

EXECUTIVE SUMMARY

ES 1. Introduction

Salapur Lift Irrigation Project has been proposed by the Karnataka Neeravari Nigam Limited, Govt. of Karnataka, has proposed Salapur Lift Irrigation Scheme to irrigate the left out areas between Rameshwara LIS and Veerabhadreshwara LIS. Further, the farmers of the area are demanding for the 'Lift Irrigation Scheme' to mitigate their sufferings. Hence, the project is necessary to the drought prone area. There was also representation from local farmers and elected representatives to provide irrigation facilities to these left out area. To eradicate regional imbalances and equitable distribution of water, the proposed project is essential.

The area under consideration comprising of Ramdurga Taluk of Belagavi district and Badami and Mudhol taluks of Bagalkote district situated between the Malaprabha and Ghataprabha rivers. The area is on both side of the ridge bifurcating the Ghataprabha and Malaprabha basins and is most fertile area in need of irrigation facilities. This region lies entirely in Krishna river basin in the Deccan Plateau of Southern India.

ES 2. Project Description

Salapur Lift Irrigation Scheme envisages lifting of 1.80 TMC of water from Ghataprabha River to provide irrigation facility to 13,000 Ha of command area and benefit 19 villages in Ramdurga taluk of Belagavi district and 6 villages in Badami taluk & 2 villages in Mudhol taluk of Bagalkot district. The proposed irrigation is for Kharif season and the intensity of irrigation is 100%.

The proposed project requires a total of 289.98 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 569.00 Crores.

Table ES 1: Salient Features of the project

Name of the project	Salapur Lift Irrigation Scheme
Type of project	Irrigation
Type of irrigation	Gravity flow
Type of flow	Gravity
River	Ghataprabha
Location of Lift Point	16°13'3.16"N 75°23'4.59"E
Water Utilization	1.80 TMC
Command Area	13,000 Ha
Villages Benefitted	27 villages
Soil Type	Red soil and Black soil
Cost of the Project	569.00 crores
Government order	WRD 03 NIN 2018, Bangalore; dt: 07.03.2018
Land required for Project	289.98 Ha
Forest Land requirement	Nil
Submergence	Nil
Power requirement	25.55 MW
B.C Ratio	1.43
Nearest Protect Area	Yadahalli Chinkara Wildlife Sanctuary boundary - 15.82 Km, ESZ boundary - 14.67Km

ES 2.1 Water availability

This scheme is envisaged as an independent scheme. It is proposed to lift runoff water (1.80 TMC) between downstream of Dhupdal Barrage & Up to proposed lift point during monsoon. Ten day average flow of Ghataprabha River was reviewed for various gauging stations for the period between 1985-2009 to calculate available yield at the proposed project site. Average inflow of 13.87 TMC in June, 27.49 TMC in July, 68.93 TMC in August and 61.55 TMC of water in September is available in the river. Therefore, sufficient water is available in the river and hence, there is no impact on downstream.

ES 2.2 Command area of the project

Sl. No.	Name of District	Name of taluk	Name of taluk
1	Belagavi	Ramdurg	Salapur, Salapur Tanda, Nagnur, Nagnur Tanda, Daddibhavi, Daddibhavi soppadla, Obalapur, Batkurki, Batkurki Tanda, Rajanal, Chennapur, Chennapur Tanda, Aneguddi, Aneguddi Tanda, Hanamapur, Umatar, Timmapur, Timmapur Tanda and Nandihal.
2	Bagalkote	Badami	Bellikandi, Havalkod, Jangavad, Vadiyan Hoskoti, Shipar matti and Kain katti.
		Mudhol	Varchagal and Palikemane (Aralimatti).

ES 2.3 Land Requirement

The proposed project requires 289.98 Ha of land for implementation of the project. The land required is only for construction of Intake Canal, Jack Well Cum Pump House, Delivery Chamber, Distributary Canal (above ground structures) and Rising Main (below ground structure). The required land will be acquired as per the Right to Fair Compensation and Transparency in Land Acquisition Rehabilitation and Resettlement Act, 2013.

