

Construction of Vented Barrage across Gangavali River at Honnali” Under combined water supply scheme to Karwar- Ankola towns, enroute villages, Aditya Birla Chemicals Ltd & Project Sea-Bird

DETAILED PROJECT REPORT

Executive Summary

1. Preamble:

Karnataka Urban Water Supply and Drainage Board intends to construct a permanent water storage reservoir for catering to the growing drinking water supply requirements of Karwar, Ankola and enroute villages and also, Sea-Bird at Karwar, sustainable to the next 5 decades requirement (50 years). This scheme has been principally approved by as Phase-II the Government of Karnataka vide order no. UDD31/UWS2007/Bangalore. Dt 28-02-2009. For this purpose, it has been planned by the Board to construct a vented barrage across the river Gangavali, which flows in the region.

2. Origin and Topography of Gangavali River:

Gangavali River (also called Bedti River) originates from the Western Ghats the south of Dharwad as Shalmali river and flows in the west direction to meet the Arabian sea just after the Ganga temple. Here the river embraces the name Gangavali. This stream joins at kalghatgi at 30 KM lower down to Bedthi river that takes birth near Hubli. The river then flows west and then South-West for a further distance of 69 KM.

This river has a total catchment of 3574 Sq Km and has a total length of 152 KM. On its course towards the Arabian Sea, the river falls from a height of 180 M at a point called Manjguni on the Western face of the Sahyadri.

The bed fall of the river is gentle for the first 72 KM. After that point, the river bed falls rapidly with a clear overfall at Magod which is popularly known as magod Falls. Afterwards the River runs in deep gorges with steep bed falls. Souda (tributary to Bedti River) joins the river after the falls. The river has dense evergreen and semi-evergreen forests along its path on either bank.

The river flows in Dharwad district initially and then in Uttara Kannada district.

3. Geology:

The soils in the Gangavali basin are mainly lateritic in origin and tend to be reddish to brownish in colour. The various types of soils found are clay, lomey, clayey-loamy, with under layers of laterite and grey granite in some places.

4. Climate and rain fall:

With the major portion of the river lying in the Western Ghats, the Gangavali River basin receives a large amount of rainfall. Mean annual rainfall ranges from 1700 mm to 6000 mm, with 95% of the rainfall received during the months of June to September (July being the rainiest). There is some rainfall in the post monsoon season also in the form of thunder showers, mostly during October-November period. During the heavy monsoons, the River floods the nearby villages and fields.

The yearly temperature is 22 C-36 C. The humidity ranges between 60-75% depending on the season of the year.

5. Water Demand:

The water demand has been calculated at the supply rate of 135 LPCD of water to Karwar city & Ankola town, 70 LPCD to enroute villages & Seabird as per their request to cater to the requirements of the next 50 years.

The population forecast for the year 2068 has been made using the following three standard methods.

- a) Arithmetical increase method
- b) Geometrical increase method
- c) Incremental increase method.

The average ultimate population works out to 458297 for 2068 for Karwar, Ankola & enroute villages. Apart from this, bulk requirements of Sea-Bird and Adity Birla Chemicals Ltd., Binaga are also considered for water demand calculations.

Taking into consideration the water supply requirements of the next 5 decades for Karwar, Ankola and Enroute villages and the bulk requirements of Sea-Bird, ultimate total demand has been worked to 10858.05 ML (0.383 TMC) catering for 120 days in the summer season, including 20% losses for evaporation, leakages etc.

6. Storage Capacity of the proposed barrage:

The barrage is planned to store 10,926.72 ML (0.386 TMC) of water. From the capacity contour calculations, storage of the reservoir at FRL 10.50 M is 11,169.55 ML. Hence, FRL is fixed at 10.50 M. The proposed vented dam will have submergence up to 10.5 Mtr contour, the existing river boundary (shown as blue line in the auto cad drawing) or the 10.5 Mtr contour whichever is farther from the center of river is taken as baseline for calculating the area of submergence.

7. Location of the Barrage:

After conducting topographical surveys and geophysical investigations, a site downstream of the existing water lift point of KUWS & D Board at Latitude 14 39' 30" and Longitude 74 26' 05" has been selected, near Honnali village of Ankola Taluka. The site can be easily approached by roads, has defined banks, with narrow gorge with hard granite under layer at comparatively shallow depths with rock outcrops seen in the river bed. Thus, the site is Techno-economically the best suited location for the construction of the proposed vented barrage.

