

Name of work: Survey, Investigation, Design, Supply, Installation, Testing and Commissioning of Head works including all appurtenant structures, pipe line, motors with pumps and electro mechanical works including providing power supply with 5 year operation and maintenance under Veerbhadreshwar LIS.

GENERAL REPORT

1.0 INTRODUCTION

1.1 The river Ghataprabha originates in the Western Sahyadri range near Amboli and flows across Maharashtra & Karnataka & joins the Krishna River near ChikkaSangam in Bilagi Taluk on upstream side upstream side of Almatti Reservoir. The main tributaries of the river are Hiranyakeshi, Tamrapani & Markandeya. A dam is constructed at Hidkal across the river. It has a God gifted catchment with an assured rainfall varying from 6250 mm to 1000 mm. The river receives floods during June to October.

1.2 The area of Left side of Ghataprabha Right Bank Canal at R.L. 610.00 m is being irrigated and the area above this level could not be brought under irrigation. Similarly from Malaprabha Left Bank Canal an area of Right side is being irrigated below the R.L. 610.00 m. There is also a LIS of Rameshwara Lift Irrigation Scheme covering the area of west side. In between lays the fertile land that is deprived of irrigation facility which is at higher R.L. of 670.00 m. The area of nearly 17,377 Ha is possible to be irrigated by lifting water to an R.L. 670.00 m. For this Veerabhadreshwara Lift Irrigation Scheme is proposed to irrigate. The farmers of the area are demanding for the 'Lift Irrigation Scheme' to mitigate their sufferings.

Earlier, it was proposed to irrigate the said area villages under Saundatti & Ramdurga taluks by lifting water from Ghataprabhariver near Aralimatti village in Gokak Taluk. Since the 'Rameshwara LIS' was implemented with lifting point near Aralimatti village in Gokak taluk, the water availability at the proposed location for 'Veerabhadreshwara LIS' could not be established at the above lifting point.

Subsequently the alternate lifting location with sufficient availability of water was investigated and could be stationed near Chikkur Tanda in Mudhol taluk on the right

bank of Ghataprabha River. From the proposed lifting point (Chikkurtanda) by harnessing 2.50 TMC it's possible to irrigate area under Ramadurga & Mudhol taluks.

Lifting water from the newly proposed lifting point will provide irrigation to 4 villages in Mudhol taluk & 30 villages in Ramdurga taluk, for which no alternative irrigation means are available. The total area proposed to irrigate is 17,377 Ha. In previous DPR, out of 2.60 TMC, 0.13 TMC of water was considered for filling of M.I. tanks. Hence, in the revised DPR 2.40 TMC of water is considered for irrigating 17,377 Ha of land in Mudhol & Ramdurga taluks and 0.10 TMC of water is considered for filling of M.I. tanks coming under the command area of VLIS.

2.0 THE REGION AND ITS IRRIGATION NEEDS

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

The entire population in this region is purely depending on agriculture, which in turn forms the back bone of economy of the region. Food crops like Jawar, Bajra, Wheat, Grams, Sun flower, Maize, etc., are grown in this area. But due to lack of adequate and timely rainfall, the region often suffers from scarcity and periodical famine. The scenario is such that during summer months even the drinking water needs to be transported to this famine struck area.

The villages benefited by the project are located in Belagavi & Bagalkote districts.

Mudhol Taluk :1) KillaHoskoti	2) Dadahatti	3) Gudaganal	4) Mallapur
Ramdurg Taluk :1) Venkatapur	2) Guttigoli	3) Gudagoppa	4) Hoskoti
5) Budni	6) Tondikatti	7) Bichguppi	8) Kullar
9) Timmapura	10) Udupudi	11) Bhidaki	12) Rokkadakatti
13) Panchagaon	14) BannurTanda	15) RampuraTanda	
16) DadibhaviTanda	17) Chandargi M	18) Godchi	19) Totagatti
20) Sidnal	21) Chadaragi	22) Kesaragoppa	23) Gudikoppa
24) Chikkoppa	25) Hirekoppa	26) Murkatnal	27) Bannur
28) Salhalli	29) AribinchiTanda	30) ObalapurTanda	

The Taluk wise area benefitted through this project is as follows:

- 1) Mudhol Taluk: 1680 Ha and
- 2) Ramdurg Taluk: 15697 Ha

15697

2.2 The annual normal rainfall in Ramdurga & Mudhol taluks is 486 mm. These taluks mainly lies in rain-shadow area. The soil is fertile and if irrigation facility is provided, farmers can grow crops with good yield, which will afford them much needed protection for survival and cultivating agriculture. Employment opportunity in the area will increase and the living standards will also improve.

