

Chapter 8

Irrigation Planning and Command Area Development

8.0 General

The Bedti - Varadalink project is planned to augment the existing irrigation in the drought prone Raichur district under Tungabhadra left bank canal command. The GCA, CCA and designed annual irrigation under Tungabhadra Left Bank Canal (TBLBC) are 364686 ha, 324213 ha and 244381 ha respectively, utilizing a quantum of 2605 MCM of water allocated as per KWDT award for use under TBLBC. Accordingly, the existing intensity of irrigation works out to 75% only. By diverting surplus waters from the west flowing Bedti river to augment the irrigation under the TBLBC in Raichur district, not only the drought prone areas could be brought under irrigation, but the intensity of irrigation under TBLBC also, could be increased by bringing additional area under irrigation.

Link-I of the Bedti – Varadalink project is proposed under National Perspective Plan (NPP), wherein the monsoon surplus waters of Pattanadahalla and Shalamalahalla, both streams of Bedti river, are contemplated to be diverted by lifting towards eastern side of Western Ghats to a stream leading to Varada river which is a tributary of Tungabhadra river for irrigation use in the **target command area** under the existing Tungabhadra left bank canal command in Raichur district of Karnataka.

Link- II of Bedti -Varada link project is proposed by Govt. of Karnataka as an intra-state link (Bedti - Dharma - Varada, to divert the monsoon surplus waters of Bedti river from Suremane diversion site to eastern side of Western Ghats to Dharma river which joins Varada river and

further to Tungabhadra river for irrigation use in the target command area. As mentioned above, the cultivable command area under the Tungabhadra left bank canal is 324213 ha and is spread in Gangavati, Kanakagiri, Karatagi taluks in Koppal district and Manvi, Maski, Raichur, Sindhanur, Sirivara and Deodurg taluks of Raichur district.

8.1 Existing/proposed irrigation facilities in the target command area

8.1.1 Existing irrigation facilities

The existing Tungabhadra dam provides irrigation under TBLBC command, a part of which is proposed to be augmented with the diverted water through proposed B-V link project. The details of irrigated area under TBLBC command are furnished in **Table 8.1** below.

Table – 8.1

Details of Irrigated area under TBLBC command

S.No.	Details	Area
1	GCA (ha)	364686
2	CCA (ha)	324213
3	Annual Irrigation (ha)	244381
4	Annual utilization (MCM)	2605

Source: Salient features of the Tungabhadra project

The schematic diagram of Tungabhadra LBC canal is given as **Fig. 8.1**. The distributary wise area irrigated under the TBLBC command is furnished at **Annexure : 8.1**.

