

# Wildlife Mitigation Measures

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**Abstract:** *The aim of this Report is to reduce accidents between stray animals and vehicles. I have been noticed that incident and accident involving animals are gradually increasing over many years, collected data from the past few years for the causes of accident and suggested the methods and reviews to decrease the percentage of the death ratio of the domestic and non - domestic animals which has been taken from the research and foreign countries implements and proposed. There has been an upsurge in the incidence of automobile accidents involving both domestic and wild animals. The number of animal - related accidents has been proven to be proportional to the season of the year. Most of these mishaps occur in May. The seasonal variations in animal shelters can explain this. The second highest frequency of incidents occurs in October and November, when animals begin to migrate to wintering habitats. Males are most vulnerable to dying beneath the wheels of vehicles during this time of year. Animal - vehicle accidents (AVAs) on Indian highways pose significant threats to both human safety and wildlife conservation efforts. This report presents a comprehensive overview of the prevailing scenario, contributing factors, and potential mitigation strategies concerning AVAs in India.*

**Keywords:** Animal - related accidents, stray animals, vehicle safety, seasonal variation, migration patterns.

## 1. Introduction

Nagpur - Mumbai Super Communication Expressway (NMSCE) is a road project proposed to connect two economic hubs of the state of Maharashtra. The proposed alignment of 701 km is planned to facilitate faster transport of goods and services, support the agriculture sector, and boost existing infrastructure. Infrastructure development projects, in particular roads, are known to cause irreversible damage to wildlife and natural heritage. Therefore, the Maharashtra State Road Development Corporation (MSRDC) has shown a concern to include wildlife - friendly measures at the early phase of the road construction. Although the highway is planned as a Greenfield development project, the proposed alignment doesn't cross through any existing wildlife protected area. Since the NMSCE is planned to be an access - controlled highway, the road might cut through wildlife connectivity outside the protected area network. In this regard, MSRDC approached Wildlife Institute of India (WII) for providing inputs and suggestions on designing and placing of appropriate wildlife mitigation measures to minimize irreversible damage to landscape having conservation importance. Most of the 701 km long proposed alignment passes through areas of high human use and agriculture.

Hence as a first step, we identified and prioritized the areas that might hold high conservation value. A reconnaissance survey and literature review were conducted for the same. We marked a total of 117.73 km, in total, as wildlife focus areas (WFA).

## 2. Problem Statement

The escalating frequency of vehicle - animal accidents (AVA) along highways in India presents a critical challenge, endangering human lives, causing substantial property damage, and significantly impacting the rich biodiversity of

the region. These accidents result from the intersection of transportation infrastructure and wildlife habitats, leading to a range of issues:

- 1) **Human Safety and Economic Impact:** AVAs pose a severe threat to road users, causing injuries, fatalities, and substantial economic losses due to vehicle damage and medical expenses. The resulting traffic disruptions and road closures also impact commerce and travel efficiency.
- 2) **Wildlife Conservation Concerns:** The continuous expansion of highways into natural habitats disrupts wildlife movement patterns and leads to increased animal mortality rates. Endangered species are particularly vulnerable, facing population declines and habitat fragmentation due to these accidents.
- 3) **Infrastructure Limitations:** Existing highway infrastructure inadequately addresses the interaction between vehicular traffic and wildlife, lacking sufficient mitigation measures such as wildlife crossings, fencing, and signage to reduce collision risks.
- 4) **Lack of Awareness and Data:** Public awareness about animal crossing zones and responsible driving practices around wildlife habitats is insufficient. Moreover, a dearth of comprehensive data regarding AVA occurrences and patterns hinders effective mitigation planning and interventions.

## 3. Challenges

**Wildlife Fragmentation:** The highway's construction threatened to fragment habitats, impeding the movement of animals and exacerbating the risk of species isolation.

**Vehicle - Animal Collisions:** The increased traffic flow raised concerns about rising incidents of vehicle - animal collisions, posing risks to both wildlife and commuters.

**Mitigation Planning:** Designing effective measures to mitigate these challenges without compromising the functionality of the highway required careful planning and collaboration among stakeholders.

