

# **Chapter 11**

## **Environmental impact assessment and environmental management plan**

### **11.0 General**

Water is an essential element in all the sustenance and developmental activities of the mankind which is required throughout the year. Water is also required for sustenance of the surrounding environment. Precipitation is the only source of fresh water supply which is unevenly distributed both in space and time confined to mainly monsoon season i.e. June to October in the Indian sub-continent. As such, storage reservoirs to store flood waters are necessary so that the availability of water could be ensured throughout the year for various requirements including drinking water. Though reservoirs increase the water availability leading to various developmental activities and prosperity in the area, some adverse impacts on account of them on the environment are also likely. As such, it is necessary to identify the adverse impacts along with the positive benefits of the reservoirs to mitigate or ameliorate the anticipated adverse impacts on the environment while enhancing the beneficial impacts.

In order to identify both positive and adverse environmental impacts with their economic evaluation due to the proposed Godavari (Inchampalli) – Cauvery (Grand Anicut) link project and to suggest measures to mitigate or ameliorate the anticipated adverse impacts on the environment, the Environmental Impact Assessment (EIA) study of the link project is required to be carried out. EIA is to be undertaken to ensure that the project is in compliance with the national environmental and social requirements. The Terms of Reference (ToR) for the proposed EIA study are being submitted to the Ministry of Environment, Forests and Climate Change (MoEF&CC) for approval. On obtaining the approved ToR, EIA study of the link project will be carried out. Therefore, for the present, based on the available information for similar projects, general description and the proposed approach for

Environmental Impact Assessment of the project, Environmental Management Plan and Environmental Monitoring Plan along with the tentative costs to implement the Environmental Management Plan are presented in the following paragraphs:

### **11.1 The proposed project**

The objective of the Godavari (Inchampalli) - Cauvery (Grand Anicut) link project is to utilize the unused waters of Chhattisgarh in Indravati sub-basin, in addition to the balance in Godavari between after duly considering the upstream utilization in the catchment for the benefit of southern states. The project traverses through the districts of Jayashankar Bhoopalapally, Warangal, Nalgonda districts in Telangana; Krishna, Guntur, Prakasam, Nellore, Chittoor districts in Andhra Pradesh and Tiruvallur, Kancheepuram, Vellore, Tiruvannamalai, Villupuram, Cuddalore, Perambalur, Tiruchirapalli of Tamil Nadu. The annual quantum of diversion through the link will be about 7000 Mm<sup>3</sup> (247 TMC) and the maximum daily transfer will be about 62 Mm<sup>3</sup> (2.20 TMC) during monsoon period.

### **11.2 Project description**

The Godavari (Inchampalli) - Cauvery (Grand Anicut) link project comprises the following components.

1. Proposed Inchampalli barrage across river Godavari with FPL of 87 m on downstream of the confluence of Indravati with Godavari.
2. Existing reservoir at Nagarjunasagar with FRL of 179.83 m across river Krishna.
3. Existing reservoir at Somasila with FRL of 100.58 m across Pennar river.
4. Existing Grand Anicut across Cauvery river with FRL of 59.22 m.
5. Main canal of 1210.841 km from Inchampalli barrage across Godavari to Grand Anicut across Cauvery river

6. One tunnel at RD 86.35 km of 9.15 km length in the reach from Inchampalli to Nagarjunasagar. 1.3 km long tunnel from RD 302.786 km to RD 304.101 km; 4 km long tunnel at the offtake of link canal near headworks of Somasila; one km tunnel from RD 700.976 to RD 701.976 km; and 3.1 km long tunnel from RD 826.776 km to RD 829.876 km.
7. Lifting arrangements through 4 stages of 57 m (RD 0.0 km), 38 m (RD 18.0 km), 23.2m (RD 26.50 km) and 11.0m (RD 60.50 km) totaling to 129.20m of static lift on main canal; a lift of 52.63m at 97.50km for Kakatiya Stage II feeder branch (at RD 97.50 km on main canal), lifting through 3 stages of 64.50m (0.00km), 58.0m (75.00 km) and 74m (95.00km) for the 116 km long Gottimukkala feeder branch canal (taking off at RD 199.15km on main canal) totaling to 196.50m; a lift of 67.14m for Srisailam LBC feeder branch (Alimineti Madhava Reddy LIS) from Nagarjunasagar reservoir
8. Several cross drainage and cross masonry works across various streams and roads.
9. In all, 39 number of branch canals and 7 direct sluices / feeders to facilitate irrigation enroute and in the existing irrigation systems through piped distribution
10. A canal power house of 120 MW installed capacity at the take off from Nagarjunasagar reservoir and another is proposed at Musi headworks with an installed capacity of 70 MW.
11. Command area (CCA) of about 887022 ha of land with annual irrigation at 944572 ha.
12. Canal top solar power generation arrangement along the alignment

