



Source: Photograph by Akanksha Saxena.

There are huge population of monkeys and langurs living on the road, to take care of these animals the canopy crossings may be made 2-3 places facilitate these animals to crossover the road. National Highway authorities were requested to make a provision in their estimates.

**#17 Bridge For Monkeys And Other Animals To Cross Over The Road In Bahia, Brazil**



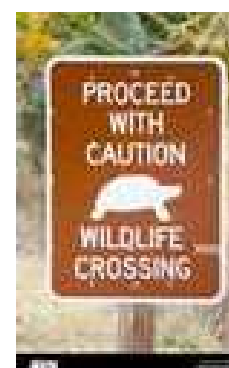
## **Objective 2. Improve motorist safety and reduce wildlife vehicle collisions**

Traffic related mortality of wildlife can significantly impact some wildlife populations particularly those that are found in low densities, slow reproducing and travel over large areas. Very common and large populations viz., ungulates... chital, sambars may cause serious problems for motorists. Under this object the specific measures for wildlife crossing structures are classified into (3) types.

- (i) Specific measures : These are the measures design to improve motorist safety and reduce collisions with wildlife.
- (a) The specific measures are fencing the places where generally wild animals cross over the road by identifying and preventing the possibility of road kills. The funnelling role of fencing that guides animals to passage structures that otherwise may be minimally effective, along with limiting access to roadways and thus reducing wildlife-vehicle collisions, justifies their use despite concerns on cost and maintenance. Barricading and closing the way is not the solution , the driving away of the wild animals to the nearest underpass and fence the areas other than underpasses prevents the road accidents. Suitable provision is made in the conservation plan for fencing. 65-70% of area is hilly terrain which is having retaining walls, in the rest of area approximately 1200-1400 mts underpasses will come and the rest of area need to be fenced in a planned manner.
- (b) Another preventive measure is signage. Signs warning of wildlife are put up all along the 7.5 Km road to caution drivers about the potential presence of animals. The purpose of animal warning signs and detection systems is to prevent or reduce the number of animal vehicle collisions. The wild animals have their right of way in the Forest , hence we should keep boards at regular intervals to keep attention of drivers and prevent accidental kills. Standard black and yellow deer warning signs are probably the most widespread roadside mitigation measure to reduce wildlife vehicle collisions.

Few examples of signs used commonly given here.







- (c) Advanced technology of animal detection system to alert the drivers to prevent accidents. Road based animal detection systems use sensors to detect large animals that approach the road. Once a large animal is detected warning signals are activated basing on that drivers to slow down and be more alert. Animal detection systems provide an extremely time specific warning signal to drivers. However it is extremely important for an animal detection system to be reliable, it must detect all or nearly all large animals that approach the road and it may not produce too many false warning signals. If an animal detection system is too unreliable can erode drivers confidence in the system and consequently result an ineffective system. Animal detection systems have the potential to provide wildlife with safe crossing opportunities anywhere along the mitigated roadway. Presently these systems are used successfully in Yellow stone National Park, USA (photo down below using solar power) and yet to start in our country, by the time of construction, depending on the availability they may be used at appropriate places.



- (d) Another measure to prevent collision is restriction of speed. The present diversion area is not a part of the Sanctuary or National park, with due consideration the authorities try to restrict the speed for the forest stretch and necessary orders may be obtained by the Chief Wildlife Warden of the State of Andhra Pradesh or State Government. The entire stretch of the road is just 7.5 Kms, the State Forest Departments shall work to install speed-detection devices and speed cameras at all sensitive stretches of road passing through. Speed limit monitoring and imposition and collection of fines shall be the prerogative of State Forest Departments as well as highways and traffic police authorities. Speed breakers are to be laid for the entire stretch of the road, suitable financial provision is made. Speed restrictions and other guidelines that spell out rules and avoidance of disturbance to wildlife and habitats along roads in natural areas must be prominently conveyed through well-designed signboards at entry and exit points.
- (ii) The second method of 2nd objective is mitigation measures that require habitat alterations in or near the roads. Under this component, the view lines need to be maintained to have clear vision to both the driver and animal to prevent collisions. Financial provision is for this component in the conservation plan. The other habitat manipulation is to intercept the feeding.
- (iii) The third method is infrastructure adaptation i.e., need to be specific in the infrastructure of the roads, curbs, ramps, medians (preferably more width of median). All these infrastructure facilities are human and wildlife friendly.