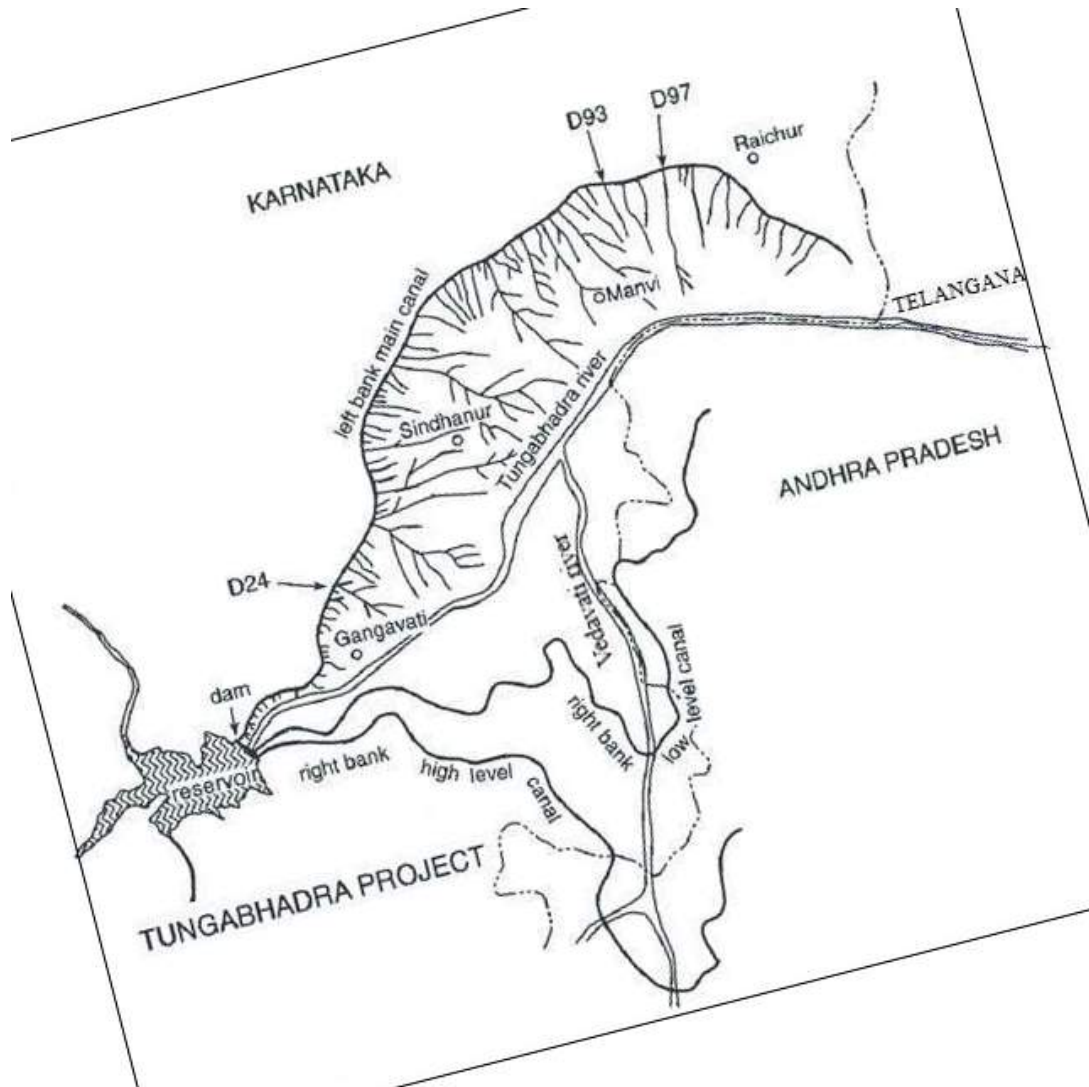


Fig. 8.1: Schematic diagram of Tungabhadra Left Bank Canal

8.1.2 Proposed irrigation facilities in the target command area

The target command area which lies in drought prone Raichur district, and forms part of existing TBLBC command, is proposed to be provided with irrigation facilities by the water diverted through the Bedti - Varada link project. The command area map of the Tungabhadra project (which includes the target command area) is shown in **Plate 8.1**.

8.2 Existing cropping pattern

8.2.1 Existing area irrigated under each crop and yield per ha

The existing cropping pattern of the Tungabhadra LBC includes paddy, cotton, garden crops and semi dry crops like jowar, groundnut etc. Accordingly, yield of each crop per ha in respect of Raichur district for the year 2018-19, along with existing cropping pattern (as % of irrigated area) in Tungabhadra left bank canal command areas is given in **Table 8.2**.

Table 8.2
Existing cropping pattern and yield rates
in Tungabhadra left bank canal command

Sl. No.	Crop	%age of irrigated area	Yield (T/ha) (Raichur dist.)
	Kharif		
1	Paddy	8.7	2.68
2	Semi dry crops	36.6	
	a) Jowar		1.37
	b) Bajra		0.92
	c) Maize		7.60
	d) Groundnut		0.86
	e) Chillies		1.24
	f) Ragi		1.20
3	Cotton	12.2	0.30
	Rabi		
4	Semi dry crops	36.4	
	a) Wheat		0.96
	b) Jowar		1.39
	c) Groundnut		0.79
	Perennial crops		
5	Sugarcane	3.5	85.5
6	Garden crops	2.6	
	Total	100.0	

Source: Salient features of the Tungabhadra project & website <https://aps.dac.gov.in/>

8.2.2 Net increase in irrigation facilities due to present project

The propose diversion is 302MCM (Link-I) and 222 MCM(Link-II) from Bedti basin to Tungabhadra sub-basin. Considering 100% intensity of irrigation in the additional area to be provided with irrigation from the augmented water and also considering irrigation during kharif season only (and ignoring evaporation losses), a delta of 0.45 m is computed with the cropping pattern as that of TBLBC. With this delta, net increase in annual irrigation from the augmented water works out to 60300 ha under Link -I and 44600 ha under Link-II.