ES 2.4 Existing cropping pattern details

The existing cropping pattern includes Maize and Local jowar contributing to 50% of the crop yield each.

Table ES 2: Details of the existing cropping pattern

Sl. No.	Kharif Crop Details	Percent (%)	Yield/Ha
1	Maize	50	5,200
2	Local Jowar	50	5,200
Total		100	

ES 2.5 Proposed cropping pattern details

Cropping pattern has been suggested for this project by taking into account the existing Cropping pattern and information from the concerned offices of Agriculture Department & Horticulture department. The intensity of irrigation is considered only in Kharif. The Cropping pattern / calendar and the extent of each crop has been suggested to optimize the monthly demand. The details of the proposed cropping pattern are as follows;

Table ES 3: Details of proposed cropping pattern

Season	Crop	Percent (%)	Area (Ha)
Kharif	Ground Nut	30	3,900

Season	Crop	Percent (%)	Area (Ha)
	Hybrid Jowar	11	1,430
	Hybrid Maize	23	2,990
	Bajra	36	4,680
	Total	100	13,000

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 (March, 2021–May, 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 5 locations for assessment of the existing status of air environment within the study area. The minimum and maximum level of Particulate Matter <2.5 μ and <10 μ recorded within the study area were in the range of 20.88 $\mu\text{g}/\text{m}^3$ to 22.63 $\mu\text{g}/\text{m}^3$ and 54.50 $\mu\text{g}/\text{m}^3$ to 66.38 $\mu\text{g}/\text{m}^3$ respectively. The minimum and maximum level of SO₂ and NO_x recorded within the study area was in the range of 4.05 $\mu\text{g}/\text{m}^3$ to 4.83 $\mu\text{g}/\text{m}^3$ and 17.91 $\mu\text{g}/\text{m}^3$ to 20.29 $\mu\text{g}/\text{m}^3$ 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 5 locations. The minimum and maximum noise level was found to be 47.91 dB (A) and 51.65 dB (A) during day time. The minimum and maximum noise level was found to be 36.53 dB (A) and 41.08 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 in the Ghataprabha river and the results shows that the pH ranges from 7.77 to 8.13, DO- 5.20 mg/L to 5.60 mg/L, BOD- 2.30 mg/L to 6.80 mg/L, EC- 552.00 $\mu\text{S cm}^{-1}$ to 894.00 $\mu\text{S cm}^{-1}$, TDS- 361.00 mg/L to 516.00 mg/L, Alkalinity- 120.00 mg/L to 250.00 mg/L, TH- 80.00 mg/L to 170.00 mg/L, Calcium- 20.00 mg/L to 40.00 mg/L, Fluoride- 0.23 mg/L to 0.52 mg/L, Chloride- 54.98 mg/L to 109.96 mg/L, Total coliform - 170 MPN/100 ml to 540 MPN/100 ml, E. coli - 1.8 MPN/100 ml to 2 MPN/100 ml. Water quality criteria of CPCB shows that, out of 4 samples, 1 sample belong criteria 'C' and 3 samples belongs to criteria 'D'. Therefore, all the water from the above locations is suitable for Drinking water source with conventional treatment.

ES 3.1.4 Ground Water

Ground water sampling was carried out at 5 locations and results shows that the pH ranges from 7.66 to 7.94, Temperature- 25.6- 27.8 °C, EC- 920 to 2190, Total Dissolved Solids- 578 mg/L to 1394 mg/L, Total Alkalinity- 250 mg/L to 350 mg/L, TH- 140 mg/L to 610 mg/L, Calcium-40 mg/L to 164 mg/L, Bicarbonates- 220 mg/L to 290 mg/L, Fluoride- 0.17 mg/L to 0.89 mg/L and Chloride- 44.99 mg/L to 299.91 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 8 locations and type of soils is mostly black soil with sandy loam and sandy clay loam soils. The results of physico-chemical analysis of the soil samples shows that the soil pH values range between 7.01 and 8.7 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 were observed to be in the range between 18.6 to 525 $\mu\text{s}/\text{cm}$. 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 0.29 to 1.05%. As per the nutrient index, the organic carbon in soil samples was at low 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 537.77 Sq.Km indicates that, the area is predominantly covered with Agriculture Land (41.47%) followed by Plantation/Vegetation (19.84%) and Scrub land (17.39%).

