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ABBREVIATIONS

2LGS	2 Lane Gravel shoulders	MDR	Major District Roads
2LMR	2 Lane Minor Realignment	MoEF	Ministry of Environment and Forests
2LRR	2 Lane Rural Realignment	MoRT&H	Ministry of Road Transport and Highways
2LSS	2 lane Sealed Shoulders	NAAQS	National Ambient Air Quality Standards
AC	Asbestos Cement	NGO	Non Governmental Organisation
AE	Assistant Engineer	NH	National Highway
AIDS	Acquired Immuno Deficiency Syndrome	NOC	No-objection Certificate
BoQ	Bill of Quantities	NO _x	Oxides of Nitrogen
BPL	Below Poverty Line	ODR	Other District Roads
CE	Chief Engineer	OP	Operational Policies
CO	Carbon Monoxide	PAF	Project Affected Family
CoI	Corridor of Impact	PAH	Project Affected Household
CPCB	Central Pollution Control Board	PAP	Project Affected Person
DE	Divisional Engineer	PCC	Project Co-ordinating Consultants
DLC	District Level Committee	PD	Project Director
DRDA	District Rural Development Agency	PIU	Project Implementation Unit
EA	Environmental Assessment	PWD	Public Works Department
ECR	East Coast Road	R&R	Resettlement and Rehabilitation
EIA	Environmental Impact Assessment	RAP	Resettlement Action Plan
EIRR	Economic Internal Rate of Return	RF	Reserve Forest
EIS	Environmental Impact Statements	RoW	Right of Way
EMP	Environmental Management Plan	RPM	Respirable Particulate Matter
EPM	Enhanced Periodic Maintenance	SA	Social Assessment
ERMP	Environmental and Resettlement Management Plan	SDU	Social Development Unit
GO	Government Order	SEA	Sectoral Environmental Assessment
GoI	Government of India	SH	State Highways
GoTN	Government of Tamil Nadu	SO ₂	Sulphur Dioxide
HC	HydroCarbons	SOS	Strategic Options Study
HD	Highways Department	SPCB	State Pollution Control Board
HQ	Head Quarters	SPM	Suspended Particulate Matter
ILO	International Labour Organisation	TDS	Total Dissolved Solids
IRC	Indian Roads Congress	TNRSP	Tamil Nadu Road Sector Project
IRI	International Roughness Index	TNSPCB	Tamil Nadu State Pollution Control Board
IS	Indian Standard	WB	World Bank
JD	Joint Director		
LAO	Land Acquisition Officer		

1.0 PROJECT BACKGROUND

The Highways Department (HD), Government of Tamil Nadu (GoTN) is preparing the Tamil Nadu Road Sector Project (TNRSP) with World Bank (WB) loan assistance. In 1997, M/s. Kinhill Pty. Ltd were appointed as the Project Co-ordinating Consultants (PCC) to assist the GoTN in the project preparation. Based on the outputs of the feasibility studies and the funding available, the road network identified for improvements include 743.4 km for upgradation works and 2600 km for maintenance works.

The upgradation component is divided into four contract packages. These include the Northern corridor (TNRSP 01) 397.9 km long and the Eastern Corridor (TNRSP 02, TNRSP 03 and TNRSP 04) along the eastern coast for a length of 334.3 km. Fourteen bypasses totaling a length of 106.6 km are planned as part of the upgradation works. Of these, the 11.2 km long Ramathapuram bypass is to be implemented in the second phase of the project. The length of the corridors by packages and links is indicated in **Table 1**. The corridors under different packages of TNRSP are indicated in **Figure 1**.

Table 1: Upgradation Corridors - TNRSP

Contract Package	Corridors	Description	Length (km)	Proposed treatments
TNRSP -01	01 - E	Chidambaram bypass	16.9	(i) 2 Lane Sealed Shoulders (2LSS)
	01 - E	Sirkazhi bypass	8.8	
	01 - N	Arcot - Polur - Elavanasur	152	(i) 2 Lane Sealed Shoulders (2LSS) (ii) 2 Lane Rural Realignment (2LRR) (iii) Enhanced Periodic Maintenance (EPM)
	01 - N	Polur - Chengam	45.1	(i) 2 Lane Rural Realignment (2LRR)
	01 - S	Vriddhachalam Jayamkondacholapuram - Tiruvarur	131.5	(i) 2 Lane Gravel Shoulders (2LGS) (ii) 2 Lane Rural Realignment (2LRR) (iii) 2 Lane Minor Realignment (2LMR)
	01 - S	Jayamkondacholapuram - Ariyalur	43.6	(i) 2 Lane Gravel Shoulders (2LGS)
			Northern Corridor (TNRSP01)	397.9
TNRSP - 02	02	Nagapattinam-Kattumavadi	116.6	(i) 2 Lane Sealed Shoulders (2LSS) (ii) 2 Lane Minor Realignment (2LMR)
TNRSP - 03	03	Kattumavadi -Ramanathapuram	99.8	(i) 2 Lane Gravel Shoulders (2LGS) (ii) 2 Lane Minor Realignment (2LMR)
TNRSP - 04	04	Ramanathapuram – Tuticorin	117.9	(i) Enhanced Periodic Maintenance (EPM) (ii) 2 Lane Minor Realignment (2LMR)
		Eastern Corridor (TNRSP02, 03& 04)	334.3	(i) 2 Lane Sealed Shoulders (2LSS)
TNRSP -05	05	Ramanathapuram bypass	11.2	
		Total	743.4	

1.1 UPGRADATION ROADS

Northern corridor: The average sealed width is 4.9 m with the sealed width varying from 3.6 m to 8.0 m. The roads are of intermediate lane standard for a large section of the corridor.

Eastern Corridor: For a major length of the road between Nagapattinam and Tuticorin, the sealed width is 5.5 m or less i.e. intermediate lane width or less.

1.1.1 Proposed treatments

The upgradation works include widening of the carriageway, geometric improvements, structural improvements to the pavement, repair/construction of bridges and culverts, junction improvements and will yield a 7m wide undivided carriageway. Five different treatment options are proposed.

- 2 Lane Sealed Shoulders (2LSS)
- 2 Lane Gravel Shoulders (2LGS)
- 2 Lane Minor Realignment (2LMR)
- 2 Lane Rural Realignment (2LRR) and
- Enhanced Periodic Maintenance (EPM)

Figure 1: Upgradation and Maintenance Corridors

For each of the treatments, three variations of the cross sections as rural, village and urban are considered and alternative cross-sections designed. Widening of the road to two lane and strengthening of carriageway on the existing alignment is involved in the first four treatments but only maintenance of the road shall be carried out in the EPM.

1.2 MAINTENANCE CORRIDORS

1.2.1 Existing Conditions

About 2600 km of roads spread over all parts of the state (covering 22 of the 29 districts of Tamil Nadu) have been identified for maintenance. A majority of these maintenance roads belong to the State Highways (SH) and Major District Roads (MDR) category, accounting for 55% and 40% respectively of the road lengths taken up. The other district roads (ODR) account for remaining 5% of the roads. About 50% of the roads identified have a single lane configuration while 35% of the roads are of two-lane configuration. Earthen shoulders exist along almost all these roads. Constricted sections of RoW less than 5m exist in some settlement stretches. In other rural sections, the RoW varies from 15 to 30m.

1.2.2 Proposed Treatments

The maintenance works involve rehabilitation of pavement; overlay of the wearing coat wherever required and provision of earthen shoulders. No land acquisition or widening is involved.

1.3 IMPLEMENTATION PROGRAM

The implementation of the improvements, with the exception of Ramanathapuram bypass is to be carried out in a single phase. The project corridors, based on the readiness for implementation have been divided into four milestone stretches. The contractors for the upgradation routes have been shortlisted and are expected to mobilize from October 2003. The construction period for the northern corridor has been planned for 42 months while the construction of the eastern corridor is to be completed within 36 months.

Implementation of the maintenance routes will be initiated simultaneously with the upgradation works. Maintenance works covered in the project include a periodic maintenance component of a tentative value of \$100 million (base year costs including contingencies) to be utilised over a four year period. In the first year (2003-04) programme 730 km of priority roads will be taken up. Subsequently, 700 km in the second year (2004-05), 600 km in the third year (2005-06) and 420 km in the fourth year will be taken up. About 150 km will be taken up independently under performance based maintenance. Out-sourced consultants will carry out the project preparation, design and bid documents for the maintenance roads. For 730 km in packages M1 & M2 for first year programme, the improvements are being finalised by the consultants and the implementation is to commence from May 2003. The project preparation for the subsequent phases of the maintenance programme will be carried out by similar arrangements.

1.4 ENVIRONMENTAL ASSESSMENTS IN THE PROJECT

As part of the feasibility studies, screening of the corridors identified the environmentally sensitive road sections and the environmental implications of the project. These findings were factored into the feasibility analysis for selection and prioritization of the project roads. Further to the selection of the feasible routes, a Sectoral Environmental Assessment (SEA) was conducted to analyze the wider environmental issues in the project. The SEA concluded that most of the roads that are candidates for improvement require detailed environmental assessment, though none of these roads are so sensitive that they are to be excluded from further consideration in the project. Accordingly, Environmental Impact Statements (EIS), Environmental Management Plans (EMP) and a Resettlement Action Plan (RAP) were prepared. Subsequent to the preparation of the EIS/EMP for the project, TNRSR has been classified as a Category "A" project due to its cumulative magnitude of environmental and social impacts.

In accordance with the WB requirements for Category 'A' projects, an Independent Environmental Review has been taken up as part of the project preparation activities of TNRSR. Given the potential magnitude of environmental and social impacts, the WB Operational directives/policies/guidelines, triggered are presented in **Table 2** below.

