



No. WII/RTI/CPIO/2022-23 (Qtr-IV)/81

To

Mr. Shivnarayan  
B-113, First Floor,  
Sarvodaya Enclave,  
South Delhi, Pin: 110017

Sub.: Information under RTI Act, 2005-reg.

Ref.: Your RTI No. WLIOI/R/E/23/00002 dated 23/01/2023

Sir/Madam,

Please refer to your application cited above under RTI Act, 2005. In this context, the information sought under RTI has been received from concerned authority/department on 09/02/2023 and the same is being sent as PDF to your registered email id [shivnarayanrajpurohit@gmail.com](mailto:shivnarayanrajpurohit@gmail.com) due to the large file size.

In case, you are not satisfied with the aforesaid reply, you may appeal to the Appellate Authority as per details given below within 30 days from the date of receipt of this letter.

Dean, FWS  
First Appellate Authority & Dean  
Address: Wildlife Institute of India, Chandrabani, Dehradun  
Phone No.: 01352646202

Thanking you,

Yours faithfully



[Dr. Manoj Kumar Agarwal]  
CPIO

**REPORT OF THE COMMITTEE CONSTITUTED BY THE MINISTRY FOR SITE INSPECTION AND HEARING OF STAKEHOLDERS AS PER THE DIRECTIONS OF STANDING COMMITTEE OF THE NATIONAL BOARD FOR WILD LIFE IN ITS 68<sup>TH</sup> MEETING HELD ON 30<sup>TH</sup> MAY, 2022**

**1. INTRODUCTION**

The project proposal for a new Broad-Gauge Railway-line from Hubballi to Ankola was under consideration at various stages since its announcement by the Ministry of Railway in 1997-98. The sequence of events and decisions related to the said project are as follows.

- The Ministry of Railway (South Western Railways-SWR) in September 1998 had requested Government of Karnataka (GoK) for diversion of forestland for construction of the line but the project failed to get clearance from the Central Empowered Committee (CEC) in the year 2006.
- Meantime, after laying of the foundation stone in May 2000, a part of project work in non-forest area from Hubballi to Kirwatti has been executed during the years 2002-06.
- After rejection of the clearance by the CEC, the proposal was again recommended by the GoK. The CEC again recommended rejection of the project in its report to the Hon'ble Supreme Court. Subsequently, the Hon'ble Apex Court transfer case to the Principal Bench of National Green Tribunal (NGT).
- Considering the project proposal, the NGT issued directions and disposed off the application vide order dated 10<sup>th</sup> February 2016 providing liberty to the project proponent to move the State Government by submitting an appropriate proposal for diversion of forest land for this project. The NGT also directed that if such application is moved, the State Government shall deal with it expeditiously and they would seek prior approval of MOEF in accordance with law and then depending upon the approval granted by MoEF&CC, the State Government in its own right would issue an appropriate order under section 2 of the Forest (Conservation) Act, 1980.
- Following directions of the NGT, a fresh proposal was submitted in April 2016 by further reducing the requirement of forest area from 667 ha to about 595.04 ha. In August 2016, the GoK recommended to the MoEF&CC for approval of diversion of the said forest land. In April 2017, a committee (Regional Empowered Committee) constituted by the

MoEF&CC inspected the proposed site and submitted its report. The Committee opined that the proposed railway line passes through the Western Ghats Biodiversity Hotspot and the Western Ghats World Heritage Site and Eco-sensitive Zone, and therefore a critical appraisal of the project from the wildlife conservation perspective needs to be done.

- Subsequently, a proposal for consideration of the Standing Committee of the National Board for Wild Life (hereinafter ‘SCNBWL’) for Hubballi-Ankola railway line project was received by the Ministry from the State Government of Karnataka in 2018 without recommendations of the State Board for Wild Life. The State Chief Wild Life Warden had recommended the proposal with the condition that the mitigation measures suggested in the study carried out by Indian Institute of Science (IISc), Bangalore, must be strictly implemented. The project involves diversion of an area of 595.64 ha of forest land for the construction of a new broad gauge railway line from Hubballi to Ankola for a length of about 161 km falling within Dharwad, Yellapura, Karwar and Dandeli Wildlife Division passing through elephant corridors, Eco-sensitive Zone and tiger corridors connecting Kali Tiger Reserve with Sharavathi Sanctuary in Karnataka

### **1.1 Consideration by the SCNBWL**

The proposal was placed for consideration of the Standing Committee of the National Board for Wild Life in its 48<sup>th</sup> meeting held on 27<sup>th</sup> March, 2018. Sequence of decisions and action after the meeting of the SCNBWL are mentioned as below.

- The SCNBWL decided that a committee comprising of one representative of the WII, one representative of the NTCA and one person from the Wildlife Division would visit the site and submit the report to the Ministry within 30 days for further consideration and this matter will be placed in the next meeting of the Standing Committee of NBWL.
- In the report submitted in August 2018, the Site Appraisal Committee of the NTCA had not recommended the project and mentioned in their report that the proposed Hubballi - Ankola broad gauge line passes through Uttara Kannada district which has very high forest cover and cuts across the Western Ghats, a biodiversity hotspot and a World Heritage Site. It also fragments the old migration path of Indian elephants. Out of the 6-tiger occupied landscapes of India, currently the Western Ghats landscape possesses the best habitat connectivity and contiguity. The tiger occupancy in the Western Ghats landscape is highly dynamic and shows spatial and temporal variation. Further, recent research highlights that the future of tigers in India depends on conserving the habitat connectivity between

isolated tiger populations of tiger reserves. In view of the aforementioned observation, the proposed railway line will be having significant negative impact on long-term conservation of tigers and other mega herbivores in the Western Ghats landscape by fragmenting existing habitat connectivity and contiguity.

- As the proposal was submitted without the recommendation of the State Board for Wild Life, it was decided in the 50<sup>th</sup> meeting of the Standing Committee of the National Board for Wild Life, held on 7.9.2018, to refer the proposal back to the State Government along with the reports of NTCA and the site inspection report. The State Government was advised to get the proposal examined by SBWL and submit the recommendations of the Board.
- Subsequently, the proposal was considered by the State Board for Wild Life in its 13<sup>th</sup> meeting held on 9.3.2020. Considering the loss of biodiversity and serious negative impact on the forests and Wild life, the SBWL, Karnataka rejected the proposal.
- However, in the 14<sup>th</sup> meeting of the SBWL held on 20.03.2020, the proposal was considered again and recommended the project for consideration by the SCNBWL.

## **1.2 Court cases**

- A Public Interest Litigation against the decision of the SBWL and the project proposal was filed in High Court of Karnataka which directed by order dated 18.06.2020 in W.P. No. 8067/2020 that no steps shall be taken on the basis of the minutes of the meeting of the State Board for Wild Life in which the proposal was recommended.

By daily order dated 1.12.2021 in W.P. Nos. 8181/2020, 8067/2020 and 2132/2020, the High Court of Karnataka directed as follows:

*This Public Interest Litigation relates to Hubballi-Ankola Broad-gauge Railway Line which is to be constructed in the Forest Area. There have been contentions by the rival parties relating to viability of the project and its effect on the wild life. It is submitted that the Karnataka State Board for Wild Life has retracted from its earlier decision and has recommended to the National Wild Life Board for reconsideration of its earlier decision. We understand that, the development work is to be carried-out. However, we have to assess the impact on the wild life and an endeavor should be made to protect the wild life. In order to find- out the impact of this development project on the wild life, we direct the National Board for Wild*

*Life to carry-out a survey over the area involved in the present cases and make an assessment of the effect of laying down of Hubballi-Ankola Board-guage Railway Line in the Forest Area involved over the wild life. The National Wild Life Board shall go through the various reports submitted by various Boards and Authorities, and for an independent assessment of the impact of the project on the wild life shall be made. The National Wild Life Board may involve the experts in making assessment, if it feels necessary. The report of the National Wild Life Board shall be submitted before the Court, by next date. List on 8th March, 2022.*

- On examination of the above order, certain questions of law were noticed by the Ministry of Environment, Forest and Climate Change and a Special Leave Petition (C) No. 005491 - 005493 / 2022 was filed by the Ministry in Hon'ble Supreme Court against the order dated 1.12.2021 of the High Court.
- On 29-04-2022, Hon'ble Supreme Court passed orders that the court is inclined to interfere with the interim order passed by the High Court in exercise of the jurisdiction under Article 136 of the Constitution of India. However, all questions are left open to be adjudicated by the High Court.
- The case came up for hearing in Karnataka High Court on 08.03.2022. The Court granted four weeks' time to file the statement of objections on behalf of the Ministry.
- The statement of objection was filed on 08.04.2022 on behalf of Ministry of Environment, Forest and Climate Change in High Court of Karnataka.
- On 20.04.2022, the matter was heard in the Hon'ble High Court of Karnataka. The Court directed as follows:

*It is hereby provided that the National Wildlife Board shall get necessary approval, if required, from the National Tiger Conservation Authority and under the Forest (Conservation) Act, 1980 and thereafter take appropriate decision in terms of the Court's order dated 01.12.2021. The earlier order dated 18.06.2020 shall not come in the way of the respondents in taking the said decision. The decision so taken shall be placed before the Court on the next date. List on 07.06.2022.*

On appeal of the Ministry of Environment, Forest and Climate Change in the Hon'ble Apex Court, the matter was heard by the Hon'ble Supreme Court on 29.04.2022. Hon'ble Supreme Court directed as follows:

*We are not inclined to interfere with the interim order passed by the High Court in exercise of the jurisdiction under Article 136 of the Constitution of India. The special leave petitions are, accordingly, dismissed. However, all questions are left open to be adjudicated by the High Court.*

As the Hon'ble High Court of Karnataka in their order that 20.04.2022 has mentioned that *the earlier order dated 18.06.2020 shall not come in the way of the respondents in taking the said decision*, the proposal for Hubballi - Ankola New Rail Line project was taken up for discussion by the Standing Committee of the National Board for Wild Life (SCNBWL) in its 68<sup>th</sup> meeting of held on 30.05.2022 under the Chairmanship of Hon'ble MEFCC. After detailed discussions, the SCNBWL decided that a Committee shall be constituted to examine the proposal.

### **1.3 Constitution of the Committee**

Based on the decision of the Standing Committee of the NBWL, the Ministry of Environment, Forest and Climate Change constituted the committee with the following composition vide Wildlife Division, Ministry's O.M. no. 1-99/2021 WL dated 03.06.2022:

|    |  |                 |
|----|--|-----------------|
| 1. | Additional Director General of Forests, (Forest Conservation),<br>MoEFCC | Member          |
| 2. | Dr. H. S. Singh, Member, SCNBWL  | Member          |
| 3. | Dr. R. Sukumar, Member, SCNBWL   | Member          |
| 4. | Representative of Director, Indian Institute of Technology,<br>Dharwad   | Member          |
| 5. | Representative of Director, Wildlife Institute of India,<br>Dehradun     | Member          |
| 6. | Representative of Director General, IFCRE, Dehradun                      | Member          |
| 7. | Deputy Inspector General of Forests (Wildlife), MoEFCC                   | Member Convenor |

Terms of Reference (ToR) of the proposed Committee as per the O.M. are as follows:

- i. The Committee shall make field visit and carry-out a survey over the area involved;
- ii. The Committee shall make an assessment of the effect of laying down of Hubballi-Ankola Board-gauge Railway Line in the Forest Area involved over the wild life;

- iii. The Committee shall go through the various reports submitted by various Boards;
- iv. The Committee shall hear public representatives, non-governmental organisation and other stakeholders who wish to present their views on the project;
- v. The Committee may, if it feels necessary, co-opt any expert for making assessment of the project;
- vi. The Committee shall submit its report within two and half months from the date of issue of this Office Memorandum.

The Chief Wild Life Warden, Karnataka was requested to facilitate the visits, meetings etc. of the Committee in Karnataka as may be required as per the ToR of the Committee.

## **2. FIELD VISITS**

### **2.1 Site Inspection**

The Committee met for deliberations and discussions based on the ToR on 16.06.2022 and the documents were shared with the committee members by the Ministry. The committee decided to carry put field inspections and hearing of stakeholders between 13<sup>th</sup> and 17<sup>th</sup> July, 2022. However, due to incessant rains in the region, the field visit was postponed. Thereafter, the committee carried out field inspections and hearing of stakeholders from 27<sup>th</sup> to 29<sup>th</sup> September 2022 as detailed below:

| <b>Date</b> | <b>Particulars</b>  |
|-------------|---|
| 27-09-2022  | Introduction to the Hubballi Ankola Rail Project (HARP) by the officers from South-West Railways to the committee members |
|             | Field visit to the proposed Hubballi-Ankola Railway project areas/sites in Ankola and Yellapur Taluks                     |
|             | Discussion at Ramanguli FRH   |
|             | Field visit (continued) to Hubballi-Ankola Railway project areas/sites in Ankola and Yellapur Taluks in the afternoon.    |
| 28-09-2022  | Meeting with the stakeholders of Hubballi Ankola Railway project at District Commissioner's office, Karwar                |
|             | Field visit (continued) to Hubballi-Ankola Railway project area in Kirwatti Taluk in the afternoon.                       |



|            |  |
|------------|--|
|            | Journey to Dharwad and stay  |
| 29-09-2022 | Meeting with the stakeholders of Hubballi Ankola Railway project at DC office, Dharwad.  |
|            | Internal discussions, deliberations among Committee members, including way forward and tasks/responsibilities to complete the report |





As a part of exercise to make an assessment of the effect of laying down of Hubballi-Ankola Board-gauge Railway Line in the forest area involved over the wild life as per ToR(ii), the members of the Committee met with key SWR officials to have discussions and to gather relevant information. In this connection, the officials of SWR made presentation to the Committee on 27<sup>th</sup> September 2022 giving salient details. The proposed railway alignment options including the structures such as viaducts/bridges, tunnels etc. was presented considering the environmental aspects. The presentation covered:

- a) brief details of project evolution including four alternate alignment proposals reducing the forest cover required, loss of trees and increasing the lengths of viaducts/bridges and tunnels,
- b) advantages of railways over roadways in respect of air pollution, carbon footprint and energy efficiency in transport of goods and people,
- c) potential for habitat fragmentation,
- d) environmental impact of the project, including suggested mitigation measures and
- e) railway operational control.

A copy of the presentation made by the SWR is placed as **ANNEXURE I**

The members of the Committee also went through reports submitted by various boards and in addition relevant state-of-the art literature as per ToR(iii).

Subsequent to this presentation by SWR officials, the members of the Committee made site visit and surveyed the locations as given in Table-1 below (as per ToR (i)) for better and holistic understanding of overall scenario with respect to the natural landscape and the transportation needs of the region. The Committee also had interactions with the stakeholders as per the ToR (iv).

