

**EXECUTIVE SUMMARY OF**  
**DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT**  
ಕರಡು ಪರಿಸರ ಆಘಾತ ಅಂದಾಜೀಕರಣ ವರದಿಯ ಕಾರ್ಯಕಾರಿ ಸಾರಾಂಶ

**BASAVESHWARA LIFT IRRIGATION SCHEME**

ಬಸವೇಶ್ವರ ಏತ ನೀರಾವರಿ ಯೋಜನೆ

BELAGAVI DISTRICT, KARNATAKA

ಬೆಳಗಾವಿ ಜಿಲ್ಲೆ, ಕರ್ನಾಟಕ



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**NOVEMBER 2016**

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FOR

**BASAVESHWARA LIFT IRRIGATION SCHEME**

at

BELAGAVI DISTRICT, KARNATAKA

Project By



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## 1. Introduction

Basaveshwara Lift Irrigation Scheme is proposed by Karnataka Neeravari Nigama to irrigate 27,462 Ha dry lands in 22 villages of Athani Taluk, Belagavi District, MoEF issued the TORs for the project vide Letter No.J-12011/23/2015-I-A-I dated 17.11.2015 based on which Draft Environmental Impact Assessment (EIA) Report was prepared along with in line as per generic structure in the EIA Notification, 2006 by MoEF, Govt.of India. The said EIA report includes the data on various field studies undertaken by the accredited experts including baseline environmental data collection from the study area during the study period December 2015 to August 2016, in line with the TORs, anticipated impacts (identified, predicted & evaluated) on different components of the environment, delineating specific Environmental Management Plan (EMP) including Environmental Monitoring Programme along with the budgetary provisions to be undertaken by KNNL stating responsibilities of various parallel departments for effective implementation of the same.

## 2. Project Description

The proposed scheme envisages lifting of 4 TMC of water from Krishna River near Ainapur village of Athani Taluk, Belagavi District, Karnataka by lift and providing Irrigation facility to 27,462Ha in 22 villages of Athani taluk of Belagavi District. The proposed irrigation is only during Khariff season and the intensity of irrigation will be 100%.

Governments of Karnataka (GoK) have accorded administrative approval for BLIS vide order No: WRD 9HI A YO 2013, Bangalore dated 22.06.2016 and the total cost of the project is 1120 Crores.

Table 1 Salient Features of the project

1.	Name of the Scheme	Basaveshwara Lift Irrigation Scheme
2.	Name of the river	Krishna
3.	Geographical Location of Lift point	Latitude 16° 40' 29.63" N Longitude 74° 53' 29.92" E
4.	Location of the Lift point	Near Ainapur village, Athani Taluk, Belagavi District, Karnataka
5.	Type of the project	Irrigation
6.	Mode of Irrigation	Flow irrigation
7.	Estimated cost of the project	Rs. 1120.36 Cr
8.	Command Area	27,462 Ha
9.	No. of villages benefitting	22
10.	Allocated water	4 TMC
11.	Cropping pattern	Kharif (June - October)
12.	Irrigation intensity	100%
13.	Submergence area	Nil
14.	Rehabilitation and Resettlement	Nil
15.	Total Land required	438 Ha
16.	Total forest land required	Nil
17.	Power Requirement	31.09 MvA, Source – Hubli Electricity Supply Company Limited (HESCOM).

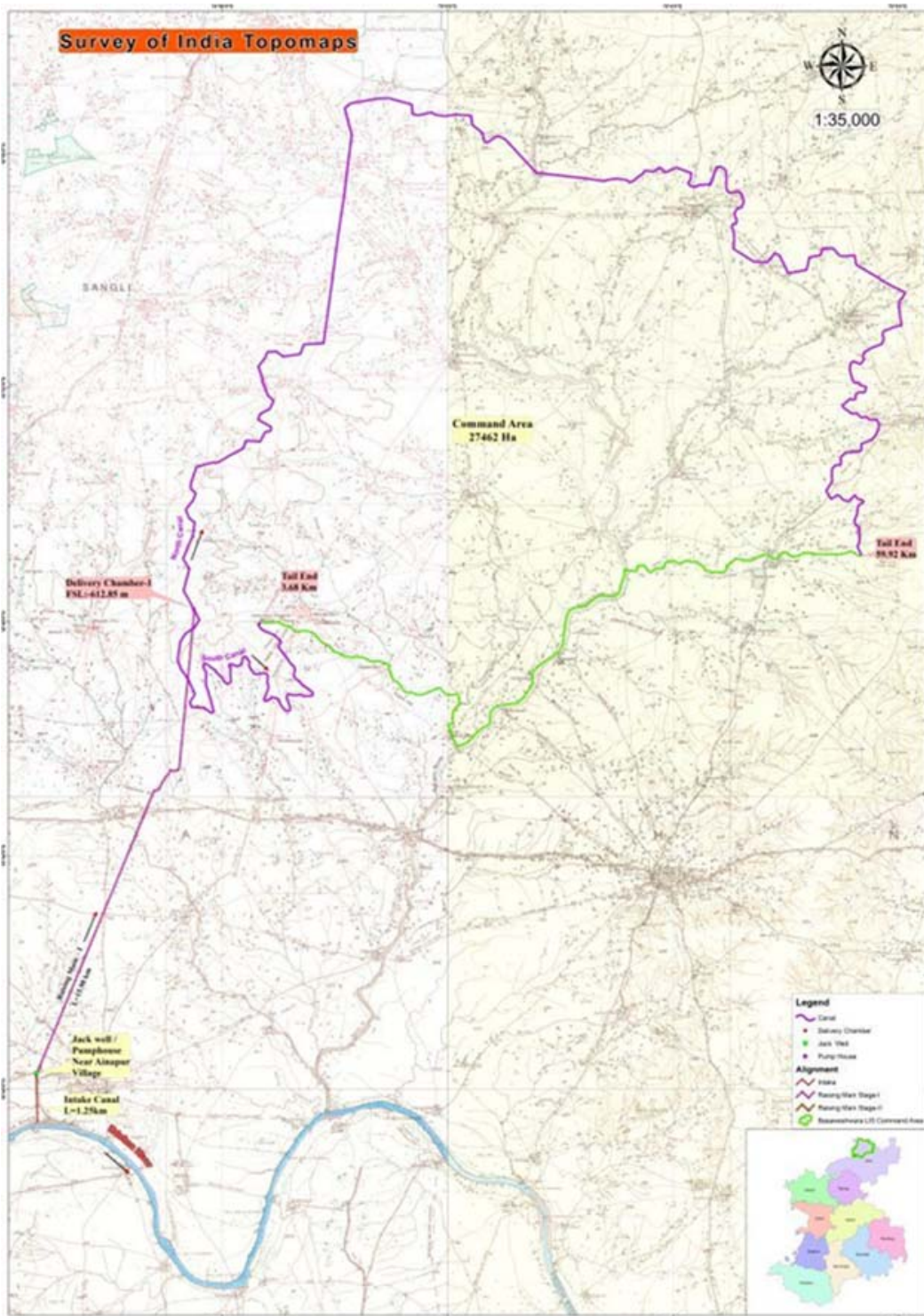


Fig. 1 Location map of the project

## 2.1 Need for the project

BLIS is proposed to irrigate dry lands in villages of Ainapur, Athani taluk, Belagavi district. The villages coming under this scheme are drought affected and agriculture is the only source of livelihood and income. Drought causes agriculture a risky venture and the proposed taluks are considered to be the more backward taluks. Due to which people are constantly translocating to adjoining towns and cities. The people of this region have no other employment opportunities except agriculture and there is potential land bank to grow suitable crops in the region. Hence providing irrigation and stabilizing the agricultural production, provides a much needed relief to the people. It improves the per capita income and standard of living of the people. Further it utilizes the water and land resources and substantially improves GDP contribution from agriculture.

