Proposed mitigation structures for the upgradation of 5.8 km Siyarkoni-Garmorwa Road under PMGSY scheme (submitted by Hazaribagh WL Division, Jharkhand Forest Department, Govt. Of Jharkhand to SC-NBWL)

The proposed project is an upgradation/ black topping of an existing *katcha* forest road of length 5.8 km connecting Siyarkoni (adjacent to NH 19) and Garmorwa villages under the Pradhan Mantri Gram Sadak Yojana (PMGSY) scheme requiring an area of 1.7894 ha inside Gautam Buddha Wild Life Sanctuary (GBWLS), Jharkhand within jurisdiction of the Hazaribagh Wild Life Division (Figure 1). The purpose of the project is to provide all-weather road connectivity to three enclaved villages within the Sanctuary – Sanjha, Kothodumar and Garmorwa. The average width of the existing *katcha* forest road in the proposed area is 12 feet.

GBWLS, Jharkhand is rich in flora and fauna with several endangered and scheduled animals (under the Wild Life Protection Act, 1972) found in and around the Sanctuary such as sloth bear *Melursus ursinus*, White-rumped Vulture *Gyps bengalensis* etc (WII 2021, 2022). Hence, the proposed road upgradation project might impact as increased mortality due to vehicular collisions, habitat fragmentation (due to obstructed movement), habitat loss/degradation and even indirect effects such as behavioural avoidance (de Rivera *et al.* 2022). The proposed project, thus, must proceed with utmost caution and implement all mitigation/ wildlife safety measures following established and relevant national and state laws, rules, policies, guidelines, judgements of higher courts of judicature and best-practices to cause least disturbance/damage to inhabiting wildlife. Implementing these will help to preserve GBWLS, Jharkhand's ecological integrity and ecosystem services while providing for the genuine connectivity needs of the enclaved villages' inhabitants.

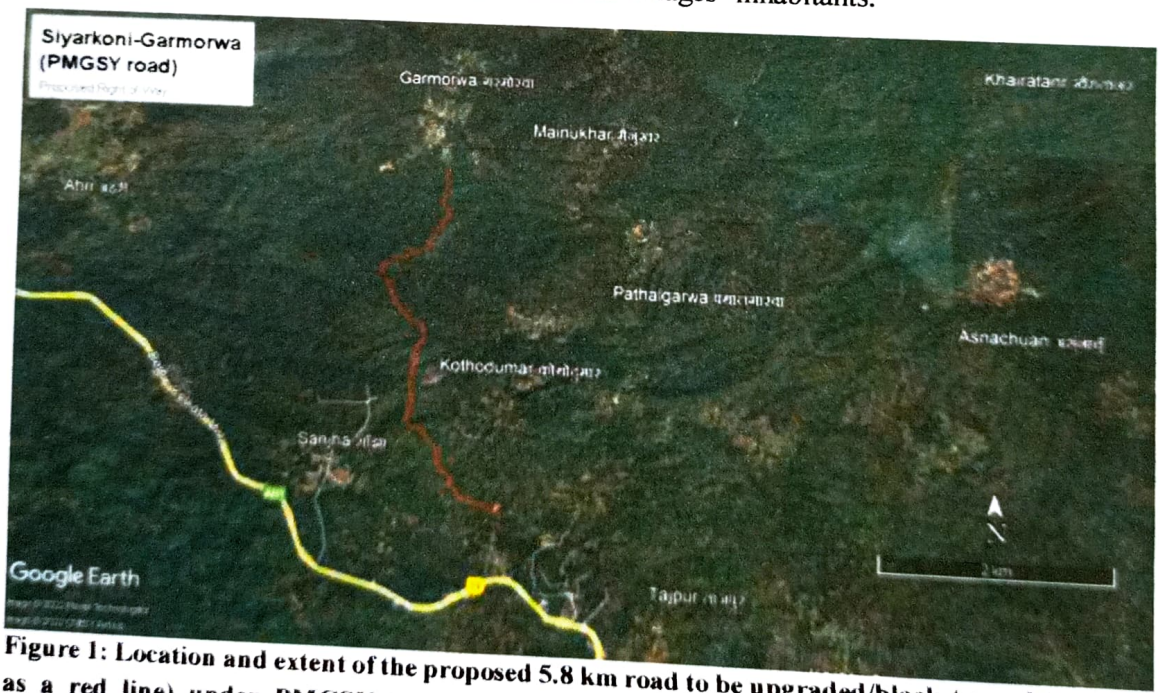

Figure 1: Location and extent of the proposed 5.8 km road to be upgraded/black-topped (depicted as a red line) under PMGSY between Siyarkoni and Garmorwa villages within GBWLS, Jharkhand

