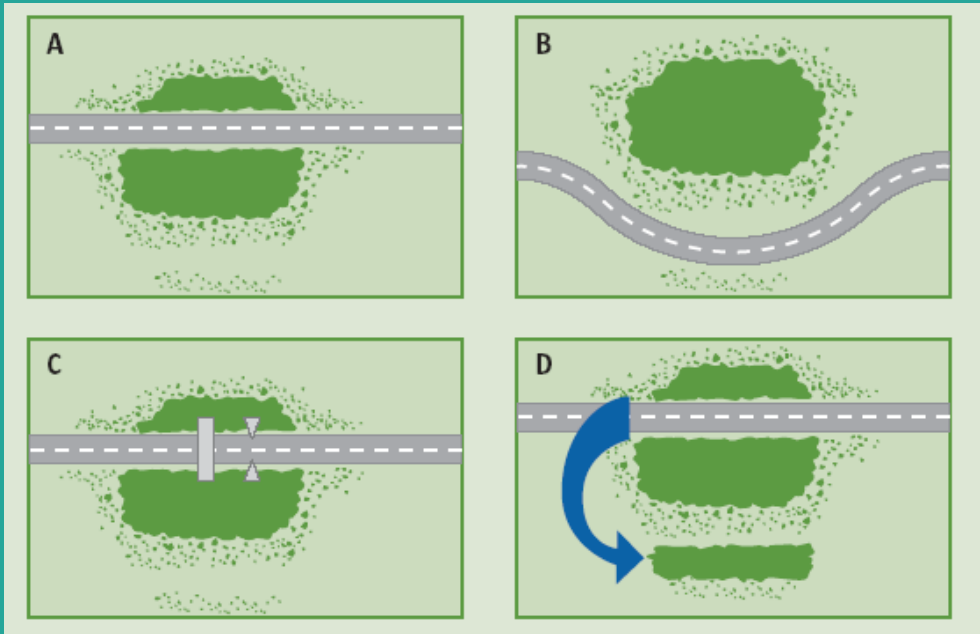
Wildlife Crossing Structures for the Shencottah Wildlife Corridor

Srinivas Vaidyanathan[1], A. J. T. Johnsingh[2,3], Nishant Srinivasiah[4], Naveen Bhat[5] & Selva Kumar[5]

1 Foundation for Ecological Research, Advocacy and Learning, 2 Nature Conservation Foundation, 3 WWF- India, 4 National Institute for Advanced Studies, 5 Kinetix Solutions Pvt. Ltd

Rule of Thumb: Avoid, Mitigate or Compensate



Schematic representation of linear intrusion and habitat (A) fragmentation (B) avoidance (C) mitigation by use of under/overpasses, and (D) compensation by creation of replacement habitat nearby (from Iuell et al. 2005)

Shencottah Gap

Critical wildlife corridor connecting the Periyar and Agastyamalai landscapes

National Highway

Railway line

Power Grid Corporation transmission line

Human settlements along linear intrusions

Mitigation is the only option

Criteria for selecting potential crossing points

Landscape-level monitoring of large mammal movement, topography and human activity on either sides of the linear intrusions

Long-term data from camera traps used for identifying individual animals

Identification of potential crossing sites based on animal movement data using GIS and field survey

Two sites, Kottavasal and MSL, identified as high probability crossing zones for elephants, tigers and leopards

Elephant photo capture locations within MSL corridor (<500m from highway) and potential movement pathways

Criteria for selecting the type of mitigation structure

1. Wildlife connectivity potential
2. Target species, single /multiple species
3. Topography of the site
4. Other linear intrusions