### **11.3 Project justification**

The peninsular rivers Krishna, Pennar and Cauvery are frequently suffering from low flows due to monsoon vagaries. Often there are conflicts regarding water distribution among the riparian states affecting inter state relations warranting Govt of India/Apex court to intervene. There are

consistent deficits at Nagarjunasagar on river Krishna, Somasila on river Pennar and Grand Anicut on river Cauvery. The crops are often deprived of reliable source of irrigation due to uncertain releases from upstream projects. Further, certain districts viz Nalgonda, Prakasam, Nellore are suffering from fluoride contaminated ground water for drinking. There are a no. of drought districts in these basins as notified by Government of India viz. Nalgonda, Prakasam, Tiruchirapalli.

The link project, on implementation will bring 9.45 lakh ha of area in Warangal, Khammam and Nalgonda districts in Telangana; Krishna, Guntur, Prakasam, Nellore, Chittoor districts in Andhra Pradesh and Tiruvallur, Vellar, Kancheepuram, Tiruvannamalai, Villupuram, Cuddalore in Tamil Nadu under irrigation and will contribute significantly to the overall growth of agriculture in the country. The link canal envisages to serve the new areas as well as command areas under existing projects. This link project will thus bring economic prosperity to the acute water short, drought-prone areas lying in the vicinity of the link project in peninsular India.

### **11.3.1 Study Area**

The study area to be considered for the Environmental Impact Assessment study and preparation of Environmental Management Plan for the proposed link project is given as under:

- i) Catchment area intercepted between Kaleswaram and Inchampalli.
- ii) Area to be acquired for various project appurtenances
- iii) 10 km on either side of the 1211 km long link canal.
- iv) Command area of the project.
- v) About 10 km radius around the project area from the periphery of the project site.

## 11.4 Legal status of the project

The Water Resources Projects, when implemented provide immense benefits to the society in the form of increased availability of water for irrigation, domestic, industrial and other uses. On the other hand, these projects will have impacts, both positive and negative on the environment of the project area and in the vicinity and also affect the socio-economic conditions of the population in the region. The project before its implementation requires statutory clearance from the Ministry of Environment and Forests and Climate Change (MoEF&CC), Govt. of India. As stipulated in the Environmental Impact Assessment Notification of 14<sup>th</sup> Sept 2006, the Terms of Reference (ToR) for carrying out the Comprehensive Environmental Impact Assessment (CEIA) study of link project are being submitted to the MoEF&CC for approval.

No new dams/reservoirs are contemplated along the main link canal except a barrage at Inchampalli, whose submergence will be confined only to the river banks. Existing Nagarjunasagar and Somasila reservoirs are planned to be utilised as balancing reservoirs, besides the existing pond at Grand Anicut which serves as outfall storage. Hence, there is no submergence involved under any of the ponds/reservoirs integrated in the link project. However, about nine villages get affected along the link canal between Nagarjunsagar and Somasila. A detailed R&R package shall be prepared in accordance with the 'National Rehabilitation & Resettlement Policy-2007(NRRP-2007)' and the 'Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Bill, 2013' formulated by Department of Land Resources, Ministry of Rural Development (MoRD), Govt. of India. Due weightage shall also be given to the R&R Policy / Act of Andhra Pradesh State and best of the provisions from the National/State acts shall be adopted in the R&R package.

The Godavari (Inchampalli) - Cauvery (Grand Anicut) link project requires 2080 ha of forest land.

A provision for afforestation in double the area in degraded forests region shall be kept as per the Forest (Conservation) Act, 1980. The project will also require Techno-economic clearance from Central Water Commission; investment clearance from Ministry of Water Resources, River Development and Ganga Rejuvenation (MoWR, RD&GR); and consent to establish from Pollution Control Boards of various states under Water (Prevention and Control of Pollution) Act 1974 and the Air (Prevention and Control of Pollution) Act 1981.

### **11.5 Basic information**

For survival of the mankind, with alarming increase in population and change in living habits, it requires a stable eco-system and increase in food production, for which the development of water resources is inevitable. However, a water resources project is likely to trigger change in the environment of the area due to construction of reservoirs causing submergence of land, displacement of population including the flora and fauna and resettlement in the surrounding catchment, denudation of forest, water logging, salinity and alkalinity of the soil, water quality and change in ground water table.

