

EXECUTIVE SUMMARY

ES 1. Introduction

Horti-Revanasiddeshwara Lift Irrigation Scheme (HRLIS) is proposed to irrigate an area of 49,730 Ha by lifting 5.763 TMC of water from Krishna River near Korthi-Kolhar Village of Basavana Bagewadi Taluk, Vijayapura district to benefit 56 villages of Indi, Nagathan and Bableshwara Taluks of Vijayapura district. The proposed take off point is along the Krishna River on the foreshore of Almatti reservoir.

The project is being implementing in the drought prone areas and the left out areas of UKP Stage-I and II project. There is about 65,000 Ha of Gross Command Area is left out in Indi taluka beyond Tidagundi branch canal and of Mulwad LIS and Indi branch canal. The area receives scanty rainfall and frequently affected by drought. In view of this, there is a representation from the local formers and MLAs of the area to plan a separate scheme to cover this area by proposing a project to lift water from Almatti Reservoir.

ES 2. Project Description

Horti-Revanasiddeshwara Lift Irrigation Scheme (HRLIS) is proposed to irrigate an area of 49,730 Ha by lifting 5.763 TMC of water from Krishna River near Korthi-Kolhar Village of Basavana Bagewadi Taluk, Vijayapura district to benefit 56 villages of Indi, Nagathan and Bableshwara Taluks of Vijayapura district.

The proposed project requires a total of 140 Ha of land and neither involves submergence nor Rehabilitation and Resettlement. Further, there are no Ecologically Sensitive Areas, National Parks, Wildlife Sanctuaries in the command area and no forest land is required to implement the scheme. The total cost of the project is 2639.60 Crores.

Table ES 1: Salient Features of the project

Name of the project	Horti-Revanasiddehwara Lift Irrigation Scheme
Type of project	Irrigation
Type of Irrigation	Piped Irrigation
River	Krishna
Location of Lift Point	Latitude 16°25'60"N,Longitude 75°41'12"E
Water Utilization	5.763 TMC
Command Area	49,730 Ha
Villages Benefitted	56 villages of Vijayapura District
Cost of the Project	2639.60 Crores
Land required for Project	140 Ha.
Forest Land requirement	Nil
Submergence	Nil

R & R	Nil
Power requirement	About 72 MVA, Source: existing Basavana Bagewadi 220 KV KPTCL substation
B.C Ratio	1.04
Irrigation intensity	100%
Government order	Awaiting

ES 2.1 Water availability

As per the deliberations held in the 4th Meeting of the Reconstituted Committee for preparation of Comprehensive Master Plan for Krishna Basin held on 30-3-2016, wherein it was assessed that the savings in UKP Stages I, II, III consequent to adoption of 100% cropping intensity and, it was recommended and proposed by the Master Plan Committee to provide micro irrigation system for 35494.00 Ha command area with 3.73 TMC of water under Tidagundi Branch Canal and this water of 3.73 TMC is utilizing to irrigate 28,000 Ha command area under Horti Revanasiddeshwara LIS.

Proposed Horti Revanasiddeshwara Lift Irrigation Scheme pump is located in the foreshore of Almatti Reservoir. The annual inflow between Almatti and Narayanpur from 1961-62 to 2013-14 have been worked out by WRDO considering to existing utilizations as per KWDT – II Final award of 19th October, 2016.

ES 2.2 Command area of the project

Sl. No	District	Taluk	Villages benefitted
1	Vijayapura	Vijayapura/ Nagathan and Babaleshwara (No of Villages: 11)	Toravi, Atalatti, Khatijapur, Jumanal, Jumanal station, Chandapur, Hitnalli, Savanalli, Honaganahalli, Dadamatti, Sarawad.
2		Indi and Nagathan (No of Villages :45)	Konkanagaon, Jeerankalagi, Devaranimbaragi, Kanchanal, Loni B.K , Elagi, Manakalagi, Gotyal, Arjanal, Jevoor, Zalaki, Mailar, Ballolli, Rampur, Bhairunagi, Shiganapur, Satyal, V. Budihal, Gundawan, Anjutagi, Choragi, Kudagi, Katral, Jigajivanagi, Lamanihatti, Kanakanal, Inchageri, Mahaveer nagar, Koluragi, Horti, Vittal Nagar, Sonakanahalli, Satalagaon P.B, Hanuman Nagar, Deginal, Nimbal, Nimbal B.K, Babalad, Nandaragi, Halagunaki, Dumakanal, Hadalasang, Guddadavasti, Kapanimbaragi, Savalasang.