Potential Locations

Kottavasal

Wildlife overpass for large carnivores

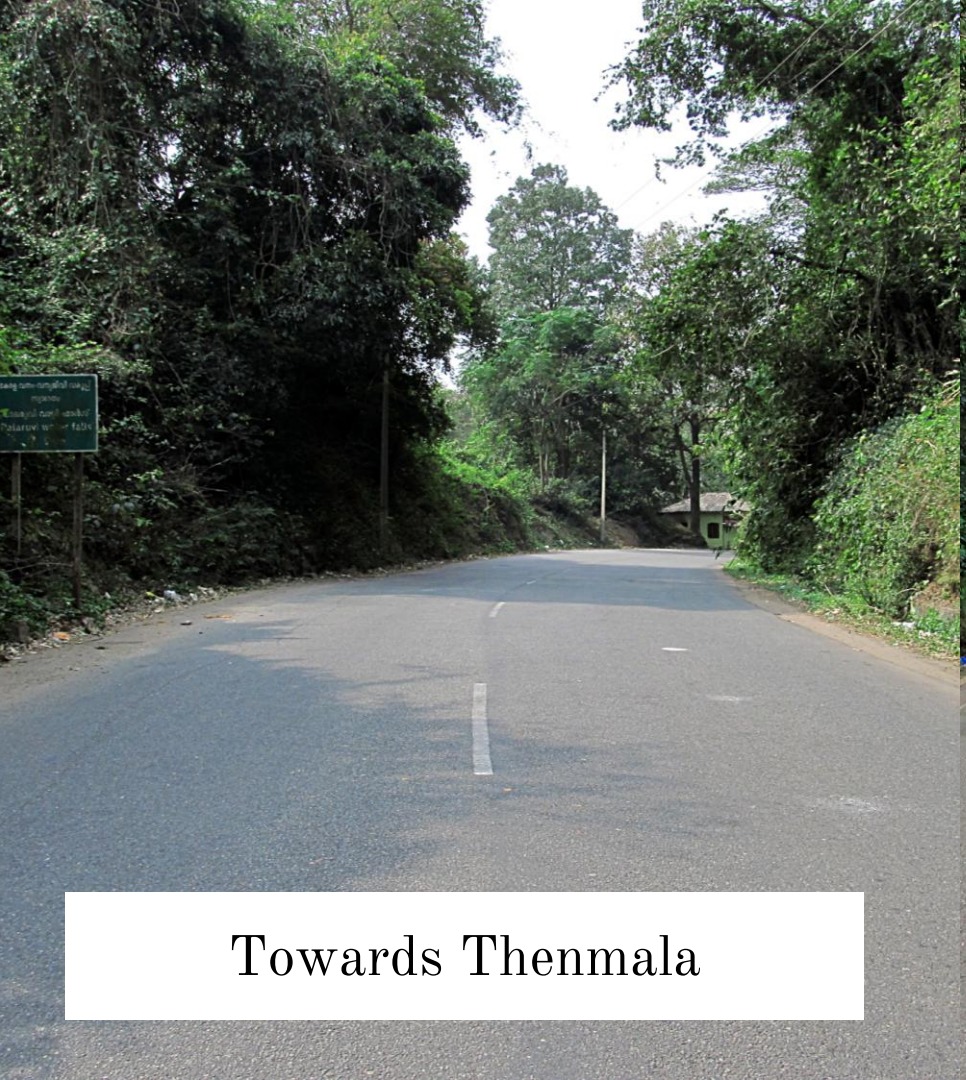
Site identified based on long term dataset on actual crossing by leopards

