	31.14898333	76.87228222	Natural Spring	31.159220	76.872062
2	Solan	Kunihar	Ser-Delag	21.56	31.15610694	76.93369417	Spring	31.164402	76.933752
3	Solan	Kunihar	Chunad	16.35	31.12043639	76.92716389	Ghumber Khad	31.097813	76.915729
4	Solan	Kunihar	Daseran	33.46	31.25030361	76.89639556	Ali Khad	31.345290	76.751710
5	Solan	Kunihar	Datti	13.75	31.21343139	76.94200389	Natural Spring	31.2134	76.9455
6	Solan	Kunihar	Giana	6.69	31.24251417	76.97371000	Jadol Nallah	31.244797	76.971309
7	Solan	Kunihar	Jailang	9.65	31.09635806	76.91457500	Ghumber Khad	31.097813	76.915729
8	Solan	Kunihar	Pajeena	14.26	31.27216667	76.98509361	Pajeena Nallah	30.904486	77.096733
11	Solan	Nalagarh	Batiakh	15.13	31.16189528	76.79551417	Ghamber Khad	31.244797	76.971309
12	Solan	Nalagarh	Beli khol 1	10.17	30.98765028	76.72758639	Tubewell	30.9739	76.7443
14	Solan	Nalagarh	Doli	16.91	31.16989861	76.78858083	Ghamber Khad	31.244797	76.971309
17	Solan	Nalagarh	Palli	12.17	31.14597194	76.70606222	Tubewell	31.1301	76.7074
18	Solan	Nalagarh	Sour	37.12	31.17750417	76.79675861	Ghamber Khad	31.179203	76.789843
19	Sirmaur	Nahan	Bajari	13.99	30.5937217	77.1922458	Ruhn Khadd	30.597300	77.191200
21	Sirmaur	Nahan	Budriyon	16.10	30.5378067	77.1979494	Tubewell 2	30.520805	77.186520
22	Sirmaur	Nahan	Dungi Sher	9.68	30.6331221	77.3480014	Jalal Khadd	30.654500	77.287000

#	District	Block Name	Cluster Name	Area (Ha)	Latitude (°N)	Longitude (°E)	Irrigation Source	Latitude (°N)	Longitude (°E)
23	Sirmaur	Nahan	Goant	8.00	30.6558489	77.2859328	Existing DAM Goant	30.654500	77.287000
24	Sirmaur	Nahan	Judag	12.61	30.5991439	77.769969	Judag Nallah	30.597400	77.771700
25	Sirmaur	Nahan	Kherichandan 2	13.81	30.6174203	77.3715114	Jalal Khadd	30.625800	77.353400
26	Sirmaur	Nahan	Kherichandan 1	14.41	30.6259144	77.3581800	Jalal Khadd	30.625800	77.353400
27	Sirmaur	Nahan	Rama	6.88	30.5508192	77.3764264	Doghat Khadd	30.557017	77.369019
28	Sirmaur	Nahan	Simbalwala	9.99	30.5863383	77.1845022	Ruhn Khadd	30.588700	77.195300
29	Sirmaur	Paonta Sahib	Fatehpur	6.61	30.4935720	77.5572816	Bata river	30.495545	77.550381
30	Sirmaur	Paonta Sahib	Killour	21.88	30.5347548	77.8167833	Tons River	30.537333	77.428417
31	Sirmaur	Paonta Sahib	Gyayaniwala	10.87	30.5033232	77.7392196	Tubewell 5	30.502320	77.738100
32	Sirmaur	Paonta Sahib	Khara	8.95	30.5059437	77.6101061	Khara Nallah	30.504800	77.611900
33	Sirmaur	Paonta Sahib	Puruwala	13.93	30.4649906	77.5766029	Tubewell 4	30.458442	77.571293
34	Sirmaur	Paonta Sahib	Upper Bhuddi	21.72	30.5044263	77.7456593	Tubewell 3	30.504220	77.745728
35	Hamirpur	Bamsan	Sachuin	8.68	31.8712939	76.6313013	Beas River	31.873213	76.632321
36	Hamirpur	Bamsan	Parol	17.51	31.6476103	76.6179330	Kunah Khadd	31.652820	76.618459

#	District	Block Name	Cluster Name	Area (Ha)	Latitude (°N)	Longitude (°E)	Irrigation Source	Latitude (°N)	Longitude (°E)
37	Hamirpur	Bhoranj	Balor-Sangrawar	33.45	31.6267243	76.6469965	Balor Nallah	31.625640	76.642828
38	Hamirpur	Bhoranj	Jol	19.72	31.6345183	76.7070369	Jol Nallah	31.632600	76.707228
39	Hamirpur	Bhoranj	Lagmanwin	6.90	31.6237738	76.6737667	Lagmanwin Nallah	31.626210	76.668000
40	Hamirpur	Bhoranj	Lambagram/ Palasi	18.17	31.587551	76.6020842	JICA dam, Plassi Nallah	31.581110	76.605492
41	Hamirpur	Bhoranj	Mundkhar tushi	27.99	31.5936208	76.6912686	Balor Nallah	31.594219	76.693075
42	Hamirpur	Bhoranj	Samlog	22.69	31.6244720	76.6478241	Samlog Nallah	31.622565	76.644925
43	Hamirpur	Bijhar	Bhalat	11.52	31.4915462	76.4880500	Bhalat Nallah	31.487184	76.478259
44	Hamirpur	Bijhar	Lafran	13.96	31.4693719	76.6068068	New Proposed	31.471386	76.591224
45	Hamirpur	Bijhar	Ghangot	8.42	31.4951547	76.5240244	Ghangot Nallah	31.500923	76.521466
46	Hamirpur	Bijhar	Kalwal	15.75	31.4599250	76.5701686	Rihal Nallah	31.466106	76.569910
47	Hamirpur	Bijhar	Seri-Bhakredi	14.88	31.5366703	76.4712635	Existing check dam	31.540604	76.462309
48	Hamirpur	Hamirpur	Branda	7.90	31.6731201	76.4576319	Kunah Khad	31.669773	76.458561
49	Hamirpur	Hamirpur	Bakarti-I	29.97	31.6612258	76.4883073	Kunah Khad	31.656500	76.489167
50	Hamirpur	Hamirpur	Jangal Ropa	22.20	31.5095344	76.4892714	Kunah Khad	31.656634	76.480294
51	Hamirpur	Hamirpur	Haar	14.90	31.6588406	76.4705583	Kunah Khad	31.657474	76.470988
52	Hamirpur	Hamirpur	Neri	7.44	31.6925099	76.4653874	Kunah Khad	31.692480	76.463274

#	District	Block Name	Cluster Name	Area (Ha)	Latitude (°N)	Longitude (°E)	Irrigation Source	Latitude (°N)	Longitude (°E)
53	Hamirpur	Nadaun	Sadhwan	8.80	31.7361754	76.4061855	MIP Nadaun	31.772473	76.371551
54	Hamirpur	Nadaun	Rail-I	6.20	31.7465415	76.4239991	MIP Nadaun	31.783160	76.4139923
55	Hamirpur	Nadaun	Baag Bharmoti	6.10	31.7628663	76.5112561	MIP Nadaun	31.772473	76.371551
56	Hamirpur	Nadaun	Kushiar-I	15.80	31.6584886	76.3774049	Maan Khadd	31.663182	76.379099
57	Hamirpur	Nadaun	Bhabran 1	11.22	31.7347585	76.3203030	LIS Bhabran	31.774385	76.322273
58	Hamirpur	Nadaun	Bhabran 2	13.90	31.7415313	76.3310206	LIS Bhabran	31.774385	76.322273
59	Hamirpur	Nadaun	Kaloor	9.74	31.7707178	76.3145780	Maan Khadd	31.771716	76.313962
60	Hamirpur	Nadaun	Kashmir	6.70	31.6287562	76.4006653	LIS Kashmir	31.626333	76.403328
61	Hamirpur	Nadaun	Phal Palsi	28.20	31.6230277	76.4102881	LIS Palsi	31.617213	76.411050
62	Hamirpur	Nadaun	Choru (Bhoo-I)	6.20	31.7921165	76.4282142	LIS Bhoo	31.794568	76.417278
63	Hamirpur	Nadaun	Manjot	7.90	31.7670861	76.4471159	Salasi Nallah	31.765812	76.448997
64	Hamirpur	Nadaun	Manjot 2	1.50	31.7670861	76.4471159	Salasi Nallah	31.765812	76.448997
65	Hamirpur	Nadaun	Tung (Baloh)	14.10	31.6987400	76.3589300	Maan Khadd	31.698665	76.359087
66	Hamirpur	Nadaun	Loharda	5.00	31.7675205	76.4243682	MIP Nadaun	31.783160	76.4139923
67	Hamirpur	Nadaun	Sai Lower	19.00	31.7243331	76.3875920	MIP Nadaun	31.772473	76.371551
68	Hamirpur	Nadaun	Pansai 1	32.20	31.6809831	76.4003736	LIS Pansai	31.676901	76.397406
69	Hamirpur	Nadaun	Pansai 2	24.20	31.6809831	76.4003736	LIS Pansai	31.676901	76.397406
70	Hamirpur	Sujanpur	Kheri	12.80	31.8866228	76.5938123	LIS Kheri	31.883472	76.592959

#	District	Block Name	Cluster Name	Area (Ha)	Latitude (°N)	Longitude (°E)	Irrigation Source	Latitude (°N)	Longitude (°E)
71	Hamirpur	Sujanpur	Beri-1	9.30	31.8796727	76.5592765	LIS Kudana Beri	31.875614	76.556180
72	Hamirpur	Sujanpur	Beri-2	12.40	31.8761100	76.5554519	LIS Kudana Beri	31.875614	76.556180
73	Hamirpur	Sujanpur	Bhahru (Pour)	7.10	31.8734661	76.5513655	LIS Bhahru Jatour	31.874561	76.552682
74	Hamirpur	Sujanpur	Bir Baghera	7.00	31.8618202	76.5310328	LIS Pour	31.873138	76.545810
75	Hamirpur	Sujanpur	Kudana	7.90	31.8721611	76.5618942	LIS Bhahru Jatour	31.874561	76.552682
76	Hamirpur	Nadaun	Bhalana Rei	18.21	31.7599613	76.5073172	LIS Pung Khad	31.760586	76.510104
77	Bilaspur	Ghumarwin	Dehra	17.90	31.5797081	76.7145722	Seer Khad	31.563439	76.724167
78	Bilaspur	Ghumarwin	Kathalag droun	20.57	31.5752181	76.7159644	Seer Khad	31.563439	76.724167
79	Bilaspur	Ghumarwin	Lower Lanjhta	11.61	31.5068239	76.6851564	Seer Khad	31.512679	76.690000
80	Bilaspur	Ghumarwin	Thandora	7.41	31.5153603	76.6745814	Seer Khad	31.512679	76.690000
81	Bilaspur	Ghumarwin	Upper Talwara	9.35	31.5302792	76.7054515	Khad	31.536281	76.699059
82	Bilaspur	Ghumarwin	Talwara Lower	1.91	31.5324636	76.7028193	Khad	31.536281	76.699059
83	Bilaspur	Ghumarwin	Talwara – Phase 2	6.91	31.5324636	76.7028193	Khad	31.536281	76.699059
84	Bilaspur	Ghumarwin	Kasol	20.53	31.4849383	76.6987277	Seer Khad	31.488194	76.692361
85	Bilaspur	Ghumarwin	Kasol Balh	8.84	31.4864853	76.6916486	Seer Khad	31.488194	76.692361
86	Bilaspur	Ghumarwin	Kasol Kanjeen	6.20	31.4849332	76.6914975	Seer Khad	31.488194	76.692361
87	Bilaspur	Ghumarwin	Mehri Kathla	14.46	31.5458322	76.7192386	Bajrauli Khad	31.542958	76.714021

#	District	Block Name	Cluster Name	Area (Ha)	Latitude (°N)	Longitude (°E)	Irrigation Source	Latitude (°N)	Longitude (°E)
88	Bilaspur	Ghumarwin	Nalti Parnal	8.77	31.5473236	76.7080033	Seer Khad	31.542958	76.714021
90	Bilaspur	Ghumarwin	Chharal Daloli	19.29	31.5233955	76.7025217	Over LIS Talwara	31.529381	76.696333
92	Bilaspur	Ghumarwin	Sandhiar (Chhat)	18.97	31.4316867	76.6285428	Existing DAM – Nearby Nallah - Sandhiar	31.427904	76.625242
93	Bilaspur	Ghumarwin	Bhadrog (Seu)	8.88	31.4667108	76.6947181	Seer Khad	31.469722	76.701667
94	Bilaspur	Ghumarwin	Bhapral	7.11	31.5228953	76.6912169	Seer Khad	31.521026	76.692330
95	Bilaspur	Ghumarwin	Samsai	5.34	31.5308969	76.6460608	Borewell	31.530131	76.642988
96	Bilaspur	Ghumarwin	Massour / Maloh	6.57	31.5142537	76.7282825	Seer Khad	31.513147	76.715551
97	Bilaspur	Ghumarwin	Chhiber	16.99	31.2765847	76.9633500	Nearby Nallah	31.415177	76.728692
98	Bilaspur	Sadar-Bilaspur	Kotlu	14.23	31.3224814	76.8192886	Ali Khad	31.318971	76.819722
99	Bilaspur	Sadar-Bilaspur	Dugga Har (Manjher)	11.43	31.2492828	76.8258989	Kuhl	31.248326	76.821016
100	Bilaspur	Sadar-Bilaspur	Loharda	23.02	31.2480992	76.8351036	Ali Khad	31.248326	76.821016
101	Bilaspur	Sadar-Bilaspur	Kainthal	6.38	31.2481381	76.8276553	Ali Khad	31.248326	76.821016
102	Bilaspur	Sadar-Bilaspur	Khod ka kyar	21.49	31.4135231	76.8234664	Ali Khad	31.248326	76.821016
103	Bilaspur	Sadar-Bilaspur	Karot	21.92	31.3358917	76.8212728	Ali Khad	31.330205	76.819376

#	District	Block Name	Cluster Name	Area (Ha)	Latitude (°N)	Longitude (°E)	Irrigation Source	Latitude (°N)	Longitude (°E)
104	Bilaspur	Sadar-Bilaspur	Salnu	27.79	31.4140614	76.8007331	Sutlej River	31.418299	76.800314
105	Bilaspur	Jhandutta	Balh Sinha	32.14	31.41790942	76.59028479	JICA Dam	31.421006	76.586704
106	Bilaspur	Jhandutta	Kosarian-I	30.03	31.43209728	76.50926669	Kosari Nalla	31.435352	76.510241
107	Bilaspur	Jhandutta	Lehar	25.23	31.33832364	76.64886813	Neri Dam	31.339178	76.652056
108	Bilaspur	Jhandutta	Tikkari Kotlu	23.65	31.37288592	76.64987101	Seer Khad	31.395545	76.626585
109	Bilaspur	Jhandutta	Fagog Banjholi	22.28	31.401528191	76.62442038	JICA Dam	31.394951	76.626561
110	Bilaspur	Jhandutta	Fagog	12.33	31.401953390	76.61774010	JICA Dam	31.394951	76.626561
111	Bilaspur	Jhandutta	Jhandu	16.06	31.365346250	76.64471864	JICA Dam	31.365975	76.643564
112	Bilaspur	Jhandutta	Tihri	29.15	31.428668750	76.64133546	LIS Tihri	31.430524	76.638139
113	Bilaspur	Swarghat	Bassi	12.44	31.311250280	76.51066361	BBMB Canal	31.410830	76.433330
114	Bilaspur	Swarghat	Dulhet 3	29.62	31.363684000	76.47051000	BBMB Canal	31.410830	76.433330
115	Bilaspur	Swarghat	Ghattewal	28.26	31.333254720	76.48952139	BBMB Canal	31.410830	76.433330
116	Mandi	Chauntara	Golwan	17.19	31.9830937	76.6983887	Ropdi Khad	31.609210	76.738469
117	Mandi	Chauntara	Kothi – I (Balh)	9.30	31.8594537	76.7446334	Tubewell	31.865520	76.744170
118	Mandi	Chauntara	Kothi - II	8.30	31.8633729	76.7419522	Tubewell	31.865520	76.744170
119	Mandi	Chauntara	Dhelu (Dhog)	9.97	32.0067600	76.7700830	Tubewell	31.897369	76.765790
120	Mandi	Chauntara	Dol	33.29	31.8476768	76.7641587	Tubewell	31.897369	76.765790
121	Mandi	Chauntara	Khadiyal	23.24	31.8648875	76.7563886	Tubewell	31.897369	76.765790

#	District	Block Name	Cluster Name	Area (Ha)	Latitude (°N)	Longitude (°E)	Irrigation Source	Latitude (°N)	Longitude (°E)
122	Mandi	Gopalpur	Sulpur	7.50	31.5946180	76.7273648	Seer Khad	31.596290	76.727312
123	Mandi	Gopalpur	Dhar	10.16	31.6714219	76.7133737	Beas River	31.490055	76.462896
124	Mandi	Gopalpur	Barchwar	10.82	31.6771775	76.7281829	River Beas	31.490055	76.462896
125	Mandi	Gopalpur	Ghadhyani	7.24	31.6775041	76.7215515	River Beas	31.490055	76.462896
126	Mandi	Gopalpur	Kharoh (Kalerka)	17.11	31.6822917	76.7249867	Beas River	31.490055	76.462896
127	Mandi	Gopalpur	Bhadarwar Khobla	9.02	31.6966322	76.7840976	Rissa Khad	31.688938	76.785604
128	Mandi	Gopalpur	Bahi	8.71	31.6052590	76.7392989	Seer Khad	31.609210	76.738469
129	Mandi	Gopalpur	Bhambhla-I	14.15	31.5900390	76.7360520	Seer Khad	31.583410	76.729555
130	Mandi	Gopalpur	Thouna/ Dhalait	8.18	31.7158760	76.8165771	Local Nallah	31.722365	76.816548
131	Mandi	Gopalpur	Rasher	10.95	31.6801242	76.7848271	Son Khad	31.679490	76.784995
132	Mandi	Gopalpur	Batail 2	9.13	31.5759188	76.7321673	Tubewell	31.581675	76.732964
133	Mandi	Gopalpur	Batial 1	19.70	31.5809700	76.7334120	Tubewell	31.581675	76.732964
134	Mandi	Gopalpur	Bag-chuhku	12.86	31.6194678	76.7194994	Tubewell	31.581675	76.732964
135	Mandi	Gopalpur	Mataur Tanda	13.05	31.5662513	76.7298865	Seer Khad	31.568450	76.727623
136	Mandi	Dharampur	Richhli	12.81	31.8016374	76.7259886	Beas River	31.828721	76.763119
137	Mandi	Dharampur	Mannu Dhar (Joh)	13.68	31.8050280	76.7171720	Beas River	31.828721	76.763119
138	Mandi	Dharampur	Haryanal	12.55	31.8094694	76.7266067	Beas River	31.828721	76.763119

#	District	Block Name	Cluster Name	Area (Ha)	Latitude (°N)	Longitude (°E)	Irrigation Source	Latitude (°N)	Longitude (°E)
139	Mandi	Dharampur	Satrehar	12.52	31.8164980	76.7516000	Beas River	31.828721	76.763119
140	Mandi	Dharampur	Ghanswai	8.3	31.8148300	76.7124217	Beas River	31.828721	76.763119
141	Mandi	Dharampur	Aarli Paryal	9.87	31.8237646	76.7096901	Beas River	31.828721	76.763119
142	Mandi	Dharampur	Richhali / Dhwali	5.75	31.8085777	76.7252515	Beas River	31.828721	76.763119
143	Mandi	Dharampur	Tarohla	8.00	31.8055123	76.7339227	Beas River	31.828721	76.763119
144	Mandi	Dharampur	Taroon	9.26	31.8371523	76.7173412	Beas River	31.828721	76.763119
145	Mandi	Dharampur	Chhapanu	8.38	31.8133850	76.7624460	Beas River	31.828721	76.763119
146	Mandi	Dharampur	Banwaar Kalaan	13.16	31.8060280	76.7458640	Beas River	31.828721	76.763119
147	Mandi	Dharampur	Dhardi-1	2.67	31.8185658	76.7193243	Beas River	31.828721	76.763119
148	Mandi	Dharampur	Baratpur	7.49	31.7631150	76.7648390	Beas River	31.828721	76.763119
149	Mandi	Dharampur	Balhara 1	1.46	31.8186283	76.7459246	Beas River	31.828721	76.763119
150	Mandi	Dharampur	Balhara 2	2.45	31.8186283	76.7459246	Beas River	31.828721	76.763119
151	Mandi	Dharampur	Dhardi 2	3.55	31.8185650	76.7193220	Beas River	31.828721	76.763119
152	Mandi	Dharampur	Lalana	4.27	31.8099510	76.7003630	Beas River	31.828721	76.763119
153	Mandi	Dharampur	Parli Paryal	1.70	31.8306630	76.7125230	Beas River	31.828721	76.763119
154	Mandi	Dharampur	Sakran Dhar	5.36	31.8125823	76.7203980	Beas River	31.828721	76.763119
155	Mandi	Dharampur	Sherpur	1.24	31.8030010	76.6917340	Beas River	31.828721	76.763119
156	Mandi	Dharampur	Chakyana	3.72	31.8224115	76.7655930	Beas River	31.828721	76.763119

#	District	Block Name	Cluster Name	Area (Ha)	Latitude (°N)	Longitude (°E)	Irrigation Source	Latitude (°N)	Longitude (°E)
157	Mandi	Dharampur	Chunighat	14.14	31.8017370	76.7044530	Beas River	31.828721	76.763119
158	Mandi	Dharampur	Gorat	12.25	31.8545549	76.7050816	Beas River	31.828721	76.763119
159	Mandi	Dharampur	Pakhdol	4.39	31.8657849	76.6986251	Beas River	31.828721	76.763119
160	Mandi	Dharampur	Tourjajar	9.74	31.7659198	76.7968914	Beas River	31.817593	76.777859
161	Mandi	Dharampur	Galloo (Chanouta)	6.19	31.7624375	76.7726141	Beas River	31.817593	76.777859
162	Mandi	Dharampur	Siram(Sarskan)	7.05	31.7929750	76.7764500	Beas River	31.817593	76.777859
163	Mandi	Dharampur	Trembala	6.06	31.6802985	76.7848850	Beas River	31.817593	76.777859
164	Mandi	Dharampur	Hiun	3.96	31.7659198	76.7968914	Beas River	31.817593	76.777859
165	Mandi	Dharampur	Kumarhda 2	10.22	31.7939110	76.8111070	Beas River	31.817593	76.777859
166	Mandi	Dharampur	Didnu	5.20	31.7830993	76.7606468	Beas River	31.817593	76.777859
167	Mandi	Dharampur	Banerti-2	10.44	31.8099205	76.7900955	Beas River	31.817593	76.777859
168	Mandi	Dharampur	Pehad-2	10.04	31.8083512	76.8076911	Beas River	31.817593	76.777859
169	Mandi	Dharampur	Chhater	10.86	31.7438326	76.7847476	Beas River	31.817593	76.777859
170	Mandi	Dharampur	Drumman	30.76	31.7686593	76.8110470	Beas River	31.817593	76.777859
171	Mandi	Dharampur	Kumahrda	13.84	31.7828430	76.8105300	Beas River	31.817593	76.777859
172	Mandi	Dharampur	Giun	27.8	31.7765780	76.8074337	Beas River	31.817593	76.777859
173	Mandi	Dharampur	Cheh	8.67	31.7681666	76.7836031	Beas River	31.817593	76.777859
174	Mandi	Dharampur	Bahn	5.63	31.8574380	76.6735770	Beas River	31.871832	76.672854

#	District	Block Name	Cluster Name	Area (Ha)	Latitude (°N)	Longitude (°E)	Irrigation Source	Latitude (°N)	Longitude (°E)
175	Mandi	Dharampur	Chatroun (Lower)	11.26	31.8554744	76.6715649	Beas River	31.871832	76.672854
176	Mandi	Dharampur	Dhalara 1	9.35	31.8481990	76.6828370	Beas River	31.871832	76.672854
177	Mandi	Dharampur	Dhalara 2	8.70	31.8424829	76.6811115	Beas River	31.871832	76.672854
178	Mandi	Dharampur	Lower Balh	6.24	31.8598720	76.6888403	Beas River	31.871832	76.672854
179	Mandi	Dharampur	Single Kuhat	3.70	31.8490200	76.6539130	Beas River	31.871832	76.672854
180	Mandi	Dharampur	Kanohi	1.32	31.8345995	76.6465384	Beas River	31.871832	76.672854
181	Mandi	Dharampur	LaHSani	1.35	31.8327101	76.6711235	Beas River	31.871832	76.672854
182	Mandi	Dharampur	Churu ra Balh	20.88	31.7856097	76.7331716	Nald Khad	31.785623	76.733106
183	Mandi	Dharampur	Seoh II	27.49	31.8696840	76.7153400	Beas River	31.875368	76.710540
184	Mandi	Dharampur	Seoh (Balh) Nichla Ropa	18.74	31.8776340	76.7145740	Beas River	31.875368	76.710540
185	Mandi	Dharampur	Lower (Nichali) Bairi	9.13	31.8186283	76.7459246	Beas River	31.871832	76.672854
186	Mandi	Dharampur	Upper Bairi	23.98	31.8768570	76.6851710	Beas River	31.871832	76.672854
187	Mandi	Dharampur	Barota	4.37	31.7631150	76.7648390	Soan Khad	31.4535	76.4508
188	Mandi	Dharampur	Manyoh- Lambri	20.14	31.7608300	76.6391320	Beas River	31.870957	76.648691
189	Mandi	Dharampur	Thanna (Ropari)	8.18	31.7251319	76.6960048	Beas River	31.870957	76.648691
190	Mandi	Dharampur	Patti (Kot)	6.90	31.7428867	76.6610650	Beas River	31.870957	76.648691
191	Mandi	Dharampur	Darwaar	9.27	31.7554972	76.6918485	Beas River	31.870957	76.648691

#	District	Block Name	Cluster Name	Area (Ha)	Latitude (°N)	Longitude (°E)	Irrigation Source	Latitude (°N)	Longitude (°E)
192	Mandi	Dharampur	Digho-Baglana (Karyal)	7.28	31.7162952	76.6908846	Beas River	31.870957	76.648691
193	Mandi	Dharampur	Skohta	1.82	31.7489201	76.6415149	Beas River	31.870957	76.648691
194	Mandi	Dharampur	Khajurti	5.76	31.8188871	76.6378875	Beas River	31.870957	76.648691
195	Mandi	Dharampur	Bandal	10.71	31.7420410	76.6786810	Beas River	31.870957	76.648691
196	Mandi	Dharampur	Chandpur	11.98	31.7427630	76.6846590	Beas River	31.870957	76.648691
197	Mandi	Dharampur	Tikri	14.51	31.7659920	76.6690850	Beas River	31.870957	76.648691
198	Mandi	Dharampur	Dyol	5.59	31.8657849	76.6986251	Beas River	31.870957	76.648691
199	Mandi	Drang	Baragaon – I & II	14.32	31.7915433	76.9146556	Baragaon nalla	31.791041	76.918390
200	Mandi	Gohar/Balh	Dharwahan-II (Sehal)	17.39	31.6309600	76.8984490	BSL Canal	31.539108	76.891403
201	Mandi	Gohar/Balh	Sawla	17.46	31.6639201	77.0534616	IPH Chamber	31.654467	77.050035
202	Mandi	Gohar/Balh	Bagga Chalog	8.63	31.6049749	77.0641159	Jiuni Khad	31.604170	77.064440
203	Mandi	Gohar/Balh	Latogali I	26.97	31.6529281	77.0910827	Bakhli Khad	31.651607	77.090040
204	Mandi	Gohar/Balh	Brikhmani	16.76	31.5489911	76.9665451	Brikhmani Nalla	31.543316	76.972369
205	Mandi	Gohar/Balh	Darvehad	12.33	31.5477490	76.9552920	BSL Canal	31.539108	76.891403
206	Mandi	Gohar/Balh	Manjhog Dhaniut	9.66	31.5059961	76.9788832	Dhaniut nalla	31.503610	76.992780
207	Mandi	Gohar/Balh	Manjhagan Chudara	28.56	31.6407385	77.0687996	Jiuni Khad	31.635346	77.067108

#	District	Block Name	Cluster Name	Area (Ha)	Latitude (°N)	Longitude (°E)	Irrigation Source	Latitude (°N)	Longitude (°E)
208	Mandi	Sadar	Dhaniyara	17.85	31.7552707	76.8660706	Arnodi Khad	31.753450	76.864714
209	Mandi	Sadar	Binol	7.21	31.7035696	77.0414134	Beas River	31.691158	77.038793
210	Mandi	Sundernagar	Palhota	17.11	31.5245214	76.9313617	Kansa Khad	31.522679	76.938181
211	Mandi	Sundernagar	Kuthain	15.45	31.5210536	76.9336357	Kansa Khad	31.505457	76.961034
212	Mandi	Sundernagar	Bhantraed	11.85	31.4318637	76.8056505	Bhantred Khad	31.429721	76.802746
213	Mandi	Sundernagar	Khagron	10.15	31.4914587	76.9592190	Kiyargi Nalla source	31.491524	76.957698
214	Kangra	Baijnath	Langhu – 1	6.20	32.0050052	76.6226181	Binwa Khad	32.014526	76.556383
215	Kangra	Baijnath	Langhu – 2	7.25	32.0096201	76.6183845		32.014526	76.556383
216	Kangra	Baijnath	Langhu 3	8.42	32.0109667	76.6183845		32.014526	76.556383
217	Kangra	Baijnath	Manghota	6.00	32.0584983	76.6516371	Binwa Khad	32.066442	76.653601
218	Kangra	Baijnath	Kudail	16.61	31.9841382	76.6773283	Dea Nallah	31.987437	76.678660
220	Kangra	Bhawarna	Thandol – 1	16.95	32.0101534	76.5278518	Mol Khad	32.011838	76.505194
221	Kangra	Bhawarna	Ghar	8.21	32.0433008	76.5438725	Mand Khad	32.041854	76.535867
222	Kangra	Bhawarna	Malahu II	8.46	32.0061150	76.5177770	Mol Khad	32.011838	76.505194
223	Kangra	Bhawarna	Malahu I	5.29	32.0115298	76.5088622		32.011838	76.505194
224	Kangra	Bhawarna	Sidhpur	30.09	32.0984580	76.4650962	Nugal Khad	32.116166	76.514466

#	District	Block Name	Cluster Name	Area (Ha)	Latitude (°N)	Longitude (°E)	Irrigation Source	Latitude (°N)	Longitude (°E)
225	Kangra	Bhawarna	Chartkhola	18.67	32.1017123	76.4317642	Tahl Khad	32.095246	76.436456
226	Kangra	Bhawarna	Ludhran 1 & 2	15.09	32.0909335	76.4312896	Tahl Khad	32.095246	76.436456
227	Kangra	Lambagaon	Maldoan	10.59	31.8700740	76.4899877	Nugal Khad	31.858220	76.492220
228	Kangra	Lambagaon	Jangal	9.15	31.8583494	76.4950284	Nugal Khad	31.858220	76.492220
229	Kangra	Lambagaon	Odri	8.76	31.9026321	76.5009377	Mol Khad	31.908113	76.490632
230	Kangra	Lambagaon	Kotlu	4.52	31.9184718	76.4976195	Mol Khad	31.908113	76.490632
231	Kangra	Lambagaon	Kathla	7.59	31.8792136	76.6326662	Beas River	31.883276	76.633760
232	Kangra	Lambagaon	Thanpal Chambi /	8.34	31.8950035	76.6238812	Beas River	31.883276	76.633760
233	Kangra	Panchrukhi	Trehal	8.22	32.0479542	76.6045931	Tubewell	32.046542	76.612365
234	Kangra	Panchrukhi	Agozar	7.03	32.0348853	76.5808869	Tubewell	32.037890	76.603328
235	Kangra	Panchrukhi	Rajhot 1	17.27	32.0273912	76.5912430	Awah Khad	32.032411	76.585905
236	Kangra	Panchrukhi	Ladoh 1	17.21	32.0483302	76.5631179	Tubewell	32.047299	76.548987
237	Kangra	Panchrukhi	Ladoh 2	5.53	32.0503098	76.5585241	Alang Nallah	32.050930	76.556383
238	Kangra	Panchrukhi	Banuri	7.73	32.0879769	76.5715521	Gharuhal Khul	32.090133	76.571402
240	Kangra	Panchrukhi	Saliana	7.33	32.0715315	76.5652309	Nai Khul	32.072317	76.565244
241	Kangra	Panchrukhi	Molichak	6.15	32.0806183	76.5620395	Tubewell	32.091321	76.552391
242	Kangra	Panchrukhi	Jandpur	8.54	32.0600477	76.6002992	Tubewell	32.071342	76.574321
243	Kangra	Sullah	Dheera 1 & 2	23.47	32.0163427	76.4532748	Nugal Khad	32.009706	76.455714

#	District	Block Name	Cluster Name	Area (Ha)	Latitude (°N)	Longitude (°E)	Irrigation Source	Latitude (°N)	Longitude (°E)
244	Kangra	Sullah	Dheera 3	10.81	32.0163427	76.4532748	Nugal Khad	32.009706	76.455714
245	Kangra	Sullah	Chainchadi Kuthera –	10.19	31.9716811	76.5307206	Mand Khad	31.972991	76.529502
246	Kangra	Sullah	Purba	15.36	31.9576174	76.4513130	Nugal Khad	31.954891	76.448075
247	Kangra	Sullah	Chandar	36.60	31.9700109	76.4959473	Mol Khad	31.972840	76.497745
248	Kangra	Sullah	Gagal Khas	23.47	32.0353877	76.4487074	Tal Khad	32.056311	76.427621
249	Kangra	Dehra	Bhatera Bassa	13.90	32.01389111	76.17543044	Baner Khad	32.016758	76.180749
250	Kangra	Dehra	Bhatoli Phakasian	11.44	31.97886204	76.13474061	Baner Khad	32.016758	76.180749
251	Kangra	Dehra	Dhanot-1	206.21	31.81110434	76.31440190	River Beas	31.809105	76.285860
252	Kangra	Dehra	Jakhota	227.54	31.79071685	76.32153773	River Beas	31.809105	76.285860
253	Kangra	Dehra	Chamba Khas	11.62	31.8197400	76.2569800	River Beas	31.809105	76.285860
254	Kangra	Pragpur	Kuhna	11.86	31.8094100	76.2850100	River Beas	31.809105	76.285860
255	Kangra	Paragpur	Lalwada	30.41	31.8243680	76.3179600	River Beas	31.809105	76.285860
256	Una	Bangana	Boul-1	19.32	31.5550988	76.2997035	Samoor Khad	31.531456	76.307145
257	Una	Bangana	Boul-2	24.55	31.4641060	76.4165480	Samoor Khad	31.531456	76.307145
258	Una	Bangana	Dulehri Rajputa	9.11	31.52801468	76.36090279	Dulheri Nallah	31.524390	76.353672
259	Una	Bangana	Sanhal	13.58	31.54250961	76.33819189	Samoor Khad	31.531456	76.307145
260	Una	Bangana	Thana Khurd	27.24	31.52461287	76.35735983	Dulheri Nallah	31.524390	76.353672

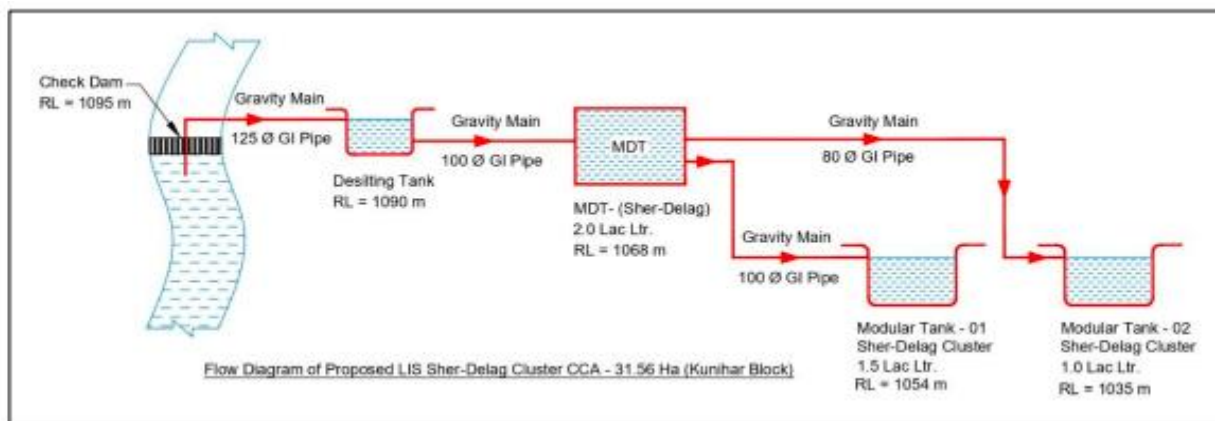
#	District	Block Name	Cluster Name	Area (Ha)	Latitude (°N)	Longitude (°E)	Irrigation Source	Latitude (°N)	Longitude (°E)
261	Una	Bangana	Balh	14.02	31.54990226	76.35127819	Balh Khad	31.5504	76.3513
262	Una	Bangana	Chadoli	26.75	31.63384094	76.29607939	Chplah Khad	31.6349	76.3048
263	Una	Bangana	Dumkhar	10.75	31.61201092	76.34466224	Chplah Khad	31.6349	76.3048
266	Una	Bangana	Muchali 1 & 2	21.26	31.61899450	76.34832520	Muchali Nallah	31.6154	76.3505
267	Una	Bangana	Nalwari	36.52	31.60697863	76.34802809	Chplah Khad	31.6349	76.3048
270	Una	Bangana	Handola	11.84	31.42496322	76.38866420	River Satluj	31.426371	76.393711
271	Una	Bangana	Dobad	8.75	31.46011468	76.41874421	River Satluj		

Annexure 3: IRRIGATION DESIGN DETAIL – PACKAGE-WISE

Irrigation Scheme flow-diagram of Package – 01 (Solan District):

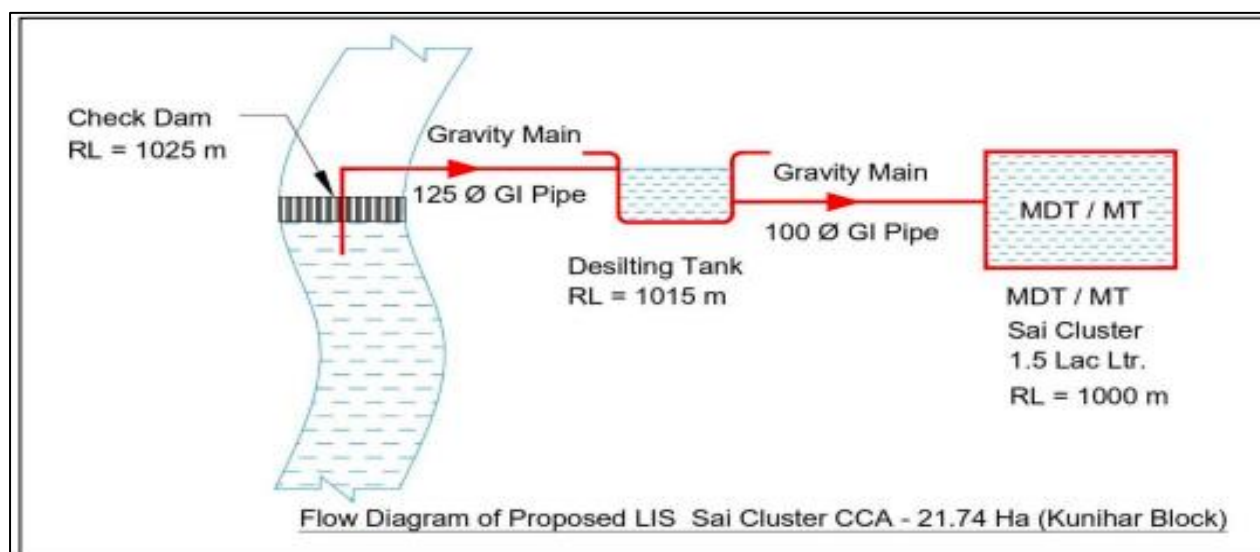
1. Proposed LIS – Ser Delag

Figure 10: Flow Diagram of Proposed LIS Ser Delag



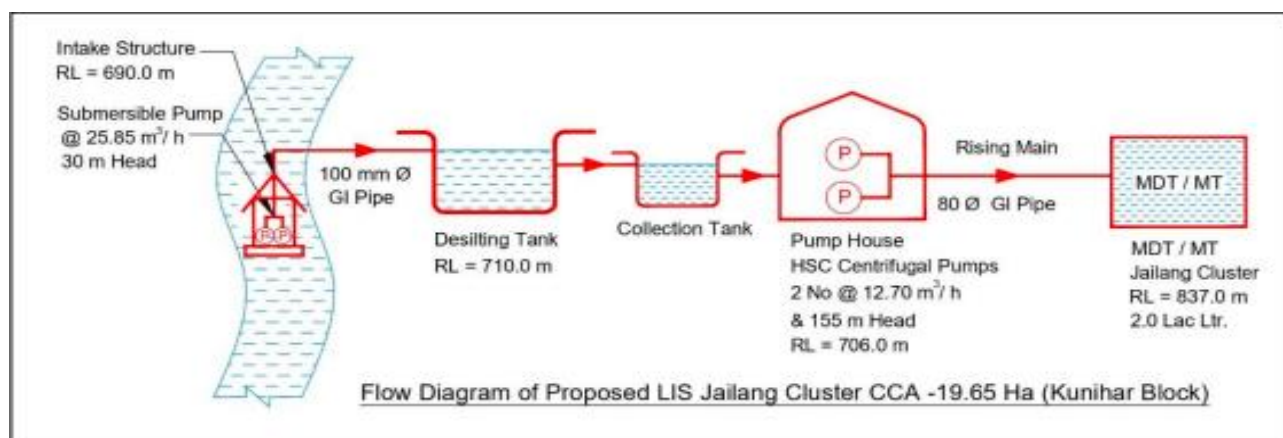
2. Proposed LIS – Sai

Figure 11: Flow Diagram of Proposed LIS Sai



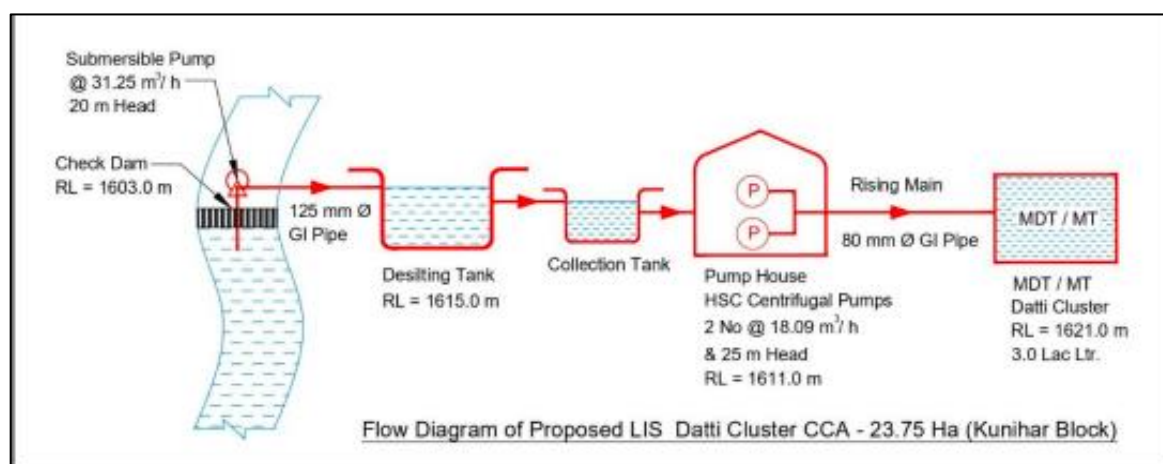
3. Proposed LIS – Jailang

Figure 12: Flow Diagram of Proposed LIS Jailang



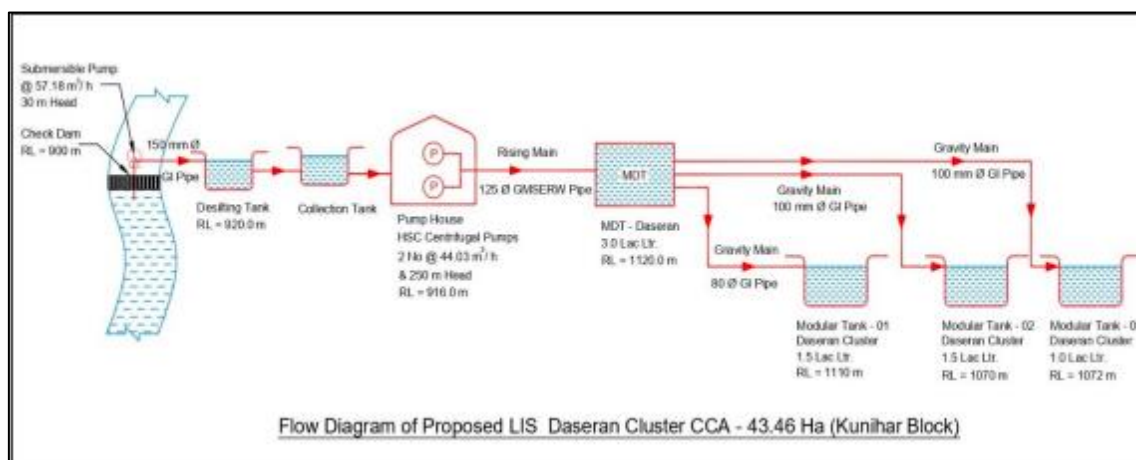
4. Proposed LIS – Datti

Figure 13: Flow Diagram of Proposed LIS Datti



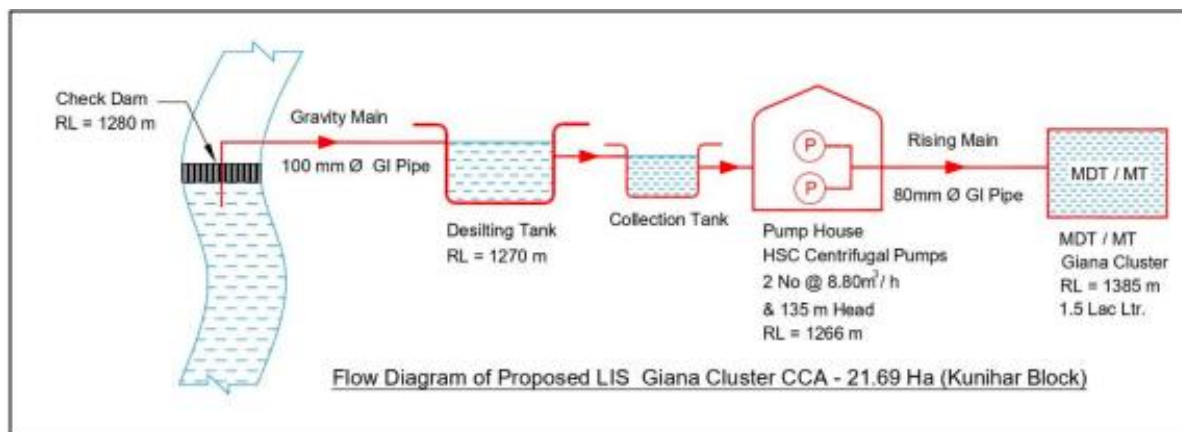
5. Proposed LIS – Daseran

Figure 14: Flow Diagram of Proposed LIS Daseran



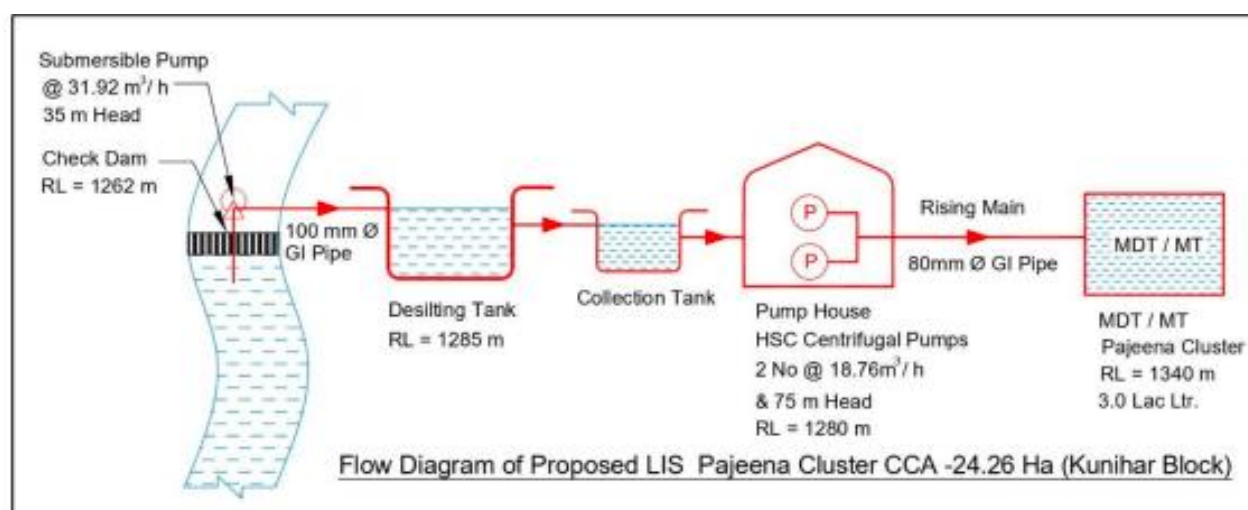
6. Proposed LIS – Giana

Figure 15: Flow Diagram of Proposed LIS Giana



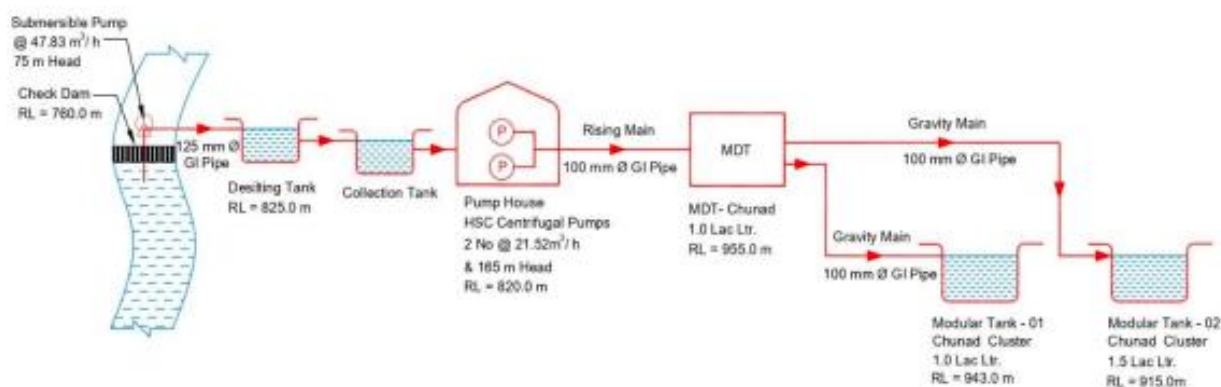
7. Proposed LIS – Pajeena

Figure 16: Flow Diagram of Proposed LIS Pajeena



8. Proposed LIS – Chunad

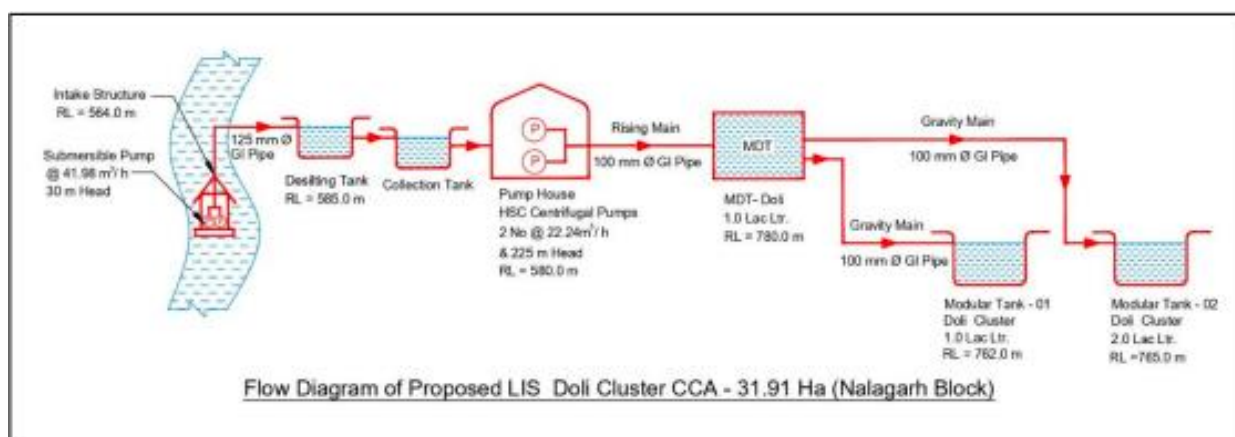
Figure 17: Flow Diagram of Proposed LIS Chunad