#### **4.2 Mitigation measures for littering in the area & conflict :**

- (i) Alighting en-route to be stopped with immediate effect. This will not only reduce the littering on both sides of the road and prevent conflict.
- (ii) Smoking is prohibited in the forest areas and regular monitoring will be undertaken to avoid forest fires.

#### **4.3 Noise control**

Noise pollution control and abatement is therefore a mandatory activity, especially when designing and planning a roadway project, attenuation or reduction in noise due to

vehicular traffic can be achieved by the use of noise barriers, limitation of vehicle speeds. alteration of roadway surface texture, limitation of heavy vehicles use of traffic controls let smooth vehicle flow to reduce breaking and acceleration and the tyre designs. Both underpasses and overpasses need to be fortified with sound barriers to prevent any disturbance to wildlife, without them investments in constructing underpasses and overpasses can go to waste as wildlife may never use them.

The noise need to be controlled, by restricting the No horn sign boards and audio systems in non AC vehicles, so that the animals may not be scared.

#### **4.4 Prohibition on night traffic :**

Prohibition of night traffic need to be studied after the implementation of all the mitigative measures. Wildlife crossings are to be monitored, afte due assessment of any more road kills even though after the implementation of all the precautions, then complete ban on night traffic along roads may be implemented using existing provisions as per the Wildlife (Protection) Act, 1972.

#### **4.5 Mitigation of impacts during project implementation :**

- (i) Water shall be sprayed by high-pressure water hoses during dust generating construction activities e.g. excavation, crushing/demolishing, concrete mixing, material handling etc. to suppress dust; and vehicles delivering loose and fine materials like sand and fine aggregates shall be covered by tarpaulin to reduce spills on roads.
- (ii) All roads (internal and external) to be used by the project authorities should be made 'pucca' (Sprinkled with water) to mitigate the dust generation along the roads.
- (iii) Idle running of vehicles will be minimized during transport and handling activities.
- (iv) The noise pollution will be checked and maintained by installing sound barricades around crushing plants and by taking up regular maintenance of heavy earth moving vehicles. Selection of equipment with less noise generation will be used.
- (v) No labour camps are allowed inside the forest areas. Labours will be trained for protection of trees and conservation and importance of wildlife. Smoking is prohibited in the forest areas and regular monitoring will be undertaken to

avoid forest fires. Labor camps will be provided with LPG for cooking and hence illegal felling of trees will be avoided.

- (vi) The debris materials will be disposed off only at identified area for disposal and proper levelling will be done after disposing the materials and shall be covered with top soil and some plantation will be done at the disposal site.
- (vii) No material including earth should be used from the forest area. All construction materials should be brought from outside the forest area including earth, stones etc.
- (viii) All outside material left over after construction or repair (including stones, sand, cement, packaging material, papers, cartons, oils, cans, bags, wires, metal objects, housing sheds, plastics and glass) should not be left on site, but should be carefully removed and carried away outside the natural area and safely disposed off or reuse elsewhere.
- (ix) The agency should ensure that no damage to any flora or fauna is caused during the course of the execution of maintenance and repair work.
- (x) The project proponents should also abide by any other conditions that may be prescribed by the Chief Wildlife Warden or in site inspection and impact assessment reports. During construction phase, forest department will depute staff to monitor the activities.
- (xi) The site will be cleaned immediately after the construction activity is over.

#### **4.6 Monitoring of wildlife crossings and study the long-term impacts.**

Monitoring needs to be an integral part of a highway mitigation project even though measures have been taken. Mitigation measures are important investment of public funds, these evaluations can help agencies to save money in future projects. Monitoring and research can range from a simple single species population with the highway corridor to more complex ecological processes and functions with regional landscapes. The parameters which are to be monitored are the mortality, increased movement of animals within populations, biological requirements such as food cover and mates, redistribution of populations and long term maintenance of meta populations and ecosystem processes.