Table 2 : World Bank Safeguard Policies Triggered

S. No.	World Bank Policy	Triggered by
1.	OP/BP/GP 4.01: Environmental Assessment	Project passes through sensitive areas and likely to have considerable impacts on environmental and social components
2.	OP 4.12: Involuntary Resettlement	Involves loss of assets, relocation, loss of livelihood
3.	OP/BP/GP 4.04: Natural Habitats	Project passes adjacent to reserve forests, wildlife sanctuaries and coastal ecosystems
4.	Physical Cultural Resources (OPN11.03)	The project entails risk / damage to cultural properties and has likelihood of chance found archeological properties

The project has complied with the requirements of BP 17.50 on Public Disclosure. Extensive consultations were held during the project design stage and post-design follow-up consultations have been conducted for each of the upgradation roads. In addition, the EA/SA documents of TNRSR have been displayed at various district libraries, HD headquarters, and other pre-determined locations.

The EA/SA outputs have been finalized after consolidating the gaps and deficiencies identified during the Review. The EA/SA outputs include a Consolidated Environmental Assessment Report (EA), Environmental Management Plans (EMP) for the individual contract packages, Resettlement Action Plan (RAP) for the project and an Environmental Management Plan for Resettlement Sites.

The maintenance works do not involve widening, therefore no major impacts are anticipated. Exclusion criteria for avoiding impacts on environmental components, such as reserved forests, tree cutting, land slides, blasting, land acquisition, etc have been worked out to guide the selection of maintenance roads. To address the environmental and social issues along maintenance roads a generic Environmental and Resettlement Management Plan (ERMP) has been prepared. Based on the ERMP, Environmental and Social Screening reports are being prepared for the maintenance road packages.

2.0 INSTITUTIONAL SETTING

A Project Implementation Unit (PIU) headed by a Project Director (PD) has been established for the project. The PCC were appointed to assist the PIU and the GoTN in the project preparation and implementation. During the implementation of the project, a Supervision Consultant (SC) procured through International Competitive Bidding will assist the HD to ensure adoption of good construction practices and the implementation of the EMP provisions.

The PIU has built in certain organizational and institutional capacity, by the creation of an Environmental Cell (EC) and a Social Development Unit (SDU) to ensure the implementation of the EMP/RAP provisions. These are already functional and will continue for the project duration.

2.1.1 Environmental Cell

The Environmental Cell comprises of a Superintending Engineer, an Assistant Divisional Engineer, 2 Assistant Engineers (HO) and 6 Assistant Engineers (Field Offices – 1 in each of the six field divisions). The Additional Divisional Engineer and the 6 Assistant Engineers will have full responsibility for ensuring EMP implementation, whereas the Superintending Engineer and the 2 Assistant Engineers (HO) will have part responsibilities. One full-time outsourced Environment Specialist, has been inducted to provide support to the Environmental Cell on a full-time basis. The forest wing of the Environmental Cell comprises apart from one Assistant Conservator of Forests, two Rangers and 6 Foresters (Field). The forest wing will be entrusted responsibility of managing the nurseries for the project, and the planting and maintenance of the saplings.

The implementation of the maintenance works will be done by the existing organizational structure, comprising the Superintending Engineers, Divisional Engineers, Assistant Divisional Engineers and Assistant Engineers. The Environmental Cell will coordinate with these engineers, the Technical Assurance consultants and contractors in order to ensure that that the ERMP is implemented.

The institutional setup for implementing the R&R provisions is presented in section 8.0 of this summary.

2.2 CLEARANCE REQUIREMENTS

The HD, GoTN has obtained all requisite environmental clearances required (**Table 4**) for the project implementation. The HD has complied with the conditions laid down in these clearances and is committed to fulfilling the requirements during project implementation¹.

Table 3: Statutory Clearances Obtained

S. No.	Statutory Authority	Statute under which Clearance is required	Current status of clearance
1	Ministry of Environment and Forests, Government of India	Environmental Impact Assessment Notification, 1994 issued under EP Act, 1986	6 th July 2000 (TNRSP 02 - 04), 18 th September 2000 (TNRSP 01)
2	Tamil Nadu Pollution Control Board	Water (P&CP) Act, 1974 & Air (P&CP) Act, 1981	Cleared, 22 nd April 1999 for Eastern corridor and 12 th Nov 1999 for Northern corridors
3	Forests Department, Government of Tamil Nadu	Conservation of Forests Act, 1980	NOC obtained for progress of works on 11-08-2000. Permission for transfer of forestland - under process.

Apart from the clearances for the overall project works, it is included in the contract documents that the contractors obtain the required clearances from the various agencies for operating his equipment and carrying out construction.

3.0 ANALYSIS OF ALTERNATIVES

3.1 CORRIDOR SCREENING

In the feasibility study, 24 corridors were screened for their environmental and social impacts through an evaluation matrix and were ranked in descending order of sensitivity. Corridors having least environmental impacts amongst corridors having highest economic benefits have been selected for upgradation. The screening exercise suggested four corridors, Cuddalore - Tuticorin, Arcot - Tindivanam - Marakkanam, Kulattur - Palayankottai - Tenkasi and Tuticorin - Anjugramam for detailed environmental assessments with focus on fauna, flora, coastal resources and public sites. The corridors to be taken up for upgradation were finalised further to the feasibility stage.

3.2 ANALYSIS OF CORRIDOR ALTERNATIVES

The eastern corridor (under TNRSP 02, 03 and 04) runs parallel to the coast. Though development of this road will bring in an improvement of this backward region, the provision of better road infrastructure along the coast has a potential to open up the coastal area to development and thereby have a possibility of ecological damage. To address this issue, corridor alternatives were analysed with an objective of providing connectivity to the coastal villages and to the southern portions of Tamil Nadu.

3.2.1 Alternatives for Provision of connectivity to Southern Portions of Tamil Nadu

Three alternatives including the eastern corridor (Nagapattinam to Tuticorin) were analysed.

- (i) Corridor 1, coastal road connecting Nagapattinam to Tuticorin;
- (ii) Corridor 4, connecting Ulundurpettai on NH-45 with Ramanathapuram on NH-49; and,
- (iii) Corridor 13, from Chennai (NH-45) connecting to Trichy, upto Tuticorin (NH-45B).

All the three corridors were evaluated and compared for their feasibility considering factors as traffic, planning, engineering and environment. It was inferred that the Eastern corridor serves more number of backward blocks than Corridor 4 and also the tourism potential is high for this corridor. Moreover, Eastern Corridor links head quarters of coastal districts as well as fishing villages, which can aid their economic development. Hence, upgradation of Eastern corridor has been selected as a better option than the Corridor 4 to improve connectivity to southern portions of Tamil Nadu.

3.3 REALIGNMENT ALTERNATIVES

Realignments along eastern corridor (TNRSP02, 03 and 04) were worked out to avoid impacts on sensitive areas and at the same time retain connectivity to coastal villages. Other guiding factors in finalizing the

¹ The clearances were obtained phase wise. The clearances stand valid after repackaging the project as no new corridors were included in the project scope.

alignments have been the engineering considerations and public opinion. With this objective local level consultations were held at the locations of realignment. Such alternatives have been worked out to avoid the Vedaranniyam swamp forest, in TNRSP02 and Vembar in TNRSP04.

3.4 BYPASS ALTERNATIVES

The proposed project includes bypasses at ten towns, in TNRSP – 01 namely Arani, Polur, Tiruvannamalai, Tirukkivilur, Vridhachalam, Ariyalur, Kumbakonam, Tiruvarur, Chidambaram, and Sirkhazi and three town i.e. Nagapattinam, Tirutturaippundi and Muthupet in TNRSP-02. The selection of the alignment for each bypass followed reconnaissance and field survey investigations, consideration of alternatives for engineering, economic and environmental feasibility and consultation with the local communities. Selection of alignments has been reiterative between interpretation of maps and revisiting the site for establishing the ground truth. The bypass alignments have been finalized after an evaluation of the various feasible alignments for engineering, environmental and social factors. Final alignment selected is economically and environmentally best – fit alternative.

4.0 ENVIRONMENTAL BASELINE, IMPACTS AND MITIGATION

This section assesses the nature, type and magnitude of the potential impacts occurring in planning and design stage, construction stage and operation stage and likely mitigation/avoidance measures on the various environmental components.

4.1 METEOROLOGY

The climate is tropical, with distinct wet and dry seasons. The climate is broadly classified into the following seasons: winter (January-February), summer (March-May), monsoons - southwestern (June-September) and retreating monsoons - northeastern monsoons (October-December). The variation of temperature is negligible with an average annual temperature around 29°C. The relative humidity is quite high for most part of the year. Though the State has two wet seasons, it receives little rainfall during the southwest monsoon because of the rain shadow cast by the Western Ghats. During the northeast monsoon, cyclones traveling from the Bay of Bengal strongly influence rainfall. Nagapattinam and Thanjavur districts along the coast are prone to cyclones.

The microclimate is likely to be modified slightly due to removal of roadside trees and the addition of increased pavement surface. Avoidance measures, such as reducing the number of trees to be cut have been worked out to minimize the impacts. The improved road will minimize the losses suffered during cyclones by aiding in speedier evacuation.

4.2 PHYSIOGRAPHY AND TERRAIN

Three major physiographic units are recognized in the landmass of Tamil Nadu. They are the Western Ghats, the Central Region and the Coastal Plains. All the upgradation roads and most of the maintenance roads pass through plain terrain. Since no substantial cut-and-fill operations are planned, the overall impact on physiography of the area would be limited. The terrain is hilly (for some stretches along the Western Ghats) for a length of about 97 km out of the 2600km maintenance roads. As no widening is proposed as part of the maintenance works, the impacts on physiography would be minimal.

No rising of the road embankment height is suggested in the designs along the upgradation roads apart from 27.1 km identified as low-lying areas. No major changes in the topography of the area is anticipated due to the project other than raise in level of embankments in the above said areas by a height equivalent to structural overlay.

4.3 GEOLOGY

The main geological division in Tamil Nadu is between the sedimentary belts and crystalline rocks. The Eastern Corridor predominantly comprises of sedimentary formations. They offer a highly porous media with good permeability. In pockets of such formation near the coast, the ground water tends to be brackish due to seawater intrusion. Crystalline rocks of Archaen age rise to the west of the sedimentary belt and occupy the remaining three quarters of the state. Among these crystalline rocks are rocks of the Chamockite group (granitic rock). The entire Northern Corridor is underlain by such crystalline formations.

