BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL,

SOUTHERN ZONE, CHENNAI

O.A. NO. 236 of 2024 (SZ)

BETWEEN:

Suo moto proceedings initiated
Based on news item titled "Over
2000 citizens oppose felling of
33000 trees for Bengaluru Suburban
Railway Project Report" appearing
in the Hindustan Times
dated 11.06.2024 **PETITIONER**

AND:

Bruhat Bengaluru Mahanagara Palike
And others **RESPONDENTS**

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CHENNAI
DATE: 25/10/24.

ADVOCATE FOR RESPONDENT NO.2

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Annexure 6.4. Stakeholder Engagement Plan

1021 Abbreviations

AFD	:	Agence française de développement
BSRP	:	Bengaluru Suburban Railway Project
BMTC	:	Bangalore Metropolitan Transport Corporation
CBO	:	Community Based Organisation
CPRs	:	Common Property Resources
CPCB	:	Central Pollution Control Board
DPR	:	Detailed Project Report
EHS	:	Environmental Health and Safety
EIA	:	Environmental Impact Assessment
EMP	:	Environmental Management Plan
EMU	:	Environmental Management Unit
ESIA	:	Environmental and Social Impact Assessment
ESF	:	Environmental and Social Framework
ESS	:	Environmental and Social Standards
ESCP	:	Environmental and Social Commitment Plan
ESMP	:	Environmental & Social Management Plan
ESMU	:	Environmental & Social Management Unit
F & A	:	Finance & Administration
FGDs	:	Focus Group Discussions
GAP	:	Gender Action Plan
GIIP	:	Good International Industry Practice
GRC	:	Grievance Redressal Committee
GRM	:	Grievance Redressal Mechanism
KfW	:	Kreditanstalt für Wiederaufbau
K RIDE	:	Rail Infrastructure Development Company (Karnataka) Limited
KIADB	:	Karnataka Industrial Area Development Board
KSDB	:	Karnataka Slum Development Board
L & PC	:	Land & Project Co-ordination
MoEFCC	:	Ministry of Environment, Forest and Climate Change
NGO	:	Non-Governmental Organisation
PAP	:	Project Affected Person
PAH	:	Project Affected Households
PIA	:	Project Implementation Authority
RAP	:	Resettlement Action Plan
RPF	:	Resettlement Policy Framework
R&R	:	Resettlement and Rehabilitation
SC	:	Scheduled Caste
SEP	:	Stakeholder Engagement Plan
SIA	:	Social Impact Assessment
SMS	:	Short Message Service
SMU	:	Social Management Unit
ST	:	Scheduled Tribe
SWR	:	South Western Railway

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Abbreviations of Stations

BAND	:	Banaswadi
BAW	:	Chikkabanavara
BNC	:	Bengaluru Cantonment
BNCE	:	Bengaluru East
BYPL	:	Baiyyappanahalli
CSDR	:	Channasandra
DHL	:	Devanahalli
HEB	:	Hebbal
HLE	:	Heelalige
JTJ	:	Jolarpettai
KDGH	:	Kodigehalli
KGI	:	Kengeri
KJM	:	Krishnarajapuram
KQZ	:	Kolar
KSR	:	Kranti Veera Sangolli Rayanna
LOGH	:	Lottegollahalli
MWM	:	Malleswaram
NMGA	:	Nelamangala
NYH	:	Nayandanahalli
RNN	:	Rajanukunte
SBC	:	Bengaluru City
WFD	:	Whitefield
YNK	:	Yelahanka
YPR	:	Yeshawantapur

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1.1. Project Background

Bangalore, officially known as Bengaluru, is the capital and the largest city of the Indian state of Karnataka. It has a population of more than 8 million and a metropolitan population of around 11 million, making it the third most populous city and fifth most populous urban agglomeration in India. Located in southern India on the Deccan Plateau, at a height of about 3,113 feet (948.48 meters) above sea level, Bangalore is known for its pleasant climate throughout the year. Its elevation is the highest among the major cities of India.

Bangalore is widely regarded as the "Silicon Valley of India" (or "IT capital of India") because of its role as the nation's leading information technology (IT) exporter. Indian technological organizations are headquartered in the city. A demographically diverse city, Bangalore is the second fastest-growing major metropolis in India. Recent estimates of the metro economy of its urban area have ranked Bangalore either the fourth- or fifth-most productive metro area of India. It is home to many educational and research institutions. Numerous state-owned aerospace and defence organizations are located in the city. The city also houses the Kannada film industry and is a hub of sporting events. It was ranked the most livable Indian city with a population of over a million under the Ease of Living Index 2020.

Transport in Bangalore consists of several intracity commute modes such as Bengaluru Metropolitan Transport Corporation (BMTC) buses, Namma Metro rail services, taxis and auto rickshaws. At the end of the 2018–19 financial year, Bangalore had more than 80 lakh vehicles registered in the city, the most in India after Delhi[1]. Over 55 lakh two-wheelers (motorcycles) and 15 lakh cars together make up for close to 85 percent of the vehicles[2]. In 2018, Bangalore was reported to have the second highest number of two-wheelers in the country[3]. Bangalore's car density (number of cars for every kilometer of road), however, was found to be 149 – much lower than other major Indian cities[4]. App based rental motorcycles, bicycles and cars are also available for commuting.

The population of Bengaluru has been growing faster. There has been a phenomenal growth in the population of vehicles as well, especially the two wheelers and four wheelers in this period due to rising household incomes. In the absence of adequate public transport system, people are using personalized modes, which is not only leading to congestion on limited road network but also increasing environmental pollution. An average citizen of Bengaluru spends more than 240 hours stuck in traffic every year. Such delays result in loss of productivity, reduced air quality, reduced quality of life, and increased costs for services and goods.

Hence, to overcome the above issue, Rail Infrastructure Development Company (Karnataka) Limited (K RIDE), with its corporate office at # 8, 1st Floor, Samparka Soudha, Dr. Rajkumar Road, opposite Orion Mall, Rajajinagar 1st Block, Bengaluru– 560010, was incorporated as a Joint Venture between Government of Karnataka and Ministry of Railways, is entrusted with the responsibility of execution of Bengaluru Suburban Railway Project (BSRP), a new Suburban Railway Project envisaging construction of 4 dedicated rail corridors in a period of 6 years. It will link Bengaluru to its satellite townships, suburban, surrounding areas and provide a mass rail based rapid transit system.

[1] *The Hindu*. 1 April 2019. Retrieved 15 October2019.
[2] *Deccan Herald*. Retrieved 15 October 2019.
[3] *The Times of India*. Retrieved 17 October2019.
[4] *Business Today*. 25 March 2019. Retrieved 17 October 2019.

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1.2. Project Corridors

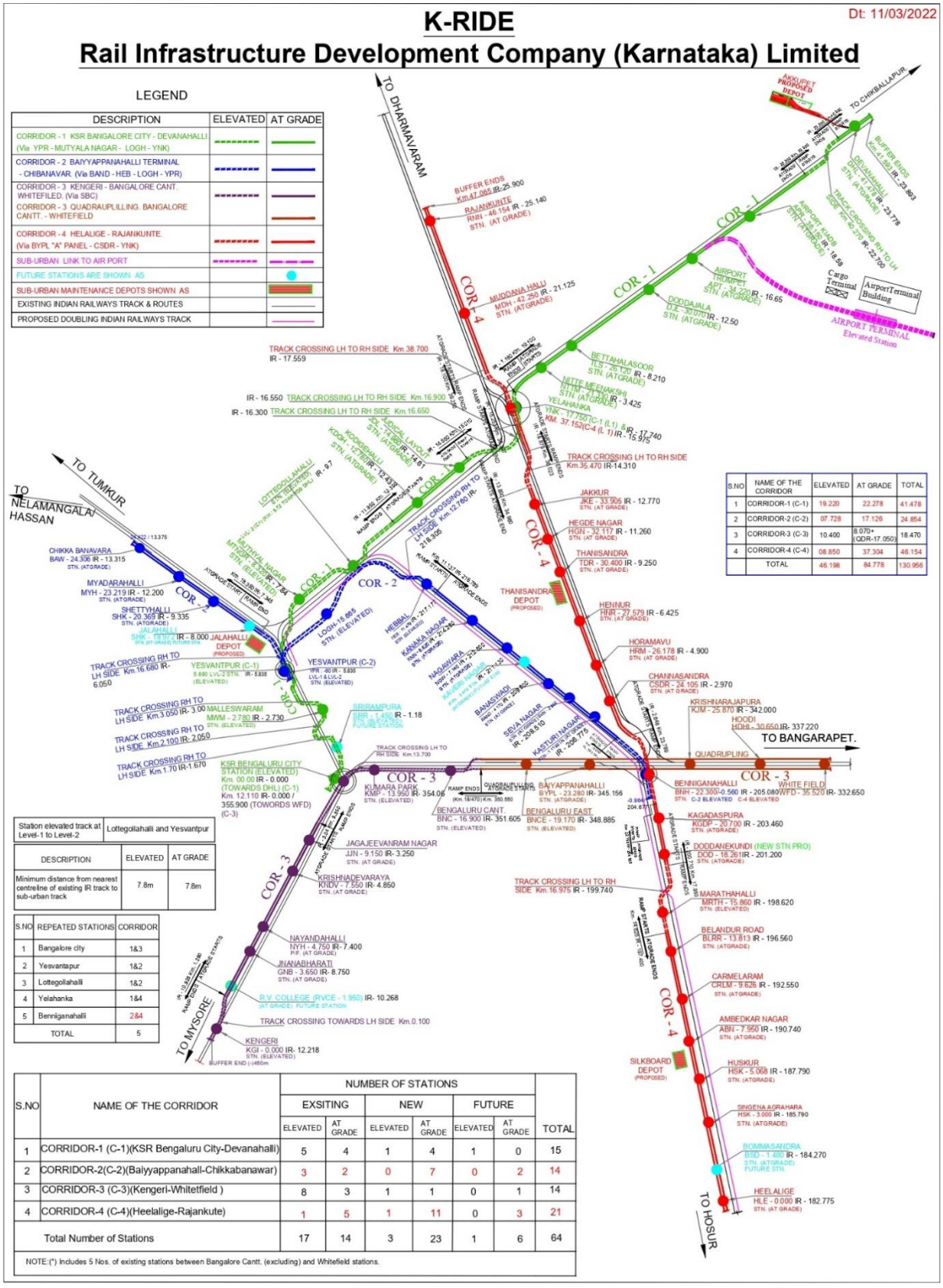

Figure.1. System Map of the Bengaluru Suburban Railway Project Corridor

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The following are the four corridors. The system map of the Bengaluru Suburban Railway Project Corridor is shown in **Figure 1**.

1.2.1. Corridor – 1: KSR Bengaluru City to Devanahalli:

Total Length is 41.478 Kms out of which Elevated is 19.220 Km and At-grade is 22.278 Kms. Stations on Corridor 1 are Fifteen (15) out of which Eight (7) Stations are elevated including one future station at Srirampura and Seven (8) Stations are At-grade.

1.2.2. Corridor – 2: Baiyyappanahalli Terminal to Chikkabanavara:

Total Length is 24.854 Kms out of which Elevated is 7.728 Kms and At-grade is 17.126 Kms. Stations on Corridor 2 are Fourteen (14), out of which eleven (11) Stations are At-grade including one future station at Jalahalli and three (03) Stations are elevated.

1.2.3. Corridor – 3: Kengeri to Whitefield:

Total Length is 35.52 Kms out of which the suburban corridor considered for the present study is only between Kengeri and KSR Bengaluru – Bengaluru Cantonment. The length of this section between Kengeri and Bengaluru Cantonment is 18.47 Kms, of which Elevated is 10.400 Kms and At-grade is 8.070 Kms. The stretch of 17.05 Kms (at grade) between Bengaluru Cantonment and Whitefield is being taken up by SWR for quadrupling. Once this is completed and becomes operational, two lines of the same shall be utilized for the Suburban services. Stations on Corridor 3 are Fourteen (14) out of which nine (09) Stations are elevated and five (05) Stations are At-grade including one future station at RV College. Five (05) stations are in quadrupling section.

1.2.4. Corridor – 4: Heelalige to Rajanukunte:

Total Length is 46.154 Kms out of which Elevated is 8.850 Kms, At-grade is 37.304 Kms. Stations on Corridor-4 are Twenty one (21) out of which Two (2) Stations are elevated and Nineteen (19) Stations are At-grade including two future stations at Bommasandra and Kaveri Nagar. Yelahanka is an inter-change station.

1.3. Adverse Impact of the Project.

1.3.1. Land Requirement

In order to minimize private land acquisition and involuntary resettlement, around 50% of the BSRP alignments are located within the railway /government land along the existing railway line. But, at certain locations (wherever railway land is not sufficient to accommodate the design) private land acquisition has been proposed. Corridor wise private land acquisition is presented in below table.

Table 1: Corridor Wise Private Land Acquisition.

Corridors		From	To	Total Length (Km)	Total Area (Sqm)	Vacant Land (Sqm)	Built Up (Sqm)
Corridor - 1	SBC-YPR-LOGH-YNK-DHL	0	41.4	41.4	48974	42340	6634
Corridor - 2	BAW-YPR-LOGH-BYPL (T)	0	25.01	25.01	115713	82166	33547
Corridor - 3	KGI-SBC-BNC (WFD)	0	18.47	18.47	83830	43091	40739

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Corridors		From	To	Total Length (Km)	Total Area (Sqm)	Vacant Land (Sqm)	Built Up (Sqm)
Corridor - 4	HLE-BENNIGANAHALLI-CSDR-YNK-RNN	0	46.24	46.24	163055	118793	44262
Total				**131.12**	411572	**286390**	**125182**
Total Area in Acres					**41.16**	**28.63**	**12.51**

Source: BSRP - Feasibility Report

The above data shows that, the design has been made to keep land requirements to the barest minimum possible by utilizing the railway land.