8. Topographical Surveys:

Topographical surveys of the site have been conducted by the KUWS & D Board. Contour surveys as well as cross-sectional surveys have been conducted by the Board to determine the storage capacity and other engineering requirements, submergence area of forest lands as well as agricultural fields. These details have been provided to the Consultants for the preparation of Pre-Feasibility Report. The Consultants have based their workings on these topographical surveys.

9. Geophysical investigations and Foundation studies

The Geo-physical investigations have been carried out by the Senior Geologist, G.W.S.U.Z.P, Karwar. Core drillings have been conducted at 20 points along the proposed alignment of the barrage and bore logging details have been provided. The log details indicate soils at the top with laterite soils, weathered and granite rocks of varying depths. These bore logs show that rocky bed is available at comparatively shallow depths in the river bed except at the banks. Hence, the barrage foundations are

provided on hard, rocky strata. Only the abutments & key walls need to be constructed by deep excavation in soil.

The bore logging details are attached herewith for ready reference and understanding of the geological strata.

10. Flood discharge Details

Full river gauge details at the proposed location were not available to assess the exact High Flood Level & the maximum flood discharge. However, the flood level details are available with the Board for the last 30-35 years. The observed maximum HFL is 11.15M. This has been used to calculate the maximum flood discharge quantity, using the bed slope of the river and the river cross section at the barrage location. Also, the maximum quantity has been worked out by accepted empirical formulae based on the river catchment area and the maximum flood discharge thus calculated has been adopted for designs.

The flood discharge worked out by by Dicken's formula works out to **10261.69 Cumecs** and is the maximum of the four different formulae used for the calculations and hence, considered for the designs.

The afflux created by the barrage construction at the U/S of the barrage is calculated to be 0.42m, which is quite small and hence, will not create any major submerge problems at the banks.

11. Brief Descriptions of the Barrage

The river cross section at the location of the proposed barrage has a width of about 230 M at the top and about 200 M at the river bed.

During the reconnaissance visits to the site, the local people have insisted that the barrage piers must be placed sufficiently wide apart to allow free passage of trees, bushes etc without blocking the vents during the rainy season so that flooding u/s of the barrage is minimized. This aspect also has been considered in the arrangement of barrage piers and the length.

The vented barrage has been planned with a width of 188M between the abutments. The overflow portion consists of 19 spans of 8.5 M clear width between the piers. The

piers and the abutments are constructed on M25 RCC body wall of adequate thickness. The RCC piers are 1.50M wide each @ 10M c/c. The barrage is very close to the coastal area and is likely to be affected due to severe coastal weather conditions, thus, may develop structural damages. Therefore M30 concrete has been suggested for the piers, body wall and working platform. The embankments on either side are earthen bunds with proper key walls, return walls of M25 concrete. Bank protections are proposed both on the upstream and downstream of the barrage with boulder pitching for a length of 50 M, as there is possibility of bank erosion during heavy flood flows. The barrage is provided with RCC aprons on upstream and downstream sides for bed protection, followed by boulder dumpings.

However the stability analysis and RCC design of piers, abutments, body wall, return walls and key walls are carried out by taking all the relevant loading, safety & stability criteria for all the conditions of river flow, as per the Codal requirements and standard engineering practices.

An operating platform of RCC with a width of 5M is provided at the top of the piers, 2.35M above the HFL. This platform will be used for storing of the gate elements during the erection stages as well as gantry movement.

Barrage Gates

It was discussed in detail about the gate arrangements during the PFR submission and finally decided to go ahead with the following type of gate arrangements.

Roller gates of single leaf element with fixed individual rope drum hoists for each gate.

M.S roller gates with rubber seals are provided which move up and down in gate grooves provided in the piers. Each vent will be provided with 4 gate elements of effective size of 8500mm x 7500 mm with rollers. Water tightness is achieved by the provision of suitable type rubber seals like bulb type, wedge type etc. Each gate element will be provided with lifting hooks of suitable designs. These gate elements will be lowered & raised in the grooves and transported to storing shed by a moving gantry provided at the operating platform. Two sets of additional gates (6 no's of elements) will also be provided as spare, which will be used as stop log gates in case of any problem with the service gates.

The gate lifting gantry will be a moving gantry with a lifting beam, with arrangements for automatic locking/unlocking with the gate hooks while lowering/lifting. The gantry moves on gantry rails provided at the operating slab level.