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

SI No	LULC Class	Area in Sq Km	Area in %
1	Agricultural Land	222.96	41.47
2	Built Up	10.69	1.99
3	Fallow Land	77.48	14.41
4	Plantation/Vegetation	106.66	19.84
5	Quarry	21.70	4.04
6	Scrub Land	93.51	17.39
7	Water Body	4.69	0.87
Total		537.70	100.00

ES 3.2 Biological Environment

A total of 5 (n=21) tree species were recorded along the project components belonging to 3 families. The Predominant species recorded in Project site is *Azadirachta indica* A. Juss. (n=10) followed by *Dalbergia sissoo* DC. (n=4). *Acacia nilotica*, *Azadirachta indica* and *Syzygium cumini* are Least Concern and remaining species are not assessed as per the IUCN conservation status, 2021. None of the species belongs to the RET category, all the recorded species are common to the region. The Dominant avifaunal species were Spotted Dove (n=24), Ashy Crowned Sparrow lark (n=18), little egret (n=17) and Jungle Babbler (n=16). River tern belongs to vulnerable category and Black-headed ibis & Woolly-necked stork Near Threatened category as per the IUCN conservation status, 2021. Further, Brahminy kite, Indian Peafowl and Black-headed ibis falls under schedule I of Wildlife (Protection) Act, 1972.

A total of 10 species (N=109) belonging to 8 families were recorded. *Eucalyptus tereticornis* L. (n=43), *Euphorbia tirucalli* L. (n=24), *Azadirachta indica* A. Juss. (n=19) and *Albizia amara* (Roxb.) B. Boivin (n=8) were the predominant species recorded in Command Area. *Chloroxylon swietenia* DC belongs to vulnerable category as per the IUCN conservation status, 2021 rest of the species were Least concern. All the species recorded are common to the region and no RET species were recorded. A total of 53 Avi-faunal species (n=488) recorded during the studies. The most dominant Avi-faunal species recorded in the study area are Lesser whistling duck (n=69), Red vented Bulbul (n=36), Little egret (n=35) and

Barn swallow (n=30). Among 53 species, River tern belongs to Vulnerable category and Black-headed ibis, Oriental White Ibis and White-necked stork belongs to Near Threatened, where remaining birds belongs to Least Concern As per the IUCN conservation status, 2021. Black Kite, Black-shouldered Kite, Eurasian spoonbill and Indian Peafowl falls under schedule I of Wildlife (Protection) Act, 1972. The study area falls under Northern Dry Zone and tropical monsoon climate. There are no protected area and wildlife corridors in the Command area.

ES 3.3 Socio-economic Environment

The total land required for the construction of the proposed project components is 289.98 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 4093 households were selected randomly across 8 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 and 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 98% of the respondents were aware of the proposed lift irrigation scheme and feels that irrigation projects are necessary to fulfill Irrigation needs. Development planned 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 will be converted to irrigated/wet lands and changes the cropping pattern. 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.
- Expected local employments during construction and operation phases (Agricultural allied activities)
- It may help to increase animal husbandry activities in the command area of the project.
- It would help further strengthen infrastructure development in the area.
- In few villages people are opposing the project due to land acquisition (they are losing their lands for the proposed project activities whereas they are not benefitting under this scheme). Chawadapur, Lokapur, Chikkur (land acquisition) villages are not irrigating under this scheme.
- Land losers were demanded one time settlement of compensation for the loss of land.
- Villages in the command Area are expecting high agricultural crop yields and change in existing cropping pattern.
- Farmers were requesting concerned authorities to complete the project as soon as possible.

- Farmers whose agricultural lands are located nearby project components expressed that their Agricultural yield may be affected due to construction activities.
- Local people expressed that the excavated muck shall be reutilized for covering the Rising Main immediately upon its installation belowground.