1.3.2. Number of Affected Structures

Table No 2 indicates the impact of project on the different types of structures i.e. residential, commercial, residential cum commercial and other structures. This table also includes the structures which are both partially and fully affected. It is observed from the table that out of the total 551 structures 371 (67.33%) are residential, 57 (10.34%) commercial, 13 (2.36%) residential cum commercial and remaining 77 (13.97%) are other structures. 33 (5.99%) CPR's also affecting. Majorly the residential structures are affected in all the corridors. A total of 52 structures are affected in Corridor-1, 339 structures are affected in Corridor-2, 81 structures are affected in Corridor-3 and 79 structures are affected in Corridor 4. Apart from the below stated structures around 111 structures to be surveyed, which is on hold due to non-cooperation from the dwellers, details are listed in table 3

Table 2: Number of Affected Structures

Partially & fully affected structures	C1	C2	C3	C4	Total	Percentage
Residential	43	225	47	56	371	67.33
Commercial	4	34	14	5	57	10.34
Resi cum commercial	1	8	4	0	13	2.36
Other minor structures	3	51	10	13	77	13.97
CPRs[5]	1	21	6	5	33	5.99
Total	52	339	81	79	551	100

Table 3: Census and Socio economic survey pending location.

Sl No	Location	Corridor	Number of likely displaced houses
1	Near Yesvantpur Railway Station	1	33
2	Krishnadevaraya halt	3	28
3	KSR Railway Station	3	35
4	Belandur Road	4	15
Total			**111**

[5] *Includes school, public toilet, temple, mosque, bus stop, govt. offices, community structures etc.*

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1.3.3. Number of Project Affected Tenants and Employees Households

Apart from the structures affected households 194 tenants and 87 employees would also be affected. Tenants are found in both titleholder's and non-titleholders' buildings. The corridor wise affected tenants and employees is presented in below table. The number of open land (land only) affected households would be identified during joint measurement survey and the RAPIC would do the socio-economic survey during project implementation to update the RAP.

Table 4: Corridor Wise Number of Affected Tenants and Employees Households

Corridor	Number of Tenants	Employees
C 1	9	16
C 2	124	11
C 3	31	27
C 4	30	33
Total	194	87[6]

1.3.4. Vulnerable Households

As regards vulnerability among PAHs, there are 186 PAHs belonging to vulnerable category. Out of these 16 PAHs are women headed households, 68 PAHs are below poverty line, 15 PAHs having disability and old age persons. Apart from that, 76 and 11 PAHs belong to Scheduled Caste and Scheduled Tribes respectively (Table 5). Both Scheduled Castes and Scheduled Tribes are considered as vulnerable group because the Scheduled Castes (SCs) and Scheduled Tribes (STs) falls under the provisions of Constitution of India and get preferential treatment in the government benefits because these people are traditionally vulnerable. The vulnerable households do not include the PAHs whose both house and commercial activities are impacted due to the proposed metro rail project.

Table 5: Corridor Wise Affected Vulnerable Households

Vulnerability	Number of Households					
	C1	C2	C3	C4	Total HH	Percentage
Women Headed Household	0	11	3	2	16	8.60
Below Poverty Line	7	47	13	1	68	36.56
Family with disability or old age	1	12	1	1	15	8.06
Scheduled Castes	0	70	3	3	76	40.86
Scheduled Tribes	7	3	0	1	11	5.91
Total	**15**	**143**	**20**	**8**	**186**	**100**

[6] *During survey the employer was hesitant to provide the details of the employees.*

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1.3.5. Number of Affected Community Property Resources

Corridor wise details of the affected common property resource are listed shown in below table. No heritage building is affected due to development of BSRP. Majority (63.64%) of the affected CPRs are religious structures.

Table 6: Corridor Wise Affected CPRs

Description	CPRs					
	C1	C2	C3	C4	Total	Percentage
School & Collage	0	0	0	0	0	0
Community Toilet	0	1	0	0	1	3.03
Religious centers	1	14	4	2	21	63.64
Hospital	0	1	0	0	1	3.03
Railway Gate,Water Tank,CW,Shed/Building	0	5	2	3	10	30.30
Total	**1**	**21**	**6**	**5**	**33**	**100**

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1.4. Stakeholder Engagement Plan

"Stakeholder Engagement Plan" (SEP) forms a part of preparation of ESIA, in accordance with the safeguard compliance requirements (ESS-10) of Environmental and Social Framework (ESF), 2018 of the World Bank. The ESS recognizes the importance of open and transparent engagement between the KRIDE and project stakeholders as an essential element of good international practices with an aim to improve the environmental and social sustainability of the project. It enhances project acceptance and make significant contribution to successful project design and implementation. It seeks to define a technically and culturally appropriate approach to consultation and disclosure. The prime objective of SEP is to improve and facilitate decision making and create an atmosphere of understanding consultation process, that actively involves likely project-affected people and other stakeholders in a timely manner, so that these groups are provided sufficient opportunity to voice their opinions and concerns that may influence decisions in Project design. The SEP shall serve following purposes:

- To understand the stakeholder engagement requirements of Karnataka State and Government of India (GoI) legislations.
- To provide guidance for stakeholder engagement;
- To identify key stakeholders that are affected, and/or able to influence the Project and its activities;
- To identify the most effective methods, timings and structures through which to share project information and to ensure regular, accessible, transparent and appropriate consultation;
- To develop a stakeholder (s) engagement process that provides stakeholders with an opportunity to proactively participate and influence project planning and design;
- To establish formal grievance/resolution mechanisms;
- To define roles and responsibilities for the implementation of the SEP; and
- To define reporting and monitoring measures to ensure the effectiveness of the SEP and periodical reviews of the SEP based on findings.
- To make SEP as a useful tool for managing communications between KRIDE and its stakeholders for the Project.
- Achieve approvals on time.
- Maintain a live stakeholder Management register to support K RIDE – BSRP

1.5. Applicable Legal and Regulatory Framework and World Bank ESF

This SEP takes into account the existing institutional and regulatory framework within the context of the following GoI and Government of Karnataka legal instruments as well as the Safeguard Compliance Requirements of Environmental and Social Framework (ESF), 2018 of the World Bank as mentioned below.

- The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013
- The Karnataka Industrial Area Development Act (KIADA), 1966
- The Right to Information Act, 2005,
- ESS 10: Stakeholder Engagement and Information Disclosure, ESF 2018, World Bank

In the context of involuntary resettlement, the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 and the Karnataka Industrial Area Development Act 1966 maintains the ethos and culture of public participation through social impact assessment.

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The Right to Information Act, 2005 provides for setting out the practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority.

The ESS-10, Stakeholder engagement and information disclosure mandates stake holder engagement is an inclusive process conducted throughout the project life cycle. The World Bank's Environmental and Social Framework (ESF)'s Environmental and Social Standards (ESS) 10, "Stakeholder Engagement and Information Disclosure", recognizes "the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice" (World Bank, 2017: 97). Specifically, the requirements set out by ESS10 are the following:

- "Borrowers will engage with stakeholders throughout the project life cycle, commencing such engagement as early as possible in the project development process and in a timeframe that enables meaningful consultations with stakeholders on project design. The nature, scope and frequency of stakeholder engagement will be proportionate to the nature and scale of the project and its potential risks and impacts.
- The Borrower will maintain and disclose as part of the environmental and social assessment, a documented record of stakeholder engagement, including a description of the stakeholders consulted, a summary of the feedback received and a brief explanation of how the feedback was taken into account, or the reasons why it was not.

1.6. Stakeholder Identification and Analysis for Proposed SEP

Stakeholders include persons or groups directly or indirectly affected by a project, as well as those who may have interest in a project and/or the ability to influence its outcome, either positively or negatively. In order to develop an effective SEP, it is necessary to first identify who the stakeholders are, their groupings and sub- groupings.

Table 7 below identifies the key stakeholder groups that may have interest in this project and/or the ability to influence its outcome, either positively or negatively. This list of stakeholders is likely to expand/change in composition as the project moves and since the SEP is a "living document" it will be updated regularly throughout the project life as appropriate.

Table 7: Stakeholders Group with Interest in BSRP

Types of Stakeholders	Description
Government Institution	Rail Infrastructure Company (Karnataka) Limited (K RIDE)
	Indian Railways, Govt of India
	Karnataka State Pollution Control Board (KSPCB)
	Karnataka Slum Development Board (KSDB)
	Karnataka Industrial Area Development Board (KIADB)
	Deputy Commissioner, Bengaluru Urban & Rural Districts
	Public Works Department, Govt of Karnataka Bengaluru Urban & Rural Districts
	Police Department, Bengaluru Urban & Rural Districts
	Bangalore Development Authority (BDA)
	Bruhat Bengaluru Mahanagara Palike (BBMP)
	Bengaluru Metropolitan Transport Corporation (BMTC)
	Karnataka State Disaster Management Authority
	Bangalore Electricity Supply Company Limited (BESCOM)
	Bangalore Water Supply and Sewerage Board (BWSSB)
	Archaeological Survey of India (ASI)

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Types of Stakeholders	Description
	Karnataka Tank Conservation and Development Authority (KTCDA)
Lenders	AFD and KFW
Community/Associations	Project Affected People (PAP)
	Inhabitants and trade people in the project affected areas
	Residential Welfare Associations in the project influenced area.
NGOs/Trust	To be identified
Public & Academic Institutions	To be identified
Print & TV media representatives	To be identified

1.7. Preliminary Stakeholder Consultation

As a part of environmental and social impact assessment, iDeCK's team has conducted stakeholder's consultation at local level. Relevant stakeholders were consulted and participated during social and environmental impact assessment. The consultations were conducted between November 2021 and March 2022. The consultations were based on informal unstructured interviews and meetings with the people available at project area during baseline surveys. The focus group discussions were conducted based on the availability of the stakeholders. The objective of this consultation was to disseminate the project information and ascertain stakeholder's views on probable environmental and social impacts that may arise with the implementation of the proposed project.

During consultation variety of views as well as valuable suggestions of public were received which were very important to develop mitigation measures to address the impacts.

Based on suggestions received, a mitigation plan to reduce the impact of the project was proposed. The mitigation plan proposed in planning phase of the project will help to reduce the cost and time to mitigate the impacts. Details on preliminary stakeholder consultations are presented in **Appendix -1**. These stakeholder consultations and inputs have been incorporated in the project identification and design.

Major findings of the preliminary stakeholder consultations on environmental and social issues are summarised as under:

Major findings of consultation on environmental issues are:

Positive Comments:

- About 64 % of the public participated in FGD's/ Public interactions are supported the BSRP project.
- Publics strongly believed that, introduction of suburban rail will facilitate them to access other parts of the city in safe and shorter time.
- Publics are in the opinion that, Suburban rail will enhance the environmental condition of their region.

Request/Suggestions:

- Requested for appropriate noise control measures also suggested to not to honk within the city limit.
- Suggested to provide adequate drainage system along the BSRP corridors to avoid inundation/ water logging during rainy seasons and proper maintenance of the same.
- Demanded for adequate underpasses to cross railway from one side to another side.

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- Requested for proper fencing at road junctions to avoid dumping of construction waste and garbage along the alignment.
- Demanded to minimise the tree felling and undertake tree plantation and landscaping along the railway track to enhance the green cover and to improve aesthetics of the region.
- Suggested to complete the construction of suburban rail project quickly within a given time frame.
- Proposed improvement should be limited and to be minimum impact to their land and their property.
- Demanded for appropriate compensation for loss of land property and livelihood.

Major findings of consultation on social issues are:

Positive Comments:

- The project will provide better connectivity between the suburban areas of Bengaluru with the city centers of Bengaluru, which will control the concentration of settlements in the city centers.
- Lower income families can stay in affordable houses in suburban areas of Bengaluru and commute to the city for their source of livelihood at affordable travel cost, which will have control on developing new slum settlements also.
- Travel time reduces as suburban railway project caters the people from the outskirts of the city without traffic block. People believe that suburban railway project will enhance the aesthetic looks of the city, as the migration to city centers would be reduced.
- People do not have any problem in surrendering their land and assets if better rates are given for their affected assets. The proposed suburban railway project would be an efficient and effective transport facility for the people settled in the outskirts of the city for their day to day travel. It will also reduce air pollution, save fuel and road accidents.
- The proposed suburban railway project will lead to diverse ways of livelihood opportunities for people also savings on their expenditure on day to day travel. People told that, due to the high expense on the travel cost and time delay they are completed to stay in city in unhygienic atmosphere, once the BSRP is operational they can move to the outskirts and travel for their work.
- The BSRP would be a reliable mode of transport with high safety to the vulnerable sections of the society, hence the mobility of women would be increased. Women in Indian scenario need to travel along with aged parents (medical purpose) or with minor children, travelling in public bus will always be difficult for them. They feel that the BSRP will be a more comfortable travel mode for them.
- The suburban railway project will provide more livelihood opportunities for small and marginal farmers, those who cultivating vegetables, fruits and flowers in the outskirts of the city, as suburban railway project will provide good access to these people to the market for their produces.
- Few households based small poultry farmers shared their opinion that, the BSRP may give better opportunities for them also, as there is a high demand for 'Natti Muttai' (country hen egg) in Bangalore city but taking the eggs in buses are always risky.
- The women face a lot of difficulties while travelling on public buses. However, they feel that Suburban railway would be a safe mode of transport for them. The women demanded for separate coach reserved for them on the train, at least in peak hours and guarded coach in late evenings and early mornings.