Tigers dectected in proximity to crossing points

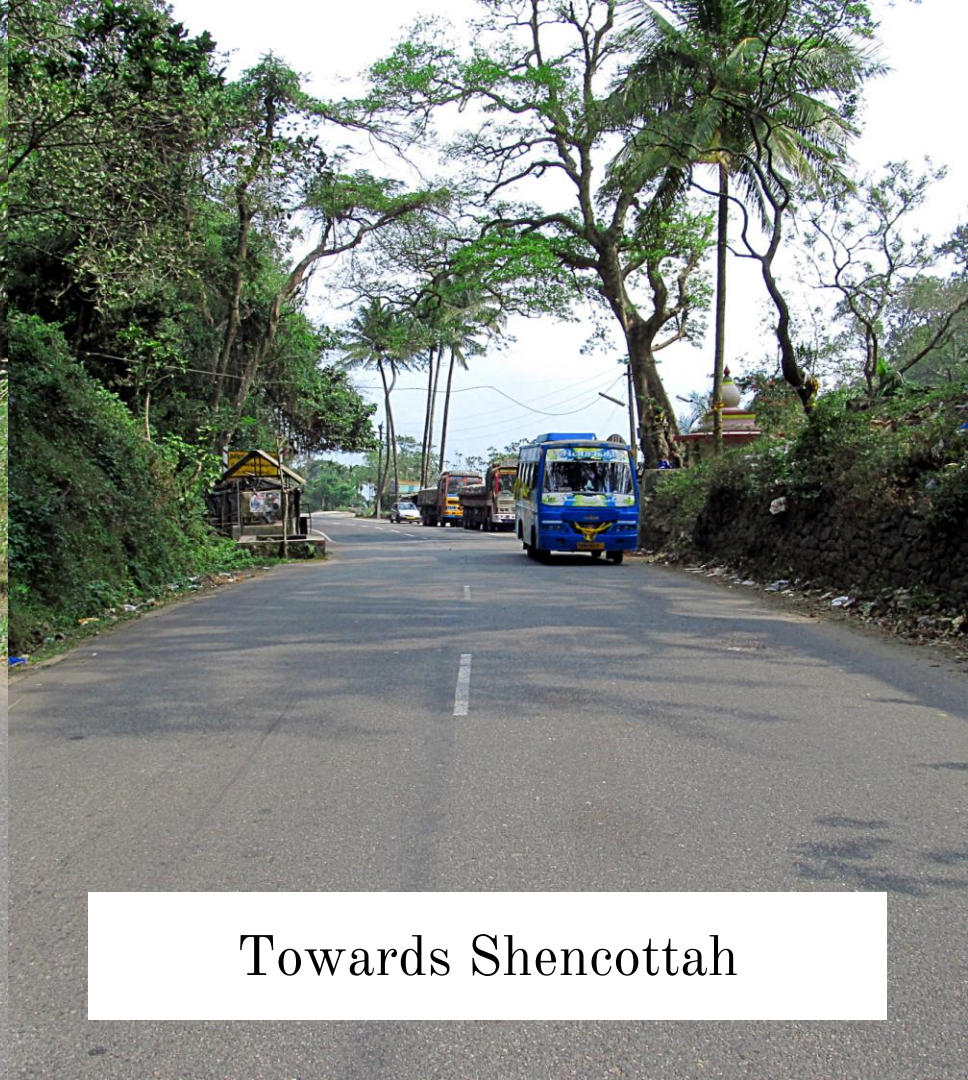
Leopards cross regularly

Barrier effect of National Highway

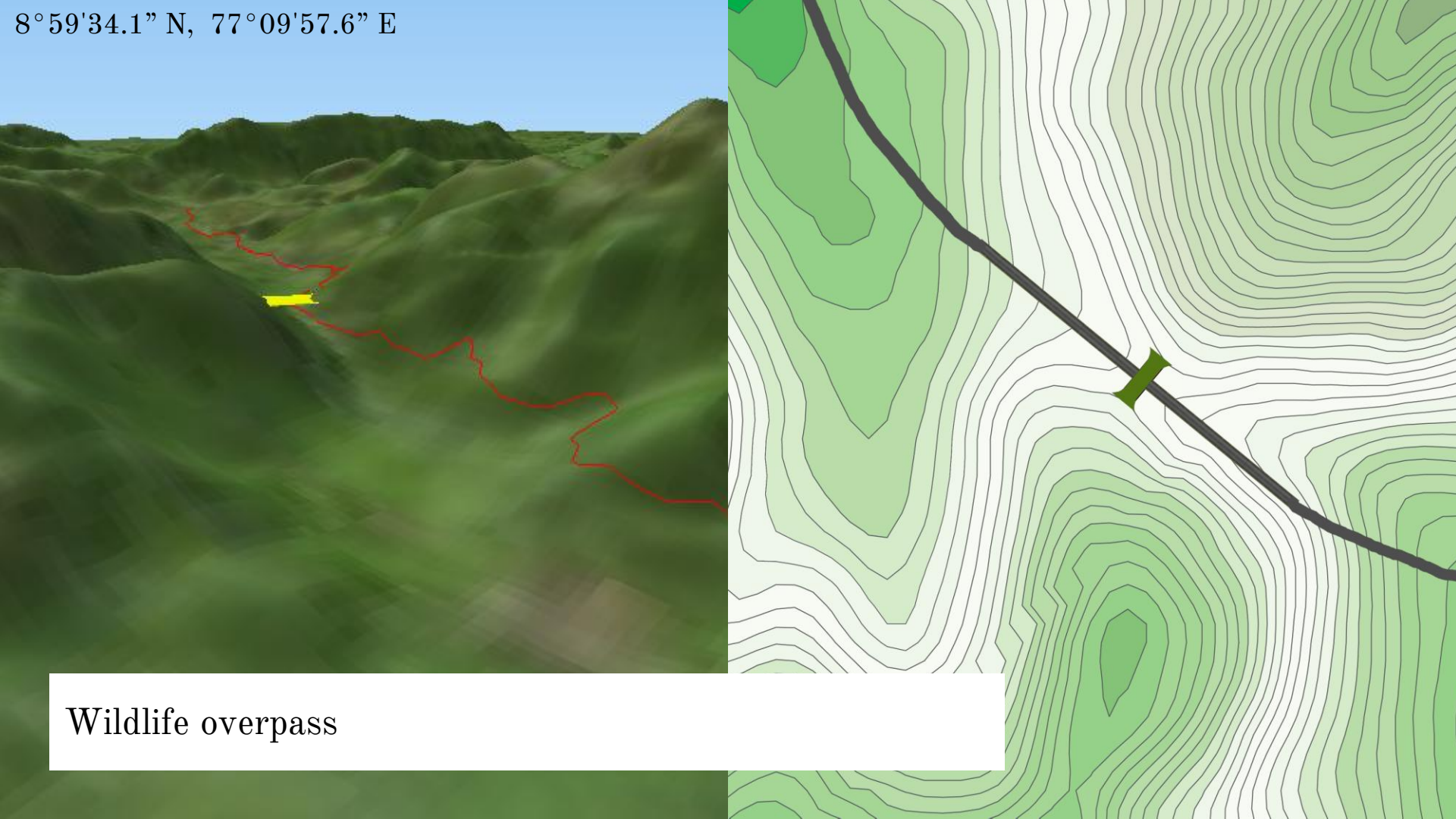
High connectivity, identified linkages, below grade road, rugged terrain conducive for wildlife overpass