## 2.2 Water availability

BLIS is proposed on the upstream of Hipparagi barrage located at a distance of 34 Km. The monthly water availability at the Almatti Reservoir during Khariff season is calculated by taking the average of water yield in the respective month from 1983-2008. The proposed project is planned to utilize water only during Khariff season. The project is designed keeping in view of the demand of downstream flow (e-flow).

## 2.3 Command area of the project

The command area of 27,462 Ha is spread across Athani Taluk of Belagavi District. There are 22 benefitting villages under BLIS. The lists of benefitting villages are given below.

Table 2 List of benefitting villages, Athani taluk, Belagavi District

Sl. No	Name of the benefiting village
1	Ajur
2	Anaturpur
3	Aralihatti
4	Balligeri
5	Bammanal
6	Bevanoor
7	Gundewadi
8	Hanamapur
9	Agrani – Ingalgao
10	Jambagi
11	Kallotti
12	Khilegaon
13	Kiranagi
14	Madabhavi
15	Malabad
16	Masarguppi
17	Naganur.P.A
18	Pandegaon
19	Sambargi
20	Shirur
21	Shivanoor
22	Tawashi



## 2.4 Irrigation Planning and structural components of the project

An intake channel (1250 m) is proposed to lift the water from Krishna River. A Jackwell cum pump house will be constructed to pump the water to the Delivery chamber through a MS rising main of 15.90 Km length (2.75 m dia). The RL of delivery chamber -1 is kept at RL 565 m. The entire 27462Ha command area will be irrigating under single stage. The technical details of the project are given below;

Table 3 Technical details of the project

<b>A. Lift Location</b>	
Name of the river	Krishna
Lift Point	Near Ainapur Village, Athani Taluk, Belagavi District
<b>B. Intake Canal</b>	
Length	1250 m
Discharge (required) QR	22.43 cumecs
Discharge (designed) QD	33.65 cumecs
Bed width	5.10 m
Side slope	1:1
Free board	0.75 m
<b>C. Jackwell cum pump house</b>	
No. of Pumps	10 + 2 standby
Total Power Requirement	3244 HP
Source	HESCOM
<b>D. Rising Main</b>	
Length	15.9 Km
Diameter	2.75 m
Material	Mild Steel
<b>E. Delivery Chambers</b>	
RL of DC	565 M
Dimension	26 X 26 X 4.5 M
<b>E. Canals</b>	
<b>South canal</b>	
Irrigating Area	1313.09 Ha
Length	3.68 Km
Required discharge (QR)	1.076 Cumecs
Designed discharge (QD)	1.131 Cumecs
<b>North canal</b>	
Irrigating Area	26148.9 Ha
Length	59.52 Km
Required discharge (QR)	18.738
Designed discharge (QD)	22.126

## 2.5 Land Requirement

The proposed project requires 438 Ha for implementation of the project. The land required is only for construction of Jack well cum pump house, Raising main, Intake canal and Delivery chambers. The required land will be acquired as per the Right to Fair Compensation and Transparency in Land Acquisition Rehabilitation and Resettlement Act, 2013.

## 2.6 Existing cropping pattern details

The present agricultural practices including the crops grown are tuned to the rainfall regime. The crops grown are Khariif crops only which are as follows. The estimated percentage area of these crops and their corresponding yields are given below;

Table 4 Existing cropping pattern in the command area

Sl no.	Crop	Produce/ Ha. (Qtls)
1	Local Jowar	2.00
2	Hy. Maize	8.00
3	Bajra	2.00
4	Groundnut	2.00
5	Hy. Jowar	2.00
Total		16.00

## 2.7 Proposed cropping pattern details

In view of introducing Drip Irrigation system in the entire command area of 27462 Ha, the following cropping pattern (for Khariff Season) is proposed.

Table 5 Proposed cropping pattern

Sl no.	Crop	Intensity (%)	Crop Area (Ha.)	Produce / Ha. (Qtls)
1	Local Jowar	1.16	318.56	40.00
2	Hy. Maize	11.50	3158.13	50.00
3	Bajra	3.45	947.44	30.00
4	Groundnut	45.98	1267.03	15.00
5	Hy. Jowar	37.9	10410.83	14.00
Total		100	27462	149.00

## 2.8 Benefit cost ratio

The benefit cost ratio has been worked out to 1.08 considering the annual administrative expenses, depreciation charges and electrical energy charges.

## 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 for Pre - Monsoon Season (Dec 2015 to Feb 2016), Post Monsoon season (March 2016 to May 2016) and Monsoon Season (June 2016 to Aug 2016). In addition to the baseline environmental monitoring, field inspection in the study area, collection of primary & secondary information for all the environmental components and discussions with the officials and local public were conducted by the experts.

### 3.1 Physical Environment

#### 3.1.1 Topography

The area mainly comprises of 0- 1% and 1 - 3% slope, of which 1 – 3% slope is predominant (54.11%).

#### 3.1.2 Ambient air quality

The results of ambient air quality reveal that, PM10 ranged between 41 – 72 µg/m<sup>3</sup> whereas PM2.5 was in the range between 18 – 30 µg/m<sup>3</sup>. SO<sub>2</sub> and NO<sub>2</sub> are in the range between 2.51 – 9.12 µg/m<sup>3</sup> and 8.5 – 13.97 µg/m<sup>3</sup> respectively. The air quality index in the study area is found to be satisfactory for PM10 and good for PM2.5 and other gases like SO<sub>2</sub> and NO<sub>2</sub>.

#### 3.1.3 Ambient Noise levels

The results of ambient noise levels were compared with Residential standards and results reveal that, the noise levels in the study area ranging from 46.15–52.34 d(B)A for day time and 36.06 – 43.67 d(B)A for night time during Post - Monsoon season. The noise levels during Pre -Monsoon season is ranging between 48.38 -54.38 d(B)A for day time and 35.8 – 37.4 d(B)A for night time and 46.88 – 49.61 dB(A) for day and 36.33 – 39.75 d(B)A for night time during Monsoon season respectively. Overall, the noise levels in all the seasons were observed to be well within the CPCB standards. Results of Ambient Noise Levels for all the seasons are given below.

### **3.1.4 Seismicity**

The proposed project area is located in the Zone-III of Seismic Zoning Map of India. Hence, the area is very less prone to Earthquakes.