Flow Diagram of Proposed LIS Chunad Cluster CCA - 36.35 Ha (Kunihar Block)

9. Proposed LIS – Doli

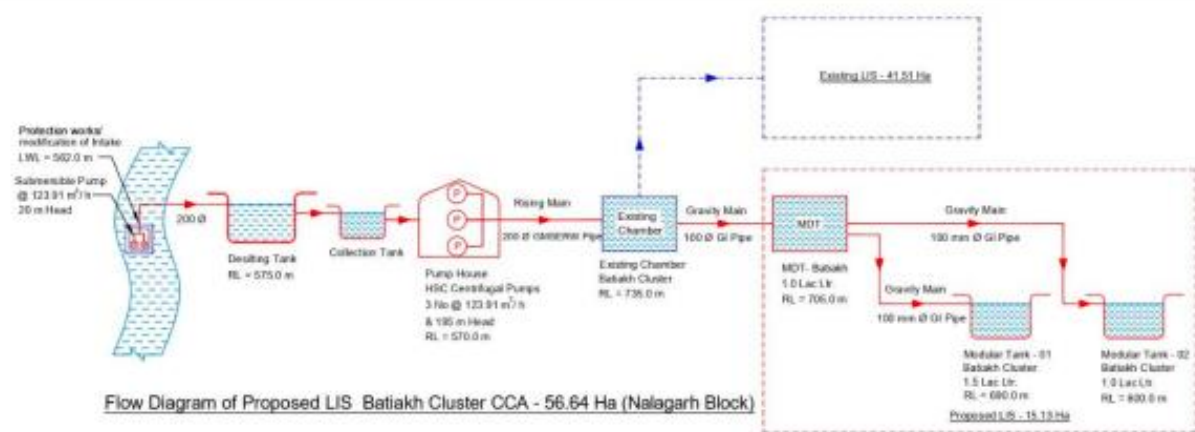
Figure 18: Flow Diagram of Proposed LIS Doli



Flow Diagram of Proposed LIS Doli Cluster CCA - 31.91 Ha (Nalagarh Block)

10. Proposed LIS – Batiakh

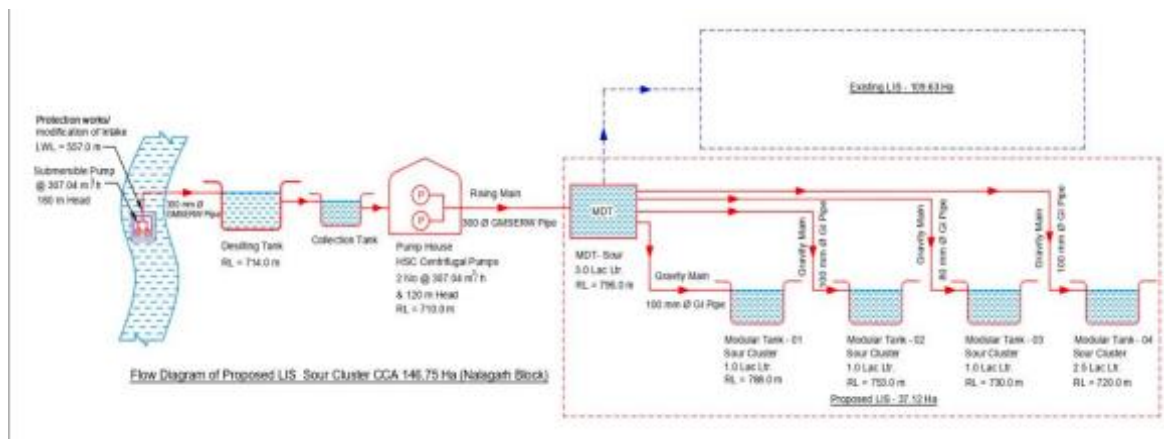
Figure 19: Flow Diagram of Proposed LIS Batiakh



Flow Diagram of Proposed LIS Batiakh Cluster CCA - 56.64 Ha (Nalagarh Block)

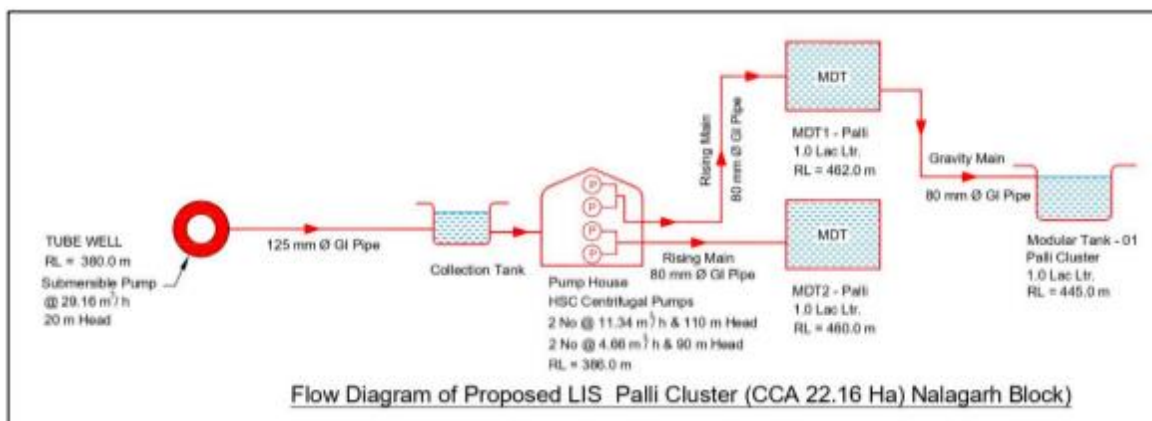
11. Proposed LIS – Sour

Figure 20: Flow Diagram of Proposed LIS Sour



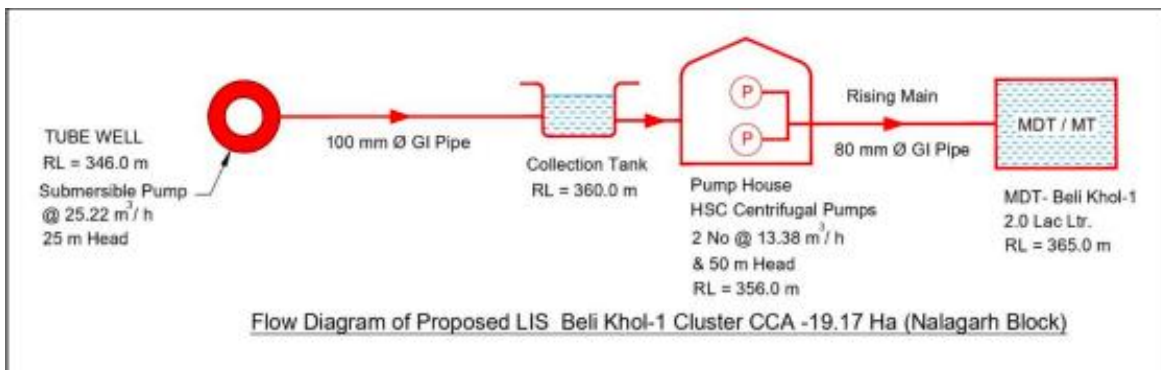
12. Proposed LIS – Palli

Figure 21: Flow Diagram of Proposed LIS Palli



13. Proposed LIS – Beli Khol 1

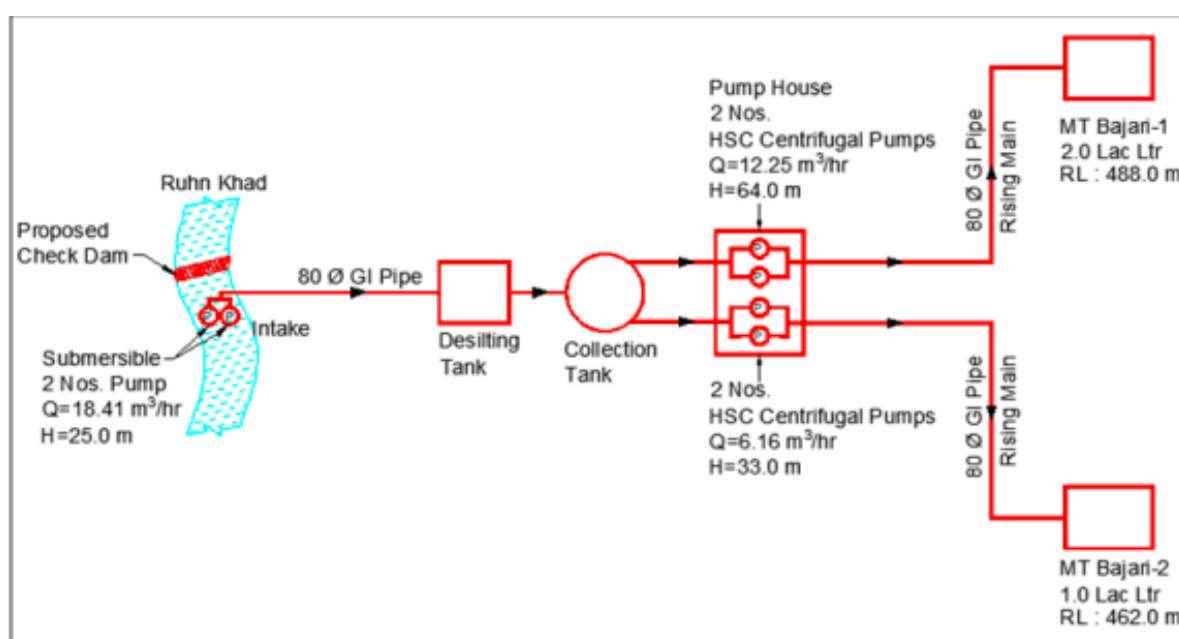
Figure 22: Flow Diagram of Proposed LIS Beli Khol 1



Irrigation Scheme flow-diagram of Package – 02 (Sirmaur District):

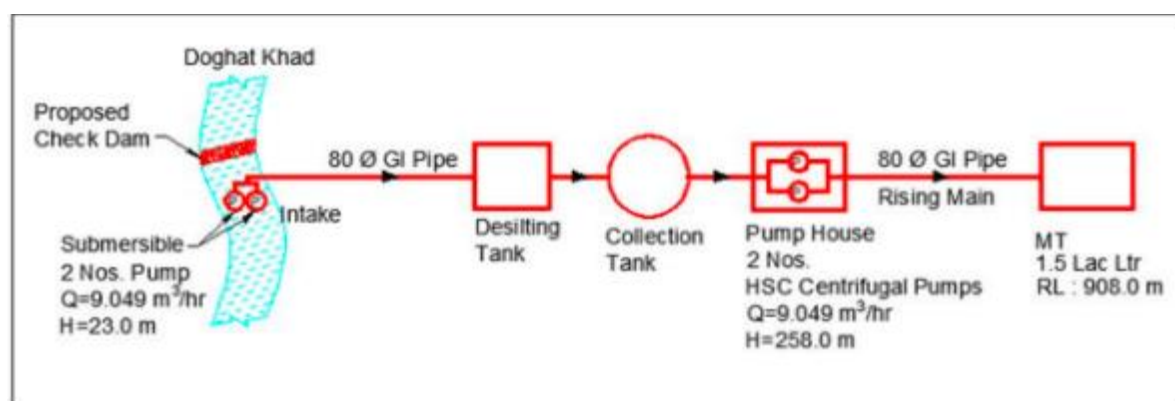
14. Proposed LIS – Bajari 1 & 2

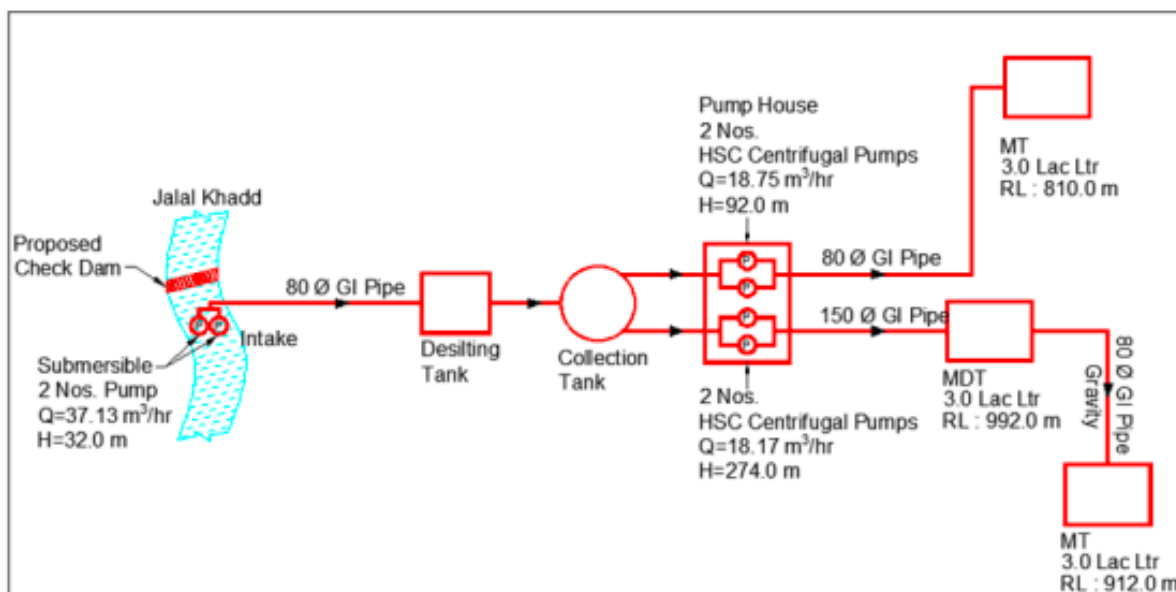
Figure 23: Flow Diagram of Proposed LIS Bajari 1 & 2



15. Proposed LIS – Rama

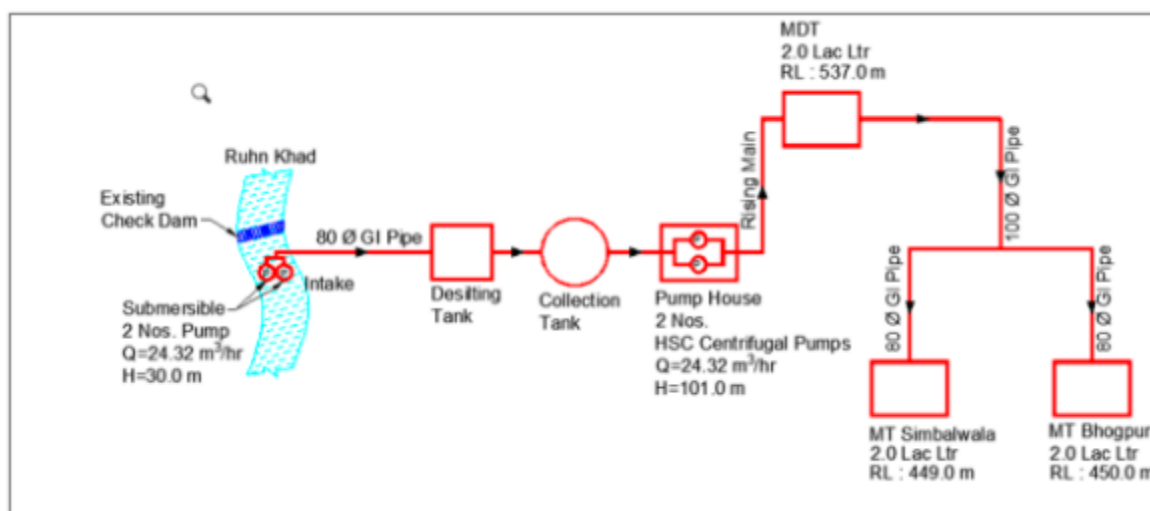
Figure 24: Flow Diagram of Proposed LIS Rama





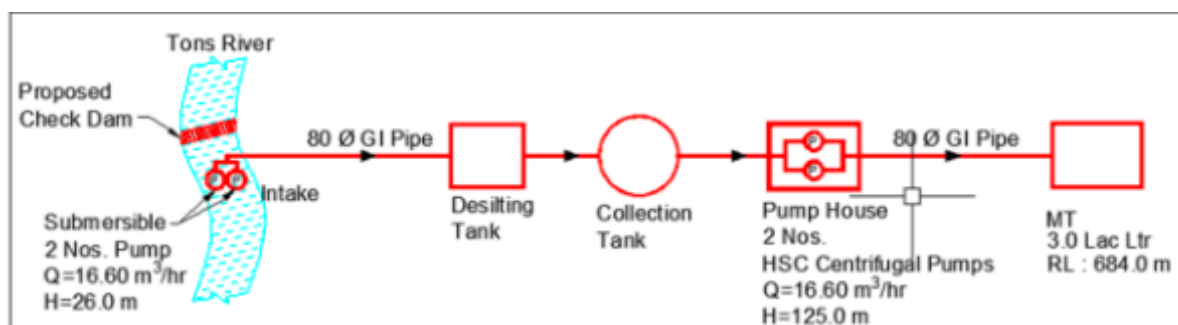
16. Proposed LIS Jungle Bhodd – Simbhalwala

Figure 25: Flow Diagram of Proposed LIS Jungle Bhodd - Simbhalwala & Bhogpur



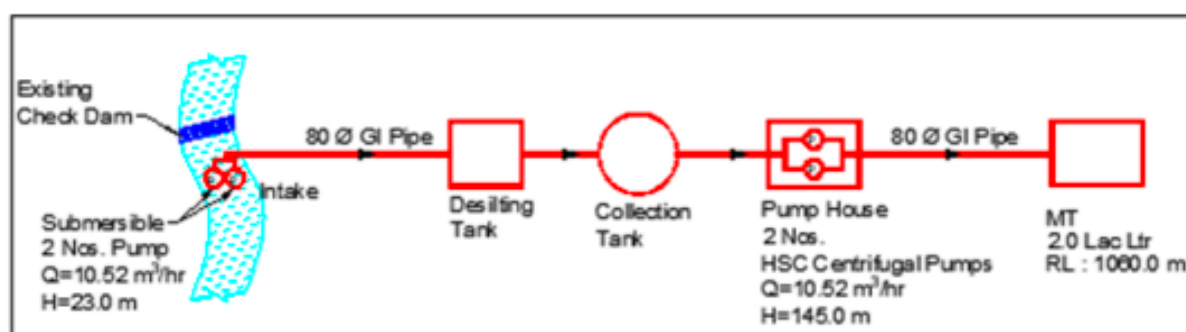
17. Proposed LIS – Judag

Figure 26: Flow Diagram of Proposed LIS Judag



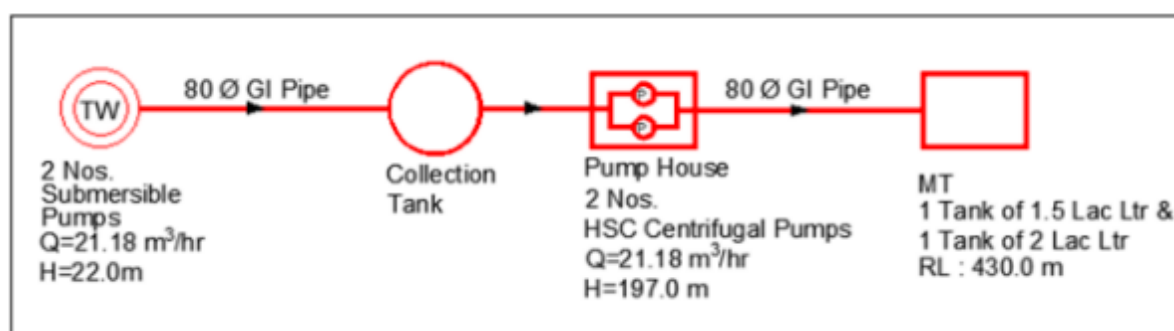
18. Proposed LIS – Goant

Figure 27: Flow Diagram of Proposed LIS Goant



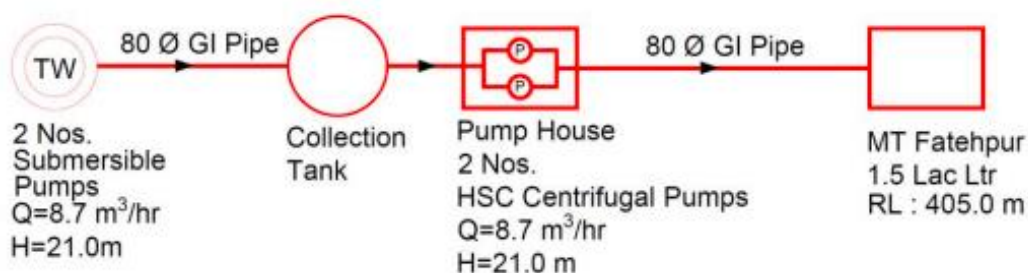
19. Proposed LIS – Budriyon

Figure 28: Flow Diagram of Proposed LIS Budriyon



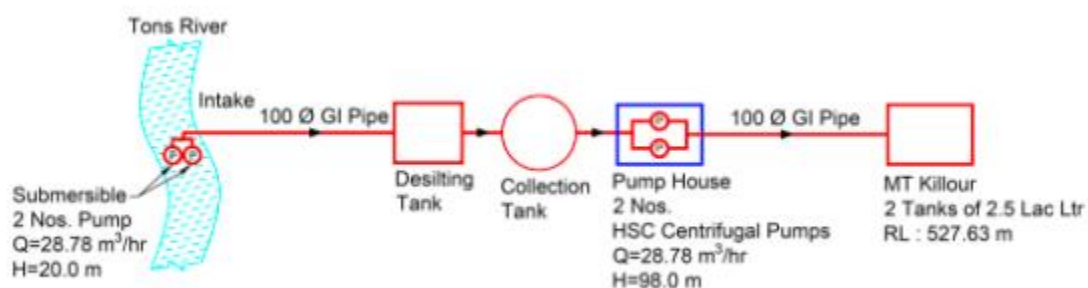
20. Proposed LIS – Fatehpur

Figure 29: Flow Diagram of Proposed LIS Fatehpur



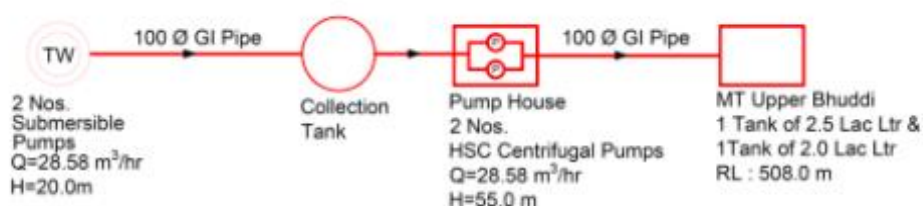
21. Proposed LIS – Killour

Figure 30: Flow Diagram of Proposed LIS Killour



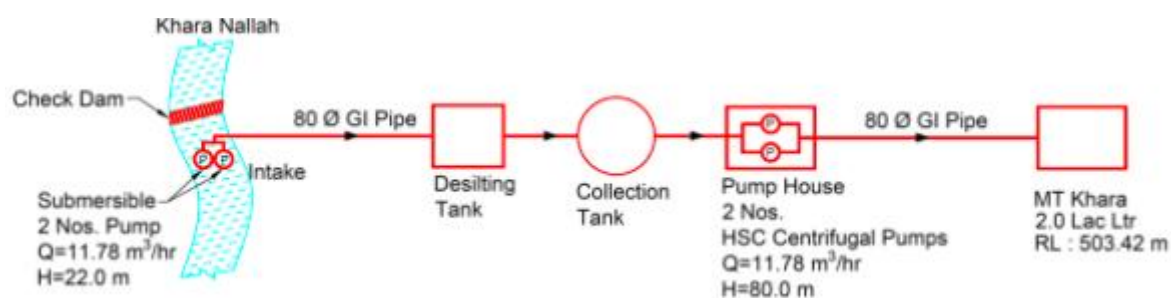
22. Proposed LIS – Upper Bhuddi

Figure 31: Flow Diagram of Proposed LIS Upper Bhuddi



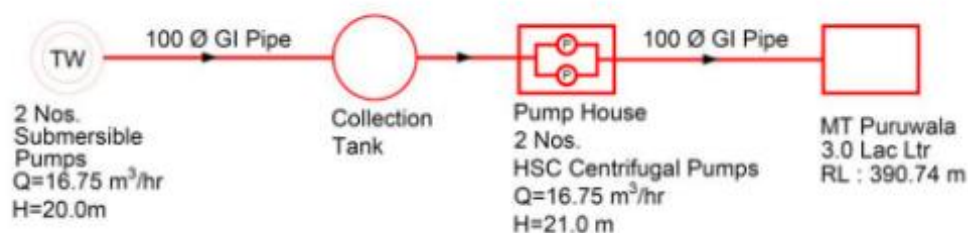
23. Proposed LIS – Khara

Figure 32: Flow Diagram of Proposed LIS Khara



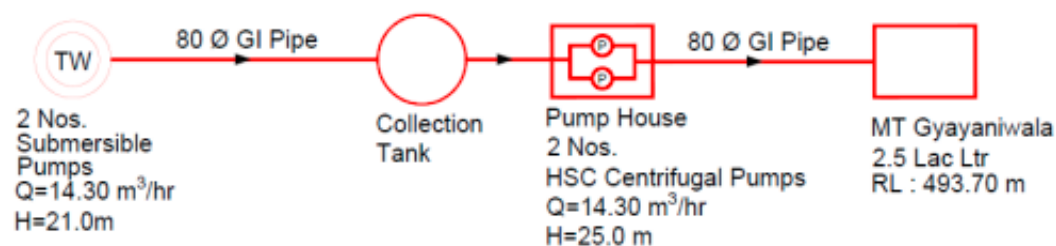
24. Proposed LIS – Puruwala

Figure 33: Flow Diagram of Proposed LIS Puruwala



25. Proposed LIS – Gyayaniwala

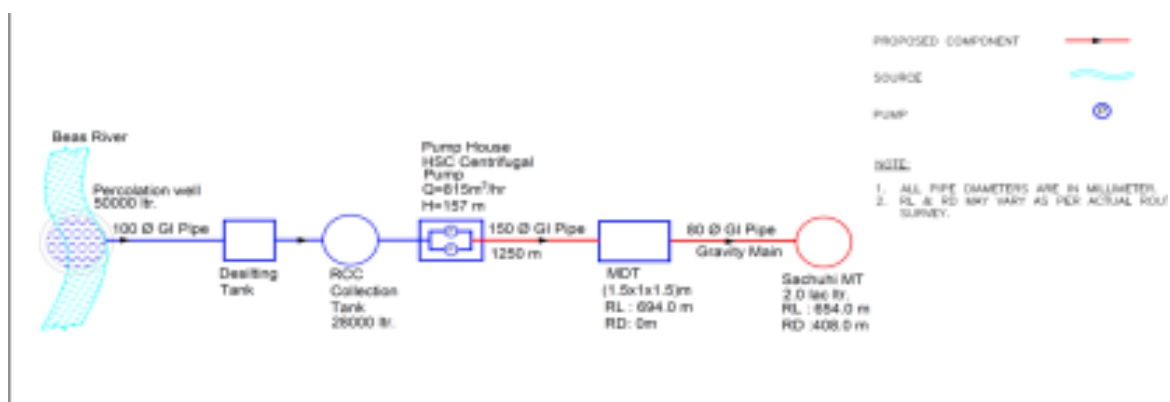
Figure 34: Flow Diagram of Proposed LIS Gyayaniwala



Irrigation Scheme flow-diagram of Package – 03 (Hamirpur District):