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"> Dust entrained during onsite travel on paved and unpaved surfaces Exhaust from the Diesel construction equipment used for site preparation, grading, excavation, trenching, tunnelling and construction of onsite structures Exhaust from water trucks used to control construction dust emissions Exhaust from pickup trucks and Diesel trucks used to transport workers and materials around the construction site Exhaust from Diesel trucks used to deliver concrete, fuel, and construction supplies to the construction site. The typical day Air Quality model output reveals that the predicted GLC for Particulate matter of maximum concentration will be 128.89 $\mu\text{g}/\text{m}^3$ (without mitigation measures) 10.07 $\mu\text{g}/\text{m}^3$ (with mitigation measures). 	<ul style="list-style-type: none"> The vehicle speed limit restricted to 10 kmph within the construction site. Any construction vehicle not meeting the emission norms standards not being allowed within the construction site and emission certificate made mandatory for the same and this is strictly enforced on the transport contractors to abide by the same. Water sprinkling done in all the dust generating activities like site clearing, levelling, excavation, material handling etc to suppress the dust. Vehicles delivering loose and fine materials like sand and fine aggregates covered by tarpaulin sheets to reduce spills on roads so as to avoid fugitive emissions. DG sets engaged in the construction site equipped with suitable stack height. Monthly Ambient Air Quality Monitoring is being carried out to assess the pollution load during construction phase.
2	Noise Pollution	Concrete Batch Plant, movement of construction Machinery,	<ul style="list-style-type: none"> Construction activities are expected to produce noise levels in the range of 85 - 90 dB (A). Noise generation during construction 	<ul style="list-style-type: none"> Selection of low noise generating machinery/equipment. Provision of protective devices like ear muff/ plugs to the workers.

Sl. No.	Environmental attribute	Activity	Impact	Mitigation Measures
		movement of vehicles for unloading of construction materials etc.	activity will affect the health on working and residing population.	<ul style="list-style-type: none"> • The high noise zones at site will be demarcated and provided with enclosures & barriers. • 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 and management of earth work, debris, sewage from labour camps, waste disposal activities,	<ul style="list-style-type: none"> • Impact on water quality during construction phase will be mainly due to sewage generated from the work station of construction workers. • Stagnated water in construction sites will result in creation of mosquitoes breeding sites and impact is anticipated on health of the workforce affecting their productivity through infection and also causes unhygienic environment. • Insanitary conditions and unscientific treatment and disposal of sewage from labor camps area will lead to sub-surface soil pollution and also contaminate ground water through infiltration factors, thereby, ground water quality of the region is affected. 	<ul style="list-style-type: none"> • For the construction worker's temporary sanitation facility (mobile STP's) will be created for the disposal of sewage generated. • Temporary drainage arrangements will be undertaken around construction spots to avoid stagnation of water. The channelized water will be collected in temporary sedimentation tank. The supernatant water will then be pumped and reused for dust suppression purposes around the construction site and also around vehicle haul roads plying to & fro from the site. • Solid wastes from the labour camps will be segregated into organic & inorganic wastes through different coloured bins (Blue Bin for dry waste & Green Bin for

Sl. No.	Environmental attribute	Activity	Impact	Mitigation Measures
			<ul style="list-style-type: none"> Improper collection, handling & disposal of solid wastes (organic solid waste) from labor camps will result in formation of leachate under precipitation/rainy days and thereby directly contaminating the surface water through runoff & indirectly affects the ground water quality of the region through infiltration factors 	Wet waste) located at different places within the camps.
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 Infrastructure Building. Collapse of blasted portion of rock and fly rock due to blasting anticipated. Providing irrigation facilities to the 13,000 Ha of the command area of Belagavi and Bagalkot Districts enhances the ground water table of the region. 	<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. As the underlying rock Granite gneiss 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, 	<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

