

PRE-FEASIBILITY REPORT

Palamuru – Rangareddy Lift Irrigation Scheme (PRLIS) Canal Network – Phase II (Irrigation) Mahabubnagar District, Telangana State

Submitted to:

**The Ministry of Environment Forest & Climate Change,
New Delhi**

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Submitted by:



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1 INTRODUCTION AND PROJECT BACKGROUND

1.1 INTRODUCTION

The erstwhile Mahabubnagar, Rangareddy and Nalgonda Districts of Telangana State are the worst drought prone and distressed areas in our country. There is tremendous shortage of drinking water, as these are fluoride affected areas. As a result, a large part of the population of these districts is being forced to migrate to other parts of the country. In order to redress this situation, the Government of Telangana has taken up the Palamuru Rangareddy Lift Irrigation Scheme (PRLIS) for alleviating the misery of these drought prone areas.

PRLIS is one of the foremost and largest welfare projects being under taken by the Government of Telangana to supply clean potable water to the upland areas of Mahabubnagar, Rangareddy and Nalgonda Districts by utilizing excess flood water. The scheme in its first phase envisages lifting of 90 TMC of flood water in 60 days during the flood season from the fore shore of the Srisailem project on Krishna river at Yellur (V), Kollapur(M) in Mahabubnagar (D) through five separate stages, ending at K.P.Laxmidvipally (V), Kondurg (M), near Shadnagar town at the highest elevation. These five stages each comprise of a reservoir and conduit between each reservoir for taking the water forward with pumphouses being constructed where necessary. While the immediate purpose for the project is to provide water for drinking and industrial purposes, the eventual plan (to be implemented at a later date) is to use this water for irrigation in these districts through a network of canals. Water will then be drawn from selected reservoirs through a separate canal and pipeline distribution network.

Thus, Palamuru - Rangareddy Lift Irrigation Scheme is intended to irrigate upland areas of Mahabubnagar, Rangareddy, and Nalgonda districts for a command area of 4,97,976 ha (12.30 lakh acres) and provide water for industrial use.

1.2 BACKGROUND

The erstwhile Mahabubnagar, Rangareddy and Nalgonda Districts of Telangana State are the worst drought prone and distressed areas in our country. There is tremendous shortage of drinking water, as these are fluoride affected areas. As a result, a large part of the population of these districts is being forced to migrate to other parts of the country. To redress this situation, the Government of Telangana have taken up the Palamuru Rangareddy Lift Irrigation Scheme for alleviating the misery of these drought prone areas which will benefit 1428 villages where about 50 lakh people will get drinking water.

The economy of Telangana is mainly driven by agriculture. About 61% of the population is rural. The economy of the state is predominantly agrarian; agriculture contributes major share of the state's income and employs majority of the work force. Since agriculture is the main activity and



it has close links with the development in other sectors For overall economic progress of the state, achieving faster agricultural growth is imperative.

The gross cropped area in the state is 62.88 lakh ha and net irrigated area is 22.89 lakh ha (36.40% of cropped area).

Thus, there is an urgent need for increasing food and fibre production to meet the demands of increasing population as well as for providing rural employment.

1.3 NEED OF THE PROJECT

The region of the project area is drained by major river namely Krishna. The climate in this region is semi-arid and has skewed distribution of rainfall in space and time necessitating water management. The normal rainfall of Mahabubnagar district is 605 mm. There is tremendous shortage of drinking water, as these are fluoride affected areas. As a result, a large part of the population of these districts is being forced to migrate to other parts of the country. In order to redress this situation, the Government of Telangana have taken up the Palamuru Rangareddy Lift Irrigation Scheme for alleviating the misery of these drought prone areas which will benefit 1428 villages where about 50 lakh people will get drinking water.

The project falls in Mahabubnagar district where major economic activity is due to agriculture, which is monsoon dependent, the net irrigated area under various sources is less than 15%, which is lowest in the State. Mahabubnagar district is situated entirely in the Krishna basin which is mostly semi-arid, often experiences drought. Due to the inconsistent monsoons and erratic rainfall, the overall agricultural production and consequently the per capita income and the overall economy of the region is low.

Rangareddy district lies in Krishna basin only. The rivers Musi and Kagna also flow through the district. From Musi water is being diverted to meet domestic and industrial needs of Hyderabad city. There are no major irrigation projects, owing to higher elevation. The nearest source of water is Krishna River from where it is required to lift and convey water.