Monitoring of underpasses have been studied in India and elsewhere. The wild animals are using the underpasses comfortably without any hesitation. Study was conducted in Narayanaghat - Muglin road under pass of Nepal - (7) mammalian species are using the underpasses. The underpasses which are constructed on the National high way / Kanha - Pench corridor are being utilised by the (18) species which include Tiger, Leopard, Wild dogs, Sloth bear, Jungle Cat, Hares, Wild pigs, Spotted deer, Indian gaur, Nilgai, Sambar and rusty spotted cats. (11) individual tigers are crossed 89 times in (6) of wildlife structures reveal the utilisation of underpasses by animals.



Chapter 5  
**Wildlife Conservation Plan**  
(incl. conservation of mega fauna)

Considering the anticipated impacts / threats posed by the project as indicated, it is necessary to take suitable amelioration measures to minimize the assessed impacts on the wildlife and its habitat. The strategy of conservation measures will be properly juxtaposed with in the cruising radii of wild animals. The plan provides for the protection and conservation of all important species of wildlife and its habitat. The components of the wildlife conservation plan are related to infrastructure improvement, providing additional water resources like percolation tanks, Check dams, repairs to existing percolation tanks, repairs to Check dams, repairs to natural water holes in the Forests, provision of funds for awareness creation in surrounding villages, development of fodder plots etc., The works will be carried out by the Forest department, hence the funds shall be deposited by the user agency with the Chief Wildlife Warden of the state of Andhra Pradesh.

As per the Working Plan of Proddatur Wildlife Division, YSR Kadapa District, Kurnool Circle by Sri P. Siva Shankara Reddy for the period of 2013-14 to 2022-23 the available fauna details are

Mammals	: 23 species
Amphibians	: 5 species
Reptiles	: 17 species
Birds/ Avi fauna	: 111 species

Though 156 species were present as per the Working plan, important conservation measures were made for the mega faunal species of the specified area.

**5.1 Conservation status of mega faunal species in “Diversion of 11.03 Ha Forest land for up-gradation and widening the existing road into two lane with paved configuration of NH 167B from Km 51/000 to Km 58/500 from Porumamilla to Chandrasekharapuram includes both components of impact mitigation and management of wildlife in the specified area”.**

Sl. no	Common name	Scientific name	IUCN Conservation status	Status of Scheduled in Wildlife (Protection) Act 1972
1	Leopard	<i>Panthera pardus</i>	Vulnerable	I
2	Indian pangolin	<i>Manis crassicaudata</i>	Endangered	I
3	Four horned antelope	<i>Tetracerus quadricornis</i>	Vulnerable	I
4	Sloth bear	<i>Melursus ursinus</i>	Vulnerable	I
5	Indian wild dog	<i>Cuon alpinus</i>	Endangered	II part I
6	Striped Hyena	<i>Hyena hyena</i>	Not assessed	III
7	Sambar deer	<i>Rusa unicolor</i>	Vulnerable	III

In addition to the above important megafauna the other Schedule I fauna present in the specified area are Indian Python *Python molurus*, Monitor lizard (*Varanus bengalensis*), Hawk species (Shikra- *Accipiter badius*; White eyed buzzard - *Butastur teesa*; Crested serpent eagle- *Spilornis cheela*; Black eagle - *Ictinaetus malayensis*) and Peafowl- *Pavo cristatus* were present in the area.

The conservation aspects for the preparation of Wildlife Management & Mitigation Plan of the above mega-fauna and other important species are arrived based on their behaviour, preferable habitats, breeding sites, food and water availability in the region. The details are as given below;

The camera traps have been installed on the road to assess the faunal diversity of the specified area, the results of camera traps shown the presence of Sloth bear, Leopard, Wild dogs, Four horned antelope, Sambhar, Chital, Mouse deer, Wild pig, Palm civet crossing the area frequently. The population of Wild dogs are high, 3-4 packs are identified in the specified area. The Sloth bears are comfortably breeding in the area and are seen by most of the villagers on the road. The good population of Four horned antelope is seen on the hilly area, all along the road and on the plateaus of hills on the both sides.