The environment and ecology certainly get degraded by inappropriate development. In respect of disturbance of environment, there are two schools of thoughts. One school holds that eco-system is fragile and highly unstable. It is implicit, therefore, that eco-system should be left as much as possible in its natural state and that its diversity should be preserved at any cost. Modification for the purpose of development should be minimal and confine to within the range of tolerance limits of various elements of eco-system. The second school of thought assures that the eco-system is globally stable and there is a large element of built in resilience in eco-system. In any case, it is realized that the water resources projects should be planned with an aim for

the sustainable development of the inter-connected elements that co-exist in the eco-system.

Water resources development that meets the needs of the present generation without compromising the ability of future generation to meet their own needs will alone be considered as a sustainable development. It is, therefore, realized that water resources projects should be planned, implemented and managed in such a way that the future demands of the growing population are met with minimum disturbance to the existing eco-system along with the incorporation of adequate control measures at appropriate stages to mitigate the adverse effects, if any to maintain the sustainability of the system in the long run.

## **11.6 Environmental and ecological aspects of storage reservoirs/ponds**

No major reservoirs are proposed to be constructed for the link project. One barrage is proposed at Inchampalli across river Godavari as Head works, one existing anicut at Grand Anicut on river Cauvery is proposed to be integrated as tail end structure. Two existing reservoirs viz. the Nagarjunasagar on Krishna and Somasila on Pennar are proposed to be utilised as the balancing reservoirs for the link project. No additional storage is proposed to be created in these two existing reservoirs for the purpose of the link project. Hence, there would be no change/adverse impact on the ecological balance, hydrological regime, submergence of forests and other areas, rehabilitation and resettlement of affected population etc, in connection with the building-up of storages. Both the Nagarjunasagar and Somasila projects have been commissioned long back and no reservoir induced seismic activity is observed in the vicinity of these projects.

### **11.6.1 Impact of Inchampalli barrage**

#### *Area of submergence*

The Inchampalli barrage, on implementation, will submerge about 9307 ha of land confined to the banks of Godavari river at full pond level of

87 m. The reservoir stretches in the upstream of the dam only within the river.

### **Villages and population**

No villages are affected and hence there is no affected population in the submergence area. So, there is no need of any rehabilitation and resettlement, compensatory afforestation, etc.

### **Development of aquatic life**

Creation of pond will increase the fish production and development of pisciculture in the region. The pond will be used for fisheries development, both culture as well as breeding. The pond, being perennial water source, will be suitable for pisciculture, especially in the shallow upper reaches of the pond. Many local families will get livelihood in the fisheries development which will improve their living standards.

### **Loss of minerals and commercial timber**

No potential coal bearing area will be under submergence and no mineral resources of economic importance are affected.

### **Flora and fauna at proposed Inchampalli barrage site**

The following animals and birds as given in **Table 11.1** are likely to be witnessed in the vicinity of the proposed barrage site.

**Table-11.1 List of fauna and birds found in the vicinity of the proposed barrage site**

<b>Particulars</b>	<b>Andhra Pradesh</b>	<b>Telangana</b>	<b>Chhattisgarh</b>
Fauna	Leopard, Jackal, small Indian Civet, Plan civet,	Wild buffalo, Panther, Bison, Panther, Wild Bear, Bear,	Panther, Tiger, Pandacories, Tanes, Panthera Pardus,



	Wild bear, Chital, Sambar, Black Buck, Nilgai, Rhesus macaques	Nilgai, Sambar, Chital, Barasingha	Black buck
Birds	Kostrel, Red Kuaded Marlin, Peregrine Falcon, Shikra, Peafowl, Great Indian Hornbill	Partridge, Pegion, Pheasant, etc	Peafowl, Jungle fowl, Sand grouse, Wood-pecker

### **Seismicity of the area**

From the general seismology of the Chhattisgarh / Telangana region, the Bhadradi Kottagudem district falls in earthquake zone-III as per IS Code: IS 1897–1984 which is considered as moderately vulnerable for seismic activity and damage. However, magnitude of the triggered earthquake on account of creation of pond at Inchampalli, is not anticipated to exceed the magnitude of the largest earthquake expected in the area.