ES 2.3 Land Requirement

The proposed project involves Piped Irrigation Network (PIN) which requires 140 Ha of land for construction of Intake Canal, Jackwell cum pump house, rising main, Delivery Chamber-1 and Delivery Chamber-2 and the land will be acquired

as per the Right to Fair Compensation and Transparency in Land Acquisition Act, 2014.

ES 2.4 Existing cropping pattern details

The present agriculture practices are tuned to rainfall; as such Kharif, Rabi and bi-seasonal crops. The estimated percentage area of these crops and their corresponding yields are given below;

Table ES 2: Existing cropping pattern in the command area

No.	Crop Details	Percentage area	Yield/ha in Quintals
I	Kharif Crops		
1.	Jowar	12.00	20
2.	Ground nut	12.00	15
3.	Maize	5.00	20
4.	Bajra	12.00	20
5.	Pulses	10.00	9
6.	Other Oil Seeds	6.00	9
II	Rabi Crops		
1.	Wheat	3.20	15
2.	Jowar	28.80	22
III	Bi-seasonals		
1	Cotton	5.00	15
IV	Other Crops like: Tobacco, Potato, Onion, Fruits, etc.	6.00	7.5

ES 2.5 Proposed cropping pattern details

It is proposed to adopt cropping pattern as adopted in Upper Krishna Project, Stage-III with cropping Intensity of 100% i.e. Khariff-65% and Rabi-35%. The details of the crops and cropping pattern adopted are as under:

Table ES 3: Proposed cropping pattern in the command area

Season	Crop	Percent	Area (Ha)
Kharif	Maize (Hy Br)	15	7459.5
	Jowar	15	7459.5
	Ground Nut	20	9946
	Sun Flower	10	4973
	Pulses	5	2486.5
	SubTotal	65	32324.5
Rabi	Local Jowar	10	4973
	Saf flower	5	2486.5
	Gram	5	2486.5
	Sun Flower	5	2486.5
	Wheat	5	2486.5
	Ground Nut	5	2486.5
	Sub Total	35	17405.5
	Total	100	49730.0

ES 3. Description of baseline environment

In order to assess the baseline environmental status, command area, 10 Km radius from the main project components were considered and the data was collected during the period of Pre-monsoon (December 2020 to February, 2021) season. In addition to the baseline environmental monitoring, field inspection in the study area, collection of secondary information for all the environmental components and discussions with the officials and local public were conducted by the experts to establish realistic information on the area w.r.t the project.

ES 3.1 Physical Environment

ES 3.1.1 Ambient Air quality

Ambient Air Quality Monitoring was carried out at 4 locations for assessment of the existing status of air environment within the study area. The minimum and maximum level of Particulate Matter $<2.5\mu$ and $<10\mu$ recorded within the study area were in the range of 19.25 to 25.88 $\mu\text{g}/\text{m}^3$ and 56.25 to 72.13 $\mu\text{g}/\text{m}^3$ respectively. The minimum and maximum level of SO_2 and NO_x recorded within the study area was in the range of 3.90 $\mu\text{g}/\text{m}^3$ to 5.45 $\mu\text{g}/\text{m}^3$ and 13.35 $\mu\text{g}/\text{m}^3$ to 17.75 $\mu\text{g}/\text{m}^3$ respectively. As per Air Quality Index, Good and satisfactory ambient air quality can be observed in the study area.

ES 3.1.2 Ambient Noise levels

Ambient Noise Level Monitoring was carried out at 4 locations. The noise level was found to be ranging between 46.31 dB(A) to 53.28 dB(A) during day time and 34.06 dB(A) to 44.17 dB(A) during the night time. The results at all the locations were found to be within the prescribed standards by CPCB.