8.3 Soil surveys

Soil surveys classify the physical and chemical characteristics of the soils of an area.As the proposed diverted water is used for irrigation under the existing TBLBC command, no further soil surveys are contemplated in the target command area.The command area under TBLBC is predominantly covered by red loamy soils and to a lesser extent by medium black soils and deep black soils.

8.3.1 Soil capability classification

Soil capability classification depicts the capability of soil for producing crops on sustained basis.The characteristics of the soils present in the command area are discussed as below.

The red loamy soils topographically occur on undulating terrains. They are shallow to moderately deep and relatively coarser in texture. They have good to excessive surface drainage conducive to erosion. These are slightly acidic in reaction and are poor in nitrogen and phosphates. These

soils respond well to irrigation, manuring and other water and land management practices. These are deep to very deep (90 -180 cm and over). Crops like wheat, jowar, millets, groundnut and pulses are grown under rainfed cultivation. Under irrigated conditions, crops like paddy, sugarcane, potatoes, chillies, vegetables etc., are grown. Deep ploughing is especially recommended.

Medium black soils are moderately deep to deep (23 – 90 cm), and are dark to greyish, brown to dark reddish brown or black in colour. They are relatively retentive, neutral to alkaline in reaction. They are moderately well drained with slow permeability. These soils are fertile and produce good yields when moisture is not a limiting factor. These are moderately susceptible to erosion. Adequate soil and water management techniques are required to get sustainable yields. The crops grown under rain fed cultivation are jowar, wheat, millets, cotton, sunflower, tobacco, and groundnut. Under irrigation, crops like paddy, sugarcane, vegetables, onion, chillies, jowar, cotton, wheat, tobacco and plantains are grown.

Deep black soils are nearly a meter in thickness. These soils are dark grey or black in colour. The texture is usually clayey throughout the section and at places on the surface, it may be clayey loam to silty clay texture. These soils are highly retentive and fertile and are moderately well drained to imperfectly drained with slow to very slow permeability. These soils generally produce good yields when moisture is not a limiting factor. Good drainage facilities are essential to obtain sustainable yields; otherwise, salinity and water logging conditions may develop. Crops similar to medium black soils can be grown in these soils. Irrigation should be controlled and well regulated on these soils, especially under light irrigation to prevent upward movement of salt and salinization of surface soil.

8.3.2 Soil and Land irrigability classification

Soil suitability for irrigation depicts the differentiation of the soils into different irrigability classes based on the limitations of physical soil properties. The soils of texture “sandy loam to clayey loam” come under soil irrigability class “A”. The soils of texture “loamy sand and clay” come under soil irrigability class “B”. The soils of texture “sand and clay” come under soil irrigability classes “C & D”. The soils belonging to soil classes from A to D come under irrigable land class, while Class ‘E’ is not suitable for irrigation. The land irrigability classification differentiates the lands based on the economic productivity potential of the lands of the area. The lands having slopes less than 10% and depth of water table more than 1.5 m come under irrigable land class. Among land irrigability classes, class 1 to class 4 come under ‘Irrigable land class’. Land under class 5 is ‘temporarily non-irrigable’ (further investigations are needed) and land irrigability class 6 is ‘land not suitable for irrigation’.

In Raichur district, most of the land slope is less than 5% and the groundwater depth is more than 1.5 m. The suitability of land for irrigation under the TBLBC command (worked out from the GIS data of Karnataka State Remote Sensing Application Center-KRSAC) is furnished in **Table 8.3**.