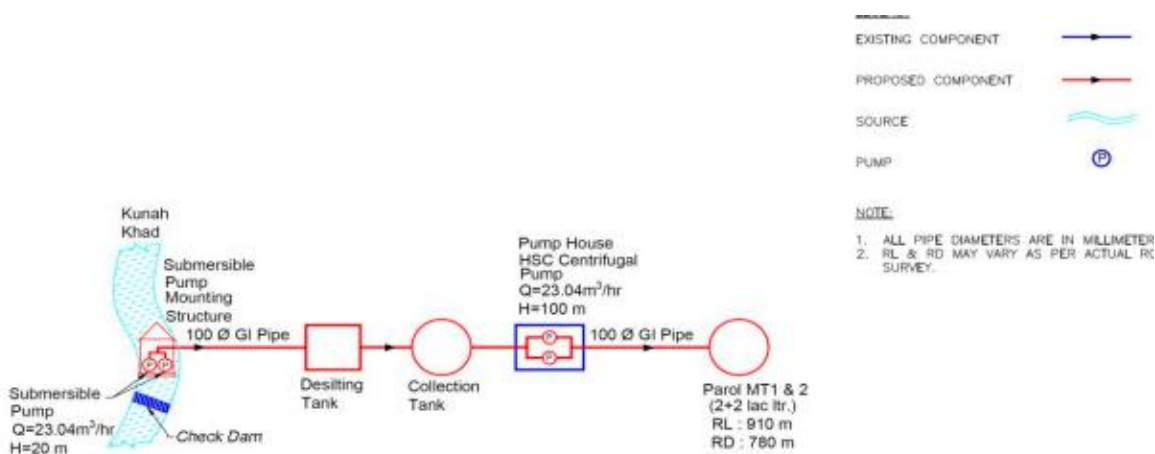
1. Proposed LIS – Sachuin

Figure 35: Flow Diagram of Proposed LIS Sachuin



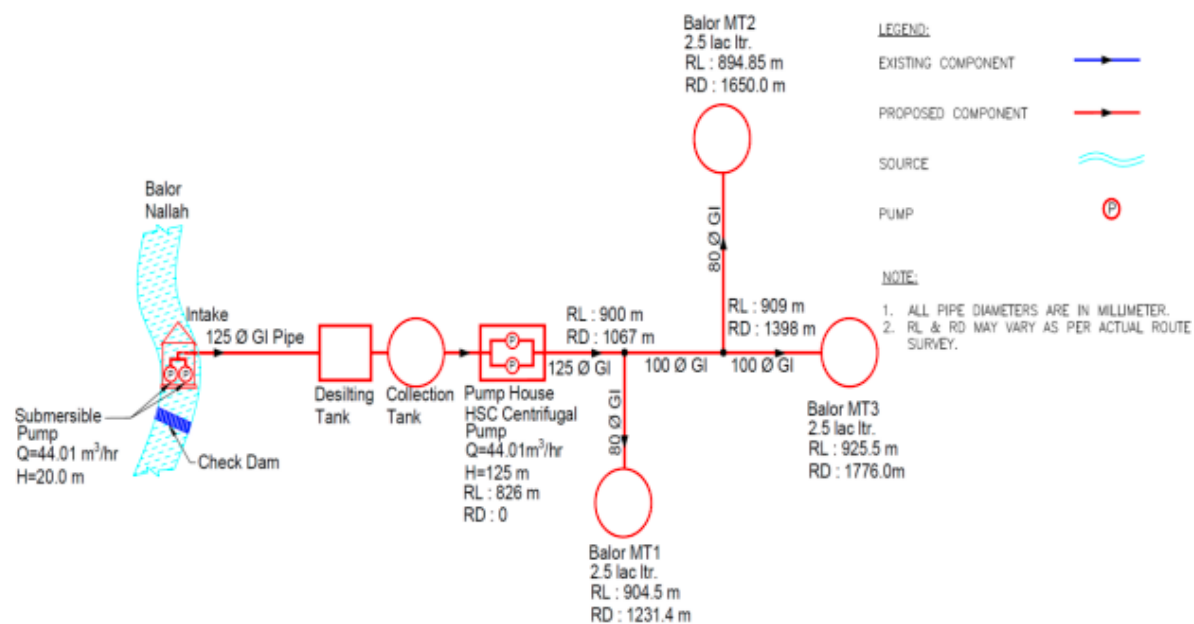
2. Proposed LIS – Dera Parol

Figure 36: Flow Diagram of Proposed LIS Dera Parol



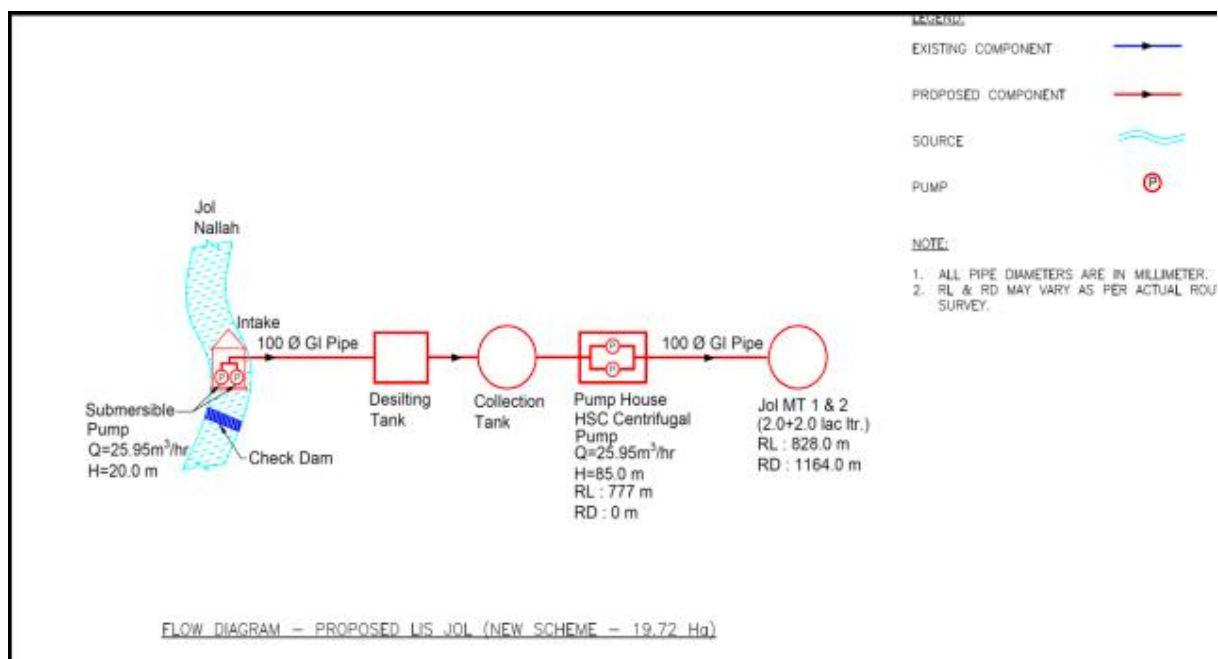
3. Proposed LIS – Balor-Sangrawar

Figure 37: Flow Diagram of Proposed LIS Balor-Sangrawar



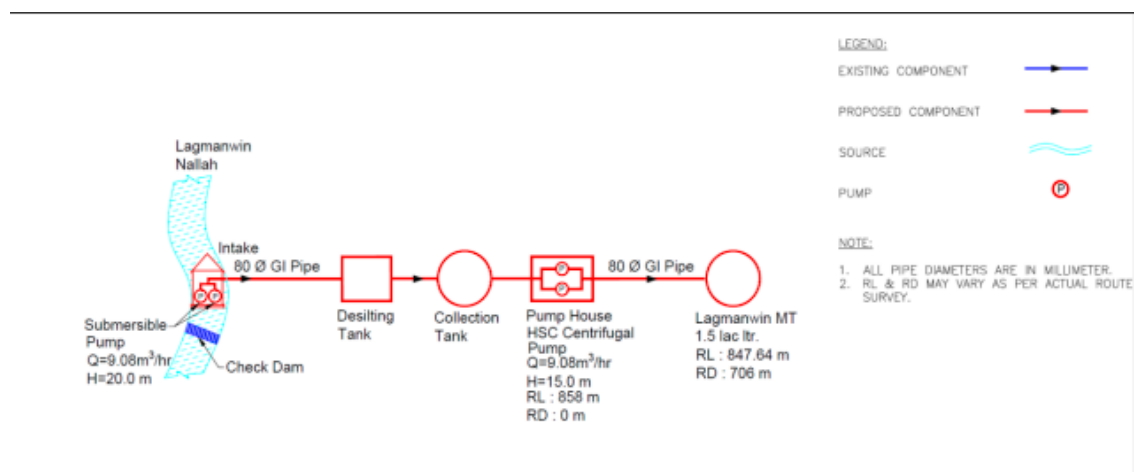
4. Proposed LIS – Jol

Figure 38: Flow Diagram of Proposed LIS Jol



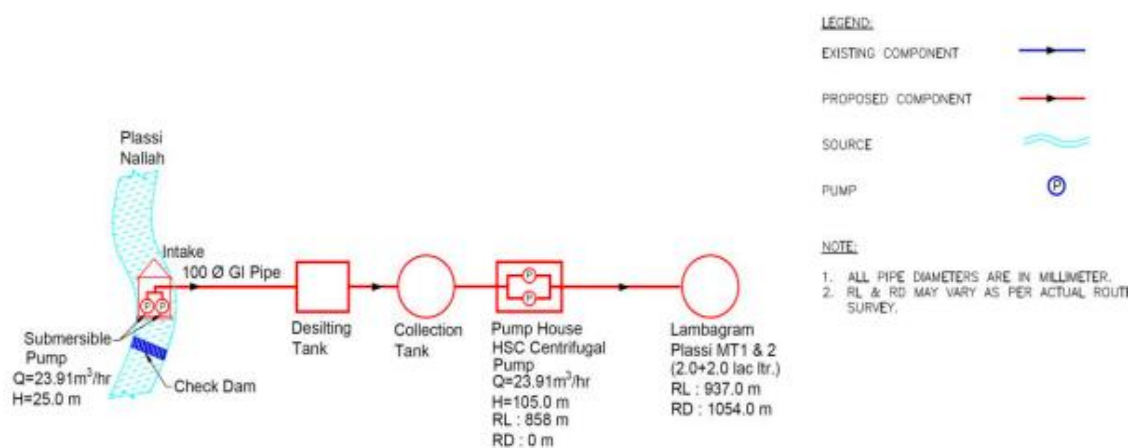
5. Proposed LIS – Lagmanwin

Figure 39: Flow Diagram of Proposed LIS Lagmanwin



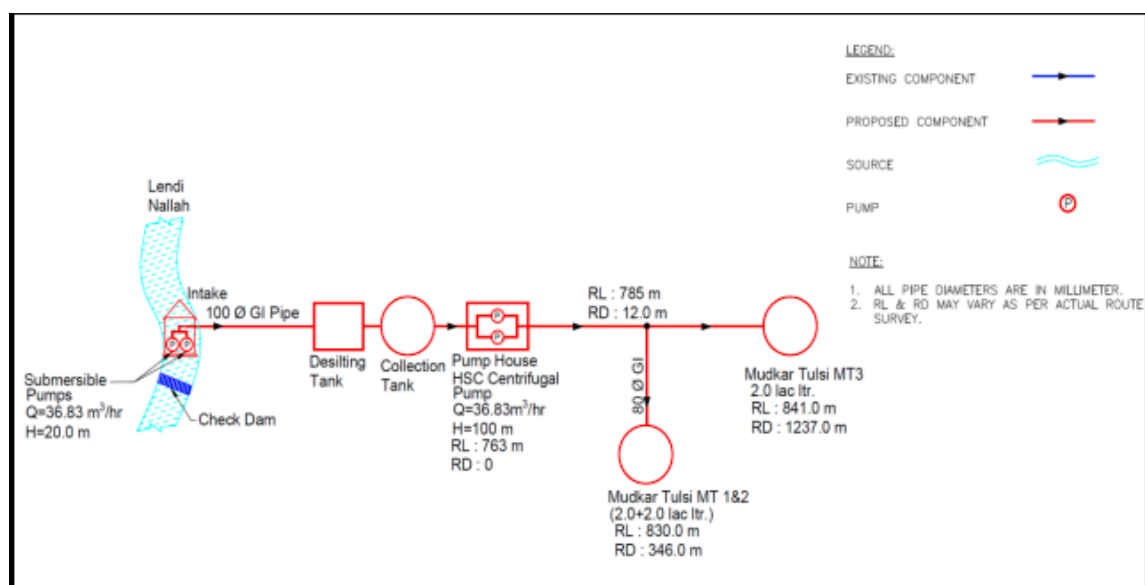
6. Proposed LIS – Lambagram/Palasi

Figure 40: Flow Diagram of Proposed LIS Lambagram/Palasi



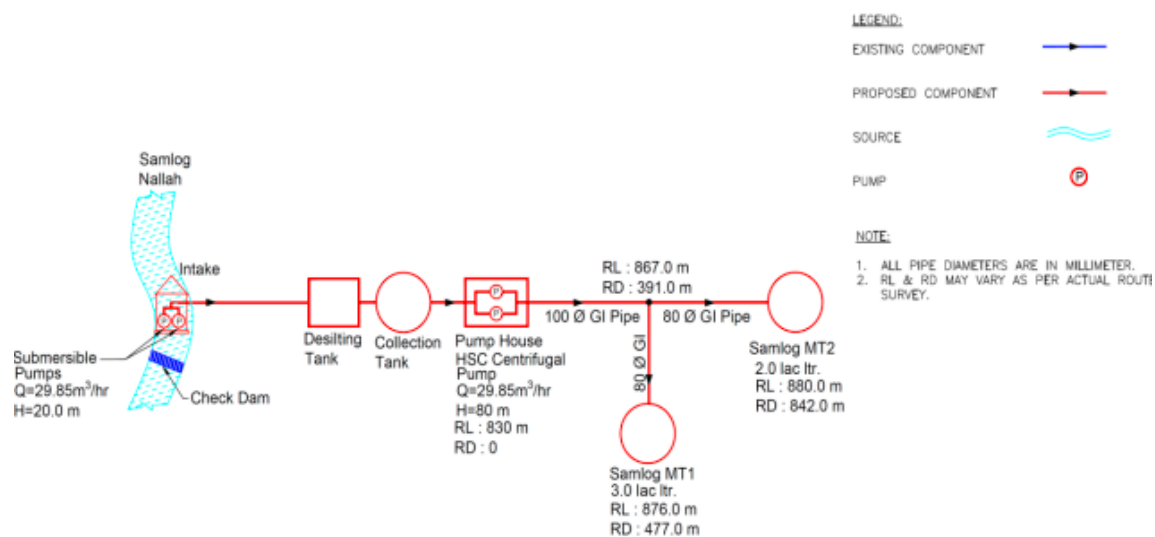
7. Proposed LIS – Mundkhar Tulsi

Figure 41: Flow Diagram of Proposed LIS Mundkhar Tulsi



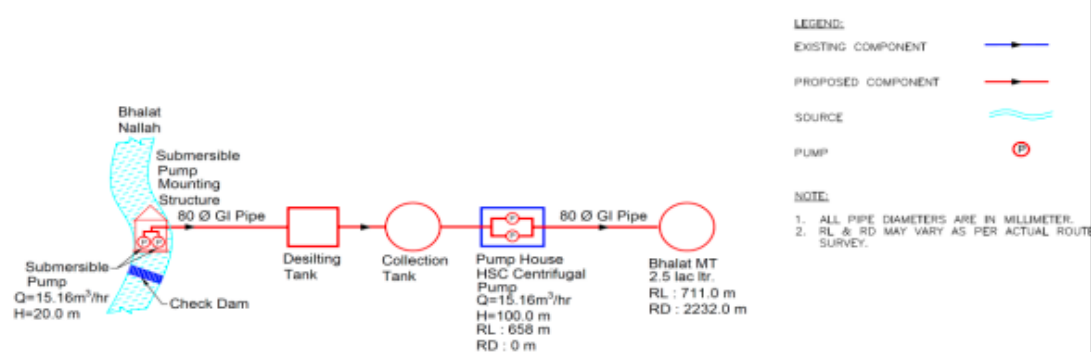
8. Proposed LIS – Samlog

Figure 42: Flow Diagram of Proposed LIS Samlog



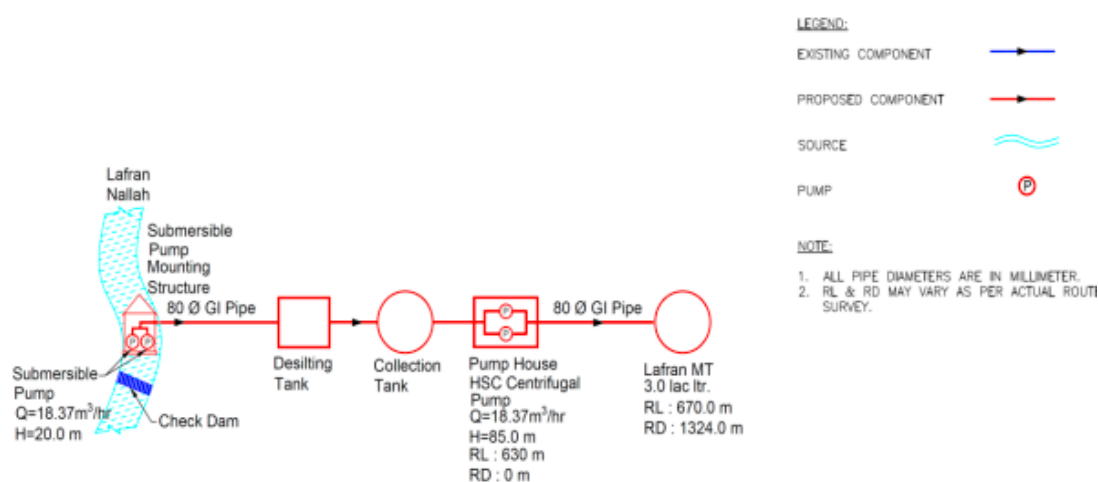
9. Proposed LIS – Bhalat

Figure 43: Flow Diagram of Proposed LIS Bhalat



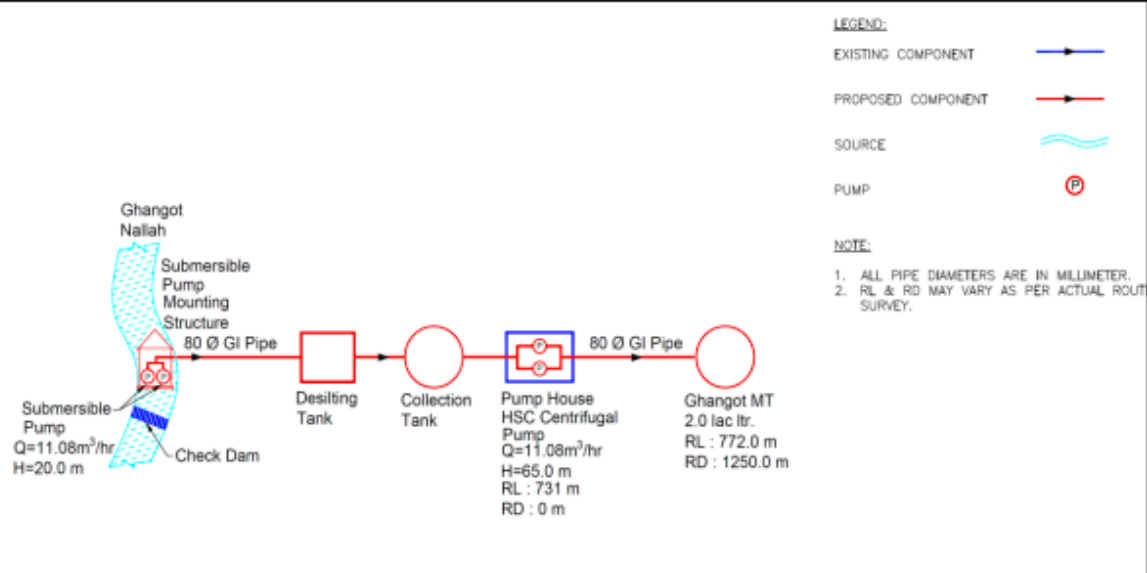
10. Proposed LIS – Lafran

Figure 44: Flow Diagram of Proposed LIS Lafran



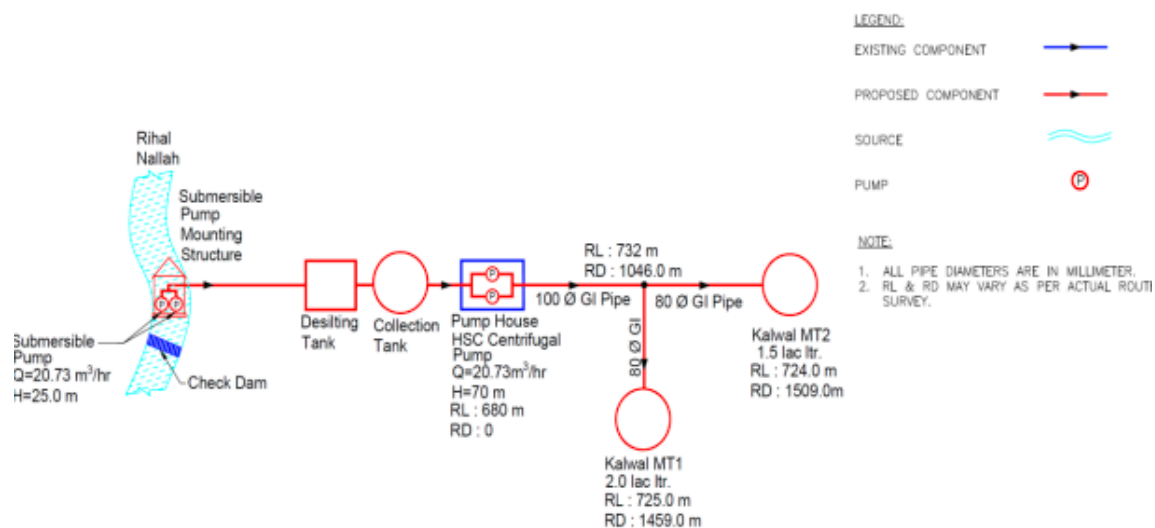
11. Proposed LIS – Ghangot

Figure 45: Flow Diagram of Proposed LIS Ghangot



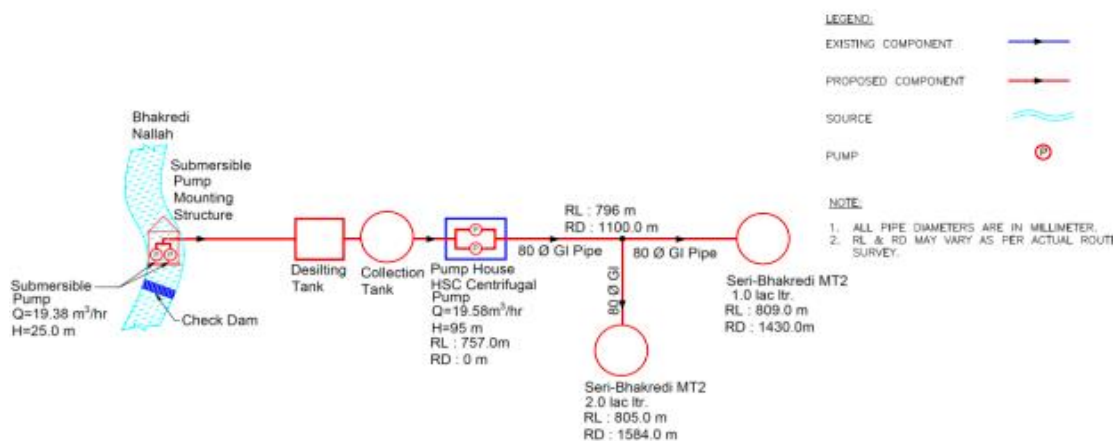
12. Proposed LIS – Kalwal

Figure 46: Flow Diagram of Proposed LIS Kalwal



13. Proposed LIS – Seri-Bhakredi

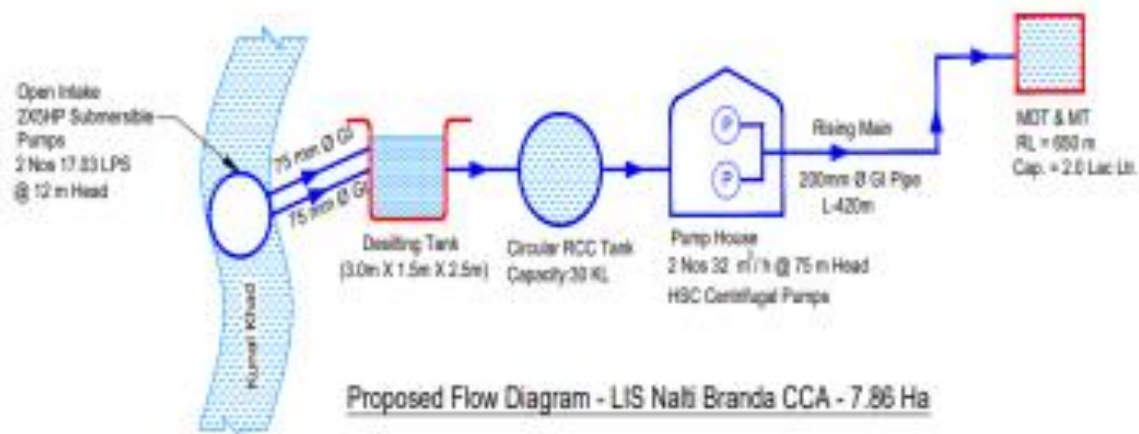
Figure 47: Flow Diagram of Proposed LIS Seri-Bhakredi



Irrigation Scheme flow-diagram of Package – 04 (Hamirpur District):

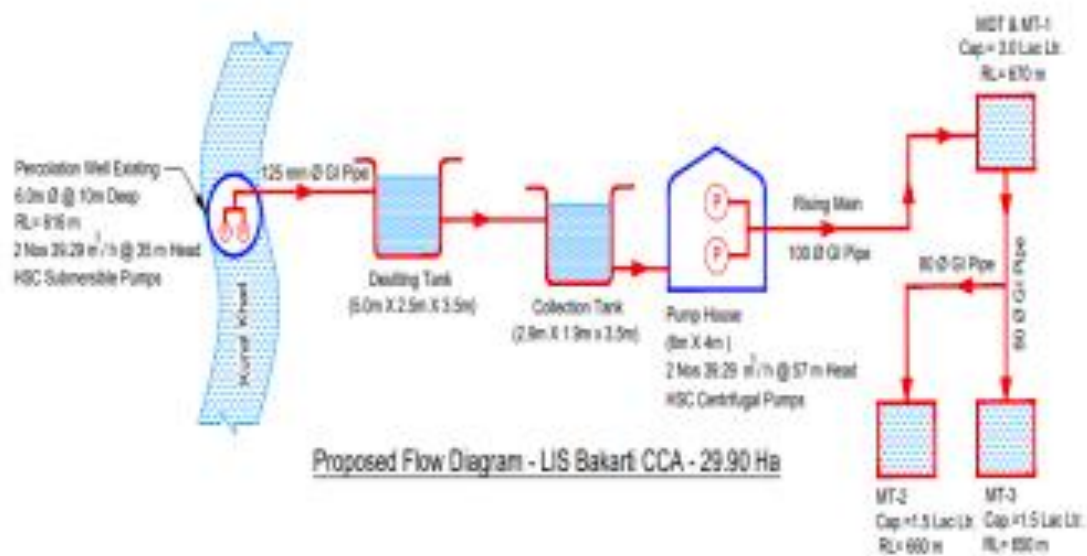
1. Proposed LIS – Nalti Branda

Figure 48: Flow Diagram of Proposed LIS Nalti Branda



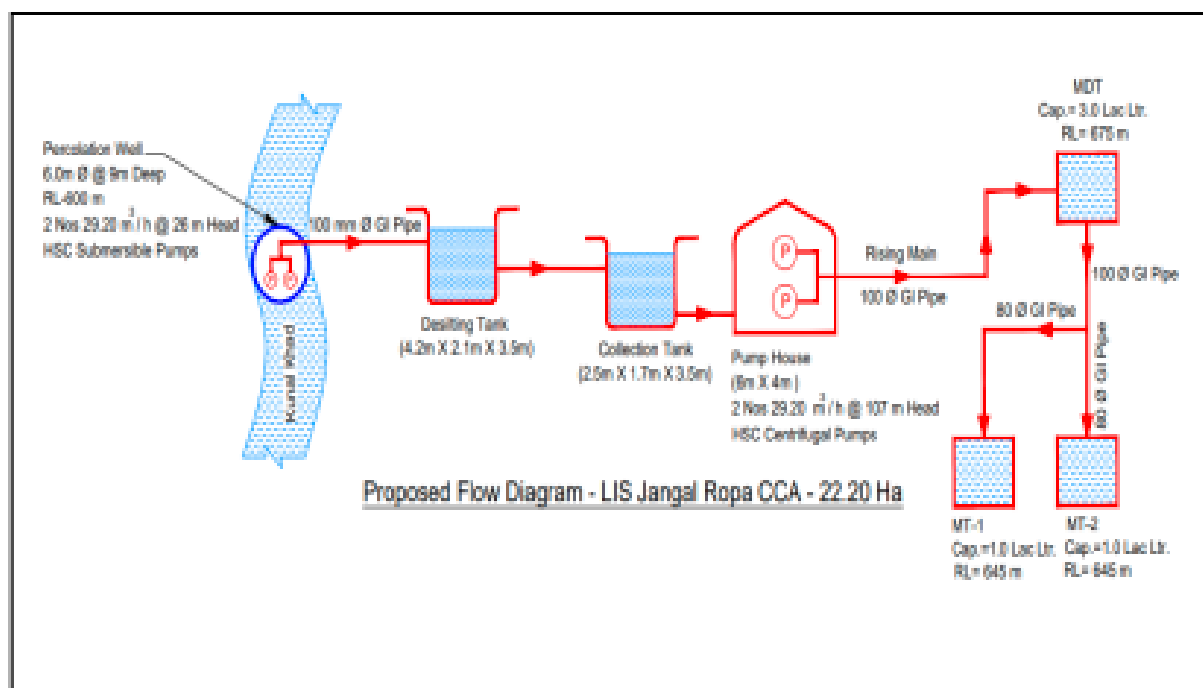
2. Proposed LIS – Bakarti-I

Figure 49: Flow Diagram of Proposed LIS Bakarti-I



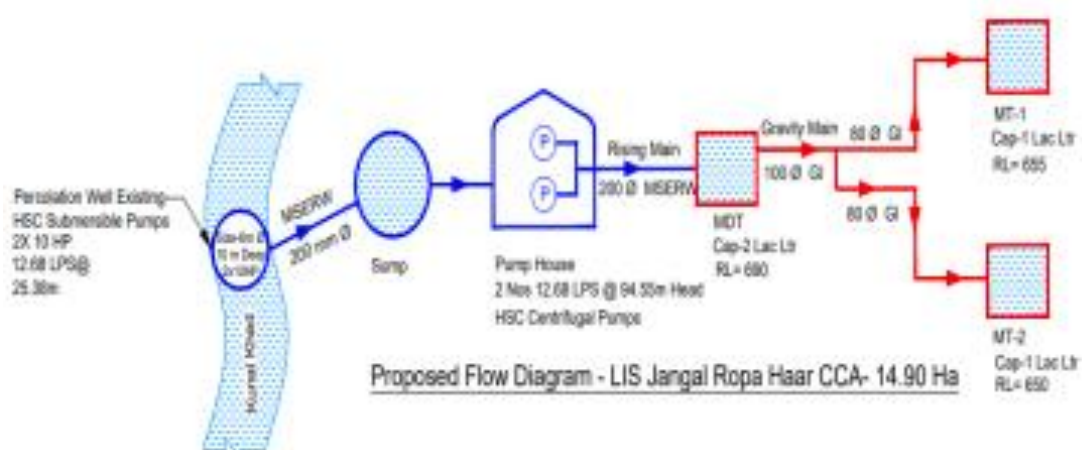
3. Proposed LIS – Jangal Ropa

Figure 50: Flow Diagram of Proposed LIS Jangal Ropa



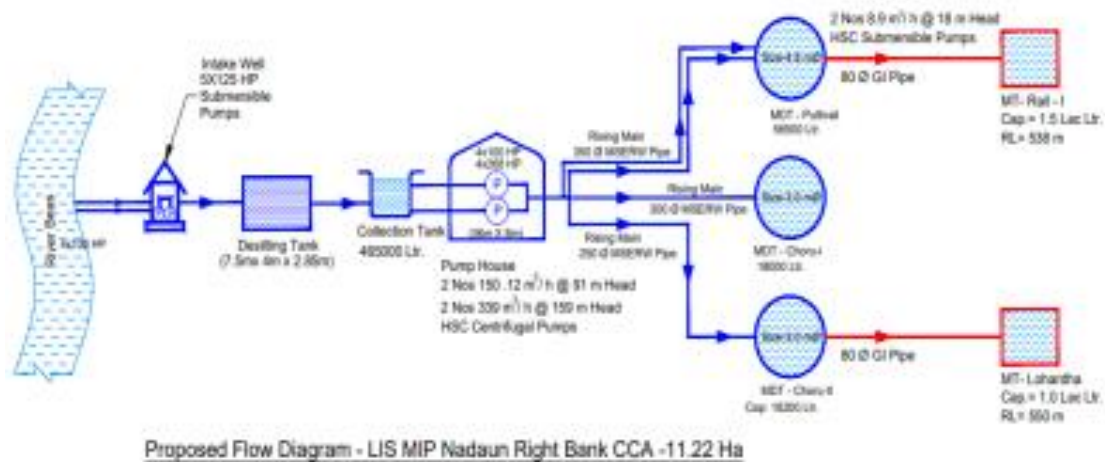
4. Proposed LIS – Jangal Ropa Haar

Figure 51: Flow Diagram of Proposed LIS Jangal Ropa Haar



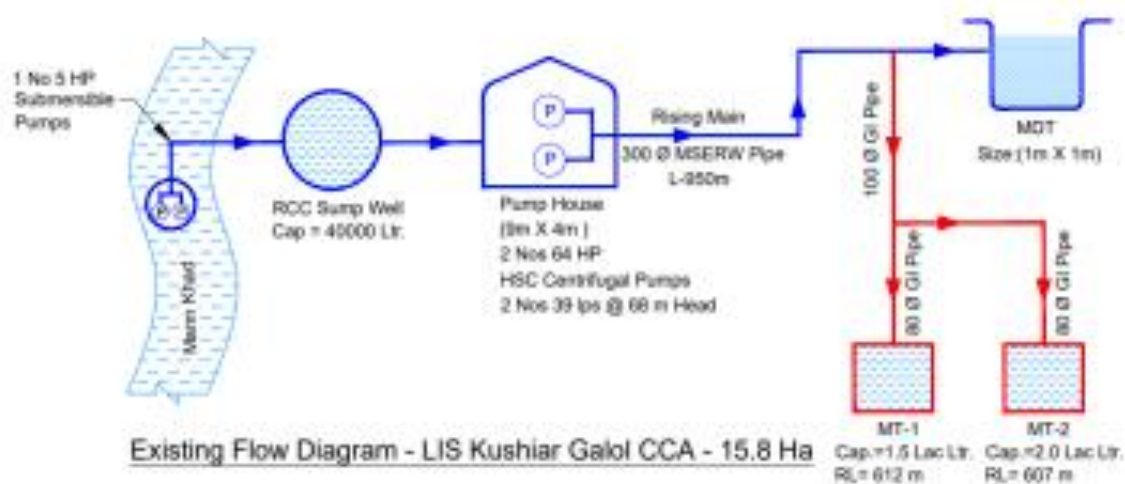
7. Proposed LIS – MIP Nadaun Right Bank

Figure 54: Flow Diagram of Proposed LIS MIP Nadaun Right Bank



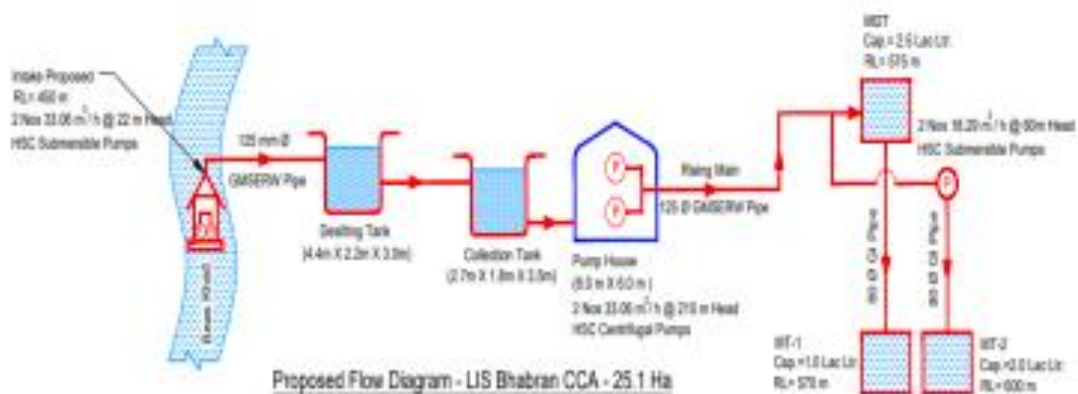
8. Proposed LIS – Kushiar Galol

Figure 55: Flow Diagram of Proposed LIS Kushiar Galol



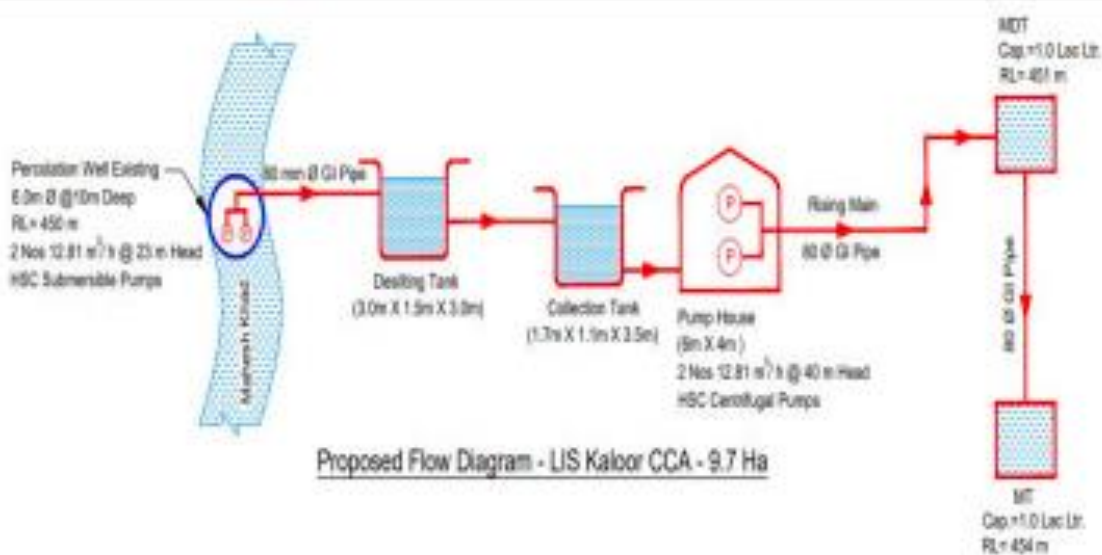
9. Proposed LIS – Bhabran

Figure 56: Flow Diagram of Proposed LIS Bhabran



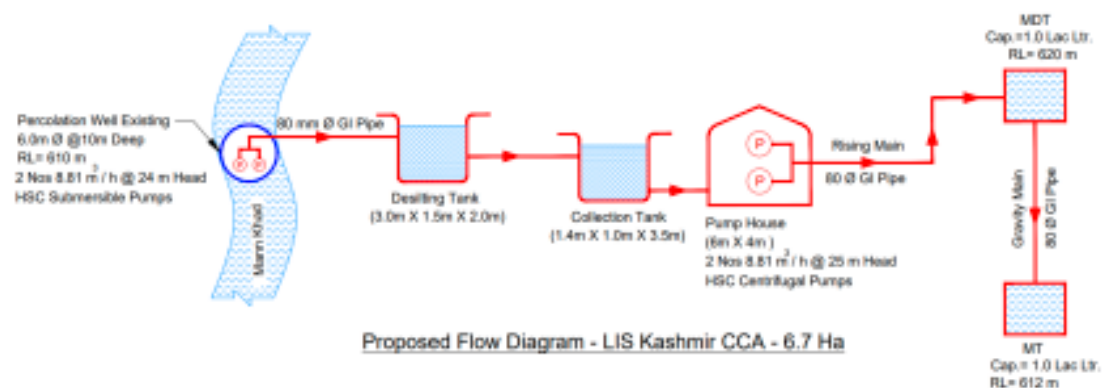
10. Proposed LIS – Kaloor

Figure 57: Flow Diagram of Proposed LIS Kaloor



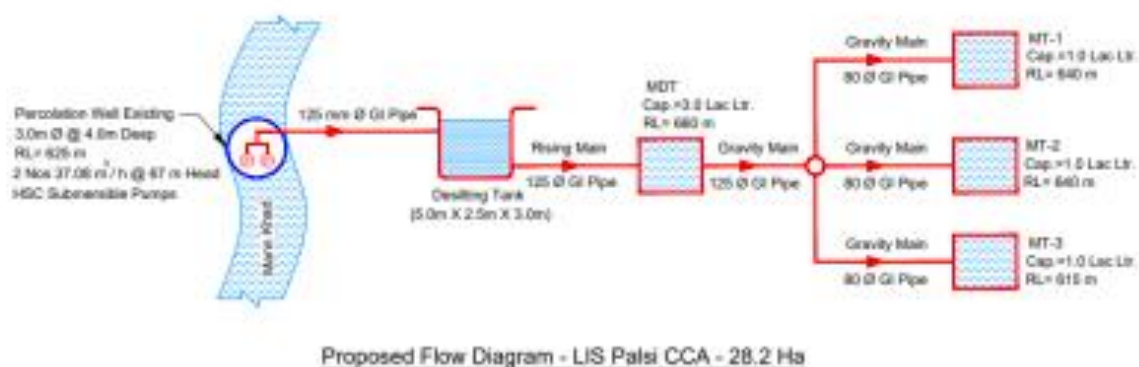
11. Proposed LIS – Kashmir

Figure 58: Flow Diagram of Proposed LIS Kashmir



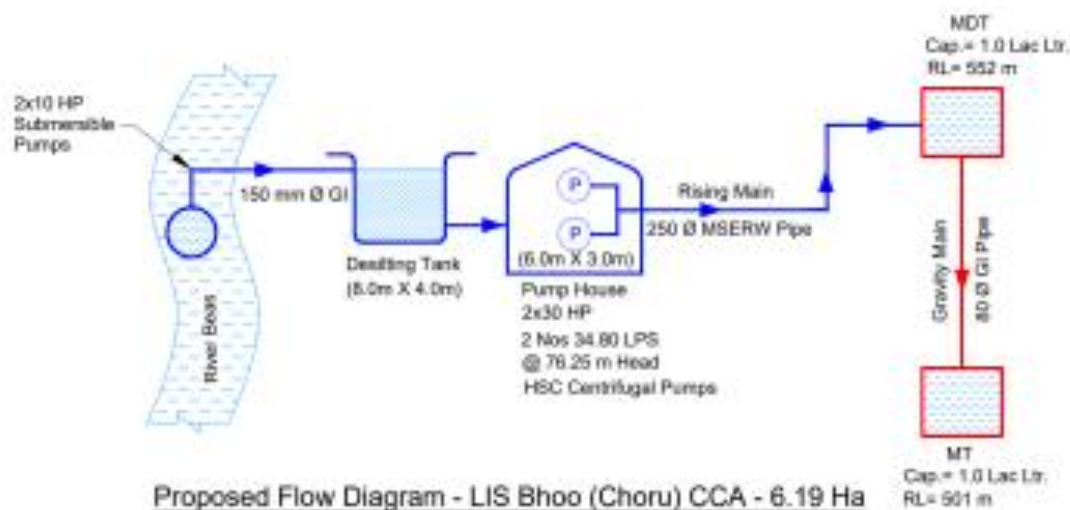
12. Proposed LIS – Palsi

Figure 59: Flow Diagram of Proposed LIS Palsi



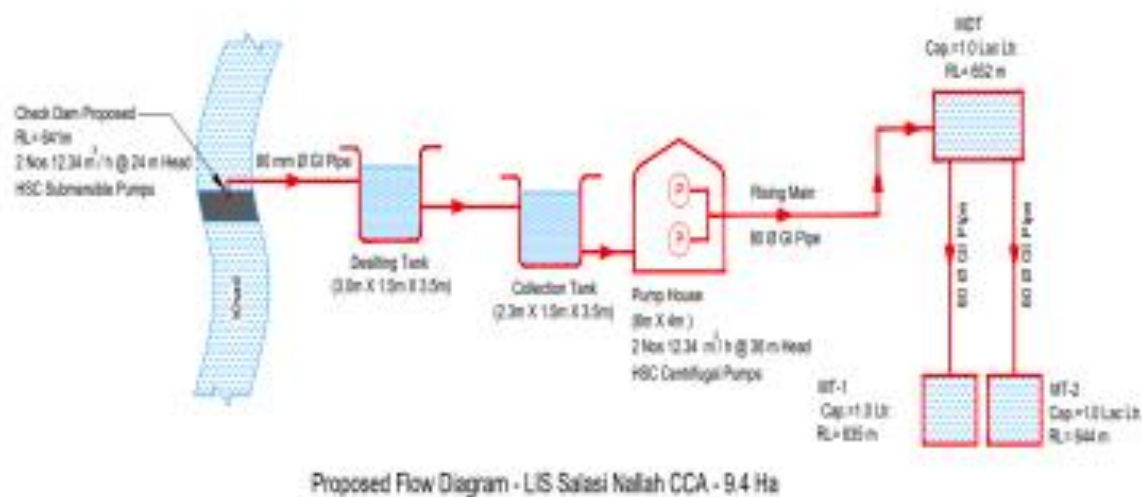
13. Proposed LIS – Bhoo

Figure 60: Flow Diagram of Proposed LIS Bhoo



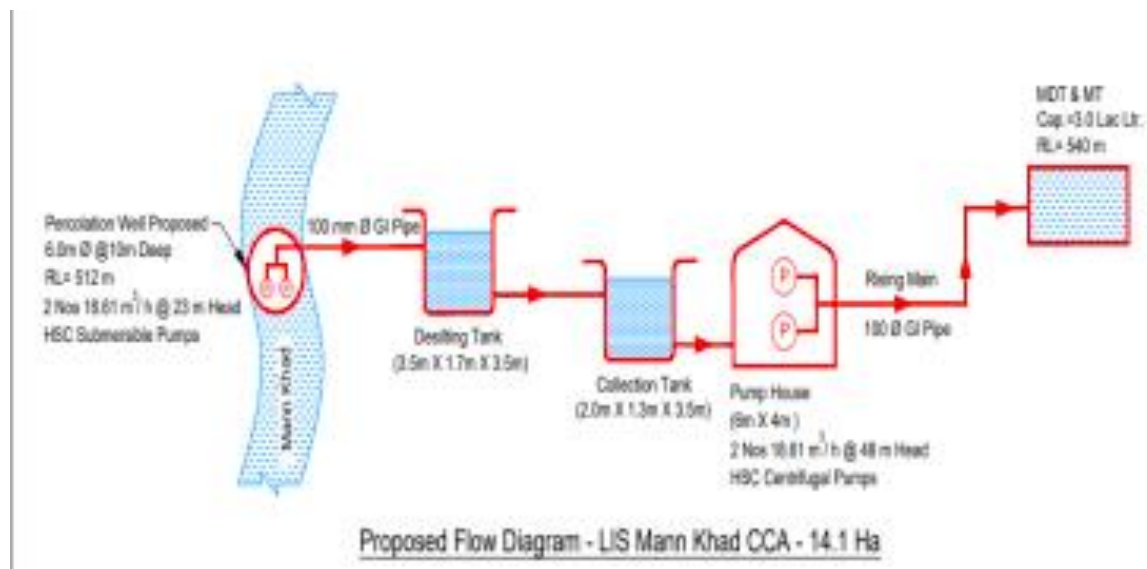
14. Proposed LIS – Salasi Nallah

Figure 61: Flow Diagram of Proposed LIS Salasi Nallah



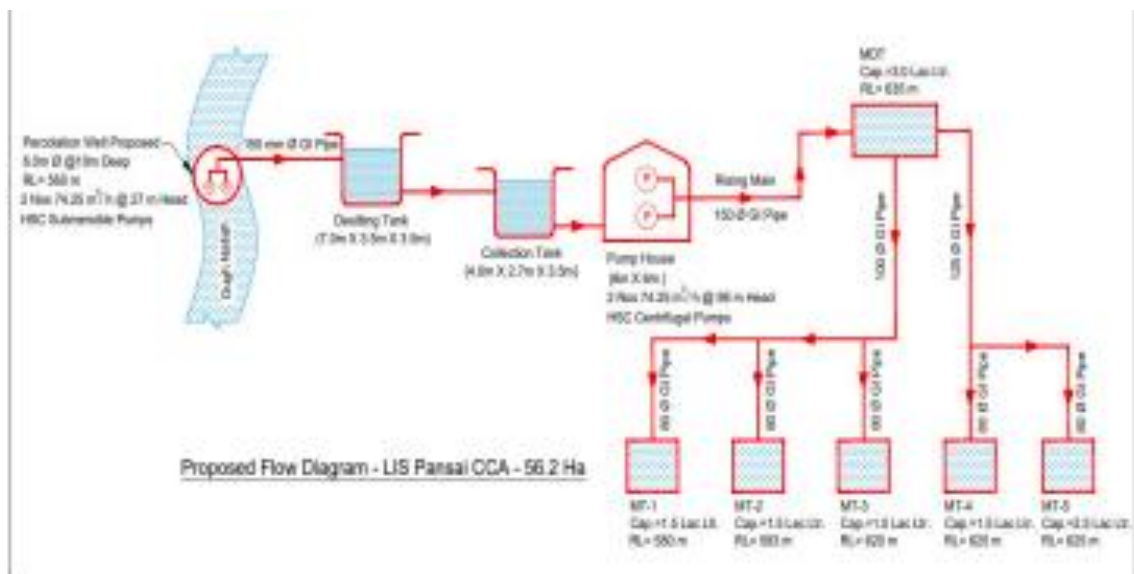
15. Proposed LIS – Mann Khad

Figure 62: Flow Diagram of Proposed LIS Mann Khad



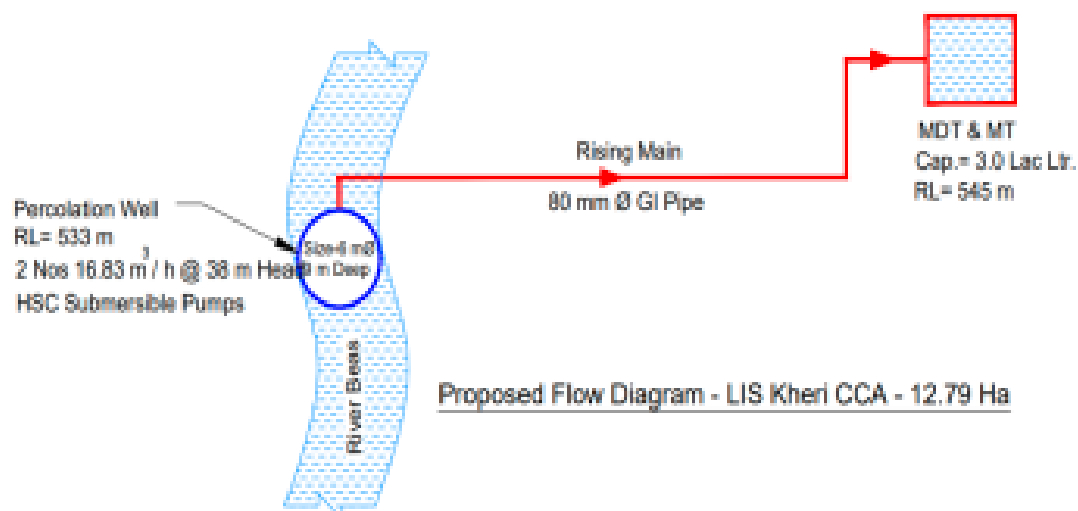
16. Proposed LIS – Pansai

Figure 63: Flow Diagram of Proposed LIS Pansai



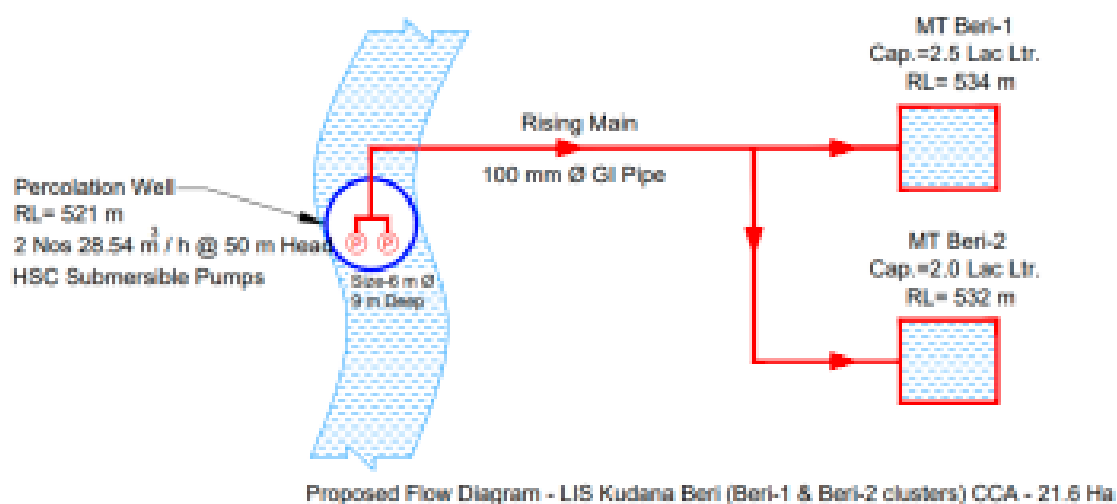
17. Proposed LIS – Kheri

Figure 64: Flow Diagram of Proposed LIS Kheri



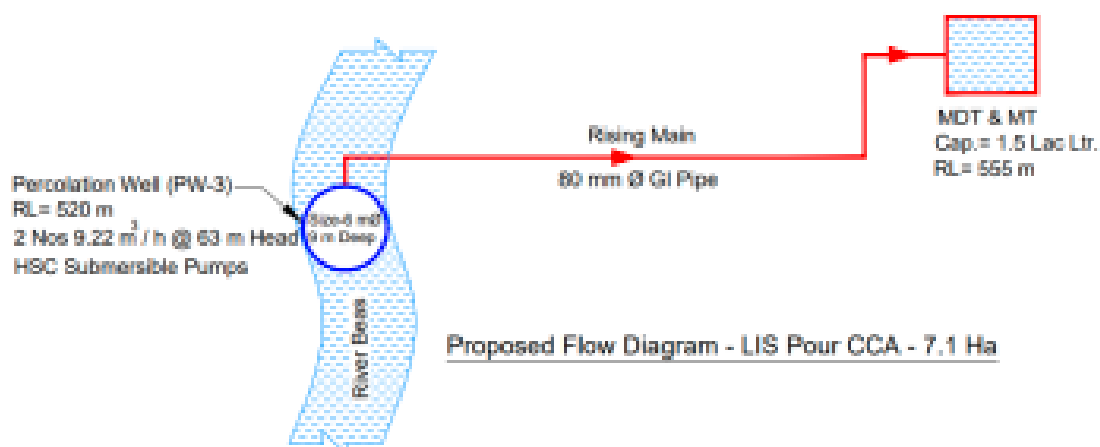
18. Proposed LIS – Kudana Beri

Figure 65: Flow Diagram of Proposed LIS Kudana Beri



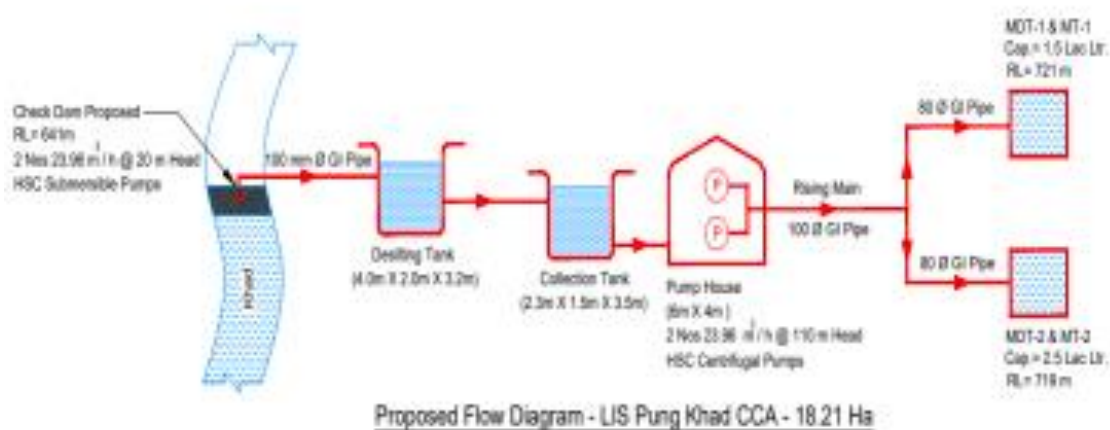
19. Proposed LIS – Pour

Figure 66: Flow Diagram of Proposed LIS Pour



20. Proposed LIS – Pung Khad

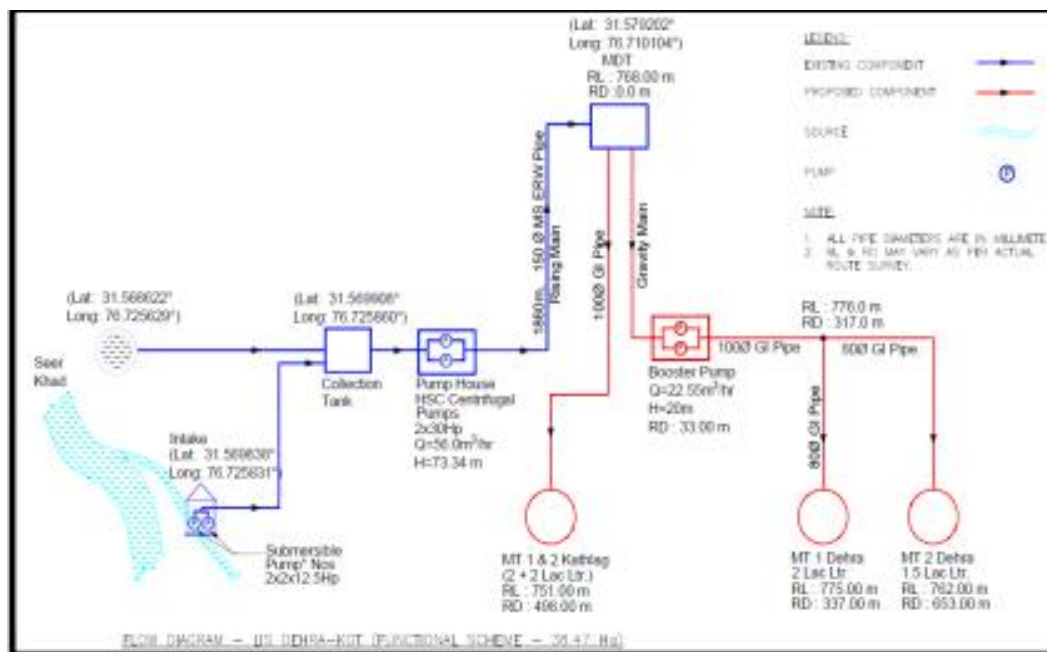
Figure 67: Flow Diagram of Proposed LIS Pung Khad



Irrigation Scheme flow-diagram of Package – 5 (Bilaspur District):