### **3.1.5 Geology and Minerals**

The main rock type observed in the command area is Basalt belonging to Deccan Traps of various flows belonging to Upper Cretaceous to Lower Eocene Age.

### **3.1.6 Soil characteristics**

In the study area the soil types found in the command area are predominantly shallow to deep black, moderately well drained, clay soils with slow permeability, vertisol, Entisol and Incept sols are found in the proposed command. The black cotton soil is rich in bases (alkaline condition) and has a very high water holding capacity. Major area of BLIS is covered by black, clay soils constitute roughly 95 percent, and are shallow to moderately deep (22.5 to 90 cm), clayey, with 45 to 55 per cent clay and contain free calcium carbonate throughout the profile. There is generally a zone of calcium nodules and gypsum in the soil profile at a depth of 45 to 90 cm, the principal salt being gypsum. Below the gypsum layer disintegrated impermeable murrum layer exists, the internal drainage of the soil is lateral rather than vertical within the profile.

The soil types found in the command area are black colored. The study area is experiencing relatively plain not affected by fully erosion in the past, but the analysis indicates that certain areas were with rill and sheet erosion.

### **3.1.7 Hydrology**

The Project site and the command area form part of the Krishna River Basin. The lift point is over the upper reaches of Almatti Reservoir. This is not in the 10.00 Km buffer zone of the lift point. Bor Nala, Kalkatti Halla, and Agrani Nadi are the other major tributaries of River Krishna in the study area. Most of these are seasonal rivers which drain in to River Krishna. Drainage pattern is observed to be dendritic to sub-dendritic with drainage density varying between 0.80 to 0.92 Kms. / Sq. Kms. Dense drainage is observed in the command area All the stream courses flow from higher reaches to lower levels following topography.

### **3.1.8 Surface Water**

The baseline status of water quality in the study area was established. Water samples were collected from 5 locations. Out of which 1 location was surface water.

In Post - Monsoon season, the Physico-chemical parameters for Krishna River were well within the standards. Total Hardness was found to be 332 mg/L, Sulphate and Dissolved Oxygen were 117 mg/L and 7 mg/L respectively. Conductivity in the sample was found to be 1352  $\mu$ S/cm, chlorides were 157.6 mg/L and total Coliform was 1CFU/100mL due to improper sanitation.

In Pre - Monsoon season, Total Hardness in the surface water was found to be 420 mg/L, Dissolved oxygen was found to be 6 mg/L, conductivity and chloride were 1390  $\mu$ S/cm and 200.57 mg/L respectively. Due to improper sanitation Total Coliform was present.

In Monsoon season, Total Hardness in the surface water sample was found to be 460 mg/L, whereas Sulphate was 144.8 mg/L. Conductivity and Chloride were 1574  $\mu$ S/cm and 269.9 mg/L respectively. Dissolved oxygen was observed to be 4.9mg/L. The values are within the prescribed standards.

### **3.1.9 Ground Water**

In Post - Monsoon season, Total Hardness in ground water was ranging from 276mg/L at Gundewadi – 540mg/L at Shirur whereas the Sulphate levels ranged between 37.66mg/L at Anantapur – 193.6mg/L at Shirur. Suspended solids ranged from 4mg/L at Agrani – 10mg/L at Shirur. Overall, the ground water quality was found to be good and confirming to IS standards. Total Coliform was absent in the sample.

In Pre - Monsoon season, The ground water quality analysis results reveal that, the Total Hardness was found in the range of 112mg/L at Anantapur – 530mg/L at Shirur, Conductivity and Chlorides

ranged from 1292 $\mu$ S/cm at Ananthapur – 1841 $\mu$ S/cm at Gundewadi and 174.4mg/L at Ananthapur and Gundewadi - 654 mg/L at Shirur respectively. Whereas Total Coliform was absent in the samples. Suspended solids were absent in Agrani and Gundewadi whereas in Anathpura it was 3 mg/L and in Shirur 6 mg/L.

In Monsoon, The ground water quality analysis results reveal that, the Total Hardness ranged from 348mg/L at Shirur – 540 mg/L at Agrani, whereas Conductivity and Chlorides ranged from 1015 $\mu$ S/cm at Shirur – 1823  $\mu$ S/cm at Agrani and 115.9mg/L at Shirur – 379.9mg/L at Ananthapur respectively. Total Coliform was absent.

### 3.1.9 Land use assessment

The results indicate that the core zone is dominated by crop lands followed by forest and water body. It also includes fallow land. The ground truth survey revealed that the crop land shown in the satellite imagery is coming in semi-arid region and farmers depend on monsoon for cultivation.

Table 6 Land use / land cover classification in the study area

Sl. No.	Land use	Area (Ha.)	Percentage (%)
1	Fallow land	717.935	2.614
2	Gullied / Ravenous Land	11.340	0.041
3	Kharif + Rabi (Double Crop)	9330.908	33.978
4	Kharif crop	7585.763	27.623
5	Lake / Tanks	104.363	0.380
6	Land with scrub	165.613	0.603
7	Land without scrub	898.155	3.271
8	Rabi crop	8058.233	29.343
9	River / Stream	357.933	1.303
10	Village	231.756	0.844
Total		27462.000	100.00

## 3.2 Biological Environment

### 3.2.1 Flora

A total of 155 plant species were recorded in both core and buffer area of the proposed project site. Of which 48 belong to tree species, 16 belongs to shrub species and 91 species belongs to herbs respectively. The project site-wise species richness, density and diversity are given in Table.

A total of 194/ha trees were recorded in the area. The dominant tree species recorded in the project *Acacia auriculiformis*, *CocusNucifera*, *Eucalyptus torticornis*, followed by *Azhadiricthaindica*. The species list is dominated by horticultural and forestry plants. The coconut trees have been planted all along the paddy bunds, and are scattered in submergence area. The trees such as *Acacia* and *Eucalyptus* have been planted along the home garden edge and in the periphery of agricultural holdings, which have been provided to the farmers under social forestry program of the Forest Department.

Out of the 155 plant species recorded in quantitative study, 3 species one belongs to various categories of IUCN. Among these one is climbers; one tree and one belong to climber category. We have also grouped *Ficus* species as Keystone species that means this tree is sacred to local community, where people worshiping and protecting and promoting in the rural areas.

### 3.2.2 Fauna

The field sighting and published records for the region indicated that 9 mammals were reported for the region. There are about 29 birds recorded for the region, which are more common found in outside the project area. There are 9 species of butterflies were observed in core and buffer area of the project. A total of 8 reptiles and 2 amphibians were also observed in the project area. Majority of the fauna recorded or reported for the region were also observed outside the project area in semi-arid region of Karnataka.

### 3.2.3 Protected Areas

There are no protected areas or eco-sensitive areas within the 10 Km radius of main project components and command area.

### 3.3 Aquatic Ecology

Detailed Limnological and Fisheries investigation carried – out in the river Krishna, in and around the project site, indicate 'Optimum' Physico – chemical and biological features to support and sustain the aquatic life present.

The fish food organisms – the Phyto and the Zooplankton had a 'poor presentation, both by numbers and species – wise. Scores of planktivore fish recorded subsists on the available food which is likely to improve during the post monsoon period due to the influx of nutrients for the catchment area as they play a vital role in the over – all biological productivity of the system.