Towards Thenmala



Towards Shencottah

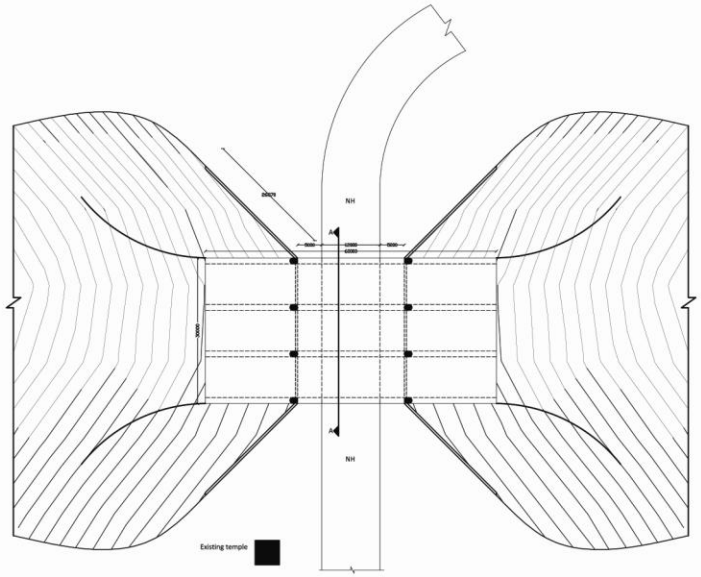


Wildlife overpass

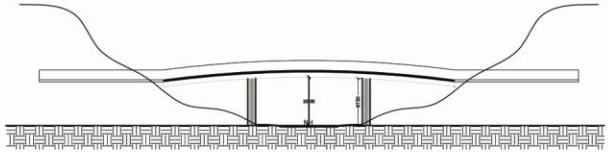
Proposed RCC Wildlife Overpass

Karuppasamy Temple

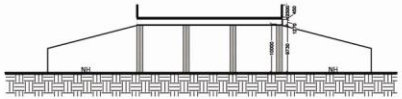
National Highway 208



PLAN



ELEVATION



SECTION @ AA

Wildlife overpass	**RCC with earthen top**
Approximate (L x B) m	**60 x 30 m**
Area	**1800 m^2**

Wildlife overpass

Wildlife overpass

Artistic rendering not at actual location

Wildlife overpass

Artistic rendering not at actual location

The design

1. Leopards are known to cross at this location, need to negotiate the highway, which is risky
2. Tigers recorded close to the highway, high potential of dispersing if safe passage is provided
3. Very low probability of elephants crossing, however design accomodates such events

Additional features to be added

1. Vegetation cover created on the overpass, use native shrubs, grasses and understorey trees
2. Three meter fence along the overpass with climbers to prevent visibility of the road and headlight during night
3. Landscaping to merge structure with topography, earthen structure with hedge planting