3.0 ALLOCATION OF WATER

The present FRL of Almatti reservoir is at 519.640 m. As per the directions of Honorable Supreme court of India, it's proposed to increase the FRL from 519.640 m to 524.246 m.

The government has constituted a committee for allocations of water in Krishna Basin under G.O. no. WRD / KDR / 2012 dtd. 13-08-2012, which has recommended for allocation of 2.5 TMC for the Veerabhadreshwara LIS'.

Accordingly the revised DPR is prepared for 2.40 TMC to provide irrigation to about 17,377 Ha along with 0.10TMC for filling of tanks in the command of this scheme.

4.0: proposed cropping pattern:

Cropping pattern has been Suggested for this project by taking into account the existing Cropping pattern and information from the concerned offices of Agriculture Department & Horticulture department The intensity of irrigation considered only in Kharif. The Cropping pattern / calendar and the extent of each crop has been Suggested of optimize the monthly demand. The month wise crop water requirement for the proposed crops for the different pattern in the command areas in as follows

Crops	Area in ha	% of command area
Kharif		
Ground nut	5213	31
HyJowar	3996	23
Hy Maize	1912	11
Bajra	6256	36
Total	17377	100

4.1: Water Requirement:

The proposed command area falls under Krishna catchment area. The Crop-Water Requirement has been computed using climatological approach. The normal monthly values of potential Evapo-transpiration for IMD observatories located in Vijayapura as been

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considered. The rainfall data of gauging station Madarkhandi which is near the command area has been considered for a period of 28 years from 1985-2013 for computing average annual rainfall in the area.

These data have been utilized in computing net irrigation Requirement of different crops by modified Penman method and FAQ publication No 24. The gross irrigation Requirements of the crops that are generally grown have been worked out considering 50% irrigation efficiency for the crops under major schemes. The total water requirement for the proposed cropping pattern works to 2.40 TMC and the calculations are enclosed. The Balance 0.10 TMC used for filling of MI Tanks coming under the command area.

4.2: Details of the Scheme:

The detailed project report of 'Veerabhadreshwara LIS' has been prepared considering all the technical aspects as per C.W.C. norms.

4.2.1: Purpose of the scheme: Veerabhadreshwara LIS is proposed to irrigate an command area 17,377 Ha. by utilizing the 2.40 TMC of water during Khariff seas along with 0.10TMC for filling of tanks in the command of this scheme. The intake point is located on right bank of Ghataprabha river near Chikkur Tanda, in Mudhol taluk of Bagalkote district.

4.2.2: Lifting Arrangements

Lifting arrangement comprises of lifting water from Ghataprabha river bed at an R.L. 516.000 m to DC at an R.L. 670.000 m with static head of 154 m

4.2.3: Intake Canal: The bed level of Ghataprabha river at the intake point is R.L. 516.000 m and present F.R.L. of Almatti reservoir (Lal Bahaddur Shastri Sagar) is at R.L. 519.640 m and it is proposed to be increased to RL.524.60m. The intake canal bed level is proposed at R.L. 516.000 m. It's proposed to take the water through intake canal for a length of 0.10 km with designed bed width of 3.00 m, F.S.D. of 1.90 m and free board of 0.60 m. The floor Level is kept at 510.00m. The intake canal is designed for 17.91 cumecs based on the requirement of water. The intake canal is submersible under high flood conditions and at F.R.L. of Almatti reservoir. The depth cut of intake canal varies from 9.742m to 20.28m. The berm of 1.0m is provided at FS+FB level to facilitate providing paver lining and every 6.0m height above 1.0m berm is

provided. The classification is assumed at 30% soil, 40% SR, 20 % SRRB, 10% of HR and cost is arrived at.

4.2.3: Fore Bay Details:

The length of Fore bay is 80.00m, starting width at intake canal is 3.00m, end at jackwell is 43.00m, base slab concrete of thickness 0.35m and side gravity wall of length 83m, width of wall is 0.5m and height of wall is Avg.15m is to be adopted. A wall of 1m height is provided at the entrance at transition from approach / intake channel to sump. The total height of sump is 6 m. Arrangement for inserting trash-rack and slop-log has been made at the entrance to sump. Divide walls have been provided up to dead storage level for each turbine

4.2.4: Location of Pump house with Jack well

Success of any lift irrigation primarily depends on availability of water & smooth working of all components of scheme. It is observed that Lift Irrigation schemes fail because of silting up of inlet pipes during peak period. The access to water source should be as short as possible, & totally maintenance free or with minimum maintenance.