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- The business (mainly the developers) groups found to be very enthusiastic because they feel that the proposed project will bring a lot of business opportunities for them.

Request/Suggestions:

- Lack of end to end connectivity is the main issue of the commuters, hence they are forced to travel by private vehicle. If KRIDE provides sufficient facilities for parking, mainly at the stations located outside the city would be beneficial for the commuters.
- Integration of BMTC with BSRP: BMTC may operate feeder bus services from outskirts settlements to the nearest BSRP stations on a regular basis, which will make BSRP more inclusive.
- Adequate compensation needs to be provided for Project Affected Families.
- Toilet facilities may be provided at all the stations.
- Station design must be differently abled people friendly.
- The affected households are required to be relocated properly by the KRIDE, if land acquisition/clearance of slum settlements takes place for the construction of the proposed Suburban railway project. The relocation sites should be decided in such a place where the households can have access to existing basic facilities like school, hospital, drinking water, sanitation, park, local market along with other services. The local government authorities should be sensitive and has an integrated plan for relocation of the PAHs.
- Replacement value and resettlement allowance to be provided for the loss of commercial units or shops. For fixing the compensation and R&R assistances the compensation and R&R policy of BMRCL may be adopted in this project also.
- The households will lose their commercial as well as residential units, which in turn will have an effect on income. However, the livelihood opportunity of the PAHs would be very much dependent on available relocation options. The KRIDE should come up with an integrated plan for R&R sites, ensuring active participation of PAHs and other stakeholders
- The daily wage labourers should get work opportunity during the construction of the project. The qualified individuals should get employment opportunities during operation of the BSRP (reservation may be given to the member of the project displaced families). Further, it should also create an opportunity for the poor and vulnerable (including women headed households, SC & ST families, etc.,) people to open a shop and small businesses in suburban stations.
- Certain people may lose their access to their properties (at certain locations middle portion of the existing road/access are in the proposed land acquisition area – hence the connectivity of the road may lose).
- People are worried about the stability of the certain old buildings located very close to the proposed alignment during construction (due to piling or heavy machinery movement), compensation and resettlement assistances to be done by KRIDE for structural damages, if any during construction.
- The residential squatters demanded for resettlement prior to the commencement of civil works.
- Certain multi storied buildings are getting affected for less than 1 meter width, owners of such buildings requested to avoid acquisition of their buildings, if not full valuation for the entire building.
- There are declared and non-declared slum settlements in within the corridor of impact of the project. KSDB is the agency responsible for development of declared slum settlements. While KRIDE will have to develop strategies for resettling the residents of the undeclared slum settlement in coordination with KSDB.

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1.8. Purpose and Timing of Proposed Stakeholder Engagement Program

This SEP is designed to establish an effective platform for productive interaction with the potentially affected parties and others with interest in the implementation outcome of the BSRP. Meaningful stakeholder engagement throughout the project cycle will:

- Solicit feedback to inform project design, implementation, monitoring and evaluation.
- Clarify project objectives, scope and manage expectations.
- Assess and mitigate project environmental and social risks and impacts.
- Enhance project outcomes and benefits.
- Build constituencies and collaboration.
- Disseminate project information/ materials.
- Address project grievances.

Adequate stakeholder consultations will require effective timing and advanced planning. To ensure information is readily accessible to affected stakeholders, and adequate representation and participation of the different groups in the process, the KRIDE will adopt strategies and different methods and techniques based on an assessment of stakeholder needs. The strategies that will be adopted to conduct stakeholder engagement process are given in Table 8. Methods for stakeholder engagement are listed in Table 9. The stakeholder engagement program is given in table 10.

Table 8: Stakeholder Engagement Strategies

Sl. No	Stages	Project with Significant Risks and Diverse Stakeholder Issues
1	Engagement at the project concept stage	• Interviews with stakeholder representative, key informants and government officials • Stakeholder planning forum
2	Engagement during ESIA studies	• Community liaison officers recruited and accompanying environmental and social specialists on ESIA studies • Interviews with stakeholder representatives and key informants • Participatory techniques used to consult with focus groups on impact-specific topics • Participatory techniques used to consult with stakeholders most disadvantaged by the project • Stratified sample interviews • Public meetings • Newsletters • Open houses, in field office and project HQ • Radio and TV notifications
3	Engagement during construction and operations	• Participatory monitoring • Annual/quarterly targeted consultation, e.g. with specific stakeholder groups • Use of internet and other means to disseminate monitoring data • Annual/ quarterly stakeholder perception surveys and follow-up • Annual/ quarterly stratified sample interviews

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Sl. No	Stages	Project with Significant Risks and Diverse Stakeholder Issues
		• Newsletters • Open houses, in field office and project HQ • Radio and TV notifications
4	Engagement on new stakeholder issues and concerns that may arise	• Grievance mechanisms • Annual/quarterly household questionnaires with project affected people • Annual/quarterly interviews with key informants and stakeholder representatives • Annual stakeholder events and gatherings

Source: Stakeholder Engagement: A Good Practice Handbook for Companies doing Business in Emerging Market, IFC, 2007

Table 9: BSRP Stakeholder Engagement Methods

Sl No	Engagement Technique	Description and use	Target audience
1	Websites	• DPR, EIA, SIA, GAP and SEP will be published on official websites of KRIDE, the AFD &KFW. • Overview of project, impacts and mitigation, and project updates through project leaflets, posters etc.	• All stakeholders
2	Media announcements	• Advance announcements of commencement of major project activities, project Grievance Redress Mechanism, and other outreach needs of the project.	• Project affected communities
3	Information Centre and Information Boards	• Advance announcement of commencement and progress for major project activities.	• Project affected communities
4	Community /public meetings	• These interactive platforms will be used to convey general information on the project detailed discussions on sub project activity that is planned by the project, project environmental and social risks and impacts and mitigation measures and to provide regular updates on implementation progress to all stakeholders. Meeting will also enable stakeholders to express their views, demands, constraints etc.	• Project affected stakeholders and communities
5	Correspondence by phone/email/ written letters	• Distribute project information to government officials, organizations, agencies, NGOs, CBOs, Trusts, companies, community/Associations and Development Partners etc and invite stakeholders to share their views, concerns, demands etc.	• Government officials, NGOs, CBOs, Trusts Community/Associations, Development Partners etc.

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Sl No	Engagement Technique	Description and use	Target audience
6	Printed media advertisement	• This will be used to disseminate and disclose project documents(e.g. ESMP, ESCP) intended for general readers and audience.	• General public
7	Distribution of printed public materials: project information leaflets, brochures, fact sheets etc.,	• This will be used to convey general information on the project and to provide regular updates on its progress to local, regional and national stakeholders.	• General public
8	Internet/ Digital Media	• Use of the official websites of implementing Ministries and Agencies to promote various information and updates on the overall project, impact assessment and impact management process, procurement, employment opportunities, as well as on project's engagement activities with the public and to invite all stakeholders to share their views, concerns, demands etc., through internet resources.	• Project stakeholders and other interested parties that have access to the internet resources.
9	One-on-one interviews	• This will be used to solicit views and opinions on project impacts and solutions.	• Vulnerable individuals, NGOs, Trusts Associations, women groups, PAPs, etc.,
10	Workshops	• This channel will be used to: (i) Present project information to a group of stakeholders; (ii) Allow the group of stakeholders to provide their views and opinions; (iii) Use participatory exercises to facilitate group discussion brainstorm issues, analyse information and develop recommendations and strategies; and (iv) Recording of responses.	• Government officials/agencies, NGOs, Trusts Associations, women groups, PAPs, etc.,
11	Focus group meetings	• This will be used to facilitate discussion on specific issues such as gender based violence, disability inclusion, etc., that merit collective examination with various groups of stakeholders using Focus Group Meetings.	• Vulnerable, women groups, etc
12	Surveys / Independent evaluations	• Surveys will be used to gather beneficiary opinions and views about project interventions. Civil society could also be engaged to support citizen feedback surveys for the project.	• Project beneficiaries

Based on the ESIAs of the four corridors, the following groups of stakeholders have been identified.

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Table 10: BSRP Stakeholder Engagement Program

Target stakeholders	Information to be disclosed	Tools of engagement & mode of disclosure	Frequency	Responsibilities
PRE-CONSTRUCTION STAGE (PLANNING AND SURVEY)				
People residing in project area/general communities	✓ Project scope and design details, design alternatives for impact minimization ✓ Grievance mechanism process ✓ Community Safety measures during project implementation ✓ Relocation of Common Property Resources (CRPs) ✓ Damages (cracks, landslides, etc.,) to assets/structures during construction (mainly to the buildings located close to the project site) ✓ Temporary impact to the access to the properties	✓ Consultations, focus group discussions ✓ Written information (one pagers/flyers) ✓ GRM Helpline number through display at project locations.	✓ At least twice ✓ Preliminary screening, ✓ Household level census socio-economic survey and consultations towards preparation of SIA.	K RIDE through, SIA, DPR and RAP implementation agency/officers.
Karnataka Slum Development Board	✓ Resettlement of slum dwellers	Tri-party meeting (K RIDE, KSDB and Slum Residents)	Regular till completion of resettlement of slum dwellers.	K RIDE
Land Acquisition Officer, KIADB	✓ Land acquisition	As per Act provisions	As per Act provisions, till completion of disbursement of replacement value for the lost assets.	K RIDE & KIADB
Other Interested Parties (External) – Government departments ✓ Forest Department ✓ Revenue Department ✓ State Pollution Control Board	✓ Project scope and design details. ✓ Land acquisition and Compensation process ✓ Secondary baseline information on environmental and social aspects; ✓ Project's induced environmental and social risks; ✓ Impact mitigation and enhancement measures; ✓ Resettlement and Rehabilitation	Face-to-face meetings	As per requirement for obtaining necessary clearances/ permissions.	K RIDE through, SIA, DPR and RAP implementation agency/officers

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Target stakeholders	Information to be disclosed	Tools of engagement & mode of disclosure	Frequency	Responsibilities
✓ Police Department ✓ District Administration	✓ Grievance mechanism process ✓ Gender related issues due to labour inflex ✓ Design intervention for physically challenged people.			
IMPLEMENTATION STAGE				
People residing in Project area/general communities	✓ Project scope and design details, ✓ Contractor establishment details i.e. labour camps, plants area etc., ✓ Grievance mechanism process ✓ Relocation of CPRs ✓ Provisions for assessment of reported damages (cracks, landslides, etc.,) to assets/structures during construction and payment, if applicable.	✓ Consultations, FGDs and meetings with communities ✓ GRM Helpline number through display at project locations and on flyers	✓ Bi-monthly ✓ As reported	KRIDE through ✓ District administration ✓ Civil works contractor
Civil works contractor	✓ Orientation on ESHS provisions; ✓ Sexual harassment provisions, ✓ Labour related aspects as provided in the Labour Management Procedures	✓ Provisions in Bid/Contract documents & also through Pre- bid conference	✓ During contract signing ✓ Periodic as part of worker's joining	KRIDE & Civil works contractor
Other Interested Parties (Internal) ✓ General Consultant ✓ Supervision Consultants ✓ Contractors, sub-contractors, service providers, suppliers, and their workers.	✓ Project information: scope and rationale and E&S principles ✓ Training in RPF and RAP requirements and other management plans ✓ Grievance mechanism process ✓ Feedback on consultant/ contractor reports	✓ Face-to-face meetings ✓ Trainings/workshops	As per requirement	KRIDE

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The K RIDE website (www. kride.in) will be used to disclose project documents, including those on environmental and social safeguard implementation performance. This will begin with disclosure of this draft EIA/EMP & draft SIA/RAP. Besides the draft disclosure documents (and the final documents in future), project brochures and updates will be posted. An easy-to-understand guide to the terminology used in the environmental and social reports or documents will also be posted on the website. In addition, the site will provide details about the Grievance Redress Mechanism and contact details. KRIDE will update and maintain the website regularly.

1.9. Proposed Strategy to Incorporate the Views of Vulnerable

The principle of inclusiveness will guide the stakeholder engagements, particularly with respect to vulnerable individuals and groups. In cases where vulnerable status may lead to people's reluctance or physical incapacity to participate in large-scale community meetings, the project will hold separate small group discussions with them at an easily accessible venue. This way, the project will reach out to groups who, under normal circumstances, may be insufficiently represented at general community gatherings. Some strategies to be adopted to reach out to these groups include:

- Identify leaders of vulnerable and marginalized groups to reach-out to these groups
- Engage community leaders, CBOs and NGOs working with vulnerable groups
- Organize face-to-face focus group discussions with these populations

1.10. Strategy to Conduct Stakeholder Engagement in Pandemic Context

COVID-19 has become a global issue and declared as pandemic by World Health Organization (WHO). Over the last two years, the whole world is collectively fighting against this pandemic to keep people safe. With the intent to contain the spread of COVID-19, GoI announced a nationwide complete lockdown on 25th March, 2020 and this lockdown continued till 31st May 2020. The pandemic has affected the country in different ways, with many states implemented border closures, other movement and social restrictions. Bangalore district lies in the state of Karnataka was also followed the same guidelines issued by Government of India. The situation is normal today and restrictions are withdrawn substantially.

The WHO expecting another wave of a variant of COVID 19 in June 2022. During the pandemic situation, movement and physical interaction would not be possible to conduct face to face interview, Focus Group Discussions, community meetings on the ground. In such situation, KRIDE may conduct consultations with various stakeholders using appropriate virtual platforms.

1.11. Resources and Responsibilities for Implementing Planned SEP Activities

1.11.1. Resources and Responsibilities

The Project Implementation Authority (PIA) headed by Managing Director has overall responsibility for stakeholder consultation and involvement. The proposed staffing complement from the ESIA management framework is given in Figure 2.