### **Public health**

The area at present does not come under malaria zone and no health risks are involved. However, formation of a water body in the shape of the pond might result in introduction of water borne diseases unless precautionary measures are taken. Adequate supplies of medicines to the public health centres will have to be ensured to prevent and contain the flare up of epidemics, apart from creating adequate infrastructural facilities for the same.

## **11.7 Impact of the link canal**

Major impact of the link project could be on account of land acquisition for construction of the canal and rehabilitation and resettlement of the affected population, environmental impact due to formation of canal water body and introduction of irrigation in the command area enroute the link canal.

### **11.7.1 Land acquisition for link canal**

For construction of 1211 km long link canal, a total area of about 28847 ha will have to be acquired. About 49 ha is specifically required for colonies for rehabilitation of affected villages. However, care has been taken to avoid the villages and towns enroute the link canal to the extent possible in order to minimize the issue of rehabilitation. Out of the total land to be acquired as above, 26767 ha is patta land and 2080 ha is forest land. Details of the land to be acquired are given in **Annexure 11.1**. The reach wise details of land to be acquired are given in **Annexure 11.1.1 to 11.1.6**. The details of reach wise borrow areas are shown in **Annexure 11.1.5**.

### **Forest land**

The proposed link canal passes in the vicinity of a no. of reserved forests viz. Kalavanagram, Kondapuram, Borgampad, Kista Sagar, Chatagonda, Kinnegiri, Guttikonda, Udayagiri, Rapur, Veligonda, Errakonda, Venkatagiri, Ramapuram, Ayyur, Managiri and Kinnersani Wildlife Sanctuary. About 2080 ha of forest land is to be acquired for the construction of canal. These forests mainly consists of open scrubs, thorny bushes, trees like neem, bamboo and common fuel species like maredu, etc. Compensatory afforestation as per the guidelines, is to be taken-up in consultation with the Department of Forests, in the degraded forest lands and other waste lands available nearby the affected forest land. In addition to this, spoil banks of the link canal are proposed to be used for social forestry. Suitable provision for the cost of afforestation is made in the estimate for the construction of the link

project. Further, the canal banks are also proposed to be used for productive plantation.

### **11.7.2 Ground water**

The bore wells and filter point wells are feasible in the alluvium formations whereas bore wells of depth more than 100m can yield more than 200m<sup>3</sup> /day in sand stone formation. The density of wells at present is negligible. The yield from filter point wells existing in the area is 130m<sup>3</sup> /day and each filter point gives a continuous discharge of 12m<sup>3</sup> /hour. Along the canal alignment, the water table is 2- 4m below ground level upto Bhadrachalam, 4.7 m upto Kothagudem and 2-4 m thereafter.

The quality of groundwater is generally good and is suitable for drinking and irrigation purposes. Chemically the water is slightly alkaline with average pH of about 7.9. However, in Nalgonda district (Nagarjunasagar reservoir), the pH is observed to be varying between 8.0 to 8.49. The 6.5 to 8.5 is the permissible limit of pH, as per IS 10500-2012 (drinking water specifications)

The groundwater in the command area fluctuates between 2.0 and 20 m in pre-monsoon season and between 0.30 and 17.34 m in the post-monsoon season below ground level as per the data observed during 2013 by the Central Ground Water Board (CGWB). The maximum ground water level in pre-monsoon is 20.19 m below ground level. It implies, in general ground water is deep. Hence, seepage from canal and irrigated fields may not cause water level to rise to such an extent to create water logging problem generally. However, in very limited areas near coastal region, there is a possibility of rising level, which may lead to water logging and salinity conditions. In such areas, suitable schemes should be devised to use the additional water accrued from seepage as a part of command area development programme. One such option is to provide enough drainage facilities so as to flush out the excess water accumulated by way of rise in underground water level.

Quality-wise, the ground water in certain pockets near Nalgonda, Podili and Kanigiri areas is affected by fluoride contamination. The same is saline in coastal areas. The ground water is good and potable in other areas of the command. Availability of ground water in the area is moderate. The available ground water potential, draft, etc. based on district-wise CGWB statistics are dealt in Chapter 8: Irrigation planning and command area development.

### **11.7.3 Surface Water**

The canal aligned as a contour canal, will interfere with natural surface drainage in the area. As such, adequate cross drainage works are provided in the link project. There would be an increase in the surface water availability in the region through import of water. The regeneration from the command area is likely to add to the available flows in these natural drainages.