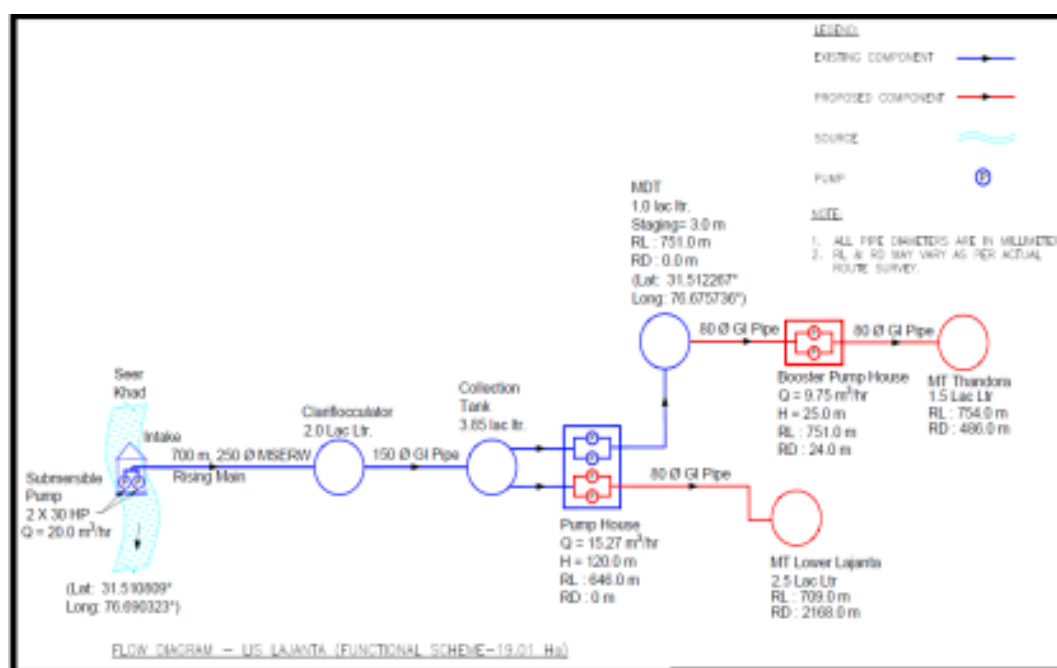
1. Proposed LIS – Dehra Kot

Figure 68: Flow Diagram of Proposed LIS Dehra Kot



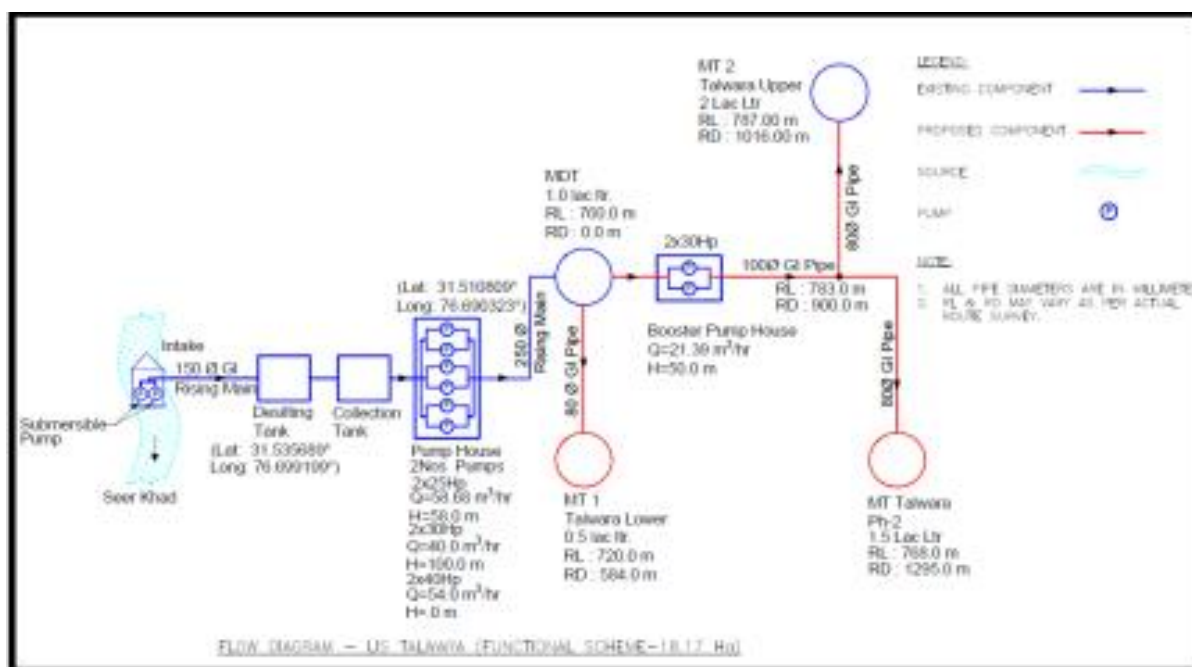
2. Proposed LIS – Lajantha

Figure 69: Flow Diagram of Proposed LIS Lajantha



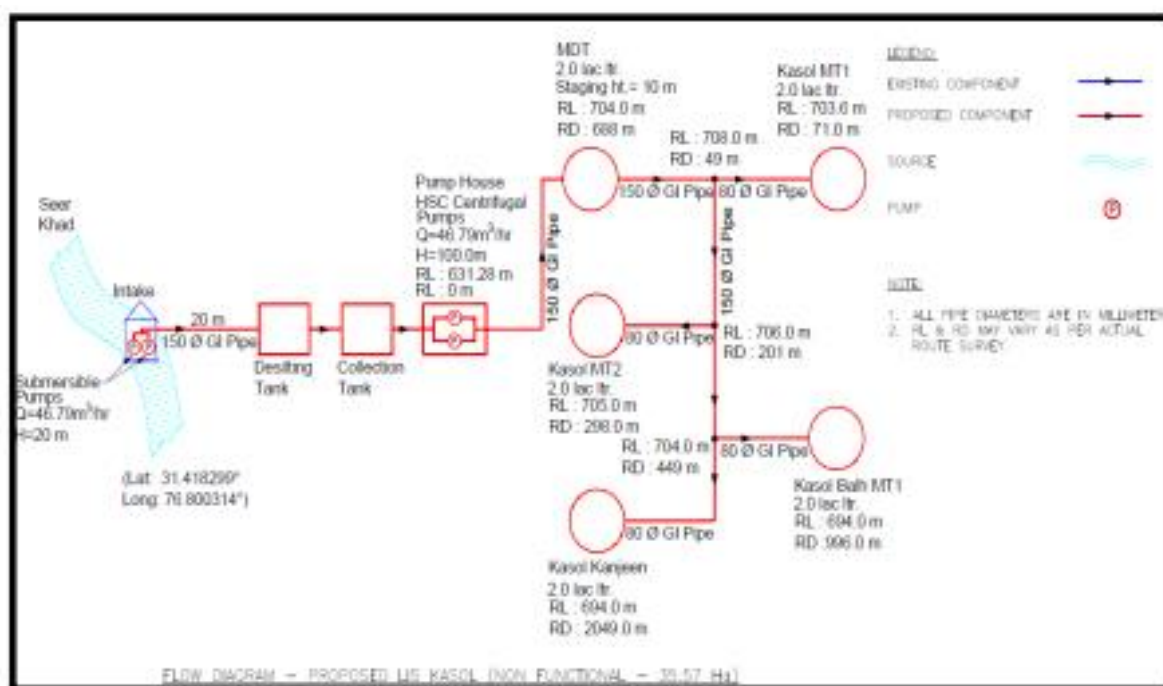
3. Proposed LIS – Talwara

Figure 70: Flow Diagram of Proposed LIS Talwara



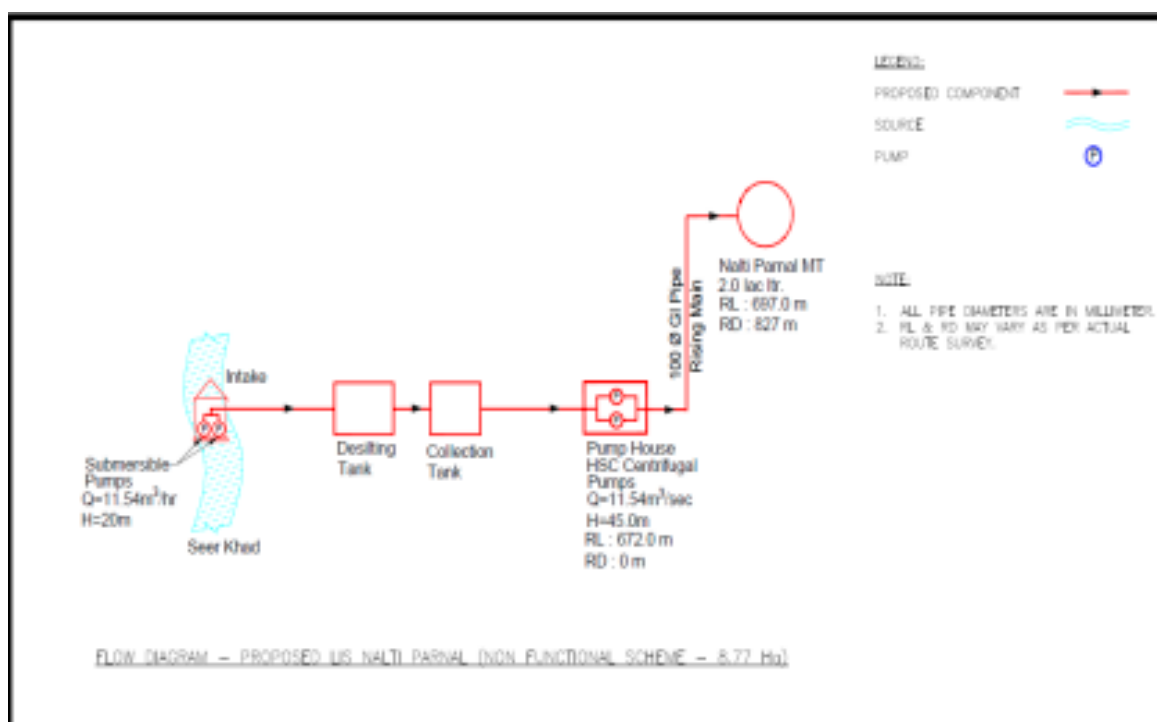
4. Proposed LIS – Kasol

Figure 71: Flow Diagram of Proposed LIS Kasol



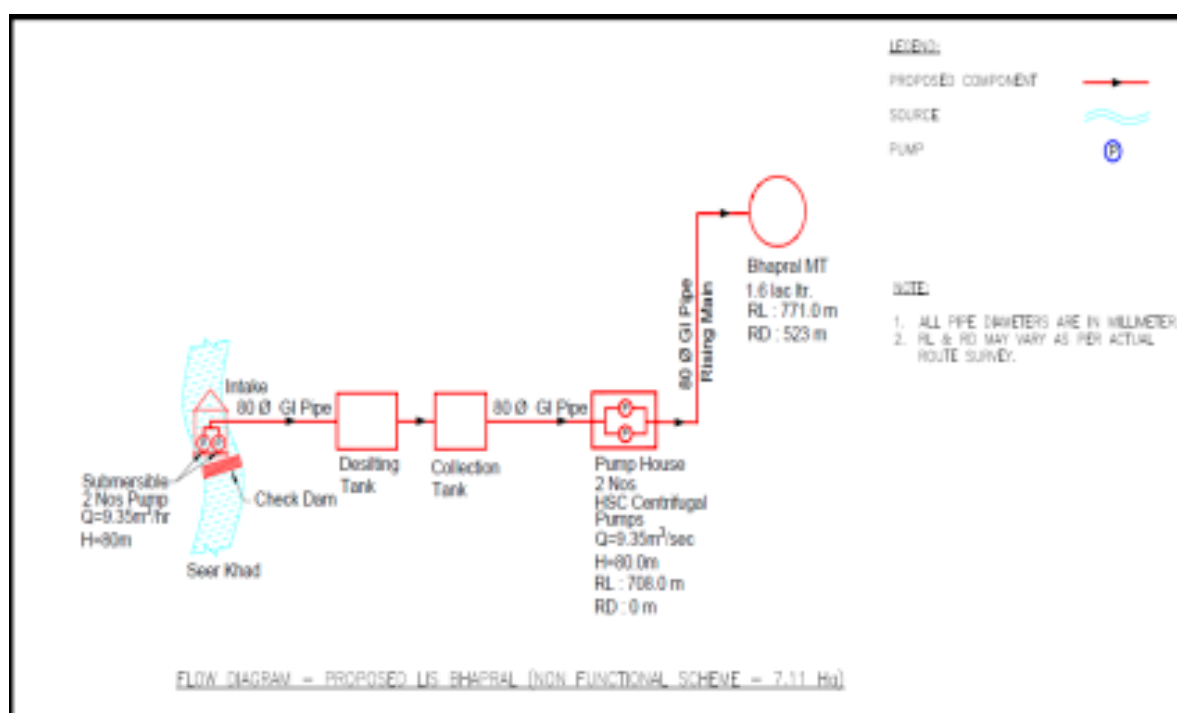
5. Proposed LIS – Nalti Parnal

Figure 72: Flow Diagram of Proposed LIS Nalti Parnal



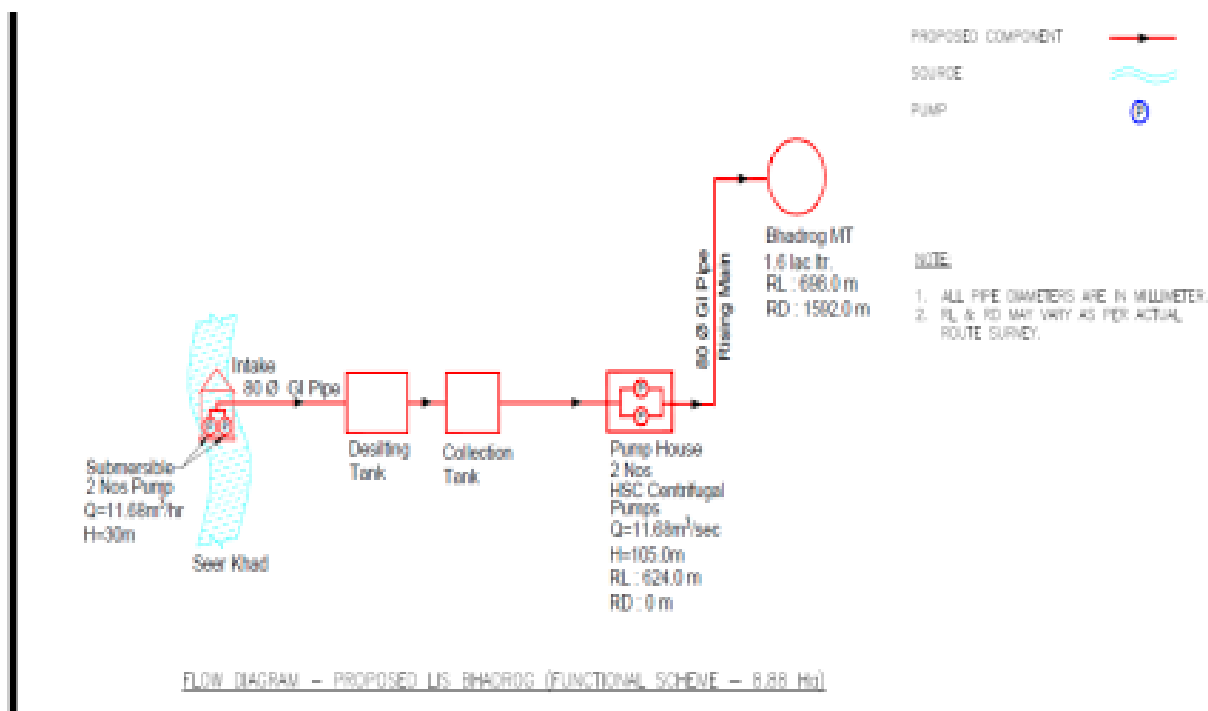
6. Proposed LIS – Bhapral

Figure 73: Flow Diagram of Proposed LIS Bhapral



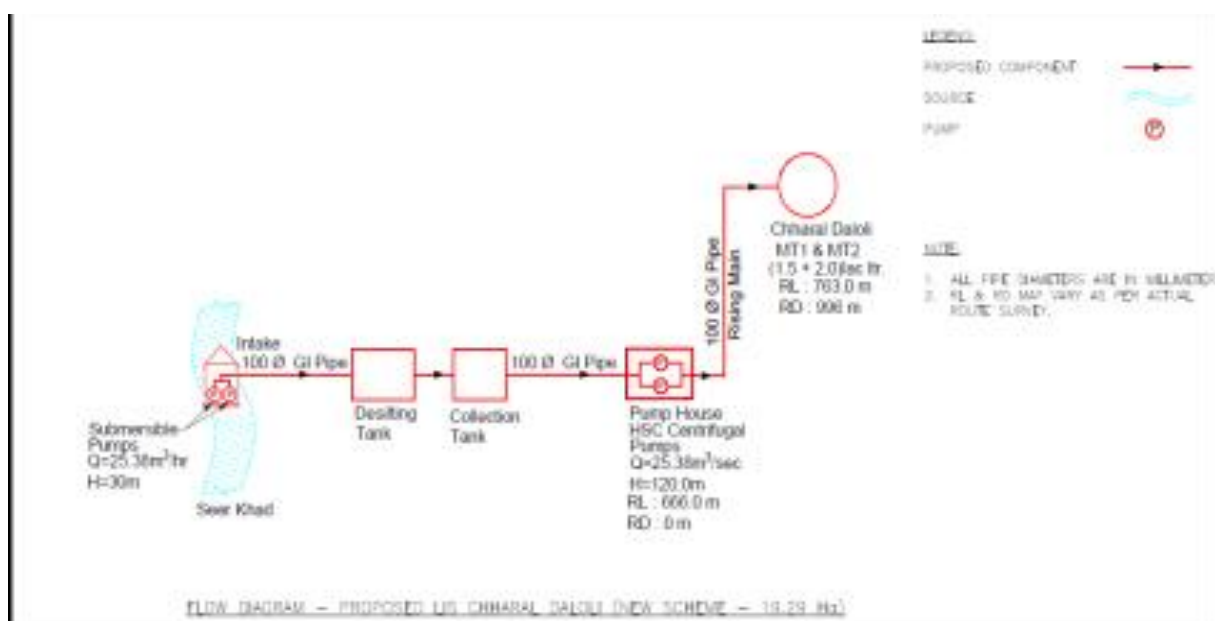
7. Proposed LIS – Bhadrog

Figure 74: Flow Diagram of Proposed LIS Bhadrog



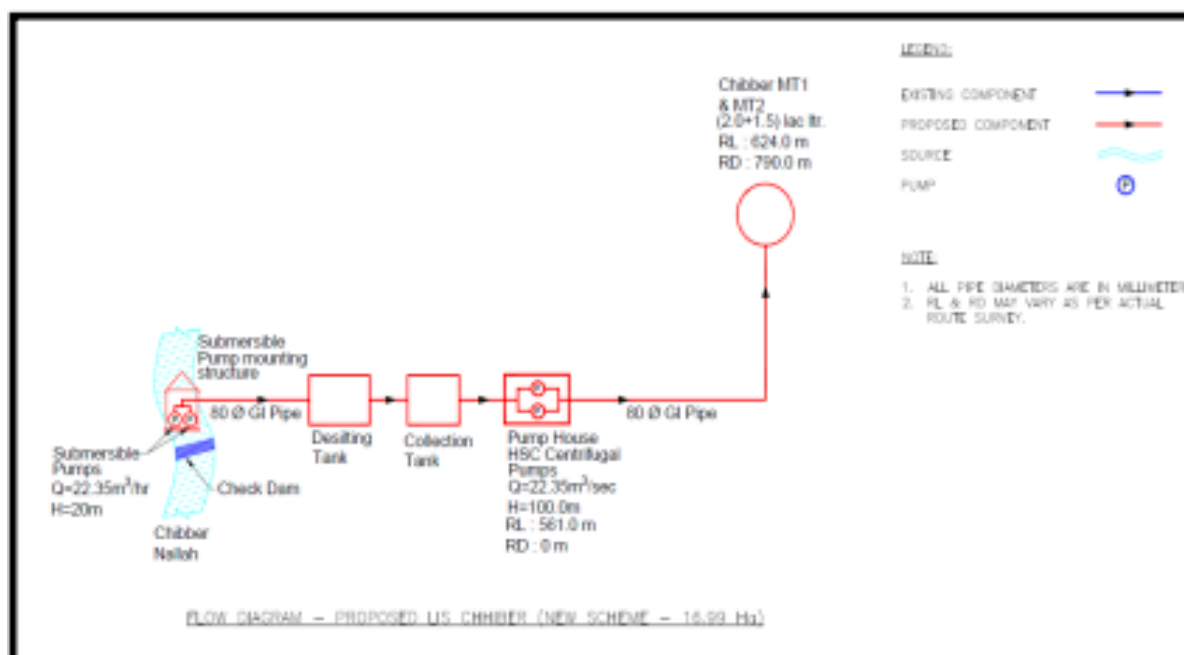
8. Proposed LIS – Chharal

Figure 75: Flow Diagram of Proposed LIS Chharal



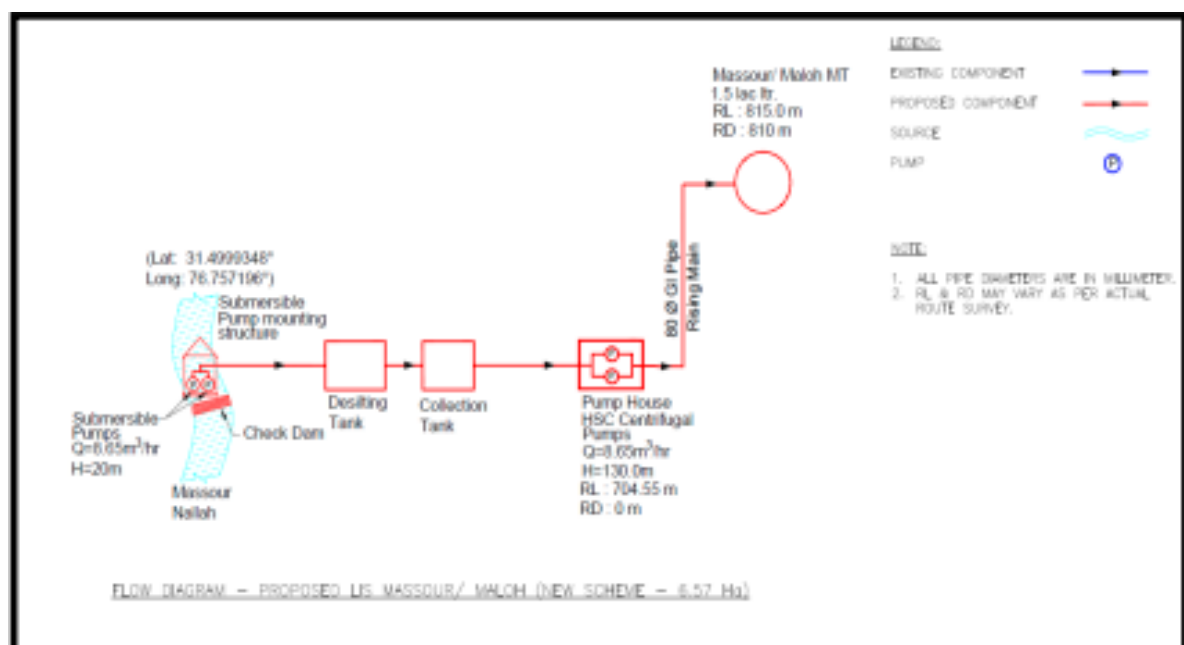
9. Proposed LIS – Chhiber

Figure 76: Flow Diagram of Proposed LIS Chhiber



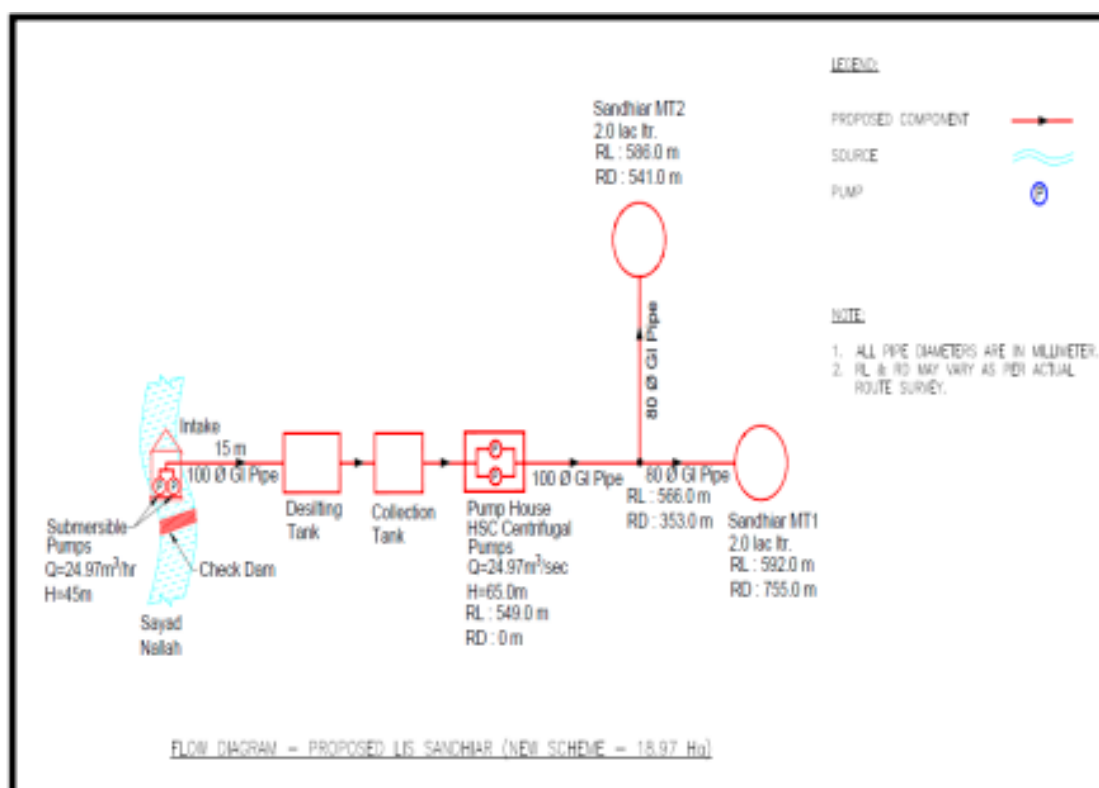
10. Proposed LIS – Massour / Malloh

Figure 77: Flow Diagram of Proposed LIS Massour / Malloh



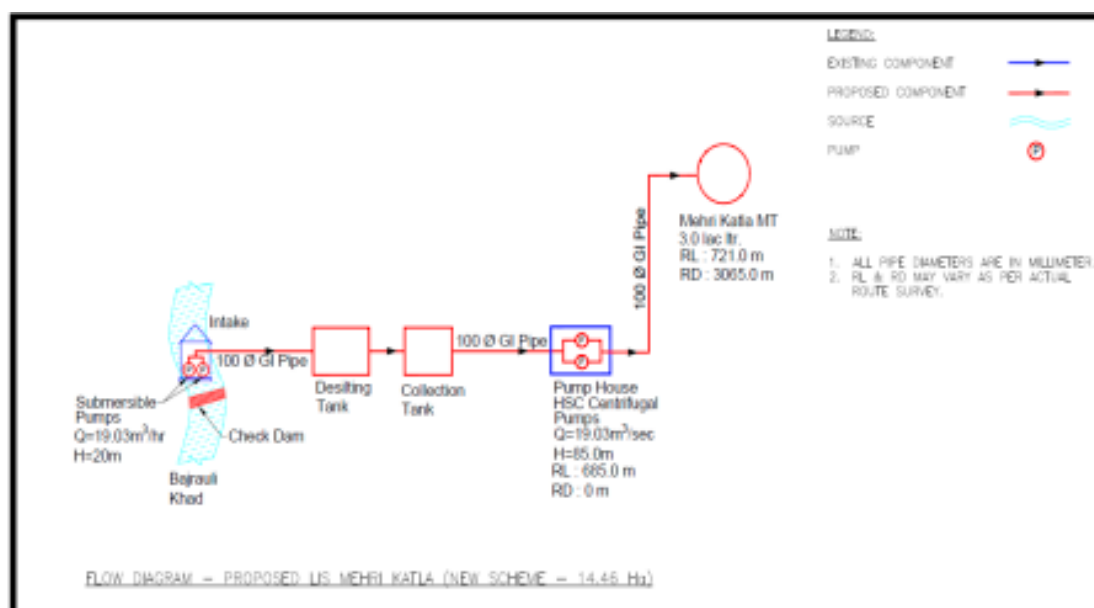
11. Proposed LIS – Sandhihar

Figure 78: Flow Diagram of Proposed LIS Sandhihar



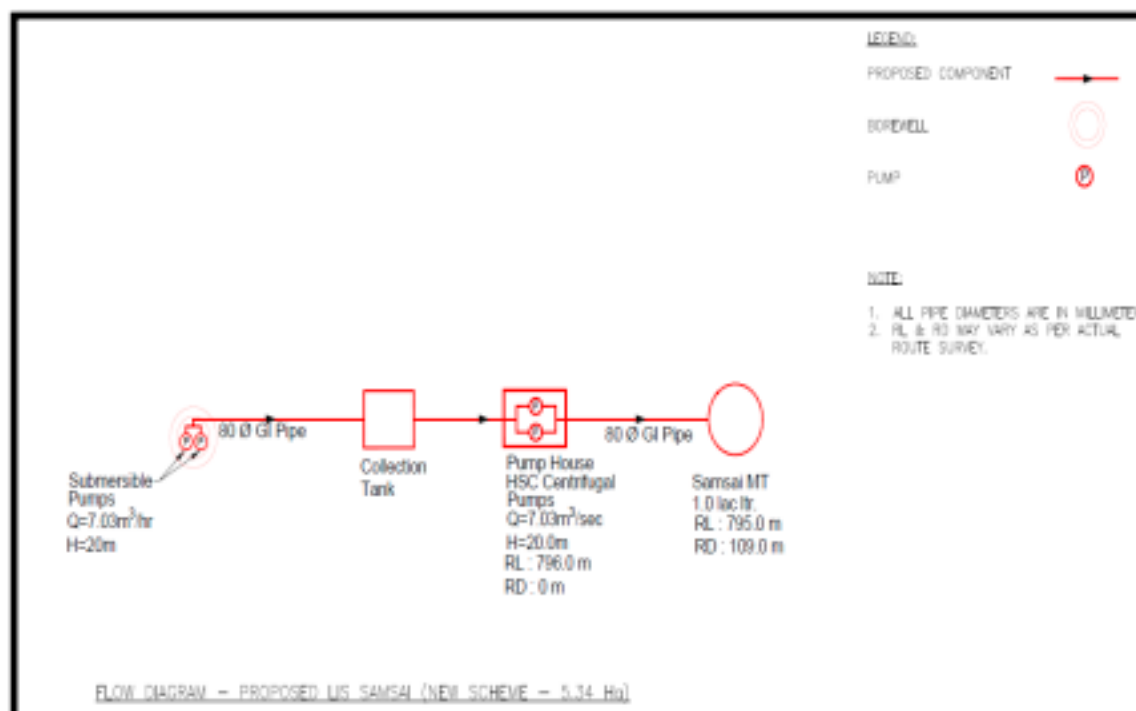
12. Proposed LIS – Meri Kathla

Figure 79: Flow Diagram of LIS Meri Kathla



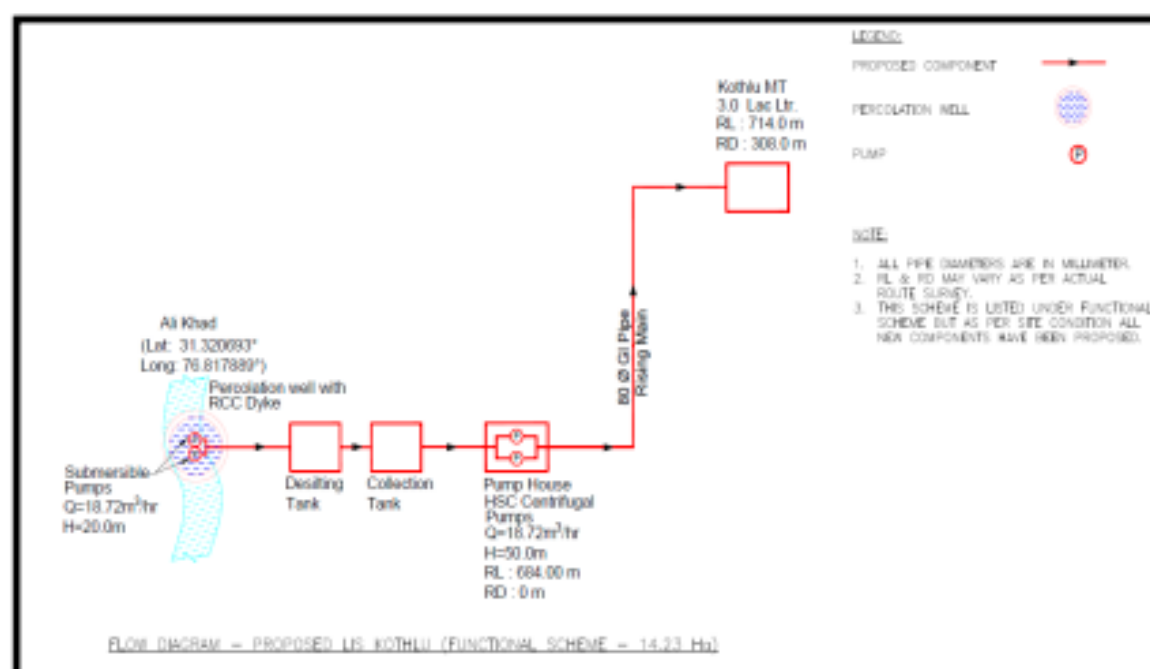
13. Proposed LIS – Samsai

Figure 80: Flow Diagram of Proposed LIS Samsai



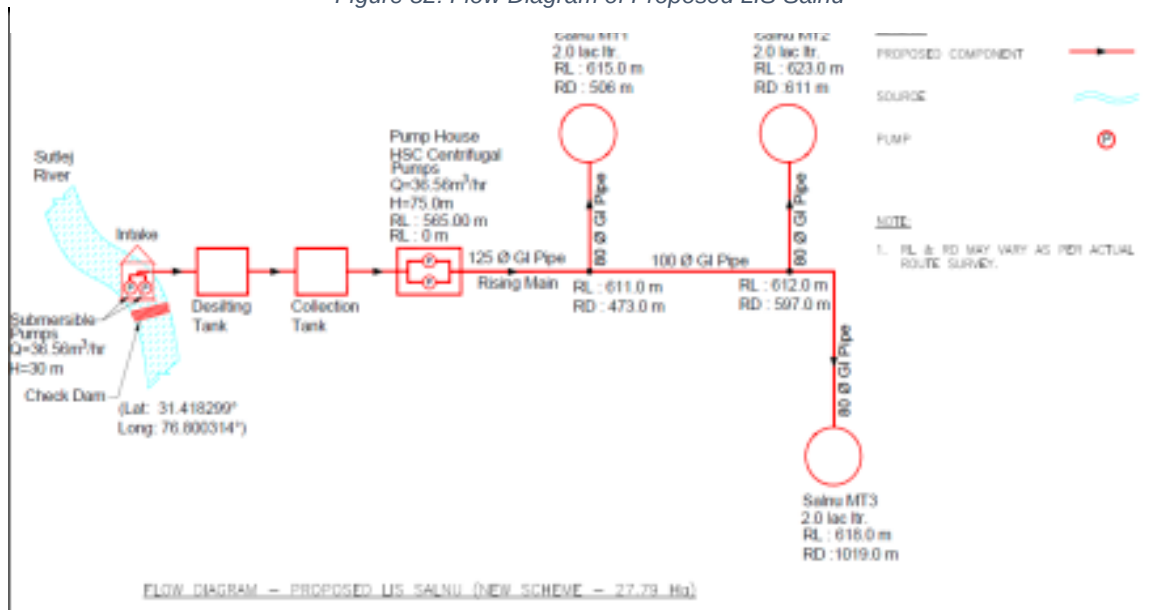
14. Proposed LIS – Kothlu

Figure 81: Flow Diagram of Proposed LIS Kothlu



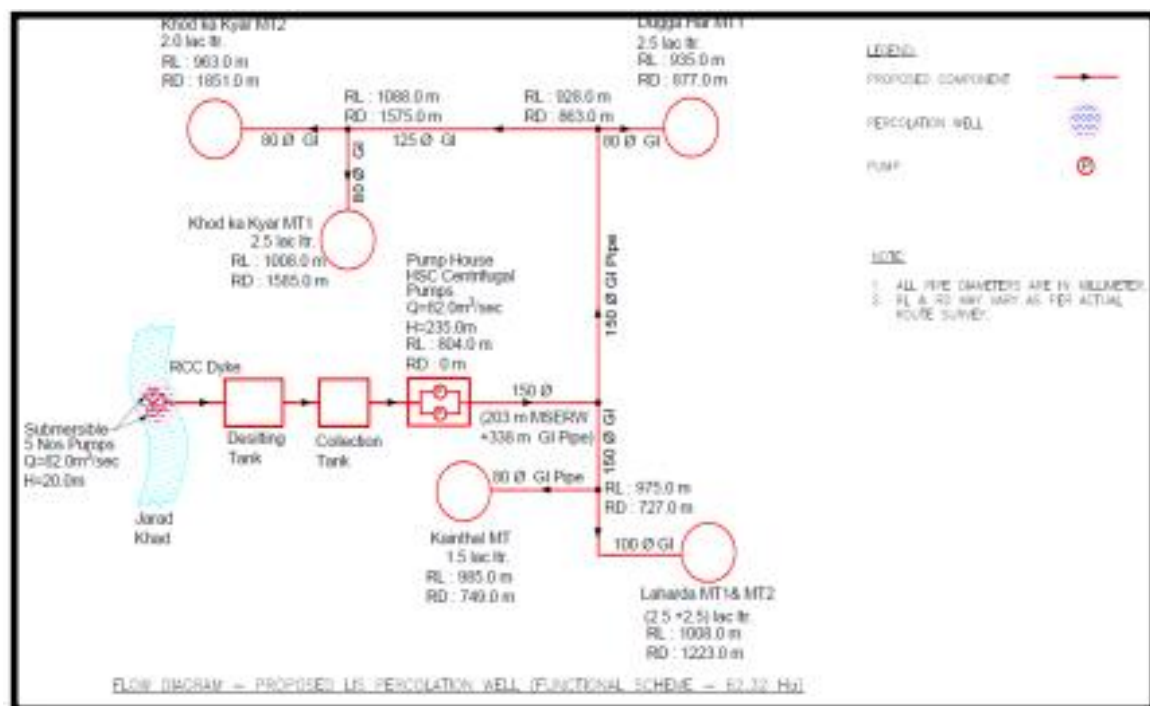
15. Proposed LIS – Salnu

Figure 82: Flow Diagram of Proposed LIS Salnu



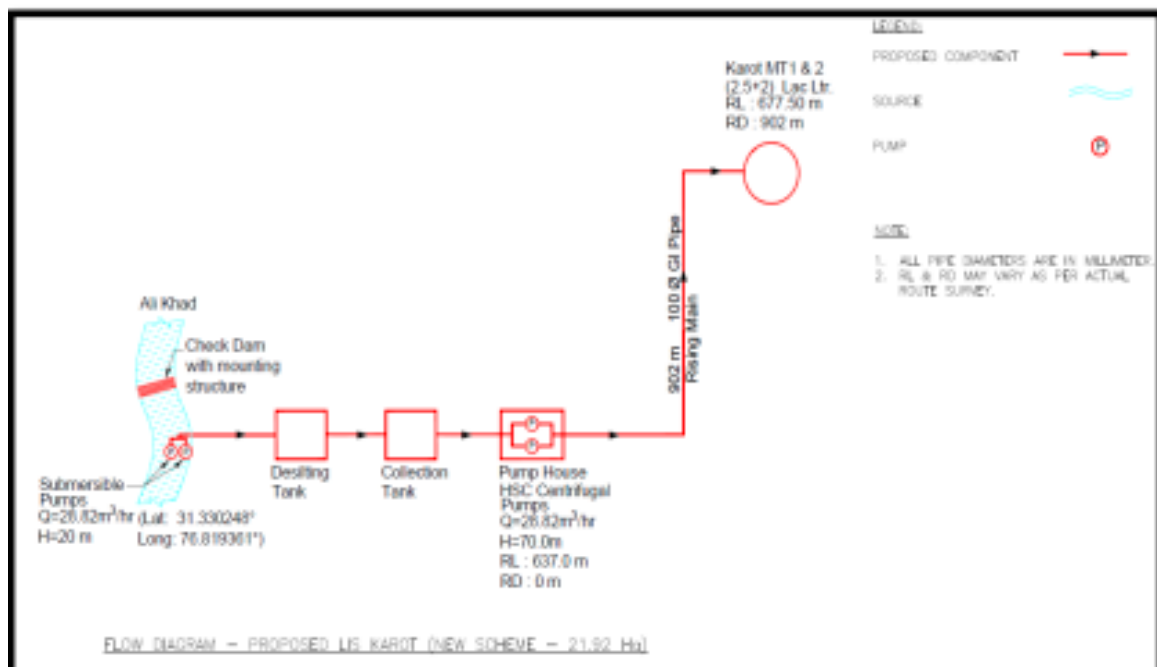
16. Proposed LIS – Percolation Well near Jarad Khad

Figure 83: Flow Diagram of Proposed LIS from Percolation Well near Jarad Khad



17. Proposed LIS – Karot

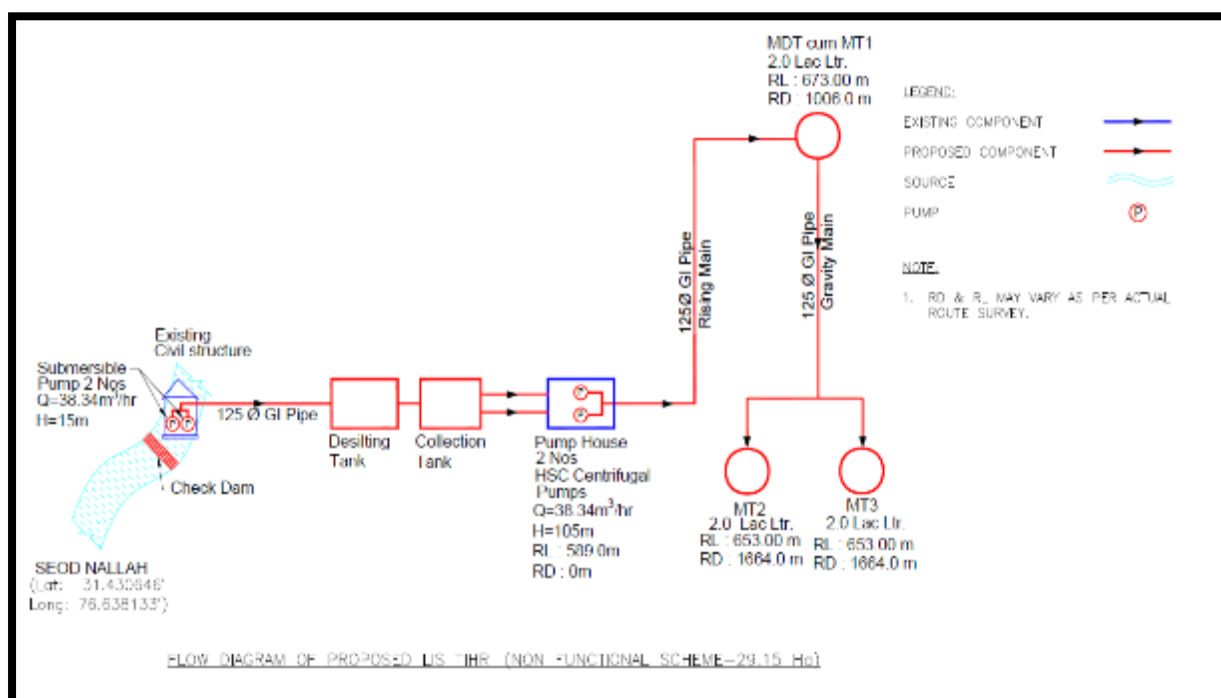
Figure 84: Flow Diagram of Proposed LIS Karot



Irrigation Scheme flow-diagram of Package – 6 (Bilaspur District):

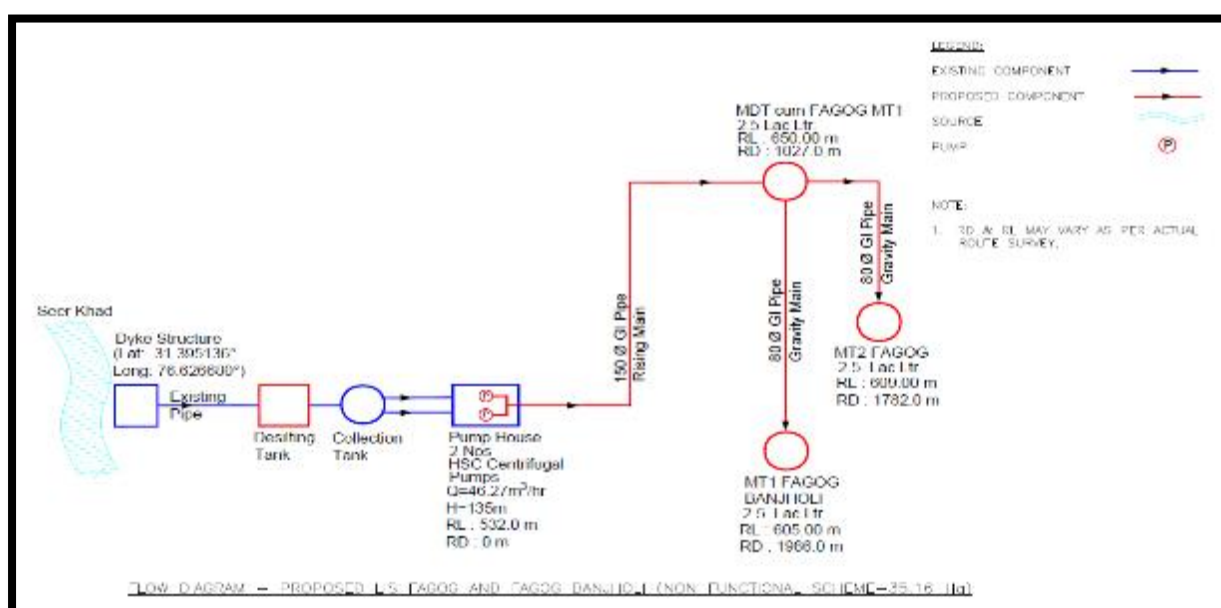
Proposed LIS - Tihri

Figure 85: Flow Diagram of Proposed LIS Tihri



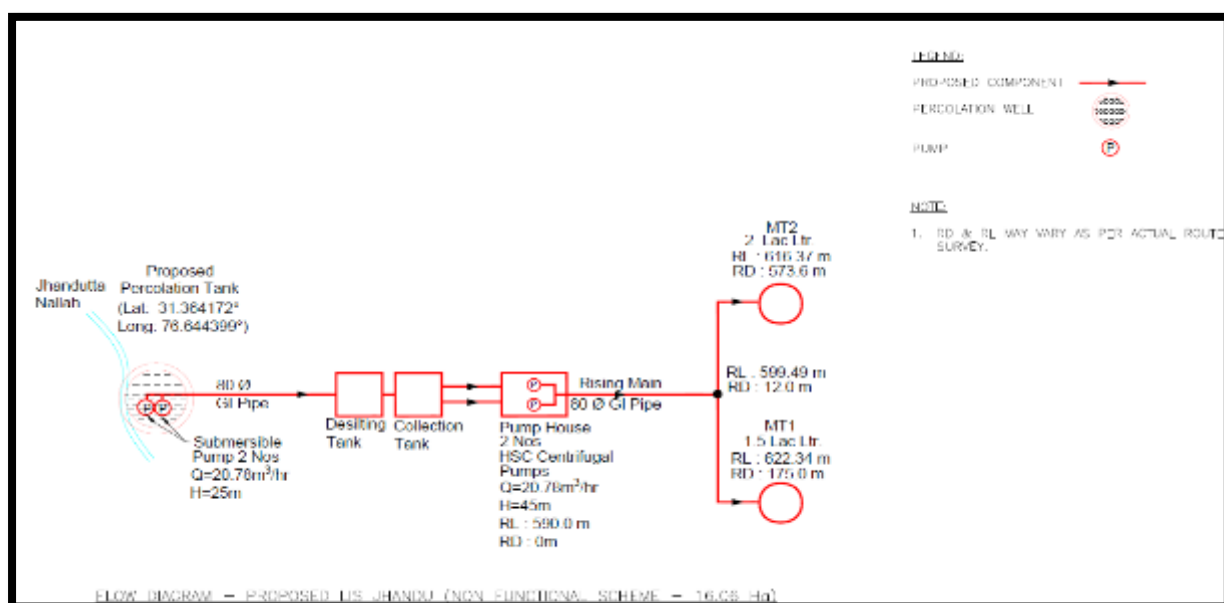
Proposed LIS - Fagog Bhanjholi and Fagog

Figure 86: Flow Diagram of Proposed LIS Fagog Bhanjholi and Fagog



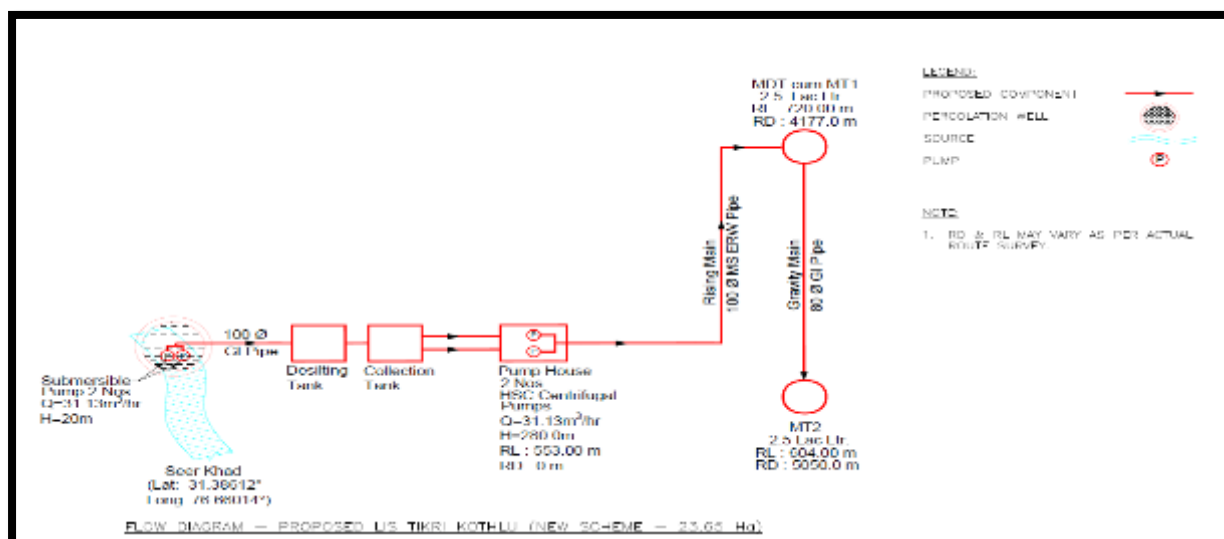
Proposed LIS – Jhandu

Figure 87: Flow Diagram of Proposed LIS Jhandu



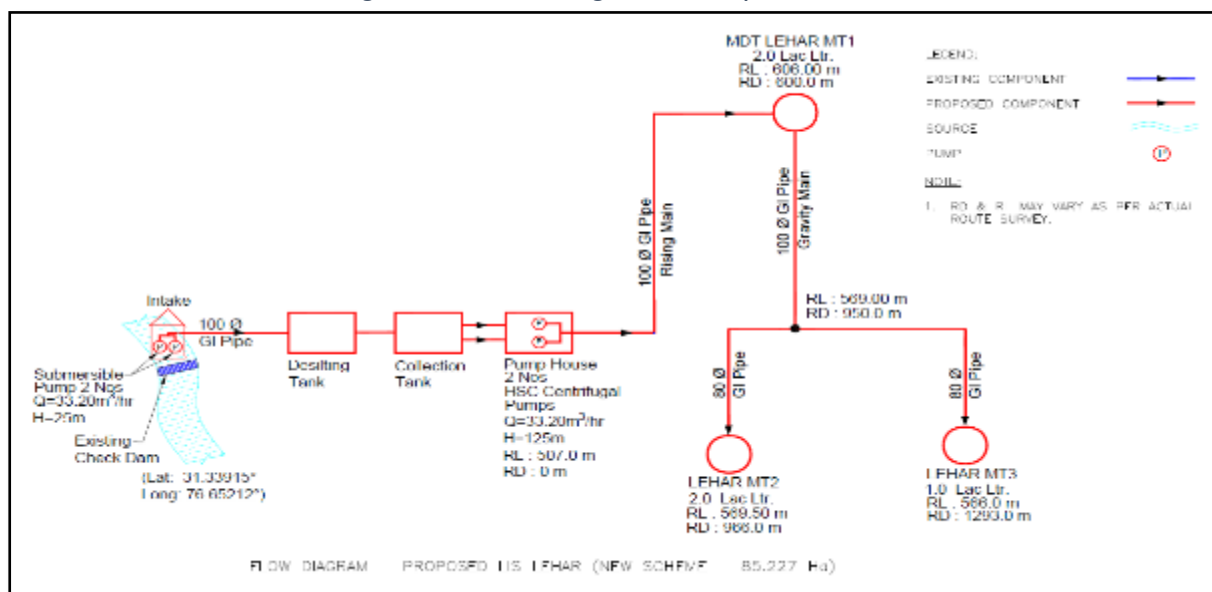
Proposed LIS – Tikri Kothlu

Figure 88: Flow Diagram of Proposed LIS Tikri Kothlu



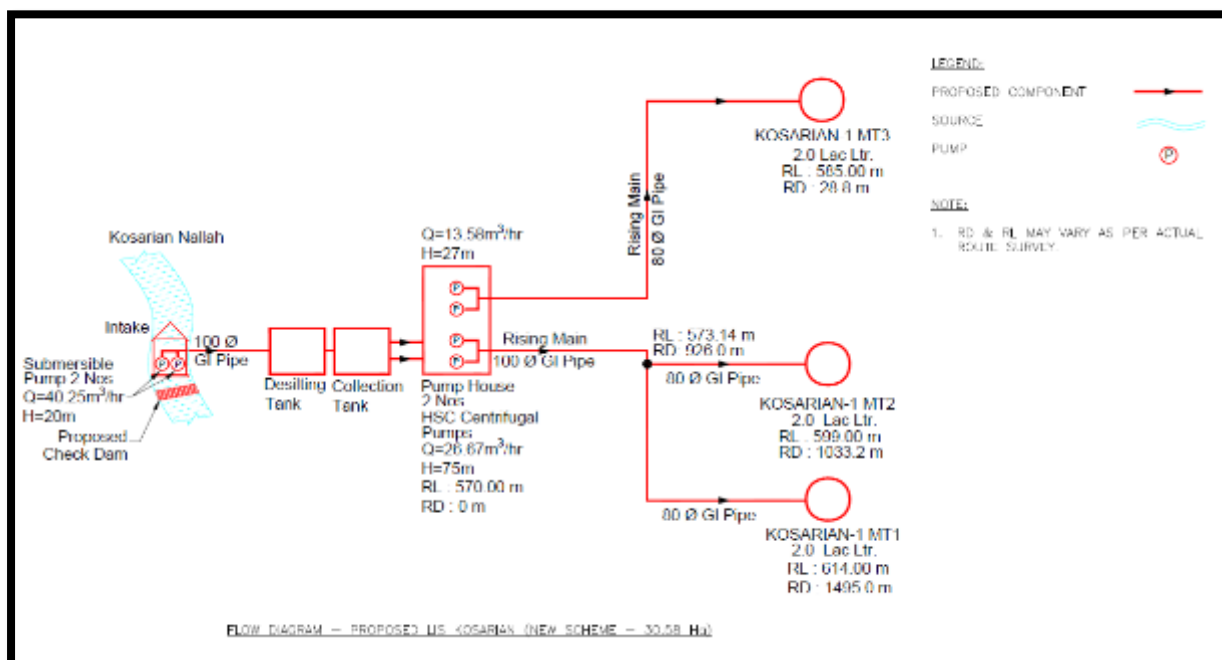
Proposed LIS – Lehar

Figure 89: Flow Diagram of Proposed LIS Lehar



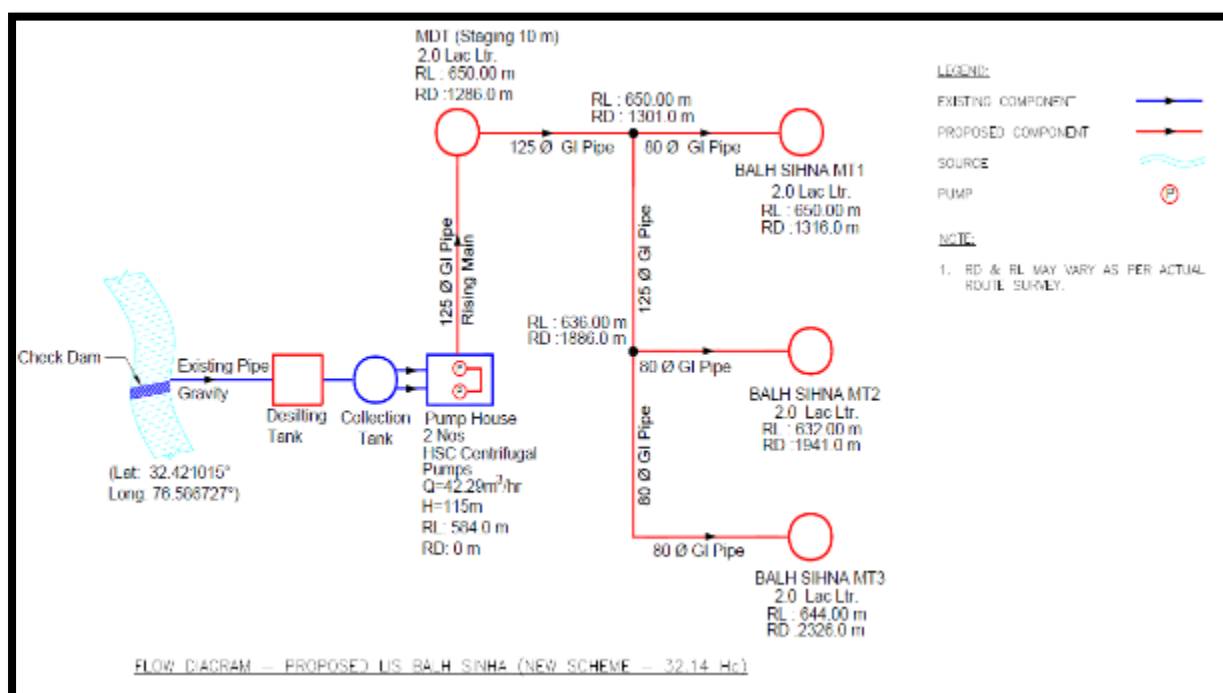
Proposed LIS – Kosarian

Figure 90: Flow Diagram of Proposed LIS Kosarian



Proposed LIS – Balh Sinha

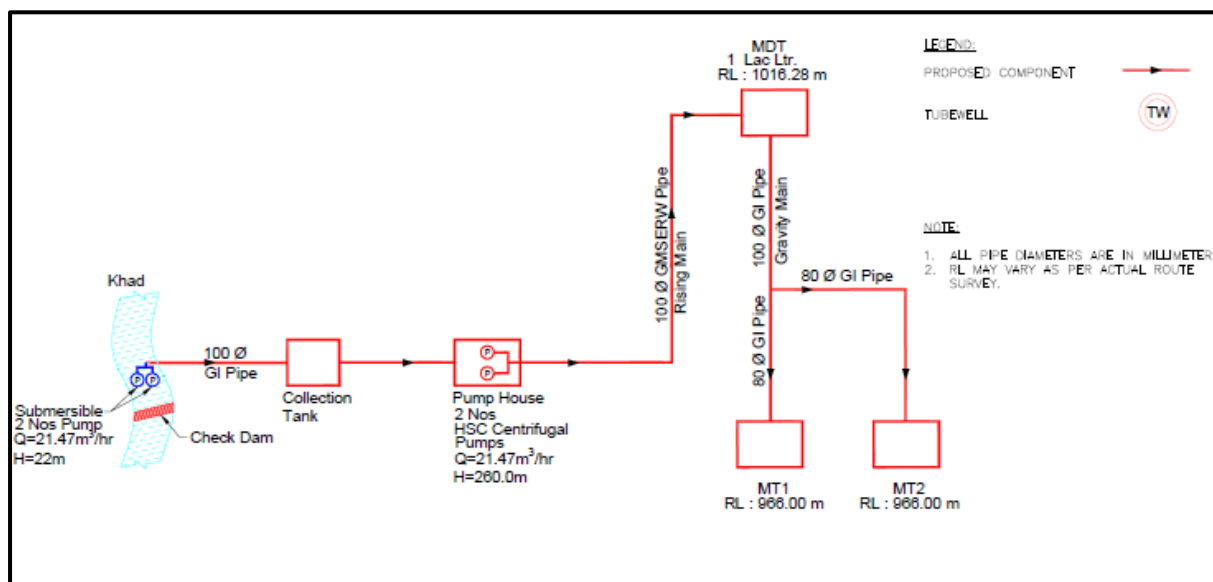
Figure 91: Flow Diagram of Proposed LIS Balh Sinha