Sl. No.	Environmental attribute	Activity	Impact	Mitigation Measures
			<p>particularly on haul roads during site clearance due to movement of heavy machinery and vehicles and during setting up of construction camps and stockyards.</p> <ul style="list-style-type: none"> Contamination of soil will take place due to maintenance of machinery, operation of DG sets, oil spills from the operation of mechanical works, etc., Leaching of solid waste generated from labour camps affects the soil quality. Over usage of water for crops leads to salinity of the soil. 	<p>with leak proof polythene as floor material to avoid spillage of oil and any other contamination of soil.</p> <ul style="list-style-type: none"> The solid waste generated from the labor camp will be segregated and handover to authorized vendor. The piped irrigation facility in the command area will not create soil salinity.
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 (11.25 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 affect soil and aquatic biota upon entry into soil and water environment. 	<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 Mudhol landfill. 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.

Sl. No.	Environmental attribute	Activity	Impact	Mitigation Measures
			<ul style="list-style-type: none"> Unused iron and welding electrodes (5% of total steel requirement) is expected during construction activities. Improper handling of these affects surface water quality and aquatic life. 	<ul style="list-style-type: none"> 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.
7	Land Use	Construction activities	<ul style="list-style-type: none"> A minor change in land use land cover/topography in the command area is anticipated due to the construction of Project components such as intake canal, Jackwell cum pump house, Delivery Chamber, Distributary Canals. 	<ul style="list-style-type: none"> Upon implementation of the project drought prone areas of the command area will be converted into irrigated land which leads to restoration/improvement of Land use and land cover of the region.
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 289.98 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 adapted to these agricultural lands. About 19 trees will be removed during the construction of project component. The chances of fishes moving in the 	<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. The trees removed during construction will be compensated through green belt development. Green belt development activities should be carried out as per

Sl. No.	Environmental attribute	Activity	Impact	Mitigation Measures
			intake canal towards Pump house will be anticipated. Because of which, loss of species will be anticipated and in turn leads to blockage of pumps.	CPCB guidelines. <ul style="list-style-type: none"> Fish mesh will be provided near the Intake floor levels so as to arrest entry of fishes inside the Pump.
9	Social Economic	Land acquisition	<ul style="list-style-type: none"> Project requires acquisition of 289.98 Ha of land. Livelihood may be affected due to land loss. Improvements in the annual incomes of about 20% p.a in the command area villages. During the influx of migrants, there is a possibility new health's problem or diseases aggravate due to the change in population density. 	<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 150 nos. during construction and operation phase. During construction phase Drinking water facility should be provided.

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 KNNL. Rs. 30,48,600/-was estimated for environmental monitoring during construction phase and Rs. 23,27,760/-is estimated for operation phase of the project. Other activities includes, monitoring of green belt/tree plantation, labor camps, land acquisition, etc.

KNNL will convene a meeting quarterly once in a year and review the progress of environmental and social mitigation measures including management plans. KNNL 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 and 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:

- Agro forestry 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.

Financial benefits:

- Agricultural linkages will be considerably improved.
- The project improves total farm output and hence raises farm income.
- Project improves yields through reduced crop loss due to erratic, unreliable or insufficient rainfall.
- Extensive agricultural production supplies raw materials to the nearby small scale industries thereby increasing the economy in the region.
- Agriculture leads to the growth of Animal husbandry which creates various job opportunity/ Self-employment.

- The increased economy in the region due to agriculture leads to openings of new Agricultural Produce Market Committee (APMC), Markets and other agriculture based shops.

Social benefits:

- All the households (No. 4,093) in the command area will be benefitted directly under the scheme.
- The project requires only 289.98 Ha of land for implementation of the scheme and the scheme does not envisage any rehabilitation and resettlement.
- Direct employment opportunities for 150 peoples (50 Technical and 100 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.
- Increased crop yield leads to export of agricultural material/products which require transportation facility, hence agricultural growth creates job opportunity in transportation

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.
Green belt development and Agroforestry activities: plantation activities along the project components and 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. 34,24,87,610/- (Construction phase - Rs. 29,65,48,600/- and operation phase - 4,59,39,010/-).