Nalgonda district also lies in Krishna basin . Major project Nagarjunsagar is in the district. Owing to higher land elevation, major portion does not come under command of Nagarjunsagar Project. The total annual rainfall is less than 750 mm and further most of the mandals are having high fluoride levels causing diseases like dental and skeletal fluorosis.

In view of the above, all these districts are drought prone and backward. It is necessary to provide drinking water on priority basis and irrigation facilities in the upland areas of district by lifting water. This proposed project provides drinking water facility to *en-route* villages, Hyderabad city and irrigation facilities to 4,97,976ha (12.30 lakh acres). The scheme shall improve the living



conditions by improving groundwater scenario and clean drinking water to the people in the three districts, agricultural output and the per-capita income of the people of the region.

1.4 LOCATION & CONNECTIVITY

The canal network is approachable by road from the nearest towns. The nearest railway station is "Jadcherla" at a distance of 23 km. The nearest airport is Hyderabad in at a distance of 93 km. Mahabubnagar is the District Head quarter, Jadcherla, Kalwakurthi, Narayanpet, Bhutpur, Devarakadra, Kodangal, Shadnagar in Mahabubnagar District & Gandeed, Tandur, Dharur, chevella, vikarabad and Pargi of Rangareddy district are the major towns located in the project area.

The Secunderabad - Bangalore Railway line of SC Railway and Hyderabad - Bangalore National highway NH-44 and State highways SH-4 & SH-21 pass through the mid region of the project area and serve as important means of commuting.

2 PROJECT DESCRIPTION

In view of drought situation in the area, the lift irrigation project was planned to be executed in two phases: Phase-I (Water Supply) and Phase-II (Irrigation). The entire scheme was planned with 6 reservoirs from which water shall be lifted in 5 lifts.

2.1 PHASE-I (WATER SUPPLY)

The immediate purpose for the project is to provide water for drinking and industrial purposes to *enroute* villages and Hyderabad city. Therefore, the first phase of Palamuru-Ranga Reddy Lift Irrigation Scheme envisages to provide drinking water facilities to *enroute* 1428 villages in 74 mandals of Mahabubnagar, Rangareddy and Nalgonda Districts, Hyderabad City and water to industrial use in Mahabubnagar, Rangareddy and Nalgonda Districts by constructing series of approach channels, open canals, tunnels, pump houses and reservoirs by lifting 90 TMC of flood water in 60 days during flood season (1.50 TMC per day) from foreshore of Srisailem reservoir located at Yellur (V), Kollapur (M) in Mahabubnagar district to K.P Laxmidevipally (V), Kondurg (M) near Mahabubnagar District which is the highest elevation in Mahabubnagar and Rangareddy districts with 5 stage lifting and then utilizing water by gravity.

2.2 PHASE-II (IRRIGATION)

The eventual plan is to use this water for irrigation in various districts through a network of canals. In second phase, canal network will be developed from the reservoirs to create irrigation to upland areas of Mahabubnagar, Rangareddy and Nalgonda districts for an ayacut of 4,97,976 Ha.



There are five stages in the project starting from foreshore of Srisaillam Reservoir and ending with K.P Laxmidevipally Reservoir.

2.3 CANAL NETWORK

The canal network is proposed from Venkatadri Reservoir at Vatttem(v), Bijinepally(M), Mahabubnagar(D) to K.P.Lakshmidvipally Reservoir at K.P Lakshmidvipally(v), Kondurg(M), Mahabubnagr(D).The details of reservoirs and canal network and Reservoirs wise ayacut are provided in **Table 2.1**and **Table 2.2** respectively.

Table 2.1: Details of Reservoirs and Canals

Sl. No.	Name of Reservoir	Name of canal	Ayacut (ha).
1	Venkatadri Reservoir	Venkatadri Main canal	56275
2	Kurumurthiyaya Reservoir	High level canal	56275
		Low level canal	16194
		Left main canal	4454
3	Udandapur Reservoir	South main canal	15789
Sl. No.	Name of Reservoir	Name of canal	Ayacut (ha).
		Right main canal	58704
		Left main canal	81378
		Maddur canal	31579
		Hanwada canal	10121
4	K.P.Lakshmidvipally	East main canal	95142
		North main canal	72065
			4 97 976

Table 2.2: Details of Reservoir- wise ayacut

Sl. No.	Name of Reservoir	Place (Village)	F.R.L	Capacity	Ayacut
			(m)	(TMC)	(ha).
1	Venkatadri Reservoir	Vatttem	542.000	16.74	56275
2	Kurumurthiyaya Reservoir	Karivena	531.000	17.34	76923
3	Udandapur Reservoir	Udandapur	629.000	15.91	197571
4	K.P.Lakshmidvipally	Lakshmidvipally	670.000	2.80	167207
					4 97 976

The flow diagram of the project including reservoirs and canal network with phasing of project are shown in **Figure 2.1**.