Irrigation Scheme flow-diagram of Package – 7 (Mandi District):

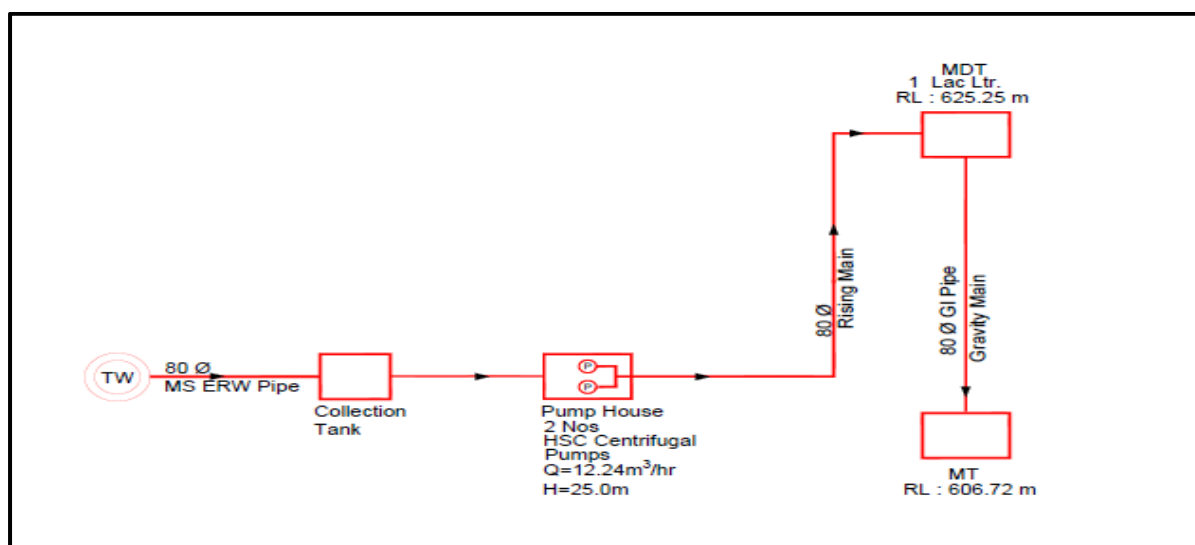
1. Proposed LIS – Golwan

Figure 92: Flow Diagram of Proposed LIS Golwan



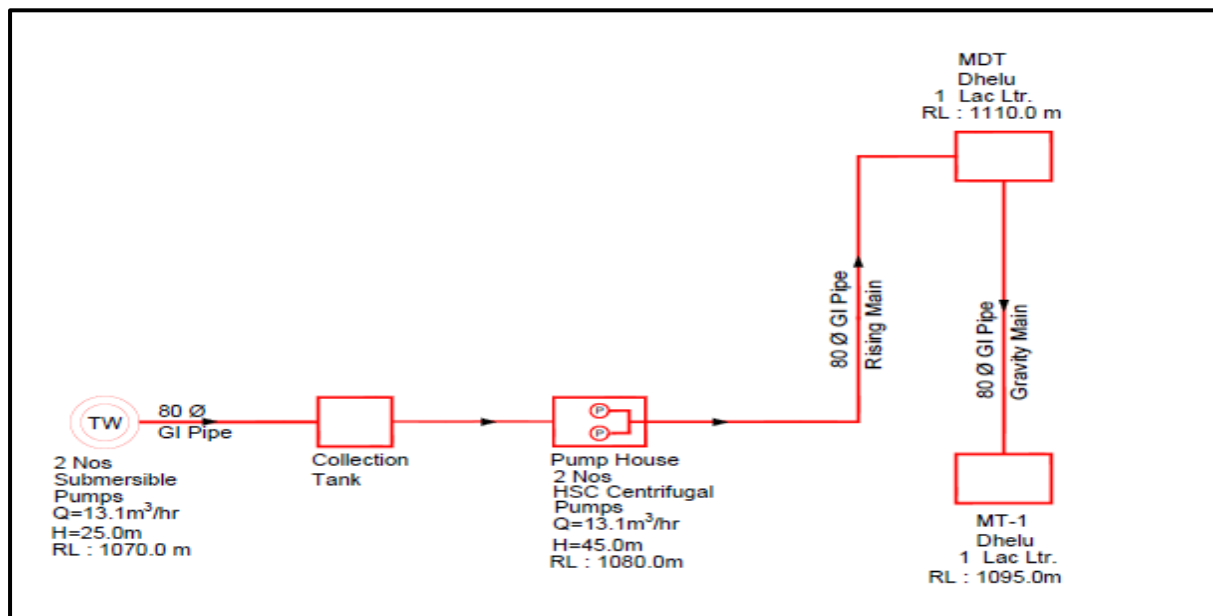
2. Proposed LIS – TW1

Figure 93: Flow Diagram of Proposed LIS TW1



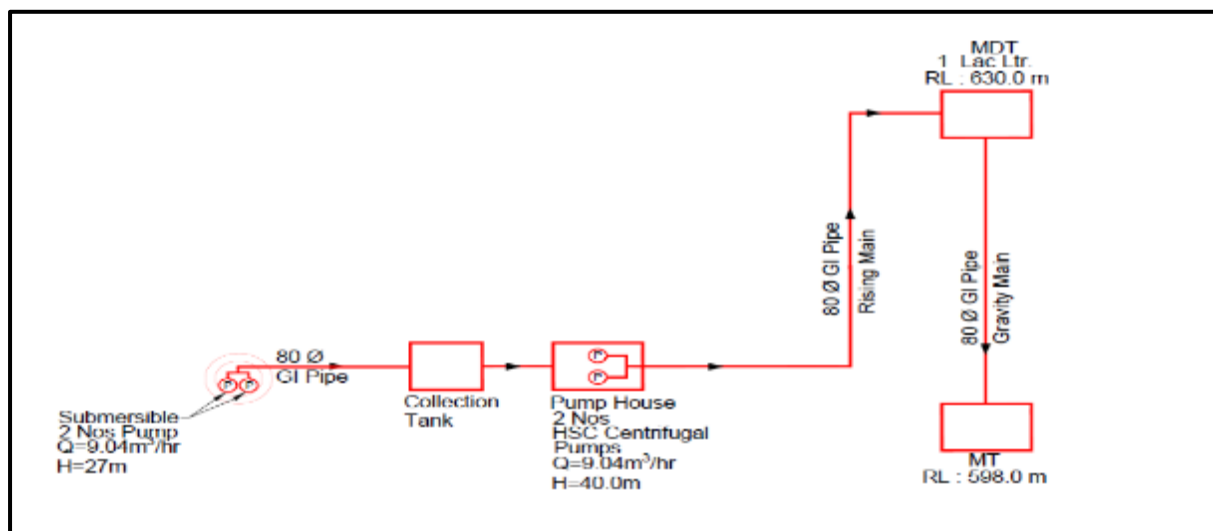
3. Proposed LIS – Dhelu

Figure 94: Flow Diagram of Proposed LIS Dhelu



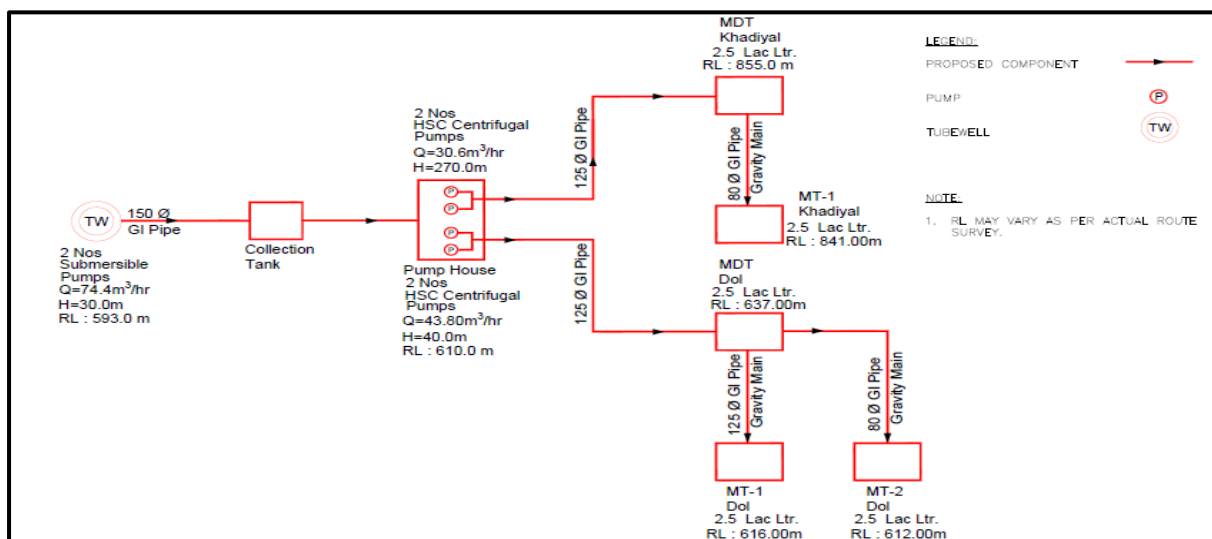
4. Proposed LIS – TW2

Figure 95: Flow Diagram of Proposed LIS TW2



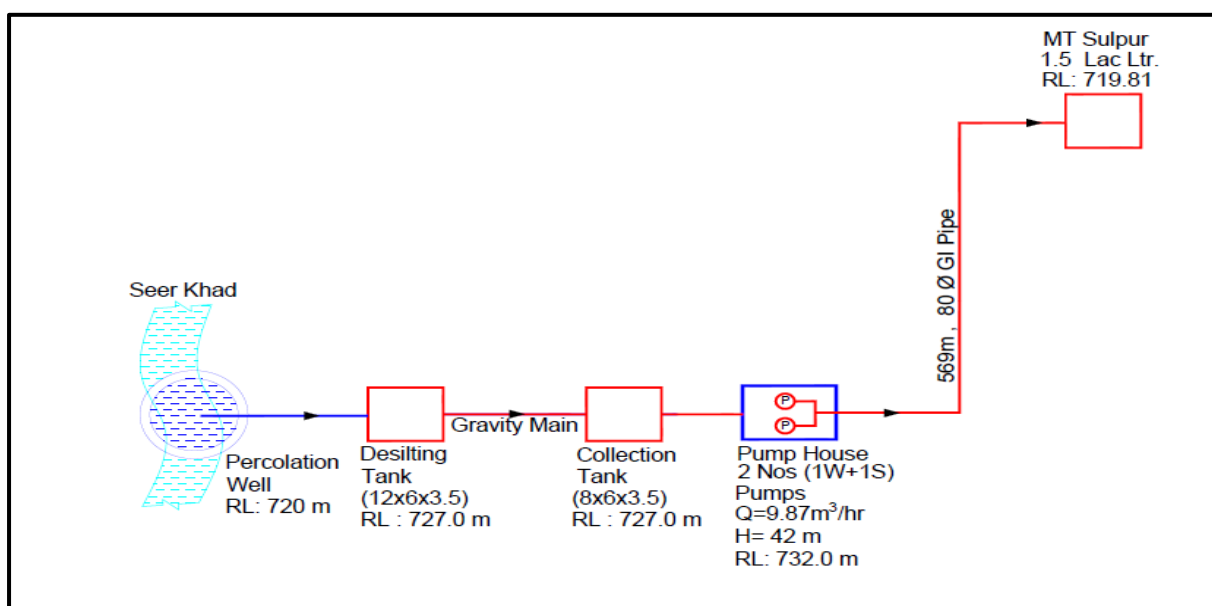
5. Proposed LIS – TW3 & TW4 Khadiyal & Dol

Figure 96: Flow Diagram of Proposed LIS TW3 & TW4 Khadiyal & Dol



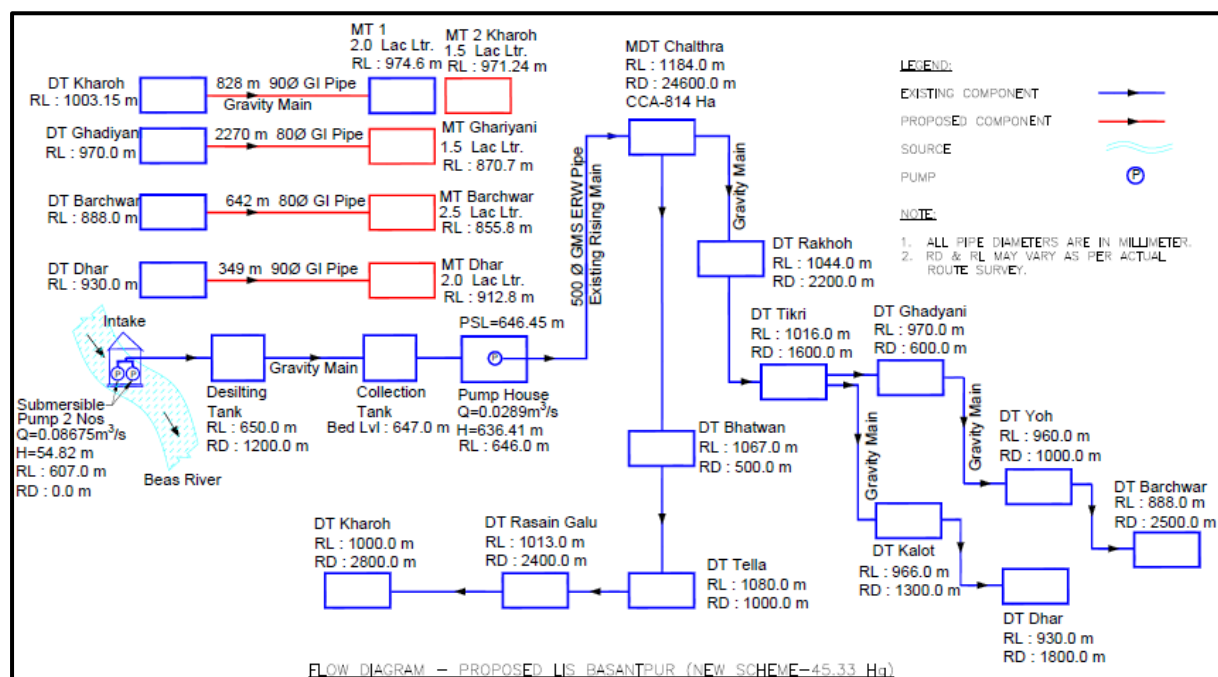
6. Proposed LIS – Sulpur

Figure 97: Flow Diagram of Proposed LIS Sulpur



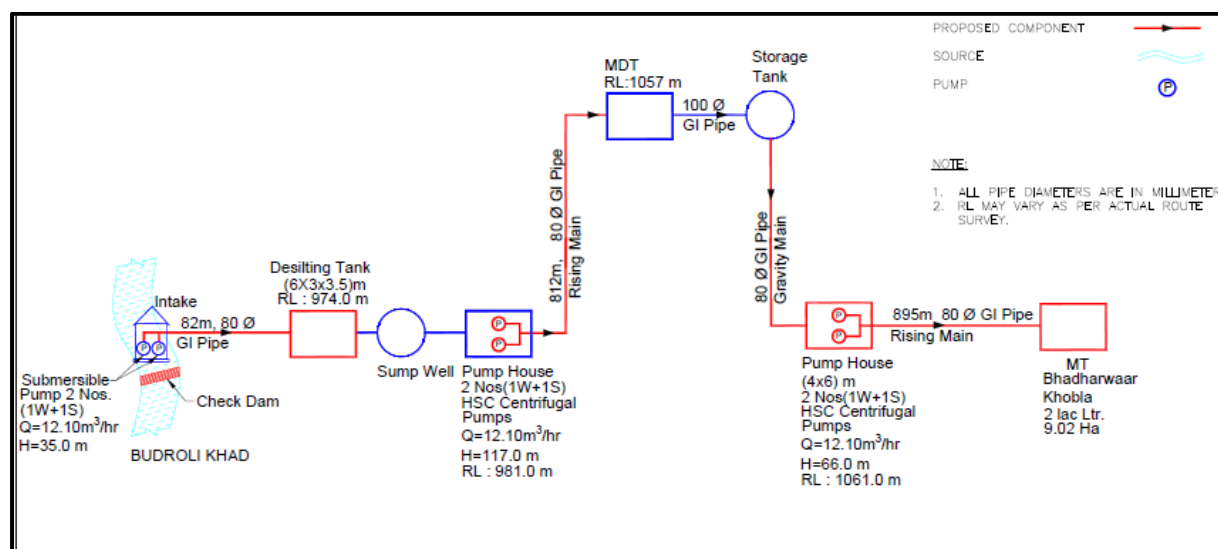
7. Proposed LIS – Basantpur

Figure 98: Flow Diagram of Proposed LIS Basantpur



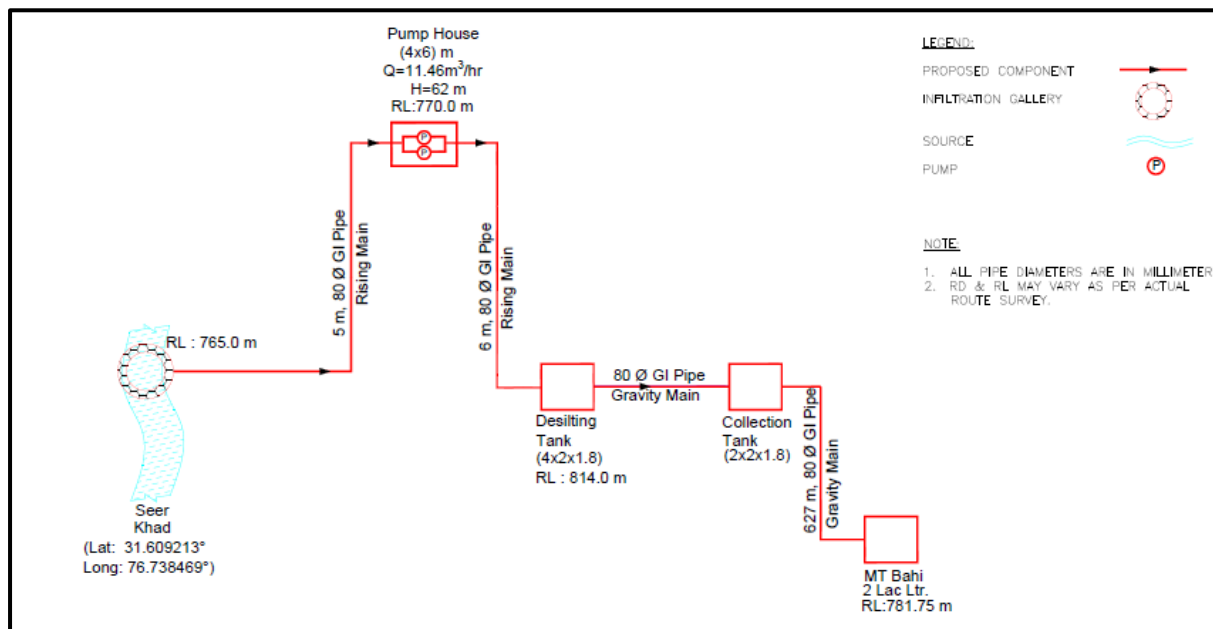
8. Proposed LIS – Bhadarwar

Figure 99: Flow Diagram of Proposed LIS Bhadarwar



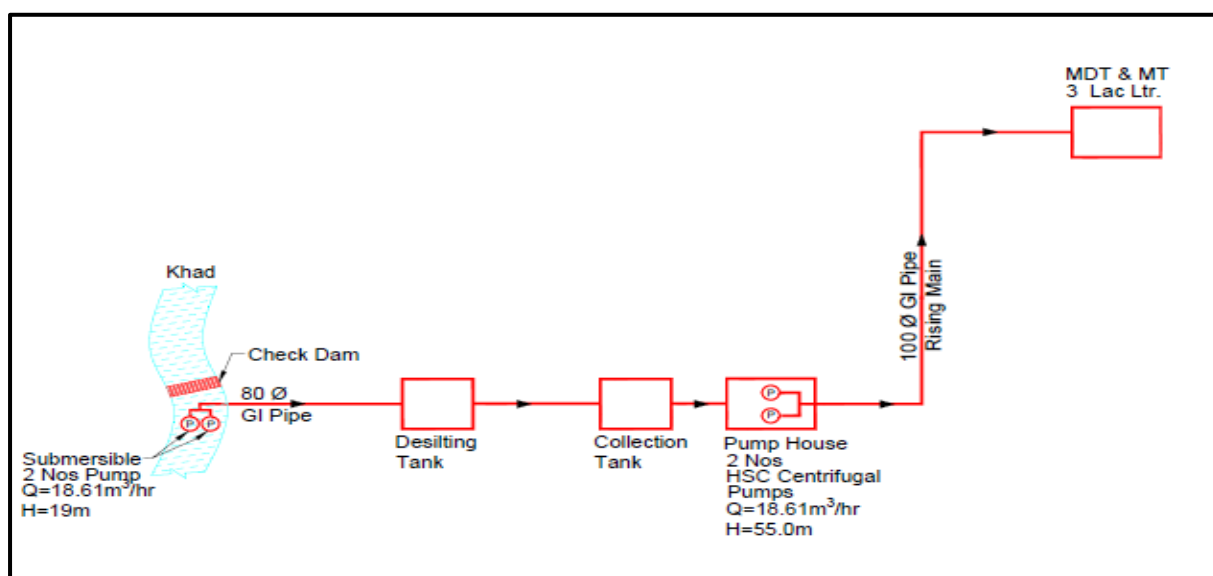
9. Proposed LIS – Percolation Seer Khad

Figure 100: Flow Diagram of Proposed LIS Percolation Seer Khad



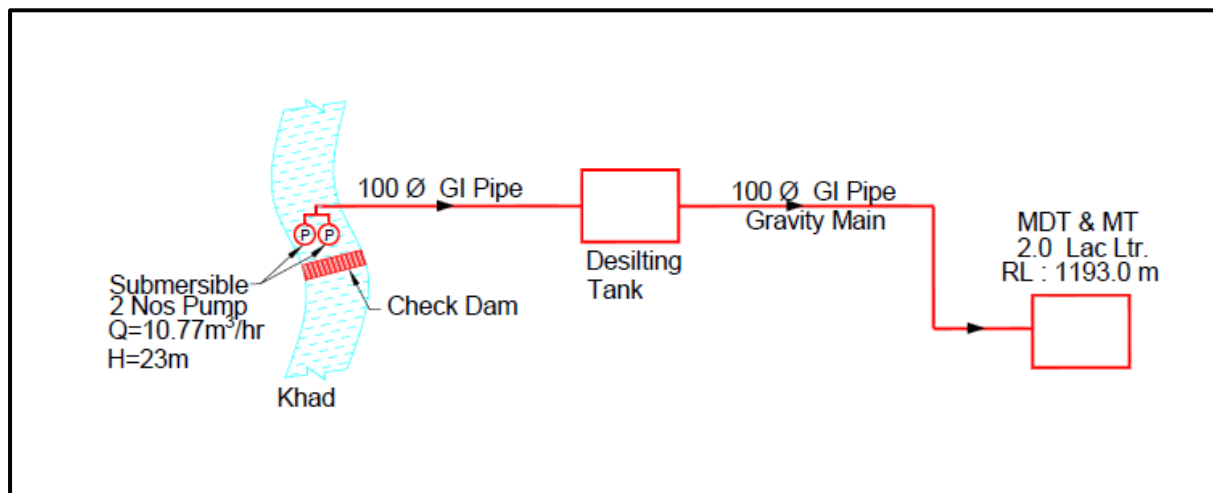
10. Proposed LIS – Seer Khad

Figure 101: Flow Diagram of Proposed LIS Seer Khad



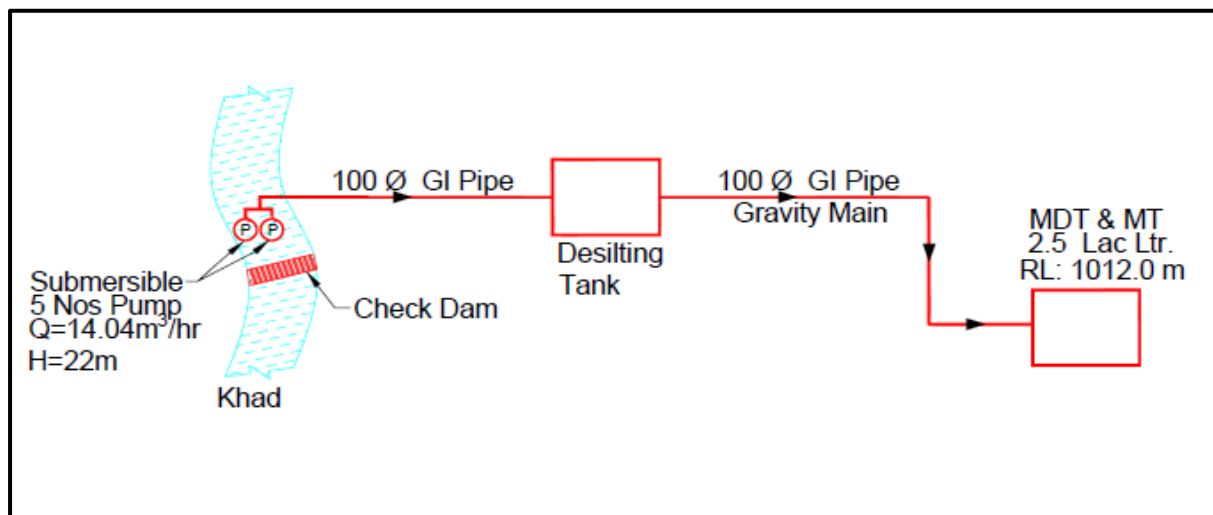
11. Proposed LIS – Thouna Kuhal

Figure 102: Flow Diagram of Proposed LIS Thouna Kuhal



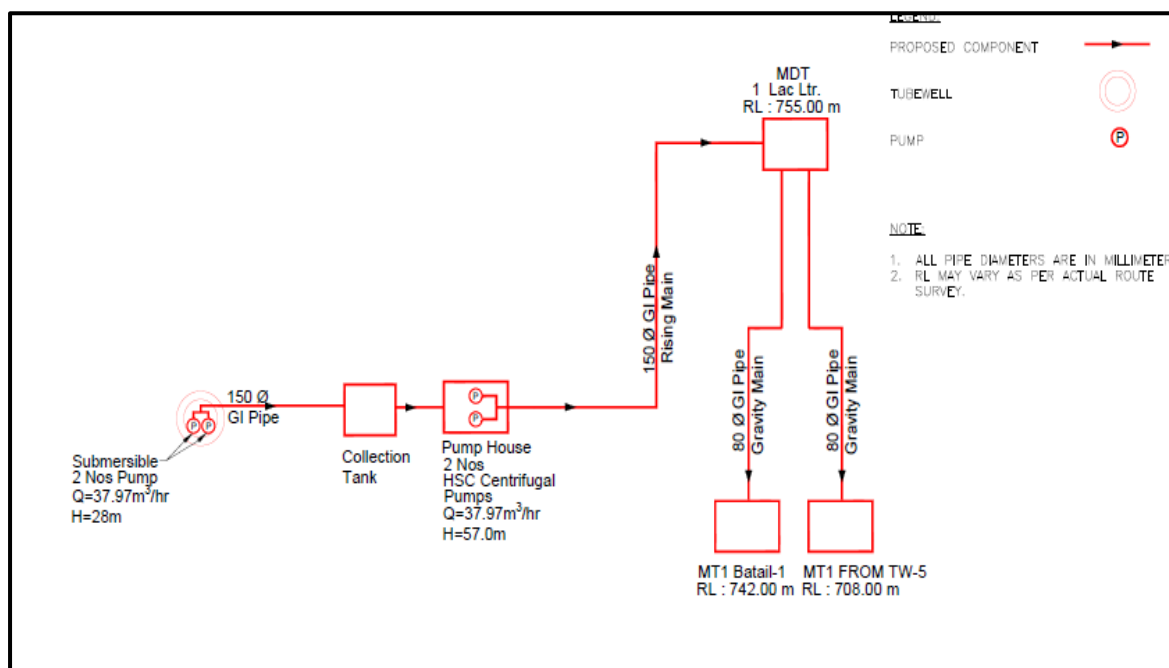
12. Proposed LIS – Son Khad

Figure 103: Flow Diagram of Proposed LIS Son Khad



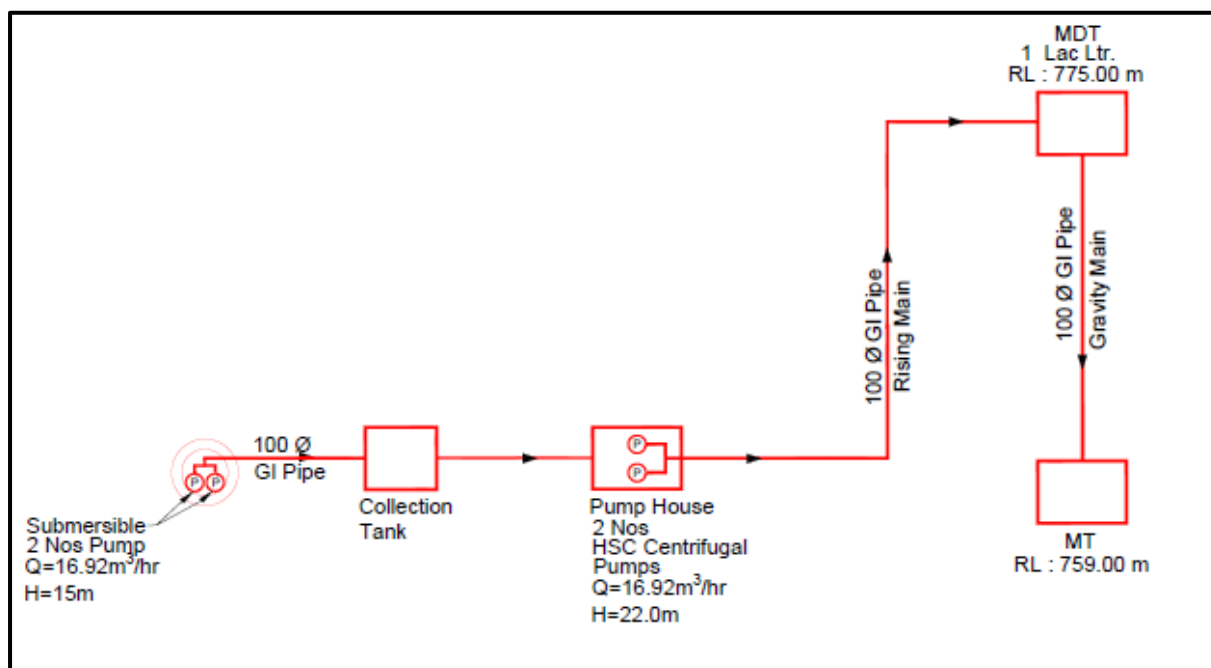
13. Proposed LIS – TW5

Figure 104: Flow Diagram of Proposed LIS TW5



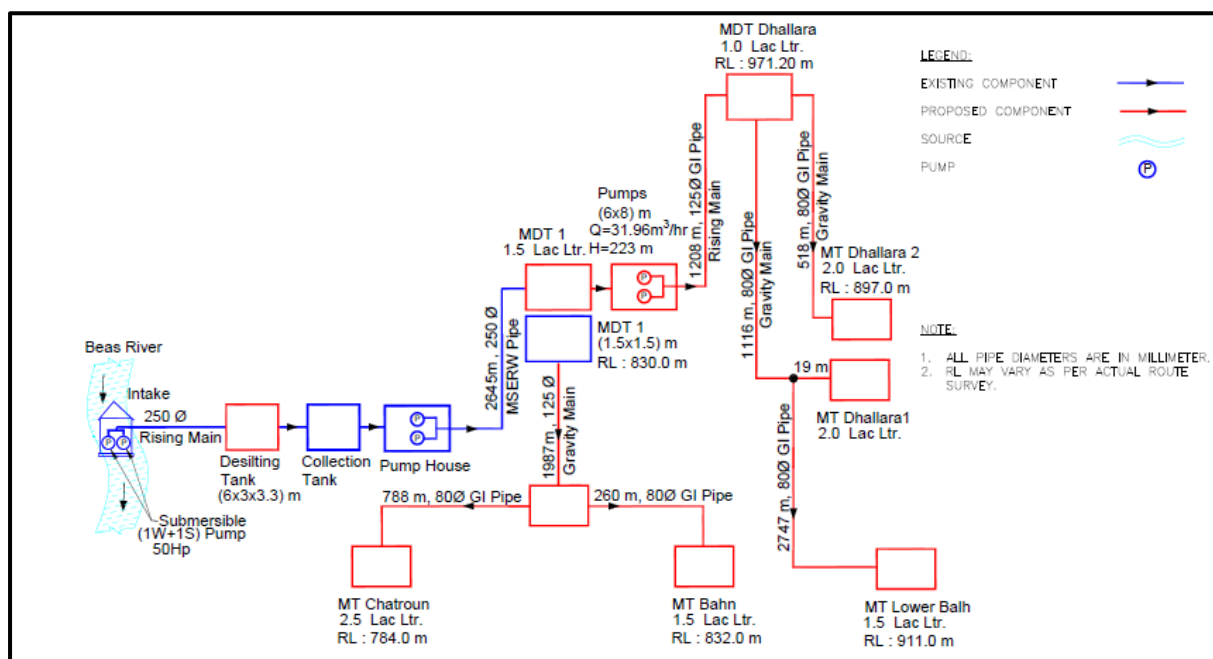
14. Proposed LIS – TW6

Figure 105: Flow Diagram of Proposed LIS TW6



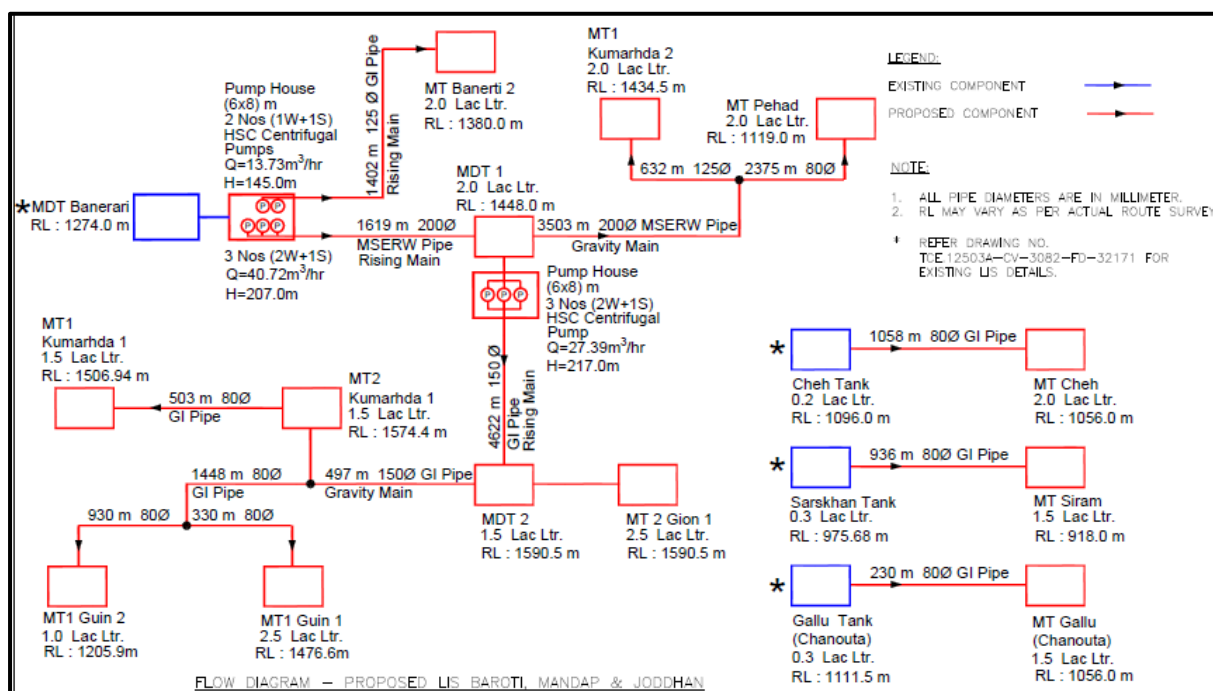
17. Proposed LIS – Kothua Dhallara

Figure 108: Flow Diagram of Proposed LIS Kothua Dhallara



18. Proposed LIS – Baroti Mandap Jodhan

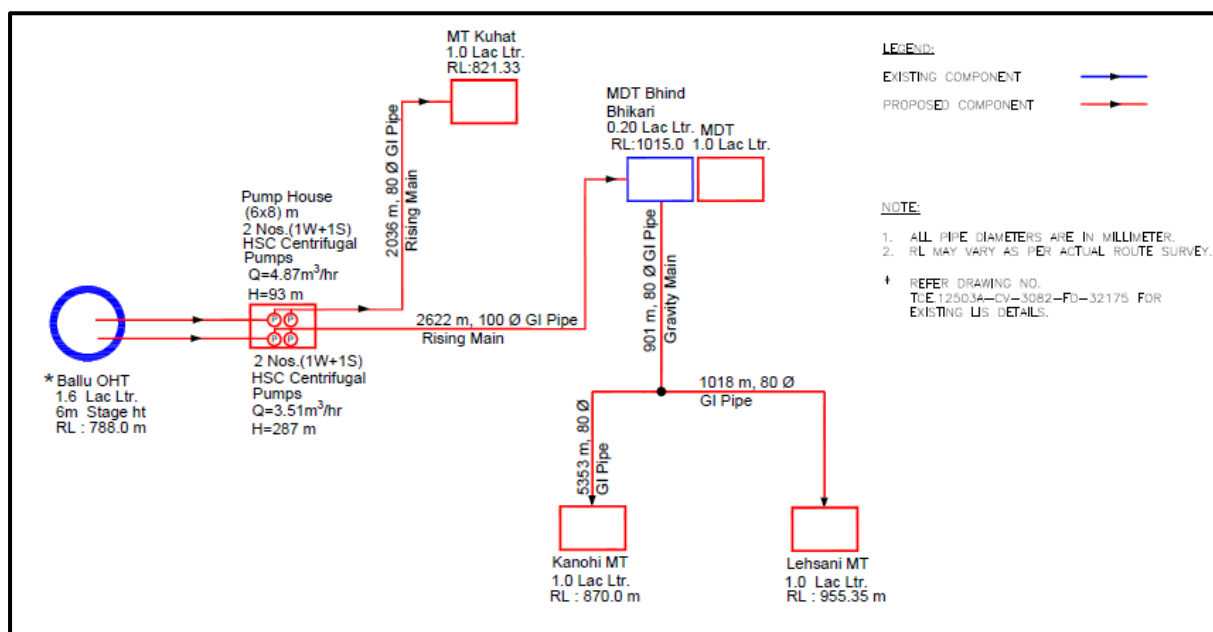
Figure 109: Flow Diagram of Proposed LIS Baroti Mandap Jodhan



The diagram illustrates a water supply system layout. It begins with a Submersible Pump (TW) with a capacity of $Q=27.47 \text{ m}^3/\text{hr}$ and a head of $H=77 \text{ m}$. The pump is connected to a 500 m, 90 Ø GI Pipe (Rising Main) that leads to an MDT (50Kl) with a water level of $\text{RL: } 705.15 \text{ m}$. From the MDT, a 434 m, 90 Ø GI Pipe (Rising Main) leads to a Pump House (4X6 m) with a capacity of $Q=27.47 \text{ m}^3/\text{hr}$ and a head of $H=84.0 \text{ m}$. The Pump House is connected to a Gravity Main (702 m, 80 Ø GI Pipe) which leads to two storage tanks: MT-1 (2.5 Lac Ltr., $\text{RL: } 758.5 \text{ m}$) and MT-2 (2.0 Lac Ltr., $\text{RL: } 718.5 \text{ m}$).