**Table-1: Locations visited/inspected/surveyed by the Committee on 27.09.2022 & 28.09.2022**

| <b>Spot No.</b> | <b>Railway<br/>Kilometrage</b> | <b>Village</b> | <b>Local Name</b> | <b>Forest<br/>Range</b> |
|-----------------|--------------------------------|----------------|-------------------|-------------------------|
| 1.              | 161/400-500                    | Bogribail      | Baleguli Cross    | Ankola                  |

|    |             |           |                       |            |
|----|-------------|-----------|-----------------------|------------|
| 2. | 155/200-300 | Navagadde | Chemical Factory Road | Ankola     |
| 3. | 135/900-000 | Sunksal   | Kotepal Road          | Mastikatta |
| 4. | 107/600-700 | kalache   | Talke bailu           | Idagundi   |
| 5. | 92/800-900  | Telangeri | Shelemane             | Idagundi   |
| 6. | 121/700-800 | Arabail   | Chitge bailu          | Idagundi   |
| 7. | 60/900-000  | Kirwatti  | Domgeri               | Kirwatti   |
| 8. | 57/100-200  | Kirwatti  | Lndiranagar           | Kirwatti   |

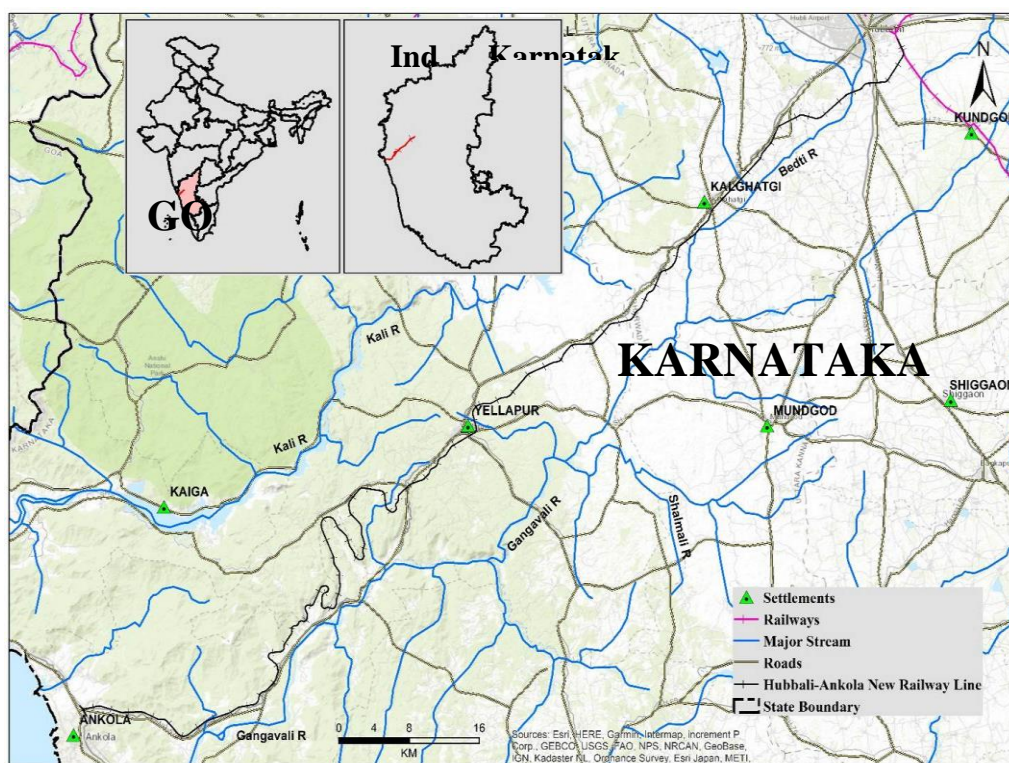


### 3. DESCRIPTION OF THE PROJECT

#### 3.1 About the Project

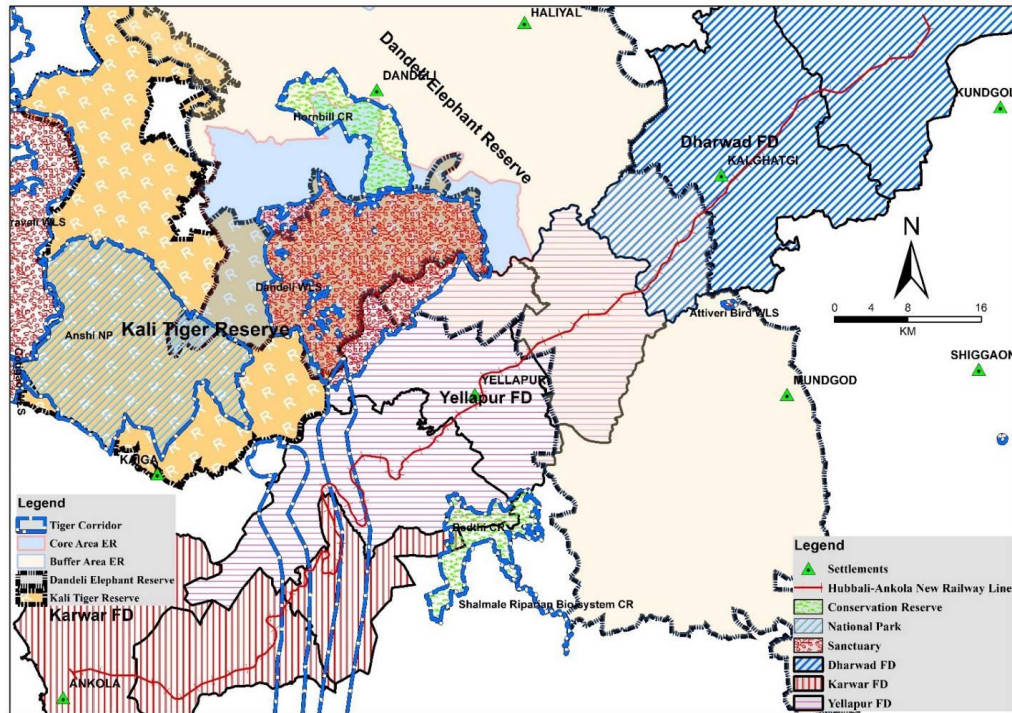
In response to decisions and action by the competent authorities, the Hubballi-Ankola Railway Project was modified time to time during the last two and half decades. Presently, the proposed Hubballi-Ankola new railway line in Karnataka comes under the jurisdiction of South Western Railways (SWR) and passes through the UNESCO World Heritage Site, Global Biodiversity Hotspot and notified (draft) Ecologically Sensitive Area (under the Environment Protection

Act, 1986), the Western Ghats. The new railway line is proposed to pass through three forest divisions, namely, Dharwad (46.97 km), Yellapur (55.78 km) and Karwar (59.01 km) forest divisions. The forest land required in these Divisions is 42 ha in Dharwad, 304.06 ha in Yellapur and 249.58 ha in Karwar forest divisions. The railway line will connect the taluks of Hubballi (Dharwad district) and Ankola (Karwar Taluka of Uttara Kannada district), via major towns, namely, Kalghatgi (Dharwad district) and Yellapur (Karwar Taluka of Uttara Kannada district). The details of the Forest Divisions (Range-wise) is provided in Table-I. The project area in the forest for which the proposal has been submitted to the Ministry for consideration by the Standing Committee of the National Board for Wild Life is 595 ha.



**Map 1: Location of Hubballi-Ankola new railway line project.**





**Map 2: Hubballi-Ankola new railway proposed project plan area distributed between through three divisions- Dharwad, Yellapur and Karwar forest divisions, Dandeli Elephant Reserve and Tiger corridors- Affected by new railway project.**

**Table I: - Division wise details of the passage (km) of proposed new railway line**

| Forest Division    | Dharwad FD   | Karwar FD    | Yellapur FD  | Grand Total(km) |
|--------------------|--------------|--------------|--------------|-----------------|
| <b>Dharwad FD</b>  |              |              |              |                 |
| Hubballi R         | 16.57        | -            | -            | 16.57           |
| Kalghatgi R        | 30.40        | -            | -            | 30.40           |
| <b>Karwar FD</b>   |              |              |              |                 |
| Ankola R           | -            | 9.70         | -            | 9.70            |
| Mastikatta R       | -            | 24.49        | -            | 24.49           |
| Ramanguli R        | -            | 21.59        | -            | 21.59           |
| <b>Yellapur FD</b> |              |              |              |                 |
| Idagundi R         | -            | -            | 31.73        | 31.73           |
| Kirwatti R         | -            | -            | 14.44        | 14.44           |
| Yellapur R         | -            | -            | 12.84        | 12.84           |
| <b>Grand Total</b> | <b>46.97</b> | <b>55.78</b> | <b>59.01</b> | <b>161.76</b>   |

#### **4. SEQUENCE OF ACTIONS BEFORE CONSTITUTION OF THE COMMITTEE BY SCNBWL**

##### **4.1 Proposal under the Forest (Conservation) Act, 1980**

The Government of Karnataka vide their letter No. FEE237FGL2002 dated 29.11.2003 had forwarded a proposal to Ministry of Environment and Forests, New Delhi for diversion of 965 ha. of forest land for construction of Hubballi-Ankola new Railway line in favour of South Western Railways. The site inspection of the above project was undertaken on 27.03.2004 by DCF (Central) and the report was sent to Ministry on 15.04.2004. The then Regional Office had not recommended the proposal as the project would destroy prime forest of Western Ghat region.

The Forest Advisory Committee had considered the proposal and recommended for rejection. Based on the recommendations of the Forest Advisory Committee, the Ministry of Environment and Forests, New Delhi vide letter No.8-134/03-FC dated 11.06.2004 also rejected the proposal on merit.

The Ministry vide letter dated 05.11.2004 had informed the State Government that the user agency made a presentation of the project before the FAC on 25.10.2004 and after consideration of the same, the committee directed the user agency to critically revise the proposal in consultation with CCF (Central), Bangalore and try to reduce the requirement of area and submit a revised proposal for construction of railway line from Hubballi to Kalghatgi. Erstwhile Regional Office, MoEF&CC, Bangalore) vide its letter dated 06.12.2004 requested the Chief Engineer, (Construction) to furnish the revised proposal in the prescribed proforma with all the requisite annexures. It was also requested to furnish a map showing the existing and proposed rail links from Bellary-Hospet section and a map showing the road links put to use for iron ore transport from Bellary-Hospet sector and to take measures to comply with the contents of MoEF's letter dated 05.11.2004.

Thereafter, the User Agency sent several letters mentioning that their revised requirement of forestland is 744.66ha. However, no proposal in the prescribed format with mandatory certificates and undertakings was received. The Ministry vide its letter No.8-134/2003-FC

dated 08.03.2007 had requested the erstwhile Regional office, Bangalore to organize a joint inspection involving the officers of State Government and Railways on the revised proposal.

The State Government vide letter dated 28.01.2008 had forwarded a proposal to Integrated Regional Office, Bangalore for diversion of 5.015 ha of forest land in Dharwad division for construction of new broad gauge railway line from Hubballi to Kalghatagi. In Part-I of the proposal, it was mentioned that the total requirement of forestland for the project is 720 ha. and in Phase-I, they require 5.015 ha. Of forestland, i.e. Hubballi to Kalghatgi railway line.

The Ministry vide letter No.8-134/2003-FC dated 29.02.2008 had requested the Railway Board to formulate a comprehensive proposal for diversion of forestland showing the total alignment of the railway line. Later on, the State Government vide letter dated 09.06.2008 had submitted a revised proposal for diversion of 683.63ha. of forestland in Yellapura and Karwar Divisions for the proposed Hubballi to Ankola Railway line. A site inspection of the area was carried out by Regional Office on 04.08.2008 and a report was submitted on 07.10.2008. It was informed that the revised proposal submitted by the State Government of Karnataka is not a complete one as advised by the Ministry and the proposal submitted by them for the Canara Circle is no different from the earlier proposal in respect of alignment of track. Therefore, Regional Office, Bangalore reiterated the stand taken earlier while forwarding the site inspection report to Ministry vide letter dated 15.4.2004. It was also recommended that regarding diversion of forest land sought in Dharwad Circle, the Ministry might consider the same favourably as extent of forest land required is only 5.015 ha. and does not involve felling of trees, subject to clearance from CEC. The State Government vide letter dated 09.07.2009 had furnished a copy of the proposal dated 30.12.2008 addressed to MoEF, New Delhi for diversion of 720 ha. of forest land to Regional Office, Bangalore.

The Ministry vide letter No.8-134/2003-FC dated 08.12.2009 constituted a team consisting of ADGF, MoEF, RCCF, Bangalore and Chief Wild Life Warden, Karnataka to inspect the site. The Committee had conducted the site visit on 28.12.2009 and submitted a report to MoEF, New Delhi.

The Ministry vide letter No.8-134/2003-FC dated 22.09.2010 had informed the State Government that the Forest Advisory Committee (FAC) held on 21.07.2010 has considered the site inspection report of the Committee under the Chairmanship of ADGF and recommended



to request the State Government to submit a diversion proposal *for only 5.015 ha. of forest land* for new Broad gauge line from Hubballi to Kalghatgi. It was also informed that this diversion of forest land should be independent and separate and should not be a part of the revised proposal involving 720ha. of forest land.

#### **4.2. Application before the Central Empowered Committee**

An Application No.952 of 2006 was filed before the Central Empowered Committee (CEC) by Parisara Samrakshana Kendra and Wilderness Club against the diversion of forest land falling in the ecologically sensitive Western Ghats in the State of Karnataka for laying the new 168.289 KM Broad Gauge Railway Line from Hubballi to Ankola. The CEC after site inspection of the area had filed a report before the Hon'ble Supreme Court. In the said report, CEC had taken a view that it may be appropriate that the Hon'ble Supreme Court may consider directing the MoEF not to consider/approve the proposal for the diversion of 965 ha. of forest land (subsequently revised to 720 ha. and then to 667ha) falling in Dharwad, Yellapur and Karwar Forest Divisions in the State of Karnataka for construction of the new Hubballi-Ankola Broad Gauge railway line and which was earlier rejected on merit by the MoEF on 10/11/06/2004. However, considering that (a) the track between Hubballi-Kalaghatgi in Dharwad Forest Division involves diversion of 5.015 ha. of forest land lying on the fringe of the forest and that as per the Contingent Plan prepared by the railways the project is viable even by commissioning in stages and that the proposal sent by the State Government to the MoEF seeking approval under the Forest (Conservation) Act, 1980 for the diversion of the said forest land has been recommended by the Regional Office of the MoEF, the CEC is also of the view that the MoEF may be granted liberty to take a decision on merit on the said proposal provided the Ministry of Railways confirms that the construction of the above said portion of the railway line is commercially viable even if the diversion of the forest land for the balance portion of the Hubballi-Ankola railway line is not permitted.