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In order to ameliorate the above-mentioned impacts on wildlife of the upgradation ofthe said road – besides causing increased noise, air, water and sound pollution – a two-day foot-survey all along the proposed right-of-way stretch was conducted during May 29-30, 2022to identify locations for construction of structures that might mitigate these impacts.

Sixteen (16) locations that had animal trails on either/both side of the existing *katcha* road or had high wildlife presence (determined through presence of animal signs – spoor/track, dung/pellets, see Figure 3) were identified for the construction of pairs of speed-barriers (Figure 2, Table 1), while six (06) locations where headwaters/seasonal stream met the road were identified for construction of RCC box culverts (Figure 4, Table 2) of appropriate dimensions (maximum 1.5 times length of the road, minimum 3.8-4.2 metre height and minimum 3-6 metre width) wildlife underpasses and for effective passage of water, incorporating slope considerations at each location to avoid debris collection and facilitate free water movement through culverts. RCC box culverts are an effective way to allow water passage where streams intersect with roadways. Since most streams along the proposed stretch of road are seasonal in nature, their dried paths also act as wildlife movement corridors, besides being important habitats for amphibians and reptiles. Culvert construction must specifically maintain an openness ratio of at least 0.75 (or higher), where openness ratio is calculated as the ratio between the product of height and width of the structure (numerator) with its length (denominator) (Reed *et al.* 1975).

Construction of the proposed mitigation structures must follow established guidelines under the PMGSY scheme and best practices as detailed in the Rural Roads Manual (IRC 2002).

Sl. No.	Latitude	Longitude
1	24.41812	85.23984
2	24.41850	85.23865
3	24.42148	85.23654
4	24.42286	85.23596
5	24.42351	85.23536
6	24.42386	85.23476
7	24.42503	85.23375
8	24.42668	85.23419
9	24.42998	85.23454
10	24.43395	85.23269
11	24.43557	85.23191
12	24.43625	85.23149
13	24.43816	85.23436
14	24.43846	85.23522
15	24.44146	85.23723
16	24.44232	85.23680

Table 1: Locations (serial number matched with map below) where pairs of speed-barrier installation is proposed along with appropriate wildlife signage; exact construction location should be at or within 10 metres of the given locations depending on feasibility; distance between speed-barrier units within each pair must be 15-20 metres to enable slowing of vehicles at these locations

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Animal cautionary/ warning signboards must also be installed at every 250 metres all along the road stretch clearly stating wildlife's preferential right of way, including one each before 50 metres at either ends of the stretch.