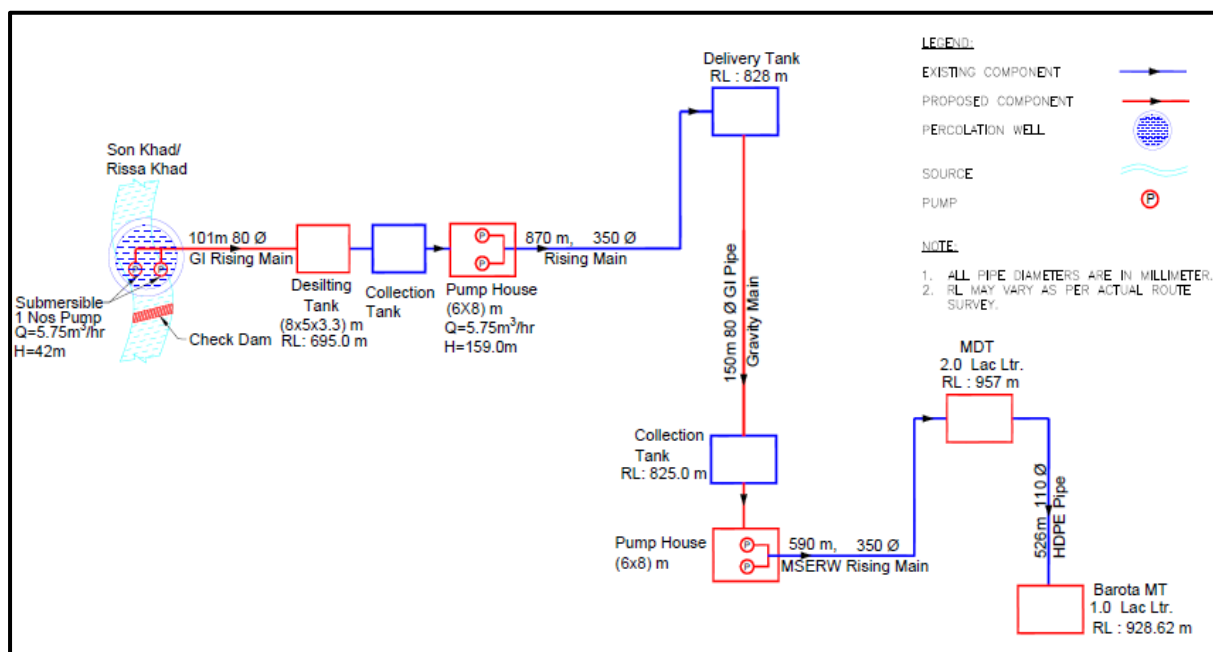
21. Proposed LIS – Sandhole

Figure 112: Flow Diagram of Proposed LIS Sandhole



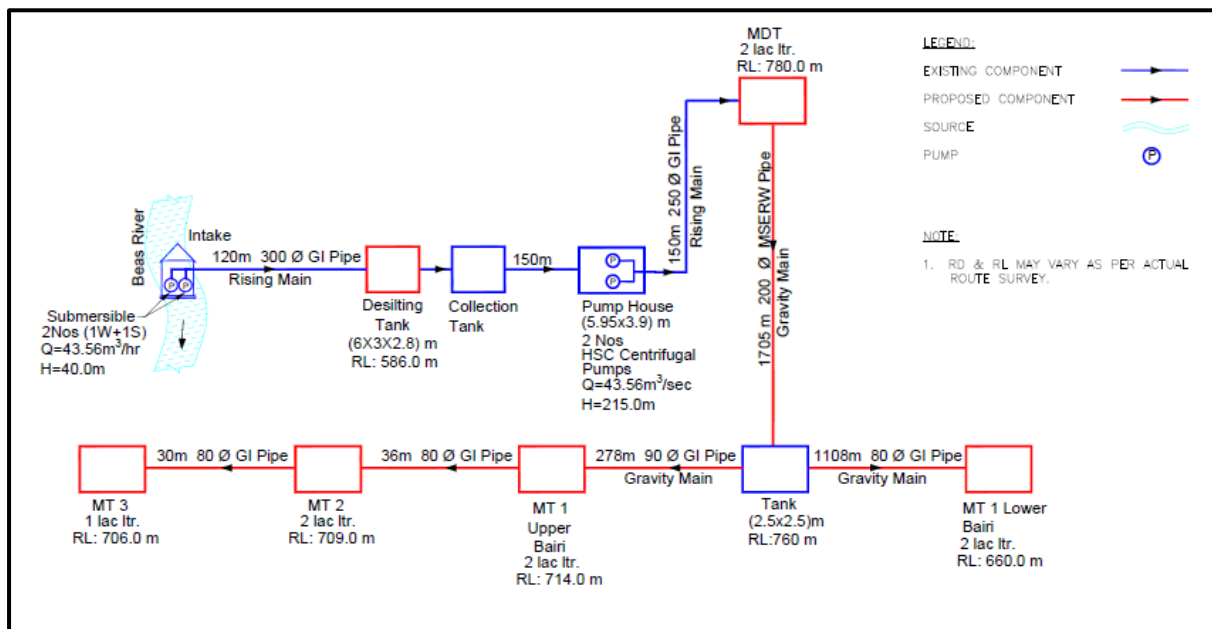
22. Proposed LIS – Brang

Figure 113: Flow Diagram of Proposed LIS Brang



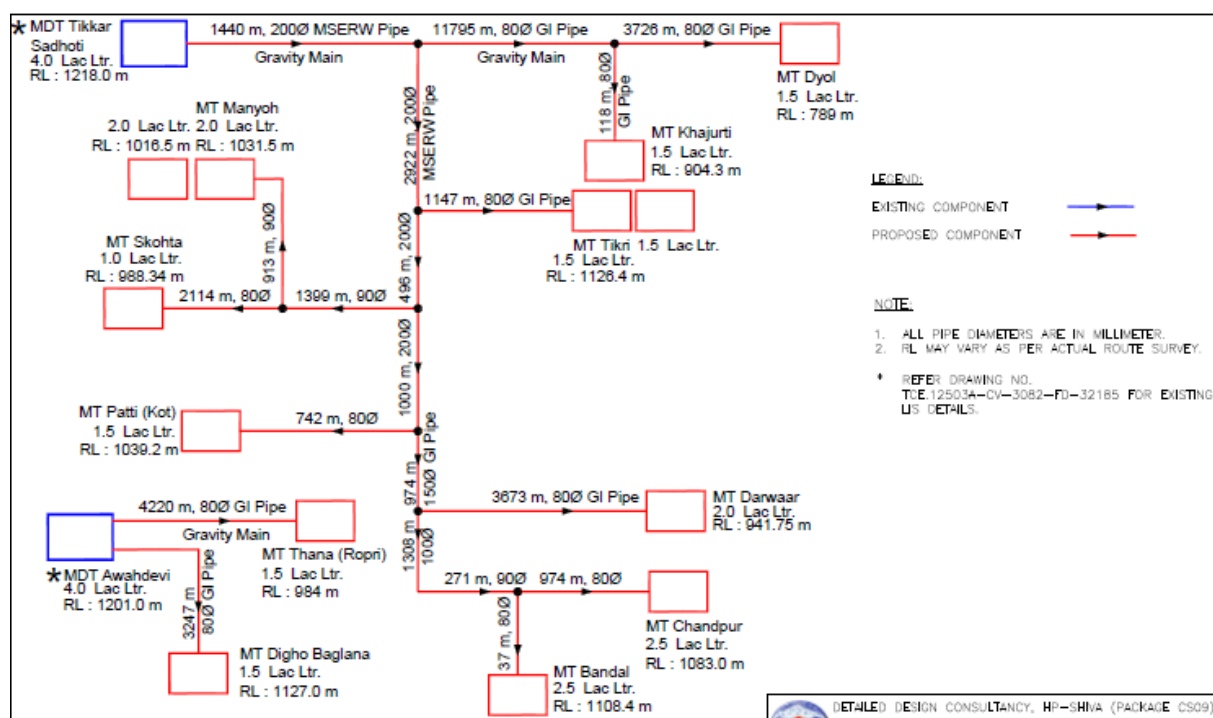
23. Proposed LIS – Bairi

Figure 114: Flow Diagram of Proposed LIS Bairi



24. Proposed LIS – Tihra

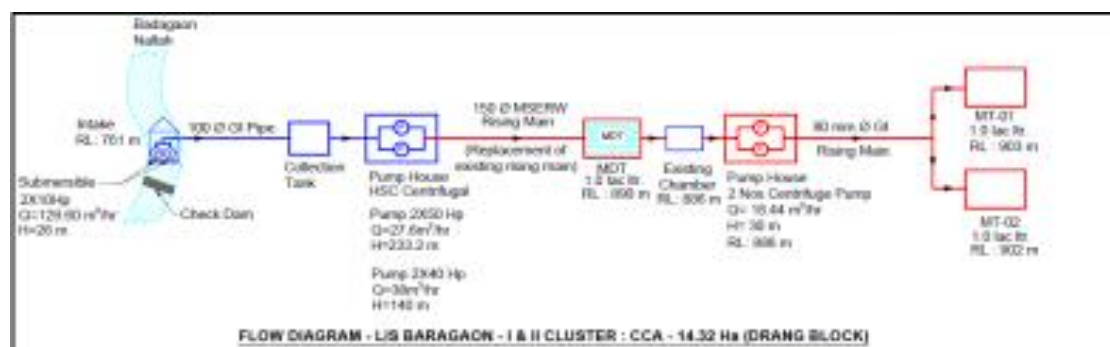
Figure 115: Flow Diagram of Proposed LIS Tihra



Irrigation Scheme flow-diagram of Package – 08 (Mandi District):

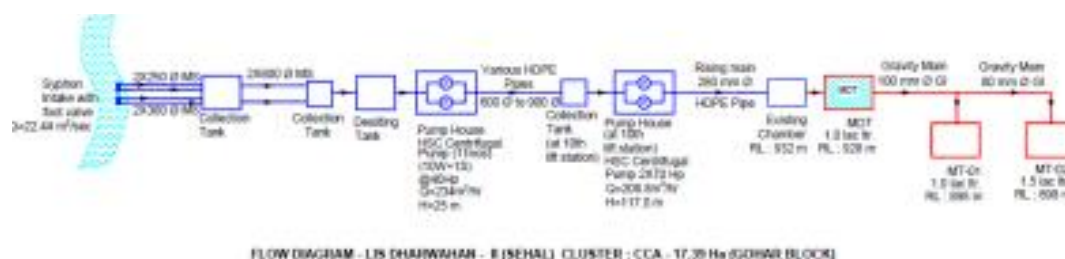
1. Proposed LIS – Baragaon I & II

Figure 116: Flow Diagram of Proposed LIS Baragaon I & II



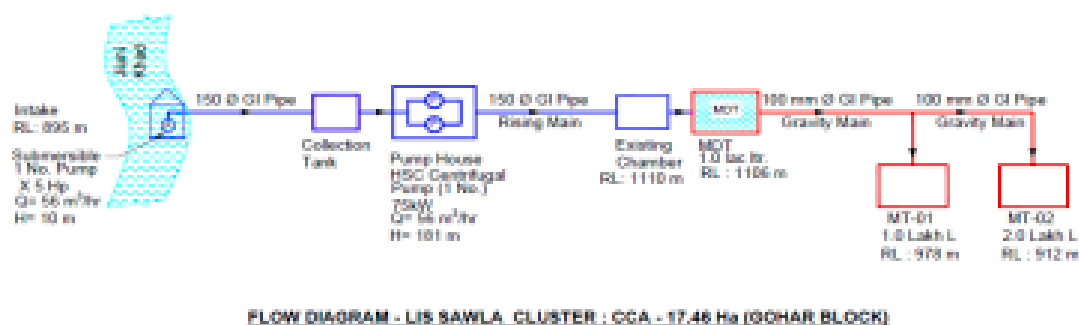
2. Proposed LIS – Dharwahan II

Figure 117: Flow Diagram of Proposed LIS Dharwahan II



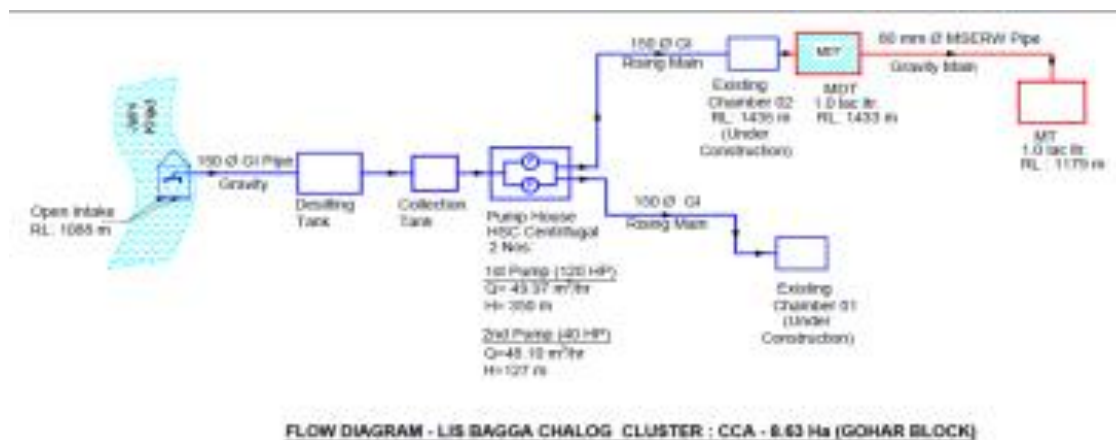
3. Proposed LIS – Sawla

Figure 118: Flow Diagram of Proposed LIS Sawla



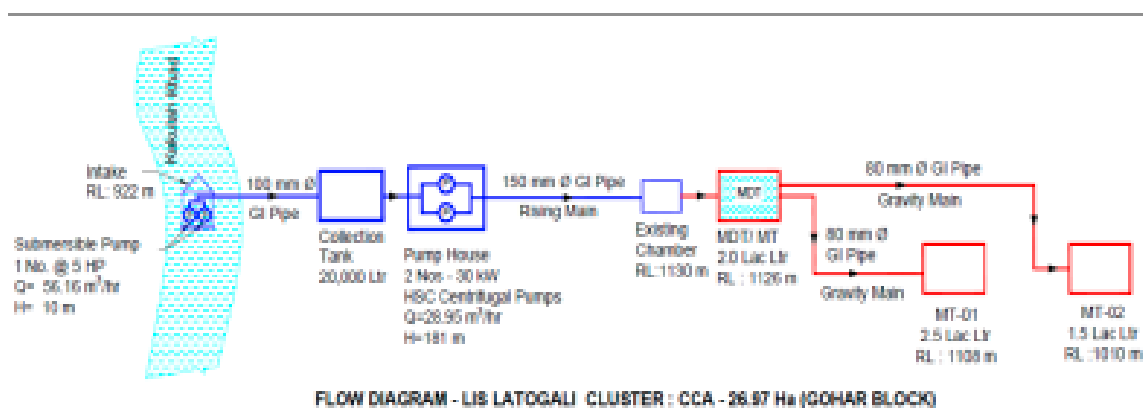
4. Proposed LIS – Bagga Chaloo

Figure 119: Flow Diagram of Proposed LIS Bagga Chaloo



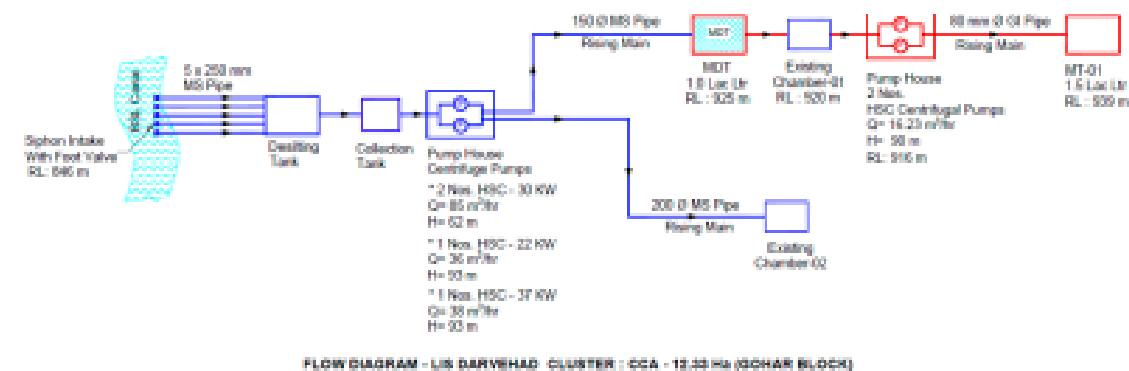
5. Proposed LIS – Latogali I

Figure 120: Flow Diagram of Proposed LIS Latogali I



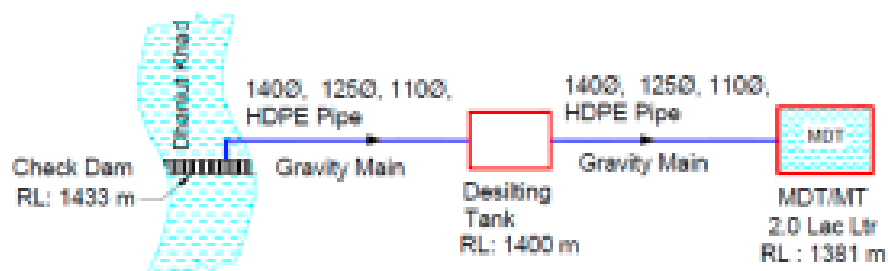
6. Proposed LIS – Darvehad

Figure 121: Flow Diagram of Proposed LIS Darvehad



7. Proposed LIS – Manjhog Dhaniut

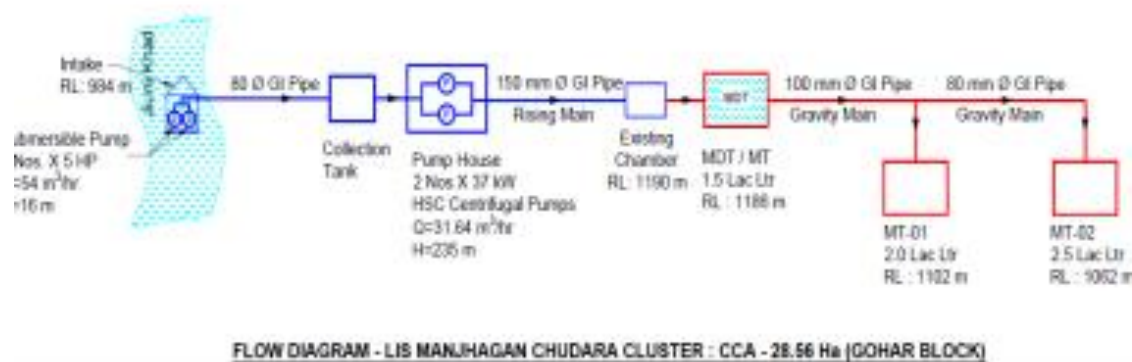
Figure 122: Flow Diagram of Proposed LIS Manjhog Dhaniut



FLOW DIAGRAM - LIS MANJHOG DHANIUT CLUSTER : CCA - 9.66 Ha (GOHAR BLOCK)

8. Proposed LIS – Manjhagan Chudara

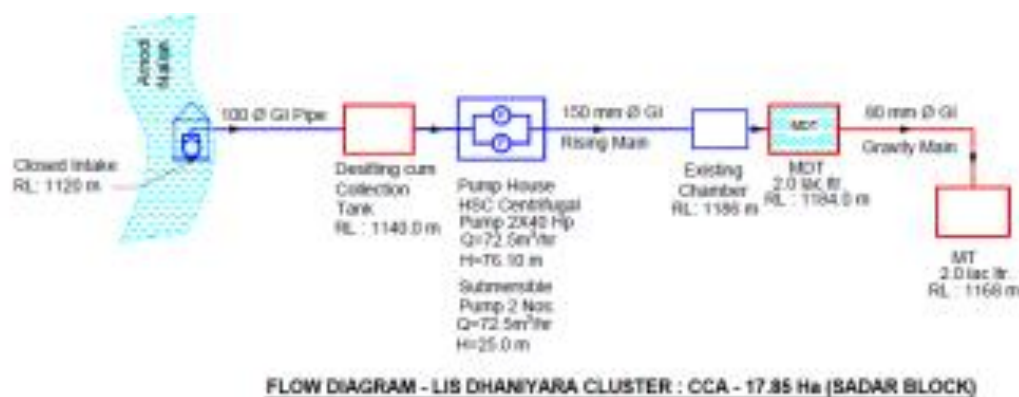
Figure 123: Flow Diagram of Proposed LIS Manjhagan Chudara



FLOW DIAGRAM - LIS MANJHAGAN CHUDARA CLUSTER : CCA - 28.56 Ha (GOHAR BLOCK)

9. Proposed LIS – Dhaniyara

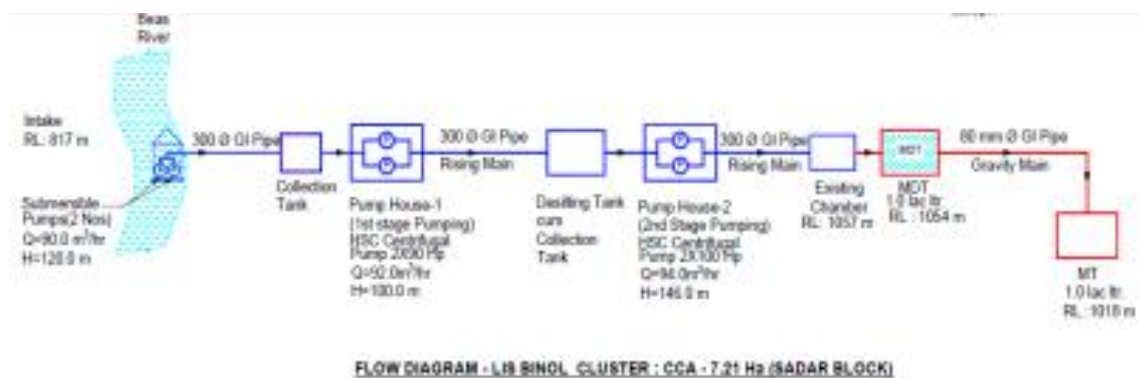
Figure 124: Flow Diagram of Proposed LIS Dhaniyara



FLOW DIAGRAM - LIS DHANIYARA CLUSTER : CCA - 17.85 Ha (SADAR BLOCK)

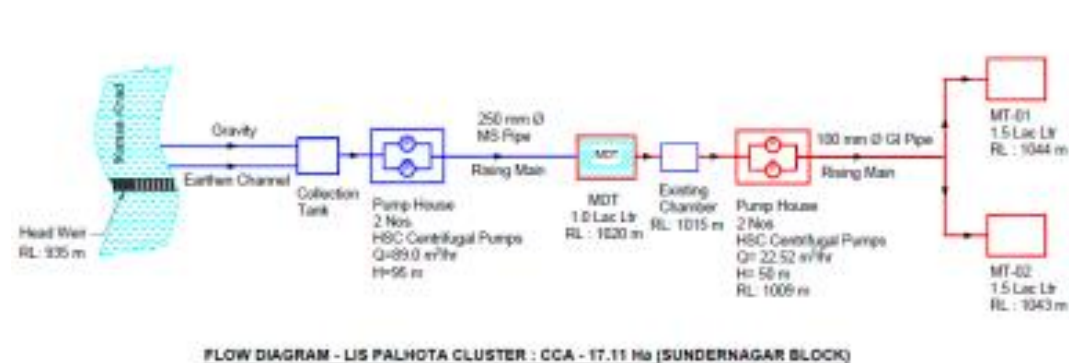
10. Proposed LIS – Binol

Figure 125: Flow Diagram of Proposed LIS Binol



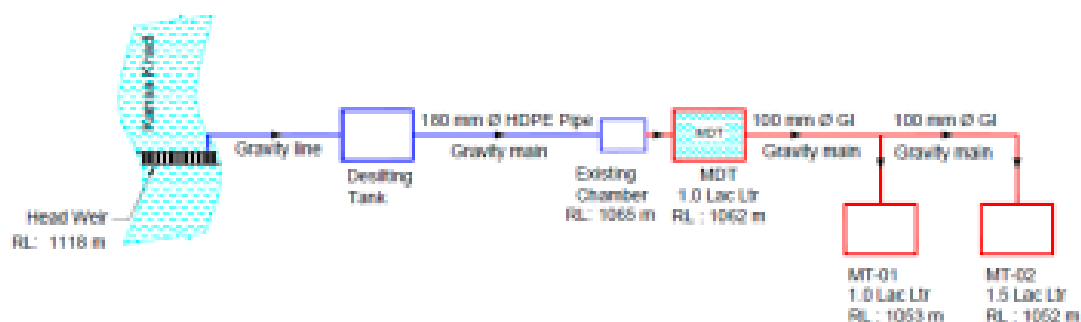
11. Proposed LIS – Palhota

Figure 126: Flow Diagram of Proposed LIS Palhota



12. Proposed LIS – Kuthain

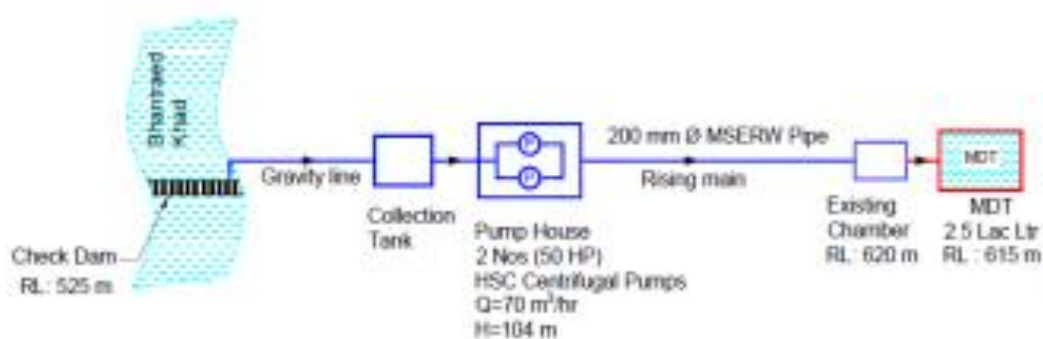
Figure 127: Flow Diagram of Proposed LIS Kuthain



FLOW DIAGRAM - LIS KUTHAIN CLUSTER : CCA - 15.45 Ha (SUNDERNAGAR BLOCK)

13. Proposed LIS – Bhantraed

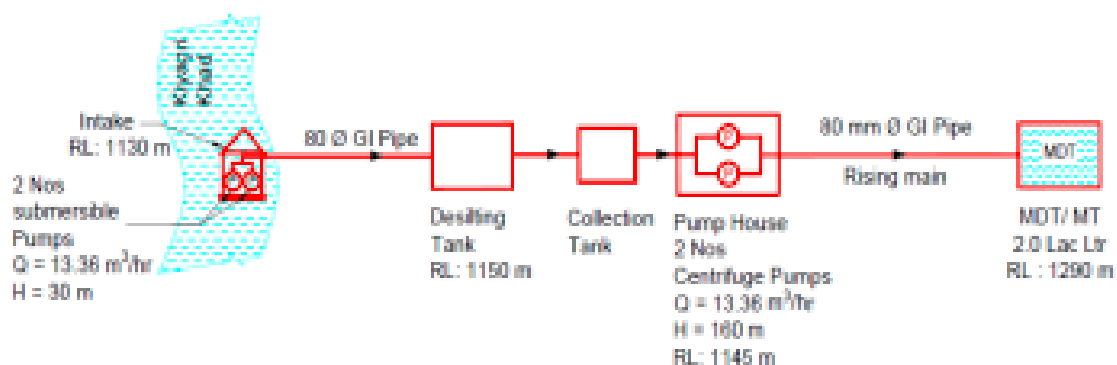
Figure 128: Flow Diagram of Proposed LIS Bhantraed



FLOW DIAGRAM - LIS BHANTRAED CLUSTER : CCA - 11.85 Ha (SUNDERNAGAR BLOCK)

14. Proposed LIS – Khagron

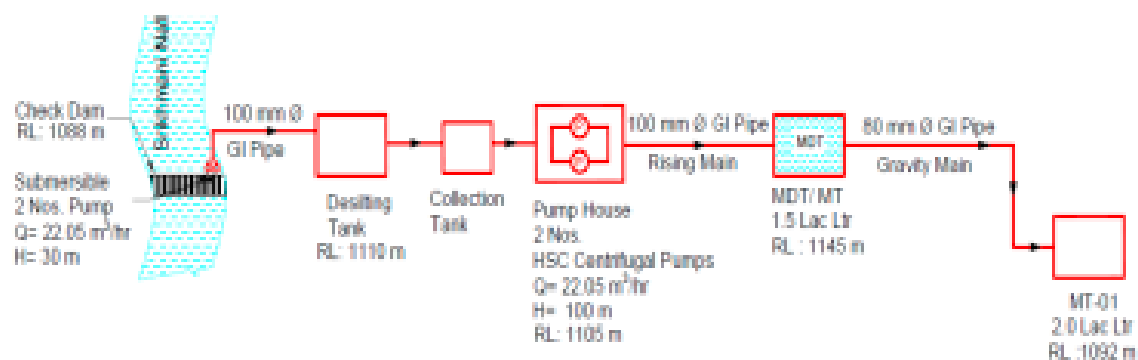
Figure 129: Flow Diagram of Proposed LIS Khagron



FLOW DIAGRAM - LIS KHARGAON CLUSTER : CCA - 10.15 Ha (SUNDERNAGAR BLOCK)

15. Proposed LIS – Brikhmani

Figure 130: Flow Diagram of Proposed LIS Brikhmani

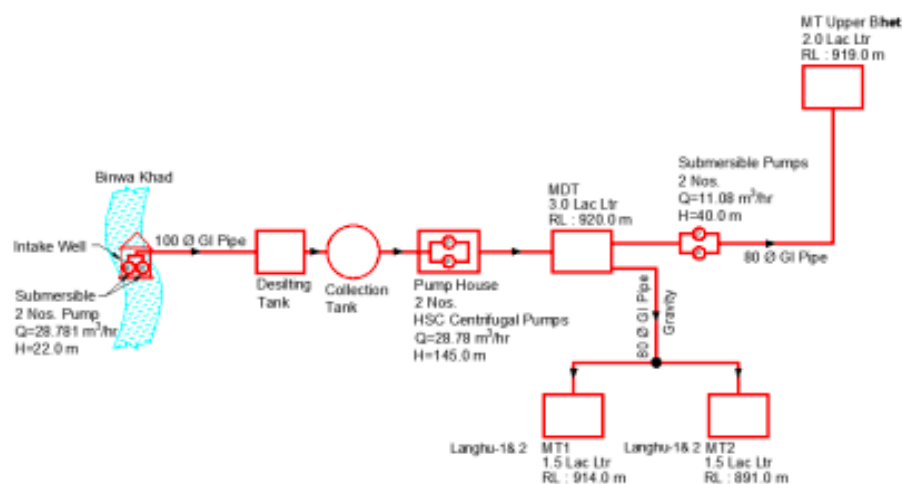


FLOW DIAGRAM - LIS BRIKHMANI CLUSTER : CCA - 16.76 Ha (GOHAR BLOCK)

Irrigation Scheme flow-diagram of Package – 09 (Kangra District):

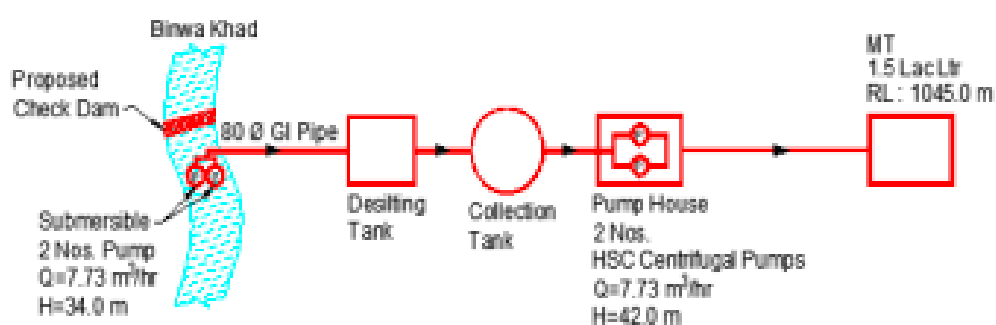
Proposed LIS – Binwa Khad

Figure 131: Flow Diagram of Proposed LIS Binwa Khad



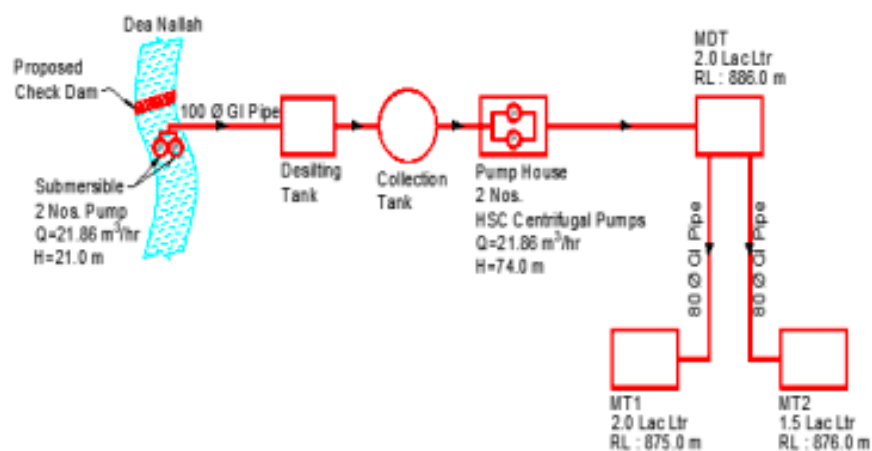
Proposed LIS – Manghota

Figure 132: Flow Diagram of Proposed LIS Manghota



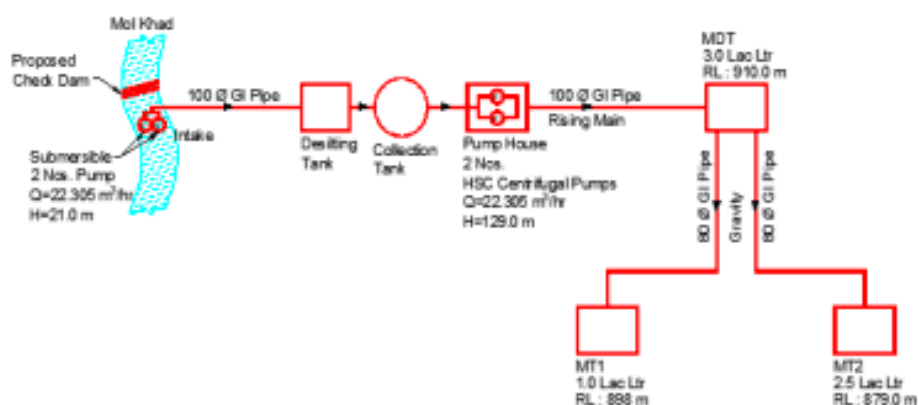
Proposed LIS – Kudail

Figure 133: Flow Diagram of Proposed LIS Kudail



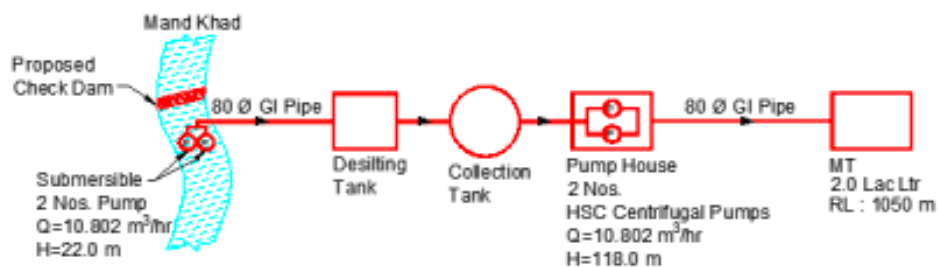
Proposed LIS – Thandol

Figure 134: Flow Diagram of Proposed LIS Thandol



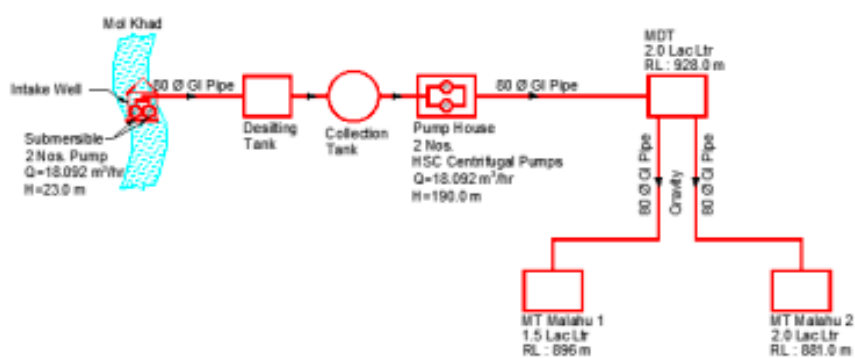
Proposed LIS – Ghar

Figure 135: Flow Diagram of Proposed LIS Ghar



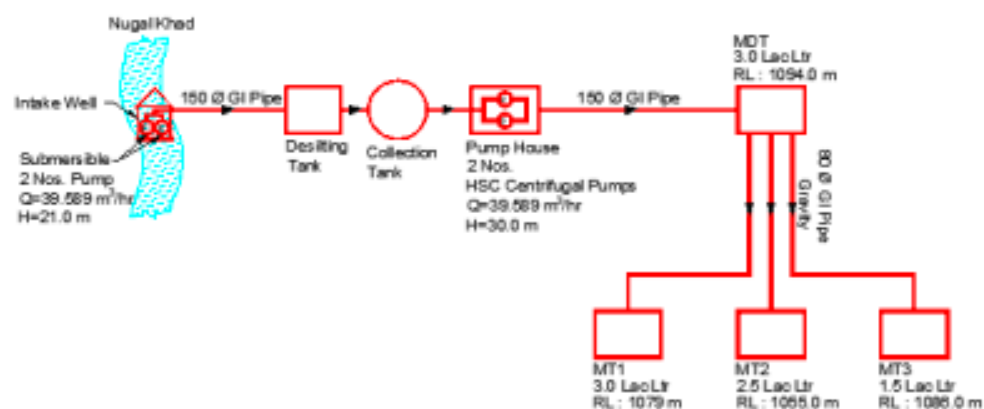
Proposed LIS – Malahu

Figure 136: Flow Diagram of Proposed LIS Malahu



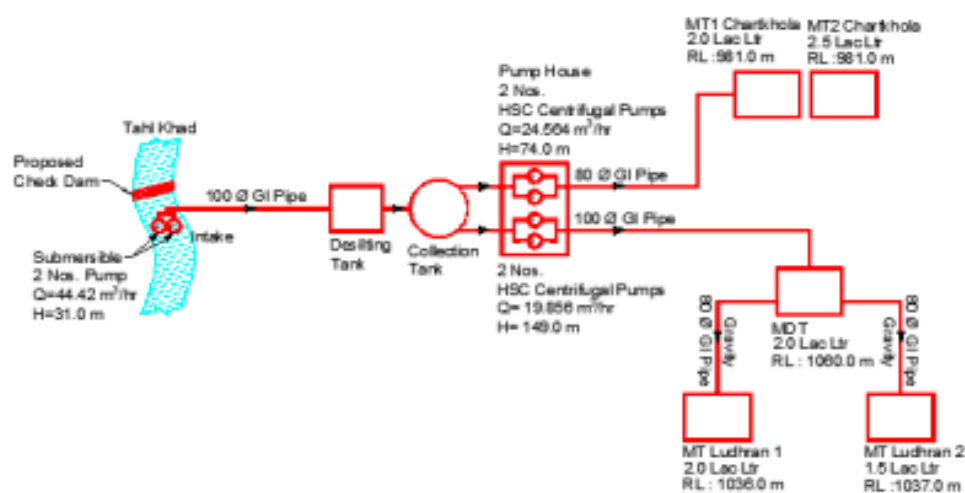
Proposed LIS – Sidhpur

Figure 137: Flow Diagram of Proposed LIS Sidhpur



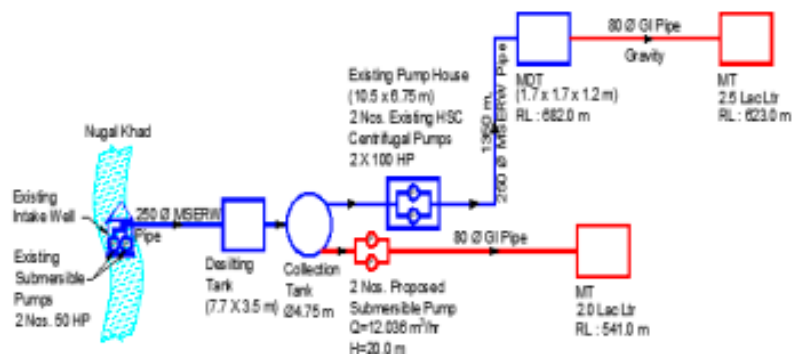
Proposed LIS – Tahl Khad

Figure 138: Flow Diagram of Proposed LIS Tahl Khad



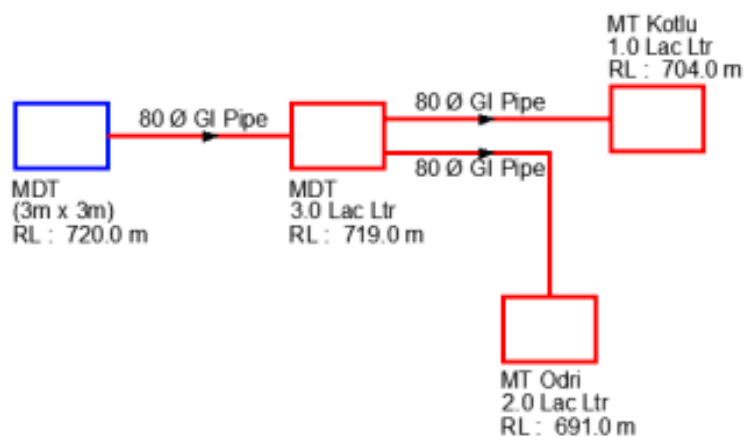
Proposed LIS – Alampur

Figure 139: Flow Diagram of Proposed LIS Alampur



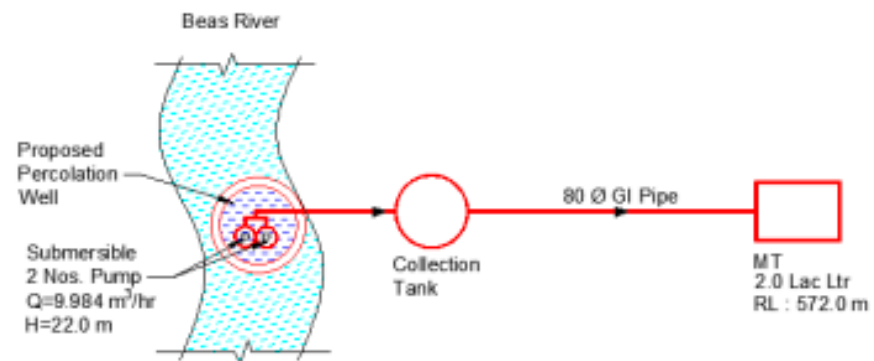
Proposed LIS – Bandhui

Figure 140: Flow Diagram of Proposed LIS Bandhui



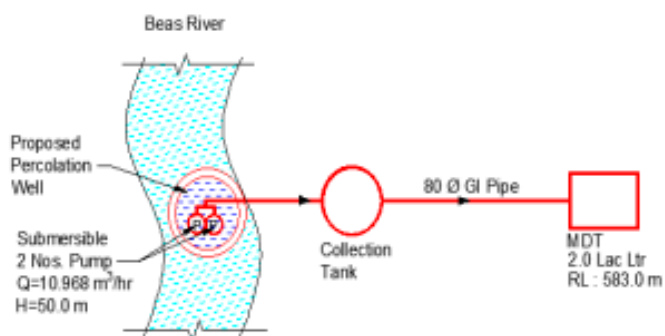
Proposed LIS – Kathla

Figure 141: Flow Diagram of Proposed LIS Kathla



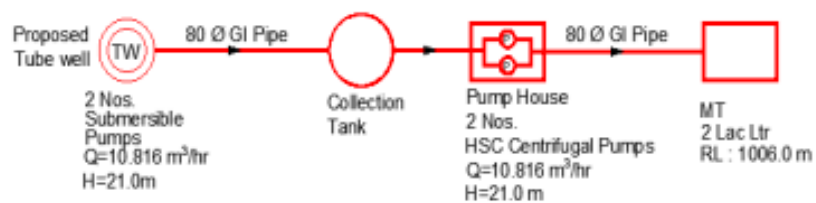
Proposed LIS – Thanpal/Chambi

Figure 142: Flow Diagram of Proposed LIS Thanpal/Chambi



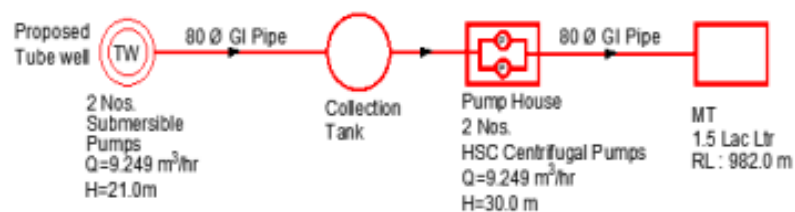
Proposed LIS – Trehal

Figure 143: Flow Diagram of Proposed LIS Trehal



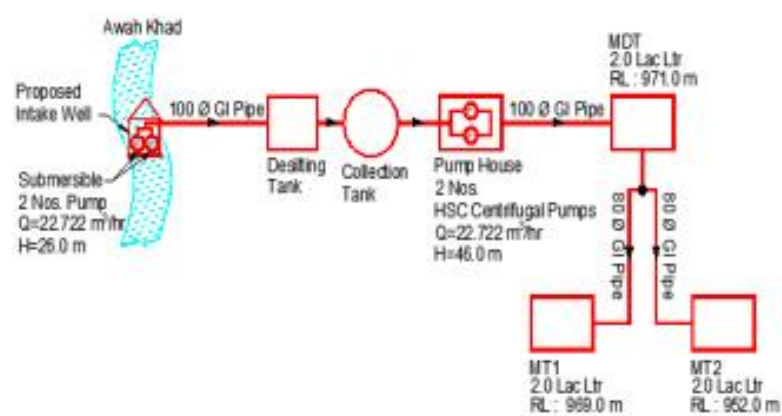
Proposed LIS – Aqozar

Figure 144: Flow Diagram of Proposed LIS Aqozar



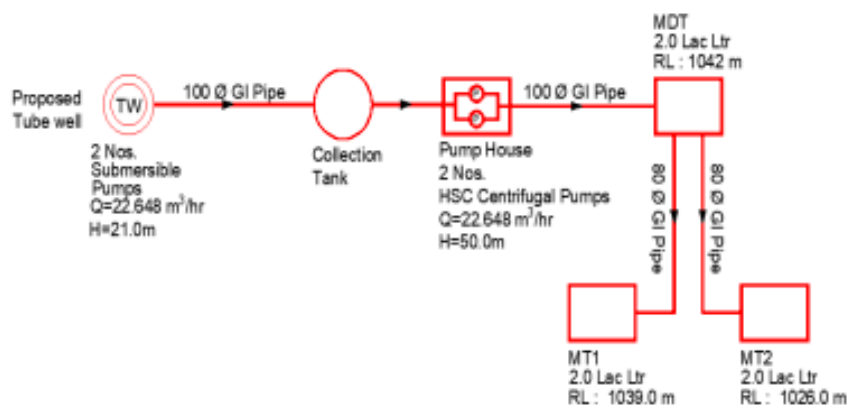
Proposed LIS – Rajhot-1 & 2

Figure 145: Flow Diagram of Proposed LIS Rajhot-1 & 2



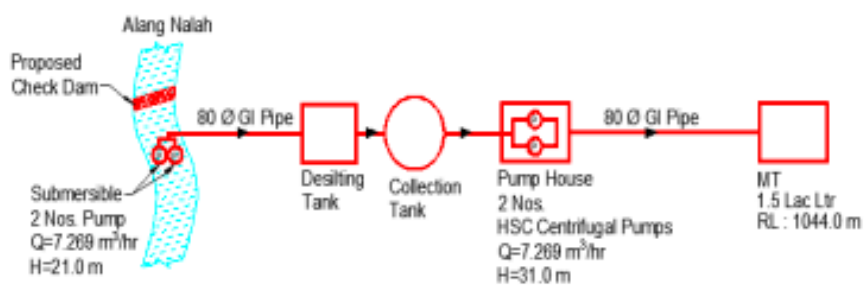
Proposed LIS – Ladoh-1

Figure 146: Flow Diagram of Proposed LIS Ladoh-1



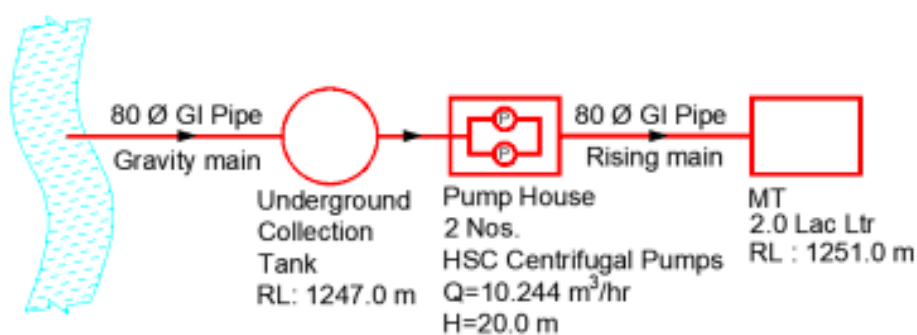
Proposed LIS – Ladoh-2

Figure 147: Flow Diagram of Proposed LIS Ladoh-2



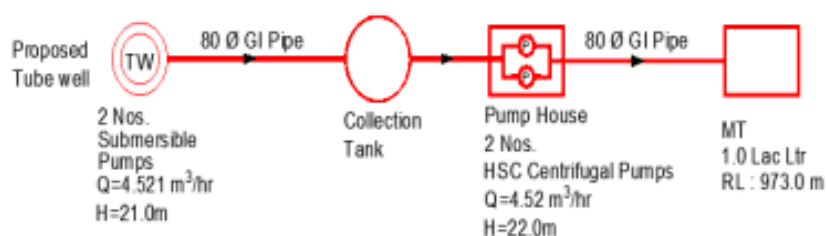
Proposed LIS – Banuri

Figure 148: Flow Diagram of Proposed LIS Banuri



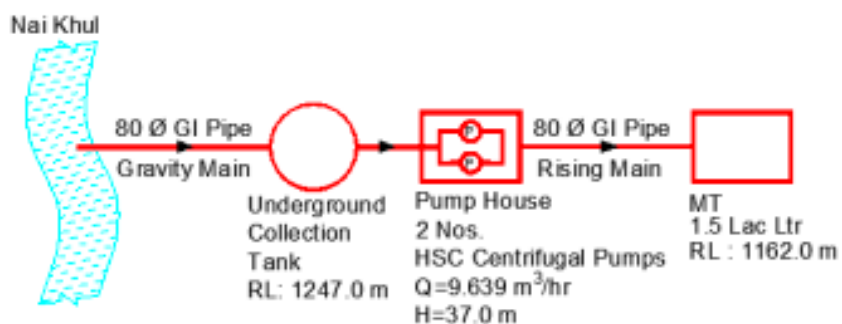
Proposed LIS – Tatehal

Figure 149: Flow Diagram of Proposed LIS Tatehal



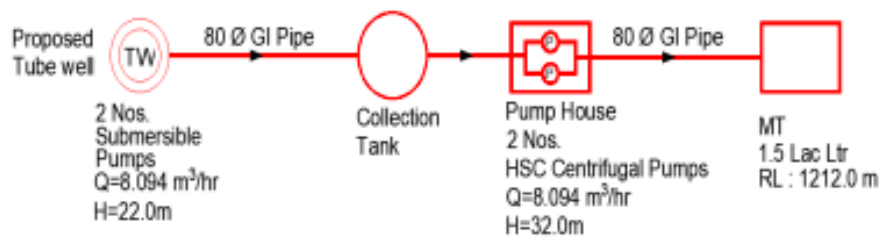
Proposed LIS – Saliana

Figure 150: Flow Diagram of Proposed LIS Saliana



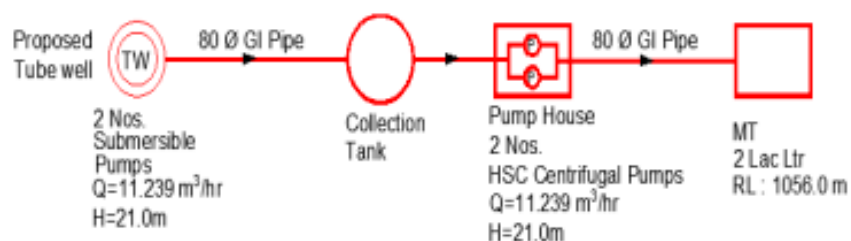
Proposed LIS – Molichak

Figure 151: Flow Diagram of Proposed LIS Molichak



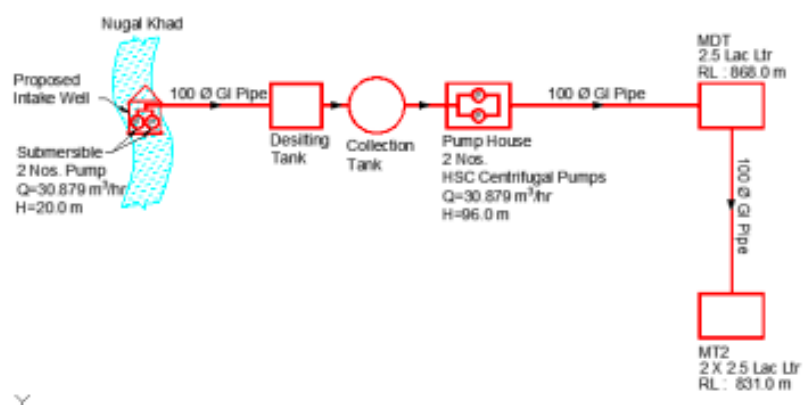
Proposed LIS – Jandpur

Figure 152: Flow Diagram of Proposed LIS Jandpur



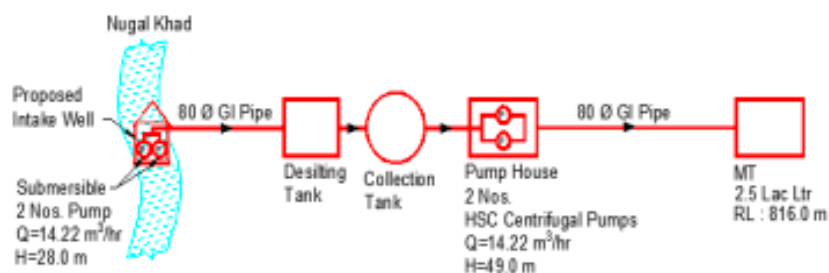
Proposed LIS – Dheera 1 & 2

Figure 153: Flow Diagram of Proposed LIS Dheera 1 & 2



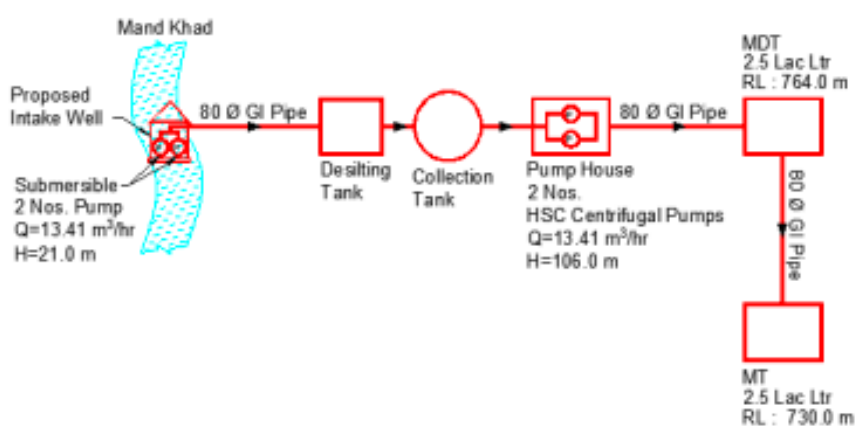
Proposed LIS – Dheera 3

Figure 154: Flow Diagram of Proposed LIS Dheera 3



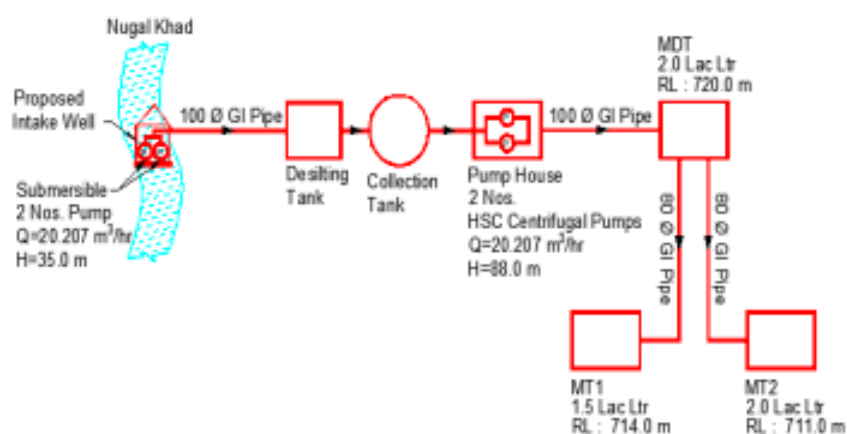
Proposed LIS – Chainchadi-Kuthera

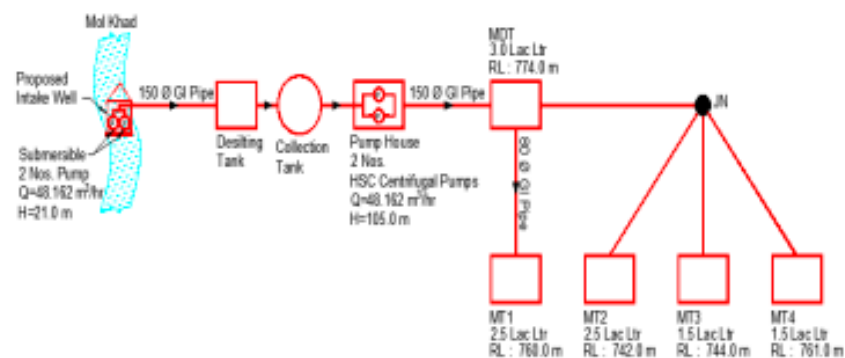
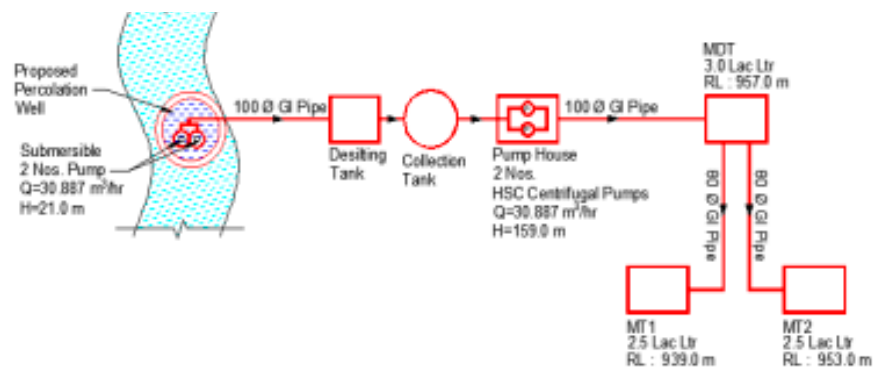
Figure 155: Flow Diagram of Proposed LIS Chainchadi-Kuthera