Species notes were prepared for mega fauna of the specified area giving emphasis on Schedule I fauna as per the Wildlife (protection) Act 1972. The Sambar species was dealt basing on the importance of fauna, as the sambar was the main prey of the top predator Tiger and also for Leopard and wild dogs in the schedule area. There are other schedule I fauna in the specified area like Bengal monitor lizard, Python and avian species which include 8-10 species of Raptors and Peafowl. The conservation measures suggest for these species is awareness among people, less disturbance from pilgrim's and provision of water bodies in the specified areas.

**5.2 Conservation aspects of mega-faunal species and other important species recorded in “Diversion of 11.03 Ha Forest land for for up-gradation and widening the existing road into two lane with paved configuration of NH 167B from Km 51/000 to Km 58/500 from Porumamilla to Chandrasekharapuram includes both components of impact mitigation and management of wildlife in the specified area.**

Sl.no	Species & Description	Behaviour	Habitat & Breeding	Food	Conservation aspects to be covered
1	<p><b>Leopard (<i>Panthera pardus</i>)</b>  Head and Body length 203- 243 cm (male), 180-208 cm( female), Ht at Shoulder 50-75cm, tail 76-106 cm, Wt 45-77 Kg ( male, 30-45 Kg (female).</p> <p>The most adaptable cat of Indian sub continent, has background color varies from pale cream, through various shades of orange, to dark rufous brown with white under parts covered with rosettes, each a cluster of small black spots around a normally unspotted centre darker than the body colour. It has small spotted head with powerful jaws, and long tail.</p>	<p>Solitary, nocturnal (less diurnal near human habitats) and territorial. Most comfortable in the lower forest canopy, where they often feed, and descend from the canopy head-first. Comfortable in water and are adequate swimmers. Carries the carcass to a secluded feeding location, typically in a nearby tree. Rest in the branches of trees with dense canopies in order to escape the heat of the day and increase their sense of safety Home range varies 9-27 Km for females and 52-136 km for males.</p>	<p>Deciduous and ever green forests, scrub jungle, open country and fringes of human habitations. Oestrous 7-14 days; gestation 90-106 days. Litter size normally 1-4, weaning begins at around 8-10 weeks, cubs independent at 12-18 months. Males associated with familiar females and cubs for as long as 24 hours, but never form permanent family groups.</p>	<p>Extremely catholic and kills small birds to adult animals weighing 100 Kg +, generally prefers prey of 10-50 Kg, prey include deer's, wild pig, young individuals of larger animals, hares, small animals, rodents, birds like peafowl and jungle fowls. Preys on live stock, occasional entering in settlements kills domestic dogs. Facultative drinkers and obtain much of their water requirements from ingested prey</p>	<ul style="list-style-type: none"> <li>Wildlife crossings to provide accessibility to the resources on the other side of the canal.</li> <li>Water holes for drinking purpose.</li> <li>Proposed grasslands for prey of the animal.</li> </ul>