© WCT

MSL

Flyover / underpass

Site identified based on long term dataset of elephants near intrusions and actual crossing by leopards

Tigers detected in proximity to crossing points

High probability of elephant crossing

Barrier effect of National Highway and Railway line

High connectivity, identified linkages, sloped terrain conducive for wildlife underpass

Three potential locations

MSL

Site 1: 13th Arch Bridge

Site identified based on long term dataset on actual crossing by leopards

Elephants close to the road , southern side

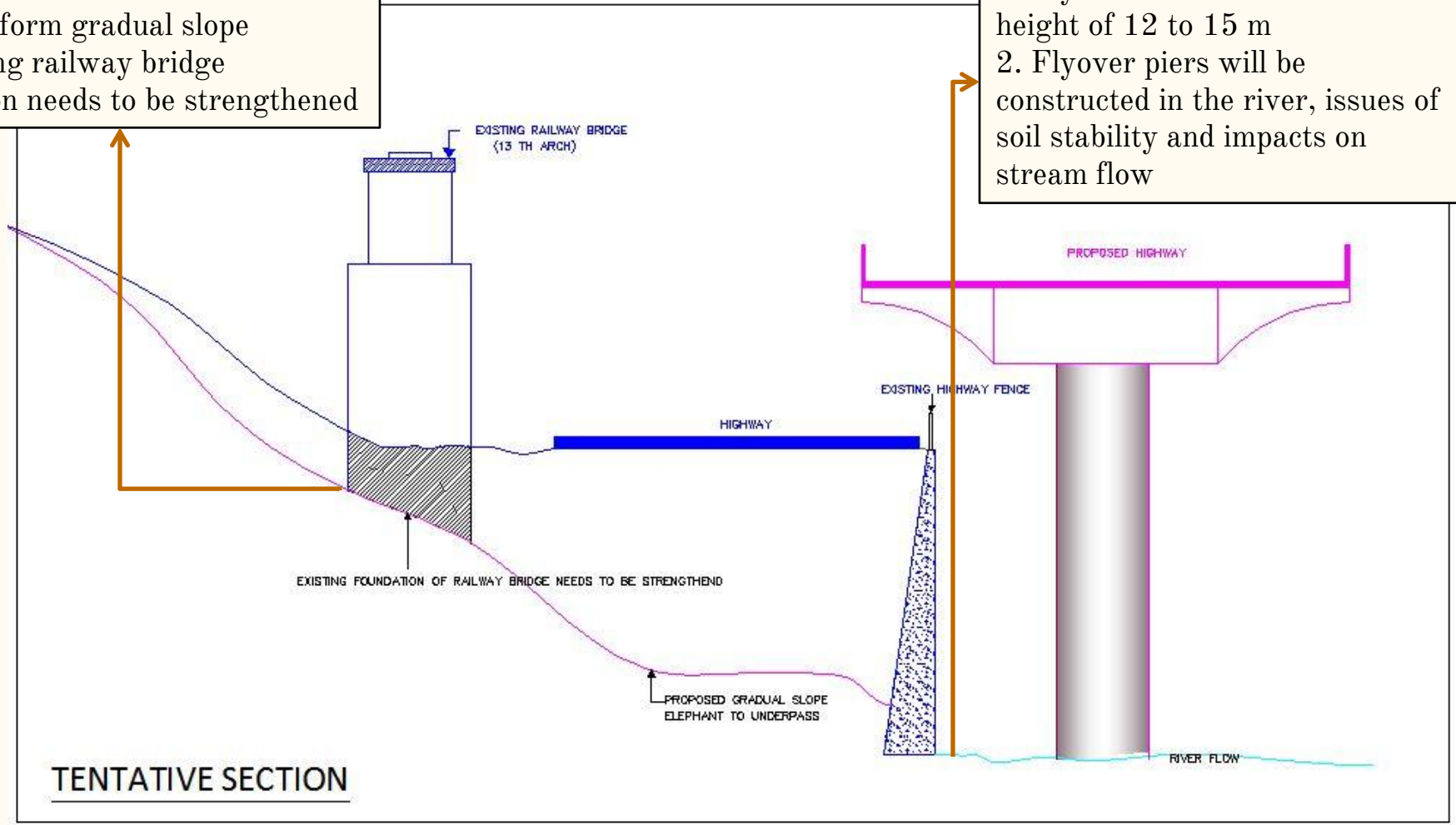
Will require further modification to the 13th Arch Bridge and realignment of the highaway