As water is to be lifted from Ghataprabha River & lifting source comes under FRL of Alamatti Reservoir, the type of inlet to jack well is to be carefully selected. It should be simple, of minimum maintenance & economical, the least of all aspects. In this connection number of LIS were visited, their functioning studied, the reasons of failure / success studied & in all following conclusions arrived.

There shall be free access to source & should be an open conduit (Minimum maintenance), so that removal of silt is easy.

Main features of VLIS –

- 1) The pump house floor level is to be at 528 m considering afflux and the proposed increase in FRL of Alamatti Reservoir.
- 2) 528 m GL is met with at 100 m from Ghataprabha River.
- 3) As Intake level is at 516 m,

4.2.5: Pumping System

Out of the total cost of the irrigation system cost of the rising main is the major component. Hence optimization of the piping system i.e. finalization of pipe dia based on head loss due to friction, thickness of pipe wall etc, has been done. The static head for the lift is 154.00m i.e. from 516 m to 670 m and the total discharge requirement is 11.94 cumecs. Pumping system proposed is Metallic Volute pumps.

4 Nos of 8021.00Hp pumps are proposed with 1 No of standby pump of 8021.00HP to lift the peak required discharge of 11.94 cumecs. Each pump is designed to lift 2.985 cumes and 4 nos of such pumps are proposed to deliver the required discharge in to delivery chamber located at RL.670.00m. And Stand by pump is also of same capacity. The details got verified by LIS Consultant the modifications and directions are incorporated in the estimate.

4.2.6: Jack well with pump house

The arrangements for lifting consist of a Sump and a pump house above the Sump. A wall of 1m height is provided at the entrance at transition from approach / intake channel to sump. The total height of sump is 6 m. Arrangement for inserting trash- rack and slop -log has been made at the entrance to sump. Divide walls have been provide up to Dead storage level for each turbine. Pump house accommodates all the pumps in a single row. 4W + 1S nos of Metallic Volute pumps each connected to 6 MW synchronous motors are proposed for lifting for a distance of 17,600 m. Dismantling joints are provided on the delivery side to reduce vibration. Non-return valve and hydraulically operated Butterfly values are provided on the delivery side. The discharge from each pump is connected to a Manifold single row rising main of graded thickness varying from 22.50mm to 14 mm, 2.69 m diameter taking off from the Manifold. An EOT Crane of 40 Tone capacity is provided for erection and maintenance of equipment inside the pump house.

4.2. 7: Rising Main

Length of rising main is 17,600 m.

The size of the Rising main has been chosen as 2690 mm for the lift in single-row based on the economic analysis. The pipe wall thickness is arrived at based on the design pressure, vacuum pressure and minimum thickness specified in various codes. To prevent corrosion of pipe line, two coats of epoxy painting is provided on inside face and outside guniting has been provided.

Air valves and scour valves are provided to admit / expel air and for draining of pipeline respectively. Anchor blocks / Thrust blocks are provided at bends to counter the unbalanced forces in the pipeline. Thrust blocks have been designed and are to be provided at appropriate places. A scour valve is to be provided at every valley that is encountered along rising main and Air release valves are to be provided at every saddle. The following criteria are used in finalizing the alignment. Refer drawings for alignment and longitudinal section of rising mains. Following points have been considered while finalizing alignment.

Following are the recommendation/ Guidance while laying Mains

- 1) A minimum soil cover of one meter above the pipeline
- 2) The alignment should facilitate free drainage of pipe through scour valves.
- 3) The amount of earth work for the trench shall be minimum.
- 4) The number of vertical bends which require air valves is minimum.
- 5) Routing of pipe along existing roads wherever possible.

4.2.8: Distribution chamber near Kullur

Water lifted from the jack well is led in to distribution chamber through rising main and the DC is designed for 3 minutes retention period. The DC is situated at R.L. 670 m. The area of 17,377 Ha is proposed to be irrigated by providing two canals. Rectangular type chamber is proposed, designs & drawings enclosed in appropriate sections.

5.0: Electrical Works

The power requirement for lift work is proposed to met by construction of 220KV substation at Lift point. A 220 KV power line is available at Vajramatti village which is around 12.00 Km from lift point.

- 1) At pumping stations one outdoor switchyard has been provided.