Proposed LIS – Purba

Figure 156: Flow Diagram of Proposed LIS Purba



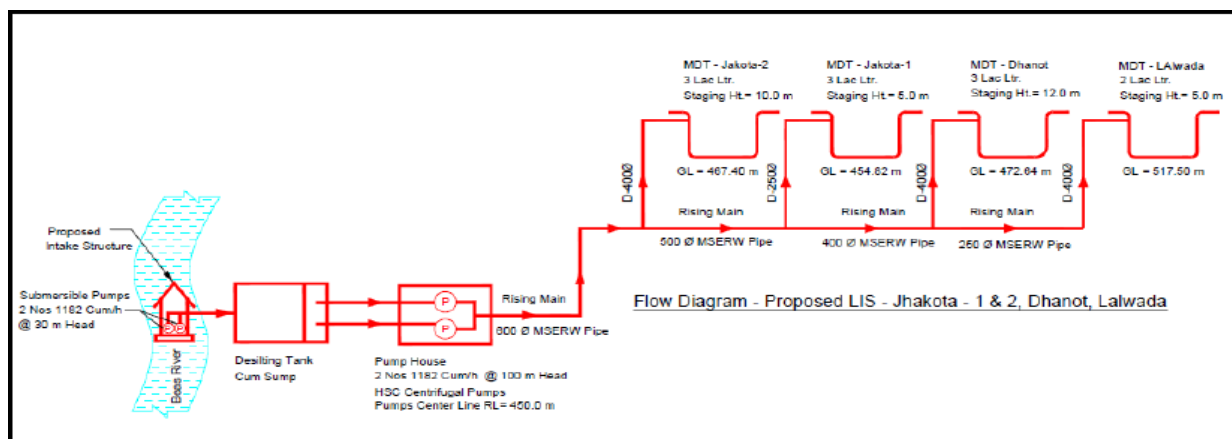
Proposed LIS – Chandar*Figure 157: Flow Diagram of Proposed LIS Chandar***Proposed LIS – Gagai Khas***Figure 158: Flow Diagram of Proposed LIS Gagai Khas*

Irrigation Scheme flow-diagram of Package – 10 (Kangra District):

1. Lalwada, Jhakota, Dhanot LIS New Schemes

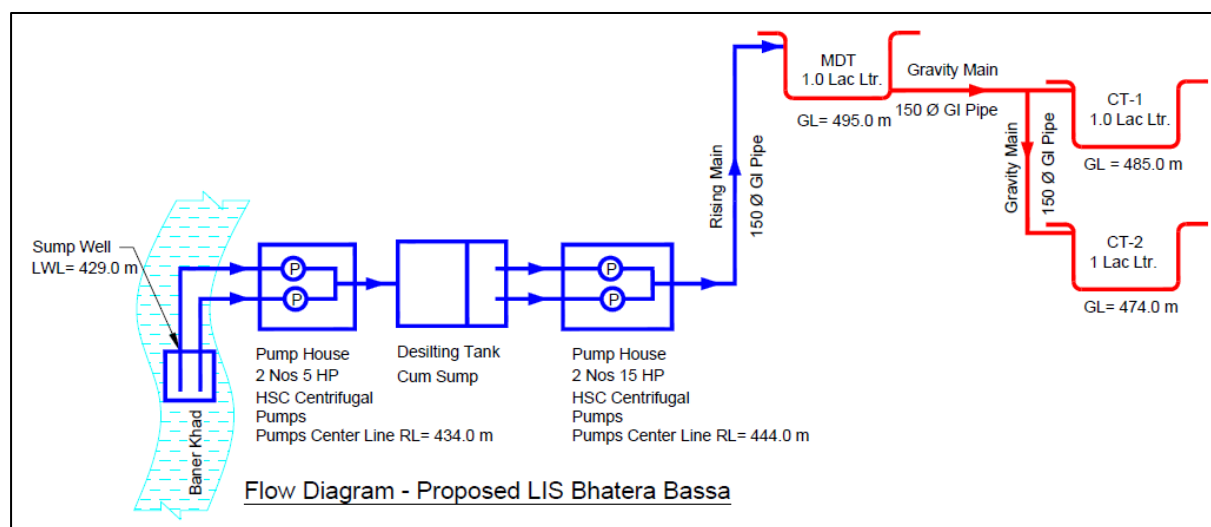
Flow diagram of proposed Lift irrigation scheme of Jhakota Dhanot Lalwada is as below:

Figure 159: Flow Diagram of New Proposed LIS – Jhakota Dhanot Lalwada



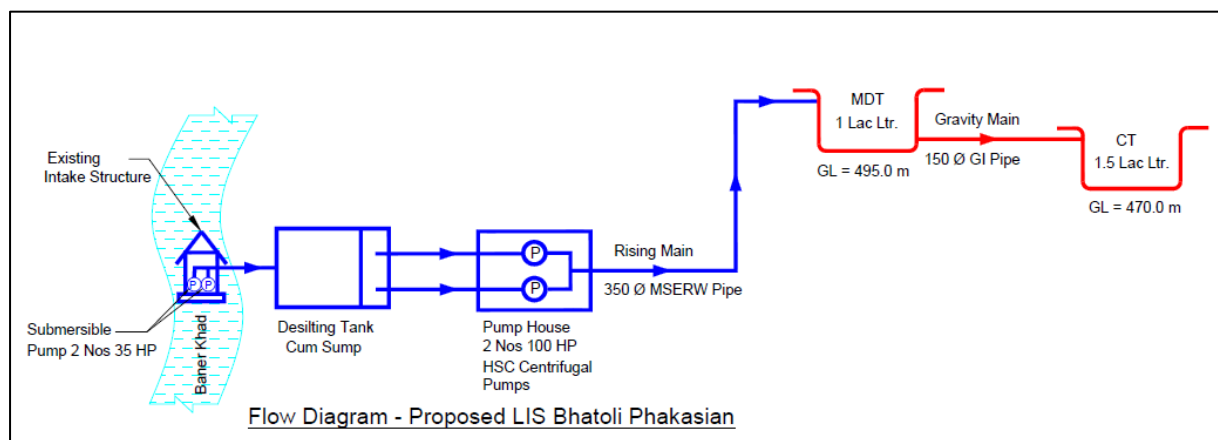
2. LIS Bhatera Bassa

Figure 160: Flow Diagram LIS Bhatera Bassa



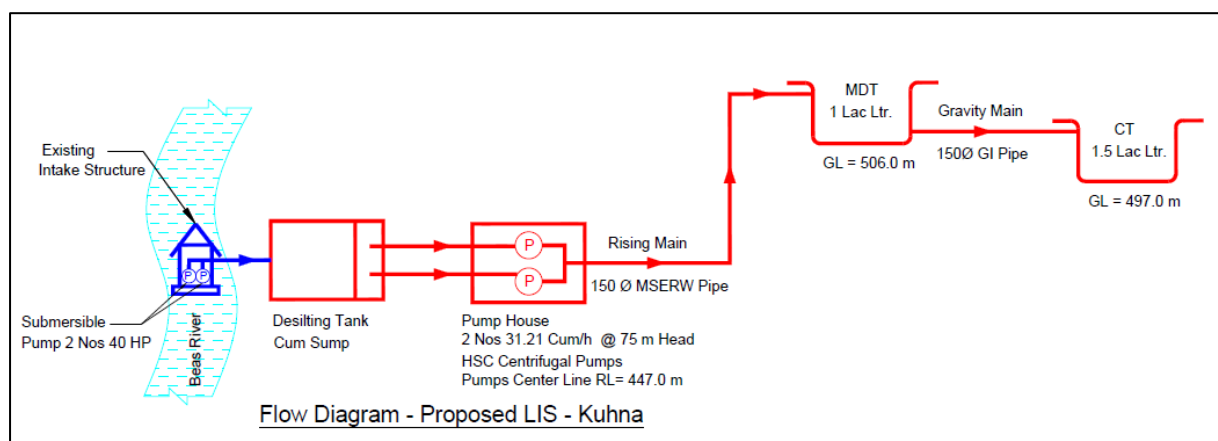
3. LIS Bhatoli Phakasian

Figure 161: Flow Diagram LIS Bhatoli Phakasian



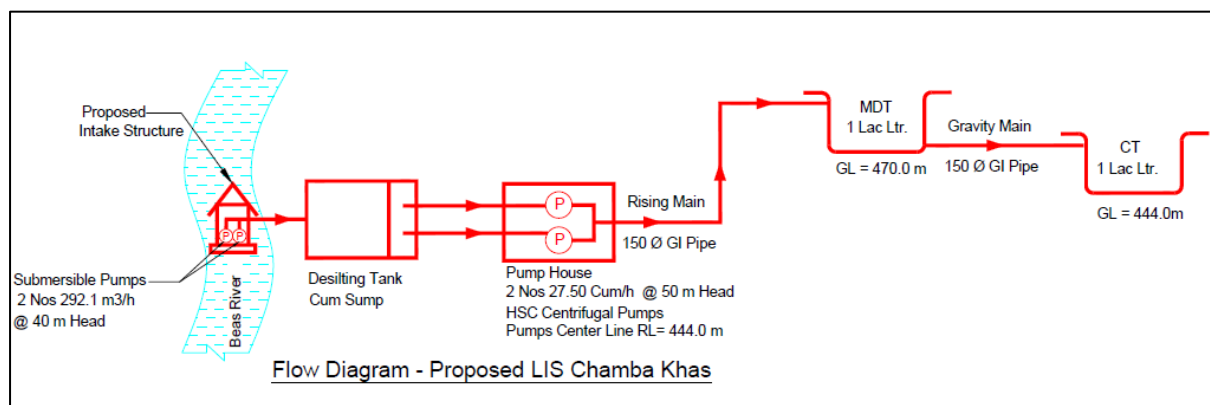
4. LIS Kuhna

Figure 162: Flow Diagram LIS Kuhna



5. LIS Chamba Khas

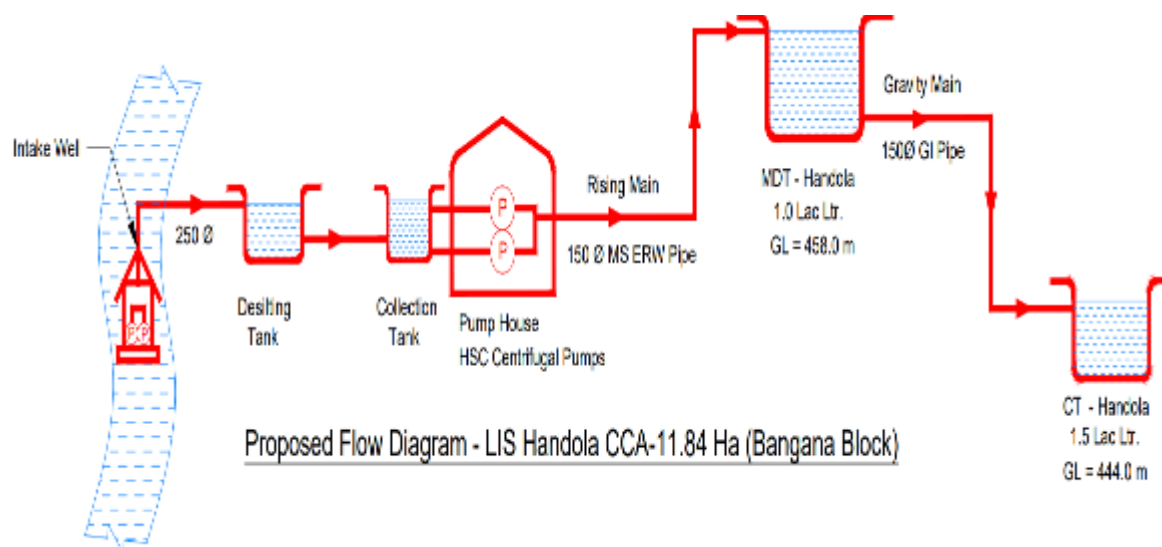
Figure 163: Flow Diagram - LIS Chamba Khas



Irrigation Scheme flow-diagram of Package – 11 (Una District):

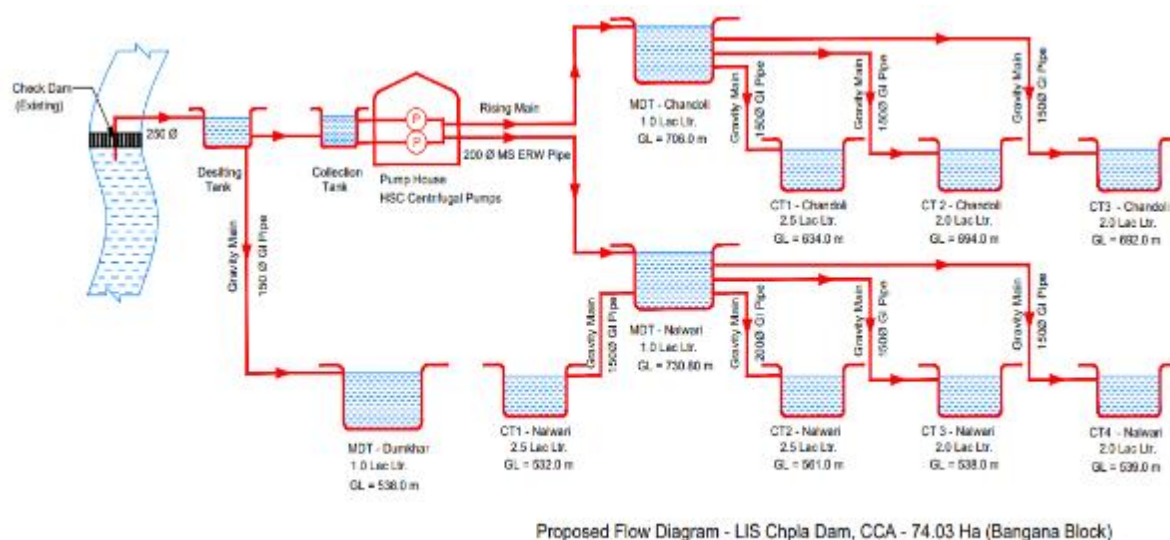
1. LIS Handola

Figure 164: Flow Diagram of Proposed LIS Handola



2. LIS Dulheri Rajputa and Thana Khurd

Figure 165: Flow Diagram of Proposed LIS Dulheri Rajputa and Thana Khurd



3. LIS over Chapla Dam

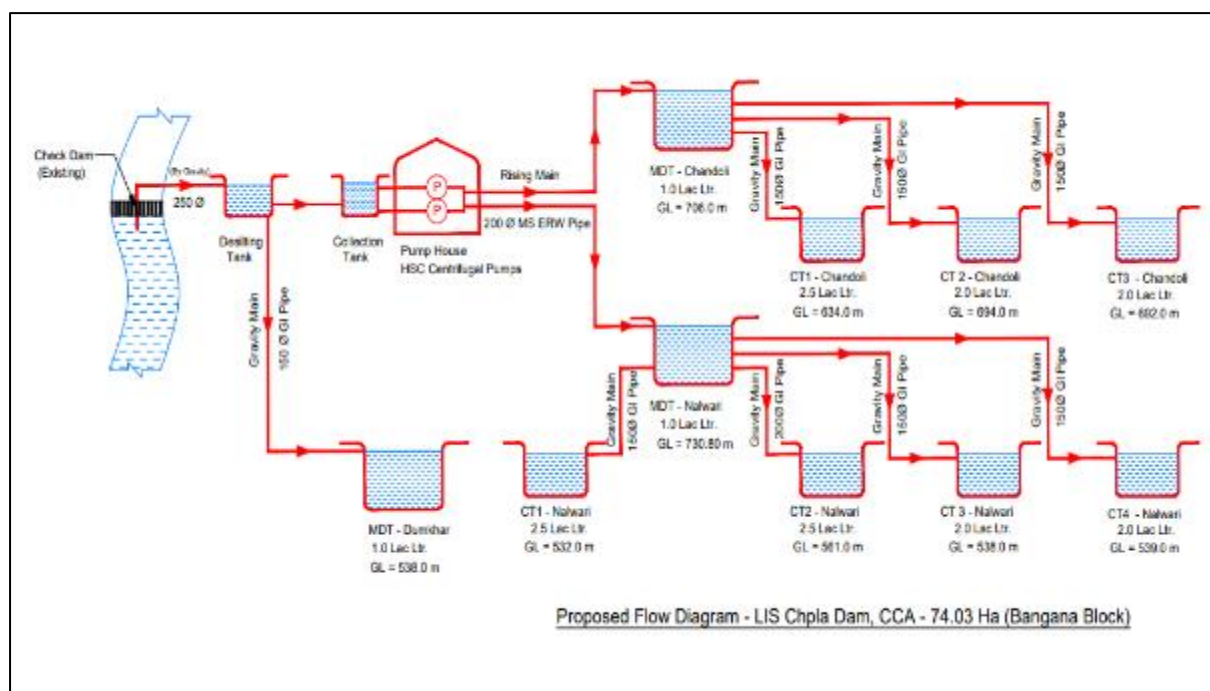
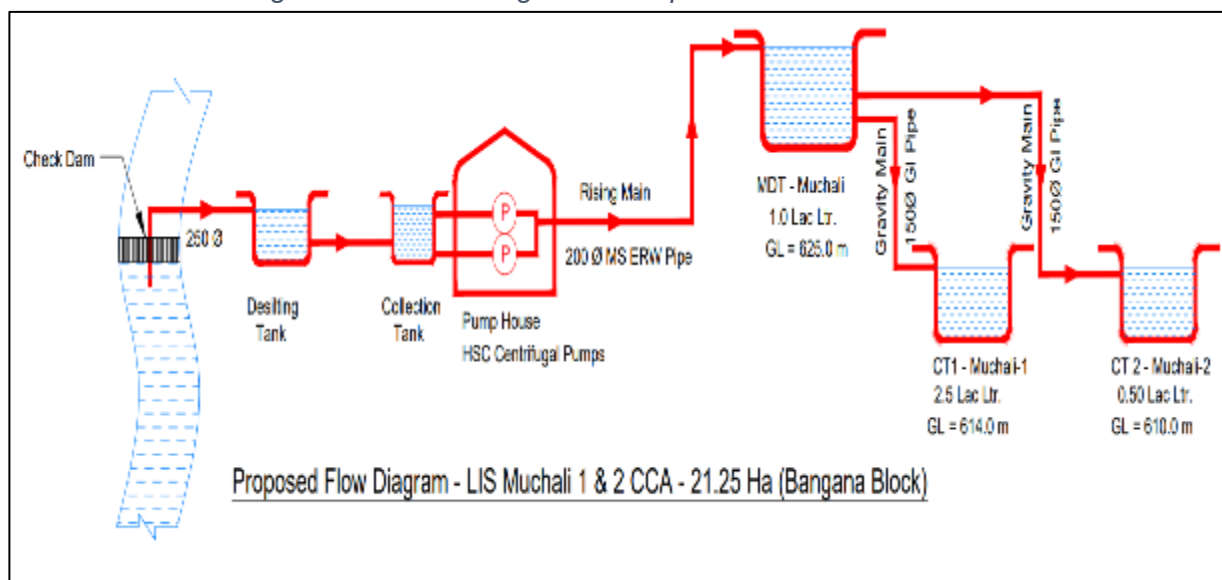


Figure 166: Flow Diagram of Proposed LIS Chapla Dam (Nalwari, Dumkhar and Charoli)

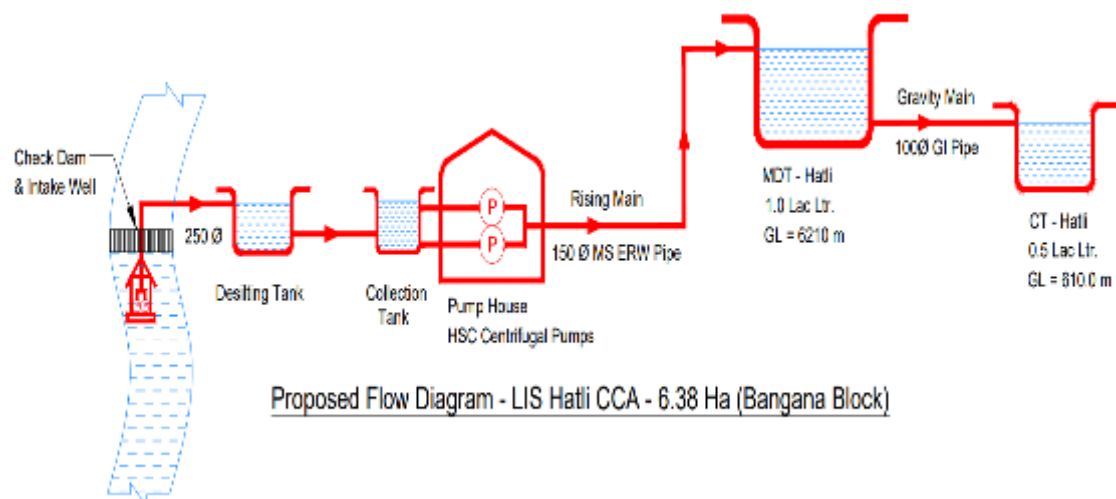
4. LIS over Muchali 1 & 2

Figure 167: Flow Diagram of Proposed LIS - Muchali 1 & 2



5. LIS Haldi

Figure 168: Flow Diagram of Proposed LIS Haldi



6. LIS Kathoh

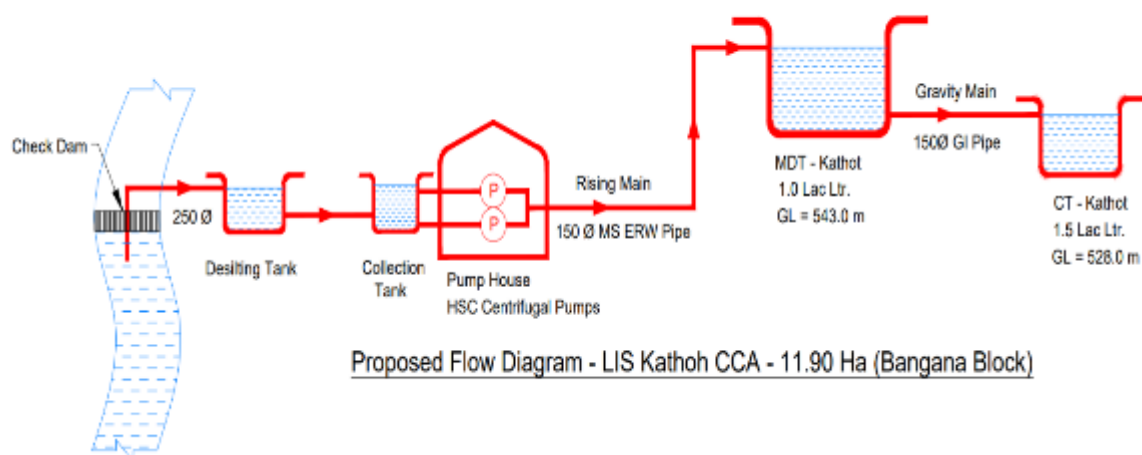
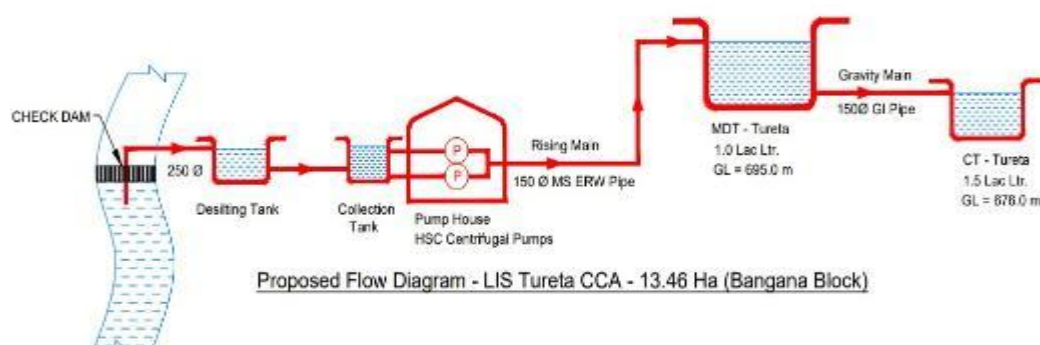


Figure 169: Flow Diagram of Proposed LIS Kathoh

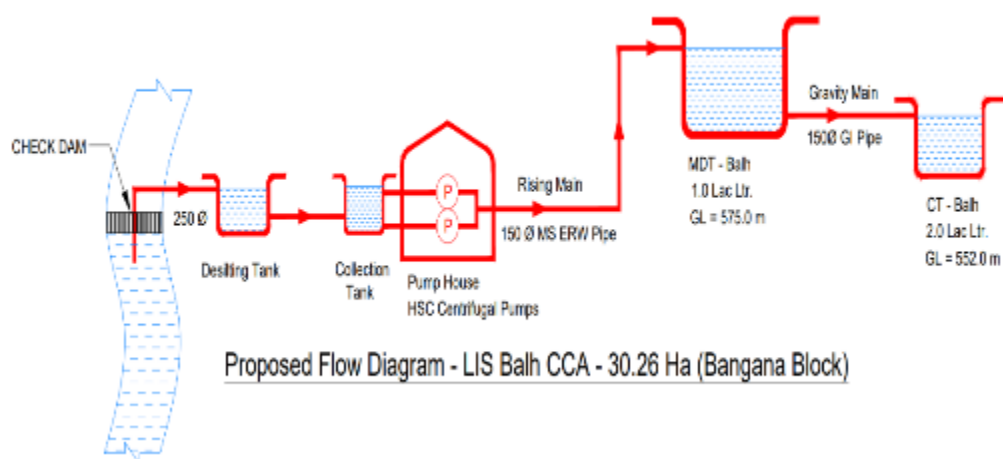
7. LIS Tureta

Figure 170: Flow Diagram of Proposed LIS Tureta



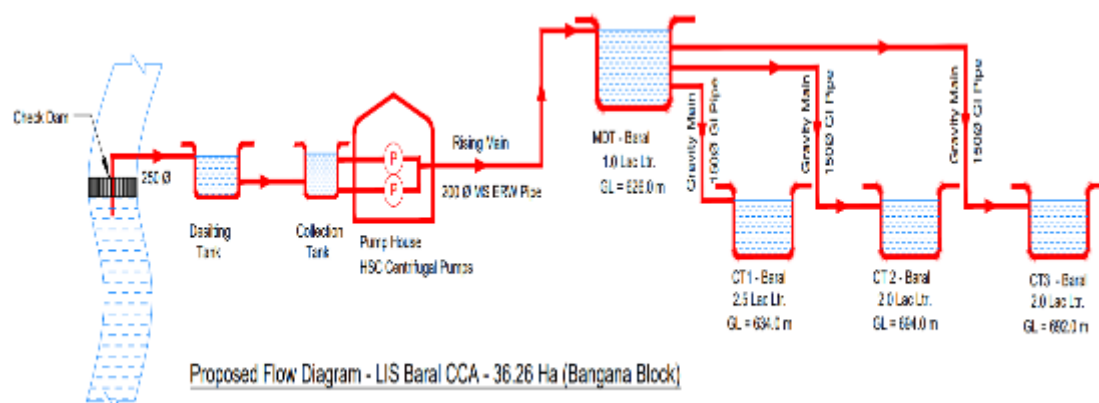
8. LIS Balh

Figure 171: Flow Diagram of Proposed LIS Balh



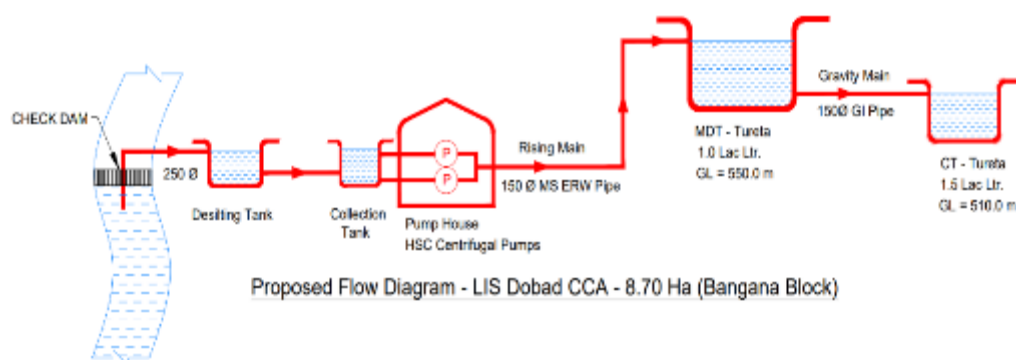
9. LIS Baral

Figure 172: Flow Diagram of Proposed LIS Baral



10. LIS Dobad

Figure 173: Flow Diagram of Proposed LIS Dobad



Annexure 4: LIST OF BANNED PESTICIDES IN INDIA²⁹

1. Pesticides / Formulations banned in India - Pesticides banned for manufacture, import and use

- Alachlor (Vide S.O. 3951 (E), dated 08.08.2018)
- Aldicarb (vide S.O. 682 (E) dated 17th July 2001)
- Aldrin
- Benzene Hexachloride
- Benomyl (vide S.O 3951(E) dated 8th August 2018)
- Calcium Cyanide
- Carbaryl (vide S.O 3951(E) dated 8th August 2018)
- Chlorbenzilate (vide S.O. 682 (E) dated 17th July 2001)
- Chlordane
- Chlorofenvinphos
- Copper Acetoarsenite
- Diazinon (vide S.O 3951(E) dated 8th August 2018)
- Dibromochloropropane (DBCP) (vide S.O. 569 (E) dated 25th July 1989)
- Dichlorovos (Vide S.O. 3951 (E), dated 08.08.2018)
- Dieldrin (vide S.O. 682 (E) dated 17th July 2001)
- Endosulfon (vide ad-Interim order of the Supreme Court of India in the Writ Petition (Civil) No. 213 of 2011 dated 13th May 2011 and finally disposed of dated 10th January 2017)
- Endrin
- Ethyl Mercury Chloride & Ethyl Parathion
- Ethylene Dibromide (EDB) (vide S.O. 682 (E) dated 17th July 2001)
- Fenarimol (vide S.O 3951(E) dated 8th August 2018)
- Fenthion (vide S.O 3951(E) dated 8th August 2018)
- Heptachlor
- Lindane (Gamma-HCH)
- Linuron (vide S.O 3951(E) dated 8th August 2018)
- Maleic Hydrazide (vide S.O. 682 (E) dated 17th July 2001)
- Menazon
- Methoxy Ethyl Mercury Chloride (vide S.O 3951(E) dated 8th August 2018)
- Methyl Parathion (vide S.O 3951(E) dated 8th August 2018)
- Metoxuron
- Nitrofen
- Paraquat Dimethyl Sulphate
- Pentachloro Nitrobenzene (PCNB) (vide S.O. 569 (E) dated 25th July 1989)
- Pentachlorophenol
- Phenyl Mercury Acetate
- Phorate (Vide S.O. 3951 (E), dated 08.08.2018)
- Phosphamidon (Vide S.O. 3951 (E), dated 08.08.2018)
- Sodium Cyanide (banned for Insecticidal purpose only vide S.O 3951(E) dated 8th August 2018)
- Sodium Methane Arsonate
- Tetradifon
- Thiometon (vide S.O 3951(E) dated 8th August 2018)
- Toxaphene (Camphechlor) (vide S.O. 569 (E) dated 25th July 1989)

²⁹ List of Pesticides which are banned, refused registration and restricted in use (as on 01.04.2022)
http://ppqs.gov.in/sites/default/files/banned_pesticides.pdf

- Triazophos (Vide S.O. 3951 (E), dated 08.08.2018)
- Tridemorph (vide S.O 3951(E) dated 8th August 2018)
- Trichloro Acetic Acid (TCA) (vide S.O. 682 (E) dated 17th July 2001)
- Trichlorfon (Vide S.O. 3951 (E), dated 08.08.2018)
- 2. Pesticide formulations banned for import, manufacture, and use**
 - Carbofuron 50% SP (vide S.O. 678 (E) dated 17th July 2001)
 - Methomyl 12.5% L
 - Methomyl 24% formulation
 - Phosphamidon 85% SL
- 3. Pesticide / Pesticide formulations banned for use but continued to manufacture for export**
 - Captafol 80% Powder (vide S.O. 679 (E) dated 17th July 2001)
 - Dichlorvos (vide S.O. 1196 (E) dated 20th March 2020)
 - Nicotin Sulfate (vide S.O. 325 (E) dated 11th May 1992)
 - Phorate (vide S.O. 1196 (E) dated 20th March 2020)
 - Triazophos (vide S.O. 1196 (E) dated 20th March 2020)

Annexure 5: NATIONAL PARKS AND WILDLIFE SANCTUARIES IN HIMACHAL PRADESH

List of National Parks & Wildlife Sanctuaries of the state

Sr No.	National Park / Wildlife Sanctuary	Area (Sq. KM)	District	Flora	Fauna
1	Simbalbara National Park	27.88	Sirmaur	Sal trees (Shorea Robusta) and grassy glades	Goral (Naemorhedus), Sambar (Rusa unicolor), Spotted Deer or Chital (Axis axis), Himalayan black bear (Ursus thibetanus laniger), Hanuman langurs (Semnopithecus), Indian muntjacs (Muntiacus muntjak)
Sr No.	Wildlife Sanctuary	Area (Sq. KM)	District	Flora	Fauna
2	Bandli	41.32	Mandi	Northern Dry Mixed Deciduous (Isoetes bilaspurensis), Himalayan Subtropical Chir Pine (Pinus roxburghii), Ban Oak (Quercus leucotrichophora)	Snow leopard (Panthera uncia), Cheer pheasant (Catreus wallichii), Himalayan Black Bear (Ursus thibetanus laniger), common Palm Civet (Paradoxurus hermaphroditus), Barking Deer (Muntiacus), Goral (Naemorhedus), Indian hare (Lepus nigricollis), Rhesus Macaque (Macaca mulatta)
3	Chail	110.00	Solan	Dense cover of Oak (Quercus), Pine (Pinus) and grassland.	Sambar deer (Rusa unicolor), Goral (Naemorhedus), Cheer pheasant (Catreus wallichii), Rhesus macaque (Macaca mulatta), Leopard (Panthera pardus), Indian muntjac (Muntiacus muntjak), Porcupine (Hystrix indica), Wild boar (Sus scrofa), Langur (Semnopithecus) and Himalayan black bear (Ursus thibetanus laniger).

Sr No.	National Park / Wildlife Sanctuary	Area (Sq. KM)	District	Flora	Fauna
4	Churdhar	56.16	Sirmaur	Coniferous forest (Pinophyta), Alpine meadows (Eucalyptus delegatensis), Deodar (Cedrus deodara), Oak (Quercus)	Common langur (Semnopithecus), Rhesus macaque (Macaca mulatta), Leopard (Panthera pardus), Himalayan black bear (Ursus thibetanus laniger), Wild boar (Sus scrofa), Barking deer (Muntiacus), Musk deer (Moschus), Goral (Naemorhedus), Royle's pika (Ochotona roylei), Indian porcupine (Hystrix indica)
5	Dhauladhar	982.86	Kangra	Western mixed coniferous forest (Pinophyta) with Deodar (Cedrus deodara), Fir (Abies), White Pine (Pinus wallichiana), Oaks (Quercus), Alpine Pastures (Eucalyptus delegatensis)	Musk deer (Moschus), Himalayan black bear (Ursus thibetanus laniger), Serow (Capricornis), Himalayan Weasel (Mustela sibirica), Himalayan palm civet (Paguma larvata), Cheer Peasant (Catreus wallichii), Western Tragopan (Tragopan melanocephalus)
6	Majathal	39.40	Solan	Pine (Pinus), Oak (Quercus)	Cheer Peasant (Catreus wallichii), Goral (Naemorhedus), Himalayan Black Bear (Ursus thibetanus laniger), Leopard (Panthera pardus), Rhesus Macaque (Macaca mulatta), Jungle Cat (Felis chaus), Himalayan Palm civet (Paguma larvata), Barking Deer (Muntiacus), Sambar (Rusa unicolor)
7	Nargu	132.37	Mandi	Moru Oak (Quercus floribunda), Ban Oak (Quercus leucotricophora), Kharsu Oak (Quercus semecarpifolia), Moist Deodar (Cedrus deodara), Moist temperate	Monal (Lophophorus), Himalayan black bear (Ursus thibetanus laniger), Musk deer (Moschus), Serow (Capricornis), Barking deer (Muntiacus), Black bear (Ursus

Sr No.	National Park / Wildlife Sanctuary	Area (Sq. KM)	District	Flora	Fauna
				Deciduous, western mixed Coniferous (Pinophyta)	thibetanus laniger), Goral (Naemorhedus)
8	Pong Dam Lake	207.59	Kangra	Eucalyptus (Eucalyptus globulus Labill), Acacia, Jamun (Syzygium cumini), Shisham (Dalbergia sissoo), Mango (Mangifera), Mulberry (Morus alba), Ficus, Kachnar (Bauhinia variegata), Amla (Phyllanthus emblica), Plum (Prunus)	Barking deer (Muntiacus), Sambar (Rusa unicolor), Wild Boars (Sus scrofa), Nilgai (Boselaphus tragocamelus), Leopard (Panthera pardus), Oriental small-clawed Otters (Aonyx cinereus)
9	Renuka	4.03	Sirmaur	Dry mixed Deciduous (Isoetes bilaspurensis), Dry Sal (Shorea Robusta), Khair (Senegalia catechu), Shisham (Dalbergia sissoo), Carrier (Mangifera indica), Cordia	Leopard (Panthera pardus), Sambar (Rusa unicolor), Spotted Deer (Axis axis), Barking deer (Muntiacus), Jackal (Canis aureus), Jungle Cat (Felis chaus), Palm civet (Paguma larvata), Black Partridge (Melanoperdix niger)
10	Shikari Devi	29.94	Mandi	Ban Oak (Quercus leucotricophora), Western Mixed Coniferous (Pinophyta), Kharsu Oak (Quercus semecarpifolia), West Himalayan Upper Oak, Moist Temperate Deciduous	Goral (Naemorhedus), Monal (Lophophorus), Black Bear (Ursus thibetanus laniger), Barking Deer (Muntiacus), Musk Deer (Moschus), Cat Leopard (Prionailurus bengalensis), Himalayan Black Bear (Ursus thibetanus laniger)
11	Gobind Sagar Wildlife Sanctuary	167.40	Bilaspur	Deciduous, Khair (Senegalia catechu), Sisso	Sambar (Rusa unicolor), Wild boar (Sus scrofa), Barking deer (Muntiacus), Red junglefowl (Gallus gallus)

Sr No.	National Park / Wildlife Sanctuary	Area (Sq. KM)	District	Flora	Fauna
12	Naina Devi Wildlife Sanctuary	123.00	Bilaspur	Deciduous, Sisso, Bamboo (Bambusoideae), Scrub (Quercus berberidifolia), Pine (Pinus)	Jackal (Canis aureus), Leopard (Prionailurus bengalensis), Rhesus (Macaca mulatta), Himalayan yellow throated Marten (Martes flavigula), Serow (Capricornis), Porcupine (Hystrix indica), Sambar (Rusa unicolor)
13	Shilli Wildlife Sanctuary	2.14	Solan	Deodar (Cedrus deodara), Fir (Abies), Ban Oak trees (Quercus leucotricophora) and numerous medicinal plants	<u>Mammals</u> - Black Bear (Ursus thibetanus laniger), Brown Bear (Ursus arctos), Leopard (Prionailurus bengalensis), Jackal (Canis aureus), Hyena (Hyaenidae), Musk Deer (Moschus), Barking Deer (Muntiacus), Bear (Ursidae). <u>Birds</u> - Woodpecker (Picidae), Peacock (Pavo cristatus), Duck (Anatidae), Parrot (Psittaciformes), Myna (Acridotheres tristis), Pheasant (Phasianus colchicus), and Hornbill (Bucerotidae) <u>Reptiles</u> - Monitor Lizard (Varanus), Indian Cobra (Naja naja), Python (Pythonidae), Indian Krait (Bungarus caeruleus), Flying Squirrel (Pteromyini)

Species of Flora found in Project Area

Sr No.	Scientific Name	Common Name	IUCN Conservation Status
1	Abies	Fir	LC
2	Acacia	Acacia	LC

Sr No.	Scientific Name	Common Name	IUCN Conservation Status
3	Bambusoideae	Bamboo	LC
4	Bauhinia variegata	Kachnar	LC
5	Cedrus deodara	Deodar	LC
6	Dalbergia sissoo	Shisham	LC
7	Eucalyptus delegatensis	Alpine Meadows	LC
8	Eucalyptus globulus Labill	Eucalyptus	LC
9	Isoetes bilaspurensis	Dry Mixed Deciduous	LC
10	Mangifera indica	Common Indian Mango	DD
11	Morus alba	Mulberry	LC
12	Phyllanthus emblica	Amla	LC
13	Pinus roxburghii	Himalayan Subtropical Chir Pine	LC
14	Pinus wallichiana	White Pine	LC
15	Prunus	Plum	LC
16	Quercus berberidifolia	Scrub	LC
17	Quercus floribunda	Moru Oak	LC
18	Quercus leucotrichophora	Ban Oak	LC
19	Quercus semecarpifolia	Kharsu Oak	LC
20	Senegalia catechu	Khair	LC
21	Shorea Robusta	Sal	LC
22	Syzygium cumini	Jamun	LC

DD: Data Deficient; LC: Least Concerned

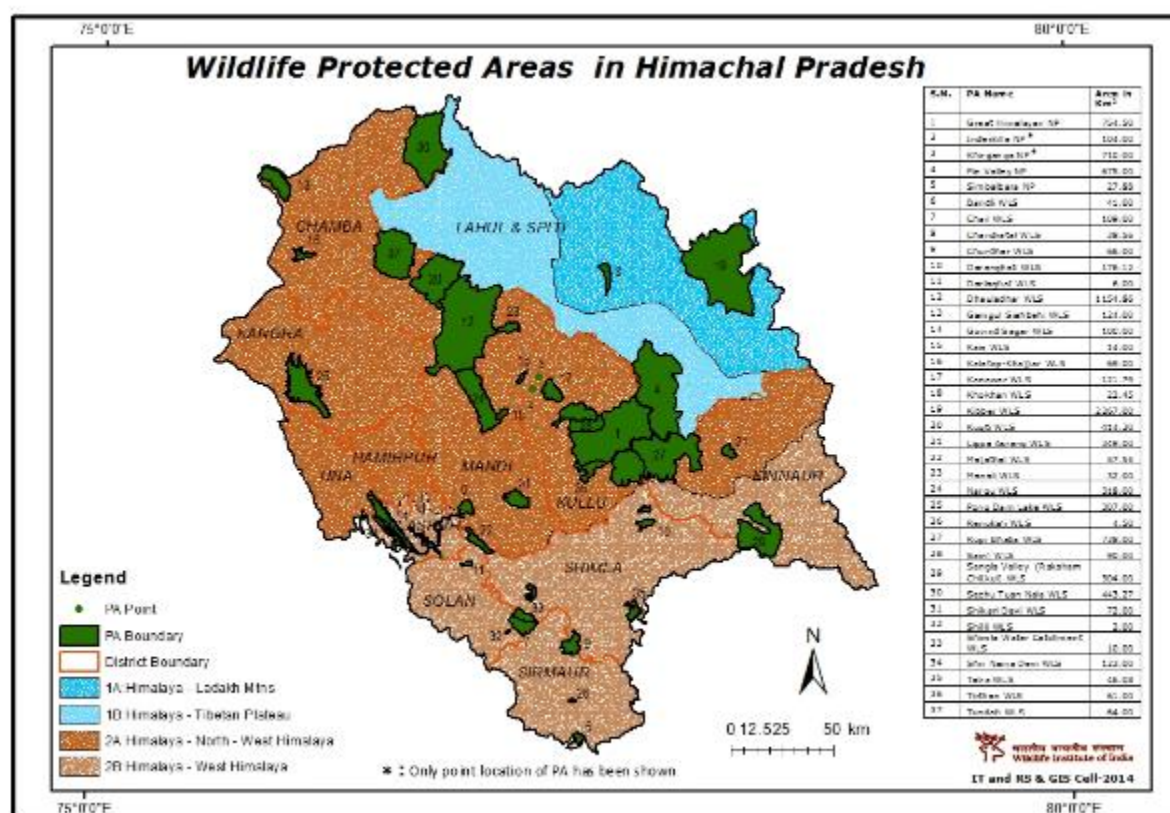
Species of Flora found in Project Area

Sr No.	Scientific Name	Common Name	IUCN Conservation Status
1	Acridotheres tristis	Myna	LC
2	Aonyx cinereus	Oriental small-clawed Otter	VU
3	Axis axis	Chital	LC
4	Bungarus caeruleus	Indian Krait	LC
5	Canis aureus	Jackal	LC
6	Capricornis	Serow	LC
7	Catreus wallichii	Cheer Pheasant	VU
8	Felis chaus	Jungle Cat	LC
9	Gallus gallus	Red Junglefowl	LC
10	Hystrix indica	Indian Porcupine	LC
11	Lepus nigricollis	Indian Hare	LC
12	Lophophorus	Monal	LC
13	Macaca mulatta	Rhesus Macaque	LC
14	Martes flavigula	Himalayan Yellow-throated Marten	LC
15	Melanoperdix niger	Black Partridge	VU
16	Moschus	Musk Deer	EN
17	Muntiacus muntjac	Indian Muntjacs	LC
18	Mustela sibirica	Himalayan Weasel	LC
19	Naemorhedus	Goral	NT
20	Naja naja	Indian Cobra	LC
21	Ochotona roylei	Royle's Pika	LC
22	Paguma larvata	Himalayan Palm civet	LC

Sr No.	Scientific Name	Common Name	IUCN Conservation Status
23	<i>Panthera uncia</i>	Snow Leopard	VU
24	<i>Panthera pardus</i>	Leopard	VU
25	<i>Paradoxurus hermaphroditus</i>	Common Palm Civet	LC
26	<i>Pavo cristatus</i>	Peacock	LC
27	<i>Phasianus colchicus</i>	Pheasant	LC
28	<i>Prionailurus bengalensis</i>	Cat Leopard	LC
29	<i>Pythonidae</i>	Python	LC
30	<i>Rusa unicolor</i>	Sambar	VU
31	<i>Semnopithecus</i>	Hanuman Langur	LC
32	<i>Sus scrofa</i>	Wild Boar	LC
33	<i>Tragopan melanocephalus</i>	Western Tragopan	VU
34	<i>Ursus thibetanus laniger</i>	Himalayan Black Bear	VU
35	<i>Ursus arctos</i>	Brown Bear	LC

EN: Endangered; LC: Least Concern; NT: Near Threatened; VU: Vulnerable

Wildlife Protected Areas in Himachal Pradesh



Annexure 6: STANDARD CONSTRUCTION CONTRACT ENVIRONMENTAL AND SOCIAL SAFEGUARD CLAUSES

Environmental clauses to be included in the bid document are delineated in the subsequent subsections.