### **11.7.4 Flood control**

The existing Nagarjunasagar reservoir has a 470.92 m long spillway and masonry dam of about 1449.63m with non over flow section of 978.71m with 26 vents, with crest gate size of 13.72 x 13.41m with maximum discharging capacity of 58802 cumec and is capable of discharging the expected flood flows to the Krishna river downstream.

Necessary precautions are taken while designing the cross drainage works so as to ensure the anticipated flow in the river during floods is allowed to flow downstream without hindrance. In addition, a number of canal escapes are proposed at suitable intervals along the link canal to drain out the excess flows from the canal to the nearby streams.

### **11.7.5 Pollution and industrial development**

There is one prominent industry i.e. the Kothagudem Thermal Power Station (KTPS) in the initial reaches of the link project, which is likely to

contribute to pollution in the project area to some extent. However, the industry under the reputed National Thermal Power Corporation (NTPC) might have arranged its own anti-pollution measures in pollution and hence the expected pollution would be minimum. There are no development projects proposed to be taken up in the immediate future. The project command in the tail end reach does not have any major industries at present and no new ones are coming up in the immediate future as per available data. As such, the project command can be started to be free area from industrial pollution.

The introduction of irrigation is likely to give an impetus for the growth of agro-based industries leading to some pollution in a very few limited pockets of the area, where strict measures may have to be undertaken to control the pollution.

#### 11.7.6 Aquatic life

There is no specific information available in respect of fish production within and surroundings of the command area of the link project. However, the specie-wise fish production in the Prakasam and Nellore districts during the year 2013-14 is given in **Table 11.2**

**Table-11.2 Specie-wise fish production during the year 2013-14**

Unit: Tonnes

Sl.No	Name of Specie	Prakasam District	Nellore district
1.	Barbus	535.00	2065.65
2.	Carps	7005.00	30571.62
3.	Cat fish	872.00	1239.39
4.	Murrel	977.00	2065.65
5.	Prawns	3042.00	32943.00
6.	Mulletts	643.00	826.26
7.	Hilsa	00.00	826.26
8.	Miscellaneous	3729.00	2478.78

Source: District hand book of Prakasam and Nellore districts for 2013-14.

The total fish production in the districts falling in the command area during the year 2015-16 is given in **Table 11.3**.

**Table 11.3**  
**Estimated fish production during the year 2015-16**

Sl. No.	Name of district	Fish Production in tonnes
1	Nellore	86340.00
2	Chittoor	4125.00
3	Tiruvallur	18001.71
4	Vellore	14471.10
5	Kancheepuram	11665.78
6	Tiruvannamalai	1805.00
7	Villupuram	4654.19
8	Cuddalore	23750.10
9	Pondicherry	6562.50

*Source: (1) Statistical Handbook of Tamil Nadu -2015-16*

*(2) Statistical Handbook of Pondicherry- 2015-16*

*(3) Statistical Handbook of Nellore & Chittoor Districts.-2014-15*

### **11.7.7 Public health**

The area as at present does not come under malaria zone and no health risks are anticipated. However, formation of a water body in the shape of the link canal and conversion of the hitherto dry area into wet area might result in introduction of water borne diseases unless precautionary measures are taken. Adequate supplies of medicines to the public health centre will have to be ensured to prevent and contain the flare up of epidemics, apart from creating adequate infrastructure facilities for the same.

### **11.7.8 Water logging and salinity**

The ground water table in the command area is well below the root zone of the crops. However, the irrigation supplies to the command area would add to the ground water recharge. This may raise the ground water table in some areas, which may lead to water logging and salinity conditions. Adequate natural drainages are available in the area to drain the water from the command area. Though no serious water logging problems are anticipated, studies and regular observations on the behavior of the soils in the area will have to be carried out for a few years before and after introduction of irrigation in the area.

### **11.7.9 Climate and ecology**

The construction of the barrage and the link canal is not likely to cause any significant changes ecologically in the area. The climate and ecological conditions of the area continue to remain more or less the same even after construction of the link canal.

### **11.7.10 Natural Resources**

No mineral resources are likely to be lost as a result of construction of the link canal.

## **11.8 Labour**

The construction of the Inchampalli barrage, conveyance system, powerhouse, lifting arrangements and CD/CM works of the Godavari (Inchampalli) - Cauvery (Grand Anicut) link project will generate huge employment potential.

The expected employment generation per crore of rupees spent on the project is 10 persons in case of a major project comprising 6.63% of engineers, 6.73% of technical, 7.76% skilled & semi-skilled, 60.22%

unskilled and 18.66% clerical. The expenditure on manpower includes expenditure on pay and allowances, bonus, social security, office expenses and traveling expenses.