Table 8.3

Suitability of land for irrigation in TBLBC command area

Sl. No.	Land suitability for irrigation	%age of area
1	Moderate limitations for sustained use under irrigation	79.82
2	Severe limitations for sustained use under irrigation	14.73
3	Very severe limitations, marginal for sustained use under irrigation	0.48
4	Not suited for use under irrigation, also not arable	1.63
5	Non-irrigable land	3.34
	Total	100.00

8.4 Agro-climatic conditions

The command area under TBLBC, lies approximately between 15⁰16" to 16⁰14" north latitude and 76⁰19" to 77⁰24" east longitude. The TBLBC command area is surrounded by Tungabhadra left bank main canal on the north, Tungabhadra river on the south, Koppal district on the west and Raichur district on the east. Based on prevailing soil characteristics, rainfall, temperature etc., the command area under TBLBC falls, agro-climatically in North-Eastern Dry zone and Northern dry zone. The agro-climatic conditions influence the cropping pattern to be adopted and thereby the crop water requirements in the command area.

8.4.1 Rainfall

The climate of the TBLBC command is dry throughout the year except in the south-west monsoon months. The relative humidity is high during the south-west monsoon season and low in the summer. The climate in the area could be divided into four seasons viz.,

1. Summer season from middle of February to first week of June
2. Monsoon season from first week of June till the end of September
3. Post monsoon season during October and November months
4. Cold season from December to middle of February.

The normal annual rainfall in the command varies from 647.4 mm to 750.5 mm. The data on seasonal and annual normal rainfall of three rain gauge stations influencing the target command area, is furnished in **Table 8.4**.

Table 8.4
Seasonal and Annual normal rainfall of rain gauge stations
influencing the target command area

Unit: mm

Sl.No.	R.G. Station	Pre-Monsoon	SW Monsoon	NE Monsoon	Annual
1	Manvi	57.1	459.0	131.3	647.4
2	Raichur	71.7	538.8	140.0	750.5
3	Sindhaur	66.4	444.3	173.1	683.8

Source: Rainfall Normals (1951-2000), IMD, Pune

Nearly 75% to 80% of annual rainfall occurs during the period of southwest monsoon (June to October). A few showers are also received during the north-east monsoon, generally in the months of November and December.

8.4.2 Climatological parameters

Raichur IMD observatory is located in the close vicinity of the command area. The normal monthly values (1981-2010) of various climatological parameters viz., max. and min. daily temperature, relative humidity, cloud cover and wind speed, pertaining to Raipur IMD observatory are given at **Annexure 8.2**. Also, the normal monthly rainfall

(1951-2000) observed at Raipur IMD observatory is given at **Annexure 8.2**.

The salient values of these parameters are furnished below.

a) Temperature

Normal daily maximum temperature of 40.4⁰C is observed in the month of May. A normal daily minimum temperature of 16.6⁰C is recorded in the month of December at Raichur IMD station. The highest daily temperature of 45.6⁰C is recorded at Raichur station on 23-05-1928 and the lowest daily temperature of 7.3⁰C is recorded on 22-12-2010.

b) Humidity

Normal monthly maximum and minimum relative humidity at Raichur are 74% (September) and 23% (March) respectively.

c) Cloud cover

Normal monthly maximum cloud cover of 5.8 oktas is recorded in July and minimum cloud cover of 2.6 oktas is recorded in January.

d) Wind speed

Normal monthly wind speed at Raichur varies from 7.6 kmph in December to 14.0 kmph in July.

e) Rainfall

Normal monthly rainfall at Raichur varies from 2.0 mm in January to 156.0 mm in September. The normal annual rainfall (1951-2000) at Raichur station is 750.5 mm.

8.4.3 Evaporation

The average annual (1976-2019) evaporation losses from Tungabhadra reservoir have been found to be of the order of 292 MCM.

However, since the monthly diversions proposed (which are during monsoon months only), are not significant, compared to the live storage capacity of the reservoir, additional reservoir evaporation losses due to the diverted water is assumed to be insignificant and hence are not considered.

8.5 Proposed cropping pattern

8.5.1 Cropping pattern adopted under the link project

Since the diverted water is used to augment the irrigation in the existing command under the TBLBC, the designed cropping pattern adopted for the TBLBC is considered for target command area also. Further, since the diversion is during monsoon months only, 100% intensity of irrigation during Kharif season only is considered. The cropping pattern considered for the target command area (based on designed cropping pattern of TBLBC) is furnished in **Table 8.5**.