The project does not have any significant impact on the seismic stability of the area as it is in Seismic zone II (Low Damage Risk zone). As the existing quarries with the requisite licenses are selected for procuring aggregates for construction, the impact on general geology of the region is insignificant.

4.4 SOILS

4.4.1 Loss of productive lands

A major extent (61%) along the upgradation roads is covered by red soil. The area covered by other soils is alluvial (24%), black (12%) and laterites (3%). A total of 249.2 ha of agricultural land is to be acquired for the project. Efforts have been made to minimize acquisition of productive lands by reducing the CoI and modifying the cross sections. The borrow areas, construction camp locations, traffic detours and other construction sites shall not be located on productive agricultural lands. The topsoil from all areas to be permanently covered shall be stripped to a specified depth of 150mm and stored in stockpiles. The stored topsoil will be utilized for the redevelopment of borrow areas, top dressing of the road embankments and fill slopes and filling up of tree pits, proposed as part of compensatory plantation.

4.4.2 Soil Erosion

Clearance of the roadside ground cover, especially along the raised sections exposes the soil and destabilizes slopes. To address the problem of soil erosion along bridge-end fills, over steep banks and embankment slopes, flatter slopes have been worked out to ensure stability and reduce possibilities of slope failures. To check soil erosion on critical stretches, turfing on critical road embankment slopes with grass sods, in accordance with IRC: 56-1974 shall be taken up. Dry stone pitching for apron and revetment will be provided for bridges and cross drainage structures. Accurate grading of drains, correction of batter slopes to reduce erosion, provision of runoff control structures shall be in place before start of earthworks.

No soil erosion is envisaged during the operation stage as all the slopes and embankments of the project road would have been stabilized through sound engineering techniques.

4.4.3 Compaction of Soil

To prevent any compaction of soil in the adjoining productive lands beyond the CoI within the RoW, the movement of construction vehicles, machinery and equipment will be restricted to CoI. Haul roads for the transport of borrow materials and traffic detours during construction will not be routed through agricultural lands.

4.4.4 Soil quality and contamination of soil

The results of the soil quality monitored at seven locations along the corridors revealed no pollutant or leachate at any of the sampling locations.

The contractor shall initiate measures to minimise waste generation from all construction activities. At the construction sites, the vehicles and equipments will be maintained and refueled only at fueling areas, without spillages. At the wash down and refueling areas, "oil interceptors" shall be provided. Unusable debris material shall be dumped in secure landfill sites.

4.5 BORROW AREAS AND QUARRY SITES

4.5.1 Quarries

The requirement of quarry material for TNRSP is 5,777,502 m³. The contractor will identify suitable licensed quarries (with the requisite environmental clearances and redevelopment plans) from which materials will be procured with the approval of the Engineer. The Engineer will ensure that the selected quarries have approval under Tamil Nadu Minor Mineral Concession Rules, 1959.

4.5.2 Borrow Areas

The total quantity of borrow material required along the up-gradation routes is 2,954,162 m³. Borrowing is to be carried out only from designated borrow areas, road side tanks etc, with prior approval of the engineer. Borrowing is to be carried out in accordance to the guidelines laid out in IRC-10-1961, to avoid any adverse impacts. No borrow area shall be opened without the permission of the Engineer. The topsoil from such borrow areas shall be conserved. To minimise impacts as spillage during the cartage of borrow

materials, the access roads will be properly maintained and the vehicles carrying borrow materials covered. The contractor shall evolve site-specific redevelopment plans for each borrow area location and implement them after the approval of the Engineer.

4.5.3 Sand Mining Locations

About 2,146,825 cu m of sand would be required for the pavement and for the cross-drainage structures proposed. As the project corridor is in the vicinity of rivers such as Cheyyar, Ponnaiyar, Vellar and Kollidam along Northern Corridor and Vaigai, Agniar, Pambar and Vaippar along the Eastern Corridor, sand required for the construction will mostly be procured from their banks. Such extractions will be carried out from sand quarries licensed under Tamil Nadu Minor Mineral Concession Rules, 1959 [Corrected upto 31.3.2001]. Precautionary measures as covering of vehicles will be taken to avoid spillage during transportation.

4.6 WATER RESOURCES

4.6.1 Surface Water Resources

The upgradation roads traverse across four drainage basins (Palar, Ponnaiyar, Vellar and Kollidam/Cauvery) along the Northern Corridor and seven drainage basins (Cauvery, Agniar, Pambar, Vaigai, Gundar, Kottakaraiar and Vaippar) along the Eastern Corridor. Apart from the major rivers, there are several surface water sources such as ponds and tanks along the corridors, which have traditionally been the source of water for domestic uses and irrigation. Impacts on ponds and other surface water bodies have been avoided by suitable design modifications. However, a total of 84 ponds/surface water bodies are directly impacted. The impacts on the water bodies along the existing stretches are mostly limited to the cutting of the embankments. The loss in storage capacity, if any, to these ponds will be compensated through deepening of the existing ponds or increasing the surface area after consultation with the project affected communities. Typical designs have been prepared for various pond locations that offer scope for mitigation as well as environmental enhancements.

4.6.2 Water Quality

Degradation of water quality is possible due to increased sediment load from construction sites and accidental discharges into watercourses from drainage of workers' camps and from spillage in vehicle parking and/or fuel and lubricant storage areas. All wastes arising from the project will be disposed off, as per SPCB norms, so as not to block the flow of water in the channels. The wastes will be collected, stored and taken to the approved disposal sites. To avoid contamination of the various surface water bodies and drainage channels in the vicinity of the construction site, periphery of the stockpile material shall be closed with silt fencing to avoid discharge of sediment-laden runoff into water bodies. The contractor shall ensure that no sanitary wastes from the labour camps are discharged into the nearby watercourses and that oil interceptors are used at vehicle maintenance/fueling locations.

4.6.3 Ground Water Resources

The depth of ground water table along the corridors varies from 5 to 30 m. The depth of water table gradually increases from the coastal stretches towards the inland areas. To assess the extent of the problem of salt-water intrusion along the eastern corridor, data on groundwater quality was collected from the PWD for wells within 30 Km from the coast. Vilathikulam block along TNRSP-04 is the only dark block² along the corridor, while the Nagapattinam block along TNRSP-02 is a saline block.

Most districts along the Eastern Corridor contain groundwater with TDS levels not recommended for drinking³ without any treatment. Maximum TDS values are observed around Devipattinam (10,000 – 12,000

² Over exploited blocks and dark are those where ground water extraction is 85 - 100 %. Blocks with extraction between 65 and 85 % have been classified as grey. White blocks are those where ground water extraction is less than 65 %

³ The desirable level of TDS in drinking water as per IS: 10500 is 500 mg/l which in absence of an alternate source is permitted up to 2000 mg/l.

mg/l). To further study the effects of seawater intrusion, salinity levels⁴ were also mapped. The maximum salinity levels along the Eastern Corridor (15 ppt) are observed between Tiruppalakkudi and Uppoor.

Monitoring and analysis of ground water quality was carried out at seven identified locations for selected physical, chemical and bacteriological parameters. The results indicate that in the Northern Corridor (TNRSP 01), the ground water can be used for drinking after suitable treatment and disinfection. However, along the eastern corridor, the ground water is unfit for drinking, as TDS (Total Dissolved Solids) as well as percent sodium values and the chloride content is high.

4.6.4 Community water sources

A total of 172 hand pumps and 26 wells located within the CoI of the up-gradation roads would be impacted. The project envisages replacement of these sources prior to removing them. To prevent any stress on the local water sources due to the relocation, the process of dismantling shall commence only after the community agrees upon the provision of the water supply source at the relocation site. Owners of private wells impacted by the project will be compensated at replacement cost.

4.6.5 Alteration of Drainage along Water Crossings

As part of up-gradation works, 81 new bridges (16 major and 65 minor) are to be constructed and refurbishment is to be carried out in 30 major and 64 minor bridges. Construction along the watercourses is to be carried out in the lean flow periods. As the rivers are seasonal, the construction activities will not necessitate any major diversion of the waterways.

Detailed hydrological investigations have been undertaken and suitable design of bridges and culverts have (designed to handle 50yr peak flood) been proposed to ensure that the project road does not obstruct the existing course of the surface water flow and alter the hydrological setting. Existing cross-drainage structures will be upgraded and additional cross-drainage structures will be provided at locations, where the flow is obstructed at present. Recharging pits for roadside drains in urban areas are also to be provided. These vertical drains will dispose off unwanted run-off and encourage recharging of underground water resources.

4.6.6 Drainage issues along Flood Prone Sections

Design proposes that the new sub grade be 1 m above the flood level or perched water table in flood prone sections. It ensures that the finished pavement is above the High Flood Level so as to prevent any impacts due to any water seepage in the pavement. However in low lying areas where the raising of the road by 1 m might adversely affect the surrounding, the road will be raised only by the depth of the structural overlay (a maximum of 0.5m). No significant impacts in the drainage pattern due to the raising of the road profile are likely, as the road design itself takes care of the cross-pavement drainage.

4.6.7 Increased Surface Run-off

Increased runoff from the project has been worked out as 2,019,814.2 cu m. Impacts due to surface runoff include increased soil erosion and local flooding or water logging. However, as the roads have been designed with table drains to take care of runoff and surface runoff shall be drained to the nearest cross drainage structure. The engineering design includes design of adequate cross drainage structures, which shall take care of the extra flow.

4.6.8 Water Requirements for Construction

The water demand for construction activities is 1280 m³/day for the Northern Corridor and 910 m³/day for the Eastern Corridor. Water requirement at a particular place works out to be 20 to 25 m³/day. The contractor will arrange for water required for construction in such a way that the water availability and supply to nearby communities remain unaffected.