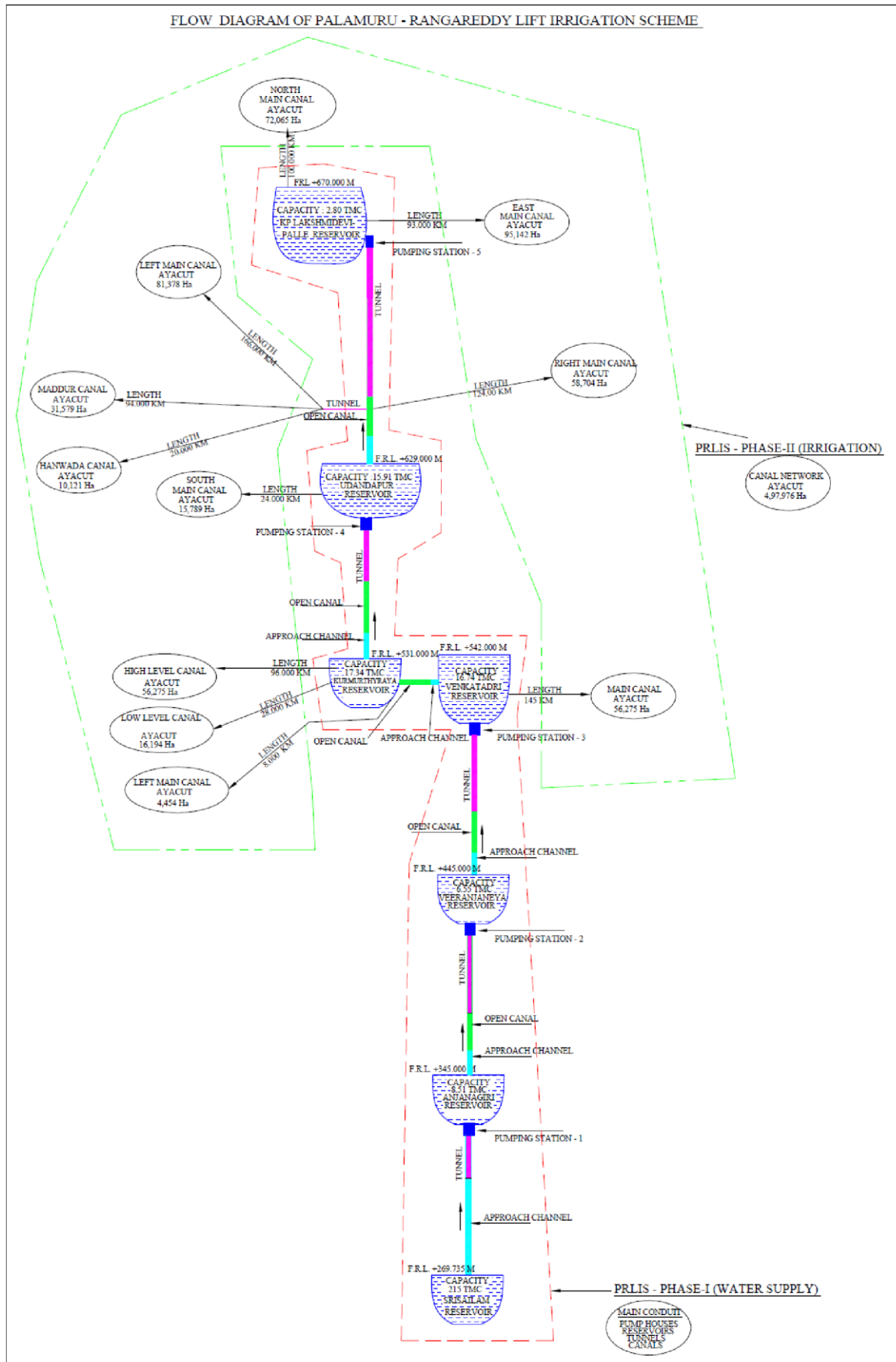


Figure 2.1: Flow Diagram of Project with Phasing



2.4 RAW MATERIAL REQUIREMENT

The construction materials mainly including cement, sand, coarse aggregates, revetment stones, reinforcement steel and structural steel are required for water conductor system, Main canals, CM & CD structures and distributory network system. The construction material to the extent mentioned below will be procured from respective sources to the work sites.