Although the Krishna River is reported to harbor 119 fish species, from its origin point and upto its confluence with the Bay of Bengal, in the studies carried – out, close to the project site, 52 species of fish were recorded, which includes 4 exotic fish species.

Fish seed stocking and the fisheries developmental strategies have been highlighted which should be taken – up with all sincerity and seriousness by the concerned Government Institutions to facilitate fisheries development on the basis of scientific know – how available to help the fisher folk to ekk – out their livelihood honorable.

## 4. Anticipated Environmental Impacts & Mitigation Measures

Due to the activities of the project, there will be potential impacts on the environment of varying magnitude. Most of the impacts are likely to occur during the construction phase of the project. The following section reveals the prediction of impacts due to the project on the physical, biological and social environment. Impacts have been assessed based on the information collected from the primary and secondary data.

### 4.1 Ambient Air Quality

The construction of the project is expected to last approximately in 24 months. The initial site clearing will be followed by site preparation activities

Sources of air pollution

- Pollution due to fuel combustion in equipments. The operation of construction equipments requires combustion fuel. Normally, diesel is used for such equipments. The major pollutant which gets emitted as a result of combustion of diesel is SO<sub>2</sub>.
- Dust pollution: The operation of the trucks carrying construction materials to the site, batching plants during the construction phase is likely to generate fugitive emissions, which can move even up to 100 m in predominant wind direction.
- Emissions due to usage of firewood for cooking at labor camps.
- Due to operation of DG sets and excavation, laborers are prone to health problems.
- Fugitive dust emissions during excavation for main canal, branch canals and distributaries

The following mitigation measures will be followed to control potential emissions of fugitive dust during construction of the project:

- HSD with low sulphur content will be used for the construction equipments/ vehicles which has low ash content.
- Unpaved roads in the project construction site are watered frequently as necessary to prevent fugitive dust. All vehicles carrying construction materials are covered with tarpaulin to avoid spillage of construction materials.

- All the trucks carrying construction materials to the site shall be inspected regularly and shall have valid Pollution under Control (PUC) certificate.
- Labors camps shall be provided with LPG facilities.
- Usage of PPEs like nose masks will be provided.
- During excavation, regular water sprinkling will be undertaken to avoid fugitive dust.

## 4.2 Ambient Noise Level

Sources of noise pollution

- During construction phase, various sources of noise pollution arise due to operation of machineries like concrete plant, cranes, batch plants, material lifting operations, communication noise, including DG sets etc.,
- Other source of noise pollution includes movement of vehicles for unloading of construction materials, fabrication, handling of equipments.
- Construction activities are expected to produce noise levels in the range of 80 – 95 dB (A).

Various measures proposed in spite of noise levels are lower than the prescribed standard values as per CPCB, are presented below.

- DG sets are placed on the rubber cushion padding, enclosed and maintained well in good condition. It is encased and barricaded & taken to all places where it will be used. This reduces the noise level in and around the source by 4 dB.
- Ear plugs must be provided to all employees and laborers while working, irrespective of the noise levels as protection, to receive the noise and as well as exposure of the same for a longer period.
- During construction time, possible chances of number of trucks coming to the project area is more carrying debris, muck etc and the drivers of these vehicles must be instructed with sign boards and not to use shrill horns for any purpose.
- Silent Zone boards must be installed at all places where human activities are there along with proper training to them to handle various equipments, tools and other related items.
- Personal protective equipments like ear plugs must be distributed to all and compulsorily workers are made to use the same.
- Acoustic hoods, silencers are used at these locations and these noise generating sources are kept under enclosures.
- Supervisory staff must check and monitor to ensure the workers to follow all the above said measures while at work.
- Controlled blasting will be undertaken wherever necessary to minimize the noise even though it is cost effective.

## 4.3 Water Environment

Sources of water pollution

- Improper treatment of sewage from labor camps leads to infiltration into the subsurface soil and finally affects the ground water.
- There will be creation of unaesthetic conditions in the site, attracts mosquitoes/fly, thereby chances of deteriorating the health of the workers in unhygienic conditions.
- Improper disposal of construction debris, used oil, diesel for DG sets, etc will result in ground water contamination and in turn affecting drainage of the area.

- Spillage of excavated earth during construction of intake canal leads to turbidity of river water.

The mitigation measures include;

- The sewage generated from the labour camps shall be treated in the Septic Tank and Soak Pits designed and constructed as per IS 2470 Part-I & Part-II.
- There will be no open discharge of sewage from labour camps and the labour camps will be provided with sufficient bathrooms and toilets. Periodical health check-ups for labors will be done.
- No construction labor camps are allowed within 1 Km from the river bed.
- Construction debris will be reused at site, used oil generated from the DG sets will be stored separately and handed over to authorized recyclers.
- During construction of intake canal, the river course and the point of contact of intake canal will be provided with sand bags.
- The leakages of oil spills from machinery shall be collected in leak proof barrels and then disposed off to KSPCB authorized dealers.

#### **4.4. Land Environment**

Sources of Land pollution

- Impacts on the natural drainage system and soil erosion: There shall not be any affects in the core or buffer area either on the drainage or on the water regime of the area. The proponent will undertake afforestation using native species to prevent top soil erosion. However, it is proposed to construct check dams with gully plugs, retaining walls against slope coming in command area of Ghataprabha river basin.
- Loss of productive soil and impact on natural drainage pattern: The majority of the land coming in buffer area is belonging to crop land, where farmers are practicing mixed cropping pattern. The proposed project doesn't affect the land use or drainage of the area. The project proponent only requires 125 ha for construction activities.
- Study of the problem of landslide and assessment of soil erosion potential and the impact: Since the working area is not much deep and terrain, it is proposed to have proper drainage system to divert the drainage water away from the workings, there shall be no problem on land slides.
- The afforestation program is aimed at planting native species capable of forming good humus, so that the water retention capacity of the floor is high and surface erosion is reduced. Effective steps like afforestation using leguminous plants by mulching with proper drainage and retaining walls to minimizing soil loss if any and maintaining the nutrient of the soil of the area as existing in the buffer zone.

Mitigation measures:

- Top soil patches are scattered with thickness varying from 5cm to 50 cm. This soil will be removed in advance and staked separately at designated area with a height not exceeding 2m.
- Select soil stockpile location to avoid slopes, natural drainage ways and approach road points.
- Temporary seeding - protect topsoil stockpiles by temporarily seeding preferably grass and legume species as soon as possible, within 30 days after the formation of the stockpile.
- Permanent vegetation - if stockpiles will not be used within 12 months they should be stabilized with permanent vegetation to control erosion and weeds.

- Before spreading topsoil, establish erosion and sedimentation control structures such as diversions, dikes, waterways and sediment basins.
- Maintain grades on the areas to be top soil.
- Roughening - Immediately prior to spreading the topsoil, loosen the sub-grade by disking or scarifying to a depth of at least 100 mm to ensure bonding of the topsoil and subsoil.
- Ensure that soil horizons are replaced in the same order that they were removed.