This case was subsequently transferred to the National Green Tribunal (NGT), Principal Bench, New Delhi as per the orders of Hon'ble Supreme Court. The Hon'ble NGT after considering the report of CEC, vide order dated 10/02/2016 has disposed of the Application with liberty to the project proponent to move the State Government by submitting an appropriate proposal for diversion of forest land for this project. The Hon'ble NGT has also directed that if such Application is moved, the State Government shall deal with it expeditiously and they would

seek prior approval of MoEF in accordance with law and then depending upon the approval granted by MoEF, the State Government in its own right, would issue an appropriate order under Section-2 of the Forest (Conservation) Act, 1980. The orders so passed by the State Government shall operate for period of four weeks and shall be immediately put on the website in accordance with the rules. If there is a challenge to the order granting permission for diversion of forest land for non-forest activity in favor of Project Proponent, the record of this file shall be tagged to that Application

In pursuance of the Hon'ble National Green Tribunal, 2<sup>nd</sup> respondent vide letter 24/10/2016 addressed to 7<sup>th</sup> respondent submitted proposal for diversion of 595.64 ha. of forest land in Karwar, Yellapura & Dharwad Division for construction of New Broad Gauge Railway Line of Hubballi Ankola in favour of the Deputy Chief Engineer, Construction-I, South Western Railway, Club Road, Keshwapur, Hubballi. The said proposal was redirected to Regional office by MoEF&CC, New Delhi for consideration.

After initial scrutiny of the proposal State Government was requested to furnish RoFR compliance certificate vide Regional office letter dated 01.02.2017. The State Government vide their letter dated 15.04.2017 has furnished the requested RoFR certificates.

Regional office, Bangalore vide OM dated 19/04/2017 had constituted a committee comprising of Dr. C. Dyavaiah, IFS (Retired), Dr. Avinash. M. Kanfode, CF(C) and Shri. Ashok. B. Basarkod, CCF, Canara Circle to carry out the site inspection of the proposed area. The site inspection of the area was carried out by the Committee from 22/04/2017 to 24/04/2017.

The proposal was considered in the Regional Empowered Committee (REC) held on 05/05/2017. The REC after examination of the proposal and the site inspection report of the Committee constituted by Regional office vide OMNo.4-KRA 1101/2016-BAN/2293 dated 19/04/2017, decided to seek the following from the State Government/User agency:

- **Objectives of the project:** The current objectives for proposing the railway line were asked to be spelt out clearly for examining the project on similar lines as the set objectives.

- **Cost benefits analysis:** A detailed cost benefit analysis is required which also should include the cost involved in transport through alternate routes and also by alternate modes of transport.
- **Enumeration of trees:** The Committee which has gone for Site Inspection observed that in Dharwad division, the tree enumeration was done during 2005 and it requires fresh enumeration for ascertaining the number of tree species, its girth class and species composition. Re-enumeration is also required to be done in respect of forest areas proposed in Karwar and Yellapur divisions as the sampling intensity is poor as per that enumeration. As stratified random sampling in different forest types and densities is suggested with GPS reading of the plot center.
- **Compensatory Afforestation:** The State Government should firm up their stand whether they prefer unbroken revenue lands of Kudremukh project which are surrendered to Government (about 2,500 acres) or same degraded forest land for taking up CA.
- **Comments onsite inspection report by the user agency:** The user agency is requested to give their detailed comments on various issues raised by the Committee during site inspection of the project area.
- **Detailed presentation of the project:** The User agency is required to make power point presentation on the various aspects of project before REC during next meeting covering technical, financial, ecological and hydrological aspects.

After receipt of requisite information from State Government and user agency, proposal was again considered in the REC meeting held on 10/07/2017. The REC after detailed deliberations on all issues had decided to recommend for in principle approval of the project subject to the fulfilment of the following conditions: -

- a. The user agency has to strive for increasing the number of tunnels (from suggested 25) and viaducts.
- b. User agency should revise mitigation plan in consultation with the Forest Department including more number of under passes.
- c. It is seen that the alignment passes through Bedthi Conservation Reserve, Hornbill Conservation Reserve, overlapping Buffer Zone area of Anshi-Dandeli Tiger Reserve and Elephant Corridors. User agency should submit appropriate proposal for consideration by the Standing Committee of National Board of Wildlife.
- d. Hard copies of the enumeration list of trees to be felled to contain species-wise, girth-wise details which shall be submitted by the Karnataka Forest Department.

- e. The Compensatory Afforestation scheme to be prepared in detail clearly mentioning the degraded area or other revenue land surrendered by Kudremukh Project (during the meeting, it is noted that State Government was in the process of getting hose lands for CA at the earliest).

Accordingly, State Government had been requested vide letter dated 11/07/2017 to take necessary action to comply with the conditions stipulated by the REC and report to Regional office for further action in the matter.

Based on the information received from Government of Karnataka vide dated 17/08/2017, the proposal was again placed before REC which was scheduled on 29/08/2017. REC deliberated in detail about the clarifications submitted by the State Government. REC noted that user agency had submitted the proposal for wildlife clearance, and requested the State Government to pursue the same and intimate further developments in the said application to the Regional Office within 3 months' period. REC also opined that as the project is located in the Western Ghats Region, an important biodiversity hotspot, a critical appraisal of the project from the wildlife conservation prospective needs to be done.

## **5. OBSERVATIONS OF THE SC-NBWL COMMITTEE**

Based on the previous scientific reports, scientific publication, report of the Centre for Ecological Sciences, Indian Institute of Science, Bangalore, and field observations of the committee members, some basic facts and findings of the committee are discussed in this section.

### **5.1 : Importance of the Western Ghats and its Protected Areas**

The Western Ghats running in a north-south direction close to the west coast of peninsular India are an important geological landform and much older than the Himalaya. The Ghats are the origin of Godavari, Krishna, Cauvery and a number of other rivers and extends over a distance of approximately 1500 kilometre from Tapti river in the north to Kanyakumari in the south with an average elevation of more than 600 metre asl and traverses through six States, namely, Gujarat, Maharashtra, Goa, Karnataka, Kerala and Tamil Nadu that is interrupted only by the 30 km Palakkad Gap at around 11°N.



The Western Ghats region is a global biodiversity hotspot (recognized as one of the world's eight 'hottest hotspots') harbouring many endemic species of flowering plants, fishes, amphibians, reptiles, birds, mammals and invertebrates and is also an important center of evolution of economically important domesticated plant species such as pepper, cardamom, cinnamon, mango and jackfruit.

A number of flagship mammal species occur in the Western Ghats, including parts of the single largest population of globally threatened 'landscape' species such as the Asian Elephant, Gaur and Tiger. Endangered species such as the lion-tailed Macaque, Nilgiri Tahr and Nilgiri Langur are unique to the area. Western Ghats has many unique habitats which are home to a variety of endemic species of flora and fauna such as Myristica swamps, the flat-topped lateritic plateaus, the Shola forests and grasslands, and wetlands and riverine ecosystems. The forests of the Western Ghats include some of the best representatives of non-equatorial tropical evergreen forests in the world. The Western Ghats contain exceptional levels of plant and animal diversity and endemism for a continental area. In particular, the level of endemism for some of the 4-5,000 plant species recorded in the Ghats is very high: of the nearly 650 tree species found in

the Western Ghats, 352 (54%) are endemic. Animal diversity is also exceptional, with amphibians (up to 179 species, 65% endemic), reptiles (157 species, 62% endemic), and fishes (219 species, 53% endemic). Invertebrate diversity, once better known, is likely also to be very high (with some 80% of tiger beetles endemic). The region is also key to the conservation of a number of threatened habitats, such as unique seasonally mass-flowering wildflower meadows on plateaus, montane *shola* forests and grasslands, and *Myristica* swamps.

At least 325 globally threatened (IUCN Red Data List) species occur in the Western Ghats. The globally threatened flora and fauna in the Western Ghats are represented by 229 plant species, 31 mammal species, 15 bird species, 43 amphibian species, 5 reptile species and 1 fish species. Of the total 325 globally threatened species in the Western Ghats, 129 are classified as Vulnerable, 145 as Endangered and 51 as Critically Endangered. Although the Western Ghats only make up 180,000 km<sup>2</sup>, or little less than 6% of India's total land area, they are home to more than 30% of the country's plant, fish, herpetofauna, bird, and mammal species. The region is home to 67 percent of the endemic fish species and 50 percent of the endemic amphibian species in India. Around 30% of the world's Asian elephant (*Elephas maximus*) population and 17% of the remaining tigers (*Panthera tigris*) population are found in this region.

The Western Ghats not only harbour rich biodiversity, but also support a population of approximately fifty million people and include areas of high human population density and, therefore, there is a need to conserve and protect the unique biodiversity of Western Ghats while allowing for sustainable and inclusive development of the region.

The Western Ghats's high montane forest ecosystems greatly influence India's monsoon weather pattern and moderates the tropical climate of the region. Vast areas of Western Ghats fall under a number of protection regimes, ranging from Tiger Reserves, National Parks, Wildlife Sanctuaries, Conservation Reserves and Reserved Forests and are subject to stringent protection under laws including the Wild Life (Protection) Act of 1972, the Indian Forest Act of 1927, and the Forest Conservation Act (1980). Through these laws the forests and protected areas area are under the control of the State Forest Departments and the Chief Wild Life Wardens, ensuring legal protection.





UNESCO has included certain identified parts of Western Ghats in the UNESCO World Natural Heritage List.

### **5.2 Elephant population and distribution in the project region**

Elephant distribution in southern India has its northern most limit in recent historical times in northern Karnataka, where the species was spread in the districts of Uttara Kannada and Belgaum. During the 1980s, the northern Karnataka region held an isolated population of about 50 elephants mainly in the forests of Dandeli. This population was genetically similar to the elephant population further south in the Mysore Elephant Reserve, thus indicating a recent break in the distribution along the ghats. Since about two decades ago, the elephants of this region began to expand their range by moving northward into southern Maharashtra as well as further southward into Karnataka. The causes for this movement or dispersal have not been studied and therefore remain speculative. Even today, the estimate of the elephant population of this region is not robust, though it is expected to be about 50-100 individuals.

On the other hand, the distribution of elephants is better documented through preparation of maps depicting villages where conflicts between elephants and agriculture are known. During the 1980s, the presence of elephants in the forests along the Hubballi to Yellapur and beyond to Ankola was virtually unknown (with the population confined to the north of the highway), but the southward movement of elephants has established the presence of elephants to a considerable distance in the Kanara and Dharwad Forest Circles. This widespread distribution of elephants also may indicate that the once-isolated population in northern Karnataka may now be experiencing gene flow with the much larger population in the Mysore Elephant Reserve in southern Karnataka. This aspect however requires further study.

In March 2015, the Karnataka Forest Department declared a second Elephant Reserve for the state, namely, the Dandeli Elephant Reserve spread over an area of 2321 sq. km in the districts of Uttara Kannada, Belgaum, Haveri and Dharwad.

During the field visit, the frontline forest staff informed the committee of elephants sighted along the present highway from Yellapur to Ankola, mostly on the plateau region closer to the town of Yellapur. Apart from a few bull elephants, they reported the crossing of a herd of 9 elephants and another of 13 elephants. These elephants would presumably also move across the proposed railway line which is aligned roughly parallel to the highway.

### **5.3 Tiger habitat, their movement and corridors**

Kali (Dandeli-Anshi) Tiger Reserve comprises Dandeli Wildlife Sanctuary and Anshi National Park and covers 1,306 km. It was declared a Tiger Reserve in the year 2007. It lies in Uttara Kannada district of Karnataka between latitude 14° 57' 23.04" N; longitude 74° 15' 7.56" East and latitude 15° 9' 56.16" North; longitude 74° 43' 10.56" East. The tiger habitats around Dandeli-Anshi span about 5,000 km of deciduous and semi-evergreen forests, together with seven additional nearby protected areas in Karnataka, Goa, and Maharashtra. The Kali Tiger Reserve itself also harbours more than 200 species of birds like the Ceylon frogmouth and the Asian fairy bluebird, and many species of hornbills like great hornbills, Malabar pied hornbills, Malabar grey hornbills, and Indian grey hornbills.

This tiger population block, which includes the Koyna Wildlife Sanctuary, Chandoli National Park, Radhanagri Wildlife Sanctuary, and the forests of Sindhudurg, is the northernmost boundary of the Western Ghats population. The prey base is low in this area, but once it is

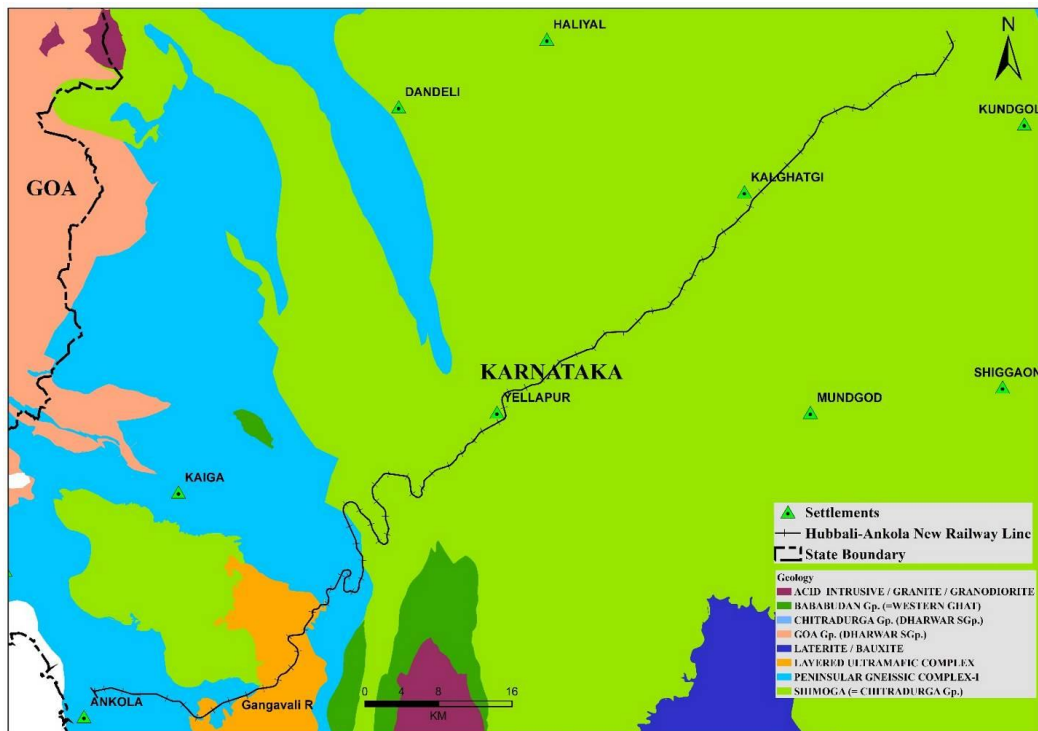
restored, the tiger population could rebound. The tiger habitats of Goa, which are adjacent to Kali Tiger Reserve in Karnataka, are connected to Sahyadri Tiger Reserve and Radhanagari Wildlife Sanctuary. Currently there are 30 tigers in Kali TR as mentioned by the Field Director of Kali TR, suggesting that this may be a source population of tigers in this region. Changes in habitat quality within and around the corridors are correlated with mining activities (around the Mollem, Kulem, and Malpon forest ranges in Goa), agricultural growth (around the Chandgad, Sawantwadi, Kankavali, Kurang, Pachal, and Amba forest ranges in Maharashtra), and highways. State Highways of Maharashtra (116, 277, 111), National Highways (4A, 204), and State Highway 4 of Goa all pass through the corridors at various points; hence appropriate wildlife passageway needs to be constructed for smooth movement of the wildlife in the region. Around well-known tourist destinations in the corridors (such as the forested regions of Amboli, Radhanagri, and Chandoli), significant land-use change is also evident (Status of Tigers 2018).