- Revetment Stone: 45,000 MT.
- Coarse Aggregate: 75,36,962 MT.
- Fine Aggregate/Manufactured sand: 33,49,762 MT
- Soils: 2,75,59,517 MT

2.5 MANPOWER REQUIREMENT

As the course of the project is long involving different components in various locations, no centralized congregation or influx of people is expected. Locally available manpower shall be utilized in the nearest place of work.

During the peak period about 7000 Unskilled, Semi-Skilled & Skilled personnel will be deployed along the entire stretch of the project. The labours can be hired from the surrounding areas of the canal network, if available, in order to avoid large scale congregation of outside labor.

At any point of time and place the number of people on the work site shall not be more than 300. The people will be spread over the entire stretch of the canal network area.

2.6 RESOURCE OPTIMIZATION/RECYCLING AND REUSE

Resource Optimization / recycling and reuse are envisaged in this project. The excavated muck comprising of soil, pebbles, rubbles and boulders obtained from the excavation of canal network and construction of tunnels and structures etc. will be utilized for revetment, embankment and aggregates for concrete if found suitable and filling of low lying areas and for green belt development. Mainly the manufactured sand produced from excavated muck shall be used for concrete works instead of natural sand.

2.7 WATER REQUIREMENT

The total quantity of water required during construction period is 2700 KLD (2300 KLD for construction purpose and 400 KLD for domestic purpose). Water requirement during construction stage will be met from surface water.



2.8 ENERGY REQUIREMENT

The power requirement for the project is 2944 MW in all the 5 stages of Pumping Stations. The Power consumption of the project is 4366 MU per annum. Required Power will be supplied by DISCOMS of Telangana.

Power requirement during construction phase is 90MW (for construction 75 MW and 15MW for domestic requirement).

Power to various lift points is to be availed from the TSSPDCL.

The fuel requirement during construction shall be 1,03,833 MT.

2.9 GENERATION OF SOLID AND LIQUID WASTE

The municipal solid waste generated during construction will be about 716 kg/day considering the entire project and it will be managed & handled in accordance with Solid Waste Management Rules, 2016.

During the project construction stage, 320 KLD of waste water will be generated from the labour colonies. The toilets in labour colonies will be provided with mobile STP. Labours will not be stationed in one place throughout the construction phase; therefore, it will be planned in a phase wise manner as per the demand.

2.10 GENERATION OF MUCK

A large quantity of muck is likely to be generated as the result of excavation of canals and construction of structures. The excavated soil and rubble will be utilized for revetment, embankment and aggregates for concrete and for filling of low lying areas and for greenbelt development. The generated muck shall be used for production of coarse aggregates and manufactured sand which can be used as fine aggregates in concrete work.

2.11 FACILITIES AT PROJECT SITE

Proper site services such as First Aid, Canteen / Rest Shelter, Drinking Water will be provided to the construction workers. Various facilities to be provided during construction and operation of the project are as follows:

1. Electricity will be provided by transmission lines and standby DG sets.
2. Potable drinking water will be provided to the workers by tankers during construction.
3. To provide the first aid for any sort of injuries encountered during the operation, one first aid room will be provided. First aid kit and sufficient stock of material / medicines needed for first aid shall be provided as per requirement.



4. For women workers arrangement for a crèche will be made as per the requirement.
5. Necessary arrangement will be made for conducting refresher course as laid down in vocational training rules to upgrade skills of the persons involved in the project.
6. Construction workers engaged in areas of the project will be provided with LPG/Kerosene for cooking purpose to prevent possible tree felling for firewood.

2.12 CONSTRUCTION SCHEDULE

The canal network and structures such as super passages, aqueducts, drops, bridges etc. is planned to complete in 30 months from the date of signing agreement.

2.13 PROJECT COST ESTIMATE

The project cost estimate for all components of Phase-I and Phase-II is as follows:

Sl. No.	Item	Cost (Rs. Crores)
1	Work Items	29827.91
2.	Lump Sum Provisions	2153.09
3.	Non-work items	2570.00
4.	Rehabilitation & Resettlement	588.00
5.	Unforeseen works	61.00
	Total	35,200

The total amount of the estimate is worked out as Rs. 35,200 crores.

