

Executive Summary

OF

**SUREWADA LIFT IRRIGATION SCHEME
ACROSS THE WAINGANGA RIVER
Tahsil Bhandara, District Bhandara; Maharashtra**

**PROJECT PROPONENT
WATER RESOURCE DEPARTMENT
Bhandara
Government of Maharashtra**

EXECUTIVE SUMMARY

1.0 INTRODUCTION

Irrigation is an artificial application of water to the soil. It is used to assist in the growing of agricultural crops, maintenance of landscapes, and revegetation of disturbed soils in dry areas and during periods of inadequate rainfall. Various types of irrigation techniques differ in how the water obtained from the source is distributed uniformly to the entire field, so that each plant has appropriate water requirement which the plant needs. Irrigation Schemes mainly comprises of canal and lift irrigation, where the distribution of water is important. Thus the lift irrigation will certainly increase agricultural productivity per unit of the land.

The surewada Lift Irrigation Scheme (L.I.S) is proposed by Water Resource Department, Bhandara Maharashtra, on Wainganga river near village Surewada. The scheme previously envisages lifting 30.04 Mm³ of water from the water spread area of Goshikhurda reservoir. But now with revised Net Irrigation Requirement as proposed by WALMI Aurangabad & approved by C.E Goshikhurda Project vide Ltr. No. 582/ CEGP/T-3(2)/Surewada L.I.S Dtd. 7/02/2011, it now envisages lifting 22.54 Mm³ of water. This water is proposed to be utilized to irrigate 5000 ha. of Land.

The scheme is administratively approved by the competent authority vide Govt. Resolution No. Surewada/2001/1080/(171/01) Dt. 29/11/2006. The cost of the project will be 68.58 Crores.

Design parameters of scheme are initially finalized in subcommittee meeting held on 15/12/2009 & 21/04/2010 held at Nagpur. However, Standing committee meeting held on 22/04/2010 at Nagpur it is directed to re-estimate the crop water requirement from the recognized institute. Accordingly revised crop water requirement is worked out by WALMI Aurangabad. The revised crop water requirement & design discharge is approved & recommended by C.E. Goshikhurda project, (W.R.) Nagpur. Vide Marathi Ltr. No. 582/CE Gosi/T-3(2)/Surewada LIS/Design Dt 7/02/2011.

2.0 PROJECT OBJECTIVES

Flow irrigation facilities are negligible and farmers have to depend on monsoon rains. But its distribution pattern is not uniform, dry spells of fortnight are often experienced. Supported agriculture will help in creating more employment opportunities, which is the need of the hours. Further with development of irrigation in area. Agro industries would also be developed. Bhandara District is thickly covered by forest (6.0%). Construction of dam which involves submergence of forest land is not possible due to forest conservation Act, 1980. Hence the Lift Irrigation is the best option which requires minimum forest land.

3.0 LOCATION OF THE PROJECT SITE

The Surewada Lift Irrigation Scheme is proposed on the left bank of River Wainganga near village Surewada, Taluka & District Bhandara. The project site is approachable 10 Km away from district headquarter, 3 Km away from Surewada village. The scheme envisages construction of pump house on Wainganga River and distribute to irrigate 5000 Ha of land identified in 22 villages. The location of the project site is shown in **Figure 1** as given below:

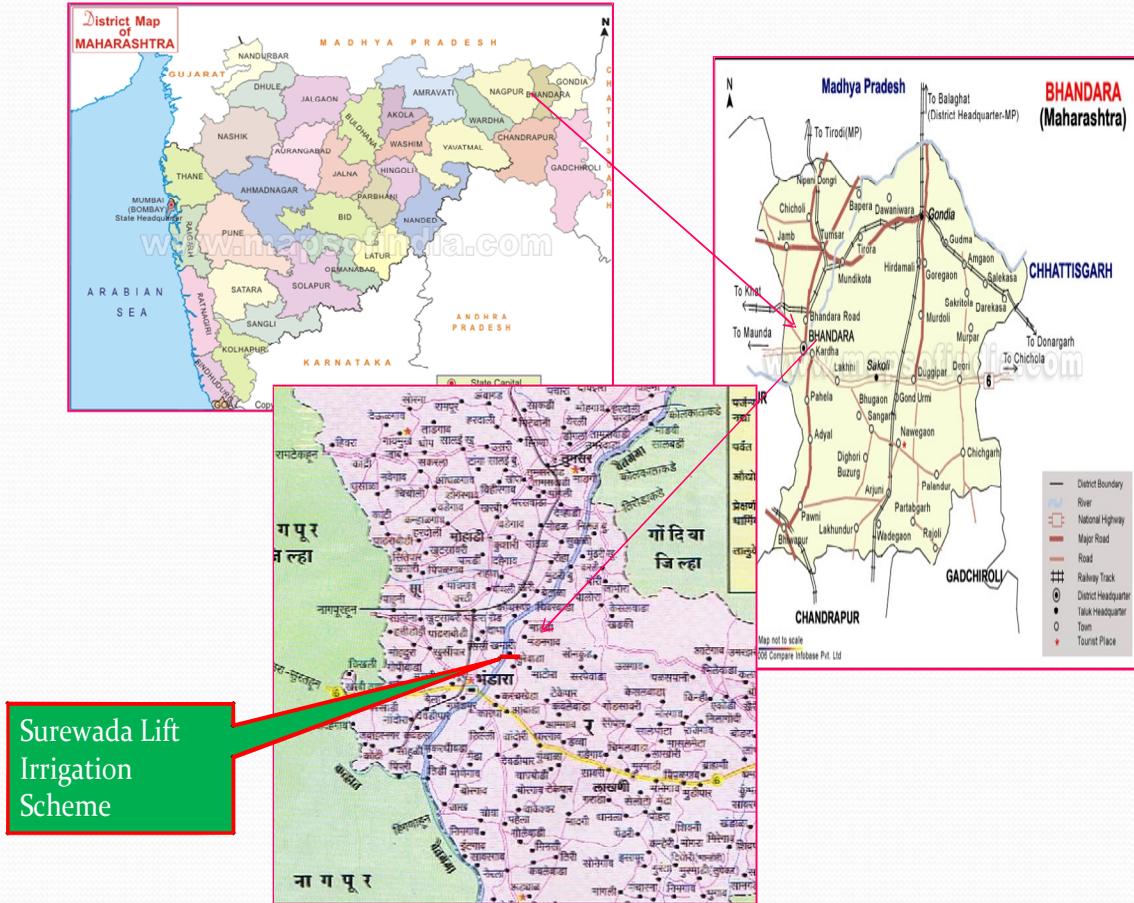


Figure 1: Location map of the project

4.0 SALIENT FEATURES OF THE PROJECT

Name of Project	Surewada Lift Irrigation Scheme State Maharashtra
District	Bhandara
Taluka	Bhandara
Nearby Villages	Surewada
Toposheet	55 O/12, 55 O/16
Latitude	21° 10' 50" N
Longitude	09° 44' 43" E
River Basin	
Name of River	Wainganga River
Basin	Godavari Basin
Sub-Basin	Wainganga
HYDROLOGY	
Catchment Area	
Gross Catchment	19388.54 Km ²
Free Catchment	4418.52 Km ²
YIELD AVAILABLE	
<ul style="list-style-type: none"> • 75% Dependable • Up stream utilization 	8963.75 Mm ³
<ul style="list-style-type: none"> Madhya Pradesh Maharashtra 	5977.72 Mm ³ 2362.72 Mm ³
Total Available Yield at Site	623.31 Mm ³
Utilization of yield	30.07 Mm ³
Expected cost of the project	Rs. 68.59 Crore
B.C. Ratio	1.61

5.0 DESIGN OF THE RISING MAIN

Thickness of rising main is worked out on the following basis.

- I. Thickness computed for internal positive pressure as per I.S.5822. 1994 cl.B-9.2 for normal pressure and 50% surge pressure (t_1).
- II. Thickness computed for negative (Vaccum) pressure for resistance against buckling for 0.58 Kg/cm² pressure, which includes 0.33 Kg/cm² atmospheric pressure and remaining of back filing material 1.2 m above buried pipe (t_2)
- III. Thickness as per cl.No.5 of I.S. 4889-1375 part-VII, required from handling consideration (t_3).