Table 8.5

Cropping pattern adopted in the target command area

Sl. No.	Crop	%age of irrigated area
	Kharif	
1	Paddy	15
2	Jowar	14
3	Bajra	7
4	Maize	7
5	Cotton	21
6	Fodder	7
7	Groundnut	15
8	Chillies	7
9	Ragi	7
	Total	100.0

8.5.2 Proposed irrigation facilities

The diverted water through the Bedti - Varada link canal is proposed to augment the irrigation needs in the existing command area in the tail end of the TBLBC in the drought prone Raichur district of Karnataka. The existing distributary system of the TBLBC is proposed to be used for supplying the diverted water to the tail end of TBLBC. Under Link- I, a quantum of 302MCM of water is proposed to be diverted from Bedti basin to Tungabhadra dam (via Varadariver). Ignoring transmission and evaporation losses and considering irrigation during kharif only with 100% intensity of irrigation and an average delta of 0.45 m, the area that could be irrigated by the diverted water under Link-I is worked out as 60300 ha. From the distributary wise area irrigated under TBLBC given at **Annexure:8.1**, it is seen that beyond Distributary No. 89 at about RD 160 km of TBLBC, the area irrigated is seen to be 69041 ha (against 60300 ha) which is proposed to be augmented with diverted water through Link- I.

Similarly, under Link-II, a quantum of 222MCM of water is proposed to be diverted for irrigating an area of 44600 ha. From **Annexure 8.1**, it is seen that between distributary No. 65 at RD 122.70 km and Distributary No. 89 at RD 160.0 km of TBLBC, the available area irrigated is 49489 ha. This area is proposed to be augmented with diverted water through Link-II.

The abstract of annual irrigation and utilization from Bedti - Varada link is given in **Table 8.6**.

Table 8.6

Abstract of annual irrigation and utilisation

through Bedti-Varadalink project

Bedti - Varada link project	Annual irrigation	Utilisation			
		Irrigation	Municipal	Industrial	Total
	(ha)	(MCM)	(MCM)	(MCM)	(MCM)
Link I	60300	274	8	14	296
Link II	44600	202	6	10	218
Total	104900	476	14	24	514

8.5.3 Scope for double & multiple cropping pattern and change in cropping pattern

The designed cropping pattern of the TBLBC is considered in the target command area. Further, since the diversion is during monsoon months only, irrigation in the target command area is proposed during kharif season only with 100% intensity of irrigation, so as to benefit more area in the drought prone Raichur district. As such, no double or multiple cropping is considered in the target command area.

8.6 Crop water requirement for irrigation

The monthly crop water requirement for each crop in the target command area has been computed adopting Potential Evapo-transpiration (Penman Monteith method) and normal rainfall data of Raichur IMD observatory which is in the close vicinity of the target command area. The monthly normal rainfall and the monthly potential evapo-transpiration values of Raichur IMD station are given at **Annexure 8.3.1**.

The proposed cropping pattern in the command area is adopted as given in Table 8.5. The intensity of irrigation is considered to 100 %. The crop calendars and crop coefficients of various proposed crops are considered as adopted in the water balance studies of Tungabhadra Sub-basin and at Tungabhadra dam site in Krishna basin - 2016 (TS No. 65). The computations of crop-wise monthly crop water requirement of the crops as per the cropping pattern proposed in the target command area are furnished in **Annexure 8.3.2**. The average delta is worked out as 0.45 m and the details are furnished in **Annexure 8.3.3**.

8.6.1 Monthly waterrequirement for irrigation

Based on crop water requirement computed as discussed above and the crop wise area proposed to be irrigated from the diverted water, the crop wise / month wise distribution of the total water requirement is computed. The details of computations for Link-I (274MCM) and Link-II (202 MCM) are furnished in **Annexure 8.4.1** and **8.4.2** respectively. The monthly abstract of crop water requirement for Link-I and Link-II in the target command area is furnished in **Table 8.7**.

Table8.7
Monthly abstract of cropwater requirement
in the targetcommand
Unit: MCM

Month	Link - I (60300 ha)	Link - II (44600 ha)
June	16	11
July	81	60
August	80	59
September	57	42
October	19	14
November	15	11
December	6	5
Total	274	202

Note: The monthly diversions are phased as per the water availability at the proposed diversion sites (based on daily simulation) whereas the monthly water requirements are arrived based on the designed cropping pattern of TBLBC and crop water needs.