3 ANALYSIS OF ALTERNATIVES

The canal network from reservoirs for an ayacut of 4,97,976 Ha (12.30 Lakh acres) are shown the Index map. The alignment of canal network is finalised based on the analysis of alternatives duly considering techno-economic feasibility.

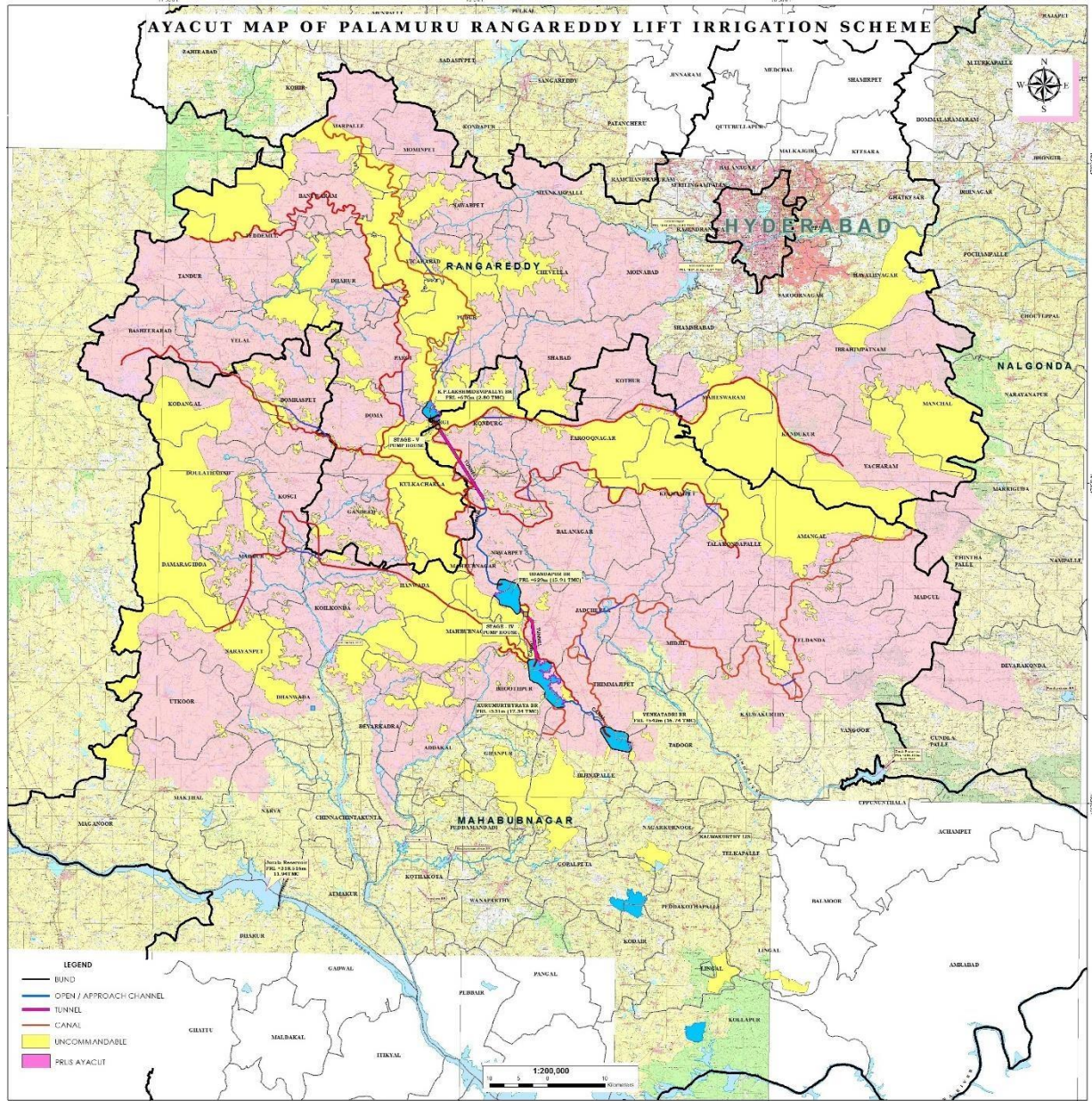


Figure 3.1: Palamaru Rangareddy Lift Irrigation Scheme with Alternatives



4 ENVIRONMENTAL AND SOCIAL ASPECTS

4.1 TOPOGRAPHY

The proposed project is in Deccan plateau of India. Topography is relatively mild to higher slopes.