#### 4.5 Biological Environment

A total 438 Ha of area (includes lift, jack well cum pump house & Canals) is going to be acquired for the proposed project area. There is no reserve forest either in barrage or in proposed canal area of the project. Also there were no trees coming in proposed pump house and canal area. Hence we can safely conclude that it won't have any impact on biodiversity of the area.

Mitigation measures:

No forest area will be diverted for non-forestry activity. Hence, there is no impact on flora and fauna of the region.

#### 4.6 Evaluation Impacts

Matrix method was used to identify interactions between various project activities and environmental parameters and components. Later, a weightage of 1-10 shall be given to the impacts based on the significance of the impacts. The impacts are quantified 'with' and 'without' EMP. The criteria adopted for weightage are given below;

Table 7 Criteria for evaluation of impacts

SI.No	Criteria	Score
1	Minor impact	1-2
2	Medium impact	3-4
3	Significant impact	5-8
4	Major impact	9-10



Table 8 Evaluation of Impacts

Sl.No	Environmental Attributes	Project Activities	Nature of Impacts										Without EMP	With EMP	
			Magnitude	Reversible	Irreversible	Long Term	Short Term	Direct	Indirect	Positive	Negative				
<b>A. Construction Phase</b>															
<b>1.Impacts on Land Environment</b>															
1	Land	Construction of intake canal, pump house and rising main	M	✓			✓	✓				✓	Orange	Green	
		Excavation for canal	H	✓		✓		✓				✓	Red	Green	
		Vehicular movement	M	✓			✓	✓				✓	Green	Green	
2	Change in Topography	Construction of intake canal, pump house and rising main	M	-	✓	✓	-	✓				✓	Orange	Green	
3	Loss of Productive Soil	Construction site, temporary offices, workers camps, stockyards	M	✓				✓		✓		✓	Orange	Green	
		Construction of Haul roads	L	✓			✓	✓				✓	Green	Green	
		Excavation for canal	H	✓		✓		✓				✓	Red	Green	
4	Compaction of Soil	Site Clearance	L	✓			✓	✓				✓	Green	Green	
		Movement of vehicles	L	✓			✓	✓				✓	Green	Green	
5	Contamination of Soil	Machinery and operation of the Diesel Generator Sets	M		✓		✓		✓			✓	Orange	Green	
		Labor camps	H	✓			✓		✓			✓	Red	Green	
<b>2. Impacts on Water Environment</b>															
1	Eutrophication	Sewage from labor camp	H	✓			✓	✓				✓	Red	Green	
		Muck disposal	H	✓			✓	✓				✓	Red	Green	
2	Change in River	Construction of Intake	M	✓			✓		✓			✓	Orange	Green	

Sl.No	Environmental Attributes	Project Activities	Nature of Impacts										Without EMP	With EMP
			Magnitude	Reversible	Irreversible	Long Term	Short Term	Direct	Indirect	Positive	Negative			
	Water Quality	canal, jack well cum pump house, sumps, disnets												
		Diversion of river water	H		✓	✓		✓		✓				
		Decomposition of sediments and deposition of organic matter	M	✓			✓	✓			✓			
		Washing of equipments	L	✓			✓	✓			✓			
		Muck disposal	M	✓			✓	✓			✓			
3	Change in surface and ground water quality	Sewage from labor camp	H	✓				✓		✓		✓		
<b>3. Impacts on Air Environment</b>														
1	Increase in dust concentration	Construction equipments, operation of DG sets,	M	✓				✓	✓			✓		
		Excavation	H	✓				✓	✓			✓		
2	Fugitive Emissions from various sources	Vehicular movement	H	✓				✓	✓			✓		
		Loading and dislodging Use of sand, fine aggregates	M	✓				✓	✓			✓		
		Batching plant	M	✓				✓	✓			✓		
3	Increase in SO <sub>2</sub> , PM, NO <sub>x</sub>	Vehicular movement	M	✓				✓	✓			✓		
		Operation of DG sets	M	✓				✓	✓			✓		
		Fuel Combustion in equipments and Vehicles	M	✓				✓	✓			✓		
		Burning of fuels from construction workers	M	✓				✓	✓			✓		
4	Impact on Human Health	Emission of Dust particles	M	✓				✓	✓			✓		
<b>4. Impact on Noise Environment</b>														

Sl.No	Environmental Attributes	Project Activities	Nature of Impacts											Without EMP	With EMP
			Magnitude	Reversible	Irreversible	Long Term	Short Term	Direct	Indirect	Positive	Negative				
1	Increase Noise Level	Movement of vehicles	M	✓				✓	✓				✓	Orange	Green
		Operation of D.G sets	L	✓				✓	✓				✓	Green	Green
		Movement of vehicles carrying raw materials	M	✓				✓	✓				✓	Orange	Green
<b>5. Impact on Biological Environment</b>															
1	Pressure on existing natural resources	Immigration of labor population	L		✓	✓			✓				✓	Green	Green
2	Reduced Photosynthetic activity, Wilting of plants	Transportation of construction materials	M		✓			✓		✓			✓	Orange	Green
		Site Clearance	M		✓	✓			✓				✓	Orange	Green
3.	Impacts on Fishes and Aquatic Ecosystem	Increase in turbidity of water due to Washing of machineries	M	✓				✓	✓				✓	Orange	Green
		Sewage from labor camp	H	✓				✓	✓				✓	Red	Green
<b>6. Impact on Socio-economic Environment</b>															
1	Land acquisition	Affecting livelihood	H		✓	✓			✓				✓	Red	Orange
2	Impact on Human Health	Due to water/air borne diseases, traffic movement	H	✓				✓		✓			✓	Red	Green
<b>B. Operation Phase</b>															
1	Impacts on Land Environment	Application of natural fertilizers and pesticides	H		✓	✓			✓		✓			Orange	Green
2	Impact on water environment	Application of fertilizers and pesticides	M		✓	✓				✓	✓			Yellow	Green

## 5. Analysis of Alternatives

The command area villages are deprived of irrigation facilities from the existing Ainapur LIS project. The eastern side of the command area is covered under Halyal and Karimasuti LIS. Thus, the villages under the proposed command area are deprived of irrigation facilities. In order to provide irrigation to these deprived villages Basaveshwara Lift Irrigation scheme has been proposed.

## 6. Environmental Monitoring Program

The purpose of the monitoring programme is to ensure that the objectives of the project is achieved through the mitigation measures and result in desired benefits to environment and local population of the region.