Considering maximum thickness with tolerance of 12.5% above 3 cases, however this thickness should not be less than as recommended in I.S. 3589-1991 as minimum thickness.

Parameters proposed by Central Designs Organisation are as under.

Area to be benefitted	Proposed
• Command	
Gross Command area (shown in Fig. 2)	7219 Ha.
Culturable Command area	5883 Ha.
Irrigable Command area	5000 Ha.
No. Of villages	22
• Information about pumps	
Type	V.T Pumps
No. of Pumps	5 Nos
capacity	410 HP/each
Efficiency of pumps	90
Total H.P. required	2050
• Rising Main	
Length	3.9 Km
No of rows	1 no
Diameter	2000 mm
Discharge	2.89 m ³ /sec
• Pump House (Layout of the pump is shown in Fig. 3)	
Pump level	263.700 M
Water Discharge level	263.350 M
Pump medium level	268.500 M
Minimum flow level	268.500 M
• Canals	
Canal level	276.500 M
Length	22.32 Km
FSD	2.00 M
Design Discharge	2.89 M ³ /Sec
Open Flow	1.05 M

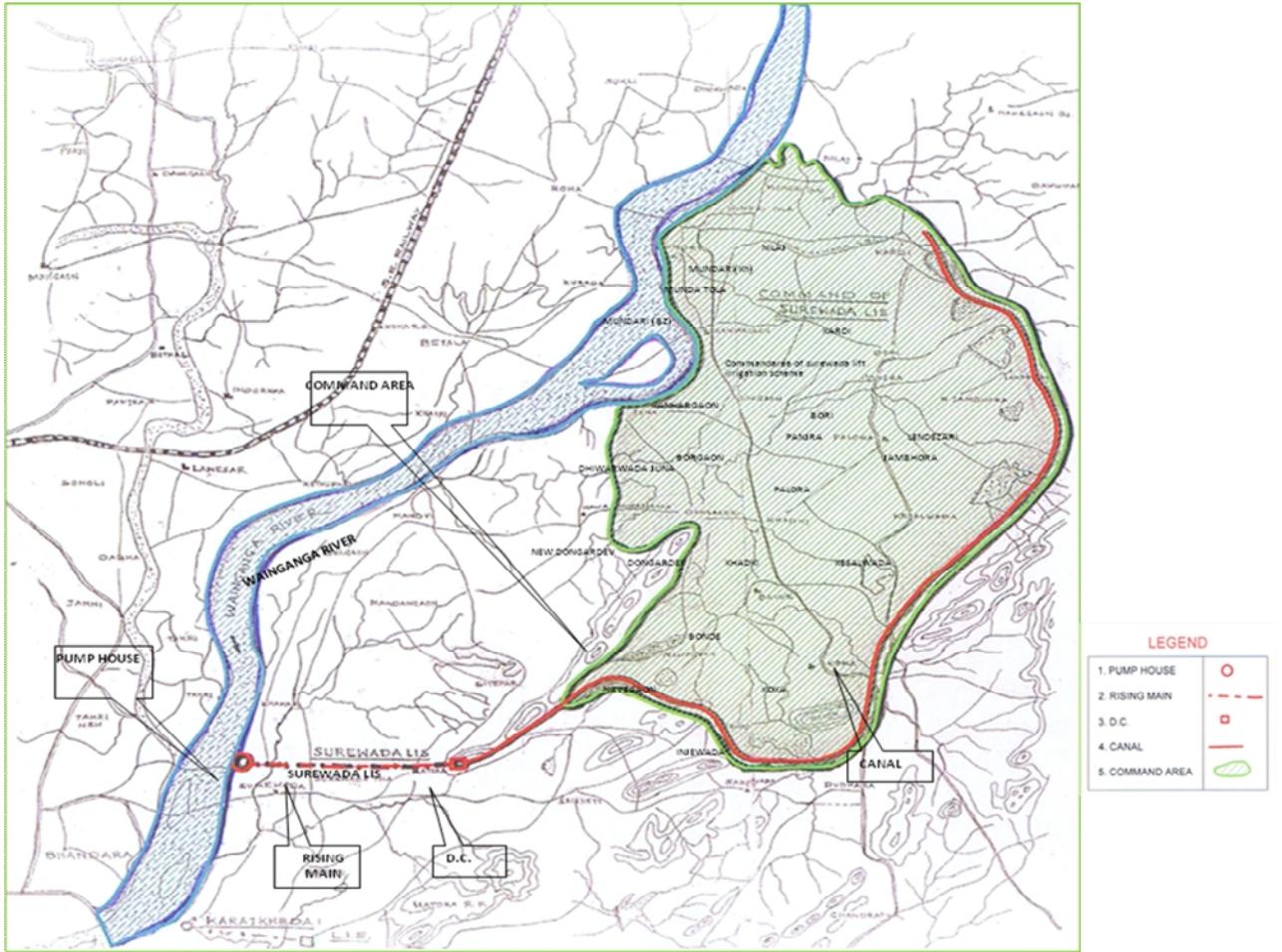


Figure 2 Command Area Map

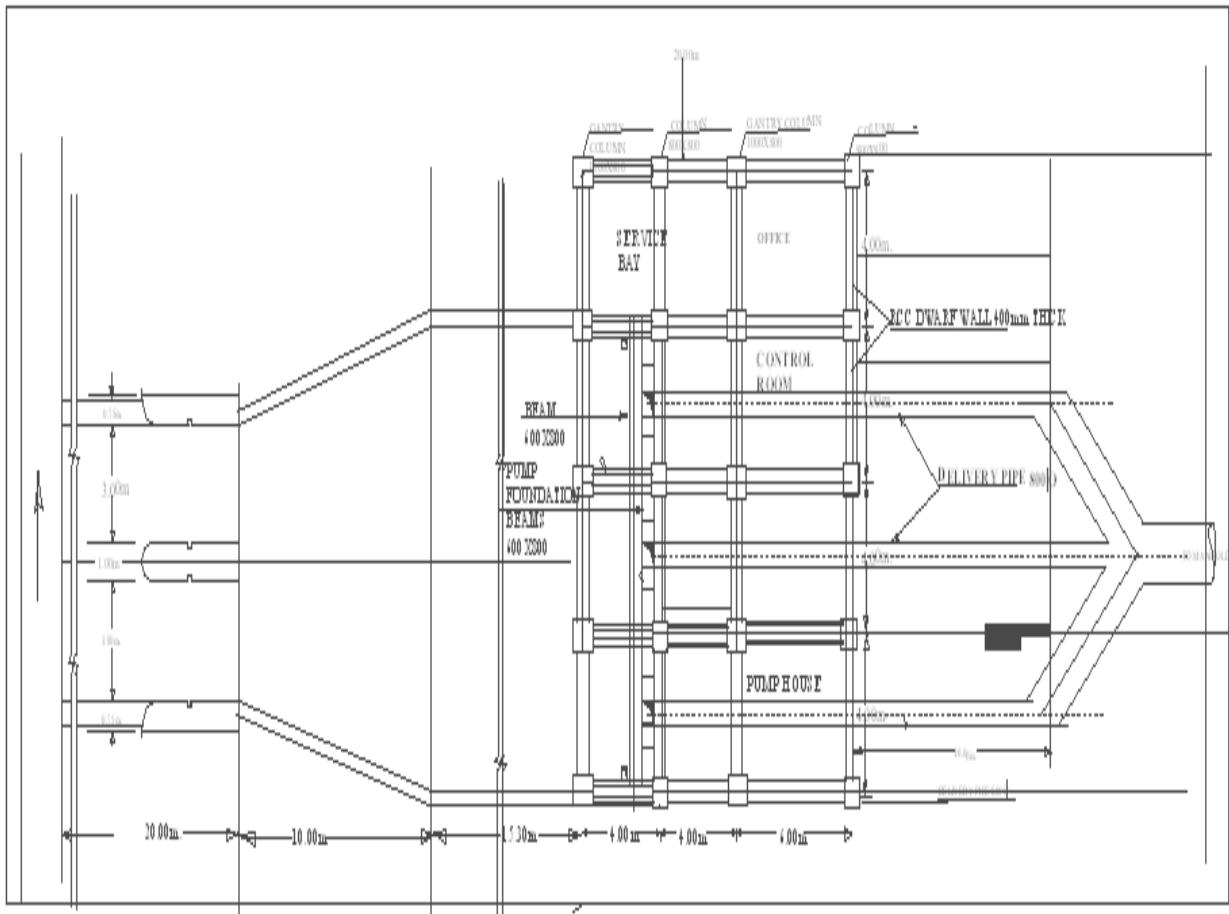


Figure 3 Layout of the pump house

6.0 DESCRIPTION OF THE ENVIRONMENT

The study was carried out to generate baseline data with respect to air, water, noise, soil quality, land use pattern, hydrogeology, flora & fauna and socio-economic aspects. The study was carried out summer seasons 2011.

Meteorological Data: The last 30 years data of Gondia observatory of IMD (Indian Meteorological Department) shows that In May the mean daily maximum temperature is about 42.1oC and the mean daily minimum temperature is about 28.4oC. The heat in the summer season is intense and on some days in May and June the maximum temperatures may rise up to 47oC. The total rainfall of the region is 1397.8 mm.