2	<p><b>Indian Pangolin</b> (<i>Manis crassicaudata</i>)</p> <p>Indian Pangolin is sexually dimorphic with males being up to 90% heavier than their counterparts. The entire body except the foot pads, ventral side of the head and trunk, and inner surface of the limbs are covered by epidermal derived scales. The scales are overlapping. Parts not covered by scales have a sparse cover of white or grey hairs. The mouth is small, the external ears or pinnae are very reduced and the eyes are small. The hind legs are longer than the forelegs. The claws on the digits are extremely long. Teeth are absent. The size of the Indian pangolin, head and body length 48-82cm, tail length 40-60 cm and having weight of 9-18 Kg. The adult male is about one third larger than the female.</p>	<p>The species has been reported from a variety of habitat types that include open grasslands, scrub and rain forests, and near human settlements. Indian pangolins have been reported to prefer hilly terrains as compared to other habitat types (Roberts 1977). Breeding is aseasonal, usually give birth to single; gestation period 65-70 days. Maternal care around three months Young pangolins become independent at five to eight months of age, and are believed to reach sexual maturity at 2 years The life expectancy is 13.5 years.</p>	<p>The species has been reported from a variety of habitat types that include open grasslands, scrub and rain forests, and near human settlements. Indian pangolins have been reported to prefer hilly terrains as compared to other habitat types (Roberts 1977). Breeding is aseasonal, usually give birth to single; gestation period 65-70 days. Maternal care around three months Young pangolins become independent at five to eight months of age, and are believed to reach sexual maturity at 2 years The life expectancy is 13.5 years.</p>	<p>Pangolins are obligate myrmecophagids foraging on eggs, young and adults of ants and termites with a preference for insect eggs over adults. (Prater 1980). The most favoured food sources have been reported to be leaf nests containing eggs and adults of large red ants Feeding is determined by the availability of ant and termite prey close to the soil surface nest and prey is consumed using their specialized tongue.</p>	<p>Create fire lines in the Pangolin habitats to control forest fire. Control human and livestock pressure in pangolin habitats. These two actions will increase the dry forest produce in the forest and facilitate the increase in the termite mounds, facilitates the Pangolins.</p>
3	<p><b>Four horned Antelope</b> (<i>Tetracerus quadricornis</i>)</p> <p>Head and body length 90-110 cm, Height at shoulder 55-65 cm, horns 8-10cm posterior, 1-2.5 cms anterior, Wt 15-25 Kg. A smallest Asian bovid endemic to India and</p>	<p>Primarily grazers, but browse when lack of grasses. Diurnal and solitary by nature. It uses the same latrine sites regularly for defecation and alys droppings in piles.</p>	<p>Dry deciduous forest, Open grassland, dry thorn scrub, scrubland and lightly wooded country. Prefers undulating terrain. Habitats close to water bodies.</p>	<p>Herbivorous animals with a ruminal digestive system, they prefer to feed on nutrient rich fruits, flowers and fresh leaves.</p>	<p>1. Wildlife crossings to provide accessibility to the resources on the other side of the road. 2. Water holes for drinking purpose.</p>

	<p>Nepal, Only males in this species grow horns. One pair of horns is located between the ears, and the other on the forehead. Four-horned antelopes have a slender body with thin legs and a short tail. Their coat is yellowish brown to reddish in color. The underparts and the insides of the legs are white. Facial features include black markings on the muzzle and behind the ears. A black stripe marks the outer surface of each leg.</p>		<p>The reproductive activity is seasonal with mating taking place during early monsoon (May - July) and fawning during spring (February - April). Gestation period 8 months. Males associate with females for copulation with the rest of the parental investment in terms of gestation and caring of young being provided by the females. Females are sexually mature by one year of age and size of litter between 1-2, mostly two.</p>		<p>3. Development of grasslands within the specified area.</p>
4	<p><b>Sloth bear (<i>Melursus ursinus</i>)</b></p> <p>Sloth bears are mostly black, rarely reddish brown or blackish brown tinge on the shaggy coat, with no under fur. A V or U shaped whitish or buff coloured breast patch is present, the long pale muzzle is covered with thin short greyish white hair. The region just below the eyes up to the ears and the sides of the head is covered with short black hair. It is the only bear with long hair on its ears. The neck region and behind possesses long</p>	<p>Nocturnal and crepuscular. The Sloth bears come out shortly before sunset, hunt for food in the night and retire in the morning.</p>	<p>Wide range of habitats including wet and dry tropical forests, savannahs, scrub lands and grass lands. It shelters in rock out crops, thickets and tree cavities. Endemic to Indian sub continent. Mating occurs in May to July, mating pairs come together for one or two days. However, breeding and birthing may occur at other times of the year</p>	<p>The species is opportunistic feeder, eats whatever available in diff. seasons including natural, cultivated, animal food viz insects or carrion - omnivores food habit. Adopted to myrmecophagy with flexible protrusible lips and nostrils that can seal while sucking termites and ants. Open ant mounds and enjoy the termite food by sucking</p>	<p>Wildlife crossings to provide accessibility to the resources on the other side of the road. Water holes for drinking purposes. Plantation of fruit bearing trees proposed.</p>