Table 9 Environmental Monitoring Plan for construction phase (24 months)

Environmental Parameters	Parameters to be Monitored	Frequency of Monitoring	Locations	Responsibility	Estimated Cost in Rs.
Surface water quality of Krishna river	pH, Temperature, EC, TDS Alkalinity, TH, DO, BOD, COD, NO <sub>3</sub> , PO <sub>4</sub> , Cl, SO <sub>4</sub> , Na, K, Ca, Mg, Silica, Oil & grease, MPN, Total coliform	Fortnightly once until completion of Intake canal	Near Lift Point (Ainapura), Down stream and Upstream of lift point (3 No.)	Contractors or agencies appointed by KNNL	20,000/-
Ground water quality	pH, Temperature, EC, TDS Alkalinity, TH, NO <sub>3</sub> , PO <sub>4</sub> , Cl, SO <sub>4</sub> , Na, K, Ca, Mg, Silica, Oil & grease, MPN, Total coliform	Once in a month	Agrani, Ananthapur, Gundewadi, Shirur (4 Nos.)	Contractors or agencies appointed by KNNL	30,000/-
Soil Quality	pH, EC, Mg, Ca, Alkalinity, Cl, Na, K, Organic Carbon, K, PO <sub>4</sub> , SAR, N and Salinity	Once in a month	lift point –Ainapur, Masarguppi, Agrani – Ingalgaon, Shivanoor, Gundewadi, Bevanoor, Anantpur, Khilegaon, Pandegaon, Sambaragi, Madabhavi (11 Nos.)	Contractors or agencies appointed by KNNL	38,500/-
Air Quality	PM <sub>10</sub> , PM <sub>2.5</sub> , NO <sub>2</sub> and SO <sub>2</sub>	Monthly	Lift point - Ainapur, Agrani – Ingalgaon, Malabad, Pandegaon (4 Nos.)	Contractors or agencies appointed by KNNL	37,000/-
Noise Levels	Leq Day, Leq Night in dB(A)	Monthly once until completion of construction works	Lift point - Ainapur, Agrani – Ingalgaon, Malabad, Pandegaon (4 Nos.)	Contractors or agencies appointed by KNNL	22,000/-

Environmental Parameters	Parameters to be Monitored	Frequency of Monitoring	Locations	Responsibility	Estimated Cost in Rs.
Sub-Total / month					1,47,500/-
<b>Sub-Total A - For 24 months</b>					<b>35,40,000/-</b>
Aquatic life	Limnological and biological studies	Six monthly once until completion	Near lift point (1 No.)	Contractors or agencies appointed by KNNL	2,00,000/-
Health check ups	Spirometry, Pulse Oxymetry, Blood Test, Lung Function Test, Eye test, Physical fitness tests	Six monthly once until completion	Labor camp (1 No.)	Contractors or Doctors / PHC appointed by KNNL	3,00,000/-
Sub-Total / 6 month					5,00,000/-
<b>Sub-Total B - For 24 months</b>					<b>20,00,000/-</b>
<b>Total</b>					<b>55,40,000/-</b>

Table 10 Environmental Monitoring Plan for operation phase (3 years)

Environmental Parameters	Parameters to be Monitored	Frequency of Monitoring	Locations	Responsibility	Estimated Cost in Rs.
Surface water quality of Krishna river	pH, Temperature, EC, TDS Alkalinity, TH, DO, BOD, COD, NO <sub>3</sub> , PO <sub>4</sub> , Cl, SO <sub>4</sub> , Na, K, Ca, Mg, Silica, Oil & grease, MPN, Total coliform	Quarterly once for 3 years	(Near Lift Point), Down stream and Upstream of lift point (3 No.)	Agencies appointed by KNNL	20,000/-
Soil Quality	pH, EC, Mg, Ca, Alkalinity, Cl, Na, K, Organic Carbon, K, PO <sub>4</sub> , SAR, N and Salinity	Quarterly once for 3 years	lift point – Ainapur, Masarguppi, Agrani – Ingalgaon, Shivanoor, Gundewadi, Bevanoor, Anantpur, Khilegaon, Pandegaon, Sambaragi, Madabhavi (11 Nos.)	Agencies appointed by KNNL	38,500/-
Sub-Total /3 months once					58,500/-
<b>Sub-Total A for 3 years</b>					<b>7,02,000/-</b>
Aquatic life	Limnological and biological studies	Yearly once for 3 years	Near intake canal (1 No.)	Agencies appointed by KNNL	1,50,000/-
<b>Sub-Total B for 3 years</b>					<b>4,50,000/-</b>
<b>Total</b>					<b>11,52,000/-</b>

Based on the above and as per the guidelines of MoEF under the supervision of Executive Engineer, HBC Division, KNNL, Athani, six monthly compliance reports shall be submitted to Regional Office of MoEF, Bangalore.

In order to verify the effectiveness of monitoring program, Regional Office, MoEF, Bangalore and Regional Office, KSPCB, Belagavi will be the enforcing agency to monitor the project activities.

## 7. Social Impact Assessment

### 7.1 Project affected villages

One of the direct impacts of the project is Land acquisition and this project requires land from 20 villages as detailed in the Table below.

Table 11 Details of project impacted villages

Sl.No.	Impacted villages	Taluk & District	Sl. No.	Impacted Villages
1	Khilegaon	Athani taluk, Belagavi district	11	Bammanal
2	Ajur		12	Jambagi
3	Anathapur		13	Kallotti
4	Malabad		14	Kiranagi
5	Bevanoor		15	Aralihatti
6	Tawashi		16	Gundewadi
7	Naganur		17	Shivanoor
8	Shirur		18	Madabhavi
9	Sambaragi		19	Hanamapur
10	Aralihatti		20	Masarguppi

### 7.2 Impact of the project

- Basaveshwara Lift Irrigation scheme is proposed to irrigate an area of 27462 Ha spread across 22 villages of Ainapur, Athani taluk, Belagavi district, utilizing 4 T.M.C of water from Krishna River during Khariff season. This will help to increase the agricultural production during Kharif season which in turn will raise their economic status and standard of living.
- Employment Generation due to the project: Around 300 people (50 Technical and 250 construction labourers) are expected to be employed for the construction work of intake channel, jack well cum pump house, raising main, delivery chamber and distribution network with flow irrigation. During operation phase labourers will be appointed for operation and maintenance of the jack well.
- The only negative impact is that 438Ha of agricultural land spread across 20 villages and owned by 404 titleholders will be lost for the project construction purposes, but they will be sufficiently compensated as per Right to Fair Compensation and Transparency in Land Acquisition Rehabilitation and Resettlement Act (RTFC&LARR Act), 2013.

So overall impact of the project is progressive for the development of the villages and the agricultural production will increase contributing to the economy of the region. Villagers, generally welcome such irrigation projects and cooperates with the land acquisition process .The Department takes due care to consider the development needs of the people and due care will be taken to avoid all negative impacts.

## **8. Project 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. The details before and after the advent of irrigation is given below.
- Extensive agricultural production supplies raw materials to the nearby small scale industries thereby increasing the economy in the region.
- Altogether, population of 68,735 belongs to 12,636 families in the command area will be benefitted directly under the scheme.
- Direct employment opportunities for 300 members, 250 during construction phase and 50 members during operation phase of the project. Further, indirectly labor opportunities will be substantially improved since larger area will be brought under irrigation.
- It improves fodder crops and in turn dairy farming in the command area.
- Labor requirement will be reduced considerably.
- The project requires only 438 Ha for implementation of the scheme and does not envisage rehabilitation and resettlement.
- No tree cutting involved and no forest land required for implementation of the scheme. Agro forestry shall be taken up in command area and it improves the ecosystem services.