8.7 Water Planning

The Bedti -Varada link project is conceived as an irrigation project envisaging irrigation benefits in the Tungabhadra left bank canal command area in the drought prone Raichur district. The provision of 14 MCM of water for domestic water supply and 24 MCM of water for industrial water supply is kept along with 476 MCM for irrigation in target command.

8.7.1 Surface water

8.7.1.1 Water availability

A quantity of 302MCM through Link- I and 222MCM through Link-II, against the water balance at respective diversion sites viz., Pattanadahalla (181MCM), Shalamalahalla (276 MCM) and Suremane (298MCM), respectively is proposed to be diverted through the Bedti -Varada link project for irrigation utilization in the target command area under Tungabhadra left bank canal.

8.7.1.2 Irrigation demand to be met under the link project

The average deficit in water use under the Tungabhadra left bank canal is found to be around 1177 MCM. 476MCM out of 524 MCM proposed to be diverted through the Bedti- Varada link project, is earmarked to augment the irrigation use in the water short Raichur district near the tail end of the TBLBC.

8.7.1.3 Domestic & industrial water supply

There is a provision of 14 MCM and 24 MCM made for domestic and industrial water supply from the envisaged diversion of Bedti -Varada link project. Details are furnished in **Annexure 8.5**.

8.7.1.4 Transmission losses

There is a provision of 10 MCM made for transmission / conveyance losses from the envisaged diversion of Bedti -Varada link project.

8.7.1.5 Evaporation losses

Evaporation losses are not accounted for in the water planning as the diverted water is proposed to be directly fed in to the existing Tungabhadra project and will be utilized in the TBLBC command during monsoon months.

Month wise demands of the proposed link canals are furnished in **Annexure: 8.6.**

8.7.2 Groundwater

8.7.2.1 Groundwater potential

The proposed target command area of the link project lies in four Taluks of Raichur district of Karnataka, viz., Devdurga, Manvi, Raichur and Sindhanur. The groundwater availability, existing draft for irrigation, balance groundwater available for irrigation development in the four taluks of Raichur district are furnished in **Table 8.8** below. The present level of groundwater development in the four taluks, varies between 19% and 70%. The characterization of the groundwater potential in the area is observed to be safe.

Table 8.8
Groundwater availability and existing draft in
the target command area

Unit: ham

Taluk	Net Annual GW availability	Existing draft for irrigation	Provision for D&I use	Balance available for irr. development	Existing stage of GW development
Devdurga	7133	2170	667	4296	38%
Manvi	34285	5861	996	27428	19%
Raichur	7465	4838	717	1910	70%
Sindhanur	26054	4943	808	20304	21%

Source: Ground water information booklet, CGWB-2013 for Raichur district.

8.7.2.2 Conjunctive use / groundwater support

In order to make an economic and efficient use of available water resources, it is essential that a judicious mix of surface and groundwater are resorted to for irrigation purpose. There is considerable scope to further intensify the irrigation in the command areas by making use of the groundwater resources available. This may further facilitate in checking the hazards of water logging and soil salinity in the command.

In the present planning, since augmentation to the irrigation in the command area is contemplated in the kharif season only, the available groundwater resources could be utilized for further intensification or augmentation of the irrigation facilities in the rabi season.

8.8 Command area drainage

The command area is drained by a network of number of small streams and nallahs. The command area has quite good drainage facilities. However, with the introduction of more irrigation, as the command area develops, drainage problem may crop up in the course of time. Suitable provision is, therefore, made in the project estimate towards chalk and collecting drains in the command area.

8.9 Water course / field channels

The diverted water is utilized to augment the irrigation under the existing TBLBC command. The distributary wise design discharge and area to be irrigated under the TBLBC is already furnished as **Annexure 8.1**. This existing network of distributary system is proposed to be utilized to provide irrigation through the diverted water.