Not considered due to technical aspects

8°59'34.1" N, 77°09'57.6" E

1. Minimum 3 - 5m earth needs to be cut to form gradual slope
2. Existing railway bridge foundation needs to be strengthened

1. Flyover with a minimum clear height of 12 to 15 m
2. Flyover piers will be constructed in the river, issues of soil stability and impacts on stream flow



8°57'44.9" N, 77°05'19.4" E

MSL

Site 2: Near entrance of tunnel

Elephants very close to the road

Steep gradient

Terrain cannot be altered due to existing slope, rocky formation and railway line

MSL

Site 3: At railway bridge

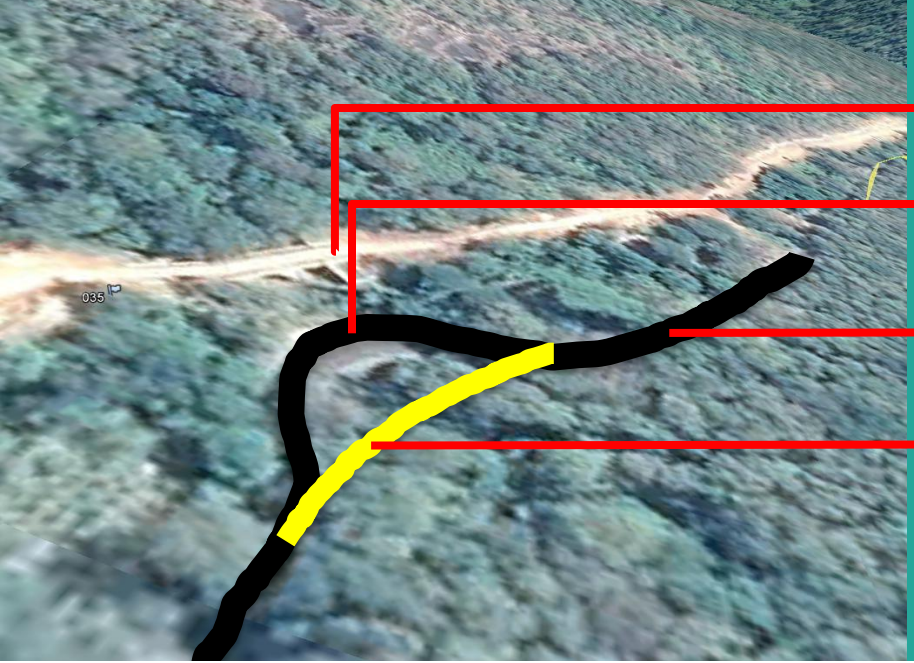
Railway bridge provides under pass for elephants

Presence of stream across the railway line and National Highway

Minimal realignment of road can provide an underpass

Existing road can be dismantled to provide a gentle gradient for quick passage and to ensure that elephants do not stray along the highway