ES 3.1.3 Surface Water

Surface water sampling was carried out at 4 locations and the results shows that the pH ranges from 8.25 to 8.36, DO- 4.30 mg/L to 4.90 mg/L, BOD- 3.50 mg/L to 9.00 mg/L, EC- 1069 $\mu\text{S cm}^{-1}$ to 1304 $\mu\text{S cm}^{-1}$, TDS- 694.00 mg/L to 843.00 mg/L, Alkalinity- 168.00 mg/L to 212.00 mg/L, TH- 260.00 mg/L to 320.00 mg/L, Calcium- 60.00 mg/L to 76.00 mg/L, Fluoride- 0.34 mg/L to 0.42 mg/L, Chloride- 68.21 mg/L to 131.17 mg/L, Total coliform - 110 MPN/100 ml to 210 MPN/100 ml, E. coli - 14 MPN/100 ml to 38 MPN/100 ml. Water quality criteria of CPCB shows that, all the samples belong criteria 'E'. Therefore, all the water from the above locations is suitable for irrigation purposes.

ES 3.1.4 Ground Water

Ground water sampling was carried out at 7 locations and results shows that the pH ranges from 7.33 to 8.48, Temperature- 23.8- 26.8 $^{\circ}\text{C}$, EC- 1299 to 5.51 $\mu\text{S}/\text{cm}$, Total Dissolved Solids- 839 mg/L to 3289 mg/L, Total Alkalinity- 160 mg/L to 292 mg/L, TH- 380 mg/L to 1980 mg/L, Calcium-80 mg/L to 500mg/L, Bicarbonates- 128 mg/L to 292 mg/L, Fluoride- 0.45 mg/L to 0.92 mg/L and Chloride- 31.48 mg/L to 577.12 mg/L. All the values are well within the standards (IS 10500:12 second Revision).

ES 3.1.5 Soil characteristics

The soil samples were collected from 15 locations and type of soils is mostly deep black soil & shallow black soil. The results of physico-chemical analysis of the soil samples shows that the soil pH values range between 7.7 and 8.76 and most of the values belong to soil reaction index II and III, which shows that the

soils of the study area are under the neutral range to Alkaline. The electrical conductivity of the soil samples was observed to be in the range between 218.9 to 742 $\mu\text{s}/\text{cm}$. Based on the rating chart of soil tests, all the soil samples belong to normal i.e., salt index I, whereas organic carbon content of soil samples were observed to range from 0.23 to 1.41%. As per the nutrient index, the organic carbon in soil samples was at high level in the study area. Similarly, the available phosphorus values are in high range.

ES 3.1.6 Land use assessment

Land use land cover of the study area of 1068.49 Sq.Km indicates that, the area is predominantly covered with Fallow land (67.78%) followed by crop land (25.45%) and Built up area (4.15%). Water bodies comprises of (1.59%).

Table ES 4: Land use / land cover classification in the study area

Sl.No.	Classes	Area in Sq. Km.	Area in Percentage
1	Cropland	271.92	25.45
2	Current Fallow	724.22	67.78
3	Water body	17.02	1.59
4	Scrubland	9.26	0.87
5	Built-up	44.34	4.15
6	Barren Rock	1.04	0.1
7	Mining area	0.69	0.06
Total		1068.49	100.0

ES 3.2 Biological Environment

A total of 12 trees species (n=159) belonging to 8 families were found in Project area, the predominant tree species recorded are *Azadirachta indica* A. Juss. (n=51) and *Cocos nucifera* L. (n=27). As per the IUCN conservation status 2021, *Santalum album* Linn. is Vulnerable to the region and rest of the species were belongs to Least concern category. All the recorded species are common to region and no RET species were recorded. Further, a total of 48 avifaunal species (n=1157) with the predominant ones being River Tern, Little Egret, Blue-winged Parakeet and White-necked Stork. As per Wildlife (Protection) Act 1972, Brahminy Kite and Indian Peafowl belongs to Schedule I category. Similarly, Oriental garden lizard, Indian crested porcupine, Indian grey Mongoose, and Indian Palm Squirrel were recorded in the project area.

Similarly, a total Number of 16 trees species (n=201) belonging to 10 families were found in Command area, the predominant tree species recorded are *Azadirachta indica* A. Juss. (n=92) followed by *Vachellia nilotica* (L.) P.J.H. Hurter & Mabb (n=25) and *Leucaena leucocephala* C.E. Hughes (n=24). All the recorded species are common to region and no RET species were recorded. A total of 50 avifaunal species (n=657) were recorded at the command area with predominant species namely House Swift, Red-whiskered Bulbul, Jungle Babbler, Little Green Bee-eater, little egret and Laughing Dove. As per Wildlife (Protection) Act 1972, Black Kite, Brahminy Kite, Indian Peafowl, Oriental Honey buzzard and Shikra were Schedule-I species recorded in Command area.