During the monsoon season the waterway must be kept clear and hence, the gates will be removed from the barrage and transported to the storage shed for safe keeping and maintenance repairs.

Provision for a storage shed of size 30M x 15 M is made on the right bank of the river in the estimates.

12. Submerge Details.

The river regime is within marked banks only and only during heavy floods, small areas of agricultural lands as well as forest lands at the banks get submerged it is learnt from the local people that the flood water recedes normally in 8-10 days. Hence, no much damage is envisaged due to flooding. The FRL of 10.5M is below the HFL level of 11.15. Hence, no additional areas get submerged by barrage impounding. The submergence details for FRL of 10.50M are as below.

Agricultural fields	: 17.9 Hectares.
Forest areas	: 34.98 Hectares.

13. Environmental Impact Assessment:

Storage up to FRL of 10.5M is well below the river HFL of 11.15M. Hence, the water level will be within the river regime only. Hence, large scale adverse effects due to the construction of the barrage appear minimal. However, the views of the Consultants are separately enumerated with this report.

However, Environmental Issues, being of utmost importance to any project, it is recommended that a full scale EIA study be conducted to know the merits and demerits of this barrage on the ecology and plan remedial measures if found necessary.

14. Project cost:

The estimate cost of the project will be as below.

With Fixed Roller gate arrangement – Rs. 15862.00 Lakhs.

The estimate cost includes the provisions for ETP charges, price rise for 2 years, price adjustment & Land Acquisition cost etc as suggested by KUWS & D Board,

Dharwad during the discussions on 20-09-2014 as % of the basic cost and for all other items the rate considered for Dharwad Circle SR 2018-2019 with Area Weightage 15% for Ankola area and also WRD rates.

ENVIRONMENTAL IMPACT ASSESSMENT.

One of the main factors, which contributed to the economic developments of our country, is the water resources projects for irrigation, drinking and industrial uses. With the economic development came the changes in the life styles, demanding higher quantity of drinking water supply. Likewise, the industrial development also brought in great demand on water requirement. To meet such demands, both present and future, development of water resources projects is an absolute necessity and any responsible Government will have to make efforts to fulfill such demands.

Any river valley project results in environmental impacts, both during construction and the operational phases. The objective of the environmental impact assessment is to assess both the positive and negative impacts so that necessary environmental management measures can be adopted, wherever necessary, to minimize the adverse impacts.

The proposed Gangavali Vented Barrage Scheme is being taken up to meet the drinking water requirements of Karwar, Ankola and enroute villages and also of the Sea-Bird naval base at Karwar for the next 50 years. The impacts of this project can be broadly discussed as below.

I. Beneficial Aspects of this project:

Socio-Economic Issues.

A sustainable and assured drinking water supply to the beneficiaries will be having a huge impact on the lifestyle of the people. The foremost benefit of this project, will no doubt, have a hugely positive impact on the social structure of the society and will contribute to the increased economic activities in the region of Karwar, Ankola and enroute villages of surrounding areas. Gangavali project will also contribute to the requirements of the biggest defense base at Sea-Bird at Karwar. It is needless to say

that without the development of Sea-Bird and other industrial establishments like M/s. Aditya Birla Chemicals, Ltd Binaga the regions remains underdeveloped. Thus, the socio-economic as well as defense gains due to this water supply scheme , in the long range, will fulfill the national needs.

Employment opportunities:

The construction activities of the barrage will create job opportunities for the skilled as well as unskilled workers of the region during the construction. The construction will also provide indirect employment opportunities for many trades like welders, garages, shops & commercial establishments, goods suppliers etc. In short, there will be a lot of economic activities resulting in the social well-being of the people in the surrounding neighborhood.

Ground water recharge:

The open wells and the bore wells in the barrage will get recharged due to the impounding of water. Such well recharges will result in better agricultural productions of local products like coconut, paddy, vegetables etc. It is learnt that at present, the water levels in the drinking wells in the vicinity get depleted during the summer seasons. This problem will be mitigated by the recharge of these wells.

Rehabilitation:

Rehabilitation of villages is a very serious problem in any river valley project, which brings in untold psychological miseries to the people and brings in huge difficulties and legal issues. The most notable aspect is that the construction of this barrage and consequent impounding of water will not submerge any of the villages on the river bank, thus problems on such accounts do not exist.