Air Environment: The ambient air quality at ten different locations was monitored during the study period. The monitoring was carried out simultaneously at nine locations 'each day for 24 hours on two consecutive days every week. The analysis was carried out as per the method described in the applicable IS-5182. The 98 percentile of the PM₁₀, PM_{2.5}, SO₂ and NO_x during the study periods are shown in **Table 2**

Table 2 :
Ambient Air Quality

Parameters	P ₉₈ Values (µg/m ³)
PM ₁₀	49.7
PM _{2.5}	16.8
SO ₂	10.0
NO _x	12.7

The value of parameters at all the location is found within the limits prescribed by Central Pollution Control Board (CPCB).

Water Environment

The pH values ranged from 7.9 to 8.3 for four surface water samples and 7.3 and 7.6 for five ground water samples. Out of six, three surface water samples, collected during rainy season, the turbidity was higher between 4.5 NTU to 5.5 NTU. On the other hand, three ground water samples had turbidity <1.0 NTU well below desirable level of 05 NTU as per drinking water standard IS 10500-1991. In general, the ground water quality of Study area is good, which can be used drinking purpose after necessary disinfection.

Noise Environment: The ambient noise levels equivalent for-1 hr duration at 9 different locations was recorded. The ambient noise levels Leq for 1 hr duration at nine different locations were recorded at 41.7 to 62.9 db (A) during day time and 39.8 to 64.7 db (A) during nighttime.