From the Dang forests in Gujarat to the Palakkad Gap in Kerala, and then again from the Parambikulam-Anamalai complex to the Periyar-Kalakad-Mundanthurai-Kanyakumari complex, the Western Ghats topography has the ability to support continuous tiger occupation. The Nagarhole-Bandipur-Sathyamangalam-BRT-Mudumalai-Wyanad population, which is spread throughout the three states of Karnataka, Tamil Nadu, and Kerala, is the most significant source population in this environment. Despite possessing suitably broad habitat patches, the other sources have rather low tiger densities, and their cores are concentrated within Protected Area complexes. These populations are Kudremukh, Bhadra, Anshi, and Dandeli north of the Palakkad Gap, and Kalakad-Mundanthurai, Periyar, and the Parambikulam-Anamalai complex are located south of the Palakkad Gap.

Tigers in Goa, Maharashtra and Karnataka uses this corridor that the railway line will cut through. The tiger corridor is separated by two corridor patches. Hubballi-Ankola proposed new railway line passes through this crucial tiger corridor, to an overall extent of 38.52 km. The proposed rail line passes through the tiger corridor connecting Dandeli-Anshi Tiger Reserve with the Sharavathy sanctuary. Therefore, the consideration by the Standing Committee of the National Board for Wild Life as per section 38O (1) (g) of the Wild Life (Protection) Act, 1972 along with the advice of National Tiger Conservation Authority is mandatory.

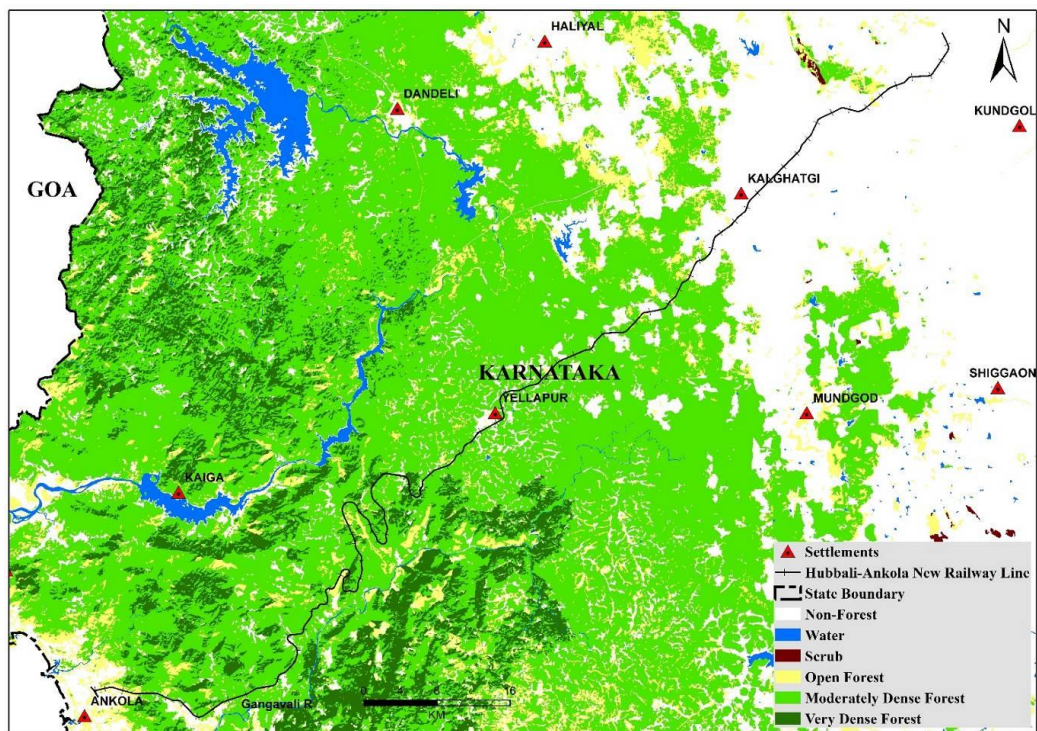
#### 5.4 Terrain Analysis

The proposed railway line will be descending from MSL of 637 m at Hubballi to MSL of 15 m at Ankola. The tunnels, viaducts, bridges and cuttings have been planned in the project to get reasonable slopes (1:100) for railway track to maintain high speed of the trains. The terrain analysis of new railway proposed line project geospatial layer's prepared for the study is Geology, DEM (Drainage, Slope, Aspect and Contour). The geospatial layers prepared using ArcGIS 10.6.

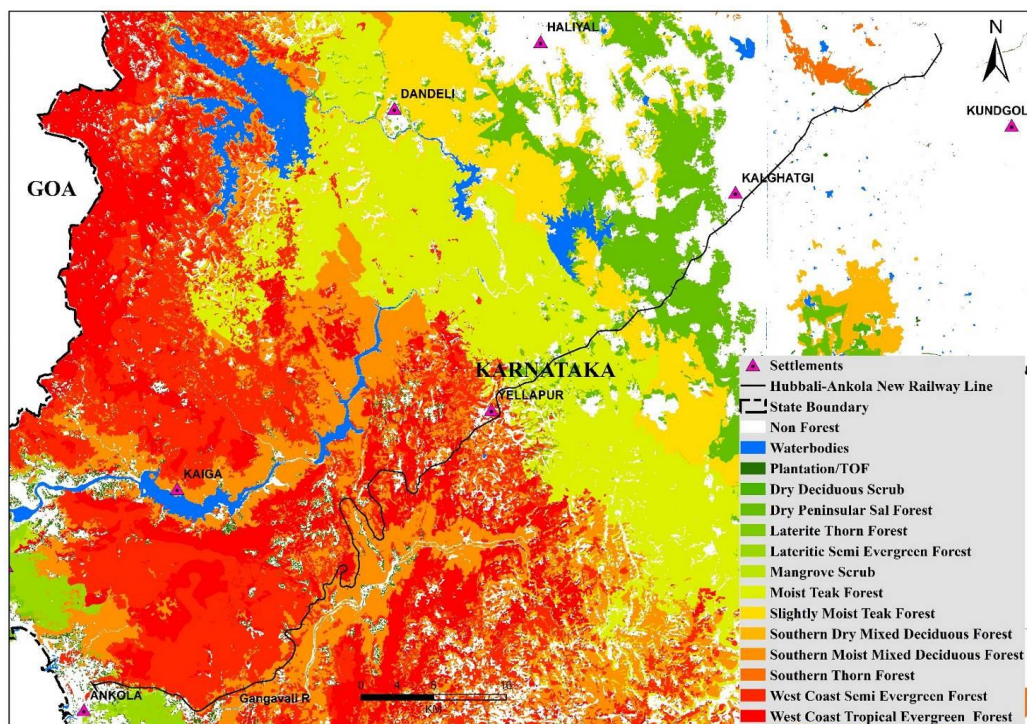


Map 3: Geology of Hubballi-Ankola new railway line (Source: GSI <https://bhukosh.gsi.gov.in/Bhukosh/MapView.aspx>))





**Map 4: Forest cover map (source: Forest Survey of India)**



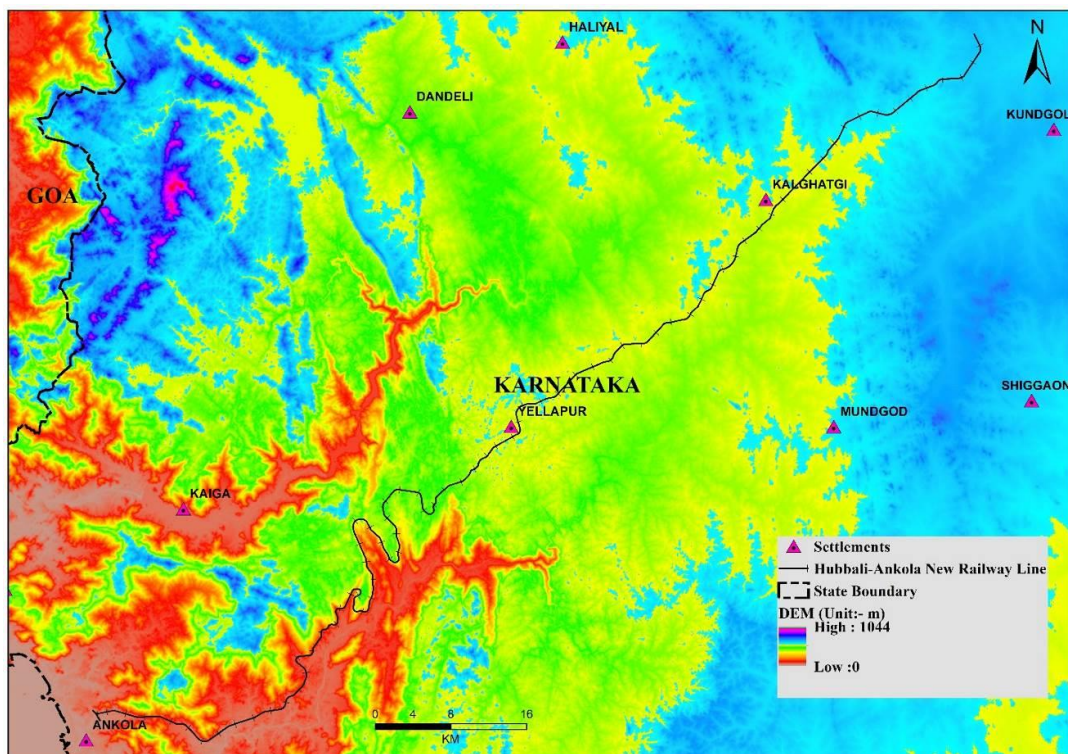
**Map 5: Forest type map (Source: Forest Survey of India)**

## 1. DEM

The SRTM (Shuttle Radar Topography Mission) was used to generate digital elevation data with a resolution of 1 arc-second for the United States and 3 arc-seconds for global coverage. Using the SRTM DEM analysed elevation and drainage network. This analysis was done using ArcGIS 10.6.

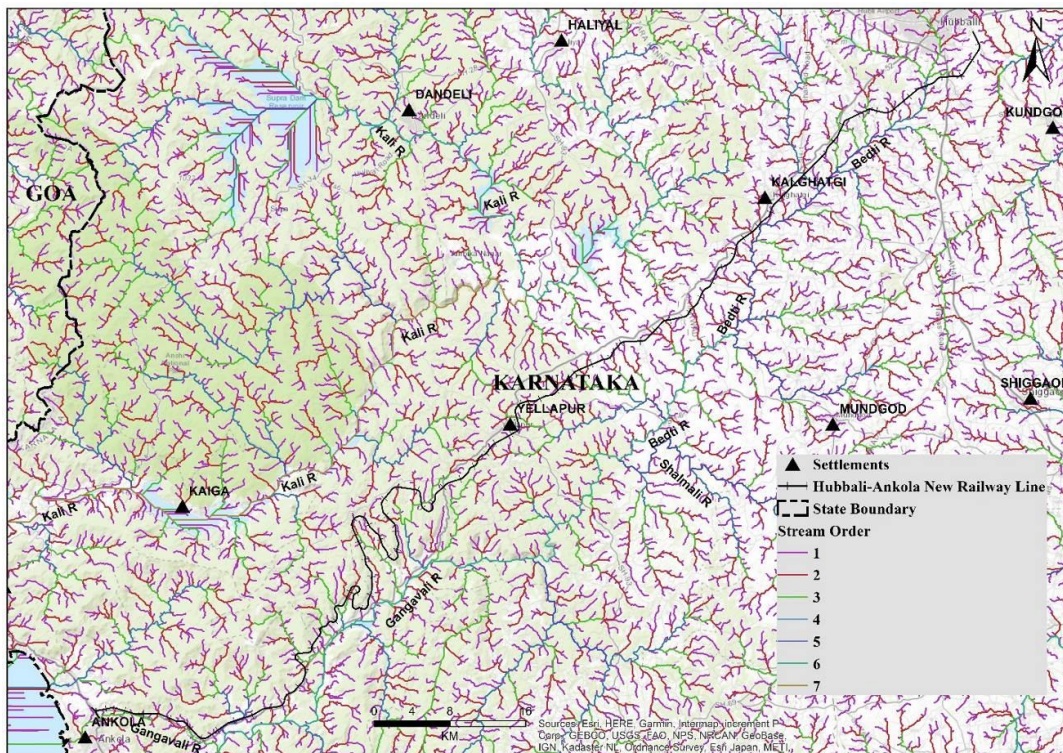
Elevation: - The terrain of the Hubballi-Ankola new railway line project is rough and undulating - typical of the larger ecoregion that it is a part of - with altitudes ranging from 6m to 643m (asl) map 6.

Drainage Network: - Drainage network prepared using SRTM DEM 30m resolution. The new railway line project passes over (119 Stream) the major tributaries of river Gangavali and river Bedti. The major stream order falls under the railway line 1<sup>st</sup> order (77), 2<sup>nd</sup> order (26), 3<sup>rd</sup> order (12), 4<sup>th</sup> and 5<sup>th</sup> order each (2) map 7.