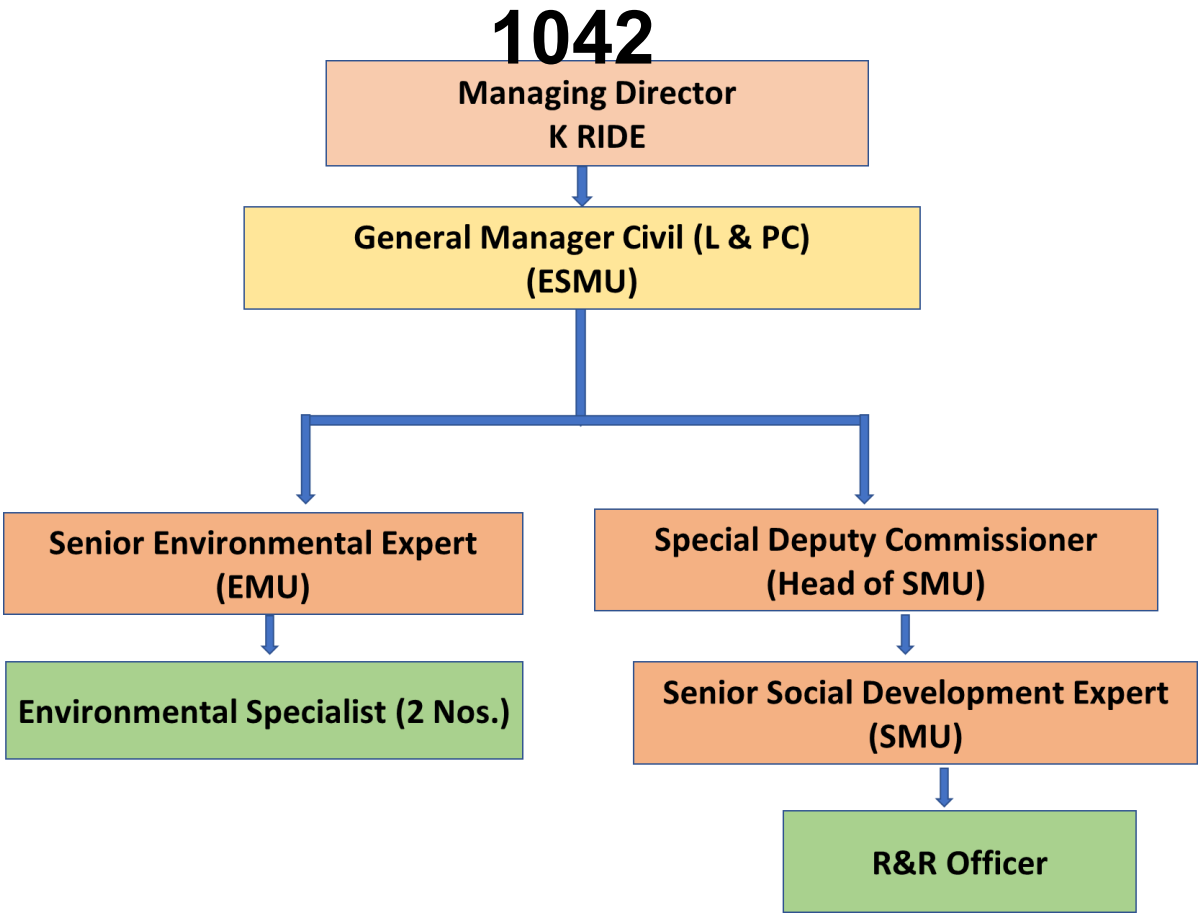

Figure.2. Organization Structure of PIA's Environmental & Social Management Unit

1.11.2. Social Management Unit

KRIDE will set up a Social Management Unit (SMU) which shall coordinate with the SLAO KIADB on land acquisition and undertake the resettlement and rehabilitation activities and stakeholder consultation and involvement. This SMU would be supported by a RAP Implementation Consultant (RAPIC). The roles and responsibilities of SMU are given below;

- Updating of RAP based on the revalidation of the census and socio economic survey and on completion of land acquisition activities.
- Implementation of R&R activities of BSRP;
- Land acquisition and R&R activities in the field;
- Ensure availability of budget for R&R activities;
- Liaison with SLAO , KIADB and district administration for support for land acquisition and implementation of R&R;
- Monitor land acquisition and progress of R&R implementation;
- Develop and implement a public consultation program and communication strategy for disclosure of RAP;
- Liaison with district administration for government's income generation and development programs for the PAPs;

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- Monitor physical and financial progress on land acquisition and R&R activities;
- Provide support for the affected persons on problems arising out of LA/ property acquisition

Special Deputy Commissioner would be the administrative head of the SMU. A Senior Social Development Expert (Sr.SDE) with educational background of post-graduation in Social Work or Sociology will be appointed in SMU as full time by KRIDE to assist Special Deputy Commissioner. A Resettlement and Rehabilitation Officer (RRO) with background of social science would be appointed (full time) in this SMU to supervise and monitor overall activities of resettlement implementation and consultation with project affected people and other stakeholder and he/she will report day to day progress to Sr.SDE. A civil engineer with a background of building valuation would be appointed to verify and approve the valuation of the non-titleholder, which would be prepared by the RAPIC. The KRIDE may hire more professionals if necessary during project implementation to support the Sr.SDE. The flow chart of organization setup for SMU is shown in Figure-3.

The duties of Sr. Social Development Expert will involve but are not limited to:

- Reporting to Special Deputy Commissioner (SDC);
- Support the special DC to management of Social Management Unit;
- Management all community/field related tasks in the field office;
- Review of community development plan based on mitigation proposed in RAP in coordination with RAPIC;
- Implement community engagement strategy and oversee all community liaison related matters;
- Manage the grievance mechanism set up for the project affected areas;
- Oversee implementation and monitoring of RAP;
- Establish a monitoring and evaluation plan and other tools established such as the grievance register, commitment register and consultation register;
- Provide reports to General Manager for onward submittal to Managing Director, K RIDE and AFD & KfW.

The duties of R&R Officer will involve but are not limited to:

- Reporting to Sr. Social Development Officer;
- Supervise and monitor overall activities of RAP & SEP;
- Perform community engagement;
- Provide liaison between community development programme measures and implementing partner-agency, if any;
- Manage arising community matters;

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- Perform monitoring and evaluation to track progress of implementation of mitigation measures and assess if progress and performance of mitigation actions being undertaken by the K RIDE to ensure objectives are met. Liaise with appropriate K RIDE personnel to ensure that grievances are tracked, reported and responded accordingly as necessary.

The duties of the Civil Engineer will involve but are not limited to:

- Verify the structure valuation prepared by the RAPIC;
- Guide and provide technical assistance to the structure affected PAPs on re-establishing the affected buildings utilising the salvaged materials.
- Support the Special DC to address the grievance of the structure affected PAPs.

The implementation activities will be scheduled as per the overall project implementation and included in individual RAPs for each section. All activities related to the land acquisition and resettlement will be planned to ensure that compensation is paid prior to displacement and commencement of civil works. Public consultation, internal monitoring and grievance redress will be undertaken intermittently throughout the project duration.

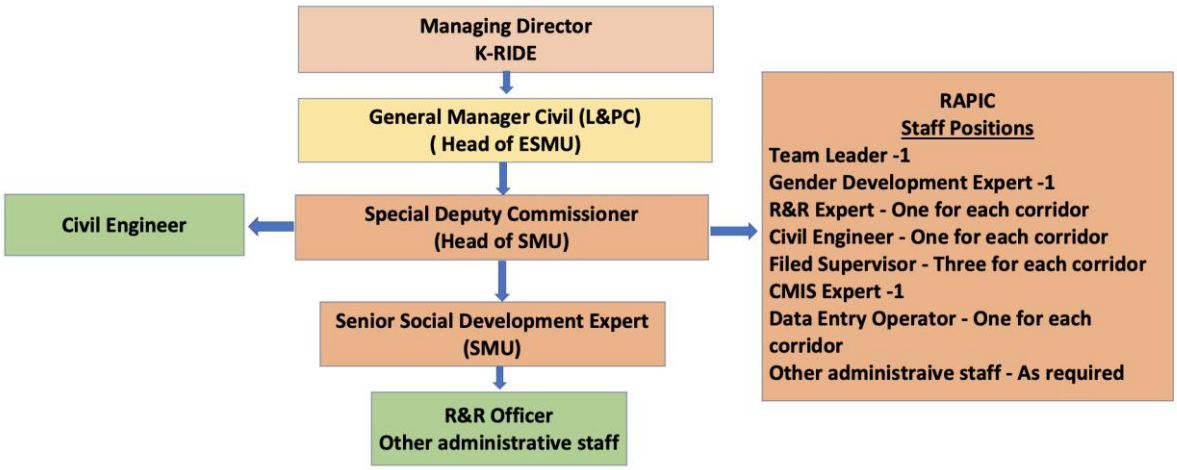

Figure.3.Organisation Setup of Social Management Unit

1.11.3. Environmental Management Unit

KRIDE will set up an Environmental Management Unit (EMU) which shall look after the monitoring and implementation of the environmental mitigation measures in the EMP and address the grievances of environmental and social issues of the project and ensure compliances with World Bank Frameworks, guidance note, General EHS guidelines and Railway specific EHS Guidelines and GIIPs and applicable State and National laws.

Senior Environmental Expert (Sr.EE) of EMU reports to General Manager Civil (L&PC) (ESMU) who is responsible for management of environmental and social issues of the project. Sr. Environmental Expert of EMU will be assisted by Environmental Specialist (2 nos), who shall be responsible to look after all the environment issues related to the project during the project preparation, implementation and operation periods. Environmental and Social Management Unit will be supported by the technical

and field staffs for the project implementation with the assistance of the Environmental Specialist of Design Consultant & Contractor. Organisation structure of EMU is presented in **Figure 4**.

It is envisaged that the Environmental Management Unit will be responsible for:

- Ensuring approvals/permission/NOC obtained from regulatory bodies/authorities for various components at different project stages
- Monitoring implementation of the EMP measures in consonance with the timeline for the project as per the approved budget;
- Maintaining interaction with the stakeholders, public and various statutory authorities pertaining to environment, land acquisition, rehabilitation and resettlement of K RIDE project;
- Interacting regularly with the Environmental Expert of Design Consultant & Contractor on the status of the environmental mitigation and enhancement measures;
- Inspecting project site on regular basis to monitor the mitigation measures being implemented by the Contractor;
- Document and disseminate good practices, minimize and resolve bottlenecks during the implementation of EMP.

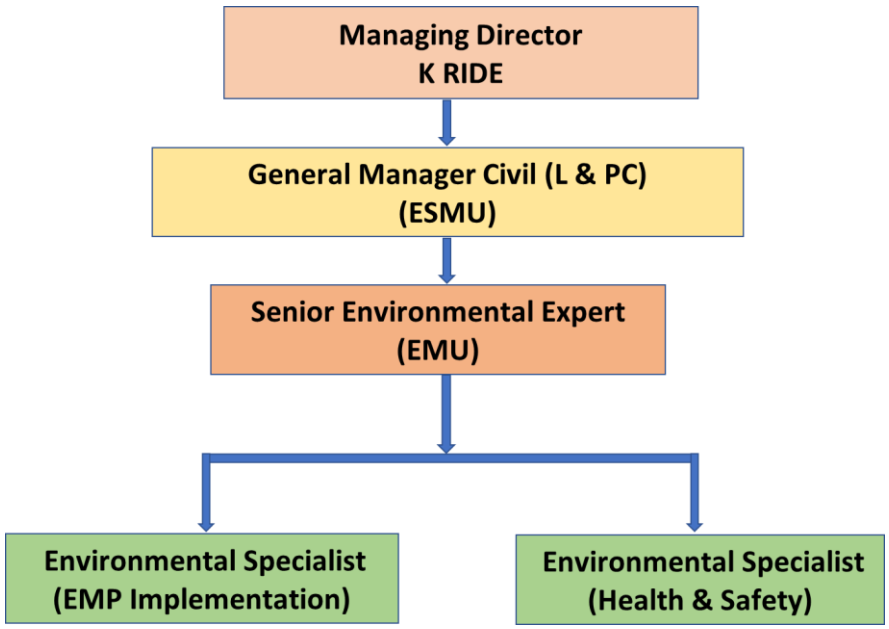

Figure.4.Organisation Setup of Environmental Management Unit

Responsibility of Senior Environmental Expert:

He is familiar with the Indian environmental legislation, environmental monitoring, EMP implementation aspects etc. The Environmental specialist shall oversee day to day implementation of the environmental management plans pertaining to the construction contract for various BSRP Corridors and is also responsible for monitoring reports to World Bank. Additional recruitment if needed will be undertaken as necessary on contract basis. He will be responsible for obtaining regulatory clearances. He will coordinate with PIA to conduct necessary training program for the workers, engineers and office staffs. Briefing the Contractor about the requirements of the Environmental Specification and/ or EMP, as applicable, advising the Engineer about the

interpretation, implementation and enforcement of the Environmental Specification and other related environmental matters, monitoring and reporting on the performance of the contractor/project in terms of environmental compliance with the EMP to the GM (L&PC) and MD KRIDE and KfW & AFD and providing technical advice relating to environmental issues are also the responsibility of the Senior Environmental Expert.