Along the northern corridor, the contractor in consultation with the Engineer will identify suitable water sources so that community water supply / sources are not disrupted. Only at locations where surface water sources are not available, the contractor can contemplate extraction of ground water. Consent from the

⁴ Salinity levels in order of 0.5 ppt (parts per thousand) are desirable while levels upto 1.8 ppt is permissible. Salinity levels in excess of 18.1 ppt indicate salt-water intrusion.

Engineer that no surface water resource is available in the immediate area for the project is a pre-requisite for extraction of ground water. The contractor shall need to comply with the requirements of the state Ground water department for extracting ground water for construction. The contractor will not be allowed to extract any ground water from over exploited, dark blocks and grey blocks.

4.7 AMBIENT AIR QUALITY

Ambient air quality (AAQ) monitoring was carried out at eleven locations. All monitored RPM, SPM, SO₂, NO_x, CO, HC & Particulate Pb concentrations were found to be within the 24 hourly NAAQ Standard⁵ for Residential, Rural and other areas. Buffer levels of 58.3%, 56.2%, 89.9% and 88.0% exists for RPM, SPM, SO₂ and NO_x respectively with respect to the NAAQ Standards.

During the operation stage of the project, improved road surface conditions and traffic capacity of the corridor will remove the local congestion and facilitate smooth traffic flow, which in turn would help to reduce the pollutant levels especially in the inhabited areas. Construction of the 13 bypasses and 34 km of other localized deviations will contribute significantly in improving the ambient air quality by diverting the road away from built-up areas that include residential development and community facilities located very close to the existing RoW.

4.7.1 Generation of Dust and Exhaust Gases

High levels of SO₂, HC and NO_x are likely from hot mix plant operations. The asphalt plants, crushers and the batching plants will be sited at least 1 km in the downwind direction from the nearest human settlement. Vehicles delivering loose and fine materials like sand and fine aggregates shall be covered to reduce spills on existing roads. Water will be sprayed on earthworks, temporary haulage and detour roads on a regular basis. During and after compaction of the sub-grade, water will be sprayed at regular intervals to prevent dust generation. The hot mix plants will be fitted with dust extraction units and cyclones/scrubbers to reduce exhaust gases. It shall be ensured that the dust emissions from the crusher and vibrating screen from the stone quarries do not exceed the standards. To ensure the efficacy of the mitigation measures suggested for reduction of gaseous emissions, air quality monitoring shall be carried out at least once every season during the period for which the hot mix plant is in operation.

Dust generation will be minimal during the operation stage in all those sections where the 2LSS strategy has been adopted due to the presence of paved shoulders. In case of the other cross sections adopted, some generation of dust will be inevitable due to the presence of the unsealed (earthen and gravel) shoulders. All slopes and embankments turfed as per best engineering practices will help to minimize the dust generation during operation of the road.

4.7.2 Other Measures to Improve Quality

Pollution resistant species, which can grow in high pollutant concentrations or even absorb pollutants, have been recommended for plantation in the first row along the most polluted stretches of the road: *Temindia arjuna* (Arjun), *Cassia fistula* (Amaltas), *Tamarindus indica* (Imli), and *Azadirachta indica* (Neem). Other measures such as the reduction of vehicular emissions, ensuring vehicular maintenance and up-keep, educating drivers about driving behaviour / methods that will reduce emissions are beyond the scope of the TNRSPP. Apart from provision of the mitigation measures, their effectiveness and further improvement in designs to reduce the pollutant levels with increase in traffic shall be monitored.

4.8 NOISE LEVELS

Continuous 24 hours monitoring of noise levels was carried out at eleven selected locations to establish the baseline noise levels along the sensitive receptors and at representative land uses along the corridors. Minimum noise levels were monitored at the Reserve Forest location (Mudanai). Noise levels are within the standards⁶ stipulated for sensitive areas. In rural areas (Pugaipatti), monitored noise levels are within standards for rural and residential areas. Existing noise levels in urban areas along the upgradation corridors are generally in excess of relevant standards.

Noise impacts during the construction stage will be associated with heavy vehicle movements and use of mechanical equipments for earthworks, pavement laying, and bridge construction. All construction

⁵ National Ambient Air Quality Standards, Central Pollution Control Board, 11th April, 1994

⁶ The Noise (Regulation and Control Rules), 2000

equipments used for an 8 hour shift will conform to a standard of less than 90dB(A). Machinery producing high noise, as concrete mixers, generators etc, must be provided with noise shields and their usage timings will be regulated. Workers in the vicinity of high noise levels must wear earplugs, helmets and be engaged in diversified activities to prevent prolonged exposure to noise levels of more than 90dB(A) per 8-hour shift. Construction camps, hot mix/aggregate crushing plants shall not be located within 1000 m from settlement areas, sensitive land uses as schools and hospitals.

The impact due to vehicular noise during the operation stage in urban areas is expected to be insignificant as incremental noise due to the increased traffic is far below the ambient noise. In addition 13 of the major urban areas are being bypassed. The impact on the rural acoustic environment is also expected to be negligible because of the high dispersion of noise in open rural areas and the improved road and traffic conditions that tend to reduce noise. Speed limits to less than 65 km/h at the entry and exit of each village and urban areas will be specified.

Critical locations (35 Nos.) that are likely to be adversely affected as a result of the implementation of the project have been identified. At such locations, provisions have been made in the environmental budget for noise mitigation. The decision on the type and specifications for noise mitigation will be taken by the Engineer in consultation with the Environmental Specialist of the PIU on a case-to-case basis.

4.9 AREAS OF ECOLOGICAL SIGNIFICANCE

4.9.1 Reserve Forests

The upgradation roads pass through about 13 km length within/close to Reserve Forests. The Northern Corridor passes close to 6 Reserve forests, and cuts through one RF and passes adjacent to another RF. Though these forests support a variety of flora, threatened or endangered floral species have not been reported from any of the areas. Some protected faunal species, especially the Spotted Deer are known to inhabit these forests. The alignment has been routed to minimize acquisition of forestland. However, acquisition of 3.2 Ha of forestland which includes 2.9 Ha. in Kelur Forest Range (Arani Polur road link) and 0.3 Ha in Mudanai Forest Range (Polur Chengam road link) was unavoidable. The acquisition of forestland is being taken up in accordance with the Forest (Conservation) Act.

The Eastern corridor does not pass through any Reserve Forests and the nearest Reserved Forest is at a distance of 3 Km.

Precautionary / preventive measures during construction: For stretches adjacent to the Reserve Forest areas, the contractor shall ensure that construction activities shall be limited to the proposed RoW, so as to avoid any impacts on the vegetation within the forest areas. Construction camps, stockyards, concrete batching or hot mix plants shall not be located within the forest. Procurement of any kind of construction material from within the forest area is strictly prohibited. No water resources within the forest area shall be tapped for road construction. The road through forest areas shall be declared as a silence zone. Signages curbing the speed of vehicles and horns shall be placed at the start and end location and every subsequent km along the forest length.

Mitigation / enhancement measures within the Reserve Forests: Extensive consultations held at each of the Reserve Forest locations with the forest department officials and the local people revealed that the deer cross the roads in search of drinking water due to the non-availability of a drinking source within the forests. It was felt prudent that provision of a drinking source within the forests would be a more lasting solution than providing safe passages for animal crossings. The existing source of water in some forest areas such as Mudanai forests is the percolation ponds dug by the forest department. These are rain fed and do not serve the purpose during summers when it is most needed. Therefore, instead of percolation ponds it is suggested to have small ponds of size 1m x 10m x 0.3m with cement concrete sealing (to prevent percolation losses). The shallow tanks will not submerge the animal in case it falls into the tank. Deep tube wells will be dug within such forest areas. Water will be pumped from these tube wells with a motor powered by photo voltaic cell. The water will drain into ponds for animal consumption. To minimize movement of the monkeys along the corridor, planting fruit species that provide fruits at different seasons of the year are suggested. The species to be planted can include *Musa paradisiaca*, *Mangifera indica*, *Carica papaya*, *Psidum guajava*, and *Citrullus vulgaris*

Prevention of access / control of grazing within forests: To prevent the animals in the forest coming onto the roads and to protect the forest from grazing cattle, a thick vegetative barrier of *Parkinsria caulata*

and *Acacia latronaris* is planned. To discourage cattle from grazing the roadside vegetation, the species suggested for avenue plantations within the Reserve Forests stretches is non-palatable.

4.9.2 Reserve Forests along Maintenance Corridors

One of the maintenance corridors, the Salem Vaniyambadi Road, in Dharmapuri district passes through Reserve Forest (about 2 Km of the corridor from Km 73.8 to 75.8). Deer crossings along this stretch are also reported. Adequate safety measures have been worked out for the minimisation of adverse impacts during construction.

4.9.3 Biosphere Reserves

Gulf of Mannar Biosphere Reserve is a marine reserve off the southern coast of Tamil Nadu. The reserve contains 120 species of corals, and is rich in faunal and floral diversity. The Reserve comprises 21 islands, mostly of coral origin and, with a land area of 623 ha. The nearest among the 21 islands to the coast, Kariyashuli, lies at a distance of about 7 km from the road upgrade. The other islands are at least 15km from the coast. Hence no major impacts on the Biosphere Reserve are likely due to the proposed project.

4.9.4 Wild life Sanctuaries and National Parks

Twenty-three Wildlife Sanctuaries have been declared within Tamil Nadu. No Project roads directly traverse a Wildlife Sanctuary. Only the Udayamarthandapuram Birds Sanctuary is located at 0.5 km from the eastern corridor (TNRSP-02). Another sanctuary, the Point Calimere Sanctuary lies at a distance of 25 km from the Eastern Corridor.