#### 4. Observations & Solutions

- The site has a natural water stream and forest cover along the stream. The area potentially can hold dispersing tigers as the existing tiger corridor of Bor - Umred is nearby. A single span 30 - meter bridge is planned here, and the stream will be trained artificially to shorten its course. This will change the natural course of the stream and vegetation covering it. Micro - ecological processes get severely affected by such alterations. At macro level, ungulate species such as Nilgai won't be able to cross through under the narrow bridge when the amount of water channel increases. Accordingly, Bridge length is recommended to be increased to 60 meters with two 30 - meter spans, which allows wildlife movement across the structure even during increased water in the stream.
- The site has open grasslands on both sides that form a connected network of such patches in the larger landscape. A 7 - meter wide and 3 - meter - high Cattle/Public underpass is proposed to be built here. Open scrub habitat is suitable for species such as Nilgai, Hyena and Leopard. An existing highway passes along the proposed alignment of Samruddhi expressway in the south where a village also exists. Accordingly, A suitable wildlife underpass should be made available in the nearby wildlife focus area (from chainage 126.58 to 130.85 km) to ensure regular connectivity.
- A viaduct is planned over the depression in topography. Strips of Teak mixed forest occur at the start and end point of the viaduct on the slopes and further at 310.000 km. Agriculture patches are interspersed in the natural vegetation. The alignment cuts through the forest strip twice and causes fragmentation. The habitat is conducive for species found in dry areas such as Chinkara, Hyena and Leopard. Accordingly, a suitable structure of 7 - meter span and 4 - meter height should be provided at 310.200 km chainage in the Teak Forest habitat.
- The landscape at these sites is majorly agriculture and human dominated. Small patches of grasslands on both sides of the alignment form a larger network of similar habitats. Such patches in mosaic might serve as refuges for wildlife species. Although the landscape around the marked structures does not have vast natural areas, there is rare presence of fauna such as Chinkara, Blackbuck, Indian Wolf and Leopard. Smaller mammals such as Jungle cat, mongoose and shrew species might be present in the landscape throughout. Accordingly, box culverts become prime choice for wildlife crossing where WUP of 7 meters with possible skew structure should be provided.

#### 5. Conclusion

In this Project report the in - depth study of wildlife species, provision of suitable wildlife underpass, length of the bridges at various construction packages has been studied.

The natural course of the streams and the vegetation cover should be preserved so that the wildlife species dependent on the water, food and space resource of the stream aren't deprived of it. Bridge length is recommended to be increased to 60 meters with two 30 - meter spans, which allows wildlife movement across the structure even during increased water in the stream. Human settlements on one side of the structure and heavy use of the structure by humans in future make this less than an idle spot for wildlife to cross. A suitable wildlife underpass should be made available in the nearby wildlife focus area (from chainage 126.58 to 130.85 km) to ensure regular connectivity. In that case, there is no need to modify this structure.

The bridge over the stream is only 18 meters wide, which will effectively turn this into a tunnel for wildlife species. Therefore, it is recommended to extend the span to 60 meters with two 30 - meter spans and keep the median open to let the sun penetrate during daytime.

The length of the minor bridge should be increased from two spans of 12.856 meter to two spans of 30 meter (total 60 meter) and the structure should be skewed to match the original alignment of the stream. Entire width of the water channel should be available to wildlife species for movement and height from the base of the channel should be available for movement of Blackbucks.

Since the embankments at 308.200 and 310.000 km are cutting through the hill slope, any wildlife overpass or underpass won't be feasible. Nearby viaduct can potentially provide a passage for wildlife movement, however the village and agriculture close to viaduct doesn't make it an ideal spot for most species. Therefore, a suitable structure of 7 - meter span and 4 - meter height should be provided at 310.200 km chainage in the Teak Forest habitat.

The water stream at 335.430 km is banked by agriculture on both sides and wouldn't provide good conductance for terrestrial mammals. Minor bridge at 335.688 is quite close to human habitat and a span of 40m is already provided. Therefore, box culverts have become the prime choice for wildlife crossing where WUP of 7 meters with possible skew structure should be provided.

The PUP is proposed on kachcha road, which can also be used by wildlife occasionally. However, future development is likely to convert this into a paved road for vehicle movement. Therefore, alternative crossings should be available to the wildlife in nearby area, namely the box culvert at 348.220 could be extended to a 7 - meter - wide structure with open median. A minor bridge of two spans of 8 meter at 349.260 with open median could serve as WUP.

PUP is planned to have 6 - meter height. With the extended width and open median, it could serve as the wildlife crossing in nighttime. No other suitable wildlife crossing structure is available in proximity, making this site important. Two spans of 7 meters each may be provided to allow more space for animal movement.

## References

- [1] W. Richard J. Dean, Colleen L. Seymour, Grant S. Joseph and Stefan H. Foord (2019), A Review of the Impacts of Roads on Wildlife in Semi - Arid Regions, Diversity, doi: 10.3390/d11050081, pp 1 - 19 Ledec, G. & Posas, P. J. Biodiversity conservation in road projects: Lessons from World Bank experience in Latin America. *Transp. Res. Rec.* 1819, 198–202 (2003).
- [2] Andreas Seiler (2001), Ecological Effects of Roads, Grimsö Wildlife Research Station, Dept. of Conservation Biology, University of Agricultural Sciences, S - 730 91 Riddarhyttan, Sweden, pp 1 - 41
- [3] David Magintan (2015), Mitigation of road related impacts on wildlife, Research Gate, DOI: 10.13140/RG.2.1.3256.7202, pp 1 - 27
- [4] J Emerg Trauma Shock.2021, A Study of the Pattern of Injuries Sustained from Road Traffic Accidents Caused by Impact with Stray Animals, *Journal of Emergencies, Trauma, and Shock*.
- [5] doi: 10.4103/JETS. JETS\_29\_20, (link: - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8054802/>)