8.10 Water management

8.10.1 Review and evaluation of existing system of operation and distribution in the command and/or in some adjoining projects, if any

Maximum gains in water use efficiency can only be made when these are combined with better water management practices. Keeping this concept in view, the Government of Karnataka has decided to cover maximum possible command areato ensure that irrigation water is distributed efficiently and equitably in the command area and that it be used efficiently through Participatory Irrigation Management (PIM),where irrigation co-operatives maintain the canal network and field channels, expands the irrigated area and distribute and provide tail-enders their fair and just share of water. Rehabilitation of existing canal network through stakeholders' participation to make water available to tail-enders is given a priority.

8.10.2 Proposals for Participatory Irrigation Management (PIM) including formation of Water Users Association (WUA)

The Government of Karnataka has taken up initiative to involve beneficiaries and stakeholders in irrigation management by enacting the KarnatakaIrrigation Act, 1965. Under the provisions of this Act, Water Users' Association (WUA) have been formed in the state. The same can be adopted in case of Bedti - Varada link project also.

8.10.3 Scope of introduction of modern technology like sprinklers, drip irrigation etc.

Additional water is proposed to be diverted to augment the irrigation in the target command in water short Raichur district. With the possibility of

increased irrigation in the area, there is adequate scope for introduction of sprinkler and drip irrigation systems in the command area.

8.11 Command Area

The command area under the Tungabhadra left bank canals, in which the target command area of the link project lies, spreads in Koppal and Raichur district of Karnataka. The gross command area, CCA and annual irrigation in the command area are 364686 ha, 324213 ha and 244381 respectively. Out of the 244381 ha of annual irrigated area under TBLBC, the target command area will be 104900 ha.

8.11.1 Location

The entire command area proposed under Bedti - Varada link project lies in the tail end reach of Tungabhadra left bank canal command in Raichur district of Karnataka. The taluks involved are Devdurga Manvi, Sindhanur and Raichur.

8.11.2 Classification of land

The land use particulars of Raichur district (in which the command area lies) for the year 2018-19 are furnished in **Table 8.9** below.

Table 8.9
Land use classification of Raichur district for the year 2018-19

Category	Area (ha)	Percentage to total area
Forest	18167	2.17
Barren land	20084	2.40
Land put to non-agricultural uses	20768	2.48
Permanent pastures & other grazing lands	19816	2.37
Sub-total	78835	9.42
Land under miscellaneous crops & trees	13684	1.64
Culturable waste	10712	1.28
Other fallows	49733	5.95
Current fallows	79900	9.86
Net area sown	602979	72.15
Sub-total	1592851	90.58
Area sown more than once	142215	17.01
Gross area sown	745194	89.16
Reporting area for LUS	835843	100.00
Geographical area	844200	

Source: <https://aps.dac.gov.in/LUS/Public/Reports.aspx>

8.11.3 Irrigation

(a) Present sources of irrigation in command

The present source of irrigation is the existing Tungabhadra project.

(b) Methods of irrigation followed

At present, the conventional method of applying water through minor irrigation channels, distributaries and water courses is being followed in

these areas. However, sometimes electric/diesel pump sets are also used to lift water from the streams and wells.

(c) Status of land development for irrigated Area

Land development measures like land shaping, land levelling, aligning of field channel and drainage channels etc., need not be taken up in the command area, since it is existing command under TBLBC.

8.11.4 Socio-economic aspects

The socio-economic indicators of Raichur district are furnished in **Table 8.10.**

Table-8.10
Socio-economic indicators of Raichur district

S.No	Description	
1	Geographical area (Sq km)	8442
2	Population (2021 census)	
	Total	1928812
	Rural	1438464
	Urban	490268
	Male	964511
	Female	964301
3	Population density per Sq km	228
4	Sex ratio (Female to 1000 male)	1000
5	SC population	4,00,933
6	ST population	3,67,071
7	Literacy rate	59.56%
8	Workforce	46.8%
9	Workforce in agricultural	69.7%

S.No	Description	
	sector	
10	No of households	359337
11	Households with Electricity	87.54%
12	Households with Tap water facility	61.10%
13	Households having wells	26.62%
14	Households with drainage connection	36.31%
15	Households availing banking services	50.58%

8.11.5 Infrastructure facilities

(a) Roads and railways

Hospet- Hubli and Guntakal- Raichur railway lines pass through the TBLBC command area. NH no. 50 (Chitradurga to Sholapur), 150A (Srirangapatna to Jevargi) and 167 (Bellary to Mahboobnagar via Raichur) along with several state highway and district roads connect various places in the TBLBC command area.