	<p>hair up to 30 cm long. They have long (6-8cm), slightly curved, ivory-coloured front claws, for digging, and shorter claws in the rear. The front feet are turned inward, also probably an adaptation for digging. They have a broad palate, protractible lips, and they lack the upper two middle incisors, all specializations for eating ants and termites. Sloth bears measures height at shoulder 65-85 cms and 140-170 cms from nose to tail, weighing 80-150kg - Males and 60- 100 Kg of females.</p>		<p>also. During the time there is considerable vocalizing and fighting occurs. Gestation period lasts for six to seven months, litter size 1-3 (usually 2) Cubs comes out from the den after (6) months and ride on the mothers back for another (6) months to prevent predation. Females remain indens for 2-3 months, and during this period rarely come out to eat Weaning period 18-24 months. First breeding for females at 4 years and males little later. The life span is around 40 years.</p>	<p>termites and ants. Open ant mounds and enjoy the termite food by sucking them like a vaccum cleaner. The other food include insects, fruits, plants, tubers, roots, flowers and vegetation. They are good climbers to feed honey and fruits. Mohwa flowers, white grub also favourite food.</p>	
5	<p><b>Indian wild dog (<i>Cuon alpinus</i>)</b> Head and body length 88-135 cm, Tail length 32-50 cm, Wt 15-20 Kg (male) and 10-13 Kg (female). Uniquely Asian reddish brown forest dog, has shorter legs, more bushy tail, shorter, thicker muzzle. The dorsal body fur is red to brown in color while the fore neck, chest and stomach are white colored. They have a large ear which is rounded and give their characteristic look.</p>	<p>Species tend to live in groups (Packs) varies numbers from 5- 20+ also. There is a strict social hierarchy within the pack, mostly diurnal and certain times hunts in the night also. They have a very complex and an elaborate communication system. They produce a characteristic whistle like coo-coo in</p>	<p>Open woodland interspersed with grassy meadows, dry deciduous, moist deciduous and tropical dry forests. The breeding season in wild dogs is between November and December with a gestation period around 63-70 days. The pups are born by February and every litter has around 1-12 pups. The life span of the species is 15 years.</p>	<p>Their common preys are deer, sambar, wild boar etc. On its own, it will hunt small prey, such as fawns and hares, but at times it may hunt in pairs and will kill medium-sized ungulates, such as deer. Occasionally scavenge on leopard and tiger kills. It drinks frequently after eating and will actively search for a water source</p>	<p>1. Wildlife crossings to provide accessibility to the resources on the other side of the road. 2. Water holes for drinking purpose. 3. Development of grasslands within the specified area.</p>



		order to co-ordinate the packs while moving through jungles and keeping them intact.		once finished. Wild dogs start eating the prey even before it is dead. Cleaning it to the bones within a few hours.	
6	<p><b>Striped Hyena (<i>Hyena hyena</i>)</b> Head and body length 100-115 cm, Ht at shoulder 66-75 cm, wt 26-41 kg (male) 26-34 Kg (female). Skulking scavenger has a sloping back, spindly legs, a buff body with a black stripes on the flanks and legs, and coarse long fur. The back has a dark crest and the throat and breast are black. The tail is long and shaggy. The forelegs are longer than the hind ones giving it an ungainly slouched appearance. Sexual dimorphism does not exist other than the visible teats in case of pregnant females and the genitalia. The young are pale white, mane less, but with stripes.</p>	Generally considered solitary, but has some social organization. Forages individually principally at night and is rarely seen in groups. Water is consumed every night if it is available, can survive without water for long periods and live under desert conditions. The hyena is known to paste two diff. coloured secretions from its anal gland, white and black for communication.	Arid, mountainous regions with scrub woodland. Tropical forests of southern peninsula. It dens in rocky hills, ravines and crevices. Breeding season aseasonal, oestrus reported only one day, gestation 90-91 days, litter size 1-4, cubs begin to. Eat meat at around one month but are suckled for 6-12 months. Females are sexually mature at one year and may give birth at 15-18 months. Life span 23-24 years in captivity.	<p>Predominantly scavenger, diet consists mainly carrion and human refuse. Scavenges large and medium sized mammals, even eating bones from carcasses if the meat has been picked off. Supplements its diet with fruit, insects and occasionally by killing small animals like hare, rodents, reptiles and birds.</p>	<p>1. Wildlife crossings to provide accessibility to the resources on the other side of the road.</p> <p>2. Water holes for drinking purpose.</p>
7	<p><b>Sambar (<i>Rusa unicorn</i>)</b> Head and body length 160-210 cms, Ht at shoulder 110-160 cm, antler size 70-100 cm, record 128 cm, wt 180-270 Kg (male), 130-230 kg (female). A typical forest deer with a shaggy, dark brown coat, and large spreading antlers, largest</p>	Sambar are predominantly forest dwellers, favouring the cover of trees, venturing out in to the open mainly at night and lat at dusk or early dawn. They usually rest the whole of day.	It has wide ranging habitat types from mixed deciduous forest, arid and dry forests. Prefers moist habitat with undulating terrain. River and stream banks are chosen for daytime rest.	Sambar are herbivores, eating various grasses, foliage, fruits, leaves, water plants, herbs, buds, berries, bamboo, stems, and bark, as well as a wide range of shrubs and trees. At certain times of the	Sambar constitute one of the largest and most favoured prey species for tiger, leopard and Wild dog. Sambar preference of cover, presence of water and inviolate spaces (free of disturbance) is basic