4.2 CLIMATIC CONDITION

The project area experiences semi-arid climate. The rainfall in the three districts is scanty and most of the rain fall is received during south west monsoon which is more often erratic. The Mahabubnagar district has a normal rain fall of 605 mm. The climate of the district is generally hot.

As per the SAPCC Telangana the districts which are highly exposed to the drought are Mahabubnagar and Nalgonda mainly due to their geographic location and influence of parameters like distribution of rainfall.

4.3 EXISTING LAND USE PATTERN

Land proposed for utilization under canal network is agriculture land and homesteads. A total of 15,790 ha of land will be acquired for excavation of main canal & distributary network etc.

4.4 SEISMICITY AND EARTHQUAKE

As per Bureau of Indian standards [IS-1893- part -1: 2002], the study area falls under seismic zone II. However, there is no record of earthquake reported in the region.

4.5 GEOLOGY

Major rock types in the area are Granite & gneisses, Limestone, Shales & Basalt.

4.6 SOIL CLASSIFICATION

Mahabubnagar district is mainly covered by three types of soils Viz. red sandy soil (Dubbas and Chalkas) Red earth (with loamy sub-soils and Chalkas) and black cotton soils. Red sandy soils and red earth are permeable and well drained whereas the Nalgonda district soil comprises of red soils, black soils, alkaline soils and alluvium. The red soil constitutes 85 % of the area. Black soils are found over the limestone area, in the south- eastern part of the area. Alkaline soils occur as limited patches in the central part. Alluvial soils occur along Alair, Musi and Kagna rivers. Red Soils are predominating in the Rangareddy district followed by black soils. The surface soil texture map is provided in **Figure 4.1**.