Udayamarthandapuram Birds Sanctuary: The Sanctuary covers an area of 45 ha and the wetland habitat provides suitable feeding areas for approximately 25 to 30,000 resident and migratory birds, comprising at least 55 species, between August to February, every year. The bund walls of the Sanctuary are approximately 500 m from the road. To minimize the disturbance due to increased traffic noise, about 1-km stretch of the road in both the directions shall be declared as Silence Zone. Signages curbing the speed of vehicles and horns shall be placed at the start and end location. Setting up of labour camps within 1 km radius of the sanctuary and prevent movement of any noise generating construction machinery and vehicles close to such area shall be avoided. Construction activities involving heavy equipments within 1km on either (km 84.0 to km 87.0) have been prohibited between October and January. During the operation of the road, no impacts are expected because the most of the species of migratory birds are high flying and are not vulnerable to collision. Signboards informing the road-users about the sanctuary shall be provided along the road on either side.

Only one of the maintenance corridors, the Ambasamudram Papanasam Road, in Tirunelveli District is at a distance of 3 Km from the Mundanthurai Wild life Sanctuary. The other maintenance corridors do not pass through or close to any Sanctuary or National Park.

4.9.5 Avenue Trees

A total of 13049 trees were observed along the Northern Corridor (TNRSP 01) and 8234 trees were observed along the Eastern Corridor within 15 m of the centerline of the road. The total number of trees along TNRSP 02, 03 and 04 is 3179, 1642 and 3413 respectively. The predominant species included Tamarind (*Tamarindus indica*), Palmyrah Palm (*Brassia flabellifer*), Coconut (*Cocos nucifera*), Neem (*Azadirachta indica*) etc. In most cases single row of avenue trees are observed.

Along the Northern Corridor, tamarind is the most common species accounting for 57 % of the trees. The overall tree density along the Northern Corridor varies from 51.6 to 19.9 trees per km.

Palmyrah palm is the most common species along the Eastern Corridor accounting for 65 % of the total trees. The tree density along eastern corridor varies from 33.4 to 16.5 trees per km.

The principal impact on flora involves the removal of 5700 trees for the creation of a clear zone within the CoI. To minimize the felling of trees, the designs have been worked out such that only trees within 1.5 m from the edge of the proposed carriageway in urban sections and trees within 1.5m from the edge of the proposed shoulder in rural sections will be felled for the project.

To compensate for every tree cut as part of the project, at least four trees shall be planted. The total number of trees to be planted is 29,387. A detailed landscaping plan has been prepared for the project

including separate tree planting strategies for Northern and Eastern Corridors. The strategy has been worked out to suit the soil regimes and climatic conditions. The forest wing within the environmental cell will carry out the tree plantation along the project roads.

Along most of the maintenance roads, roadside plantations exist in a single row on either side. As maintenance works do not involve any widening, no adverse cutting of roadside trees is anticipated. Only those trees that are safety hazards will be felled or removed with prior approval from the Engineer (HD). The HD shall approve such felling after obtaining a “clearance” for such felling from the concerned departments, if applicable.

4.10 COASTAL AND MARINE RESOURCES

Tamil Nadu has a coastline of 1,000 km and a continental shelf area of 41,412 sq. km with a high diversity of coastal species. There are numerous fishing villages, old trading ports and also high diversity of coastal resources including fisheries, aquaculture farms, mangroves, salt pans, coral reefs, seagrass beds, marine algae, chank beds, oyster banks and sea-cucumbers.

Fisheries Along the coast there are 442 marine fishing villages supporting a total population of 537,000. Major fisheries centers exist at Chennai, Tuticorin and Chinna Muttam, while medium sized centers operate at Palayar, Valinokkam, Cuddalore and Nagappattinam. The three districts of Nagappattinam, Pudukkottai and Ramanathapuram together account for nearly 60% of the fish catch.

Aquaculture Aquaculture ponds are observed along the Eastern Corridor along Package TNRSP 02 and TNRSP 03. Brackish waters shrimp farming is carried out, mostly of the black tiger shrimp (*Penaeus monodon*), and to a lesser extent the white shrimp (*P. indicus*) and giant Malaysian prawn (*Macrobrachium rosenbergii*).

Further, increasing the traffic carrying capacity of the corridor is not likely to have any impact on the intensification of production from the industry as it operates on another set of indicators that are independent of the quality of connectivity. Proliferation of this industry is mostly dependent on availability of quality shrimp seeds and infection free areas, in proximity to the coast, which are gradually becoming scarce. Consultations carried out with the prawn farm owners along the eastern corridor also endorse this fact. Necessary steps have been taken by the TN government through Aquaculture act to regulate environmentally damaging aquaculture practices.

Salt pans Along the Eastern Corridor, salt pans are observed between Kattumavadi and SP Pattinam (Km 58.0-59.0 & 73.0-75.0), Tondi and Devipattinam (Km 25.0-26.0), Ramanathapuram Kilakarai (Km 11.0-120) and Kulattur and Tuticorin (Km 7.0-20.0).

Areas suitable for the industry are already being used for salt farming. Hence, improving the connectivity is no way going to aid in increasing the industry's extent.

Mangroves There are significant areas of mangroves within 10 km of Project roads near Chidambaram (Pichchavaram, 110 km²), Muttupet (68 km²), along the Palk Bay coast and in the majority of the twenty-one Gulf of Mannar islands. All of these are located more than 5 km from the project roads.

Mangrove vegetation within 500 m from the corridor is observed at Papagani, Kottaiakarai and Mallatar river crossings. However none of these areas are significantly close to the road to be impacted. Hence implementation of the project will not cause any removal or degradation of mangrove species. At these locations adequate care must be taken during the construction period to avoid any adverse impact due to the road construction activity. The preventive / precautionary measures include no siting of construction camps and no disposal of construction wastes/ debris within 1 Km of mangroves and adequate training of the workers, and availability of their fuel requirements to be ensured by contractual obligations to prevent any illegal felling.

4.11 CULTURAL RESOURCES

4.11.1 Cultural Heritage Sites

Tamil Nadu has a rich cultural heritage and the corridor passes near many sites and structures of religious, historical, and cultural significance. The settlements containing cultural heritage sites along the upgradation roads include:

Religious Places: Tiruvannamalai, Tirukkovilur, Kumbakonam, Sirkazhi, Chidambaram along the Northern Corridor and Velankanni, Ervadi along the Eastern corridor

Places with Archaeological Importance: Arcot, Gangaikondacholapuram along northern corridor, Manora and Ramanathapuram along eastern corridor.

Along a few maintenance roads cultural heritage sites have been observed. The maximum number of such sites is observed along Krishnagiri Ranipet Corridor in Dharmapuri District.

Potential impacts on religious and historic sites during the construction stage relate to the possibility for physical damage to occur to structures located close to the road works. Implementation of mitigation measures should ensure that no permanent damage is caused to such structures. In the longer term, construction of the bypasses will make a direct contribution to the conservation of monuments in congested towns such as Tiruvannamalai, Chidambaram etc. by diverting through traffic.

4.11.2 Sacred Groves

In many villages along the upgradation and maintenance corridors, sacred groves⁷ exist. The trees at some places are very old and also considered sacred by the local people. In other cases ponds/tanks are found in close vicinity of the grove. Significance of these sites in religious, aesthetic as well as ecological terms has been taken into account in the design of the road upgradation. The Sadakatti sacred grove, termite mount, (Km 11.0-12.0) along Tiruvannamalai Tirukkovilur road will get affected. No other significant impact is expected on the sacred groves due to the road widening activities.

4.11.3 Other Cultural Properties

There are several cultural properties as temples, shrines, mosques, tombs and churches along the corridors and also within the RoW. These structures though not significant at a regional level, is of significance to the local communities. Impacts on cultural properties are avoided at several locations through changes in the cross section, changes in the curve radius. The design considered changes on a case-to-case basis to have least impact on cultural properties. However, a total of 279 cultural properties either in part or in whole are being affected, as changes in design and alignment at such sections were not feasible.

Based on their usage, social importance and historical significance, some of the cultural properties have been taken for enhancement and at some places designs have been changed to conserve, avoid impacting these structures. The enhancements will be carried out with the following objectives:

- To enhance the appeal and environmental quality of the project corridor to its users
- To enhance visual quality along the highway, and
- To generate goodwill amongst the local community towards the project, by the enhancement of common property resources.

A total of 44 sites are selected for which specific enhancements designs have been prepared. 23 of these sites lie along the Northern Corridor while the remaining 21 sites are along the Eastern Corridor.

4.12 LAND USE ALONG THE EASTERN CORRIDOR

The upgradation roads selected pass through predominantly backward areas of the state that have been neglected in terms of access to basic infrastructure and economic opportunities. Given the general backwardness of the project districts and the ecological fragility along the coastal areas, the land use changes that are likely to be triggered due to a project of this magnitude, was assessed along Eastern corridor. An attempt to provide a direction for land use planning by integrating development, with resource availability, factoring in environmental concerns and thresholds was made.

Based on an evaluation of the existing land uses, the development trends and potential for induced development along the corridor, stretches susceptible to induced development due to the project were identified. Accordingly, a length of 46.2km was found to be vulnerable to induced development. Intrinsic suitability for specific land uses has been worked out with water availability as a major determinant in the development of the region.

⁷ Sacred groves are pockets of natural vegetation with temple/shrine which local people protect out of religious sentiment.

Findings of the suitability exercise and the induced development issues related to the land use changes were presented to the various governmental agencies⁸ in landuse workshop. The land use workshop provided a forum for assessing the situation and arrive at an implementation mechanism that would address the core issue of induced development by planning and regulating land uses. There was an overall consensus amongst the workshop participants that there was no necessity for modifying the existing legislations, as they had in them in-built all necessary safeguards for regulating and planning land uses. Further, the recent Tamil Nadu Highways Act, 2002 provides adequate powers to the Highways Department in managing developments along the highways. Enforcement mechanisms for management of land uses, strengthening of the existing land uses control mechanisms through inter-departmental co-ordination with the line agencies have been worked out. To educate the members of the local municipal bodies, it is proposed that training on the controls and regulations will be provided as part of the project.