	<p>deer in India. The antlers in the Sambar are three tined with a long, acutely angled brow tine and main beam that forks into a terminal fork. The belly is darker than the back. Females are lighter and less shaggy. Both sexes have a well-developed throat mane and an enigmatic sore spot on the throat. These are preferred prey of Tiger.</p>		<p>Sambar are polygynous, one male mating with multiple females. Males are very aggressive at the time of the breeding season. They guard their breeding territory and attract female deer by means of vocal displays and smell. There is no specific breeding season, though it most commonly takes place between September and January. Usually, just one fawn is born, after a gestation period of about 9 months. They begin to eat solid food from 5 to 14 days and ruminate once they are 27 to 35 days old. They stay with their mothers for approximately 2 years.</p>	<p>year, they like eating different types of fruit.</p>	<p>requirement. Presence of sambar is an indicator for tiger presence also in the area, hence need to be protected. Wallowing is one of the unique character, requires slushy area with water for wallowing. Proposed underpasses, water holes and required grass species planting near water holes like Napier grass species.</p>
--	--	--	--	---	--

### 5.3 Managerial prescriptions for Wildlife Conservation of the specified area.

#### 5.3.1 Fodder Management in the specified area.

The following operations to be done in the management of fodder Plots.

1. Grass lands having more than 5-10 Ha need to be identified in the Forests blocks and demarcated by planting stones or by suitable methods to relocate comfortably. Proper record need to be maintained for the plots identified.
2. A study to be conducted on the utility of grass species by herbivore in the Reserved Forests and species need to be identified. The palatable grass species will be listed out and the soft and coarse grass species will be identified. The forest area does not harbour any coarse grass feeder like Gaur/ wild buffalo to graze and keep the coarse grass at a low height so that fresh flush of tender shoots come up naturally to meet the needs of soft grass feeders like deer's, antelopes.
3. Unpalatable grass species and weeds like *Parthenium*, *Cassia tora*, *Eupatorium* species need to be removed. The species need to be identified for the removal from the grass plots. In addition to the weed species, the natural grasslands roughly measuring 15 Ha in area in the forest beats are basically invaded and overgrown with unpalatable grass and weeds that are to be manually uprooted first and staked in heaps within the plot and left to decompose as humus in course of time.
4. The gaps within the grass plots will be enriched by dibbling with grass seed ball composed of *Dicanthium annulatum*, *Aristida species*, *Cenchrus ciliaris*, *Setaria pumilla*, *Setaria intermedia*, *Eragrostris uniloides*, *Apluda mutica*, *Panicum repens*, *Chloris barbata*, *Hetropogan contortus*, *Chrysopogan fulvus*, *Themeda triandra*, *Themeda quadrivalvis* and wild tuwar dal (*Atlosia scorbioides*) will be broadcast sown at the rate of 3 to 5 kgs seeds / Ha during the month of May/ June (broadcast sowing is considered in view of large area involved) and weeding will be done twice a year i.e. after commencement of monsoon (Sept/Oct) and (Nov/ Dec) month. Exotics may be avoided as far as possible to prevent future problems.
5. The treated grass plots will be maintained for three years until the entire area is covered with local palatable grass species.