## 9. Environmental Management Plan

Although agriculture is usually associated with its positive impacts on human life, irrigation practices may be associated with impacts on environmental conditions, which may eventually curtail the sustainability of irrigation projects. For this reason, Environmental Impact Assessment (EIA) has been recognized as an integral part of the early planning studies of irrigation projects in order to identify any expected negative impacts and suggest the necessary mitigation plans to curb these impacts through formation of Environmental Management Plan (EMP).

Project Activity	Impacts	Mitigation measures	Advantage	Location	Responsibility & Monitoring Agency	Time frame
<b>A. Construction Phase</b>						
<b>1. Air Environment</b>						
Fuel combustion from construction equipments	Emission of pollutants (PM, SO <sub>2</sub> )	High speed Diesel with low sulphur content will be used for the construction equipments/ vehicles which has low ash content	Reduction in pollutants level	Intake canal, jack well cum pump house	Contractor & KNNL	Throughout the construction period (24 months)
Vehicular movement and operation of batching plants	Dust pollution	Water sprinkling and vehicles should be covered with tarpaulin, speed limit restrictions	Reduction in fugitive emissions	Intake canal, jack well cum pump house, access roads, around construction site, disnets	Contractor & KNNL	Water sprinkling - 3 times/day
Burning of fire wood	Emission of pollutants (C, SO <sub>2</sub> )	Labor camps supplied with LPG facility	Reduction in emission levels	Labor camp	Contractor & KNNL	Throughout the construction period (24 months)

Project Activity	Impacts	Mitigation measures	Advantage	Location	Responsibility & Monitoring Agency	Time frame
Operation of DG sets, excavation	Health problems to labors	Usage of Nose masks	Healthy working environment	Intake canal, jack well cum pump house, access roads, around construction site, disnets	Contractor & KNNL	Throughout the construction period (24 months)
<b>2. Noise Environment</b>						
Operation of DG sets and usage of construction equipments	Increase in noise levels	PPEs such as, ear plugs and ear muffs will be provided to the workers, Acoustic enclosures for DG sets	Reduction in noise levels	Intake canal, jack well cum pump house, access roads, around construction site, disnets	Contractor & KNNL	Throughout the construction period (24 months)
Vehicular Movement	Increase in noise levels	Construction activities shall be restricted only to day time	Reduction in noise levels	Intake canal, jack well cum pump house, access roads, around construction site, disnets	Contractor & KNNL	Throughout the construction period (24 months)
<b>3. Water Environment</b>						
Sewage from labor camps	Surface and ground water pollution	Treatment through septic tank and soak pit	Reduction in pollution load	Labor camps	Contractor & KNNL	Throughout the construction period (24 months)
Stagnation of water	Mosquito breeding grounds	Providing proper sanitary facilities	Healthy environment	Labor camps	Contractor & KNNL	Through out the construction period (24 months)
Excavation and operation of DG	Muck generation,	Reuse of muck at site, disposal of used oil	Reduction in surface and ground water	Intake canal, jack well cum pump house, disnets	Contractor & KNNL	Throughout the

Project Activity	Impacts	Mitigation measures	Advantage	Location	Responsibility & Monitoring Agency	Time frame
sets	blockage of natural drains and contamination of ground water	KSPCB authorized preprocessors	contamination			construction period (24 months)
Construction of intake canal	Increase in turbidity levels in river	Provision of sand bags	Healthy aquatic ecosystem	Intake canal	Contractor & KNNL	4 Months
<b>4. Soil Environment</b>						
Construction of labor camps, stock yards	Loss of fertile soil	Waste land will be used for erection of labor camps	Land resource optimization	Waste land	Contractor & KNNL	Throughout the construction period (24 months)
Maintenance of DG sets and construction machineries	Soil contamination	Maintenance at service centres	Reduction in soil contamination	Intake canal, jack well cum pump house, access roads, around construction site, disnets	Contractor & KNNL	Throughout the construction period (24 months)
<b>5. Solid and Hazardous waste Environment</b>						
Excavation	Change in hydraulic regime	Reuse of excavated earth	Natural drainage pattern maintained	Intake canal, jack well cum pump house, disnets	Contractor & KNNL	Throughout the construction period (24 months)
Improper dumping of solid waste from labor camps	Water pollution	Labor camps at 1 km away from river, Disposal to Municipal Authorities	Reduction in siltation and eutrophication	Intake canal and river course	Contractor & KNNL	Throughout the construction period (24 months)
<b>6. Biological Environment</b>						

Project Activity	Impacts	Mitigation measures	Advantage	Location	Responsibility & Monitoring Agency	Time frame
Construction activities	Wilting of plants	Water sprinkling	Normal photosynthetic activity	Intake canal, jack well cum pump house, access roads, around construction site, disnets	Contractor & KNNL	Throughout the construction period (24 months)
Labor camps	Riverine water pollution	Labor camps at 1 km away from river, restrictions for not using the river water	Zero water pollution	Labor camps	Contractor & KNNL	Throughout the construction period (24 months)
Use of fire wood	Cutting of trees	LPG for labor camps	Positive ecosystem services	Labor camps and its surrounding	Contractor & KNNL	Throughout the construction period (24 months)
Washing of construction equipments	Reduced DO levels	Washing at authorized service stations	Aquatic system maintained	Krishna river	Contractor & KNNL	Throughout the construction period (24 months)
<b>7. Socio-economic environment</b>						
Land acquisition	Affecting livelihood	Compensation as RFCLA&TRR Act 2013	Sustainability for livelihood opportunities	Khilegaon, Ajur, Anantapur, Malabad, Bevanoor, Tawashi, Naganur, Shirur, Sambargi, Aralihatti, Bammanala, Jambagi, Kalloti, Kiranagi, Balligeri, Gundewadi, Shivanoor, Madabhavi, Hanamapur, Masarguppi	KNNL	6 months
Vehicular movement	Health problems	Water sprinkling and movement of vehicles carrying raw materials	Healthy environment		Contractor & KNNL	Throughout the construction

Project Activity	Impacts	Mitigation measures	Advantage	Location	Responsibility & Monitoring Agency	Time frame
		only during night time.				period (24 months)
<b>B. Operation phase</b>						
Excess application of fertilizers and pesticides	Soil and water contamination	Awareness on organic farming practices	Reduction in pollution load	Command area	KNNL and Water user Associations	3 years

## 9.1 Command Area Development Plan

### 9.1.1 Water Users' Association (WUA)

The modern irrigation management aims at high efficiency of water conveyance and appropriate methods of water application, through participatory irrigation management at each stage of irrigation development. In Karnataka, it is essential to promote and implement the theme of participatory irrigation management in all the Irrigation projects through formation of Water Users' Association. The construction of OFD works will be taken up after formation of WUAs under the supervision of CADA, Belagavi.