The study area belongs to Northern Dry Zone representing the dry climate with scanty rainfall. Rolli Reserve Forest found within the command area (6.61 km) and no Ecologically Sensitive Areas are found in the study area.

ES 3.3 Socio-economic Environment

The total land required for the construction of the proposed project components is 140 Ha and the project does not involve any R&R activities. A micro level assessment of the socio-economic environment obtaining in the Project Impact Area (comprising villages and habitations within 10 km radius from the proposed project site) was made through field surveys of 60 households were selected randomly across 7 villages with in the study area, for Household and Focus Group Discussion survey methods. The focus of micro level assessment was on understanding the socio-economic conditions of the households in terms of family size, livelihoods pursued, income and expenditure patterns, housing conditions, education and health status. In addition, impression was perceived both positive and negative impacts of the proposed project was gathered during household surveys and in-depth discussions with key informants.

During the Household and Focus Group Discussion surveys, it was revealed that nearly 90% of the respondents were aware of the proposed lift irrigation project and feels that the project is necessary to fulfill Irrigation needs. Irrigation projects are necessary to uplift standard of living of the people, revives economies and alleviate poverty. The proposed project increasing agricultural jobs, Rain fed lands have been converted into irrigated/wet lands. With rising literacy levels and awareness about growing opportunities, the youth in the area are focused more on non-farm sector and service sector employment. There are however apprehensions about the negative impacts of land acquisition for the proposed project. The perceptions of the respondents in surrounding areas are summarized as follows:

- The groundwater resources in the command area may increase.
- Development of the secondary sector in the area has positively contributed to induced development leading to creation of multiplier self and wage employment opportunities.
- It would help further strengthen infrastructure development in the area.
- Expected high agricultural crop yields and change in existing cropping pattern.
- It may help to increase animal husbandry activities in the command area of the project.
- Famers are requesting concerned authorities to complete the project as soon as possible.
- For greenery purpose questions were raised to respondents and they have mentioned Mango, Neem, Pongamia and other fruit trees would be very use for their region.

ES 4. Anticipated Environmental Impacts and Mitigation measures

Sl. No.	Environmental attribute	Activity	Impact	Mitigation Measures
1	Air Pollution	Site preparation, construction activities, transportation of raw materials, earth work, DG operation etc.	<ul style="list-style-type: none"> Emission of dust due to site clearance & excavation activities and exhaust gases due to use of heavy vehicles & machinery and unloading construction materials etc. Operation of hot mix plants and DG sets leads to the gaseous emission of high levels. Gaseous emissions from vehicular movements carrying construction materials Dust emissions may cause reduction in growth rate, deposition of dust on leaves, photosynthetic activity, necrosis, leaf curling, abscission, etc. in the plants. Continuous exposure to dust emissions may cause respiratory disorders, eye irritation, cough, chest pain, infections, etc. in human. The typical day Air Quality model output reveals that the predicted GLC for Particulate matter of maximum concentration will be 14.54 	<ul style="list-style-type: none"> Water Sprinkling will be carried out thrice a day during non-monsoon season to avoid fugitive dust emissions. In order to avoid fugitive emissions, vehicles delivering loose and fine materials like sand and fine aggregates will be covered by tarpaulin sheets to reduce spills on roads and speed will be restricted to 15-20kmph within construction zone. Periodic maintenance of all vehicles, equipments and machineries used for construction shall be done to ensure that the emissions levels are as per norms of CPCB. DG sets will be engaged in the construction site will comply as per the CPCB guidelines and equipped with suitable stack height. As per KSPCB Guidelines, the hot-mix plants with dust extraction unit will be installed in downwind direction from nearby settlement and located at least 500 m from the nearest habitation. Monthly Ambient Air Quality Monitoring as part of EMoP will be carried out to assess the pollution load during construction phase.