The issue of land use management along the Eastern Corridor was further discussed with stakeholders⁹ to ascertain their views, wherein a separate session in the workshop was set aside to exclusively discuss the issues related to land use management. After adequate deliberations on the issue it was decided by all participants to institute a study reviewing the land use changes and the developments induced along the Chennai Cuddalore section of the East Coast Road. The study would focus on the implementation process, the lessons learnt and would provide critical inputs to formulate measures to control induced development along the project road. The HD is now under the process of finalizing the TOR for the study. Adequate cost provisions has been incorporated in the Environmental Budget to initiate the study.

5.0 PUBLIC CONSULTATION IN THE PROJECT

Public consultation has been an integral part of the project. The HD has prepared a consultation strategy for the project to facilitate identification and inclusion of the social and environmental issues in the project. The broad approach and strategy of community consultation is designed as a multi-level participatory process, based on a network of project stakeholders, local organizations, NGO's, professionals at the District and State Levels.

5.1 CONSULTATIONS DURING PROJECT PREPARATION

The following are different types of meetings and levels at which consultations have been held.

- State level (Apex level) consultative workshops (4 Nos),
- District level consultations with Collectors of districts and other officials (10 Nos),
- Village level consultations with public, PAP's, stake holders etc. (15 Nos)
- Survey of ecologically sensitive areas - meetings with interested NGO's in districts where these areas have been identified (10 Nos)
- Public consultation meetings at proposed bypass towns (10 Nos), and,
- Public hearings at each of the 11 districts.
- Various design decisions especially the finalization of alignments has been taken in consultation with the stakeholders. Suggestions obtained in consultation sessions held at bypass locations are incorporated into the designs.

Consultations were also carried out during the independent review and consolidation exercise (with the various Government Agencies, NGOs, PAPs, academic institutions and local groups in the study area) to assess the adequacy of issues addressed in the base EA documents. These consultations have provided necessary inputs for verification of baseline information presented in the EA and information on PAPs of residential, commercial as well as community properties. The issues and concerns raised during these consultations were incorporated into the Consolidated EA/SA to the extent possible.

⁸ A land use workshop was conducted by the Highways Department on the 25th of September 2002 to work out mechanisms for managing land uses along the corridor.

⁹ A State level Stakeholders workshop was conducted by the Highways Department on the 24th of October 2002 at Chennai to address the concerns of the various Stakeholders.

5.2 FOLLOW UP CONSULTATIONS

Following the design incorporating suggestions from public consultations, the EA/SA outputs have been presented to the stakeholders for further comments and suggestions. These have been conducted as land use workshop and stakeholders workshop.

5.2.1 Land use workshop

A study on the induced development impacts due to the project was carried out to assess the anticipated developmental impacts and associated implications on the ground water resources. The findings of the study were placed for discussion in land use workshop. The workshop was aimed at arriving at suitable mechanisms for management and control of land use along the eastern corridor. The outcomes of the workshop have provided inputs into finalization of mechanism to control induced development impacts along the project roads.

5.2.2 Stakeholders' workshop

Stakeholders workshop at state level was conducted by the PIU at Chennai on 24th October '02 with representations from the NGOs, PAPs apart from the various government departments, both at the districts and state levels. The stakeholder workshop provided a platform to the PIU for presenting the project proposals to the stakeholders and gathering the perceptions and inputs for consideration in the project. The suggestions/comments/grievances obtained were incorporated into the design to the extent possible. In continuation of the state level workshop, two regional level workshops¹⁰ were conducted in November 2002:

- At Tiruvannamalai along northern corridors (TNRSP01) and
- At Ramanathapuram along eastern corridor (TNRSP02, 03 and 04).

Outcome of the consultations have been commensurate with the design and hence no major modifications in the design are envisaged. However, additional requirements of the stakeholders, as the request for a bypass for Jeyamkondam town have been received and would be evaluated.

5.2.3 Disclosure of Information

The Consolidated Environmental Assessment, Environmental Management Plans and Resettlement Action Plans prepared for the finalized designs were also placed in all the district libraries for reference before conduct of stakeholder's workshop. Electronic copies of the same are placed in the website of TNRSP for download. In addition, a project brief has been provided along with invitations to the participants of the stakeholder's workshop.

6.0 IMPLEMENTATION ARRANGEMENTS

6.1.1 Integration of EMP with project

To ensure the implementation of these measures by the Contractor, the entire EMP document is made a part of the contract document for the respective contract package. A detailed monitoring plan including the reporting formats and schedules for ensuring the effective implementation of the management measures are included as part of the EMP and ERMP.

The environmental management measures have been included as specific items within the Bid document. Material quantities for implementing these measures have been worked out based on the designs and specifications. These are included in the BoQs for the project as a separate head entitled "Environmental Quantities". To ensure the availability of sufficient funds for implementation of these provisions, the environmental costs have been integrated into the overall costs for the project.

Similar to the EMP for the upgradation roads, the Environment and Resettlement Management Plan (ERMP) for the maintenance roads will be a part of the contract document.

¹⁰ One each for the eastern and northern corridors.

6.1.2 Training of the Members of the Environmental Unit

Members of the Environmental Unit will be trained in environmental protection both in theoretical and practical aspects. While theoretical aspects will form the bedrock of the training programme, it will be the practical site visits and /or hands-on training at project site itself, which will be of direct use to the project.

Basic training required for environmental awareness shall be provided initially and then experts in specific aspects of road-related works who will train the officials regarding the detailed procedures will be identified. Specific modules customized for the available skill set shall be devised after assessing the capabilities of the members of the Environmental Cell and the requirements of the project. The entire training would cover basic principles of environmental assessment and management; mitigation plans and programmes, implementation techniques, monitoring methods and tools. The cost estimates for training of the PIU has been worked out and included in the Environmental Budget for the project.

6.1.3 Reporting systems

The PIU will set the targets for each activity envisaged in the EMP beforehand and all reports will be against these targets. Contractor will report to the Engineer, on the progress of the implementation of the environmental measures and the monitoring as suggested in the monitoring plan on a monthly basis. The Engineer will in turn report to the PIU on a quarterly basis which will be reviewed and forwarded by the PIU to the World Bank. The PIU will also send compliance report to the MoEF every six months as per the conditions of clearance granted for the project after receiving the report from the contractor verified by the Engineer.

6.1.4 Environmental Budget

The summary budget for the Environmental management costs for the Upgradation and Maintenance Routes to be taken up in the project are presented in **Table 5**.

Table 5: Environmental Budget in the project (in IN R million)

Budget Head	TNRSP01	TNRSP02	TNRSP03	TNRSP04	Maintenance roads
General Items	12.6	4.97	4.97	4.97	6.66
Mitigation/Enhancement/ Monitoring in construction stage	54.59	16.44	10.33	10.80	
Monitoring, Administration, Training and Mobilization in operation stage	3.85	4.04	4.04	4.04	-
Training in Maintenance corridors	-	-	-	-	4.0
Total (Million IN R including 10% contingencies)	78.14	28.00	21.27	21.79	11.73

7.0 LAND ACQUISITION AND RESETTLEMENT IMPACTS

The impacts of land acquisition and resettlement in TNRSP are quite high, compared to other similar projects in the country. A total of 14976 households are affected by the project. The total land to be acquired for the upgradation roads (TNRSP 01 to 04) is 572.74 hectares of which 384.80 hectares will be acquired from private owners. 38 ha of land is to be acquired for the Ramnathapuram bypass (TNRSP-05) to be implemented in a later phase of the project. The addressal of resettlement issues in the project has been carried out in accordance with the Resettlement Policy adopted by the Government of Tamil Nadu (GoTN) and the Operational Policies of the WB.

7.1 R&R POLICY FRAMEWORK

The Highways Department (HD) vide G.O.Ms.No. 193 dated 10.08.1998 of Tamil Nadu, has accepted the Principles and Policy Framework for Social Impacts and Resettlement to be adopted for TNRSP. It reflects the policies of the Government of India and the World Bank towards involuntary resettlement and has

formed the basis for working out the entitlements. The principles and approach to be followed in minimizing and mitigating the negative social and economic impacts in the project have been outlined in the policy. The RAP has been prepared as per the provisions laid down in this policy.

For implementing the policy provisions, mechanisms and procedures are worked out. The HD has made a commitment towards these issues through various notifications and Government Orders, which are presented in **Table 6** below.

Table 6: Government Orders Related to R&R Aspects

Order No & Date	Purpose
G.O.Ms.No. 193 dated 10.08.1998	Description of the principles and approach to be followed in minimising and mitigating negative social and economic impacts in the project.
G.O.Ms.No. 221 dated 19.12.2000	Constitution of Implementation Committees – Five committees, three at district level and two at state level to look after the R&R aspects of the PAPs.
G.O.Ms.No. 174 dated 15.08.1998	Sanction of staff to carry out surveys for LA estimates
G.O.Ms.No. 151 dated 07.09.2001	Relaxing Conditions for Acquisition of Wetland, otherwise prohibited as per the provisions of LA act.
G.O. Ms. No. 59 dated 16.03.2001	Government Order on Sanction of Rs 49.5 Crore towards Land Acquisition
G.O. Ms. No. 885 dated 21.9.95	Land acquisition through negotiation – Fixation of land value – Constitution of committee – Orders issued
G.O.Ms. No. 20 dated 30.01.03	Sanction of staff to form R&R cell to carry out implementation of R&R activities
G.O. Ms. No. 40 dated 25.02.2003	Government Order on Enhanced Payment of compensation through private negotiation
G.O. Ms. No. 184 dated 16.10.2002	Government Order on constituting a policy framework approved empowered committee

7.2 PRINCIPLES OF R&R POLICY AND ENTITLEMENTS

There are four broad categories of socio-economic impacts, which require mitigation in this project. They are:

- Loss of assets, including land and house
- Loss of livelihood or income opportunities
- Collective impacts on groups, such as loss of common property resources, and
- Targeted support to vulnerable groups.

The entitlements and options for each impact category are provided in the detailed entitlement matrix for the project. This matrix has formed the basis for formulation of entitlement options and enabled the working out of the R&R budget. The support principles for the various categories of impacts are presented in **Table 7**.