Land Environment:

All the soil samples were clayey in textures with clay percentage ranging from 46.1% to 56.9%.

- a) The soils had very low gravel. All soil samples had shrink – swell characteristics of black cotton soil.
- b) All the samples had pH values between 6.9 to 8.2 showing slight alkalinity.
- c) The bulk density of all samples was in the range of 1.14 g/cm³ to 1.25 g/cm³. All soils had good drainability.

Cropping Pattern

Paddy is the major crop contributes to 63% of the Lift Irrigation Scheme. Pulses (12%) Ground nut (16%) are the major other crops of the study area besides these crops wheat, Jawar, Gram, Tur and other crops contribute 1 to 3% of the study area.

Land use

The land use pattern for the project is 55 ha. private land, 3.74 ha. Revenue land

and 38.66 ha. forest land which will be distributed 10.3 ha for pump house rising main and 87.10 ha. Main canal & distribution canal. Thus the total land use will be 97.4 ha.

Eco-sensitive Environment: The study area does not have any eco-sensitive environment within its command area. There is no wildlife sanctuary, national park and historical monuments in the command area. However, Reserved Forest is present North-east and south-east part of the Project Site.

Socio-Economic Environment: There are 44 inhabited villages in the command area from Surewada lift irrigation scheme spread over taluka & district Bhandara. The 44 inhabited villages have a population of 141359 comprising of 71886 males and 69473 females. The population is distributed among 29680 households in the study area.