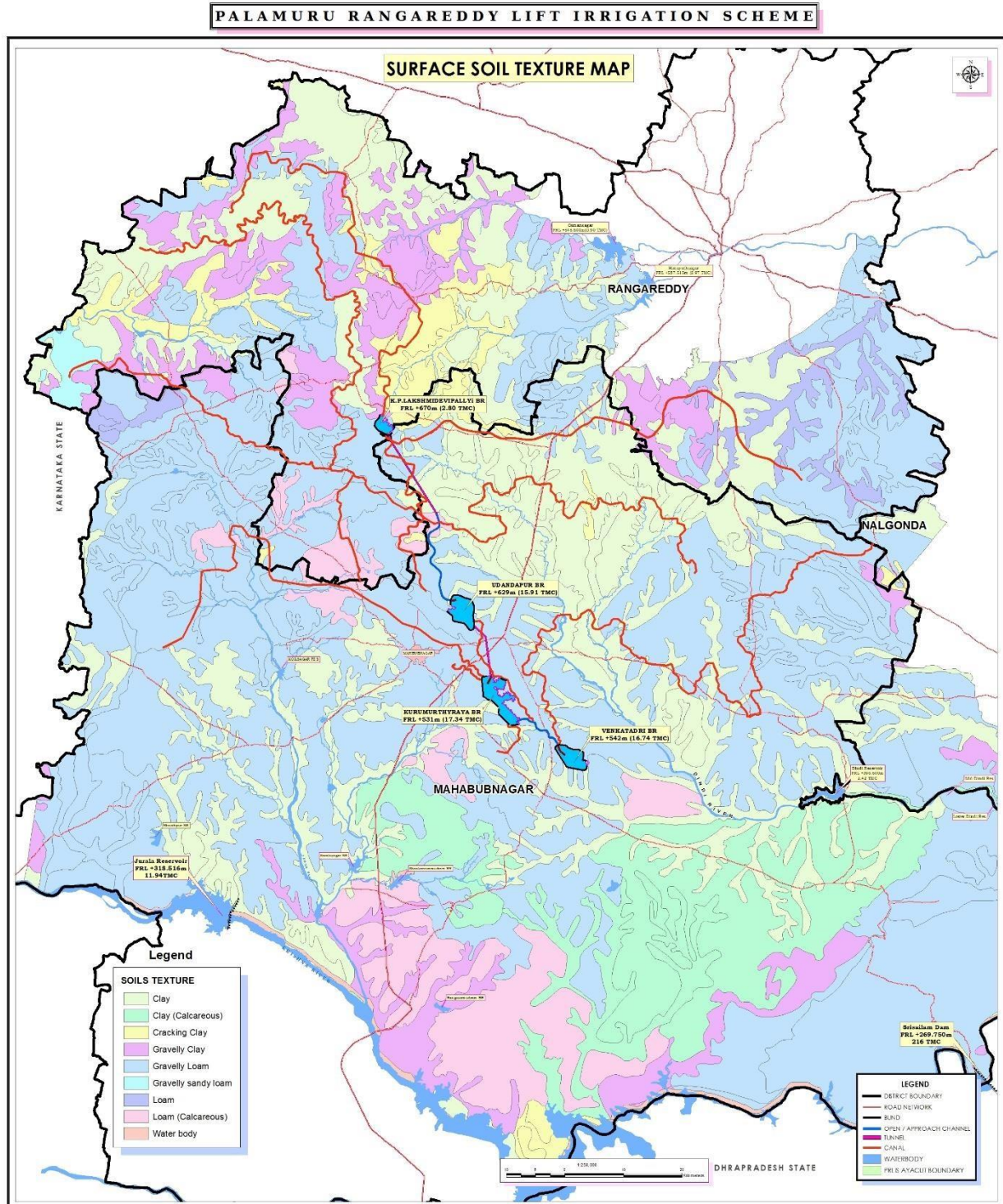


Figure 4.1: Palamaru Lift Irrigation Scheme Surface Soil Texture Map

4.7 DRAINAGE

The entire district lies in Krishna river basin. The district is covered by eight major watersheds viz., Magnurvagu basin, Musi basin, Upper Krishna basin, Dind basin, Tungabhadra basin, Okachetty



basin, Kagna basin and Lower Krishna basin. The Krishna and Tungabhadra are two principal rivers that flow through the district. The Krishna river flows through Gadwal, Atmakur, Wanaparthy, Alampur and Achampet mandals whereas Tungabhadra meanders through Taluks of Gadwal and Alampur. River Dindi, a tributary of Krishna traverses through Kalwakurthi and Achampet areas and Koilsagar is another tributary to Krishna river. Peddavagu and Chinnavagu are small tributaries to Krishna. The water divide runs in west-north west to east and south west through the catchment of Krishna and Tungabhadra rivers. The water divide separates the Krishna and Koilsagar basins in the North East-South East districts. The district is divided into 49 micro basins.

4.8 HYDROGEOLOGY

Ground water occurs in all the geological formations in the district. The major rock types in the district are peninsular gneissic crystallines, limestones, conglomerates, sandstones, shales, basalts and alluvium. The occurrence and behaviour of ground water is an outcome of combined interplay of hydrological, geological, structural, climatological factors, which together form dynamic integrated system. All these factors are inter-dependent and inter-related, each adding its contribution in functioning of the dynamic system. The yield of wells depends on recharge conditions, draft etc. In drought condition, the yield of wells will drastically dwindle in phreatic aquifers.

4.9 GROUND WATER

In Mahabubnagar district, number of Mandals categorised as Safe is 53 (<70 % of net available resource) and Semi Critical is 11 (70 - 90 %). Range of water levels varies from 3 to 20m bgl (during Pre-monsoon-2012) and from 1.52 to 19.20 m bgl (during Post monsoon-2012). Ground water in the district, in general is suitable for both domestic and irrigation purposes.

4.10 LAND ACQUISITION AND REHABILITATION & RESETTLEMENT PLAN

Resettlement & Rehabilitation (R&R) Master Plan highlighting the guidelines of land acquisition and provision for rehabilitation measure will be formulated. The rehabilitation policies of the state government of Telangana and RFCTLARR Act, 2013, Government of India will serve as basis for preparation of the R& R plan for the project affected families. The land required for canal network is 15,790 ha. The Land shall be acquired as per Right to Fair compensation and Transparency in Land Acquisition Rehabilitation and Resettlement acts of State and Central governments.



5 PROJECT BENEFITS

Apart from irrigation, other benefits are also envisaged as follows:

- **Indigenous Production**

The project leads to enhancement of indigenous food grain production.

- **Export Possibility**

This project may ultimately lead to export of excess food grains.

- **Domestic / Export Markets**

The project produce will have favourable impact on domestic and export markets.