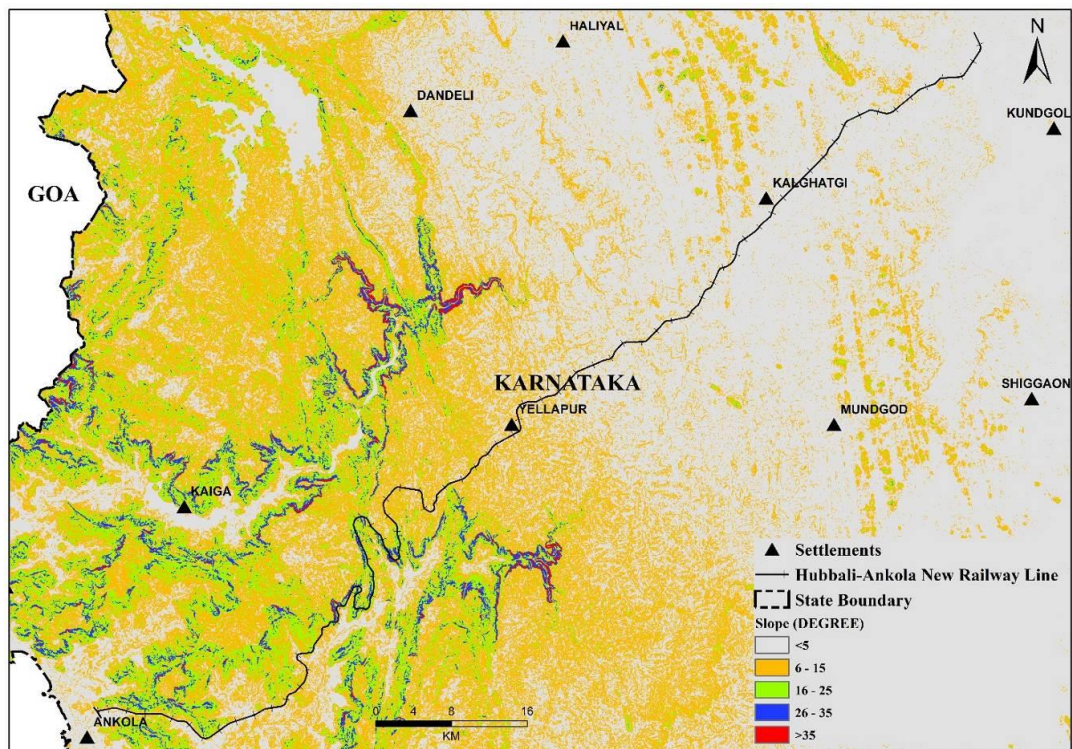


Map 6: SRTM DEM map (30m resolution) (source: USGS Earth Explorer)



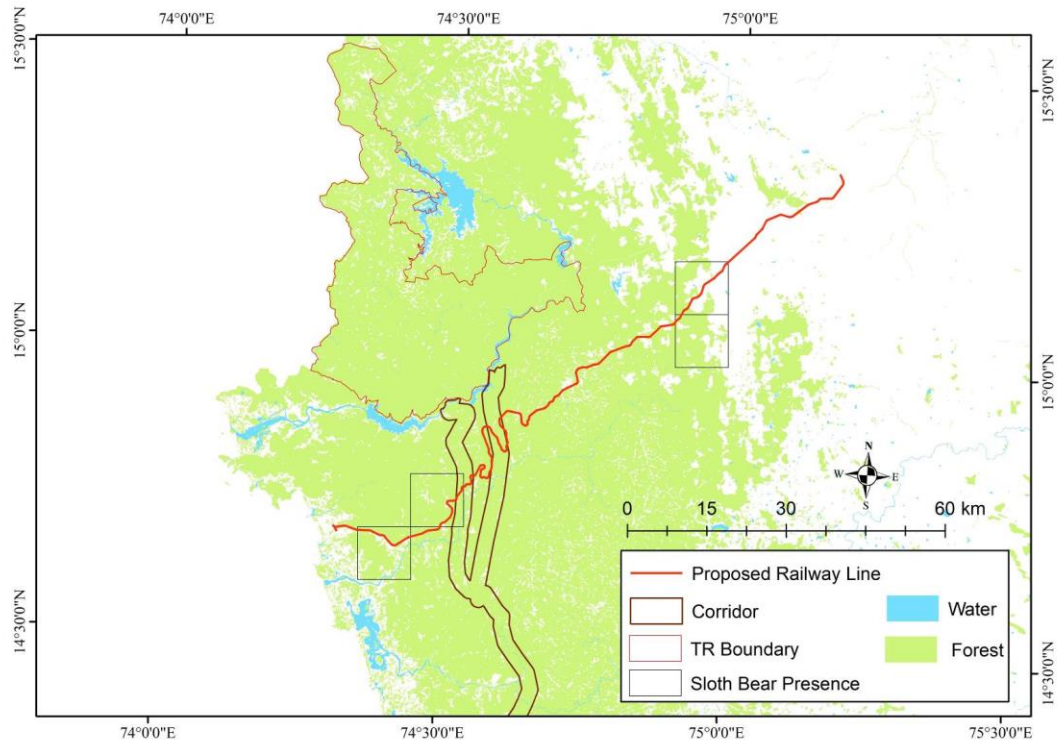


Map 7: Drainage Network map prepared using SRTM DEM 30m resolution

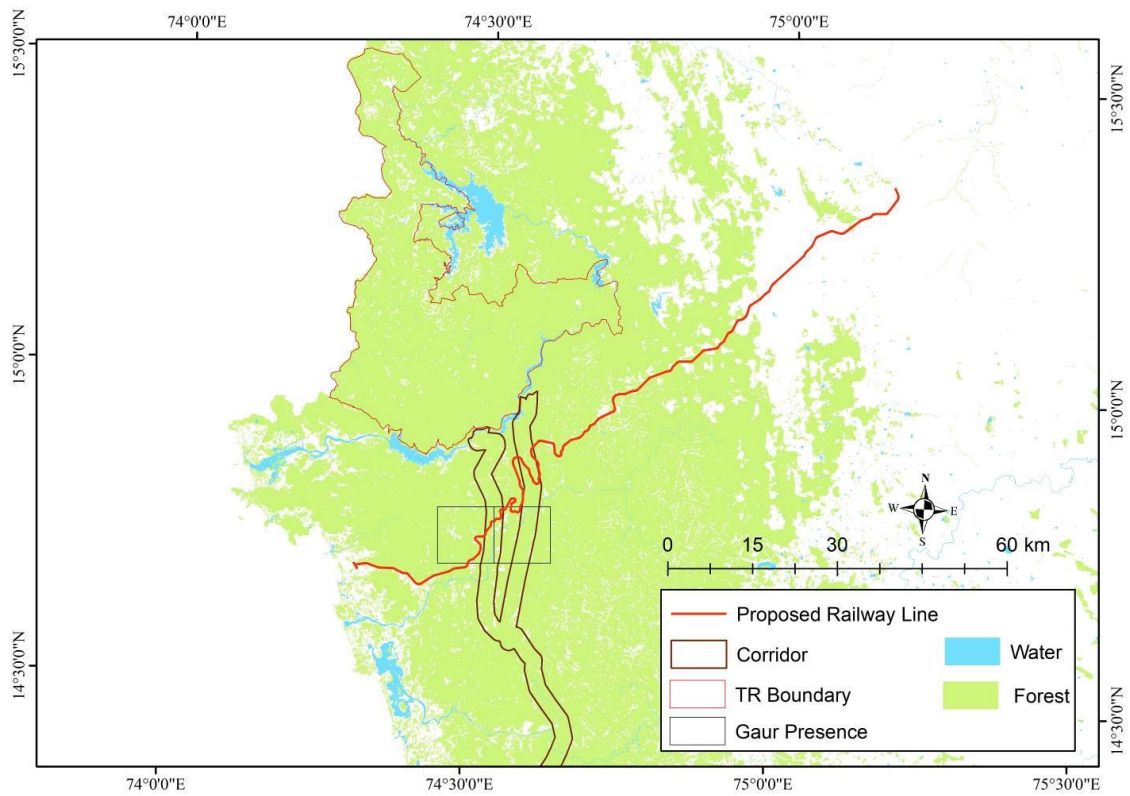


Map 8: Slope map prepared using SRTM DEM 30m resolution

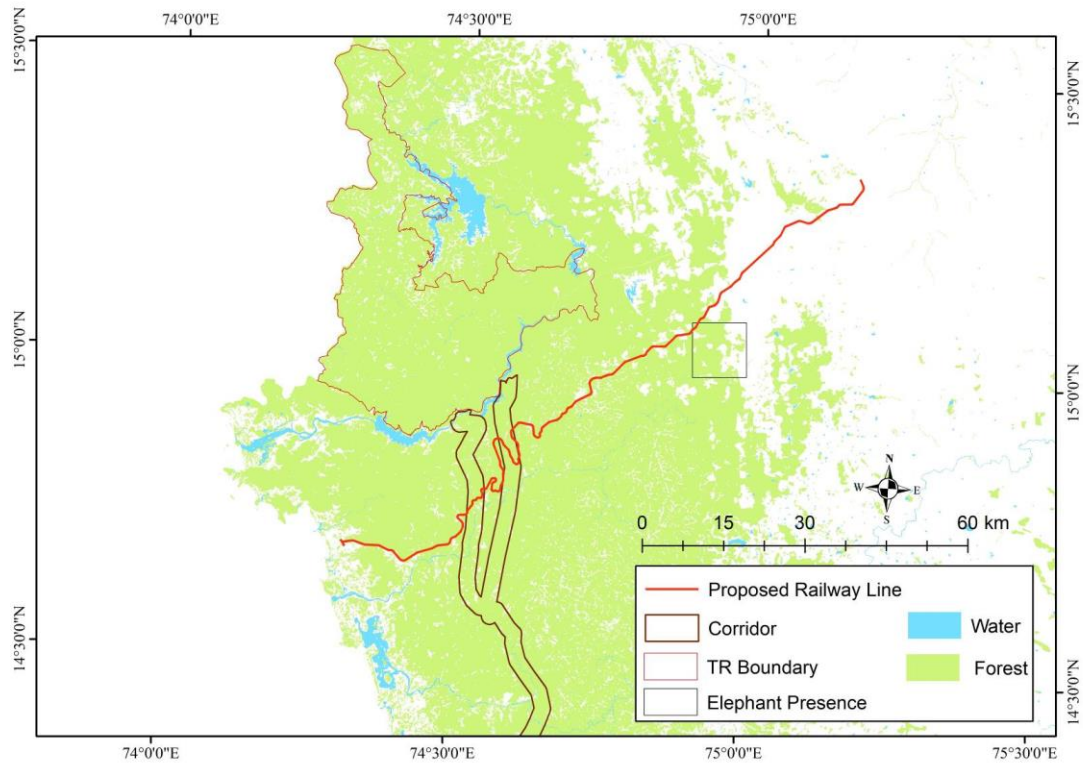




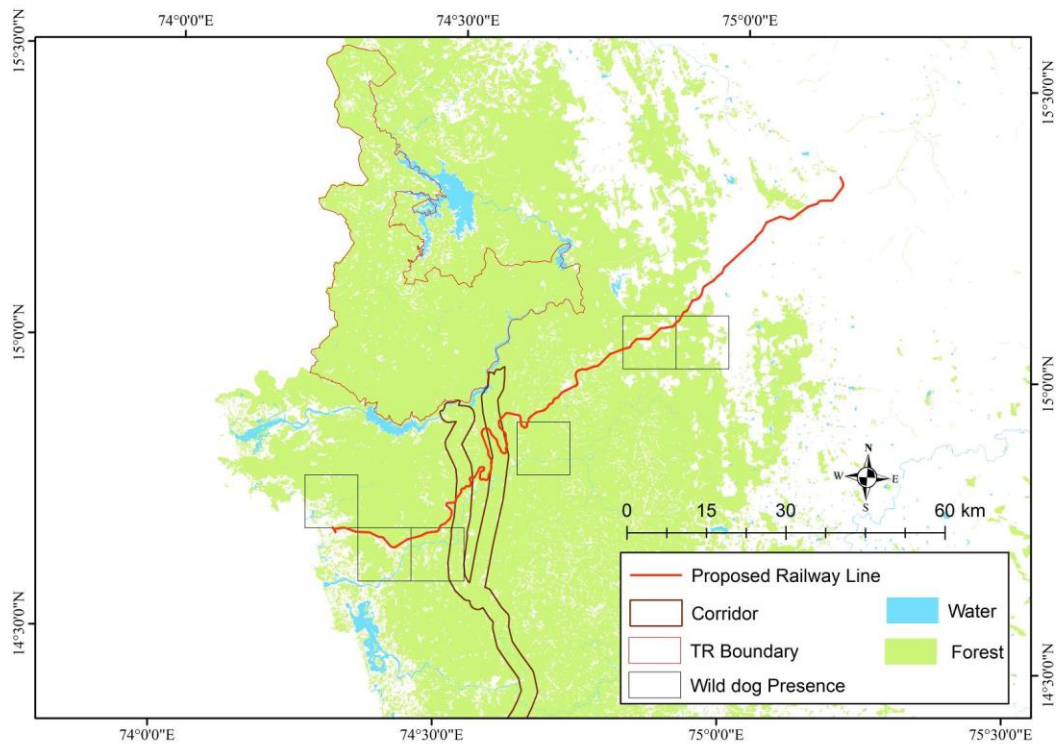
Map 9: Critical areas for sloth bear presence in the proposed railway line alignment



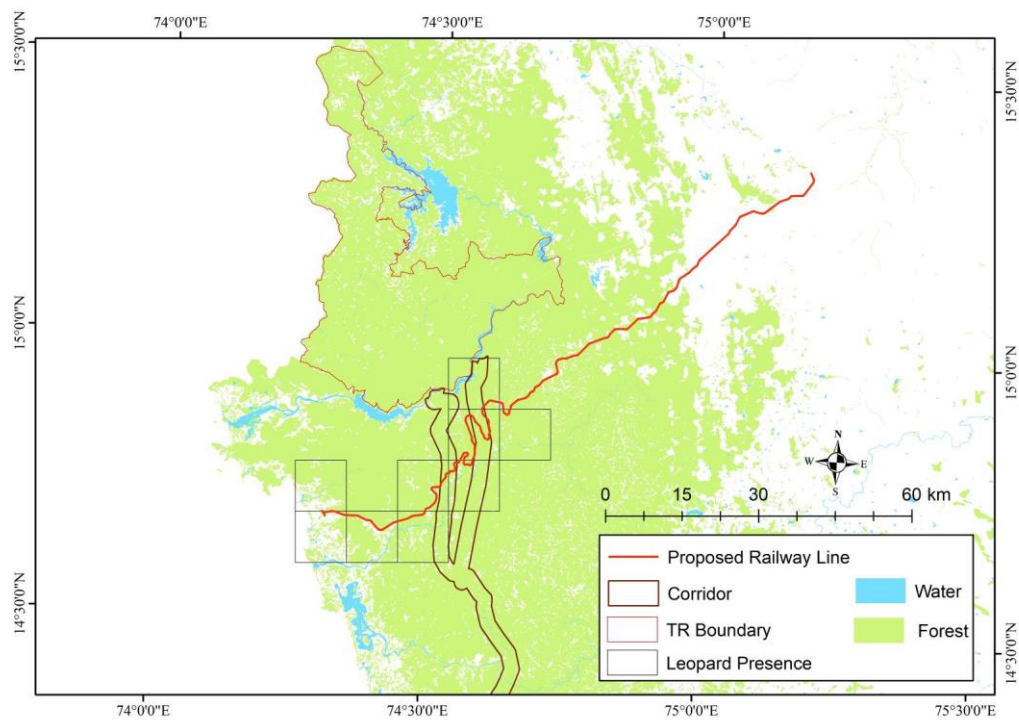
Map 10: Critical areas for gaur presence in the proposed railway line alignment (Source: All India Tiger Estimation 2018)