7.0 ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

Impact on Air: During construction phase the principal impacts on ambient air quality will be due to emissions of fugitive dust from the raw material and solid waste handling areas as well as construction activities. The generation of fugitive dust will reduce drastically as soon as the construction activities ceases. The changes in ambient air quality-.due: to emissions from construction machineries and vehicles will not be permanent. The dust emission will be suppressed by sprinkling of water on the service road and project site.

Impacts to air quality during operation phase will be mainly due to vehicular traffic movement, connecting network of roads with various project. All the earthmoving equipment and transportation machineries will be regularly maintained to reduce the impact due to S02 and NOx.

Impacts on Noise level: During construction phase major sources of noise generation will be due to movement of earth-moving machineries, movement of

heavy vehicles and excavation & digging activities. But this will be restricted to Project site only. It is expected that construction activities will involve noise generation below 90-dB (A). There will not be any impact due to noise from the project components during night time as the construction activities will be restricted to two shifts only and no machinery operation will take place during night time. Overall, the impact of generated noise on the environment is likely to be insignificant, reversible and localized in nature and mainly confined to the day hours.

Impact to Noise quality during operation phase will be mainly due to vehicular movement, and by the operation of booster pumps for lifting the water for storage. The noise level produced through operating of the pumps will be slightly higher than the general noise level. However, State-of-the-art technologies will be used in the pumping system to keep the noise level at a bare minimum limit. The personnel working in the noise prone zone will be provided ear muffs etc.

Impacts on Water quality: During construction, lot of debris, mud etc; will be generated. During, the-monsoon season, storm water run-offs will contain large amounts of suspended solids. These will ultimately flow into natural drainage channels of the reservoirs. During construction a suitably designed storm water drainage system will be provided to reduce the suspended solids content of storm water. Some impact on water quality due to escape-of suspended solids from various construction activities like excavation, temporary diversions etc. may occur which will be collected in sump and will be utilized for dust suppression and other purposes,

During operation large quantities of water will be used in the reservoir for irrigation purposes. However, the water will be lifted during flood time-only, Therefore, it will not create any significant impact on the downstream users. In order to conserve water and minimize the loss of water conduit pipeline system has been proposed for irrigation purpose from the reservoir. The discharges will be integrated for reducing the water loss. Moreover the irrigation is planned

through conduit pipelines as well as gravity which will reduce adverse impacts.

Impact on Fish Fauna: During the construction-phase there will be no impact on the fish fauna. For implementation of the project the flood water of river will be lifted during the monsoon. During the monsoon season the availability of the fish in the river decreases in comparison to other season.

Changes in Drainage Pattern: The reservoirs will cause some changes in the drainage pattern of the area, over a period of time. The reservoirs have been designed according to drains of the area. It is kept in mind not to divert any drain and collect the whole water of the catchment of the upstream drains because the drains are seasonable. Monsoon water of these drains will be collected in the submergence of the reservoirs. There will be no changes in the drainage pattern after the construction of reservoirs as the major portion of drains will always have water.

Impact due to Submergence: Ground water table surrounding the reservoirs area will rise because of large water impoundment. The reservoirs exert a huge hydrostatic force on the ground below it which will change the ground water table. The reservoir will allow a good amount of water to percolate in the vicinity. Thus the underground artesian flow will help in recharging. The greenbelt development on the lake periphery will retain the surface water allowing it to percolate to the ground. Changes in the ground water quality are not expected after the creation of reservoirs. The project will not generate any kind of hazardous waste after construction.

Impact of Water Logging: In an irrigation project, the soil in the command area becomes waterlogged, and is rendered useless if proper drains are not provided. This is due to typical nature of the soil in command area and higher ground water table. As far as this project is concerned, the present ground water', level is moderately deep in the command area and therefore water logging possibility is remote.; The supply of water for irrigation through pipe will not have any impact

on water logging in command area are negligible.

Impact on Ecological Environment:

The project surrounding area comprises some forest area and there is no indication that the area has corridor functions to other wild life. During operation phase, forest cover available due to the afforestation program to be implemented by the project authorities will increase the forest cover area. In addition fishes will be grown in water storage reservoirs. There will be positive impact on the fisheries as tanks will have water round the year.