The efficient management of irrigation water for maximizing productivity requires, firstly the efficient on farm water management and secondly the optimization of the use of water and land, through appropriate methods of water application. The efficient on-farm water management is related to water delivery system and allied works in the command area, which distributes the water to each farm. The items of works pertaining to on farm water management are termed as "On Farm Development Works". The On Farm Development works comprise of the following,

- Maintenance of disnets, sumps
- Control structures
- Maintenance of Automation
- Surface Drainage system
- Farm roads
- Land forming (Smoothing / grading/leveling)

### 9.1.2 Green Agro forestry activities in command area

Agro-forestry refers to the practice of Agriculture and Forestry in the same piece of land. The Karnataka Forest Department (KFD) has accorded high emphasis on farm forestry as a component in the afforestation programmes. The sector of Agro-forestry or Farm Forestry has a good potential as most of the agriculture lands are devoid of any trees, in the district. The trees if planted on the bunds and on the boundary of the lands, protect the crops from the desiccating high winds and also provide additional income from the trees to the farmer apart from providing him fodder and fuel as well.

Table 12 Green belt developments Plan around intake canal and jack well

Area proposed for Green belt	No. of saplings	Source for saplings	Time frame	Responsible agency for implementation
Intake canal	30	Belagavi KFD Nursery	After completion of inspection path works	KNNL
Jack well cum pump house	80	Belagavi KFD Nursery	After completion of site works	KNNL
Command area	10/ ha	Belagavi KFD Nursery	First 2 years - 137310 Next 2 years – 137310	KNNL and KFD
Canal Bank Plantation	12720	Belagavi KFD Nursery	After completion of inspection path works	KNNL and KFD

Table 13 Species recommended for green belt development

Sl.No	Local Name	Botanical Name	Sl.No	Local Name	Botanical Name
1	Ala	<i>Ficus bengalensis</i>	18	Kadivala	<i>Stephegyne parviflora</i>
2	Basari	<i>Ficus infectoria</i>	19	Kadnugge	<i>Moringa pterygosperma</i>
3	Beete	<i>Dalbergia latifolia</i>	20	Kakke	<i>Cassia fistula</i>

Sl.No	Local Name	Botanical Name	Sl.No	Local Name	Botanical Name
4	Buruga	<i>Bombax ceiba</i>	21	Kanagalu	<i>Dillenia pentagyna</i>
5	Dindiga	<i>Anogeissus latifolia</i>	22	Kaval	<i>Careya arborea</i>
6	Godda	<i>Lannea coromandlica</i>	23	Mathi	<i>Terminalia tomentsa</i>
7	Goni	<i>Ficus mysorensis</i>	24	Muthuga	<i>Butea monosperma</i>
8	Halasu	<i>Artocarpus heterophyllus</i>	25	Nandi	<i>Lagerstroemea lanceolata</i>
9	Honne	<i>Pterocarpus marsupium</i>	26	Nelli	<i>Emblica officinalis</i>
10	Hunalu	<i>Terminalia paniculata</i>	27	Neralu	<i>Syzygium cumini</i>
11	Ippe	<i>Madhuca Indica</i>	28	Shivani	<i>Gmelina arborea</i>
12	Jagalaganti	<i>Diospyros montana</i>	29	Tadasalu	<i>Grewia tilaefolia</i>
13	Jambe	<i>Xylia xylocarpa</i>	30	Tare	<i>Terminalia bellerica</i>
14	Saguvani	<i>Tectona grandis</i>	31	Hunase	<i>Tamarindus indica</i>
15	Yethiga	<i>Adina cordifolia</i>	32	Honge	<i>Pongamia pinnata</i>
16	Mavu	<i>Mangifera indica</i>	33	Huruglu	<i>Chloroxylon swietenia</i>
17	Kadugeru	<i>Semecarpus anacardium</i>	34	Bevu	<i>Azadirachta indica</i>

## 9.2 Fisheries Development Plan

Around 10 lakhs fish fingerlings comprised of Indian major crap – catla catla -40.0% *Labeo rohita* -30.0% and *Cirrhinus mrigake* -30.0% in the size of over 75 mm are to be introduced in the Krishna River annually in and around the project site. Fisheries division at Narayanpur reservoir complex, Vijayapura, saudatti and Tungabhadra dam (Bellary) will definitely meet the requirement needed. The project site authorities related to this project could also contribute their service and also submit their indents well in advance say during January – February of each year to the respective officers of the department of fisheries who, on their part, will make sure to effect the supply required, around august –September, the process helps in increased fish production from the river Krishna and their reservoir/impounded to be formed. The entire profession since years, generation after generation to modestly ekk out their livelihoods.

## 9.3 Muck Disposal plan

Table 14 Muck disposal plan

Total excavated quantity cum	Service Road and Inspection Path	Formation of embankment	Filling trenches	Land leveling	Constructi on of CD works
2059650	617895	308948	823860	205965	102982

## 9.4 Cost for implementing EMP

Table 15 Cost for implementing EMP

Item	Particulars	Estimated Cost in Rs.
<b>I. Construction Phase</b>		
<b>A. Air Pollution Control</b>		
Water sprinkling	400/- x 2 tractors x 3 trips per day x 24 monthsX 25days (excluding rainy season and holidays)	7,00,000.00
Personnel protective equipments	Lumpsum	50,000.00
Chimney to DG sets	Lumpsum	50,000.00
LPG as cooking fuel	4 cylinders per unit x 25 units x 550 x 2 years	18,00,000.00
<b>Sub-total A</b>		<b>26,00,000.00</b>
<b>B. Noise Pollution Control</b>		

Item	Particulars	Estimated Cost in Rs.
Personnel protective equipments	Lumpsum	50,000.00
<b>Sub-total B</b>		<b>50,000.00</b>
C. Water Pollution Control		
Septic and soak pit	Lumpsum	1,00,000.00
Sand bags	Lumpsum	50,000.00
<b>Sub-total C</b>		<b>1,50,000.00</b>
D. Solid & Hazardous Waste Management		
Solid waste collection bins with shed	Lumpsum	50,000.00
Hazardous waste collection area with shed	Lumpsum	50,000.00
<b>Sub-total D</b>		<b>1,00,000.00</b>
E. Biological Environment		
Plantation around intake canal and jackwell	110 saplings x 100 rs	11,000.00
Agro forestry development	274620 saplings x 10 rs	27,46,200.00
Fisheries development	Lumpsum	10,00,000.00
Canal bank plantation	63.6 Km X 1 sapling/5m = 12720 saplings x 1900 rs	2,41,68,000.00
<b>Sub-total E</b>		<b>2,79,25,200.00</b>
F. Socio-economic Environment		
Land acquisition	1081.08 Acres x 2.74 cr x 2 x 100 solatium	93,80,00,000.00
Awareness and Training	5 lakhs per year x 3 years	15,00,000.00
<b>Sub-total F</b>		<b>93,95,00,000.00</b>
G. Environmental Monitoring during construction period		
<b>Sub-total G</b>		55,40,000.00
<b>Total (A-G)</b>		<b>97,58,65,200.00</b>
<b>II. Operation Phase</b>		
Environmental Monitoring for 3 years		11,52,000.00
Green Belt mainatenance for 3 years		15,00,000.00
Awareness and Training for 3 years		15,00,000.00
Soil conservation measures and implementation of CAT plan for 5 years		9,68,00,000.00
<b>Total</b>		<b>10,09,52,000.00</b>