Table 7: Support Principles for Categories of Impacts

Category of Impact	Support Principles
Loss of Assets	<ol style="list-style-type: none"> 1. The project will compensate and replace lost assets at their replacement cost 2. The entitlement unit for such assistance is the household or family. 3. A Land Market Value Survey would be done to establish the real replacement cost of assets to be acquired. 4. The project will provide the option of compensation in kind as well as other support mechanisms to those deemed as vulnerable or at risk.
Loss of House and Shelter	<ol style="list-style-type: none"> 5. Every effort will be made by the project to ensure that new housing is available before people are required to relocate. 6. If it is found that clusters of people have to be relocated, the project will provide an option for new housing in a resettlement site approved by the affected people, with adequate infrastructure and utilities. 7. If resettlement sites are developed as part of the project, the local “host population” will also be consulted about their views and needs, and be given appropriate support to reduce any negative impact caused by an influx of new people.
Loss of Livelihood or Income Opportunities	<ol style="list-style-type: none"> 8. Assistance will be given to the affected population to reestablish their livelihood and income, and to compensate for temporary losses. 9. All adult members of households affected in this way will be eligible for support. 10. Where possible, project affected people will be given employment in opportunities created by the project, such as work with construction or maintenance. Longer-term earning opportunities will be provided through strategies such as vocational training, employment counseling, inclusion in income generating schemes, and access to credit.
Group Based Development Opportunities	<ol style="list-style-type: none"> 11 Through designs, provision of infrastructure, and other support mechanisms, the project will replace lost assets and minimize any negative impact on groups, particularly groups that are considered vulnerable.
Targeted Support to Vulnerable Groups	<ol style="list-style-type: none"> 12 Vulnerable groups will be provided with more options and support mechanism than for those not considered vulnerable.

7.3 MINIMISING RESETTLEMENT

Minimum acquisition and disturbance to existing features has been a prime objective of the design. Socially sensitive stretches have been avoided through selection of alternative links, provision of bypasses around settlements and realignments. Along the existing roads, changes were made in the designs to the extent feasible, thereby resulting in a reduction, if not elimination of impacts. Minimization of impacts within the limitations of technical requirements and cost effectiveness was emphasized. Separate designs were prepared for rural, village and urban sections to minimize impacts. A Corridor of Impact (CoI) approach, wherein the entire RoW will not be cleared (the occupants outside the CoI but within the RoW will not be removed for the project) was worked out to minimize resettlement impacts. The CoI varies between 9m in urban sections to 27 m in rural sections.

7.4 MAGNITUDE OF IMPACTS

A total of 14976 households are affected by the project. Out of these, 8261 households will be subject to major impacts on residence, commercial establishments or land. Of these, 3467 households will be displaced and 6240 will lose their livelihoods. The number of PAPs in major impact category works out to be 33,044 with a household size of 4. Contract Package-wise TNRS-01 has nearly 70% of the total major impacted households, while TNRS-04 has the least (6%) major impacted households. The land requirement for the upgradation along the project corridors is 572.74 ha. This includes 187.93 ha of Government land and 384.80 ha of private lands. For the 13 new bypasses, 291.81 ha land will be required. **Table 8** summarises the extent of land acquisition and resettlement impacts in the project.

Table 8: Land Acquisition and Resettlement

Impact Categories	Contract Package				Project Total
	TNRSP 01	TNRSP 02	TNRSP 03	TNRSP 04	
Major Impacts					
Loss of Houses	1477	422	76	46	2021
Loss of Livelihoods	4100	997	313	427	5837
Loss of Houses and Livelihoods	290	85	20	8	403
Total Major Impacts	5867	1504	409	481	8261
Minor Impacts	3791	1334	653	937	6715
Total Impacts (Major and Minor)	9658	2838	1062	1418	14976
Land Acquisition (in ha)					
Private Land to be acquired	248.91	88.18	23.32	24.38	384.80
Government Land Acquired	109.55	48.44	22.99	6.93	187.93
Total Land Acquisition	358.47	136.63	46.31	31.31	572.74
Corridor Length (in km)	397.9	116.6	99.8	117.9	732.2
Major Impacts PAHs include PAHs losing their place of dwelling or their livelihood due to the project, while minor impacts PAHs include PAHs who lose only a small part of their land or assets and require only a one-time payment of cash or advance notice.					

The project affects a number of community properties all along the corridors. 763 community drinking water facilities including wells, hand pumps and water supply taps are impacted. 84 ponds that serve as community facilities for bathing and washing are also getting impacted. A total of 279 places of worship are affected by the project.

7.5 PROFILE OF THE AFFECTED PEOPLE

Census / socio-economic surveys have been conducted for all impacted properties. The key baseline socio-economic characteristics (related to income, occupation, land holding, house type and access to basic amenities) have been worked out based on an analysis of the census survey data. (**Table 9**).

Table 9: Socio-economic Baseline information

Key Socio-economic Baseline information	Value/ Proportion
Demographic profile	
Household size	4.0
Sex ratio	867.7
Literacy	77.4 %
Social profile	
PAHs belonging to Scheduled Castes (SC)	11.64%
PAHs belonging to Scheduled Tribes (ST)	0.04%
PAHs headed by women	11.82%

Income status PAHs Below Poverty Line	67.25%
Occupation PAHs following Land-based occupation PAHs following non-land based occupation PAHs self employed PAHs salaried	47.25% 36.25% 2.35% 8.75%
Agricultural Land Holding size below 1ha between 1.1 to 2 ha between 2.1 to 5 ha above 5 ha	71.75% 10.00% 9.00% 9.25%
House Type Pucca house Semi-Pucca house Kutchra house	11.25% 25.75% 64.50%
Access to Basic Amenities Proportion of households located within 1 km from market place Proportion of households located within 1 km from PHC / other medical facility Proportion of households located within 1 km from primary school	52.25% 34.00% 84.75%

7.5.1 Impacts on tribal households

The project corridors do not pass through any tribal district. Census revealed that there are four households belonging to Scheduled Tribe affected along the upgradation roads. Impacts to four households do not constitute Indigenous Peoples as defined in OD 4.20. These four tribal households do not live in groups. They do neither exhibit characteristics of Indigenous Peoples nor they are attached to ancestral territory. They are not identified by themselves or by others as Indigenous Peoples. They do not speak any tribal language. Moreover, they do not depend on subsistence-oriented production. In view of this, the need for preparation of a separate Indigenous Peoples Development Plan (IPDP) in accordance with OD 4.20 has not arisen.

7.5.2 Women headed households

Women headed households constitute a total of 1588 households, accounting for 13.5% of the total households. 40% of the women are involved in primary activities both as cultivators and agricultural laborers while another 35% are not in workforce, i.e., includes persons above the working age of 60.

7.6 LIVELIHOOD RESTORATION IN THE PROJECT

TNRSP proposes to assist in income restoration and provide alternative economic rehabilitation to the various categories of people losing their livelihood. The SDU will carry out the implementation of these measures in collaboration with various government departments and training institutes. The NGOs implementing the RAP will play the role of facilitator to the PAPs.

Entitlement provisions for livelihood restoration: For loss of livelihood, all adult (18 years and above) project affected persons will be considered eligible for assistance as per the R & R Policy of the project. The livelihood restoration measures will be taken in the following ways:

- Rehabilitation and assistance for lost or diminished livelihoods will be provided. Apart from monetary assistance, the PAPs will get other assistances in the form of counselling support to start a suitable production or service activity.
- PAPs will be assisted to regain their original levels of economic well being
- PAPs from vulnerable groups will be provided with additional and tangible support mechanisms. They will receive targeted support, and counselled on options to improve their economic opportunities.
- Employment opportunities connected with the project may be provided to the extent possible.
- Local people whose livelihood is impacted will be offered jobs wherever possible and given training. While this is not entitlement, it is an additional opportunity.

7.7 RESETTLEMENT SITES

A total of 60 resettlement site locations have been identified to relocate PAPs. These sites are being identified based on their suitability for a resettlement site based on criteria such as access, distance from existing location and infrastructure availability. Consultations with both the PAPs and the host communities are to be taken up before finalizing the resettlement site. The PIU, through the civil contractors appointed for carrying out the resettlement civil works, will develop the resettlement sites and

resettle the PAPs prior to the contractor's commencement of civil works. The PIU is carrying out the site identification for the first milestone stretches, while the NGOs implementing RAP will carry out the exercise for the subsequent milestone stretches.

7.7.1 Selection of resettlement sites

(a) Consultations for acceptance: The PIU, through the local revenue officials have initiated consultations with the community on the acceptance of the resettlement sites. The details of the site are discussed with the PAPs for obtaining their perceptions on the site identified. At certain locations, the PAPs have been provided with alternative locations within the village to choose from. Wherever the sites identified were not acceptable to the PAPs, alternative locations are explored. Further, during implementation it is proposed that the NGOs to be entrusted with the responsibility of RAP implementation will carry out an acceptance survey of the PAPs prior to the finalization of the site.

(b) Consultations with host communities: Once the PAPs are willing to relocate to the identified resettlement sites, the NGO shall carry out consultations with the host community to ascertain the perceived impacts due to resettlement sites, and obtain acceptance for development of resettlement sites.

7.7.2 Development of Resettlement Sites

The resettlement sites that need to be developed in the project can be classified broadly into (i) Sites housing less than 25 PAHs, (ii) Sites housing 25-50 PAHs, and (iii) Sites housing 50-100 PAHs.

Each of the PAH willing to relocate for residential purposes will be allotted a land parcel measuring 120 Sqm. The infrastructure requirements and typical design layout of the resettlement sites shall conform at least to the minimum standards and specifications for housing the economically weaker sections (EWS).

The development of resettlement sites including infrastructure and services at these sites and the resettlement of PAPs to the sites will be completed prior to the contractor's commencement of civil works.