Sl. No.	Environmental attribute	Activity	Impact	Mitigation Measures
			$\mu\text{g}/\text{m}^3$ (without mitigation measures) $0.95 \mu\text{g}/\text{m}^3$ (with mitigation measures).	<ul style="list-style-type: none"> Green Mesh will be used to cover debris where ever excavated muck is dumped & demolition activities are carried, to suppress fugitive dust emission. Use of Personal Protective Equipment's (PPE) for all the labor.
2	Noise Pollution	Concrete Batch Plant, movement of construction Machinery, movement of vehicles for unloading of construction materials etc.	<ul style="list-style-type: none"> Construction activities are expected to produce noise levels in the range of 80 – 95 dB (A). Noise generation will be due to pump houses and DG sets during operation which affects the health on working and residing population. 	<ul style="list-style-type: none"> Selection of low noise generating machinery/equipment and provided with proper sound proof enclosures. Provision of protective devices like ear muff/ plugs to the workers and construction activity will be limited to day time only. The high noise zones at site will be demarcated and provided with enclosures & barriers. Provision of insulating caps and enclosures will be provided at the exit of noise source on the machinery. Construction equipment generating minimum noise and vibration will be chosen Speed limit for vehicles carrying construction materials will be maintained within 15-20 kmph. D.G. Sets with acoustic enclosures complying to Environment (Protection) Rules will be provided.
3	Water Pollution	Improper disposal	<ul style="list-style-type: none"> Impact on ground water 	<ul style="list-style-type: none"> For the construction worker's

Sl. No.	Environmental attribute	Activity	Impact	Mitigation Measures
		and management of earth work, debris, sewage from labour camps, waste disposal activities,	<p>(through leachate) and sub-surface soil quality during construction phase will be mainly due to sewage generation from labor camp.</p> <ul style="list-style-type: none"> • Improper collection, handling & disposal of solid wastes from labour camps which also creates unhygienic conditions. • Stagnated water in construction sites will result in creation of mosquitoes breeding sites thereby affecting human health. • Further, untreated sewage creates eutrophication in the reservoir. • Construction of Intake canal, jack well cum pump house and Muck disposal into the river water and washing of equipments leads to increase in turbidity of the water. 	<p>temporary sanitation facility will be created for the disposal of sewage generated. Mobile Sewage Treatment Plant will be installed and the treated water will be reused for Sprinkling activities.</p> <ul style="list-style-type: none"> • Waste water generated during construction activities shall be collected in a slump with impervious lining to avoid seepage of wastewater in groundwater. • Temporary drainage arrangements will be undertaken around construction spots to avoid stagnation of water. • Solid wastes from the labour camps will be segregated into organic & inorganic wastes through different coloured bins located at different places within the camps and will be disposed to authorized scrap dealer's/waste recyclers. • The muck and other waste will not be dumped on/near the river bank and machines will not be washed near river thereby avoiding entry into the reservoir.
4	Hydrology and Geology	Construction activities	<ul style="list-style-type: none"> • Impact on Geology due to top soil excavation, Blasting of Rock if any in the foundation pits pertaining to 	<ul style="list-style-type: none"> • The collapse can be avoided by formation of benches of 1.5 m to 3.0 m height for working conveniently and making access to sub surface levels for pit formation.

Sl. No.	Environmental attribute	Activity	Impact	Mitigation Measures
			<p>Infrastructure Building.</p> <ul style="list-style-type: none"> • Collapse of blasted portion of rock and fly rock due to blasting anticipated. • Providing irrigation facilities to the 49,730 ha of the command area of Vijayapura and Indi Taluks enhances the ground water table of the region. 	<ul style="list-style-type: none"> • As the underlying rock Grey & Pink Granite which is massive and hard it requires blasting and fly rock is inevitable for which controlled blasting by deploying time delay detonators, placing of moist clay bags. Provision of earplugs and goggles to workmen is suggested. • Catchment area treatment will be planned to enhance the ground water levels and to increase the surface flow.
5	Soil Quality	Land acquisition, removal of vegetation, construction activities, improper storage of muck, labour camps.	<ul style="list-style-type: none"> • Temporary loss of soil will be envisaged during the construction phase near construction site, temporary offices, worker's camps, stockyards, borrow areas, etc. • Compaction of soil will occur, particularly on haul roads during site clearance due to movement of heavy machinery and vehicles and during setting up of construction camps and stockyards. • Contamination of soil will take place due to maintenance of machinery, operation of DG sets, oil spills from the operation of mechanical 	<ul style="list-style-type: none"> • Non agriculture land will be chosen for construction of labor camps. • All the existing roads will be upgraded to avoid creation of haul roads. • Maintenance works will be undertaken at the designated construction yards with leak proof polythene as floor material to avoid spillage of oil and any other contamination of soil. • The piped irrigation is providing for command area which will not create soil salinity.