Responsibility of Environmental Specialist (EMP Implementation);

The main duties of the Environmental Specialists will include:

- Collection and dissemination of relevant environmental documents including amendments to environmental protection acts issued by the Government and various agencies such as the World Bank and other organisations.
- Co-ordination with non-government organisations (NGOs), community groups, government departments, etc. on environmental issues and obtaining the necessary clearances from the regulatory authorities.
- Monitoring the environmental aspects of the project during construction to ensure that the environmental requirements of the contract and the mitigation measures proposed in the EMP are implemented.
- Development of guidelines or a code of good practice on low-cost environmental measures that can be implemented in the railway construction and maintenance programs for the PIA.
- Development of environmental training activities for contractors and supervisory consultants staff.
- Assistance to local governments in the restoration of the environmentally degraded portions of any existing Right-of-Way, which may revert to their control due to the construction of realignments.
- Promotion of the policies adopted for the development of aesthetics of stations, depots & along rail alignments.
- Coordinating with the EO of PIA and report to GM (L&PC) on all matters related to implementation of the Environmental Management Plan.
- Laison with institutional stakeholders such as Forest Dept., Pollution Control board, Ground Water Dept., Urban Local Body, Lake Authority etc., for approvals and smooth implementation of Environmental Management Plan.
- Issuing completion certificate for constructed railway works (Stations, Deports & suburban Railway alignments) for payment.

Responsibility of Environmental Specialist (Health & Safety);

The main duties of the Environmental Specialists will include:

- Collection and dissemination of relevant health and safety documents issued by the Ministry of Railways and other funding agencies such as the World Bank, KfW and other organisations.

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- Co-ordination with non-government organisations (NGOs), community groups, government departments, etc. on environmental health and safety issues and addressing suitable manner.
- Advising the Engineer and preparing the environmental health and safety inputs for the monthly progress report.
- Development of guidelines or a code of good practice on low-cost environmental health and safety measures that can be implemented in the railway construction and maintenance programs for the PIA.
- Development of environmental training activities for contractors and supervisory consultants staff.
- Assistance to local governments in the restoration of the environmentally degraded portions of any existing Right-of-Way, which may revert to their control due to the construction of realignments.
- Assistance with the rail safety components (Stations, Deports & suburban Railway alignments).
- Ensuring and reporting of construction health and safety, labour health and safety and community health and safety as per WB's Environmental Health and Safety guidelines at railway construction site, stations, depots, sub-stations and project associated facilities such as batching mix plant, disposal sites, etc.,

1.12. Budget

Funding for the SEP implementation will be included as part of project cost, and this will be financed by KRIDE. The project allocates an annual budget of INR 44 Lakh for stakeholder engagement activities in the initial phase of the project. This includes the cost of printing, documentation, advertisement, venue, transportation, refreshment and other miscellaneous. Stakeholder engagement budget will increase gradually commensurate with project development. Breakup of the budget is given in below table.

Table 11: Cost for SEP

Sl No	Description	Amount (INR)
1	Cost for two consultations covering priority corridors	10,00,000.00
2	Cost for two consultations covering nonpriority corridors	10,00,000.00
3	Consultations at community level	20,00,000.00
4	Miscellaneous @ 10% of the total cost	4,00,000.00
Total		**44,00,000.00**

1.13. Grievance Redressal Mechanism

1.13.1. Need for a Grievance Redress Mechanism

GRM is a key tool through which local communities and other stakeholders exercise their voice. They are a way to mitigate, manage, and resolve potential or realized negative impacts, and to ensure that the project proponent (KRIDE) meet their obligations in terms of international human rights law. GRM enables project proponent to learn about and resolve concerns related environmental and social aspects including implementation of mitigation measures, ensuring workers and community health and safety, payment of compensation, resettlement and rehabilitation, restoration of loss of

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livelihood activities, assistance to the vulnerable people, replacement of common property resources, etc., as stated in the Environmental Management Plan (EMP) & Resettlement Action Plan (RAP) before they escalate. GRMs should permit a peaceful and timely resolution of problems, assuring stakeholders that their concerns have been heard and that the institutionalized mechanism will yield a fair and impartial outcome.

1.13.2. Grievance Redressal Mechanism in the BSRP Project

The land acquisition for the project is being done by the special land acquisition officer, Karnataka Industrial Areas Development Board (KIADB), Bangalore as per the KIADB Act. KIADB act as Competent Authority in addressing land and property ownership issues. All grievances related environmental and social issues (implementation of EMP measures & compensation for land and resettlement assistance) will be addressed by the General Manager (Land & Project Co-ordination), KRIDE. Grievances received at the corporate office of KRIDE, will be sorted according to subject matter and will be informed the respective offices/agencies to resolve it.

Grievance redress will be carried out at two levels: namely first level and the appellate level. Grievances of affected persons will be first brought to the attention of KRIDE (through contractor, Environmental and social field officers of KRIDE, Environmental monitoring consultant, Resettlement Plan implementation Consultant, etc) and land acquisition office, KIADB. At this level, the time taken to address a matter may vary from 15 days to one month, depending on the matter. Land related cases take longer than one week as it may require providing legal documents, change of alignment or dropping the properties from acquisition etc. All these matters require consultation with planning and design section, before a decision can be reached, thus the process can extend upto a month.

In cases where the affected person is not satisfied with the decision of the land acquisition office or the field level office / corporate office of the KRIDE, the person can approach the Grievance Redress Committee (GRC). The GRC will convene within 15 days of receiving the matter. The grievance redress process is given in Figure 5. The composition of the GRC is:

Director (Projects and Planning),	Chairman
General Manager (L & PC)	Convener
General Manager (F & A)	Member
Chief Public Relations Officer	Member
Chief Engineer of concerned Reach	Member
Tahsildar	Member
Community Representative (PAP - Male)	Member
Community Representative (PAP – Female)	Member
Team Leader of Resettlement Plan Implementation Consultant	Member
Team Leader of Environmental Monitoring Consultant	Member

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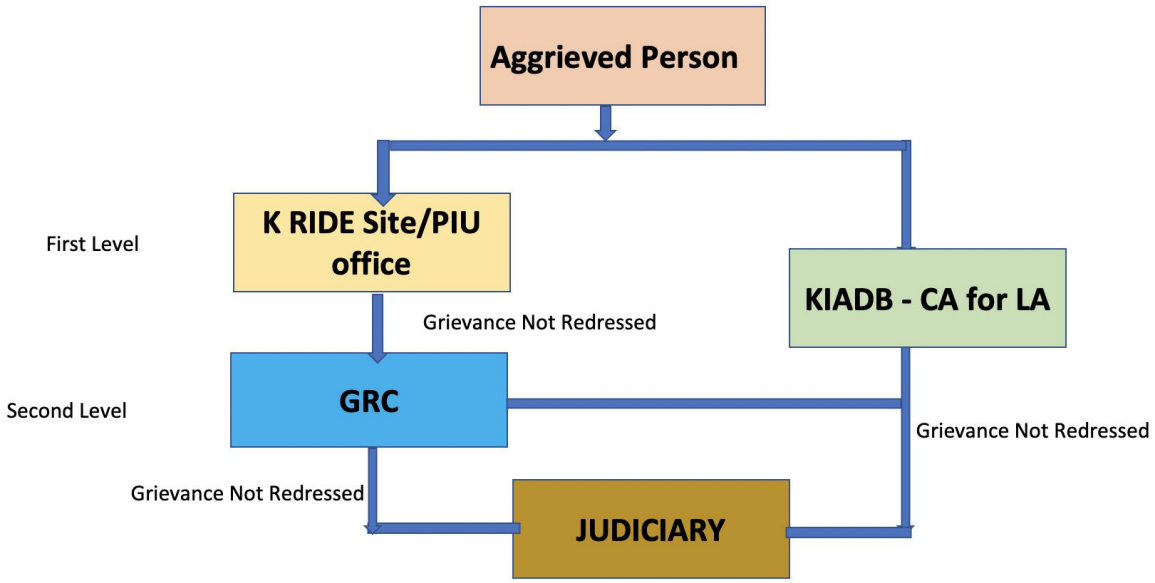

Figure.5.Grievance Redress Process

The main responsibilities of the GRC are:

- to provide support to affected persons on problems arising out of eligibility provided entitlements compensation and assistance provided;
- to record the grievance of the disadvantage community & PAPs and resolve them within the stipulated time frame;
- to report to the aggrieved parties about the development regarding their grievances and decision of KRIDE;
- address problems and complaints arising out of land acquisition and relocation of utilities;

Registration of Grievances

Grievances can be submitted as the written application in English or Kannada at the KRIDE field office, corporate office, or land acquisition officer. Careful documentation of the name of the complainant, date of receipt of the complaint, address/contact details of the person, location of the problem area, and how the problem was resolved will be undertaken. The Project Management Unit (PMU), KRIDE will have the overall responsibility for timely grievance redress on environmental & social safeguards issues and for registration of grievances, related disclosure, and communication with the aggrieved party. The aggrieved person also has the option of opting for judicial review/intervention by the courts at any point in time.

The project may be established a grievance redressal cell at PMU headed by a Public Relation Officer solely responsible for handling the grievance of the people. The team will be responsible for directing the aggrieved person to the concerned official through appropriate mode of communication. On receiving any complaints, a unique number may be generated (MIS based) which will be the reference number for the caller, and s/he can trace the progress of his/her grievance / query through that number. Any complaint lodged will be addressed within 15 days of receiving the complaint. The system may have escalation matrix, i.e. if the grievance / query remains unattended or there is no response from the concern officer for a specified period of time than the system will escalate the grievance / query to the next level and the notification will be sent to the Public Relation officer and the petitioner.

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The project will also commit itself to proactive disclosure and sharing of information with the key stakeholders, including the communities/beneficiaries. The environmental monitoring and resettlement plan implementation consultants (would be appointed by KRIDE) staff will be responsible for assisting illiterate community members and other stakeholders in registering their grievances.

1.13.3. Process Flow of Grievance Redressal Mechanism

The grievance redress mechanism will be planned around the following process flow.

Step 1: Grievance is received by the redressal officer at field level or PMU and the officer will enter the details of the complainant.

Step 2: A confirmation will be sent through auto generated SMS, with a reference number to the person on receipt of the complaint.

Step 3: Once the complaint is registered, the concerned officer/consultants will receive an SMS notification, with a deadline of 15 days to resolve the grievance. The public relation officer will monitor the complaint status by option of choosing the following actions:

a) View (Complaint will be viewed)

b) Action (what are the actions that have been taken to resolve the complaint)

c) Assign / forward (the action will be forwarded)

d) Resolve (The Problem is solved in the stipulated timeperiod)

e) Escalate (The complaint will be escalated to the appropriate authority)

Step 4 - Taking Action: A window of 15 days will be provided to the field level officers of KRIDE/consultant/Contractors site representative concerned to resolve the issue and submit their responses. In case of non-response, SMS alert will be issued to remind the officers about the action pending.

Step 5 - Resolving the grievance: Once the grievance is addressed and updated information is placed in the software, the grievance is labelled as resolved. An SMS will be accordingly issued to the complainant. If any grievance is not resolved within 15 days an SMS alert will be issued to the Public Relation Officer, PMU and the concerned officer will take appropriate action (elevate the same for the consideration of GRC) to solve the grievance.

Meetings and decision-making process of the committee: It is suggested that grievance committee shall meet regularly (at least twice in a month) on a pre-fixed date. The committee will fix responsibilities to implement the decisions of the committee. This will not only help proper assessment of the situation but also in suggesting corrective measures at the field level itself. The committee shall deliver its decision within seven days of the sitting.

1.13.4. Functions of GRC

Field Level Complaint Handling System

The complaints received from community members and other stakeholders of any concerns or complaints, or grievances should be taken up in the grievance redressal process. The concerned officer should maintain a register of all petitions received with details of date of receipt of the petition, the date of hearing, if any, date when it was considered by the committee, along with nature of

complaint/concern, action taken, and date of communication sent to petitioner. Communication in writing should be sent to the aggrieved person about the date, time and venue of the GRC sitting and make it known that s/he is entitled for personal hearing and that representation through the proxy will not be entertained. Communication will also be sent through Environmental & Resettlement Plan Implementation Consultants so as to ensure that the petitioner is informed about the date of GRC sitting.

Copies of petitions received 1-week prior to the committee's sitting should be sent to the Chairman and the member along with an explanatory note from appropriate authority and/or environmental and resettlement plan implementation consultants, as the case may be, to enable the Chairman and member to scrutinize the petitions in detail. Petitions received during the week of the committee's sitting, shall be taken up during the sitting and resolved.

Response Time

The GRC will hear grievances once in 15 days. The GRC will inform the complainant of their decision within three days of the hearing of the grievance.

There is no cost involved in approaching the project authorities or the GRC in registering grievances. The grievance redress mechanism is accessible to not only the affected persons, but the community as a whole.

Detail address of Grievance Redressal Officer is given below.

Rail Infrastructure Development Company (Karnataka) Ltd.,
"Samparka Soudha", 1st Floor, (Opp. Orion Mall),
Dr. Rajkumar Road, Rajajinagar 1st Block,
Bengaluru – 560 010,
Karnataka.
E-mail:
Toll Free No.:

1.13.5. GRM during Covid-19 & Omicron Pandemic Situation

Covid-19 and Omicron pandemic has severely affected the global economy from the year 2020 onwards. Many countries imposed lockdown to regulate the spreading of the virus to its people. Still the situation is grim where many countries are fighting against it. Recently World Health Organisation has cautioned the world on increasing cases in European and Central Asia countries. Again, spreading of Covid-19 or Omicron viruses cannot be ruled out in India. In such cases, if lockdown imposed by State Govt., project authority should come up with mechanism to receive the grievances in online and address the same through either telephone discussions or virtual meetings.