The civil works of substations include

- 1) Site leveling of substation area.
- 2) Foundation transformers along with jacking pads & pylon supports fire resistant wall etc.,
- 3) Foundation for lattice structure / equipment.
- 4) Cable trenches along with covers and sump pits.
- 5) Roads and rail tracks inside substation and fencing.
- 6) Gravel filling and anti weed treatment substation area.

6.0: Distribution Net work:

6.1 Main Canals

As per the earlier proposal it was proposed to irrigate 17,377 Ha by lifting the water from Ghataprabhariver to delivery chamber DC located at R.L. 670.000 m. From delivery chamber two canals are proposed, i.e., Salahalli canal of 20 km. length covering an area of 11,477 Ha and its peak requirement is 7.94 cumecs and Hoskote canal running to a length of 13 km covering an area of 5,900 Ha & its peak discharge is 4.00 cumecs. Both Salahalli canal & Hoskote canal are ridge canals.

Si no	Canal Name	Peak carrying capacity	Length	Command area
1	Salhalli Canal	7.94 Cumecs	20.0 Km	11477 Ha
2	Hoskoti Canal	4.00 Cumecs	13.0 Km	5900 Ha

The detailed surveys are yet to be conducted for for distribution net work beyond delivery chamber.

7.0: Administrative Approval details:

Comprising above components, the DPR for Veerabhadreshwara LIS is administratively got approved for Rs.544.00 crores by the GOK vide Ltr.No. WRD-5 MPS-2013, Bangalore, dated 21-01-2015, after getting clearance from the ERC and Board of KNNL. The DPR was cleared in ERC-6th meeting held on dated:02-09-2014 and in the 66th board meeting of KNNL held on 20-09-2014. The DPR was prepared at the price level of 2013-14. The component wise cost considered in the DPR as against the components now proposed for Electro mechanical components and civil components involved in the work up to delivery chamber as follows:

SL. No	Description	Cost as per the administratively approved DPR Lakhs	Cost as per the Estimate now Prepared in Lakhs	Difference cost in Lakhs	Reasons for Excess/ Savings
1	Collection of data, preliminary survey, investigation preparation of alternate alignment proposals conducting detailed survey	10.00	26.73	16.73	
2	PPMC (0.5% of the Estimate	0.00	272.00	272.00	

3	Design supply, installation and commissioning of pump machinery and pump house electrical works	7865.00	9826.00	1961.00	New SR Rates adapted
4	220KV Sub Station at Jack-Well, Switch Yard and Terminal Bay etc.,	2396.71	2322.35	-74.36	New SR Rates adapted
5	Construction of Intake canal	18.00	37.90	19.90	GL Variations & New SR Rates adapted
6	Construction of Jack-well cum Pump House	1171.00	1971.00	800.00	GL Variations & New SR Rates adapted
7	Construction of Raising Main	24181.00	22493.00	-1688.00	GL Variations & New SR Rates adapted
8	Construction of Delivery Chamber	20.00	75.30	55.30	GL Variations & New SR Rates adapted
9	Maintenance of Lift Scheme for 5 years	250.00	341.28	91.28	
10	Land Acquisition Charges	135.37	173.77	38.40	
11	KPICL Deposit	0.00	300.00	300.00	
12	Electricity Charges	0.00	1600.00	1600.00	
	Total Cost:	36047.08	39439.33	3392.25	


The above variation will be accounted while revising the project cost in future.

Present proposal: The detailed surveys were once again conducted for preparation of estimates of different components. There are no major changes observed against the DPR except minor variations in GL at intake channel, rising main and delivery chamber. The detailed designs and drawings are prepared and enclosed to this estimation. This estimate is under Turn-Key basis, so after tender the concern agency will conduct again the detailed designs, drawings and estimations are prepared and get approved by the concern project authority.

8.0: Conclusion

This estimation has been prepared based on the W.R.D.O. Schedule of rates for the year 2014-15, PWD Belagavi Circle Schedule of Rates for the year 2014-15 and KPTCL Major works for the year 2015 updated for the month of June, market rates for items which are not available in these SR's adapted.

The estimated cost of Head Works including all appurtenant structures, pipe line, motors with pumps and electro-mechanical works including providing power supply with 5 year operation and maintenance after successful completion of the above, works out to Rs. 406.25 Crs. Necessary drawings required for the estimate is enclosed.


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Executive Engineer,
KNNL GRBC Dn No-5, Koujalagi.



Superintending Engineer,
KNNL GRBC Circle Hidkal Dam


Chief Engineer,
KNNL, Irrigation (N), Belgaum.

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