### 5.3.2 Providing Water Resources in the Reserved Forest :

Many abandoned Kunta's and tanks exist in the forest areas. Such sites can be conveniently restored and improved. Similarly perennial water holes in streams may be improved by erecting or strengthening with additional water storing structures to help augment water availability in the hot weather. The catchment areas lies in the Forest Blocks may be suitably treated by constructing check dams, rock filled dams and farm ponds to store water to be available for wildlife in summer months. There is need to increase the quantum of water in the Reserved Forests hence proposed constructions of (6) Percolation tanks, (6) mini percolation tanks (9) Check dams, (60) Saucers and repairs to Kunta's. Two no.s solar systems may be installed in important areas of Major percolation tank with in the specified area.

(60) Saucer pits with the following measurements have proposed. The width of saucer is 3.5 Mt and net height of saucer is 0.35 Mt may be followed for the construction of Saucer pits. The dimensions are specific for Herbivore to drink water comfortably. There is every likelihood of injuries to herbivore population and small animals ,if depth of saucer is increased. Natural rain water is available in the forest during the rainy season , and the shortage of water begins in the forest from December to May months. During this pinch period water will be artificially filled into the saucer pit through the help of a tanker mounted tractor once a week. Water will be drawn from the nearby permanent water sources of local ryots or from the water resources of the developed area of temple premises.



**Design of Saucer pit.**

Two no's solar water systems are proposed in the specified area along with the Percolation Tank. This solar system contains one Borewell with Grundfos Submersible Motor, Solar panels and Water tanker near solar water system for getting water filled for the other saucers and rest of the time the borewell functions with solar power and flows the water into percolation Tank. The entire system is seen in the Photo down below. Provision is made for repairs of old Kunta's and improvement of peri annual water holes in the specified Area.



### **5.3.3 Enforcement of Forest & Wildlife Laws, procurement of vehicle and providing the base camp and assistance in maintenance of Forest Check post at the Gate.**

Enforcing the provisions of the forest and wildlife laws, which include control of littering in the area, control of plastic, halting by the vehicles en-route, control of speed, noise control and protection of wildlife in the area is a herculean task for the Forest Range Officer, Porumamilla. The Forest Range officer, Porumamilla is also the project implementing officer for the wildlife conservation works that are to be implemented in the specified area. It is proposed following measures for enforcing laws and smooth functioning of temple tourism/ pilgrimage.

- a) Strengthening of Forest Check post at the gate. It is suggested to construct well-equipped constructed check post with suitable personnel. The staff should record the movement of the vehicles and maintain the data.

- b) The vehicles shall be stopped at Check Post for verification, the staff will give proper instructions to the travellers by way of pamphlet regarding do's and don'ts in the area along with penal provisions as per the Wildlife (Protection) Act 1972.
- c) The do's and don'ts shall include the following details. For the easy understanding and smooth functioning instructions may be written on the board, which may be visible to all the tourists at a glance.
  - (i) Speed of the vehicle is restricted in the forest area (DFO should obtain necessary orders from the Chief Wildlife Warden of the State of Andhra Pradesh in this regard by explaining the importance of wildlife prominent area though it is not notified as corridor)
  - (ii) The wild animals in the area have right of way and the all the travellers are instructed to drive the vehicle by watching the wildlife. They should allow the wild animals to cross over the road.
  - (iii) All the passengers / travellers are not supposed to alight in between Seetharampuram and Check post.
  - (iv) Travellers / passengers are instructed not to litter the area.
  - (v) Smoking is strictly prohibited.
  - (vi) Feeding of wild animals *en-route* is strictly prohibited.
  - (vii) Contraventions by traveller's are liable for punishment as per the Wildlife (Protection) Act 1972.
    - a. One person will be nominated by the user agency for any issues related in the protection and wildlife accident cases. He will be the coordinator between the department and National Highway authority.

#### **5.3.4 Publicity and awareness programmes:**

- Awareness activities need to be carried out in surrounding villages. The awareness programs include display of posters, signage, celebration of Wildlife Week, Van mahotsava and other important days related to conservation of wildlife, organizing nature camps involving schools, colleges in the respected