Sl. No.	Environmental attribute	Activity	Impact	Mitigation Measures
			works, etc., <ul style="list-style-type: none"> Over usage of water for crops leads to salinity of the soil. 	
6	Solid & Hazardous Waste	Improper storage and management of earth works, sewage and solid waste from labor camps,	<ul style="list-style-type: none"> Construction activities generate wastes such as; excavated earthworks, construction waste, and municipal wastes etc. which causes unaesthetic conditions leading to health problems. Improper disposal of sewage (7.5 KLD) and solid wastes (45 Kg/day) from labor camps area leads to the formation of leachate thereby causing soil pollution, surface and ground water pollution. Indiscriminate plastic waste disposal on land makes the land infertile due to its impervious nature. Used oils generated from DG sets affects soil and aquatic biota upon entry into soil and water environment. Unused iron and welding electrodes (5% of total steel requirement) is expecting during construction activities. Improper handling of these affects surface water quality 	<ul style="list-style-type: none"> Solid and hazardous wastes generated will be stored in the leak proof bins. Scientific segregation of solid waste at site and regular disposal to authorized landfills in Vijayapura and Indi Taluks. Storage area of 10 x 10 m will be covered with zinc sheets and the ground will be covered with impervious layer to avoid leachate run off. Plastic waste will be segregated at source and handed over to KSPCB authorized recyclers. Mobile STPs are used to treat the sewage generated from labor camps and solid waste generated shall be segregated, stored in separate bins and disposed off to KSPCB authorized disposal sites. The leftovers of welding electrodes and iron components will be handed over to the nearby engineering works centre so as to remould and reuse them for making other iron works.

Sl. No.	Environmental attribute	Activity	Impact	Mitigation Measures
			and aquatic life.	
7	Land Use	Construction activities	<ul style="list-style-type: none"> The change of land use land cover/topography in the command area is comparatively very less due to its Piped Network project and the maximum project components are constructed below ground level with less construction area. The only above ground structure is Jack well cum Pump house and hence no impact. 	--
8	Ecology and Biodiversity	Construction activities, movement of vehicles	<ul style="list-style-type: none"> Deposition of dust due to construction activities will affect the photosynthetic activities of the vegetation. Construction activities and movement of vehicles creates noise which may affect the behavior of faunal species in the region. The project requires about 140 Ha of land for the construction of project components which also falls in the agricultural land which leads to loss of habitat and affects the behavioral activities of the faunal species 	<ul style="list-style-type: none"> Regular sprinkling of water alongside of construction activity is necessary to avoid dust deposition on the vegetation. Construction activities and vehicular movements will be restricted in day time to minimize the disturbance to the faunal and avi-faunal species resident to the area Agroforestry activities will be done in the command area to enhance the greenery in the region thereby providing the habitat for the faunal and avifaunal species. Awareness programmes and conservation plan for schedule I species will be implemented so as to

Sl. No.	Environmental attribute	Activity	Impact	Mitigation Measures
			<p>adapted to these agricultural lands.</p> <ul style="list-style-type: none"> The excavated earth, much boulders etc., as a routine practice in such locations, is likely to be dumped in close-by area, which may affect the aquatic life – fish species in particular, which migrate to their feeding and breeding formalities. 	<p>avoid injuring animals, hunting and poaching activities during construction activities.</p> <ul style="list-style-type: none"> Proper care will be taken while construction near river bed through utilization of mesh to avoid dust deposition in surface water body In order to prevent the sliding-back of earth, mucks, rocks, etc. into the reservoir area, the generated product are to be safely stacked away from the site at the earliest.
9	Social	Land acquisition	<ul style="list-style-type: none"> Project requires acquisition of 140 Ha of land. Livelihood may be affected due to land loss. Improvements in the annual incomes of about 10% p.a in the surrounding areas. The lifestyles changes are expected due to availability of good water source. 	<ul style="list-style-type: none"> Compensation will provide as per 2013 Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act. Creation of employment opportunities for skilled & semi-skilled workers a total 100 nos. during construction and operation phase.