1.14. Monitoring and Evaluation

Monitoring stakeholder engagement process is new to the project. A process of establishing monitoring criteria is an initial phase of development. The results to be analysed will provide background for planning better initiatives for the operation, closure and rehabilitation project stage. The following SEP activities require monitoring and evaluation from assigned personnel and team in the project:

- Implementation of BSRP stakeholder engagement strategy that includes activities to be carried out in different phases of the project.

- Implementation of Grievance Mechanism as part of SEP which includes dissemination of Grievance Mechanism, grievance logging and tracking, action taken, effectiveness of grievance management, confidentiality of the grievance raised, and number of grievances solved. A sample of stakeholder log is attached at Appendix-2.
- Evaluation of SEP implementation will be carried out at least annually. Evaluation is essential to provide feedback to improve Project SEP and enhance Project- stakeholder's relationship.

1.15. Reporting

Monthly Reports: The Public Relation Officer will prepare brief monthly reports on stakeholder engagement activities for the Managing Director, KRIDE, which includes:

- Activities conducted during each month;
- Public outreach activities (meetings with stakeholders and newsletters);
- Entries to the grievance register;
- Entries to the commitment and concerns register;
- Number of visits to the information centre;
- Progress on other social development activities
- Plans for the next month and longer term plans.

Monthly, quarterly and semi-annual reports will be used to develop annual reports reviewed by senior managers of PIA. These reports will be shared with AFD & KfW.

Annual Reports: The office of the Project Director will compile a report summarizing SEP result on an annual basis. The report will provide summary of all public consultation issues, grievances and resolutions. The report will provide a summary of relevant public consultation findings from informal meetings held at community level. These evaluation reports should be presented to the concerned senior officer of KRIDE. The evaluation report should be published to a wider audience in a transparent way through public domain documents and websites such KRIDE's website, annual report, newsletters, articles, local media and other outreach tools.

A yearly evaluation should be conducted by an independent consultant/agency using a perception survey, which uses that same set of questions over time to achieve continuity. The first survey to assess stakeholder perceptions should be conducted before commencement of major construction work to provide a baseline for community perceptions.

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Appendices

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Appendix 1: Minutes of the Stakeholder Consultations

Sl No	Stakeholders	Stake in the project	Date of the consultation /discussion	Venue of the consultation	Number of participants	Points Discussed	Suggestions/Opinion of the participants
1	Karnataka Slum Development Board	Certain declared and undeclared slums are falling in the alignment. Development of the declared slum in Karnataka is in the scope of the Karnataka Slum Development Board.	17.3.22	At the office of the Commissioner, Karnataka Slum Development Board, Bangalore	3	The resettlement of the residents of the Mr. Jayaram Colony, Mathikere	• Commissioner KSDB has suggested to have a joint meeting with the KSDB, K RIDE officials and elected representatives of the slum located constituency (Malleswaram Constituency)
2	Special Land Acquisition Officer, Karnataka Industrial Area Development Board, Zonal Office	Land acquisition for the project is being done by KIADB as per the KIAD Act 1966.	25.3.22	Office of the Special Land Acquisition Officer, Karnataka Industrial Area Development Board, Zonal Office	2	Land acquisition and disbursement of compensation and Resettlement and Rehabilitation assistances	• The land acquisition is being done as per the Karnataka Industrial Area Development Act (KIADA), 1966 and the compensation and R&R benefits will be estimated as per the RFCTLARR Act 2013. In response to the question about the resettlement assistance for non-tilted holder, he has stated that the same to be paid by K RIDE, based on the entitlement matrix of the project
3	Residential and Residential cum commercial owners of Corridor 2	Physical and economical displaced Families	17.3.22	Mohan Nagar	9	Compensation and R&R activities	• All are welcomed the project at the same time they are concerned about the compensation packages, they suggested for the prevailing market rate for the affected land and building. The tenants of the buildings requested for sufficient advance notice to find out a suitable location to shift their

Sl No	Stakeholders	Stake in the project	Date of the consultation /discussion	Venue of the consultation	Number of participants	Points Discussed	Suggestions/Opinion of the participants
							activities. The PAPs requested to maintain transparency in acquisition procedures and fixing of compensation.
4	Residential owners of declared slum	Physical Displaced Families	18.3.22	Mr. Jayaram Colony, Mathikare, Corridor 2	12	R&R activities	• There are two different opinions on relocating from this location to another site. Certain people are ready to relocate if they get 'Patta land' (legal ownership) for at least the same area of which they presently enjoying in the current location. Few people suggested that the resettlement site should be near to the existing location.
5	Residential owners of undeclared slum	Physical Displaced Families	25.3.22	Nayandahalli, Near Railway Gate, Vinayaka Extension, corridor 3	14	R&R activities	• The people at this location did not cooperate with the social survey. They stated that without a proper plan for rehabilitation they will not cooperate with the survey. Consultation is in progress with the affected community as well as with the community leaders.
6	Displaced Employees of commercial building	Loss of livelihood	14.3.22	Yelahanka (Near Railway Station)		Loss of livelihood assistance	• Last 20 years they are working as power looms operators, and they are earning around Rs. 3000 per week. Once they get displaced from the existing job it would be difficult for them to get a job in a new place, as it is not clear that the same owner would continue the business after the demolition of the structure. Even if he

Sl No	Stakeholders	Stake in the project	Date of the consultation /discussion	Venue of the consultation	Number of participants	Points Discussed	Suggestions/Opinion of the participants
							is interested to reestablish the same at new place it may take some time. Hence, they demanded for some resettlement assistances for the period actual job loss
7	Residential and Residential cum commercial owners.	Physical and economical displaced Families	14.3.22	Yelahanka (Near Railway Station)	8	Compensation and R&R activities	• All are welcomed the project at the same time they are concerned about the displacement from their houses. They have requested to limit the project implementation in the land owned by the railway. If it is necessary to acquire their land sufficient compensation and resettlement assistances to be provided. They will lose both their houses as well as the source of income.
8	Displaced **Residential Tenants.**	Affected Families	15.3.22	Mahadevapura	9	Relocation to new houses	• They are worried on getting the deposited amount (advance paid to the owner) back and another suitable house within this rent at nearby areas, as their children are studying in nearby schools also their source of livelihood activities are nearby. They requested for sufficient advance notice and assistance to transport their household item to new location
9	Displaced aged **Residential Owner**	Physical and economical (income for rent) displaced vulnerable household	15.3.22	Mahadevapura	5	Compensation and Resettlement	• A resident for the area is staying in his own house for last 23 years. He is around 63 aged old. He is staying in the

Sl No	Stakeholders	Stake in the project	Date of the consultation /discussion	Venue of the consultation	Number of participants	Points Discussed	Suggestions/Opinion of the participants
						and Rehabilitation	ground floor house of a G+1 building, and he has rented out the 1st floor houses. He is a retired employee of a private firm, his sole source of livelihood is income from the rented buildings, which is around Rs.15000/month. He and his spouse are staying in the house, they don't have children and other family members to take care of them. He has demanded that; he must get an alternate house and good compensation for his land and building (preferably as per the Bangalore Metro Rail Corporation's compensation package)
10	Community members (Random survey and face to face discussion)	Probable commuters of BSRP (beneficiaries)	20. 03.2022 to 8 .04.2022	At the proposed station locations	1000	Various aspects on BSRP and public transport	• The project will provide better connectivity between the suburban areas of Bengaluru with the city centers of Bengaluru, which will control the concentration of settlements in the city centers. • Lower income families can stay in affordable houses in suburban areas of Bengaluru and commute to the city for their source of livelihood at affordable travel cost, which will have control on developing new slum settlements also. • Travel time reduces as suburban railway project caters the people from

Sl No	Stakeholders	Stake in the project	Date of the consultation /discussion	Venue of the consultation	Number of participants	Points Discussed	Suggestions/Opinion of the participants
							the outskirts of the city without traffic block. People believe that suburban railway project will enhance the aesthetic looks of the city, as the migration to city centers would be reduced. • People do not have any problem in surrendering their land and assets if better rates are given for their affected assets. The proposed suburban railway project would be an efficient and effective transport facility for the people settled in the outskirts of the city for their day to day travel. It will also reduce air pollution, save fuel and road accidents. • The proposed suburban railway project will lead to diverse ways of livelihood opportunities for people also savings on their expenditure on day to day travel. People told that, due to the high expense on the travel cost and time delay they are compelled to stay in city in unhygienic atmosphere, once the BSRP is operational they can move to the outskirts and travel for their work. • The BSRP would be a reliable mode of transport with high safety to the vulnerable sections of the society, hence the mobility of women would be increased. Women in Indian scenario

Sl No	Stakeholders	Stake in the project	Date of the consultation /discussion	Venue of the consultation	Number of participants	Points Discussed	Suggestions/Opinion of the participants
							need to travel along with aged parents (medical purpose) or with minor children, travelling in public bus will always be difficult for them. They feel that the BSRP will be a more comfortable travel mode for them. • The suburban railway project will provide more livelihood opportunities for small and marginal farmers, those who cultivating vegetables, fruits and flowers in the outskirts of the city, as suburban railway project will provide good access to these people to the market for their produces. • Few households based small poultry farmers shared their opinion that, the BSRP may give better opportunities for them also, as there is a high demand for 'Natti Motte' (country eggs) in Bangalore city but taking the eggs in buses are always risky. • The women face a lot of difficulties while travelling on public buses. However, they feel that Suburban railway would be a safe mode of transport for them. The women demanded for separate coach reserved for them on the train, at least in peak hours and guarded coach in late evenings and early mornings.

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Sl No	Stakeholders	Stake in the project	Date of the consultation /discussion	Venue of the consultation	Number of participants	Points Discussed	Suggestions/Opinion of the participants
							• The business (mainly the developers) groups found to be very enthusiastic because they feel that the proposed project will bring a lot of business opportunities for them. • Lack of end to end connectivity is the main issue of the commuters, hence they are forced to travel by private vehicle. If KRIDE provides sufficient facilities for parking, mainly at the stations located outside the city would be beneficial for the commuters. • Integration of BMTC with BSRP: BMTC may operate feeder bus services from outskirts settlements to the nearest BSRP stations on a regular basis, which will make BSRP more inclusive. • Adequate compensation needs to be provided for Project Affected Families. • Toilet facilities may be provided at all the stations. • Station design must be differently abled people friendly. • The daily wage labourers should get work opportunity during the construction of the project. The qualified individuals should get employment opportunities during operation of the BSRP (reservation may be given to the member of the project displaced families). Further, it should

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Sl No	Stakeholders	Stake in the project	Date of the consultation /discussion	Venue of the consultation	Number of participants	Points Discussed	Suggestions/Opinion of the participants
							also create an opportunity for the poor and vulnerable (including women headed households, SC & ST families, etc.,) people to open a shop and small businesses in suburban stations. • Certain people may lose their access to their properties (at certain locations middle portion of the existing road/access are in the proposed land acquisition area – hence the connectivity of the road may lose). • People are worried about the stability of the certain old buildings located very close to the proposed alignment during construction (due to piling or heavy machinery movement), compensation and resettlement assistances to be done by KRIDE for structural damages, if any during construction. • The residential squatters demanded for resettlement prior to the commencement of civil works.

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Appendix 2: Sample of stakeholder log

Sl No	Date	Venue/Place	K RIDE staff in attendance.	Contact Persons/ organization	Meeting Summary/ Key Issues Raised	Follow-up Actions

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Annexure 8.1. Drinking Water Quality Standards (IS 10500:2012)

Sl. No.	Characteristic	Requirement (Acceptable Limit)	Permissible limit in the absence of alternate source	Remarks
Essential Characteristics				
1	Colour, Hazen units, Max	5	15	Extended to 15 only, if toxic substances are not suspected in absence of alternate source
2	Odour	Agreeable	Agreeable	a) Test cold and when heated b) Test at several dilutions
3	pH Value	6.5 to 8.5	No relaxation	-
4	Taste	Agreeable	Agreeable	Test to be conducted only after safety has been Established.
5	Turbidity NTU, max	1	5	-
6	Total dissolved solids, mg/l, Max	500	2000	-
7	Aluminium (as Al), mg/l Max	0.03	0.2	-
8	Ammonia (as total ammonia-N), mg/l Max	0.5	No relaxation	-
9	Anionic detergents (as MBAS), mg/l, Max	0.2	1.0	-
10	Barium (as Ba), mg/l, max	0.7	No relaxation	-
11	Boron (as B), mg/l Max	0.5	1.0	-
12	Calcium (as Ca) mg/l, Max	75	200	-
13	Chloramines (as Cl_2), mg/l, Max	4.0	No relaxation	-
14	Chloride (as Cl) mg/l, Max	250	1000	-
15	Copper (as Cu) mg/l, Max	0.05	1.5	-
16	Fluoride (as F) mg/l, Max	1.0	1.5	-
17	Free residual Chlorine, mg/l, Min	0.2	1	To be applicable only when water is chlorinated. Tested at consumer end. When protection against viral infection is required, it should be minimum 0.5 mg/l
18	Iron (as Fe) mg/l, max	0.3	No relaxation	Total concentration of manganese (as Mn) and iron (as Fe) shall not exceed 0.3mg/l
19	Magnesium (as Mg) mg/l, Max	30	100	-
20	Manganese (as Mn) mg/l, Max	0.1	0.3	-