Details of roads and railways of the districts falling in the TBLBC command area are given in **Table-8.11**.

Table-8.11
Distribution of roads and railways in the command area

Length of roads (km)	Length of railway line (km)	Total length of transport network (km)
4007.01	57.21	4064.22

Source:Karnataka State Remote Sensing Application Center (KRSAC), Govt. of Karnataka.

(b) Marketing facilities

Almost all the villages falling under the command are dependent on the marketing facilities available in Koppal, Gangavati, Hospet, Bellary and Raichur. In addition, numerous fair price shops, within reasonable distances are available in all villages.

(c) Agro industries

Cotton, Textile, Paper & Paper products, Oil products, Food Products and Sugar mills are the major Agro-Industries established in Koppal and Raichur districts.

(d) Banks / Credit Societies etc.

There are many Commercial banks, Rural banks, Co-operative banks and Primary Land Development Bank (PLDB) branches located in the command area in Koppal and Raichur districts.

8.11.6 Identification of problems in command area

(i) Physical problems including hazards

(a) Land slopes: The land is generally undulating; therefore, canal distribution system is aligned accordingly.

(b) Soil depth: There may not be any problem on this account, as sufficient soil depth is available in the area for providing canal irrigation.

(c) Water logging: The command area shall be monitored for water logging as the soils present in the command area are mainly clayey.

(d) Drainage: As area is undulating with moderate slopes, no drainage problem is anticipated. However, keeping in view the soil type present in the command area, suitable drainage network shall be provided.

(ii) Financial problems

Kisan credit cards issued by State Government, Primary Agricultural Credit Societies, Regional Rural Bank Branches, Commercial Bank Branches and Primary Land Development Banks will meet the credit needs of the farmers and hence no financial problems will be faced by the farmers.

8.11.7 Proposed cropping pattern with justification

The cropping pattern proposed in the target command area is based on the existing cropping pattern in the TBLBC command in kharif season.

8.11.8 Land development work proposals

As the area is already under irrigation under TBLBC, no major land development works are required.

At present fairly good extension services exist in the command area and number of commercial banks and co-operative banks also have their branches. Branches of Land Development banks are also located in some rural areas of the command area. Moreover, the agricultural materials like seeds, fertilizers, insecticides, pesticides, etc. are provided to the farmers by the concerned government departments at subsidized rates through different sale booths or fair price shops.

8.11.9 Benefits

(i) **Crop-wise increase in yield per ha and total estimated output from the command**

The crop-wise yields in pre & post project scenarios are given in **Table 8.12.**

Table 8.12
Crop-wise yield under pre and post project scenarios in the target command

CCA:104900 ha

S. No.	Name of Crop	Pre project scenario			Post project scenario		
		Area (ha)	Yield (MT/ha)	Gross yield (MT)	Area (ha)	Yield (MT/ha)	Gross yield (MT)
A	Kharif						
1.	Paddy	15735	3.83	60265	15735	8.20	129027
2.	Jowar	14686	1.70	24966	14686	4.50	66087
3.	Bajra	7343	1.72	12630	7343	4.50	33044
4.	Maize	7343	2.20	16155	7343	6.20	45526
5.	Cotton	22029	2.20	48464	22029	2.20	48464
6.	Fodder	7343	8.00	58744	7343	20.00	146860
7.	Groundnut	15735	1.14	17938	15735	2.70	42485
8.	Chillies	7343	1.20	8811	7343	3.00	22029
9.	Ragi	7343	1.20	8811	7343	5.50	40386
	Total	104900		256784	104900		573908

(ii) **Estimated value of increased production**

The gross yield in pre and post project scenarios has been presented above in **Table 8.12**. Based on the increased production, cost of increased production has been assessed.

(iii) Likely socio-economic aspects

Due to increase in food grain production, the socio-economic condition of farmers will improve in general. Agricultural laborers will get employment in the nearby area, development of livestock and dairy products will improve which will lead to establishment of more agro-based industries in the area.