Land submergence:

The submerge of Agricultural fields as well as Forest lands are extremely small, only 48 & 14.28 acres respectively.

Flora, fauna and wild life:

The project location does not lie in any wild life habitat, except small animals like wild boars etc. Hence there is no danger to any wild life habitat. Flora and fauna will get benefited due to the water availability through the year.

II. Adverse Impacts of the barrage:

Submergence of Agriculture land:

It is to be noted that the barrage water will not submerge any additional agricultural fields, other than the area which are generally affected during the high floods. However, due to the barrage water spread, about 37.96 acres of agriculture fields on the right bank and 9.73 acres on the left bank (total 47.96 acres) will be submerged in water for a longer period than the flood duration. This inundation will be harmful to the local crop, paddy and also coconut trees. The stagnation of water in these fields also may be degraded due to the sedimentation over the years. Thus, there is a likelihood of the degradation of agriculture fields in a smaller area of about 48 acres.

Submergence of Forest lands:

Like the submergence of Agricultural, the Forest submergence is not much, only about 14.28 acres on both right and left banks together in summer for four months from February to May.

Construction activities:

The construction activities will dump large quantities of mud and muck in the river, thus polluting the downstream river water during the period of construction. However, it is a temporary problem, lasting a maximum period of about 2-3 years. It has no long term effect.

III. Remedial measures for submergence:

The submergence, being very minimal, is not likely to result into any ecological problems. However, even this can be tackled by constructing protective earthen bunds at such locations.

Conclusions:

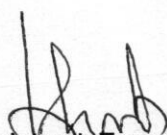
It may be noted that the construction of the barrage will not result into any environmental and ecological issues of any notable magnitude. However, if the Authorities decide, a full scale EIA study may be undertaken to study the micro effects. PMUS comments are attended and incorporated in the DPR (comments enclosed).

Accordingly, the estimate amounting to Rs. 15862.00 Lakh for "Construction of Vented Barrage across Gangavali River at Honnali" Under combined

water supply scheme to Karwar- Ankola towns, enroute villages, Aditya Birla Chemicals Ltd & Project Sea-Bird is prepared based on the Schedule of Rates of PWD-2018-19 and WRDO for the year 2013-14, including provision towards 12% GST, 12% ETP, 3% Contingency charges, 1% towards Building and other construction workers Welfare Cess, 1.50% towards capacity building, 10% towards Price Adjustment for two years @5% per annum, 0.50% Third Party inspection charges and Land acquisition charges.

The above work is proposed to take up under Urban Water Supply Scheme, with the apportionate cost from RDPR, CMC Karwar, TP Ankola, Project Sea-Bird and Aditya Birla Chemicals Ltd. with the following funding pattern:


Sl.No.	Name of the Beneficiary	Water Demand in MLD	Proportionate Share Amount (Rs. In Lakhs)
1	Karwar	20.27	4086.46
2	Ankola	7.78	1568.46
3	RDPR (For Villages)	8.77	1768.04
4	Project Sea-Bird	40.86	8237.43
5	Aditya Birla Chemicals Ltd Binaga	1.0	201.60
	Total	78.68	15862.00


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**ESTIMATE FOR CONSTRUCTION OF VENTED BARRAGE ACROSS RIVER
GANGAVALI NEAR HONNALLI HEAD WORKS FOR COMBINED WATER
SUPPLY SCHEME TO KARWAR-ANKOLA TOWNS, ENROUTE VILLAGES,
PROJECT SEA-BIRD AND ADITYA BIRLA CHEMICALS LTD, BINAGA.**

ABSTRACT

Sl. No.	Name of the Components	Amount (Rs. In lakhs)
1	Estimate for construction of vented Barrage across river Gangavali	10297.50
	Basic Cost	10297.50
2	Add 15% for Revision of SR and Market Rate Flactuations	1544.63
	Sub-total	11842.13
3	Add ETP charges at 12%	1421.06
4	Add Contigencies at 3%	355.26
5	Add Labour cess at 1%	118.42
6	Add 10% towards Price Adjustment for two years @5% per annum	1184.21
7	Add for Third party inspection charges @0.5%	59.21
8	Add for Capacity building charges @1.50%	177.63
9	Add for Survey & Design charges @1.0%	118.42
	Sub Total	15276.34
10	Land Acquisition for Construction of Vented Barrage	585.00
11	Miscellaneous and rounding off	0.66
	Total Rs.	15862.00


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