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Sl. No.	Characteristic	Requirement (Acceptable Limit)	Permissible limit in the absence of alternate source	Remarks
21	Mineral oil, mg/l Max	0.5	No relaxation	-
22	Nitrate (as NO_3) mg/l, Max	45	No relaxation	-
23	Phenolic compounds (as C_6H_5OH) mg/l, Max	0.001	0.002	-
24	Selenium (as Se), mg/l, Max	0.01	No relaxation	-
25	Silver (as Ag), mg/l, Max	0.1	No relaxation	-
26	Sulphate (as SO_4) mg/l, Max	200	400	May be extended to 400 provided that Magnesium does not exceed 30
27	Sulphide (as H_2S) mg/l, max	0.05	No relaxation	-
28	Total alkalinity as calcium carbonate, mg/l Max	200	600	-
29	Total Hardness (as $CaCO_3$) mg/l, Max	200	600	-
30	Zinc (as zn), mg/l, Max	5	15	-
31	Cadmium (as Cd), mg/l, Max	0.003	No relaxation	-
32	Cyanide (as CN), mg/l, Max	0.05	No relaxation	-
33	Lead (as Pb), mg/l, Max	0.01	No relaxation	-
34	Mercury (as Hg) mg/l, Max	0.001	No relaxation	-
35	Molybdenum (as Mo) mg/l, max	0.07	No relaxation	-
36	Nickle (as Ni), mg/l, max	0.02	No relaxation	-
37	Polychlorinated biphenyls, mg/l, max	0.0005	No relaxation	-
38	Polynuclear aromatic hydrocarbons (as PAH) mg/l, Max	0.0001	No relaxation	-
39	Total Arsenic (as As), mg/l, Max	0.01	0.05	-
40	Total Chromium (as Cr) mg/l, Max	0.05	No relaxation	-
41	Trihalomethanes Bromoform, mg/l, max Dibromochloromethane, mg/l, max Bromodichloromethane, mg/l, max Chloroform, mg/l, max	 0.1 0.1 0.06 0.2	 No relaxation No relaxation No relaxation No relaxation	-
42	Radioactive materials a) Alpha emitters Bq/l max b) Beta emitters pci/l, Max	 0.1 1.0	 No relaxation No relaxation	-

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Annexure 8.2. Effluent Discharge Standards

Sl. No.	Parameter	Unit	Effluent Discharge Standards (Inland Surface Water), GOI	Treated Sanitary Sewage Discharges by IFC
1	Colour &Odor	--	All efforts should be made to remove colour and unpleasant odor as far as practicable.	-
2	Suspended Solids Max.	mg/l	100	50
3	Particle size of Suspended Solids	--	Shall pass 850 micron IS Sieve	-
4	pH value	--	5.5 to 9.0	6.0-9.0
5	Temperature, Max.	°C	Shall not exceed 5□C above the receiving water temperature	-
6	Oil and grease, Max.	mg/l	10.0	10.0
7	Total residual Chlorine, Max.	mg/l	1.0	-
8	Ammoniacal Nitrogen (as N), Max.	mg/l	50	-
9	Total Kjeldahl Nitrogen (as N), Max.	mg/l	100	-
10	Free Ammonia (as NH_3), Max.	mg/l	5	-
11	Biochemical Oxygen Demand (5 days at 20°C), Max.	mg/l	30	30
12	Chemical Oxygen Demand Max.	mg/l	250	125
13	Arsenic (as As), Max.	mg/l	0.2	-
14	Mercury (as Hg), Max.	mg/l	0.01	-
15	Lead (as Pb), Max.	mg/l	0.1	-
16	Cadmium (as Cd), Max.	mg/l	2.0	-
17	Hexavalent Chromium (as Cr^{+6}), Max.	mg/l	0.1	-
18	Total Chromium (as Cr) Max.	mg/l	2.0	-
19	Copper (as Cu), Max.	mg/l	3.0	-
20	Zinc (as Zn), Max.	mg/l	5.0	-
21	Selenium (as Se), Max.	mg/l	0.05	-
22	Nickel (as Ni), Max.	mg/l	3.0	-
23	Cyanide (as CN), Max.	mg/l	0.2	-
24	Fluorides (as F), Max.	mg/l	2.0	-
25	Dissolved phosphates (as P), Max.	mg/l	5.0	-
26	Sulphides (as S), Max.	mg/l	2.0	-
27	Phenolic compounds (as C_6H_5OH), Max.	mg/l	1.0	-
28	Radioactive Materials □ Emitters, □curie/ml, Max. □ Emitters, □curie/ml, Max.	mg/l	10-7 10-6	-
29	Bio-assay test	mg/l	90% survival of fish after 96 hours in 100% effluent	-
30	Manganese (as Mn)	mg/l	2.0	-
31	Iron (as Fe)	mg/l	3.0	-
32	Vanadium (as V)	mg/l	0.2	-
33	Nitrate Nitrogen	mg/l	10.0	-
34	Total Nitrogen	mg/l	-	10.0
35	Total phosphorus	mg/l	-	2.0

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Annexure 8.3. Tolerance Limits for Inland Surface Water Quality

Characteristic	Designated Use Class of Inland Waters				
	A	B	C	D	E
pH value	6.5 to 8.5	6.5 to 8.5	6.5 to 8.5	6.5 to 8.5	6.0 to 8.5
Dissolved Oxygen, mg/l, Min.	6	5	4	4	-
Biochemical Oxygen Demand (5 days at 20^0C), mg/l	2	3	3	-	-
Total coliform organisms, MPN/100 ml. Max.	50	500	5000	-	-
Colour Hazen units	10	300	300	-	-
Chlorides (as Cl), mg/l Max.	250	-	600	-	600
Sodium Adsorption ratio Max.	-	-	-	-	26
Boron (as B), mg/l. Max.	-	-	-	-	2
Sulphates (as SO_4), mg/ l	400	-	400	-	1000
Nitrates (as NO), mg/l Max.	20	-	50	-	-
Free Ammonia (as NH_3), mg/l	-	-	-	1.2	-
Conductivity at 25° C microhm / cm Max.	-	-	-	1000	2250
Arsenic (as As), mg/l. Max.	0.05	0.2	0.2	-	-
Iron (as Fe), mg/l	0.3	-	50	-	-
Fluorides (as F), mg/l	1.5	1.5	1.5	-	-
Lead (as Pb), mg/l. Max.	0.1	-	0.1	-	-
Copper (as Cu), mg/l	1.5	-	1.5	-	-
Zinc (as Zn) mg/l/ Max.	1.5	-	1.5	-	-
Manganese (as Mn), mg/l	0.5	-	-	-	-
Total Dissolved Solids, mg/l	500	-	1500	-	2100
Total Hardness ($CaCO_3$), mg/l	300	-	-	-	-
Magnesium (as Mg), mg/l	100	-	-	-	-
Chlorides (as Cl), mg/l	250	600	-	-	600
Cyanides (as CN), mg/l	0.05	0.05	0.05	-	-

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Annexure 8.4. National Ambient Air Quality Standards

Pollutant	National Ambient Air Quality Standards,GOI			Air Quality Standards by IFC	
	Time Weighted Average	Industrial, Residential, Rural & Other Area	Ecologically Sensitive Area(notified by Central Government)	Averaging Period	GuidelineValue in µg/m3
Sulphur Dioxide (SO_2), µg/m^3	Annual	50	20	10 minute	500
	24 Hours**	80	80	24-Hour	20
Nitrogen Dioxide as NO_2, µg/m^3	Annual	40	30	1-Year	40
	24 Hours**	80	80	1-Hour	200
Particulate Matter (size less than 10µm) or PM_{10} µg/m^3	Annual	60	60	1-Year	20
	24 Hours**	100	100	24-Hour	50
Particulate Matter (size less than 2.5µm) or PM2.5 µg/m^3	Annual *	40	40	1-Year	10
	24 Hours**	60	60	24-Hour	25
Ozone (O3) µg/m^3	8 hours**	100	100	8-Hour daily maximum	100
	24 Hours**	180	180	-	-
Lead (Pb µg/m^3	Annual *	0.50	0.50	-	-
	24 Hours**	1.0	1.0		
Carbon Monoxide (CO) mg/m^3	8 Hours**	02	02	-	-
	1 Hour**	04	04		
Ammonia (NH_3) µg/m^3	Annual *	100	100	-	-
	24 Hours**	400	400		
Benzene (C_6H_6) µg/m^3	Annual *	05	05	-	-
Benzo (a) pyrene (BaP) particulate phase only ng/m^3	Annual *	01	01	-	-
Arsenic (AS) ng/m^3	Annual *	06	06	-	-
Nickle (Ni) ng/m^3	Annual *	20	20	-	-

Source: Central Pollution Control Board Notification dated 18th November 2009, GOI and General EHS Guidelines: Environmental Air Emissions and Ambient Air Quality, IFC, 2007

** Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week hourly at uniform intervals*

*** 24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.*

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Annexure 8.5. National Ambient Noise Level Standards

Category of Zones	National Ambient NoiseStandards, GOI		Noise Standards by IFC	
	Leq in dB (A)		One Hour LAeq (dBA)	
	Day Time 6.00 AM to 10.00 PM	Night Time 10.00 PM to 6.00 PM	Day Time 7.00 AM to 10.00 PM	Night Time 10.00 PM to 7.00 PM
Industrial	75	70	70	70
Commercial	65	55		
Residential	55	45	55	45
Silence Zone: Institutional, Educational	50	40		

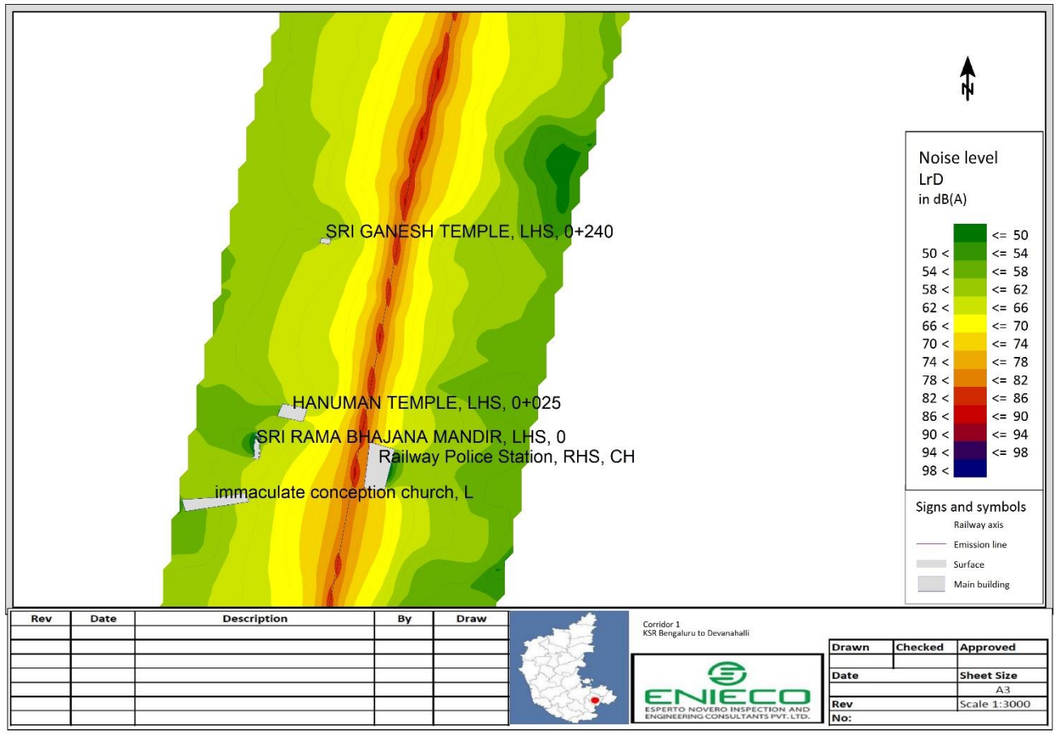
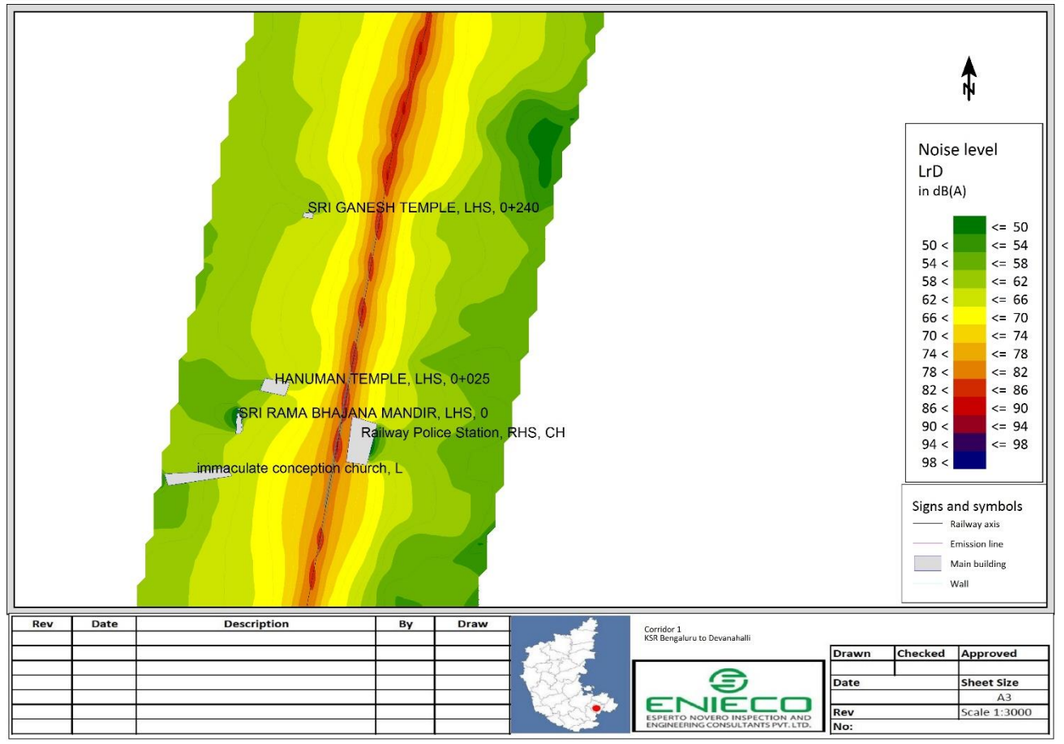
Source: Central Pollution Control Board, GOI and
General EHS Guidelines: Environmental Noise Management, IFC, 2007