Impact on forest area:

The impact on the forest area of 38.66 Ha, will be compensated by 5 times the land affected by afforestation programme. The afforestation programme/plantation will be undertaken simultaneously as per the plan designed for the proposed Lift Irrigation Project. The project will improve the impact on forest area plenty of water will be available for irrigation.

Impact on Socio-Economic factors : The construction involves generation of employment, both direct and indirect, which will improve the economy of the study area. The project will also increase the agriculture potential in the area and bring economic prosperity by reducing the problem of water scarcity, which will help to increase the health and wealth of the people. The project is likely to speed up the literacy rate because of realization of importance of education among the people of the area,

8.0 ENVIRONMENT MONITORING PLAN

For implementation of the project, the following organizations and their representatives will constitute the Environmental Management System (EMS):

- (i) Water Resource Department (WRD)
- (ii) Supervision Consultant,
- (iii) Design Consultant,

- (iv) Contractor,
- (v) Representative of Funding Agency
- (vi) Environmental Consultant/Unit, and
- (vii) Public Participation (Stakeholders and NGOs).

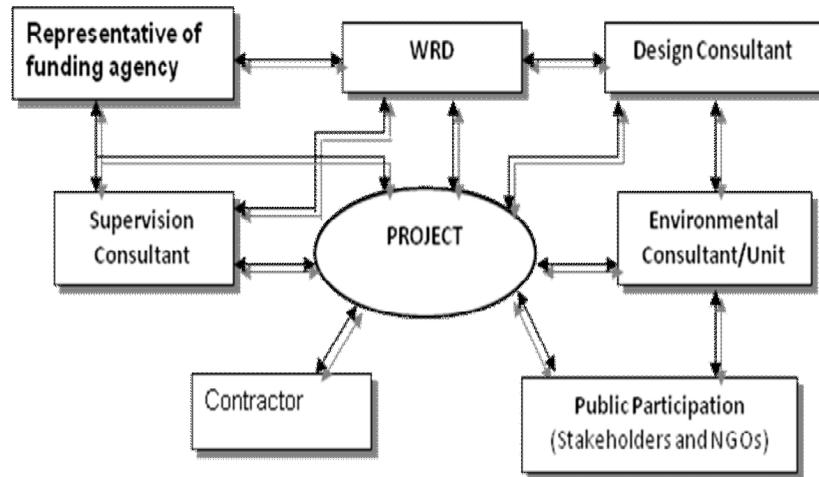


Figure 4 - Institutional Arrangement

9.0 PROJECT BENEFITS

Direct Benefits

« Production benefits i.e. Increased Agriculture Yield.

- Increase Crop productivity
- Increase in crop intensity

Crop diversification

- More commercial fish production
- increased employment outside agriculture from increased crop output in related industries such as input industry (backward linkages) and output processing industries (forward linkages)
- Improvement in sanitation due to availability of more water
- Increased in the farm forestry and vegetation in irrigated areas. This will create a beneficial impact on wildlife, flora and fauna;

- Assurance of food security

Indirect Benefits

- Increased employment in agriculture due to increased' harvesting intensity, increased "crop area and output from irrigation.
- Increased employment due to agriculture form and related activities.
- Positive impact on poverty reduction through increased productivity and increased employment opportunities
- Lower food prices for consumers, due to increased agricultural production which will improve food supply programme.

10.0 ENVIRONMENT MANAGEMENT PLAN

Construction Phase

Air Environment: During Construction water spraying will be the most effective method for suppression of dust. Water spraying on unpaved surfaces twice a day will improve the working condition and minimize pollution due to fugitive dust emissions.

Water Environment: The proponent will construct temporary sanitation facilities like septic tanks and soak pit systems for construction workers, preventing any discharge of effluents on land. Hence, no negative impacts during construction phase is anticipated.

Noise Environment: All equipment, machinery and vehicles will be maintained, serviced, well greased and oiled to reduce friction and consequent noise generation. The workers who have to operate noise-generating machines or have to work in noisy zone will wear ear protective equipment such as earmuff to safeguard against ear damage. The noise generating activities will be restricted during the day time only.