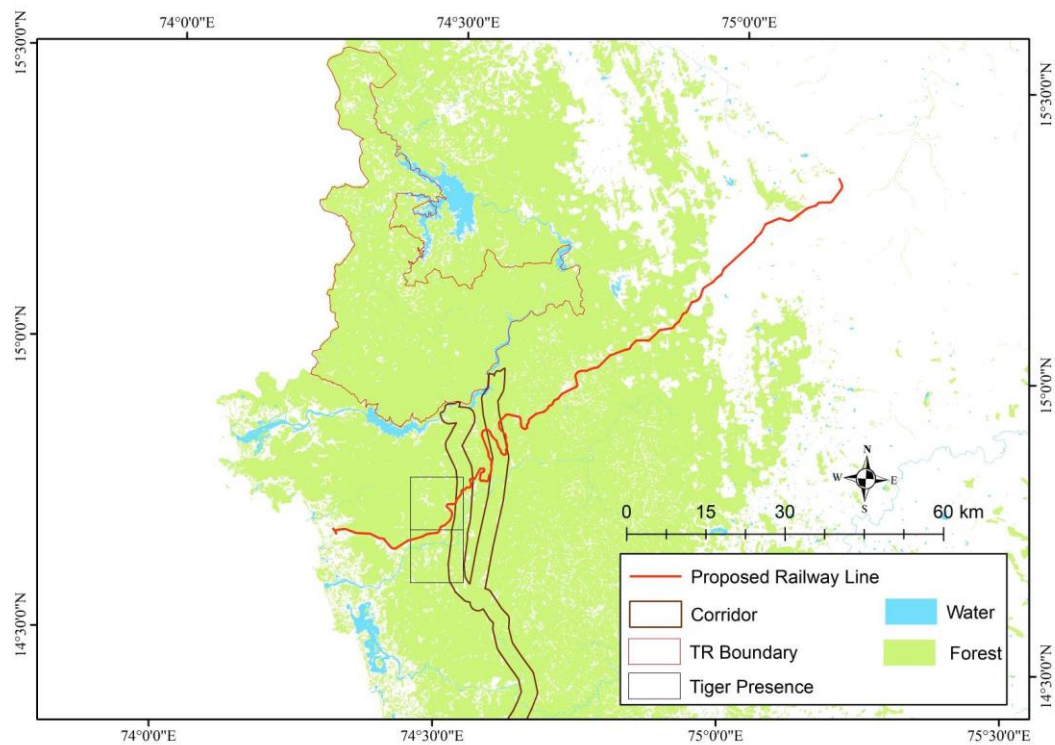
Map 11: Critical areas for elephant presence in the proposed railway line alignment (Source: All India Tiger Estimation 2018)



Map 11: Critical areas for wild dog presence in the proposed railway line alignment (Source: All India Tiger Estimation 2018)

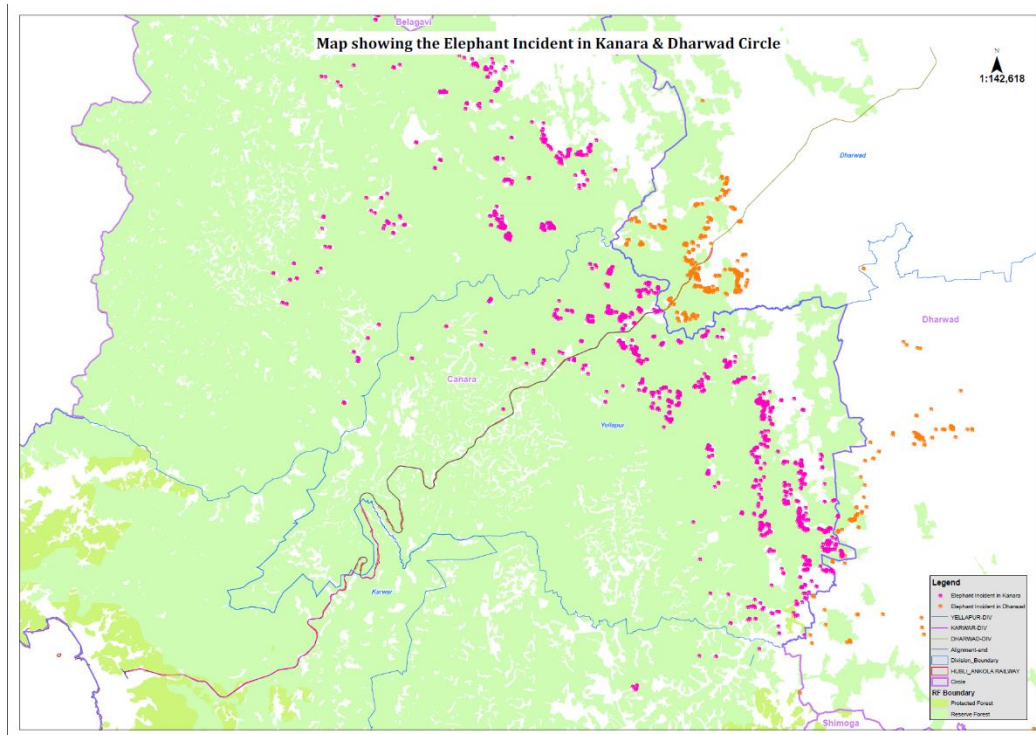


Map 12: Critical areas for leopard presence in the proposed railway line alignment (Source: All India Tiger Estimation 2018)



Map 13: Critical areas for tiger presence in the proposed railway line alignment (Source: All India Tiger Estimation 2018)





Map 14: Critical areas for recent human-elephant conflicts in the proposed railway line alignment (Source, Forest Department, Government of Karnataka)

### 5.5 Preliminary Assessment on Post-disaster Landslide Studies in Uttara Kannada District, Karnataka (Report on the State Unit of Karnataka and Goa)

The preliminary site-specific landslide investigation was carried out in affected taluk places of Uttara Kannada district. The landslide-affected area, in particular, falls in parts of Survey of India toposheet nos. 48I/08, I/12, J/05, 48 J/09 & J/10 respectively which comes in the administrative boundary of Sirsi, Yellapur, Karwar, Ankola, Supa, and Dandeli taluks of Uttara Kannada. The area exposes rocks belonging to Peninsular Gneiss-I of PGC, Chitradurga Group of Dharwar Supergroup of Archaean age, and basic intrusives of Palaeoproterozoic age. The major part of the area is made up of Chitradurga Group of rock constituting Shimoga schist belt, resting unconformably over granitic gneisses of PG-I with the Goa belt to the western parts and the North Kanara belt to the eastern parts. PG-I is represented by granitic gneiss and migmatitic gneisses.

Based on the Landslide Susceptibility map generated on a 1:50,000 scale, the susceptibility condition of the hill slope was analysed and studied. According to the landslide susceptibility map of Uttara Kannada district, about 3.7% of the area falls in High, 25.8% in Moderate, and 70.5% in Low landslide susceptible zones. The spatial overlay of the landslide incidences on

the landslide susceptibility map generated on the 1:50,000 scale indicates that landslides took place in a moderate to a high susceptible zone. The landslide occurred on a moderately steep 25-35° slope angle covered with thick overburden of soil varying between 5-10m and >10m.

The field-based observations and causative factors associated with landslide incidences were recorded for 32 locations at places in Sirsi, Yellapur, Dandeli, and Karwar taluks of Uttara Kannada district, Karnataka, based on 42 points geo-parametric landslide inventory datasheet. The datasheets included the parameters like location of incident, Area affected, volume and dimension of debris, type and rate of movement, geo morphology, land use / land cover, factors involved for such incidents, geology of the area, loss due to landslide, scientific cause and remedial measures.

Mostly the landslides were deep earth and debris flows/slides and a few are rock slides of translational and rotational in nature. Hydrological condition of all the landslide area was wet in nature and geology was of Granite Gneiss type. Geomorphology of the affected areas was moderate dissected slope and had a coverage of either agriculture, forest or plantation. No human and property loss were reported due to such incidence.





Instability of slope caused due to heavy rainfall has been referred as the main reason for landslides incidence. The landslides are triggered during monsoon due to reactivation of sub-surface and palaeo-stream channels due to heavy water infiltration and water recharge in the basin. Rainfall patterns during the South -West monsoon period from June to September 2021 were studied and analysed for Sirsi, Supa, Yellapur, Ankola, Dandeli, and Karwar taluks of Uttara Kannada districts to understand the role of rainfall in triggering major landslides in a single day. As per the record of rainfall data, it is observed that heavy rainfall is received in Sirsi, Supa, Yellapur, and Ankola, Dandeli, and Karwar taluks of Uttara Kannada district on 23rd July 2021. The area experienced 300mm rainfall in 2 consecutive days and this antecedent rainfall triggered a huge landslide in Kalache village in Yellapur taluk, Uttar Kannada district. During heavy incessant rainfall conditions, the excessive water discharge in damaged canals constructed on upslope for irrigation purposes caused excessive water infiltration, seepage, and oversaturation of the slope. Thus, the rise in the hydrostatic head of saturated slope lead to an increase in unit mass and stress that built high pore water pressure and reduced the effective cohesion of slope forming material. Further, the overflowing nala/ stream at the toe part further disturbed the natural slope stability by removing toe support as a result of toe erosion and undercutting of soil in an adjoining hill slope. The material property i.e. water retention capacity of oxidized magniferous clay-rich soil on the slope built high pore water pressure and increased the unit mass of slope forming material that further reduced the effective cohesion and shear strength of slope forming material leading to shear failure of slope mass in over water-saturated conditions. Further, the vertical excavation of the slope disturbed the original slope geometry. The exposed cut slope naturally paved a new pathway for water seepage and saturation of highly weathered rock and soil occurring as an overburden material, resulted in shear failure of slope-forming material.

## **5.6 Ecological assessment of the impact of Railways and considerations for designing of projects**

Transportation in the twenty first century will have to deal with the increasing needs of human development in a society aware of the need of environmentally friendly practices. Railway networks are expected to play a major role in economic development and, simultaneously, in the mitigation of the pernicious impacts of climate change (Smith 1998, 2003).

However, a better understanding of the ecological effects of railways is needed because the global rail network is extensive and are extending and/or increasing the capacity of their railway networks.

Designing and constructing railway line and establishing an ecologically-sustainable transportation system within a forest area and terrain as challenging as the Western Ghats requires a significant amount of information that is based on scientific and engineering investigations and calls for reliable and sustainable technological interventions. It also requires careful study and consideration of various options, examination of viability of options including multi-mode transport and optimal routing keeping ecological considerations. Traffic counts are needed for all directions. Current information regarding timing and pre-emption is also needed to be sure no other methods of transportation are possible. Data and information including the survey collection, etc. are essential to arrive at possible outcomes. The entire investigation should consider proximity to livestock, wildlife, flora fauna, vegetation, etc. in the analysis. The design of such a railway system also requires useful data such anticipated peak hour volumes, geometry, available right-of-way, topography, turning movements, and pedestrian volumes. Compared to roads, relatively little is known about the ecological effects of railways on wildlife. Railways and roads are frequently co-aligned in the same corridor, but most road ecology projects ignore parallel railways due to land ownership issues, road-specific funding or perceptions that railway impacts are negligible. Railway ecology is an emerging discipline (L. Borda-de-Água et al. 2017).

Railway tracks and trains can negatively affect wildlife and the environment in ways similar to roads and vehicles (including wildlife mortality, habitat loss and fragmentation), but the degree of these impacts may differ. Railways impact wildlife in characteristic ways that are not well understood. Wildlife–train collisions are a multifactor problem. Mitigation options exist but some are more proven than others. Many of the solutions developed for roads can probably be applied successfully to railways, but in some cases, new approaches and technologies are needed. Although roads and railways have similarities, they also differ in many respects, which can strongly influence their impacts. There can be five main differences (L. Borda-de-Água et al. 2017):

- i. traffic flow (the number of trains or vehicles) is much lower on railways than on roadways,
- ii. railway traffic flow is characterized by long traffic free intervals,
- iii. railways have lower wildlife mortality when both networks are compared,

- iv. railway corridors are narrower than those of roads, and
- v. the impact of vehicles, the most important source of chemical pollutants, is lower in railways because of inherent technological efficiency, and because many trains have electric engines. These differences have led some authors to suggest that railways are less impacting than roads in some respects on the environment (Heske 2015; Godinho et al. 2017; Borda-de-Água et al. 2017). For instance, a high-speed railway corridor occupies less surface than a highway, because it has narrower right of way. In addition, records of wildlife vehicle collisions are sometimes lower on railways (Heske 2015), possibly influenced by their lower traffic flow (if we compare infrastructures of similar category, for instance, high speed train vs. highway) and, consequently, common traffic free intervals. However, as railway network is less developed (Pérez-Espona et al. 2008; Yang et al. 2011), comparisons of wildlife collisions between roads and railways should be related to kilometers of track/road or to kilometers driven. Railways produce less pollutants than roads, as many trains have electric engines (Silva Lucas et al. 2017). Although railways and roads have several similarities, some impacts are railway specific. For instance, noise and vibrations produced by trains are considerably higher, but of shorter duration, than those produced by cars, trucks, buses, etc. (Silva Lucas et al. 2017). There can be four main types of impacts of railways on wildlife, namely Mortality, Barrier effects, Habitat loss and fragmentation, and Disturbance (Barrientos and Borda-de-Água 2017; Carvalho et al. 2017; Lucas et al. 2017; Santos et al. 2017). As these impacts are often interrelated, their distinction is not always clear.

Animal mortality on railways often occurs due to Wildlife Train Collisions (WTCs) (Santos et al. 2017), but also through electrocution or collisions with wires or bridges (Rodríguez et al. 2008; Dorsey et al. 2015; Godinho et al. 2017). The irregular traffic flow is probably one of the most important drivers influencing the mortality risk (Dorsey et al. 2015). Apparently, the existence of lapses of time without traffic allows animals/wildlife to start crossing bridges, eventually becoming trapped when the train arrives. Resource availability associated to the railway corridor, and how animals use these resources, are also key determinants of mortality rates (Malo et al. 2017).

We need a better understanding on barrier and fragmentation effects of railways alone and of potential synergetic effects with those of other linear structures such as roads or power lines.

Accordingly, we need to know whether wildlife passes are effective to restore functional connectivity, not only if they allow crossings of individuals.

We need to know whether current mortality and barrier effects threaten population survival in the long run or if, on the contrary, their impacts are negligible to the population persistence (van der Grift 1999; Dorsey et al. 2015). In the case of the proposed Hubballi-Ankola railway line, the potential for collisions with animals such as the elephant (Roy and Sukumar 2017), tiger and other species is important to evaluate.

## **6.0 Gaps/Discrepancies in the Project Proposal**

In the interest of safe-guarding ecology of the Western Ghats, a development project proposal should incorporate all measures which minimise its impact.