8°57'51.1" N, 77°04'50.2" E
Wildlife underpass

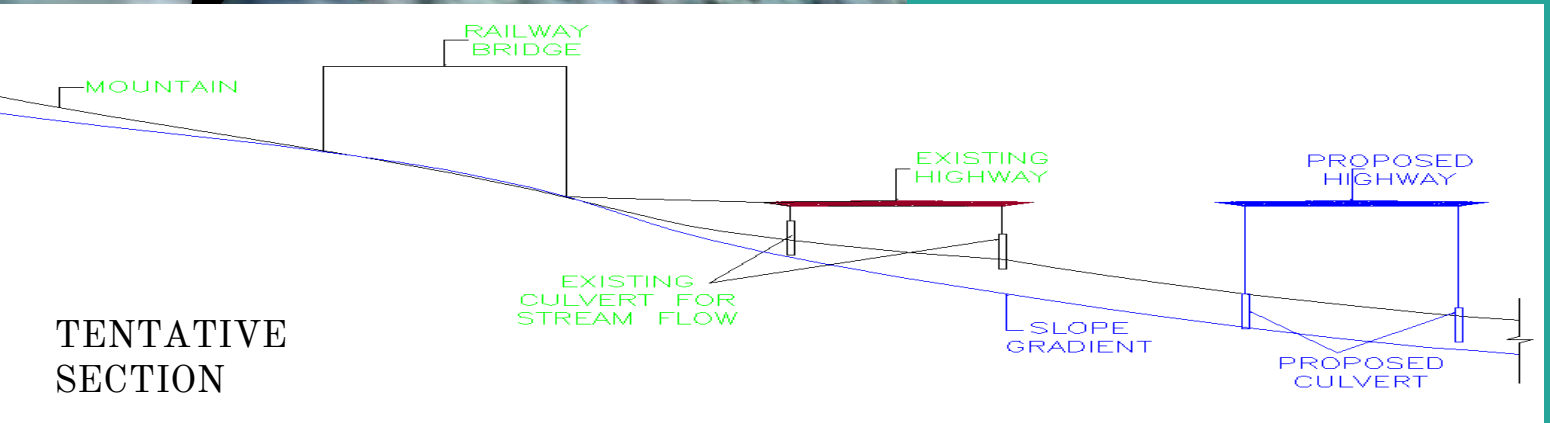


Railway bridge

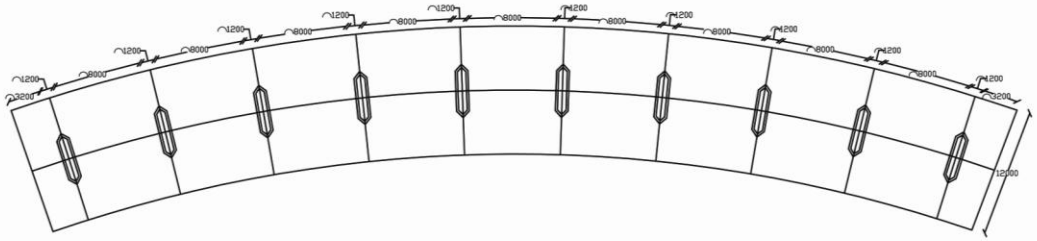
Culvert

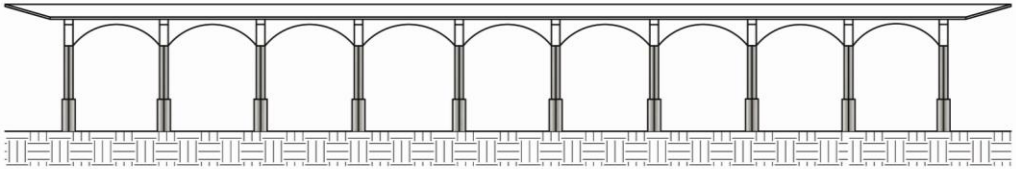
National Highway

Proposed realignment of NH

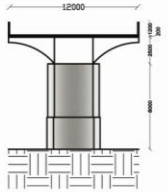


TENTATIVE SECTION





ELEVATION



SIDE ELEVATION

Wildlife underpass

Flyover/ Underpass	**RCC elevated bridge**
Approximate (L x B) m	**115 x 12 m**
Area	**1380 m^2**

Wildlife underpass

Artistic rendering, not at actual location.

Wildlife underpass

Artistic rendering not at actual location

The design

1. Elephants have come within 100 m on either side of the highway at this location, both herds and young dispersing males
2. Elephants are known to use the path of least resistance, move usually along the contours
3. There is a small stream flowing north to south across the railway line and highway and hence a natural gradient is available
4. Existing railway bridge meets minimum height and width requirement to allow passage of elephants

Additional features to be added

1. On the northern side, along the stream an animal trail can be establised to provide a safe path for elephants
2. Area around underpasses should provide adequate line of sight to enable decision making
3. Landscaping along the dismantled road to ensure vehicles are not visible and also to prevent straying of animals

Estimated budget

	Description	Kottavasal corridor	MSL corridor
1	Proposed structure	RCC wildlife overpass	RCC Elevated Bridge
2	Approximate (L x B) m	60 x 30 m	115 x 12 m
3	Area	1800 m^2	1380 m^2
4	Approximate cost	121,515,000	113,565,000
5	Approximate time for completion	15 Months	12 Months

Conclusion

The proposed mitigation structures for the Shencottah wildlife corriodors will facilitate higher rates of leopard dispersals. Our long term data shows that linear intrusions in this landscape act as barriers to elephants and tigers.

The proposed structure at Kottavasal should facilitate dispersal of tigers. The underpass in MSL corridor will provide a safe passage for elephants, additionally, to other dispering mammals.

The proposed structures meet disperal demands of a wide range of species and these need to be constructed at the earliest to ensure long term population viability of key mammals. In addition it will facilitate in the creation of ~6500 km^2 of connected wildlife habitat.