ES 5. Environmental Monitoring Programme

Environmental Monitoring Programme will be carried out during both construction phase (2 years) and Operation phase (3 years) which involves Ambient Air Quality Monitoring, Ambient Noise Level Monitoring, Soil Quality Analysis, Surface Water Quality Analysis, Ground Water Quality Analysis, Aquatic life studies and periodic Health check-ups for labors as per the CPCB guidelines through MoEF&CC recognized laboratories under the supervision of KBJNL. Rs. 44,28,120/- was estimated for environmental monitoring during construction phase and Rs. 31,91,760/- is estimated for operation phase of the project. Other activities includes, monitoring of green belt/tree plantation, labor camps, land acquisition, etc.

KBJNL will convene a meeting quarterly once in a year and review the progress of environmental and social mitigation measures including management plans. KBJNL will also review the compliance conditions of various statutory clearances and public grievances. Accordingly, six monthly compliance reports to EC conditions and also to other clearance conditions will be prepared and submitted to Regional Office, MOEF&CC, Bangalore and also to Regional Office, KSPCB on 01 June and 01 December of every calendar year without fail for monitoring of EC conditions.

ES 6. Risk and Hazard studies

This section involves studying the risk and hazards associated with the various aspects of the proposed project such as excavation, accidental falls, occupational hazards, vehicular transportation of chemicals and hazardous materials, blasting, floods etc. during its construction and operation phase.

ES 6.1 Risks and hazards during construction phase

- Flooding due to heavy inflow of water
- Epidemics/ Communicable diseases due to water contamination, by pests, insects, rodents etc. in the construction camp. Animal/snake bites.
- Fires due to Short circuit.
- Leakage of Diesel fuel and flammable chemicals– fire hazard
- Fall from height
- Trench collapse
- Landslides during excavation.

ES 6.2 Mitigation measures to be adopted during construction phase

- Major constructions near the flood prone area i.e. near the reservoir shall be carried out in dry season, Weather forecasting shall be referred before starting the civil and other activities. Storm water drain network shall be maintained
- Drinking water facility shall be made in the camp site. Disinfestation activity will be carried out periodically in the camp site to prevent the entry of pests, insects, rodents etc.
- Permit to work system, deployment of trained and authorized person for the work shall be followed.

- Secondary containment shall be provided in diesel storage area, Sand buckets and spill kit materials such as absorbent rolls shall be provided. Access to the area is provided only to authorized person, Area shall be restricted to carry flammable items
- Lifeline support, height work permit, safety nets. personnel protective equipments
- Ground survey to identify ground conditions in advance of construction works. Benching or battering shall be done, Trench sheets shall be placed on both sides to prevent collapsing
- Excavation work permit will be followed with the measures of installation of ground

ES 6.3 Risks and hazards during operation phase

- Operation of LT and HT power panels.
- Fall from height in pump stations, Jackwell areas.
- Fire in Transformer station and power control room and on site spill of fuel or chemicals used for preventive maintenance.
- Water hammer from the main pipeline after stopping the pumps.
- Noise hazard in pump operation area.

ES 6.4 Mitigation measures to be adopted during operation phase

- Trained person shall be deployed. Presence of electrical safety measures like rubber mats, electrical safety gloves shall be ensured. Approved tools and equipments shall be used to carry out the preventive maintenance of power panels.
- Adequate barricades and use of fall protection measures such as lifeline, harness shall be ensured.
- Periodic preventive maintenance shall be done by trained electricians. Ensure cabling connections are proper and intact. Firefighting equipment shall be provided.
- Surge tanks shall be considered in pipeline design at high points with non-return valves to fill the pipe when under vacuum.
- Use of hearing protection devices shall be ensured, Periodic noise monitoring activity shall be carried out. Medical examination shall be done periodically to the personnel

ES 7. Project benefits

Ecological benefits:

- Irrigation facility to the command area will upright the growth of the trees/ plants in the proposed command area thereby enhancing the opportunity for habitat development.
- Agro forestry activities will be taken up in the command area thereby improving the ecosystem services in the region.
- Improved agriculture attracts the various faunal species strengthening the food chain or food web.