Following are short comings/gaps for mitigating environment impact of the project:

- (i) No mention of temporary roads for transport of heavy machineries, vehicles, construction materials and over burden:** The proposed railway line has to pass through area full of rugged terrain, minor valleys, waterfalls and dense forests in the plains and mountainous Western Ghats. The area under the proposal supports different types of forests including evergreen, semi-evergreen, moist deciduous and dry deciduous with high canopy density. Execution of the project will result into massive excavation, cuttings and alternation of earth profile in the hilly terrains. The project proposal is silent about the temporary approach roads in the forests, which may be necessary in some areas for implementation of the project. This may cause additional damage of forests and flora and fauna therein. The following points are important to assess the quantum of excavation and transport, disruption of earth mass and needs for temporary approach roads for the operation.
- Out of 161.76 km proposed railway track, 108 km falls in the dense and diverse forests. The forests along the proposed railway track in the Western Ghats include some of the best representatives of tropical evergreen forests anywhere. It includes a diversity of ecosystems ranging from tropical wet evergreen forests to semi-moist forest containing numerous medicinal plants, important genetic resources and endemic fauna. Level of endemism is exceptionally high in the Western Ghats. Implementation of the project

will have impact on the environment which governs hydrology, forests, biodiversity and sensitive endemic species therein.

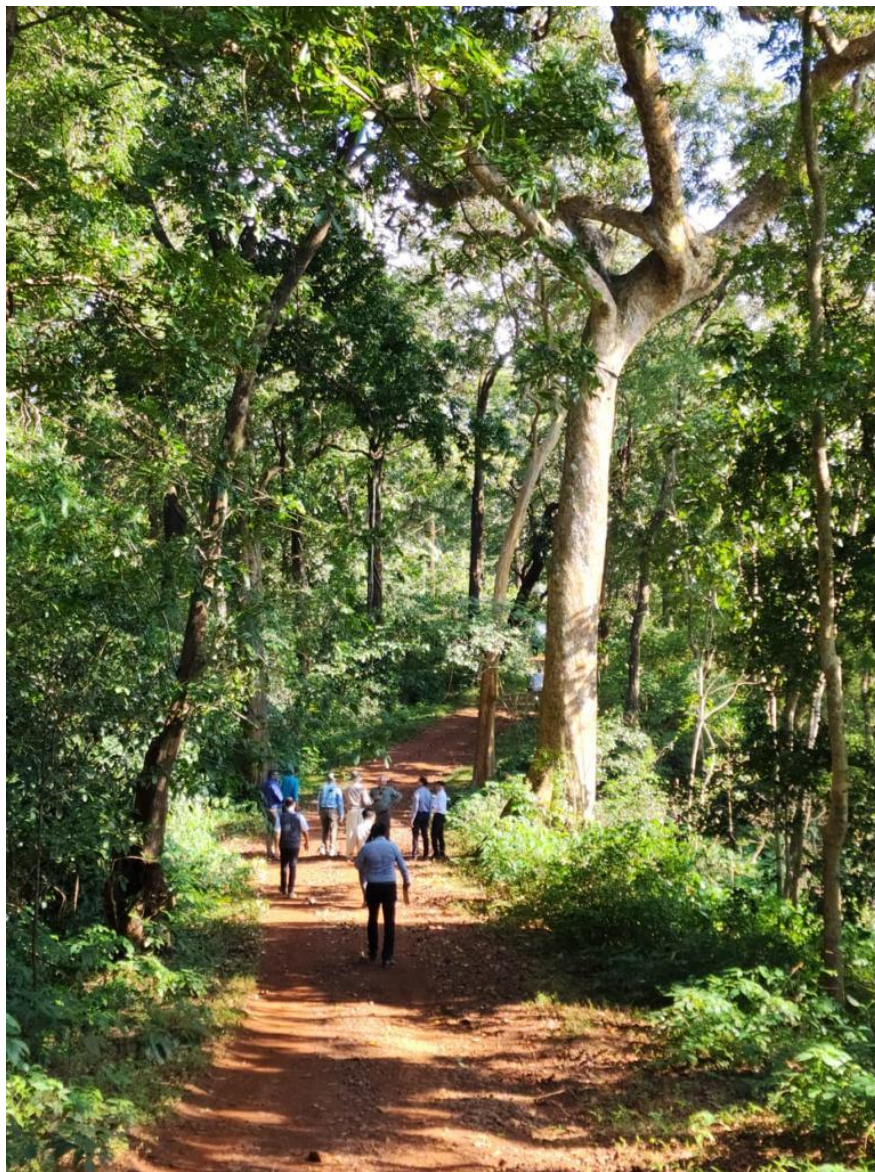
- Regeneration status and under canopy growth indicate health and richness of the forests. Site inspection reveals that, in a substantial part of the strip proposed for clearing forests along the proposed track, the numbers of young and established trees and woody vegetation below 30 cm GBH are more than marked trees having GBH above 30 cm.
- For the project, four alternative alignments were examined, and alternative II (Alt-2), which has minimum length and involves relatively less forest area, has been selected for the final proposal. **The other alternative alignments (Alt 1, Alt 3 and Alt 4) examined were shared with the committee during the presentation made by railway authorities. However, the Alt -4 seems to be arbitrary, as the alignment is drawn as straight lines and does not follow the natural terrain features of the Western Ghats.** The proposal was revised time to time to reduce the length as well as forestland required for the project. The present proposal was revised in 2016 by increasing length and number of viaducts, tunnels and bridges. This has resulted in reduction of the demand of forest area under the project. The forest area under the project has been reduced from 965 ha in the original proposal in 2003 to 595.64 ha in new proposal in 2016. **However, details of permissions sought and surveys carried out for other alternatives were not made available to the Committee.**
- The NTCA report (2018) mentions that the alignment involves 79 km in embankment, 68.73 km in cutting and 21.88 km in tunnels. A total of 329 bridges (50 major and 279 minor) and 25 tunnels (longest tunnel length 3.53 km) have been proposed for construction. The project also proposed 12 railway stations and 565 staff quarters for construction in these stations. As per the presentation made by the Railway Authority during the visit of this committee, the proposal is further revised to reduce the demand of the forest area. The new proposal has provision of 53 major bridges which cover a length of 3.2 km. The minor bridges, numbering 240, cover a total length of about 1.05 km. Viaducts cover about 8.41 km whereas 25 tunnels (longest about 4.7 km) cover 25.42 km. Total 7 (2+5) railway stations proposed within forests. Thus, in the revised proposal, 38.08 km of the proposed track will be under tunnels, viaducts, major and minor bridges, which is higher than in the previous proposal.

- As per the report of the Site Inspection Committee (August 2018) submitted to the Ministry of Environment, Forest and Climate Change, total length of the track in embankment is 79 km and the maximum height of bank is about 25 m. The total length of the track in cutting is about 68.73 km and the maximum depth of cutting is 25 m. As per the presentation made by the Railway Department during the visit of this committee, cuttings of earth profile have been proposed in the forest area, which vary from 10 m to 15 m, depending on nature of forests and earth profile. Depth of cutting is reduced in new proposal because the high cutting area in the previous proposal has been proposed into tunnels. Although some modification in the proposal has been done, it may create enormous over burden at sites, which require a plan for its management and transportation for its use in the railway track. Landslide during monsoon is not ruled out while using heavy machinery for constructing long tunnel which may cause vibration in earth profile in the hills.
- The dimension of cuttings earth profile and construction as proposed speak about the volume of earth excavation, over burdens and level of destruction of nature. With this scale of operation, disruption of hydrology, flooding and severe landslides at sides are also not ruled out, if not planned properly. The impact on fragile forests ecosystem, flora and fauna therein, streams and river ecology will be significant. Transportation of some of the over burden earth mass for use in the railway line may also create environmental problem. If these over burdens are not handle properly, it will have serious negative impact on rivers, streams and dams.
- The need of approach roads has not been mentioned in the project is a matter of clarification. It seems that environment and forest loss for constructing following additional temporary and permanent roads are missed or underplayed in the project.
- During construction period of about 8 years, as mentioned in the report, massive machineries, vehicles, materials and man-power will move from one site to other. Although roads across the proposed track can be used for transportation of machine, material and man-power at some sites, a large part of the proposed area do not have access. The project has not mentioned about temporary roads for operation of the project - transport of machineries, vehicles, materials and disposal of earth mass/over burden - in some of these remote areas. Arguments that the proposed track can be used by transportation of machine, material and man-power do not hold ground as



construction of some temporary roads in the forests may be unavoidable for project implementation. The project does not mention additional demand of forest lands for temporary road and logic given during the field visit was not convincing. Thus, a clear assurance from the project authority is needed before considering the proposal.

- The team visited a site of the local road through which tunnel is proposed. The proposed track will also eat away local roads at some places which are under operation for local people settled inside the forests. Thus, a demand by the local people for construction of new local road will be a logical consequence. These may cause additional destruction of forests which are not mentioned in the project as the proposal is silent on this issue.



- The proposed railway line crosses NH-63 and other roads. During construction phase at the sites, these roads will be diverted in the dense forest areas temporarily which

involves cutting of trees and destruction of natural forests. These are not mentioned clearly in the project and the project document is silent about diversion/approach roads during construction phase.

**(ii) Over-passes as passages for wildlife:** A large section of the proposed railway track is under cutting of earth-profile (about 40% of the total length) and cutting in substantial track- length will be high, above 10 m. There is scope to convert a substantial part of such cutting section into over-bridges for passages of wildlife without providing much elevation. There is need to increase over passes as passages for wildlife at appropriate sections.

**(iii) Exploring scope of integrating proposed railway line with existing NH-63 to minimise impact on wildlife:** Deviation of the proposed railway track from the national highway- 63 varies from 0.34 km to 8.66 km. The distance between proposed railway track and NH- 63 is within half kilometer for substantial length and a large part of the track has less than one kilometer deviation from the Highway. There is scope to integrate railway line with NH-63 for a long distance by integrating and connecting passages across both so that integrated wildlife passages facilitate movement of wildlife across the landscape. This needs examination by the high-level technical team and wildlife experts on this subject subject. This demand application of the best available technology to minimise environmental damage.

**(iv) Wildlife passages:** Most of the tunnels, viaducts and bridges have been proposed to find suitable gradients for railway line and same viaducts and bridges are mentioned as wildlife passages. Although a majority of these bridges and viaducts will serve as wildlife passage, but these may not be most appropriate for wildlife crossing at some sites.

**(v) Impact on local hydrology:** The project will have adverse impact on the hydrological system of the rivers and streams and irreversible impact on fragile ecosystem of Western Ghats. No amount of mitigation measures will be in a position to compensate the huge cost of ecological damage imposed on the Western Ghats by this project but construction of adequate passages will reduce impact by facilitating movement of wildlife, maintaining hydrological systems and reducing floods during exceptionally heavy rains that occurs once in decade(s).

**(vi) Tunnels as death traps of wildlife in absence of adequate safeguard:** It has been observed (example Madhya Pradesh) that tiger, leopard and other wild mammals enter in the railway tunnel in summer in search of cool environment and they were trapped to death by speeding trains.

- a. SWR should consider impacts of railways on wildlife, and on the methods to identify, monitor, and mitigate these impacts in a scientific manner. Wildlife train collisions (WTC) are the most often reported impact, although railway lines can also represent barriers to animal movement, bisecting populations or reducing wildlife access to resources. Little is known on the impact of habitat loss and fragmentation due to railways alone, or on their disturbance effects, including pollution (noise, chemical, light), and on the potential to provide habitat connectivity or surrogate habitats for native species in degraded landscapes. Field work is necessary to provide credible mortality rates, which, combined with computer simulations, can allow for estimations of the impact of mortality on population viability.
- b. There are a number of important issues that remain poorly explored in current knowledge of “Railway Ecology” (Keken and Kušta 2017; Waller 2017). For instance, little is known about the consequences of vibration and noise on biodiversity living adjacent to the railway bed (Lucas et al. 2017). Also, more studies are needed on the cost-effectiveness of different management actions and mitigation measures, as economics is always a limiting factor.

## **7.0 Presentation of the stakeholders:**

The Committee carried out hearing of stakeholders at Karwar on 28.09.2022 and Hubballi on 29.09.2022. The list of persons who spoke before the committee is paced as **ANNEXURE II**. The Committee also received several written representations at the time of hearing and also some through email and post. Several representations were also received by the State Government.





The representations received are placed as **ANNEXURE III**. The points raised in favour and against for the project are highlighted below:

### **7.1 Representations in favour of the project**

- i. At present goods from the hinterland of Karnataka are exported and imported from ports in Goa or Tamil Nadu. Karnataka is only major maritime state in India which has no train link from its mainland to its coast. The proposed railway link will provide a great opportunity for development of ports and easy export and import of goods.
- ii. Reduction in distance, cost of transportation and travel time for people from North Kanara to rest of Karnataka will help development of the Karnataka coastal region.
- iii. In absence of proper connectivity, industrial and other development works in Karwar region is stagnant. The new rail line would connect the North Karnataka region of the Deccan with the coastal Karnataka and would provide business/employment opportunities and boost economic, tourism, infrastructure and industrial development in the area.
- iv. Ports in the state have remained underdeveloped in the absence of adequate hinterland connectivity. Cargo handling at the Karnataka port of Karwar is expected to increase substantially after the railway project is completed. The shift in traffic to the railways would be manifolds and expected to increase cargo transport from 21 MTPA to 74 MTPA in the year 2035 with addition of the Ankola railway link.
- v. NOC has to be taken from the owner of the Airport which is being developed. Road connectivity is also an issue for people working in the Indian Naval Base.
- vi. Some stakeholders pointed out that other railway lines are also passing through some wildlife sanctuaries and Tiger Reserves in the Western Ghats. Similarly, the Hubballi-Ankola railway line project could also be initiated for the betterment of local people.
- vii. The proposed Hubballi-Ankola railway line project does not pass through Kali Tiger Reserve. Also, as per the draft Ecologically Sensitive Zone (ESZ) of Kali Tiger Reserve issued by MoEFCC in 2016, it is clearly observed that the project does not pass ESZ of Kali Tiger Reserve or any Protected Area. It is also stated that the proposed railway line would also not pass through any Protected Area i.e. National Parks or Wildlife Sanctuary or any linked Protected Area and would be 50 kilometres away from the Tiger Reserve.
- viii. The Hubli-Ankola railway line project would help the people of North Karnataka in increasing access to educational institutions, good medical facilities etc.

- ix. The damage to the wildlife which has been envisaged by the proposed project could be minimized through mitigation measures and animal passage plans.
- x. The Environmental impact of railways in terms of pollution generation, fuel consumption etc. would be less as compared to other means of road transports. ‡The proposed railway line would bring the opportunities for jobs for the local people. This would also reduce the transportation costs, increase the economy of the area.
- xi. The Hubli-Ankola railway line would help in increase of export and transportation of goods and would also help in increasing the GDP of the North Karnataka.
- xii. The high price of transportation of goods as North Karnataka is not directly linked with sea ports and longer routes are adopted to transport their goods and products which ultimately affect the pricing of such products. The proposed Hubli-Ankola railway line will serve as a cargo carrier and this would reduce the logistics cost by up to 40% and help in regional businesses compete with international markets.