- Contractor shall be responsible for implementation of Environmental Management Plan (EMP) in addition to adhering to relevant statutory environmental requirements to all engineering works as a part of good engineering practices.
- All works undertaken towards protection of environmental resources as part of the EMP and as part of good engineering practices while adhering to relevant specifications will be deemed to be incidental to works being carried out and no separate payment will be made unless otherwise specified explicitly. The cost towards environmental management as per EMP unless otherwise provided as a separate head, will be deemed to be part of Bill of Quantity of the project. The Scope of Work (SoW) of the Contractor towards implementation of environmental provision shall be as follows:
 - Abide by all existing environmental regulation and requirements of the Government of India and State Government of Maharashtra during proposed construction and implementation.
 - Comply with all mitigation measure and monitoring requirements set out in the EMP.
 - Submission of methodology stating how EMP will be complied including method and schedule of monitoring.
 - Monitoring of project environmental performance and annual submission of monitoring reports until project completion report is issued by ADB.
 - Compliance with all measures required for construction activities in sensitive areas (if any), in line with the regulatory requirements adopted by MoEF & CC, GoI.
 - Compliance of all safety rules at work, and provision of adequate health and safety measures such as water, food, sanitation, personal protective equipment, workers insurance, and medical facilities and rest shelters.
 - The Contractor should procure construction materials from the licensed/ authorized agents/ dealers. Procurement of materials from the unauthorized sources shall be considered as illegal and appropriate measures shall be taken.
 - Construction and Demolition waste shall be handled as per the provisions laid down in the C&D Waste Management Rules 2016.
 - The Contractor shall ensure that construction activities do not cause contamination of water and dispose off solid wastes, resulting from construction related activities, anywhere on the premises but dispose of as per the C&D Waste Management Rules 2016.

Annexure 7: SCEP FRAMEWORK

Process and Mechanism for Information Sharing

Process	Mechanism
Correspondences (Phone, Emails)	• Distribute Project brief/information to Government officials, NGOs, Local Government, and organizations/agencies • Invite stakeholders to meetings and follow-up
One-on-one meetings	• Seeking views and opinions • Enable stakeholders to speak freely about sensitive issues • Build personal relationships • Record meetings
Formal meetings	• Present the Project information to a group of stakeholders • Allow the group to comment – opinions and views • Build impersonal relations with high-level stakeholders • Disseminate technical information (as required) • Record discussions
Public meetings	• Present Project information to a large group of stakeholders, especially communities • Allow the group to provide their views and opinions • Build a relationship with the communities, especially those impacted • Distribute non-technical information (as required) • Facilitate meetings with presentations, PowerPoint, posters, etc. • Record discussions, comments, and questions.
Focus group meetings	• Present Project information to a group of stakeholders • Allow stakeholders to provide their views on targeted baseline information • Build relationships with communities • Record responses
Project website and disclosure	• Present project information and progress updates

Process	Mechanism
	• Disclose ESMP, RAP, SCEP, Contract Progress, RAP Implementation progress, Grievances and redresses of Grievances, and other relevant project documentation.
Direct communication with people	Share information on the timing of commencement of civil works Agree to options for removing crops and relocating fences/structures, e.g., sheds, if applicable.
Road signs	• Share information on project activities • Reminders of potential impacts (e.g., for possible landslides, road clearance activities)
Project leaflet	• Brief project information to provide regular update • Site-specific project information. • Information on disruption of water supply etc.

Stakeholder Communication Strategy

Stakeholder Group	Objective	Function/Interest in Project	Message	Means of Communication	Timelines	Responsibility	Resources
Beneficiary communities include small and marginal farmer production groups, women and men farmers, WUAs, CHPMA members, the private sector, and local microcredit/ microfinance institutions .	Ensure a good two-way flow of information, and promote ownership over subproject activities and climate-resilient horticulture value chains sector development	Direct project beneficiaries; local authorities participating in the implementation and follow-up of subprojects; beneficiaries of identified clusters; participants in horticulture enterprise development; participants in technical and climate-resilient and drip irrigation training, workshops, and exposure visits, etc.	Local collaboration and support are fundamental to project effectiveness; information must be shared openly and transparently; inputs into design and recommendations for improvements are welcome. Clear information on implementation arrangements and schedule of project interventions, including construction and civil works. <i>This will also contain details on OHS, community safety, and the role of contractors and labors.</i> Update on subproject progress and roles for any operation and maintenance after completion.	Information: Community meetings to disseminate information on project scope, design elements, and participation mechanisms. Consultation: Regular village meetings and discussions (both mixed gender and women's meetings) to monitor progress and discuss measures to enhance project benefits and mitigate risks. Decisions: Community members contribute with suggestions for effective participation and guidelines for capacity building needs with support from village leaders to ensure they are inclusive, with equal representatives of women.	During the detailed design of subprojects, including civil works, and throughout the implementation of the project.	EA (DOH); IAs (DOH and JSV); IEC Specialist, PMU; Social Development and Gender Specialist, PMU	Budget for consultations , feedback, production of all communication materials, and recruiting local communication consultant to design materials, where necessary.

Stakeholder Group	Objective	Function/Interest in Project	Message	Means of Communication	Timelines	Responsibility	Resources
			Measures will be taken to manage and mitigate noise, air, or traffic impacts. The impact on community land/CPR will be minimal, and no private property will be acquired. Details on water resources & ensuing source sustainability, crop identification, waste management of horticulture/agriculture, handling and storage of pesticides and other chemicals, improving soil fertility, etc.	Details of how and where to register feedback and complaints (e.g., with CHPMA staff) are to be provided.			
Ensure an adequate two-way flow of project information to women beneficiaries and ethnic	Women, poor and vulnerable households, IPs/ minority groups (where applicable)	As above	As above plus disseminate contents of GESI/GAP Due diligence to ensure IPs are not adversely affected by project (where applicable) Opportunities to participate in training	As mentioned above plus disseminate the contents of GESI/GAP Due diligence to ensure IPs are not adversely affected by the project (where applicable) Opportunities to participate in training in	During the detailed design of subprojects and preparation activities – regular follow-up throughout	EA (DOH); Social Development-Gender Specialist, PMU; Social Focal Person, PIU	Capacity building budget Budget for community engagement and mobilization efforts

Stakeholder Group	Objective	Function/Interest in Project	Message	Means of Communication	Timelines	Responsibility	Resources
minority beneficiaries			in income generating activities	income-generating activities Separate meetings with women organized; (i) WUA, (ii) CHPMA, and (iii) IP groups in the local language, where applicable. Printed information about the project posted in local and accessible language (or visual depictions) posted in accessible public areas. Training on WUAs and CHPMA manuals – ensuring effective management and functioning Media outreach: local radio (including local language), television, print, social media	the project lifecycle.		Budget for information material development and dissemination.

Stakeholder Group	Objective	Function/Interest in Project	Message	Means of Communication	Timelines	Responsibility	Resources
Beneficiary communities.	Raise visibility and awareness of the benefits of horticulture development for inclusive growth and for building ownership over ongoing infrastructure development (e.g., fruits, biofertilizer plant) and farmer production groups and horticulture cooperative development	Direct and indirect beneficiaries of the project.	Project investments and horticulture promotion are beneficial to the local economy, culture, and gender equity.	Media press releases and coverage about the project by local media – print, radio, and TV features (if possible). Signboards promoting the visibility of DOH, ADB, and line department's collaboration for climate-resilient horticulture/ agriculture and value chain development and improvements. Inaugurations of completed construction and civil works with promotional events at subproject sites.	At project launch and midway through as tangible results are realized. Signboards at appropriate locations at the start of construction and through project implementation.	EA (DOH), Social Development and Gender Specialist, PMU and local authorities	Capacity Enhancement; Equity
Project affected persons	Ensure meaningful consultation for complete understanding and acceptance of the project and related	Direct and indirect beneficiaries of project; partners in development activities.	Project plans (IEE/EMP, RP/RF), land acquisition impacts, entitlements, compensation rates, and GRM, as well as resettlement and	Project plans (IEE/EMP, RP/RF), land acquisition impacts, entitlements, compensation rates, GRM, and resettlement and income restoration strategies.	During the detailed design of subprojects and preparation activities – regular follow-up	EA (DOH); Social Safeguards Specialist, PMU; Social Focal Person, PIU; ADB	Human resources (PMU and PIU). Capacity building and technical support in

Stakeholder Group	Objective	Function/Interest in Project	Message	Means of Communication	Timelines	Responsibility	Resources
	environmental and social/ resettlement impacts, entitlements, and GRM channels.		income restoration strategies. Project description, environmental impacts and mitigation, EMP, and GRM. Activities during project preparation and implementation.	Project description, environmental impacts and mitigation, EMP, and GRM. Activities during project preparation and implementation. Meeting with project-affected persons. Distribution of material/documents on entitlements in local language Project PID, i.e., posters, public notices. Executive Summary of the IEE (translated to the local language) posted in local government offices (village, district, etc.) GRM channels and contact persons Sustained and regular engagement with communities	throughout the project lifecycle.		communications and community engagement Budget for IEC, PID, translation, and public posting of the IEE's executive summary and regular meetings. Budget for technical support and capacity building.

Stakeholder Group	Objective	Function/Interest in Project	Message	Means of Communication	Timelines	Responsibility	Resources
Private sector, enterprises and cooperatives	Private sector participation and partnership for effective agribusiness/horticulture development.	Direct and indirect beneficiaries of project; partners in development activities.	Promote participation in agribusiness/horticulture initiatives, which will increase the available supply of good quality products such as fresh fruits, employment creation, and endeavors to promote climate-friendly agribusiness value chain development	Partnership in workshops/meetings/surveys on horticulture development and marketing/promotion programs. A local Communications consultant will develop a unique dissemination/engagement plan as part of his/her core activities, including the design and production of a full suite of marketing materials.	Ongoing during implementation of project activities	EA (DOH) / Social Development-Gender Specialist/ Project implementation consultants	Capacity development
DOH / PMU	Setting policy and guidelines, coordination meetings, and approvals Ensure a good two-way flow of project information and promote women's ownership over subproject	Promote women's ownership over subproject activities and horticulture development Plays a role in overseeing gender inclusiveness in horticulture development in Project clusters Responsible for project implementation and	Key benefits and gender equity of subproject activities and climate-resilient horticulture and value chain development Disseminate information on progress on gender equity Main project impacts (positive and negative); implementation	Policy Guidance and Approvals: Semiannual meetings of the project (executing) committee to provide direction on project implementation matters. Reviews of periodic progress reports and any special reports. Regular coordination meeting for detail design of construction and civil works, and	From the outset of the project and regularly throughout the project lifetime.	EA (DOH)	Inputs of the ADB

Stakeholder Group	Objective	Function/Interest in Project	Message	Means of Communication	Timelines	Responsibility	Resources
	activities and horticulture development Ensure understanding of project impacts, outcomes, and outputs, and the importance of the theme of inclusive growth	O&M of constructed infrastructure subprojects and civil works	arrangements and schedule of construction and civil works Community collaboration and an inclusive approach are essential to effective project delivery	implementation of project activities. Regular flow and sharing of documentation. Formats and simple chart (s) showing responsibilities for project implementation, flow of funds, flow of activities, monitoring and follow-up. Project website			

Annexure 8: STAKEHOLDER CONSULTATIONS

Field visits by Safeguards experts

Date	Stakeholders	Participants	Key observation and Findings
02 December 2021	Farmer's consultation in PRF cluster at Kalohad, Sundarnagar, Mandi	Farmers from PRF clusters, CHPMA members, Govt. officials (from IPHE), Consultant team from GT	Farmers are motivated and convinced to cultivate horticulture crops; they expect it will change their economic condition; by inclusion of their land within the cluster they are able to keep the stray animal away by implementing solar fencing; existing lift irrigation scheme is in use; issues like resource sharing will be more carefully considered during the planning for new clusters
02 December 2021	Farmer's consultation in FLD clusters at Kuthain and Palhota, Sundarnagar, Mandi	Farmers from FLD clusters, CHPMA members, Govt. officials (from IPHE), Consultant team from GT	Existing farming practice; motivation and willingness for participation in horticulture cultivation; there is existing functional irrigation scheme in Kuthain; development of irrigation scheme will ensure availability of water in the clusters; participation of women in farming; intrusion of monkey, wild boar and peacock are reported from the clusters; few trees felling required for site preparation.
03 December 2021	Stakeholder consultation with Departmental staff in FLD cluster at Rihan, Sadar, Bilaspur	Departmental staff from IPHE, Consultant team from GT	The FLD clusters are proposed in flood plain of the river; the structures constructed by the department has washed of few years back due to flush flood; the approach towards the proposed intake point is through the forest land; the issues such as climate change impact on the proposed clusters, viability of structures, interference through forest land etc will be considered during project preparation.
04 December 2021	Stakeholder consultation with Dept. of Horticulture		Expert team has shared their experience about the field visit; also expressed their views and suggestions regarding environmental, social, climate change and gender aspects of the project; discussed data sharing and finalization of survey format.
06 December 2021	Farmer's consultation in FLD clusters at Ser Delag,	Farmers from FLD clusters, CHPMA members, Govt. officials (from IPHE),	The increase of hailstorm and frost in the region has resulted in high crop loss. The water source for irrigation is river. There

Date	Stakeholders	Participants	Key observation and Findings
	Datti and Chunar cluster at Kunihar, Solan	Consultant team from GT	are past instances of rivulet drying or river changing its course.
07 December 2021	Stakeholder consultation with Dept of Irrigation		Explanation about functional/ non-functional/ new irrigation scheme proposed for the project; discussion source of water (ground water for Una); hydrological and catchment area study requirement; resource partitioning; land holding type for different project activities; contamination and pollution issues during construction and operation phase; probable categorization of the project.
07 December 2021	Stakeholder consultation with CHPMA in-charge		Explain about CHPMA role and importance with respect to the project; approach for resolving different issues; institutional arrangement; gender equality; post harvesting facility; crop insurance etc.
08 February 2022	Farmer's consultation in PRF cluster Matur Tanda, Mandi	Farmers from PRF cluster, CHPMA members, Consultant team from GT	Farmers are managing farming on their land individually, and not collectively. Some farmers have taken up intercropping for additional income during the initial period.
09 February 2022	Farmer's consultation in FLD cluster Upper Beri, Dharampur, Mandi	Farmers from FLD cluster, CHPMA members, Consultant team from GT	The irrigation source is Beas river as well as JSV Irrigation scheme. The cultivated crop is Sweet Orange. There is a good amount of women participation in the farm activities. A portion of the solar fencing was observed to be damaged, due to which there were instances of entry of wild animals.

Summary of stakeholders and issues discussed

Stakeholders	Main topics discussed
Jal Shakti Vibhag (formerly known as DIPH), Department of Forest, Public Works Department	- Goals/objectives DOH wants to achieve with the project - Tentative design of the project components to meet the expectations of the HPSHIVA Project - Strategies to achieve the goals - Monitoring mechanism for the project - Implementation arrangement for the project - Project preparation timeline and the documentation required, such as the environmental and social management plan, the

Stakeholders	Main topics discussed
	stakeholder communication and engagement plan and the compliance with gender requirements of the Asian Development Bank • Feedback mechanism and grievance redressal.
NABARD and FIs	• Consultations on potential synergies and cross-sectoral collaboration on the overlapping issues and the potential inclusion in the project design. • Area of synergy for improved finance to farmers and entrepreneurs / priority sector lending • Extension supports to farmers in accessing finance/credit
Cluster farmers (Male and Female farmers for agriculture, horticulture)	• Project details and possible interventions to improve agriculture/horticulture production, including crops selection • Key impediments to agriculture/horticulture production • Existing markets; price and quality of agriculture inputs and requirements • Input requirements – technical and financial support, access to credit/finance, infrastructure (storage and transport) • Grievance redress mechanism • Stakeholders' opinion about the project
Private Sector	• Inputs to the beneficiaries for horticulture value chain development • Ways to improve product quality and shelf life • Infrastructure requirements – sorting/grading facilities, cold chain

Photos of consultations and site visits



Attendance Sheet of Consultation

(photograph resolution is modified to hide sensitive information)

Hispania Pradesh, Agriculture, Irrigation, Value-Added Project (HPS-VAP)
 Department of Agriculture - Government of Himachal Pradesh
 Preparation of Soil & Water Conservation Documents
 Stakeholder Consultation

Attendance Register

Stakeholder Group: Farmers

of the Cluster/Location: Chandigarh

Date: 15.12.2012

Sr. No.	Name of the participant	Sex	Mobile Number	Signature
1	Satish Kumar	Male	9811102009	[Signature]
2	Harish Kumar	Male	9811102009	[Signature]
3	Harish Kumar	Male	9811102009	[Signature]
4	Harish Kumar	Male	9811102009	[Signature]
5	Harish Kumar	Male	9811102009	[Signature]
6	Harish Kumar	Male	9811102009	[Signature]
7	Harish Kumar	Male	9811102009	[Signature]
8	Harish Kumar	Male	9811102009	[Signature]
9	Harish Kumar	Male	9811102009	[Signature]
10	Harish Kumar	Male	9811102009	[Signature]
11	Harish Kumar	Male	9811102009	[Signature]
12	Harish Kumar	Male	9811102009	[Signature]
13	Harish Kumar	Male	9811102009	[Signature]
14	Harish Kumar	Male	9811102009	[Signature]
15	Harish Kumar	Male	9811102009	[Signature]
16	Harish Kumar	Male	9811102009	[Signature]

Himachal Pradesh Horticulture, Fisheries & Animal Husbandry Department
 Department of Horticulture, Government of Himachal Pradesh
 Project on Socio-Economic Documents
 Beneficiary Registration

Attendance Register

Beneficiary Group: Farmers

Name of the Master/Location: Ch. H.

Date: 1/10/2011

Sl No	Name of the Beneficiary	Sex	Mobile Number	Signature
17	M. K. Saxi	Male	981623045	[Signature]
18	M. K. Saxi		981623045	[Signature]
19	Ram Singh	Male	781031072	[Signature]
20	Sant Ram		94509495	[Signature]
21	M. K. Saxi		981623045	[Signature]
22	Prakash		981623045	[Signature]
23	M. K. Saxi		981623045	[Signature]
24	V. K. Saxi		981623045	[Signature]
25	Ch. Ram		981623045	[Signature]
26	J. K. Saxi		981623045	[Signature]
27	M. K. Saxi		981623045	[Signature]
28	M. K. Saxi		981623045	[Signature]
29	M. K. Saxi		981623045	[Signature]
30	M. K. Saxi	Female	981623045	[Signature]
31	M. K. Saxi		981623045	[Signature]
32	M. K. Saxi	Male	981623045	[Signature]

[Signature]

Climate Resilient Agricultural Production, Irrigation & Assets Addition Project (CRAP/IA)
Ministry of Agriculture, Government of Himachal Pradesh
Preparation of Social Safety Nets for Farmers
State Farmer Consultation

Attendance Register

Cluster/Group: Paiman

Name of the cluster/location: Chatti Date: 02/02/2021

S.N.	Name of the participant	Gender	Mobile Number	Signature
33	Lachhmi Devi	Male	9818145555	G. H. Singh
34	Manoj Kumar	Female	9571055555	G. H. Singh
35	Manoj Kumar	Male	9818145555	G. H. Singh
36	K. H. Singh	Male	9818145555	Kamlesh
37	Kamlesh	Male	9818145555	Kamlesh
38	Kamlesh	Male	9818145555	Kamlesh
39	Kamlesh	Male	9818145555	Kamlesh
40	Kamlesh	Male	9818145555	Kamlesh

Baseline Survey

To ensure a complete geographic coverage, all 28 blocks in the 7 project districts were covered for the baseline survey. A sample of 10 – 15 potential participants per cluster, covering a minimum of 2 clusters in each block whose locations would be provided by the client, were selected at random. A total of 1016 potential participants within the 28 blocks (82 clusters) were surveyed for the baseline study.

District-wise breakup of households covered in Baseline survey

Sr. No.	District	# Blocks	# Clusters	# Households
1	Bilaspur	4	12	145
2	Hamirpur	6	15	221
3	Kangra	7	20	234
4	Mandi	6	20	236
5	Sirmaur	2	6	69
6	Solan	2	6	71
7	Una	1	3	40
TOTAL		28	82	1016

Baseline Survey Form

Himachal Pradesh Subtropical Horticulture, Irrigation & Value assets Addition Project (HPSHIVA)

Department of Horticulture - Himachal Pradesh Preparation of Baseline & Social Safeguard Documents (To be provided by individual farmers)

Cluster Details

S. No.	Details	Response
1.	Name of the District	
2.	Name of the Tehsil / Block	
3.	Name of the Panchayat	
4.	Name of Cluster	

S. No.	Details	Response
Individual Farmer's Details		
1.	Name of the landowner	
2.	Age of the landowner	
3.	Educational qualification of landowner	Up to 10 th 12 th Diploma Graduate Post Grad
4.	Address of the landowner	
5.	Contact no. of the landowner	
6.	Category	General ST SC OBC
7.	Primary occupation of Landowner	Agriculture Other (specify)
Family Details		
1.	Working / Salaried / Pensioner (above 18 years)	Male Female
2.	Non-working (above 18 years)	Male Female
3.	Children (below 18 years)	Male Female
Land Details (Conversion ratio – 1 Ha = 12.5 Bigha)		
1.	Total Land Holding (Ha)	
2.	Land to be included in HPSHIVA (in Ha)	

Irrigation Details			
3.	Irrigation Practice	Yes ☐	No ☐
4.	If yes, what type of practice	Open / Flood ☐	Drip / Sprinkler ☐
5.	If No, Irrigation practice	Rainfall ☐	Tubewell ☐ River ☐
Present Cultivation in the land to be given in the cluster Area			
1.	Type of crop in the land selected for the cluster formation	1) Wheat 2) Gram 3) Mustard 4) Paddy 5) Maize 6) Barren Land 7) Any other please specify (including trees)	
2.	Manuring Practice	Natural Manure ☐	Fertilizers ☐
3.	Pesticides Used	Yes ☐	No ☐
4.	Agri Equipment's used	Yes ☐	No ☐
	(if yes please mention name of equipment's)		
5.	Any major pest infestation observation	Yes ☐	No ☐
	(if yes please mention pest name)		
6.	Any wildlife disturbances	Yes ☐	No ☐
	(if yes, please specify the species name)		
General cultivation practices for the land contributed to the cluster by farmer			
1.	Land to be included in HPSHIVA (in Ha)		
2.	A.	Crop-wise cultivated area – Kharif (in Ha)	
		1) Paddy 2) Maize 3) Any other please specify	
	B.	Crop-wise cultivated area – Rabi (in Ha)	
		1) Wheat 2) Gram 3) Mustard 4) Any other please specify	
	C.	Crop production (in quintals)	1) Wheat 2) Paddy 3) Maize 4) Gram 5) Mustard 6) Any Other

	D.	Crop-wise Input cost (in Rs/Ha)	Wheat	Paddy	Maize	Other 1	Other 2
		Seed					
		Fertilizers					
		Manure					
		Plant Protection					
		Equipment (Tractors/others)					
		Hired Labour					
		Self Labour					
		Any other, please specify					
	E.	Consumption of produce (in quintals)	Self	Animals	Market Surplus		
		1) Wheat					
		2) Paddy					
		3) Maize					
		4) Other 1					
		5) Other 2					
	F.	Yearly cost saving (2021) due to above consumption					
		1) Self (Qty X Wholesale Rate)					
		2) Animals (Qty X Wholesale Rate)					
		3) Sale of cultivated crop in market					
	H.	Name of any other cultivation / by produce (Fodder, Tree, Vegetable, Fruit, etc.)					
		Yearly cost saving (2021) due to consumption of other agri produce					
	I.	Yearly Family Income from other sources of livelihood (in Rs / year)					
		1) Service					
		1) Trading / Business					
		2) Labour (Casual, MNREGA, etc.)					
		3) Pension					
		4) Income from other agricultural land					
		5) Others					

Date:

Signature

Name of farmer

Contact Details

Name of Surveyor:

Sample filled form

Himachal Pradesh Horticultural Industries, Irrigation & Value Addition Project
(HSHIP-3)
Department of Horticulture & Fisheries
Preparation of Policies, Plans & Social Safety Documents
(To be completed by individuals only)

Irrigation Details	
1. Irrigation facilities	Yes ☒ No ☐
2. If yes, what type of practice	Open / Flood ☒ Drip / ☐ Wells ☐
3. No. Irrigation practice	Rainfed ☒ Subwell ☐
Present Cultivation is the land to be given to the beneficiary	
1. Crop grown in the land	1) ☒ Wheat 2) ☐ Gram 3) ☐ Mustard 4) ☐ Sesame 5) ☐ Pigeon 6) ☐ Other Land 7) ☐ Other crops specify: ☐
2. Natural Moisture	Natural Moisture ☐ Rainfed ☒
3. Fertilizer Use	Yes ☒ No ☐
4. Agri Equipment use	Yes ☐ No ☒
(If yes, please specify the name of equipment)	
5. Fuel for irrigation about	Yes ☒ No ☐
(If yes, please specify the name of fuel)	
6. Any other characteristics	Yes ☒ No ☐
(If yes, please specify the name of characteristics)	
General cultivation practices for the land contributed to the beneficiary	
1. Land in the field	1. ☒ SHIVA (in Ha)
2. Crop-wise Outcrop area	2. ☒ Paddy
3. Any other crop	3. ☐ Any other crop
4. Crop cultivated area - Rate (in Ha)	4. ☒ Paddy
5. Crop production	5. ☒ Paddy 2014 6. ☐ Mustard 3400 7. ☐ Gram 8. ☐ Other 9. Any Other

D		Household	Subsistence	Religious	Medical	Other	Other
1	Food						
2	Foodstuffs						
3	Foodstuffs						
4	Foodstuffs						
5	Foodstuffs						
6	Foodstuffs						
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96	Foodstuffs						
97	Foodstuffs						
98	Foodstuffs						
99	Foodstuffs						
100	Foodstuffs						

Consumption of produce (in pounds)

1) Wheat

2) Barley

3) Maize

4) Other

5) Other

6) Other

7) Other

8) Other

9) Other

10) Other

11) Other

12) Other

13) Other

14) Other

15) Other

16) Other

17) Other

18) Other

19) Other

20) Other

21) Other

22) Other

23) Other

24) Other

25) Other

26) Other

27) Other

28) Other

29) Other

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85) Other

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87) Other

88) Other

89) Other

90) Other

91) Other

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94) Other

95) Other

96) Other

97) Other

98) Other

99) Other

100) Other

Date: 9/10/1991

Name: K. D. K. K.

Address: K. D. K. K.

Contact: 9/10/1991

Cluster in charge – Consultation Form

**Himachal Pradesh Subtropical Horticulture, Irrigation & Value assets Addition Project
(HPSHIVA)
Department of Horticulture - Himachal Pradesh
Preparation of Baseline & Social Safeguard Documents**

(To be provided by Cluster In-charge)

Cluster Details

S. No.	Details	Response
1.	Name of Cluster	
2.	Name of the District	
3.	Name of the Block	
4.	Name of the Panchayat	
5.	Coordinates of cluster location	Latitude Longitude

S. No.	Details	Response
1.	Population Detail of the Cluster	
	Total Beneficiaries of the Cluster	Male Female
	Total Area of the cluster (in Hectare)	
2.	Cluster Accessibility	
A	What is the current mode of accessibility to the cluster? (Kacha Road, Puckka Road, by Walk or any other)	
	If the existing accessibility is only via walking. Is any plan to improve the existing accessibility proposed.	Yes No
B	Any common infrastructure within the cluster (Public road, Panchayat Ghar, Dispensary, School etc.)	
	Distance of the nearest common property ¹ from the cluster area. Also specify the type of property (Panchayat Ghar, Dispensary, School etc.)	

¹ (Common property includes School, Gram Panchayat, Community Centre etc.)

3.	Labour Details					
	Are migrant labour employed for horticulture	Yes ☐			No ☐	
	If Yes, provide approximate number (Man Days/year)	Total		Male		Female
	Will the migrant labour be required to stay in the project area?	Yes ☐			No ☐	
	For local labour, what is the number (Man Days/year)	Male		Female		
	What is the number of self labour involved within the cluster? (Man Days/year)	Male		Female		

Date:

Signature

Annexure 9: GUIDANCE ON PREPARATION OF MUCK/ DEBRIS DISPOSAL PLAN

A large quantity of muck is expected to be generated as a result of construction civil work. Muck generated from excavation of any project component is required to be disposed in a planned manner so that it takes a least possible space and is not hazardous to the environment. The disposal of muck has to be scientifically planned by keeping in view no or low interface with any surface water body and or groundwater, and less travel of dumpers to the disposal site. The muck management and disposal plan can be prepared keeping in view the following guiding points:

First quantify the muck expected to be generated during construction based final designs;

Then calculate the amount of muck that can be utilized in project construction work, such as use of stone chips/ rocks for compaction of earth;

The balance to be disposed of away from the site and clear the site for construction;

Till the muck is not transferred to the disposal site, the muck shall be properly compacted (i.e. with the use of a roller), and stored in form of small hills covered with tarpaulin to avoid fugitive dust emissions;

Thereafter, the muck should be either disposed of to the site designated by the local authority and or identify a low-lying area and dispersions and ensure to have taken appropriate permission depending on the owner of the land;

Muck generally lacks nutrients and therefore, are difficult to re-vegetate. Thus, a layer of top-soil can be laid and plant trees of suitable species and soil binding grass and shrubs. Costing of disposal and plantation should be part of contractor's work schedule and payment.

**Annexure 10: FORMAT FOR QUARTERLY REPORT ON TRACKING OF GRIEVANCES
REDRESSAL**

Cumulative Number of grievances received till date	Number of grievances received during the quarter	Nature of grievances	Status of action taken	No. of grievances resolved during the quarter	No. of grievances resolved till date	Cumulative progress

Annexure 11: LIST OF THREATENED PLANT AND ANIMAL SPECIES IN HP

As per Himachal Pradesh State Biodiversity Board.

2 THE GAZETTE OF INDIA : EXTRAORDINARY [PART II—SEC. 3(ii)]	
(1)	(2)
2	संबंधित राज्य जैवविविधता बोर्ड निम्नलिखित अथवा कार्रवाई करेंगे :—
(i)	समग्र जानकारी के लिए, अधिसूचित प्रजातियों के सभी पहलुओं का अध्ययन करना।
(ii)	स्वस्थाने और स्थान बाह्य संरक्षण और पुनःस्थापन के प्रयोजनार्थ, अधिसूचित प्रजातियों का प्रचार; और
(iii)	जागरूकता कार्यक्रम चलाना और वन विभाग के कार्मिकों, जैवविविधता प्रबंधन समितियों, पारिपर्यटन कार्यक्रमों और वनवासियों तथा जनजातियों को अधिसूचित प्रजातियों के संबंध में शैक्षिक सामग्री उपलब्ध कराना।
[फा. सं. 28-12/2008-सी एस-III]	
ए. के. गोयल, संयुक्त सचिव	
MINISTRY OF ENVIRONMENT AND FORESTS	
NOTIFICATION	
New Delhi, the 17th March, 2009	
S.O. 783(E).—In exercise of powers conferred by Section 38 of the Biological Diversity Act, 2002 (18 of 2003), the Central Government in consultation with the Government of Himachal Pradesh, hereby notifies the species of plants and animals which are on the verge of extinction, as listed in column (2) of the Table given below, and prohibit or regulate the collection thereof subject to the conditions specified in the Annexure to this notification, for the State of Himachal Pradesh, namely :—	
Sl. No.	Name of the species
(1)	(2)
Plants	
1.	<i>Aconitum deinorrhizum</i> Stapf
2.	<i>Aconitum heterophyllum</i> Wall. ex Royle
3.	<i>Aconitum violaceum</i> Jacq. Ex Stapf
4.	<i>Eremostachys superba</i> Royle ex Benth
5.	<i>Jasminum parkeri</i> Dunn
6.	<i>Nardostachys grandiflora</i> DC.
7.	<i>Dactylorrhiza hetegiera</i>
8.	<i>Taxus wallichiana</i>
Animals	
9.	<i>Murina grisea</i> Peters, 1872
10.	<i>Cervus duvaucelii</i> (Cuvier, 1823)

(1)	(2)
11.	<i>Capra falconeri</i> (Wagner)
12.	<i>Moschus chrysogaster</i> (Hodgson, 1839)
13.	<i>Gyps bengalensis</i> (Gmelin, 1788)
14.	<i>Gyps tenuirostris</i> Gray, 1844
15.	<i>Sarcogyps calvus</i> (Scopoli, 1786)
16.	<i>Vanellus gregarious</i> (Pallas, 1771)
17.	<i>Cervus elaphus hanguli</i>
18.	<i>Capricornis sumatraensis</i>

ANNEXURE

Condition No.	Conditions
1.	No plant or animal species as notified above shall be collected in live or dead condition by any except, for purposes mentioned below, with the approval of the concerned State Biodiversity Board; and also in accordance with the provisions of the Indian Forest Act, 1927 (16 of 1927) and the Wild Life (Protection) Act, 1972 (53 of 1972) of the relevant State Forest and Wild Life Legislations, namely :—
(a)	Scientific research;
(b)	Herbarium and museum of scientific and academic institutions;
(c)	Propagation; and
(d)	Any other scientific investigation.
2.	The concerned State Biodiversity Board shall initiate or conduct :—
(i)	studies on all aspects of the notified species for holistic understanding;
(ii)	propagation of the notified species for the purpose of <i>in situ</i> and <i>ex situ</i> conservation and rehabilitation; and
(iii)	awareness programmes and provide educational materials on notified species for forest department personnel, Biodiversity Management Committees, ecotourism programmes, and forest dwellers and tribals.

[F. No. 28-12/2008-CS-III]

A. K. GOYAL, Jt. Secy.

Annexure 12: SAMPLE WATER TEST RESULT

WATER TESTING LABORATORY

IPH SUB-DIVISION : NALAGARH DISTRICT : SOLAN

Based Upon BIS : 10500-2012

Lab Ref. No. Date: 07/07/2022

Name and Address of Sender-AE IPH SUB DIVISION, Cluster Dali Under HP Shiva

Name of District Solan Block Nalagarh Sub Division Ramshehar

Gram Panchayat Dali Village Gamber Khad Habitation

Name of Scheme & Source

Date & Time of Collection 02/07/2022; 8:00 am

Date & Time of Receipt at Laboratory 02/07/2022; 11:30 am

Date & Time of Commencing

Type of Sample :- 1. Raw Water 2. Filtered Water 3. Chlorinated 4. Distributed system (Pvt. tap, Public stand post) 5. Hand pump

A	PHYSICAL TEST	1	2	3
Sr. No.	TESTS	Desirable Limit	Permissible Limit	Actual Result
1.	Temperature			°C
2.	Colour	5	15	15
3.	Odour	Agreeable	Agreeable	Agreeable
4.	Taste	Agreeable	Agreeable	Agreeable
5.	Turbidity	1 NTU	5 NTU	30 NTU
6.	TDS/Conductivity	500mg/l	2000mg/l	1535 mg/l
B	CHEMICAL TESTS :-			
7.	pH	6.5	8.5	7.26
8.	Total Alkalinity	200mg/l	600mg/l	248 mg/l
9.	Chlorides	250mg/l	1000mg/l	180 mg/l
10.	Fluoride	1.0mg/l	1.5mg/l	1.0 mg/l
11.	Nitrate	45mg/l	45mg/l	31 mg/l
12.	Sulphate	200mg/l	400mg/l	226 mg/l
13.	Total Hardness	200mg/l	600mg/l	241 mg/l
14.	Iron	0.1mg/l	0.3mg/l	0.1 mg/l
15.	Manganese	0.1mg/l	0.3mg/l	0.1 mg/l
16.	Total Arsenic	0.01mg/l	0.01mg/l	0.01 mg/l
17.	Residual Chlorine	0.2mg/l	1mg/l	0.2 mg/l
C	BACTERIOLOGICAL TEST :-			
18.	Total Coli form	0 MPN	0 MPN	NEL MPN
19.	E.Coli/Thermo-tolerant Coli form	0 MPN	0 MPN	MPN

Remarks : Observations are within given limits

Assistant Chemist Junior Engineer

Water Testing Lab Nalagarh Jal Shakti Sub Division Nalagarh

Assistant Engineer
Jal Shakti Sub Division Nalagarh

WATER TESTING LABORATORY

IPH SUB-DIVISION : NALAGARH

DISTRICT : SOLAN

Based Upon BIS : 10500-2012

Date : 05.07.2022

Lab Ref. No.

Name and Address of Sender-AE IPH SUB DIVISION

Name of District Solan Block Dharampur Sub Division

Gram Panchayat Sai Village Kosari Habitation

Name of Scheme & Source Shiva Project

Date & Time of Collection 01.07.22 : 9:15 am

Date & Time of Receipt at Laboratory 01.07.22 : 9:50 am

Date & Time of Commencing

Type of Sample :- 1. Raw Water 2. Filtered Water 3. Chlorinated 4. Distributed system (Pvt. tap, Public stand post) 5. Hand pump

A	PHYSICAL TEST	1	2	3
Sr. No.	TESTS	Desirable Limit	Permissible Limit	Actual Result
1.	Temperature			°C
2.	Colour	5	15	5
3.	Odour	Agreeable	Agreeable	Agreeable
4.	Taste	Agreeable	Agreeable	Agreeable
5.	Turbidity	1 NTU	5 NTU	2 NTU
6.	TDS/Conductivity	500mg/l	2000mg/l	538 mg/l
B	CHEMICAL TESTS :-			
7.	pH	6.5	8.5	7.24
8.	Total Alkalinity	200mg/l	600mg/l	248 mg/l
9.	Chlorides	250mg/l	1000mg/l	260 mg/l
10.	Fluoride	1.0mg/l	1.5mg/l	1.0 mg/l
11.	Nitrate	45mg/l	45mg/l	36 mg/l
12.	Sulphate	200mg/l	400mg/l	224 mg/l
13.	Total Hardness	200mg/l	600mg/l	233 mg/l
14.	Iron	0.1mg/l	0.3mg/l	0.1 mg/l
15.	Manganese	0.1mg/l	0.3mg/l	0.1 mg/l
16.	Total Arsenic	0.01mg/l	0.01mg/l	0.01 mg/l
17.	Residual Chlorine	0.2mg/l	1mg/l	0.2 mg/l
C	BACTERIOLOGICAL TEST :-			
18.	Total Coli form	0 MPN	0 MPN	NIL MPN
19.	E.Coli/Thermo-tolerant Coli form	0 MPN	0 MPN	MPN

Remarks :

Observations are within given Limit

Assistant Chemist
Water Testing Lab Nalagarh

Junior Engineer
IPH Section Nalagarh
JSV

Assistant Engineer
Jal Shakti Sub Division
IPH Sub Division Nalagarh
Nalagarh



TC-8373

**HIMACHAL PRADESH
WATER TESTING LABORATORY
JAL SHAKTI VIBHAG, NAHAN**

TEST REPORT

Sample No.: 1214

Date: 13/7/22

Test Report No.: DWTL-NAHAN-2021-1214

Name & Address of Customer: sub. divi. dadahu

Sampling Method: N/A

Sample Description: Water

Sample Quantity: 1 liter

Collected on: 11/7/22

Test Start Date: 11/7/22

Test End Date: 13/7/22

Condition of Sample When received: OK

Name of Source/Scheme: Jalal River Sample for Shiva, Praje

Name of Panchayat: Dadahu

Name of Village: Dadahu

Name of Habitation: dadahu / Kheri chengan

Type of Source: Jalal River

Sr. No.	Test	Test Method	Result	Requirement As per IS 10500:2012	
				Acceptable Limit	Permissible limit in the absence of alternate source
Physical Parameters					
1	Turbidity, NTU, Max	IS 3025 (Part 10) : 1984	4.6 NTU	1 NTU	5 NTU
2	Colour, Hazen units, Max	APHA 23 rd Edition 2017, 2120-Method B (Visual Comparison Method)	BDL (DL-5)	5	15
3	Odour	IS 3025 (Part 5) : 2018	Agreeable	Agreeable	Agreeable
4	Taste	IS 3025 (Part 7 & 8) : 2017	Agreeable	Agreeable	Agreeable
5	pH value	APHA 23 rd Edition 2017, 4500-H ⁺ Method B (Electrometric Method)	7.5	6.5-8.5	No relaxation
6	Total Dissolved Solids mg/l, Max	APHA 23 rd Edition 2017, 2540-C (Total Dissolved Solids Dried at 180° C)	271 mg/l	500 mg/l	2000 mg/l
Chemical Parameters					
7	Total Alkalinity (as CaCO ₃), mg/l, Max	IS 3025 (Part 23) : 1986	152 mg/l	200 mg/l	600 mg/l
8	Chloride (as Cl), mg/l, Max	IS 3025 (Part 32) : 1988 (Argenometric Method)	25.5 mg/l	250 mg/l	1000 mg/l
9	Total Hardness (as CaCO ₃), mg/l, Max	IS 3025 (Part 21) : 2009	256 mg/l	200 mg/l	600 mg/l
10	Calcium (as Ca), mg/l, Max	APHA 23 rd Edition 2017, 3500- Ca Method B (EDTA Titrimetric Method)	59.3 mg/l	75 mg/l	200 mg/l
11	Magnesium (as Mg), mg/l, Max	APHA 23 rd Edition 2017, 3500 Mg-B (Calculation Method)	26.2 mg/l	30 mg/l	100 mg/l

Remarks (if any): BDL: Below Detection Limit; DL = Detection Limit

Note :

- This report should not be produced partly or full without approval of signatory authority for legal purpose.
- The results refer only to tested samples and parameters tested.
- Samples will be stored for a period of 7 days from the date of issue of report.

Tested By
Water Testing Laboratory, Nahani

Authorized Signatory
SUMIT GOYAL
Water Testing Laboratory, Nahani

Annexure 13: SAMPLE EMR TEMPLATE

A. Introduction

1. Overall Project Description and Components
2. Location of the Project or Packages (note: use maps and pictures as visual aids)
3. Environmental Category (note: discuss categorization based on ADB SPS and national law)
4. Project Implementation Progress (note: summary of activities and construction progress and main civil works during reporting period; use photographs)

B. Institutional Arrangement for Environmental Safeguards

1. Institutional Arrangement (note: description of the project institutional arrangement as a whole)
2. Environmental Safeguard Staff/Personnel (note: briefly discuss staff, institution and roles)

Table X. Staff Involved with Environmental Safeguards

Name	Designation/Office	Key Environmental Safeguards Role/s	Email address
PMU			
PIU			

C. Statutory Environmental Requirements

1. Government Policy Compliance (note: discuss status of clearance/s, permit/s, etc. and compliance of the project; include all permits and clearances as appendices)
2. Compliance Issues (note: indicate any non-compliance on national/state and reason of non-compliance)

Table X. National/state/local environmental statutory environmental requirements

Statutory Environmental Requirements ³⁰	Title of National/State Policy	Issuing Office	Civil work/Package number that are compliant

³⁰ Specify statutory requirements: environmental clearance, consent to establish and/or operate, forest clearance, workers/Labor permit and license, etc.

D. Loan Covenant

Table X. Compliance Status of Environmental Provisions of the Loan Covenant

Clause	Description	Status of Compliance	Remarks
Schedule 4 para. 7	Environment. The borrower shall ensure, or cause the EA to ensure, that the preparation, ...		

E. Scope of work/Package Descriptions

1. Describe the general/key scope of works of all the contract packages.
2. Status of Construction per package

F. Environmental Management Plan

1. Implementation of Construction Environmental Management Plans (CEMPs).
2. CEMP implementation issues

G. Information Disclosure and Consultations (note: this section is only applicable if any consultations are performed during reporting period; if so, provide any information on consultations conducted during reporting period such dates and locations, topics discussed, type of consultation and issues/concerns raised; attach attendance sheet, and photos.)

H. Grievance Redress Mechanism (GRM)

1. GRM Information (note: show framework, members and access to GRM)
2. Grievances Received (if any)
3. Status of Current Grievances (if any)

I. Conclusion

1. Overall Progress of Implementation of Environmental Management Measures
2. Unanticipated Environmental Risks and Impacts (note: Section is only applicable if there are unanticipated environmental impacts and/or risks)

J. Annexes (as appropriate)

1. Sample CEMPs by contractors
2. Available Permits or clearances from the government
3. Photographs relevant with CEMP implementation.