Land Environment Management: All attempts will be made to manage the

activities during construction to minimize erosion and soil losses: At the end of the construction phase, soil will be stabilized in the unpaved areas with the help of plantation activities.

Debris Management: It is observed that during the operation of the reservoirs there will be no solid waste generation; it is possible that some domestic and municipal waste will be generated by the residing person which will operate the pumps. For the domestic and municipal waste proper care will be taken, by the project authorities.

Flora and Fauna: During construction, there will be insignificant impact on the ecology and biodiversity of the project area because there is not much vegetation except few wild grasses, shrubs and bushes in the project area. These vegetations will be uprooted but the same will be compensated by green belt development.

Socio-economics: The construction phase will provide employment to local people, the socio-economic impact is expected to be positive; hence no mitigation measures are required. Majority of the labour force will be recruited from the surrounding areas thus building goodwill and giving job opportunities

Operation Phase

Table 2: Environment Management Plan during Operation Phase

Project Activities	Associated Impact	Mitigation Measure
Flushing of sand accumulated in the desilting chambers		Controlled discharge of flushing from desilting chambers
Development of Reservoir	Beneficial impact to avi fauna	Regular maintenance of the reservoir, pasture development and afforestation around the reservoir
Irrigation to command area	Water logging if water will be supplied through open	There will be no water logging as the water will be

	channels	supplied by conduit pipelines
Use of Agrochemical such as fertilizer and pesticides	Underground water and surface water contamination due to nitrates, phosphates and pesticides	Training programme for farmers for judicious use of fertilizers and pesticides and recommending fertigation use for improved irrigation management system
Water Pollution	COD will increase due to soap and detergent	Boards will be displayed on prominent location for prevention of water
Reduction of Water Flow	Reduced flow and increased silt level during operation phase	Controlled discharge of flushing from desilting chambers over pro longer period or during high flow periods provision of check walls with boulders, stones and with / without meshes, check reservoirs with boulders and stones at locations and. spurs on Catchment area treatment
Development of Reservoirs.	During, Project operation water storage poses potential .to provide breeding -grounds, for vector and water borne diseases impact will be long term, and irreversible if not controlled Water based or related disease related. Like malaria, gastroenteritis/typhoid, dengue and phylaria.	Preventive measures to control of water borne diseases vectors through regular health, monitoring and taking up necessary Mitigative measures like regular cleaning and maintenance etc. Preventive measures to control mosquito. Provision" of separate - funds for preventive and curative aspects of health, provision of health centers
Practice of agriculture	Soil erosion	Regular training and advice to farmers
Natural Hazards	Any incidence of natural hazards can affect local resources and people in the surroundings	The proposed project site has been selected after detailed engineering study by taking adequate

		<p>engineering design aspects for project components like Jackwell ^site, pumping stations, and reservoirs, in case of natural calamity, provision of warning system for any major natural hazard/accident shall be made. Regular education to downstream/upstream users or likely affected people will be educated about do's and don'ts. In case of any mishap Provision of appropriate emergency response plan will be established.</p>
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Green Belt Development Plan : It is proposed to create and maintain a green belt along the Dam line as per the MoEF norms. Green belts will be developed all along the dam line to prevent the soil erosion. Species of plants for the greenbelt development will be selected in a consultation with local forest department.

Catchment Area Treatment Plan : A ridge to valley approach would be followed while implementing the Catchment Area treatment Plan.

Pisciculture Development Plan: At present the fishing is not a major source of livelihood in the project area in the absence of large water impoundment, but it 'is expected to change after the commissioning of the proposed project. A large amount of water will be impounded after the completion of the project. Fishing will be greatly promoted because of the new reservoirs.

11.0 CONCLUSION

From the detailed analysis of the environmental impacts and the remedial measures suggested / recommended, it can be concluded that no significant deterioration in the ecosystem is likely to occur due to measures to be taken up

during construction and operation of the proposed project. On the other hand the project is likely to have several benefits like Improvement in Agriculture Production and employment generation. The project will also help to boost the economic growth of the area, by way of improved infrastructure and better socio-economic condition.