## **7.2 Representations against the Project**

- i. Based on the previous reports of the committees and environmentalists, the proposed railway line is believed to cause major destruction for the environment and bio-diversity of the region.
- ii. Hundreds of workers would be involved in construction of the railway line for a few years. These people along with machinery also would move from one place to other within the bio-diversity rich areas and create more disturbance over a much larger area which no one has assessed and estimated.
- iii. Since the doubling of another railway line is proposed in the nearby Hubballi to Vasco (Goa) sector, the construction of one more railway line will disturb the entire ecosystem and bio-diversity of the region.
- iv. The area through which the proposed Hubballi-Ankola railway line will pass is rich in bio-diversity. There are reported deaths of wildlife due to train hits and the mitigation measures which are being suggested these days for the linear infrastructure projects are not implemented properly then how can the implementation of proposed mitigation measures in new railway line project/ linear infrastructure projects be expected.
- v. The cost benefit analysis of the Hubballi-Ankola railway line project by NTCA is also on the negative side, if ecological loss is accounted for.
- vi. Lakhs of people would be affected and disturbed if the eco-system of the Western Ghats is disturbed due to Hubballi-Ankola railway line project. The project would lead to



exploitation of the natural resources of the North Karnataka and would benefit only a few people and industries.

- vii. The Tiger Census in the recent past years have reported the increasing numbers of Tigers in the Kali Tiger Reserve, its corridors and other habitats in the region through which the railway line will pass. The Hubballi-Ankola railway line project would not only disturb the Tiger habitat and Elephant corridors but would also disturb the larger proportion of the bio-diversity of the region.
- viii. Disturbance in the ecosystem due to Hubballi-Ankola railway line may also lead to increase in cases of Human-Wildlife Conflict as certain wild animals such as Tigers, Leopards, Elephants etc. would be displaced from their natural habitats due to the construction of the railway line.
- ix. Hydrology of the area along will undergo major changes with floods and siltation of the dams and waterbodies.

## **8.0 RECOMMENDATIONS OF THE SC-NBWL COMMITTEE:**

As mentioned above in this report, various committees and reports of the experts assessed the impact of the project on the forests and biodiversity in the area of Biodiversity Hotspot and World Heritage Site and rejected the project proposal after considering all aspects of its merits and demerits during the last two decades. To minimise the loss of forests, the project proposal was modified over time by changing the alignment, reducing the area for the forest diversion and increasing tunnels and bridges. Undoubtedly, even after revision, environmental loss after implementation of the project would be huge. On the contrary, it is also a fact that Karnataka is the only large maritime state in the country which does not have good rail connectivity of its main land to its coast. Thus, it is difficult to ignore the demands of society for rail link to its coastal zone to meet the needs of development.

Although the representative of the Director, WII, Dehradun, has taken the view that the status-quo should be maintained of earlier recommendation of the joint site inspection report of WII, NTCA and MoEF&CC in 2018 against the proposed diversion of the 595.64 ha forest land in Karwar, Yellapur and Dharwad divisions for the construction of new Hubballi-Ankola Railway line, the committee decided to take a more balanced, unbiased and objective view, based on field observations, representation of the stakeholders, and a more comprehensive view of the costs and benefits of the railway project in the context of developmental needs of the region as a whole.

As narrated above in this report, the committee has examined the proposal through field inspections and discussions, and found gaps/discrepancies and short comings in the project proposal. Therefore, the committee recommends that the proposal in the present form should not be considered. The project may qualify for consideration by the Standing Committee of the National Board for Wild Life only when all gaps/discrepancies and issues raised by the committee members, as mentioned above in this report, are addressed to minimise ecological loss and submitted afresh. In the background of these facts, the Committee also makes the following recommendations:

### **8.1 Need for regional master plan for transportation infrastructure:**

An integrated regional policy of highway and railway track, connecting the hinterland of Karnataka to its coastal region should be prepared before implementing the Hubballi-Ankola railway project. This matter was also raised at the 68<sup>th</sup> meeting of the Standing Committee of NBWL held on 30.05.2022. If the proposed project (Hubballi-Ankola railway line) is implemented, there is an imperative to balance the ecological loss by showing benefits through “avoided deforestation” on a regional scale. There are several ways to achieve these ecological benefits at the larger scale. For instance,

- i. The proposed doubling of the Hubballi-Vasco railway line in the Ghat section (Kali Tiger Reserve: Castle Rock-Kulem and the Bhagwan Mahaveer Sanctuary in Goa) will only be a limited gain at the cost of local ecology because of the steep gradient (1:37) which makes it far less attractive to achieve energy efficiency and profitability in transportation of goods and people. Except for the existing single railway track, the forests along this line within Karnataka (Kali Tiger Reserve) and Goa (Bhagwan Mahavir Wildlife Sanctuary) are among the least disturbed, high-quality forest with high biodiversity in the Western Ghats; one option therefore would be to drop this proposal for doubling of the existing track (which has been approved by the NBWL-SC).
- ii. There is another proposal from the Railways for a new line between Talguppa in the plateau with Honnavar on the coast in Karnataka; prima facie, this track is slated to pass through even richer forests than the proposed Hubballi-Ankola line and therefore the proposal can be dropped. There are also several roads from the hinterland to the coastal region of Karnataka with plans for expanding some of these (such as existing NH-63) to 4-lane highways (which would result in forest loss to perhaps an even greater extent than the proposed railway line). The combined impact of implementing all these linear

transport infrastructures would be irreparable loss of biodiversity, and alteration of the landscapes, river systems, water streams and hydrology.

- iii. Further, the Government of Karnataka should take a relook at expansion plans for the road network and demonstrate “avoided deforestation” overall in its masterplan for improving the transportation infrastructure in the state between the hinterland and the coast.
- iv. Indeed, the proposed Hubballi-Ankola railway line, with its gentle gradient of 1:100 along the ghat section (unlike the much steeper gradient in the existing Hubballi-Vasco line), has the potential for becoming the major transportation link across the central Western Ghats, provided that several conditions are fulfilled – avoided deforestation in the region, provision of state-of-the art animal passages across the line, significant increase in energy efficiency in transporting goods and people, reduction in accidents (especially human casualties), and improved national security. Each of these aspects has to be quantified in a scientific manner in order to make a convincing case for the implementation of the railway project.
- v. SWR should put in efforts to scientifically compute the energy map showing reduction in energy achievable and reduction in carbon footprint vis-à-vis roads. The present proposal only provides a generic account and does not contain any scientific computation specific to the project. However, this needs to be brought out clearly using engineering principles by SWR. There has to be better authoritative information and data with proven forecasting model. SWR should provide evidence of well tested, benchmarked and validated forecasting model. The model should consider the following parameters: i) capacity to volume ratio, ii) level of service, iii) probable migration of traffic replacement from roads to rail, iv) probable migration of passengers from road users to rail systems and thereby reduction of road users, v) probable diversion of cargo goods to rail systems including categorisation in terms of perishables, materials, metals, precious cargo, large and heavy cargo, etc.
- vi. Another roadmap worth examining by SWR is what-if scenarios. One of the what-if scenarios should consider possibility of the present single line railway system to double line system with facts of its impacts and effects.

## **8.2 Wildlife mitigation measures:**

The main issue with wildlife mitigation measures relate to the risks of collisions between trains and wildlife species along this track. There is need to identify movement routes of wildlife,

mainly tiger, leopard, elephants, sloth bear, ungulates and other mammals, for constructing proper wildlife passages at appropriate sites. Cuttings of earth profile, more than 10 m, have been proposed in the forest area in substantial length of the proposed track. Some of these cutting sections can be easily transformed into wildlife passages. Also, the presence of Giant Malabar Squirrel in the region calls for canopy walkways to enable them to cross over the track safely. There is need of world-class model of adequate wildlife underpasses and overpasses as wildlife passages at appropriate locations based on movement requirements of species along the stretch of the proposed Hubballi-Ankola railway line passing through forested areas.

The railways have proposed locations for providing passages for elephant movement based on the earlier IISc report. However, in the ten years since the IISc study was conducted, there could be many changes in the elephant movement of the region. Thus, there is a need for a more up-to-date and detailed consideration of the local topography and the specific locations where elephants may cross the proposed railway track in order to ensure site-specific mitigating structures such as underpasses to allow the animals to pass freely.

A safety fence is needed to check wild animals entering in the tunnels. There is need to design fences along the railway track to guide wild animals to pass through under or over wildlife passages, without crossing over the railway track at the most vulnerable places.

SWR should make use of sensors and provide a list of sensor technologies being planned to prevent collisions with wildlife. These must be identified clearly in the project proposal.

A perspective plan for the Dandeli Elephant Reserve which covers this entire region should be prepared by the Karnataka Forest Department, setting out clear management goals for the habitat and the elephant population of this region. A detailed land-use and vegetation map should be prepared in order to guide management actions. A reserve-specific elephant population estimation exercise should be planned and executed prior to the start of any construction. In the course of management interventions arising out of elephant-human conflicts, it would also be useful to characterize the movements of a couple of family groups as well as a few male elephants in detail through GPS telemetry. Perhaps the most important aspect of elephant management in the reserve would be effective mitigation of elephant-human

conflict. The reasons for elephant-human conflicts in northern Karnataka must be better understood, and a conflict management plan put into place.

A tiger management plan for the region should also be prepared by the Karnataka Forest Department in consultation with the National Tiger Conservation Authority and Wildlife Institute of India. This should take into consideration the movement of tigers between the Kali Tiger Reserve in the north and protected areas such as Sharavathi Wildlife Sanctuary to the south of the proposed railway line.

### **8.3 Compensatory afforestation plan:**

SWR to provide a clear plan for compensatory afforestation involving site specific native species (herbaceous, shrubby and tree species) and mixed species in consultation with and the concurrence of the Karnataka Forest Department and in confirmation with the Government of India guidelines for the proposal for clearance under Forest (Conservation) Act, 1980.

### **8.4 Mitigation measures for landslide-prone stretch of the railway line:**

SWR needs to place high importance to the aspect of recurring landslides in the Western Ghat region. There are currently a few options of mitigating landslides. However, this aspect has not been covered in the presentation made by SWR. The technological interventions that shall be implemented must be very clear and proven. SWR need to have a serious look at these issues and bring out an action plan that is implementable and sustainable.

SWR should undertake to implement the following remedial measures suggested for retaining the slope gradient in the landslide affected areas of the proposed railway line:

- i. Degraded slopes should be first backfilled, eased, and well compacted with suitable construction material to retain the slope geometry and a reinforced retaining structure with seepage holes in downslope direction on the failed slope should be constructed in benches at required intervals along the slope for toe support and effective drainage system on slopes as long-term remedial measures.
- ii. Culvert of suitable dimensions should be constructed at necessary sites for proper drainage management on slopes.
- iii. The irrigation canal should be lined (concrete-lined) to avoid water percolation in the adjoining hill slope. In near future, as per the site condition the construction of an irrigation canal in upslope should be properly planned with proper engineering



measures to avoid risk to life and property. The timely maintenance and monitoring of the old irrigation canal should be in practice to check surface indicators for slope instability.

- iv. Plantations on the eased slope should be done to enhance plant root cohesion to increase and strengthen the cohesive strength of slope forming material. The turfing of the slope using vetiver grass/plantation on the slope will add root cohesion to slope forming material and will resist the further movement of material.
- v. Benching of the slope and gabion wall/ wooden crate wall should be constructed in successive benches to check the ground subsidence.
- vi. Slope gradation is required for slope stabilization. At seepage points, horizontal perforated pipes should be installed on slopes to drain excess water through drains to prevent slope saturation.
- vii. The precarious hanging boulders should be removed from the slope to minimize the risk. The trees with a deep root system should be removed as the widening of joints and fracture system by tree roots increases the slope vulnerability in the long run.
- viii. The natural flow path of streams should not be blocked and the original flow path of the stream channel should be maintained. The drain channels and culvert of suitable dimensions should be constructed to drain excess flowing water to suitable sites for proper drainage management on the slope and surrounding areas.
- ix. A buffer zone along the tectonically active river sections has to be demarcated. The infrastructure and development activities shall be avoided especially along the fringe of the river sections. The same is recommended for Kalache village in Yellapur taluk which got badly affected by many landslides incidences and suffered loss of life and property.
- x. People should be made aware of the surface indicators of slope failure such as the development of cracks on the upslope, in house walls, the origin of any new spring, etc. to predict the probability of slope failure in near future.
- xi. For any major infrastructure activities and land conversion, input from experts in Geology may be sought at the planning stage itself as the geological setting of the terrain has a major role in determining the slope stability condition in long run.
- xii. During the heavy rainy season, the people staying on vulnerable hill slopes should move to safer places in plain/gentle areas, where the chances of landslides are very less/negligible. The local district administration should give early warning to the people

to evacuate from the vulnerable places during high-intensity rainfall in peak monsoon season.

- xiii. SWR should clearly identify technologies for structural and ecological protection against landslides, mud-slides, slope stability analysis, etc. that form part of this project.
- xiv. The proposal should ideally have before-after-control-impact designs and be long term. Proposal should list measures planned to improve mortality estimates, and to understand how impacts threaten population dynamics. SWR proposal should address how it will go from local scale studies (e.g., animals use of the underpasses) to landscape scale (i.e., where to place these underpasses to maximize the connectivity at regional/population levels) and also for less studied, less charismatic species along with larger mammalian species, and to explore the potential environmental benefits of green practices on railway corridors through scientific studies.

### **8.5 Engineering and technological measures for the railway project:**

SWR should substantiate the technical information that is presented in its current proposal and work toward providing an optimised alignment that would cause the least disturbance to the ecosystem. Optimisation of alignment should also be based on maximum length of the railway line passing underground or tunnels reducing the exposure outside and surface transport

SWR should consider and spell out the technologies used in the construction, for instance, (i) viaducts/bridges whether this will be pre-stressed concrete, precast, box-girder type, light gauge steel ii) tunnels – using Tunnel Boring Machines (TBMs) or any other. that would obviate the need for having to have several temporary access approaches to the site, disturbance to the system around, damages, mud slides and other pollution such as noise, air, and light.

Proposal should clearly justify selection of a specific technology/technologies over others with quantification of benefits that would accrue.

### **8.6 Measures during the construction phase:**

SWR should spell out the measures and guidelines they propose to take during the construction phase in order to minimize disturbance and collateral damage to the environment. A Manual should be brought out and placed before appropriate authorities for their consideration. The Manual should include measures being considered for transport of materials, mobilisation of resources with stock & storage facilities and strategies to deal with, movement of men and machinery without constructing any road or access to the site/location. The Manual should provide non-negotiable steps of mitigation measures; short term & long-term including assurances & guarantees to protect and maintain the buffer & track line.