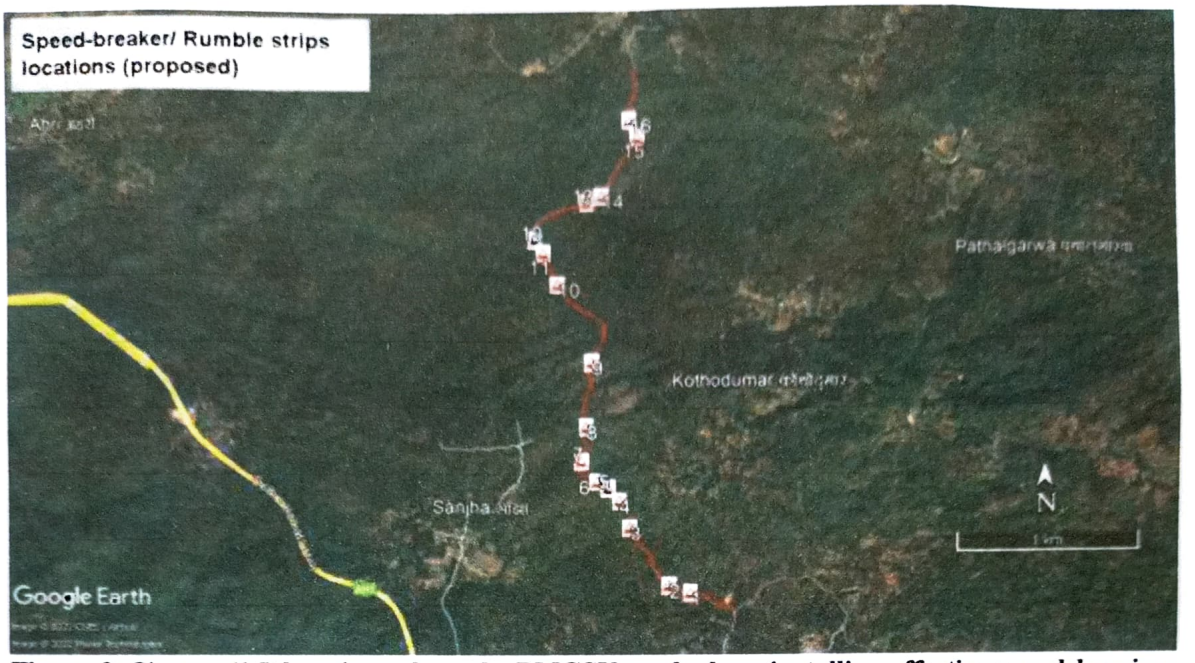

Figure 2: Sixteen (16) locations along the PMGSY road where installing effective speed-barriers in the form of speed-breaker and/or rumble strip pairs are proposed to reduce vehicular speed thus minimising animal-vehicular collision risks

Figure 3: Wildlife signs of chital (spoor/hoof mark depicted above), black-naped hare, jackal and an unidentified snake were recorded along the stretch during the two-day survey

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Sl. No.	Latitude	Longitude
1	24.42263	85.23605
2	24.42456	85.2338
3	24.42579	85.23428
4	24.43832	85.23494
5	24.44104	85.2372
6	24.44371	85.23719

Table 2: Locations (serial number matched with map below) where RCC box culvert of appropriate dimensions (maximum 1.5 times length of the road, minimum 3.8-4.2 metre height and minimum 3-6 metre width) installation is proposed keeping an openness ratio of minimum 0.75 and considering slope of the location to permit free water passage without debris collection

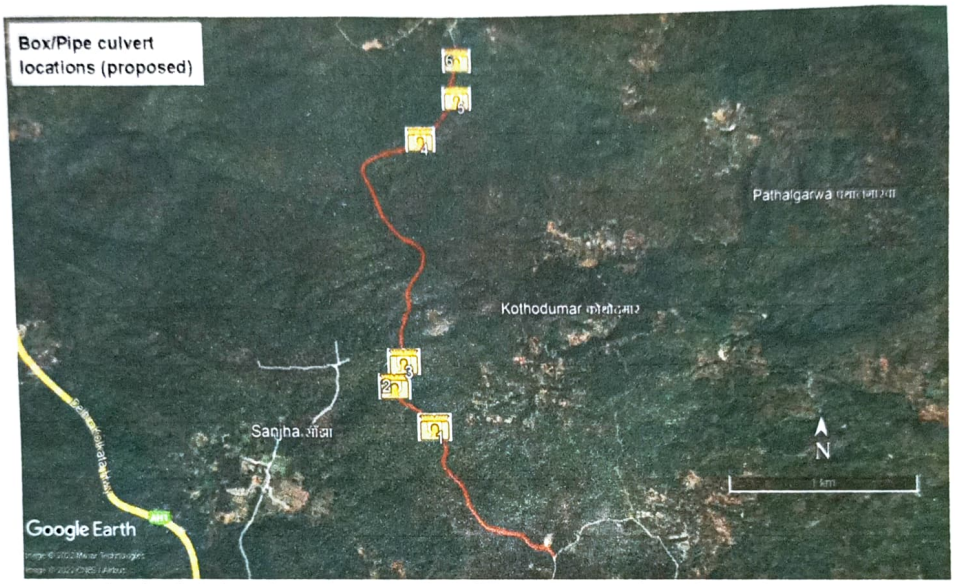

Figure 4: Six (06) locations along the PMGSY road where installing RCC box culverts of appropriate dimensions detailed above are proposed to allow water passage and wildlife movement

REFERENCES

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