- Agricultural development/improvement gives rise to dairy farming which leads to bio-gas production thereby reducing the pressure on the trees/forest for fuel wood.
- Agriculture gives rise to animal husbandry that produces various types of manure which in turn helps in maintain the fertility of the soil.
- Irrigation leads to rise in ground water table that supports the floral growth which attracts the various land animals, Avi-fauna, arboreal animals, small animals etc.
- Irrigation creates the suitable environment for soil microorganisms for their survival and to keep the soil rich in nutrients.
- No forest land is required for the Project.
- The proposed cropping pattern will ensure that the soil does not lose its fertility.

Financial benefits:

- Agricultural linkages will be considerably improved.
- Increase in food production and yield leads to increase in income level as the land turns into irrigated land.
- Extensive agricultural products will produce raw material to nearby small scale industries.
- Reduced crop loss due to erratic, unreliable or insufficient rainfall.
- Agriculture leads to the growth of Animal husbandry which creates various job opportunity/ Self-employment. Improved economical status of the region.

Social benefits:

- Stabilized agriculture as water is available whenever it is required.
- All the households in the command area will be benefitted directly under the scheme.
- The project requires only 140 Ha of land for implementation of the scheme and the scheme does not envisage any Rehabilitation and Resettlement activities.
- Direct employment opportunities for 100 peoples (30 Technical and 70 construction labourers) are expected to get employment during construction phase. During operation phase labourers will be appointed for operation and maintenance of the jack well.
- Implementation of the project enhances indirect employment opportunities for the local people.
- Migration of People in search of job towards urban and cities will reduces and also burden on cities will be reduced.
- The employment increases the socio-economical status of the benefitted villages, which in turn increases the education of children by avoiding discontinuation of schools and avoids child labour.

ES 8. Environmental Management Plan

Construction Phase Management Plan		
Environmental Safeguards: Water sprinkling, erection of barricades, covering by green mesh/ sheets, Provision of stack and acoustic enclosed for DG.	Land acquisition plan: Land acquisition will be planned in consultation with PAFs as per the provisions of RFC&TLA, 2013.	Reservoir RIM Treatment Plan: Construction of embankment for 500 m on either sides of the intake canal
Muck disposal plan: all the muck generated will be reused for covering the project components, construction of service roads, embankments land levelling and CD Works.	Public health delivery system & labor Management Plan: Provision of Periodical health check-up for labors, medical facilities during emergencies, Creches for labor's Children and provision of Personal Protective Equipments.	Sanitation and Solid waste management plan: Provision of Solid waste and Hazardous waste bins with shed
Energy conservation measures: Provision of solar lighting near Jack well cum Pump House.	Environmental monitoring programme: Monitoring of Air, Noise, Surface & ground water, Soil, Aquatic life and health check-ups.	Air, Noise & Water Management Plan: Barricades, Green mesh PPEs for laborers, Insulation Caps and safety enclosures for machineries, Oil interceptors, Slump with impervious lining to avoid seepage, Installation of STP.
Operation Phase Management Plan		
CAT plan: involves Soil Conservation Practices , Reclamation of salt affected soils, Management of saline and sodic soils and construction of check-dams.	Command Area Development: Development of communication network, Water Users' Association, Training and Agriculture Extension Program.	Conservation of Schedule I species: Awareness programmes regarding importance of Schedule I and RET species.
Agroforestry activities: plantation activities in the command area.	Fisheries Conservation & Management Plan: Stocking of fingerlings and reintroduction of Critically Endangered / near threatened fingerlings	Local area development plan: Up gradation of school furnitures, health centres and Identification of folk, art and cultural activities, Smart classes.
Air, Noise & Water Management Plan: PPEs for laborers, Regular Service and Maintenance of machines, Operation and maintenance of STP.	Environmental monitoring programme: Monitoring of Air, Noise, Surface & ground water, Soil, Aquatic life and health check-ups.	Ground water management plan: measures to avoid salinity in the command area by extracting ground water.

The cost for implementing Environmental Management Plan is Rs. 70,16,17,880/- (Construction phase – Rs. 14,85,53,120/- and operation phase – 55,30,64,760/-).