- **Employment Generation**

The implementation of Irrigation scheme will create employment opportunities in the project area. The employment is associated with improved farming practices as well as the construction of the irrigation scheme. A total of about 7000 unskilled, Semi-Skilled & Skilled workers will be hired during construction of canal network.

With irrigation additional farm labour would also be required because of higher cropping intensity providing employment opportunities to local people within and outside the vicinity of the project area.

- **Industrial development**

Establishment of agro and ancillary industries are also envisaged, which would give rise to employment to the local people.

- **Additional infrastructure**

Proposed Project does not involve any additional infrastructure for Industrial area, residential area, green belt, social infrastructure etc. Project involves only infrastructure which are required for irrigated agriculture and R&R of PAFs / PDFs.

6 ANALYSIS OF PROPOSAL

The canal network is proposed to irrigate the upland areas of about a net ayacut of 4,97,976 ha (12.30 lakh acres), in addition drinking water facility to enroute villages, Hyderabad city and industrial use in Mahabubnagar, Rangareddy, and Nalgonda districts.

The importance of irrigation is to increase agricultural output and employment. The proposed project is expected to provide employment in different activities such as construction, transportation and plantation activities during construction phase and subsequently in agro - and



other industries. The total man power requirement for the construction period is estimated as 7000. The people will be spread over the entire canal network area. The cost of the project is Rs. 35,200 crores.

Benefits without and with project has been calculated and detailed in **Table 6.1**. The Benefit - Cost Ratio works out to be 1.23 and detailed calculation has been provided in **Table 6.2**.

Table 6.1: Benefits Without and With Project

Item	Without project (in Lakhs)	With project (in Lakhs)
Net value of produce	29051.14	820784.08
Net Annual benefits		791732.94
Drinking water supply		11506.63
Industrial water supply		8304.33
Fisheries returns		8505.25
Total Annual benefits	29051.14	1640833.23

Table 6.2: Total cost for Benefit-Cost Ratio

Sl. No.	Particulars	Before Irrigation	After Irrigation
A	GROSS RECEIPTS		
1	Gross Value of the farm produce	57039.42	1053785.25
2	Dung Receipts @ 30% of the fodder expenditure	2566.77	31613.56
3	Total (A): Gross Receipts (1+2)	59606.20	1085398.81
B	EXPENSES		
1	Expenditure on Seeds	16466.32	78094.74
2	Expenditure on Manure		
3	Expenditure on Pesticides		
4	Expenditure on Hired Labour		
5	Fodder expense @ 15%/10% of Gross value of farm produce	8555.91	105378.53
Sl. No.	Particulars	Before Irrigation	After Irrigation
6	Depreciation on implements @ 2.7% of Gross value of farm produce	1540.06	28452.20



7	Share & Cash rent @ 5%/3% of total gross value of farm produce	2851.97	31613.56
8	Land revenue @ 2% of total gross value of farm produce	1140.79	21075.71
9	Total (B): Expenses (1 to 8)	30555.06	264614.73
C.	NET VALUE OF PRODUCE		
1	Total Gross Receipts	59606.20	1085398.81
2	Minus total expenses	30555.06	264614.73
3	Net Value of Produce	29051.14	820784.08
D.	ANNUAL BENEFITS		
1	Net value after irrigation		820784.08
2	Net value before irrigation		29051.14
3	Net annual benefits		791732.94
4	Revenue from Domestic water supply 227 M cum @ 50.69 Lakhs per M cum		11506.63
5	Revenue from Industrial water supply 57 M cum @ 145.69 Lakhs per M cum		8304.33
6	Fisheries (Average Reservoirs Area*Rate as per Fisheries Department)		8505.25
	Total (D)		820049.15
E.	ANNUAL COSTS		
1	Interest on Capital @ 8% of estimated total cost of the project Rs 35,200 Cr		352000.00
2	Depreciation of the project @ 1 % of the project cost Rs. 35,200 cr		3520.00
3	Annual operation and maintenance charges @ Rs. 223/Ha		902.83
4	Maintenance of Head works @ 1% of the cost of Head works Rs. 14500 Cr		14500.00



5	Depreciation of Pumping System @ 3.33% of the estimate cost of Pumping station assuming life of the system as 30 Years. Rs. 14500	48285.00
6	Power charges for lift irrigation Rs. 248980 Lacs	248980.00
7	Total (E)	668187.83
	BENEFIT COST RATIO 820049.15 / 668187.83	1.23