7.7.3 Environmental Management in Resettlement Sites

A generic Environmental Management Plan (EMP) for resettlement sites has been prepared taking into consideration all relevant environmental factors and information available for the selected sites. The provisions in the EMP for resettlement sites shall be strictly adhered to.

7.8 IMPLEMENTATION PLAN FOR RAP

7.8.1 Institutional Arrangements

The PIU has built in certain organizational and institutional capacity, by the creation of a Social Development Unit (SDU). The major responsibilities of the SDU include (i) Acquisition of land required for the project and (ii) Resettlement and Rehabilitation of the PAHs. An officer of the rank of a Joint Project Director (JPD) has been appointed to co-ordinate the implementation activities related to Land Acquisition and R&R in the SDU. On issues related to land acquisition at the PIU HQ, the JPD (SDU) will be assisted by a LAO of the rank of a Deputy collector from the Revenue Department and supported by an Assistant Divisional Engineer and two Assistant Engineers in technical matters as alignment changes or improvements. These will be in addition to six Field officials of the rank of Tehsildars who have been deputed for the various districts for carrying out the land acquisition besides regular tasks in all Districts.

An externally procured R&R Specialist and two Assistant Engineers at the PIU will facilitate the work of NGOs for R&R implementation. Extension officers, one each for the project districts will be deputed from the Department of Rural Development. These officers will co-ordinate with the NGOs and ensure that the livelihood restoration and other entitlements suggested are provided to the PAPs.

The SDU will carry out a periodic internal monitoring of the progress of R&R implementation. An implementation schedule has been prepared with specific targets for each of the R&R components.

NGO involvement in R&R implementation: To assist the PIU to implement the R&R provisions in the project, four NGOs will be procured. The NGOs are to be mobilized from the 15th April 2003.

Grievance Redressal Committees: To redress the grievances of the PAPs, state and district level committees have been constituted. To ensure transparency, representatives of State and District level NGOs have been included. The State Level Committee has been constituted to carry out a periodic review

of the effective implementation of the RAP provisions. The committee is to meet once in every six months to take decisions on R&R issues received from the district authorities.

District Level (R&R) committees for each of the project districts headed by the respective District Collectors, have been constituted for coordinating the implementation of the RAP and to redress the grievances at the district level. DLCs will be set up in each of the 11 districts that the upgradation roads pass through. The District level committees will continue to function, for the benefit of the PAPs during the entire life of the project.

External impact evaluation: The external impact evaluation agency will verify the compliance of the NGOs contracted for the R&R component with the targets and objectives of the project and that the PAPs are being compensated fairly and in timely fashion. The agency shall evaluate the R&R activities to ensure compliance with the R&R policy for the project and the requirements of the World Bank. They are expected to provide necessary directions to the SDU to make mid-course corrections to the implementation schedule, if required. The impact evaluation agency shall carry out an annual evaluation of the R&R implementation apart from the end evaluation.

7.8.2 Training of Social Development Unit

The external R&R expert shall, based on interactions with the SDU and the NGOs implementing the RAP assess the training needs for the various target groups based on which he will work out training modules specifically suited to the various target groups.

The outsourced R&R Specialist shall, based on interactions with the SDU and the implementing NGOs, assess the training needs for the various target groups and work out training modules specifically suited to these groups. These need to be detailed by the R&R Specialist based on the assessment of the training requirements. The proposed modules include topics such as participatory rural appraisal, micro planning, community consultation, livelihoods generation, etc.

7.8.3 Internal Monitoring and Reporting

RAP implementation will be closely monitored to provide officials at Social Development Unit (SDU) of the PIU with an effective basis for assessing resettlement progress and identifying potential difficulties and problem areas. Monitoring will be carried out by appropriate specialists within the SDU and reported regularly to the Project Director on a quarterly basis. The indicators for achievement of objectives under the resettlement and rehabilitation programme are of two kinds as stated below:

Process Indicators – Indicating project inputs, expenditure, staff deployment, etc.

Output Indicators – Indicating results in terms of numbers of affected people compensated and resettled, training imparted, credit disbursed, etc.

7.8.4 Database Management Systems

A database will be established to record, update, retrieve, and monitor the Land acquisition and R&R implementation. The details collected from census and joint verification surveys will be compiled. An external Database Management Specialist shall establish the database. Apart from the establishment of a database, the outsourced specialist shall be entrusted responsibility for training the Social Development Unit staff on the management, updating and retrieval of the database. The database shall provide the following outputs:

- Aid the NGOs in finalising the entitlements of each PAPs and PAHs.
- Tracking the status of R&R implementation
- Provide for decision making at the PIU.
- Monitor and regulate the land acquisition, distribution of compensation and assistance, grievance redressal and financial progress.

7.8.5 Reporting

All monitoring reports will have to be compiled within fifteen days at the end of each month. The first task of the NGOs will be to ensure that all entitled persons, whether an individual, a household or a community, receive the entitlements due to them. The filled up formats will be compiled, analyzed and results will be

sent to the SDU for review. After reviewing the internal reports for a quarter the SDU will prepare the quarterly report at the end of that quarter and send to the Project Director for his assessment on the quarterly progress of implementation.

7.8.6 External Impact Evaluation

The services of an external Impact Evaluation Agency will be procured to carry out an evaluation of the R&R implementation. The external Impact Evaluation Agency is expected to submit annual evaluation reports to the PIU. The agency is expected to come out with a comparative analysis with reference to pre-project and post-project scenarios. In the process of such comparison, if the agency finds out changes, it will be necessary on the part of the agency to explain the reasons thereto. Moreover, if the agency finds out any shortcoming in the existing plan of actions, it should include its recommendations with the implementation details and procedures.

The SDU after receiving report from the external Impact Evaluation Agency would review the same within fifteen days. Within a week thereafter, the SDU will submit a review report with recommendations to the PIU. The PIU is authorized to initiate necessary contingency management or corrective actions, if required and if so recommended.

7.8.7 R&R Implementation Procedure

Requisite implementation procedures have been developed by the SDU to carry out the resettlement and rehabilitation of PAPs located within CoI of the project corridors. The implementation of RAP will involve the following activities:

- Finalization of cut-off dates and notification for clearance of encroachments and squatters from RoW/acquisition of private properties.
- Verification of properties, estimation of losses and distribution of Identity Cards to EPs.
- Preparation of PAPs for relocation / rehabilitation, and,
- Relocation and resettlement of PAPs.

The PAPs will be served with a sufficient notice to vacate their properties prior to the commencement of the civil works. The HD will ensure that the civil construction works will be initiated for the construction package where the land acquisition process is completed, the PAPs resettled and the CoI is free from any encumbrances.

Based on the magnitude of land acquisition and resettlement and the progress of the LA activities till date, section wise details of roads to be handed over to the contractor has been worked out. It will be ensured by the PIU that all impacts related to resettlement and rehabilitation including payment of compensation along each of these stretches will be completed prior to handing over of stretches to the contractor.

7.8.8 Readiness for RAP implementation

The upgradation roads have been classified into four milestone stretches. The commencement of works for the first milestone stretches will be from the October 2003. The second, third and fourth milestone stretches will commence after 9, 12 and 18 months after the start of the first milestone stretches. The SDU has initiated the land acquisition and resettlement activities related to all impacts associated with first milestone stretches, for all the contract packages. The following major activities pertaining to land acquisition and R&R demonstrate the readiness of implementation of the PIU of the R&R provisions in the project.

- **Land plan schedule** has been completed for the 153.7 km of first milestone stretches, including the bypasses.
- **Acquisition of land** through negotiations with private landowners has been initiated through the field officers in the districts. 4.83 ha of the 26.55 ha private land acquisition along the first milestone stretches has been acquired through private negotiations by the PIU till date.
- **Valuation of replacement cost of structures** is being carried out based on the PWD schedule of rates. The valuation of structures is in progress for the first milestone stretches.

- **Replacement of utilities** is being initiated in consultation with the respective line agencies as the electricity board, telephones department etc. Consent has been obtained from these departments for the shifting of utility lines, and will be carried out as deposit works by the respective departments.
- **Resettlement sites, identification and selection** have been initiated. A total of 60 resettlement sites has been identified by the PIU. The finalization of sites has been done based on the environmental and social criteria for identification and selection for TNRSP-01 and TNRSP-02. The site finalization of the other two packages is in progress.
- **Relocation of community assets** has been entrusted to the NGOs implementing the R&R provisions.
- Expression of Interests has been obtained from the **NGOs for R&R implementation**. The shortlisted NGOs have been invited to submit technical proposals. The NGOs are to be expected to mobilize by the 15th April 2003.
- **Deployment of Social Development Unit** will be complete by March 2003. These include the deployment of the field level positions and the outsourced R&R expert for the project.

7.8.9 Resettlement and Rehabilitation Budget

The cost for implementation of RAP has been worked out in accordance with R&R policy approved by GoTN; and based on the information from socio-economic survey data. The costs for compensation of various losses have been worked out equal to replacement value based on the market rate and the PWD's schedule of rates. The minor impacted property owners will be provided only compensation for loss of their properties. The following **Table 10** presents the overall budget with costs for all R&R components. Broad estimates for the budget for Phase II of TNRSP (Ramanathapuram bypass) and the resettlement costs along the maintenance roads are included.

Table 10 : Summary of R&R Budget (IN R Million)

Items	TNRSP -01	TNRSP-02	TNRSP-03	TNRSP-04	TNRSP-05	Total
Land Acquisition	290.50	82.95	21.36	15.66	10.99	421.46
R&R assistance	255.50	91.59	26.86	26.33	6.30	338.41
Consultancies (NGO Services, impact evaluation, Training, etc.)	15.1	6.4	5.98	8.15	0.0	35.62
R&R goods	2	2	2	2	0	8
R&R works, including resettlement sites development and relocation of community assets	57.66	25.44	11.08	12.62	0	106.8
Operating costs (salary of SDU)						28.85
Contingency 10% for un-quantified impacts	62.076	20.838	6.728	6.476	1.729	93.914
Total	681.836	227.218	71.008	67.236	14.019	1033.054

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