The total expenditure on the Godavari (Inchampalli) - Cauvery (Grand Anicut) link project is Rs 85951 crore. Thus, the manpower required for the construction of the project will be 85951 persons considering the cost of the link project. Thus, the overall manpower comprises 5699 engineers, 5785 other technical, 6670 skilled & semi skilled, 51760 unskilled and 16038 clerical personnel. The details on year-wise distribution of manpower/employment which can be generated due to the link canal project are shown in **Annexure 11.2**.

## **11.9 Sedimentation**

Since the proposed structure at Inchampalli is only a barrage, the chance of facing any problem on account of sedimentation is quite remote and if at all encountered, it is going to be quite insignificant.

## **11.10 Environmental status**

### **11.10.1 Ground water regime**

The district wise ground water potential as estimated by the Central Ground Water Board, for the districts lying in the command area is furnished in Chapter 8: Irrigation planning and command area development.

### **11.10.2 Aquatic life**

There is no record of any fish sanctuary in and around the Inchampalli barrage and en route the link canal.



### **11.10.3 Tourism**

The area can be developed as a tourist resort after the formation of the Inchampalli pond. Nagarjunasagar, Somasila and Grand Anicut reservoirs ponds are already developed as tourist places.

### **11.10.4 Health hazards**

There is no indication/record of any health problem due to water and soil borne diseases in the area.

## **11.11 Environmental impact**

The National Council of Applied Economic Research (NCAER), New Delhi was entrusted with the studies of socio-economic and environmental implications of all the three constituent links/reach I to III of the link project. The general inference on the environmental impact of the link project is based on the conclusions drawn in their report.

### **11.11.1 Surface water regime**

The canal is aligned to be a contour canal and will interfere with natural surface drainage of the area. As such, appropriate nos. of cross-drainage works as required are provided in the project.

### **11.11.2 Impact on groundwater**

Provision of canal irrigation in the proposed command area causes additional recharge to the ground water. As a result, the groundwater levels will rise gradually year by year. Part of this augmented groundwater reserves find its way into the local streams. To avoid likely rise in water table with consequent harm to crop growth, appropriate drainage system will have to be in place to dispose of the surplus recharge along with surface drainage.

### **11.11.3 Aquatic life**

The Inchampalli pond can be utilised for development of fisheries. However, pre and post impoundment surveys have to be undertaken to work out the steps needed for development of fishery in the pond. Fish ladders will be provided to allow movement of important migratory fish population.

### **11.11.4 Natural resources**

The submergence under Inchampalli barrage is limited to river portion. As such, the mineral resources likely to be lost will be very negligible.

### **11.11.5 Effect of water bodies**

The formation and use of water bodies in the region is not likely to result in introduction or enhancement of water borne diseases, provided no heavy industrialization around the project area takes place in the post-project scenario.

### **11.11.6 Aquatic weeds**

The chances of impounded reservoir leading to growth of noxious aquatic weeds and intermittent host are remote in the given circumstances. The nature of existing aquatic weeds in submergence area and their impact on fisheries development has to be studied in detail after the formation of the pond to evolve possible remedial measures, if necessary.

### **11.11.7 Climatological changes**

Some induced climatological changes on account of the link project may happen in the long run. But the type of changes cannot be outlined at this stage in the absence of a comprehensive EIA study.

### **11.11.8 Impact on seismicity**

The Godavari river flows along a faulted graben, with the highest recorded earthquake in the region having occurred in 1968 near Bhadrachalam. The barrage site falls in Zone –III as per IS 1897-1984 and as per the map of India showing the various seismic zones (IS code: 1893-1975 “IS criteria for earth quake resistant design of structures”). As per the Director (Seismology), India Meteorological Department, for the dams of height less than 100 m, seismological observations are not necessary.

### **11.12 Adverse impact of the link project**

Implementation of any water resources project helps in raising the prosperity level in the region. However, some adverse effects bound to occur which should be mitigated through suitable remedial measures. Some of the adverse impacts could be as listed below.

1. Resettlement from the displaced people in the project area, since most of the benefits of the project are for the people living in the command area.
2. Formation of water body may result in introduction of water borne diseases unless precautionary measures are taken.
3. The shortened drainage length due to pond formation may cause additional silting.
4. Submergence of forest area causing environmental and ecological degradation along the link canal.
5. Water logging and salinity due to increased irrigation in the command area.