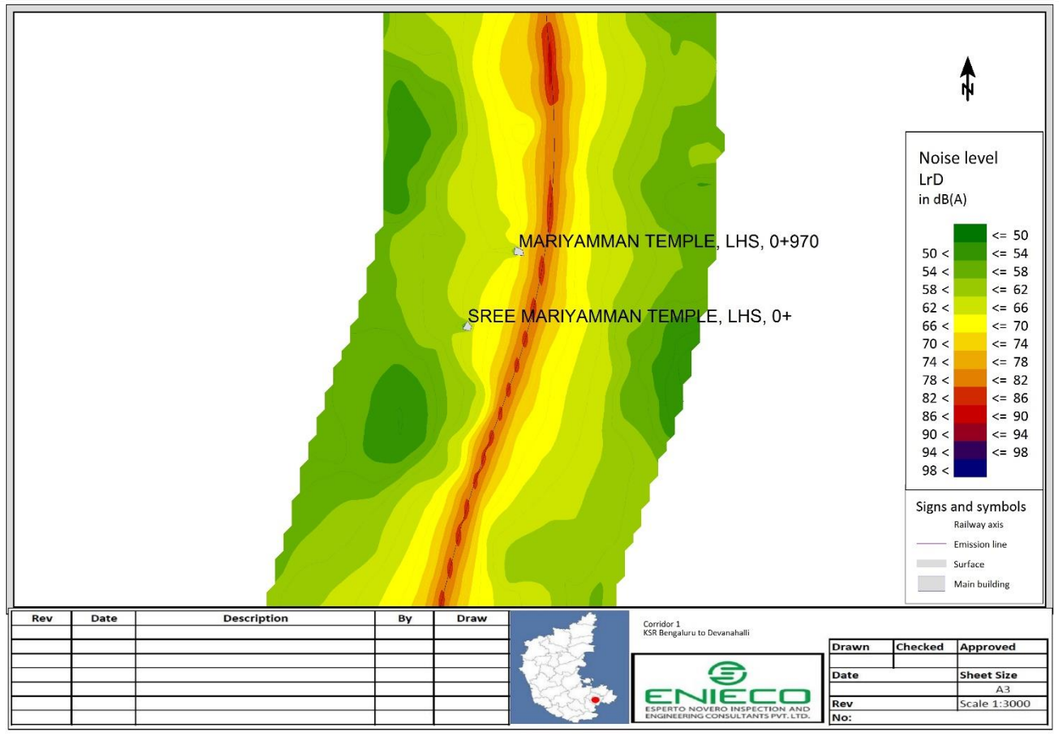
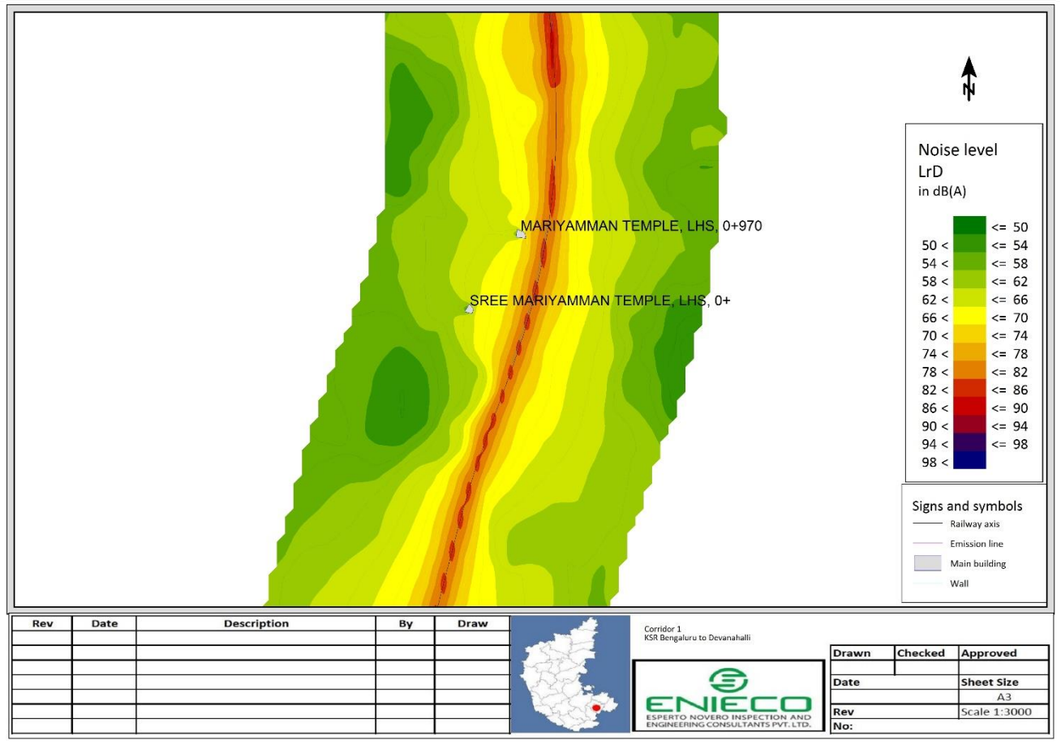
- *Silence zone is an area comprising not less than 100 metres around hospitals, educational institutions, courts, religiousplaces or any other area which is declared as such by the competent authority*
- *Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.*

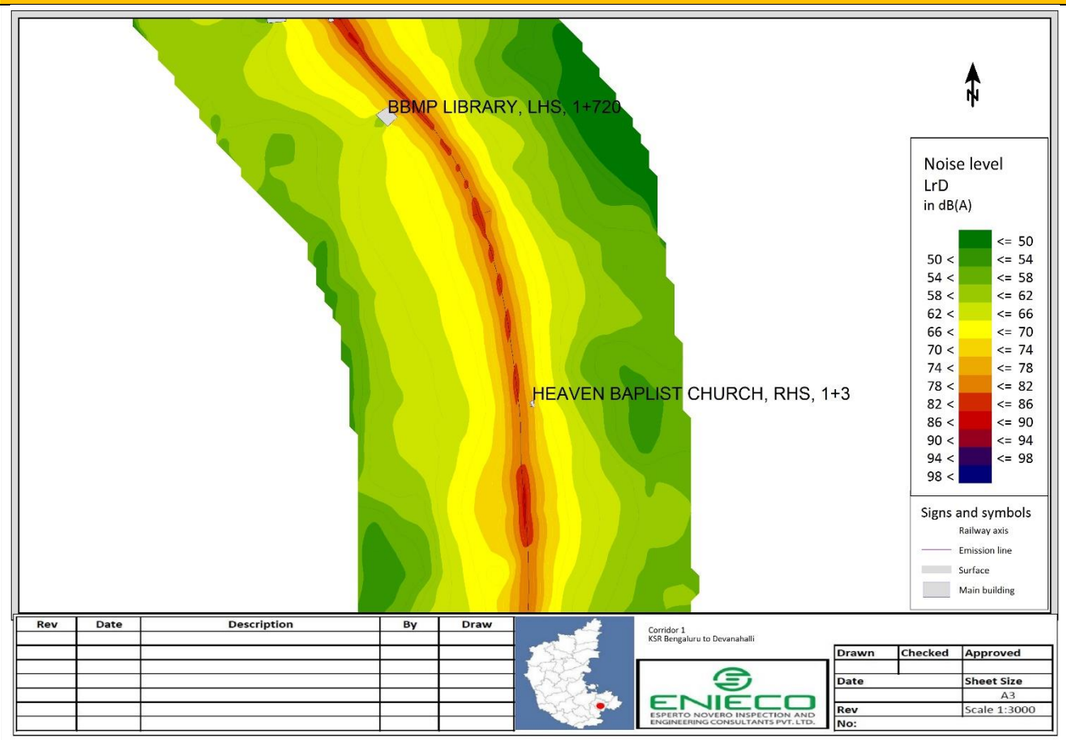
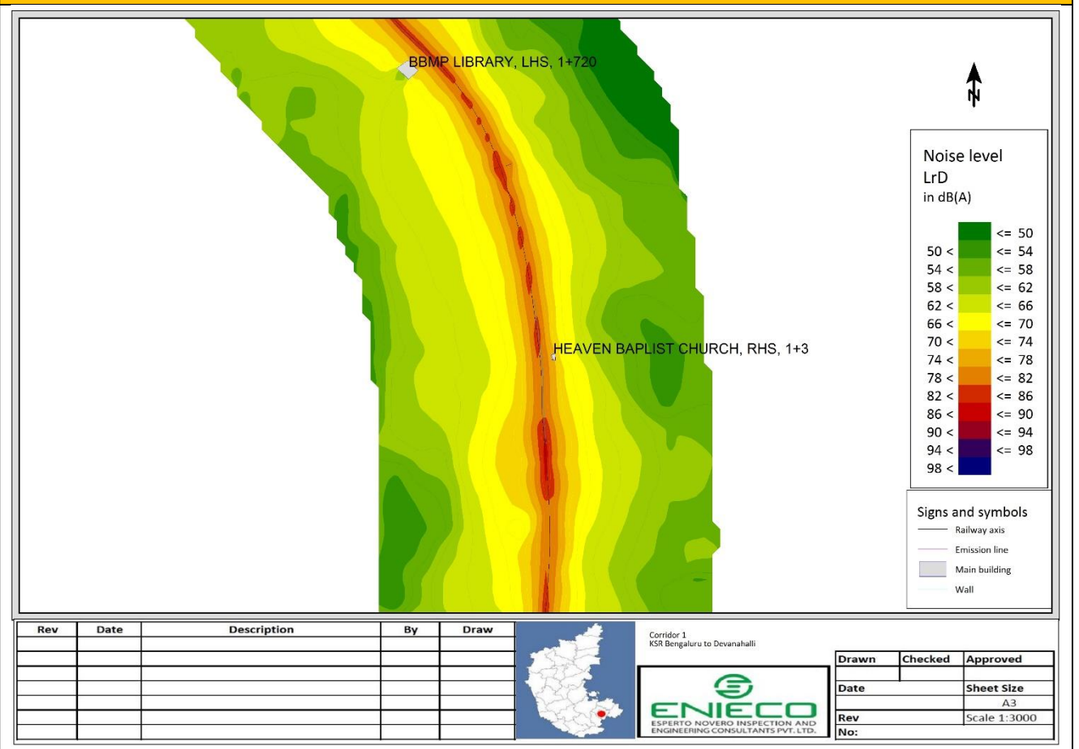
- *dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.*
- *A "decibel" is a unit in which noise is measured.*
- *"A", in dB(A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.*
- *Leq: It is an energy mean of the noise level over a specified period*

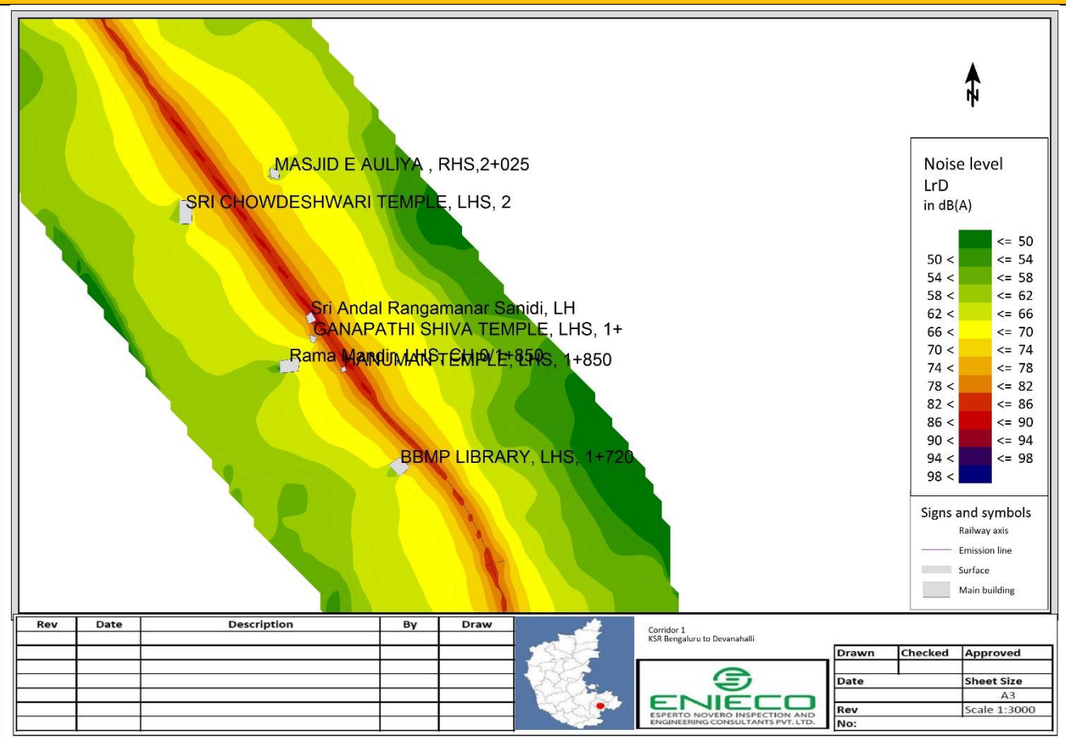
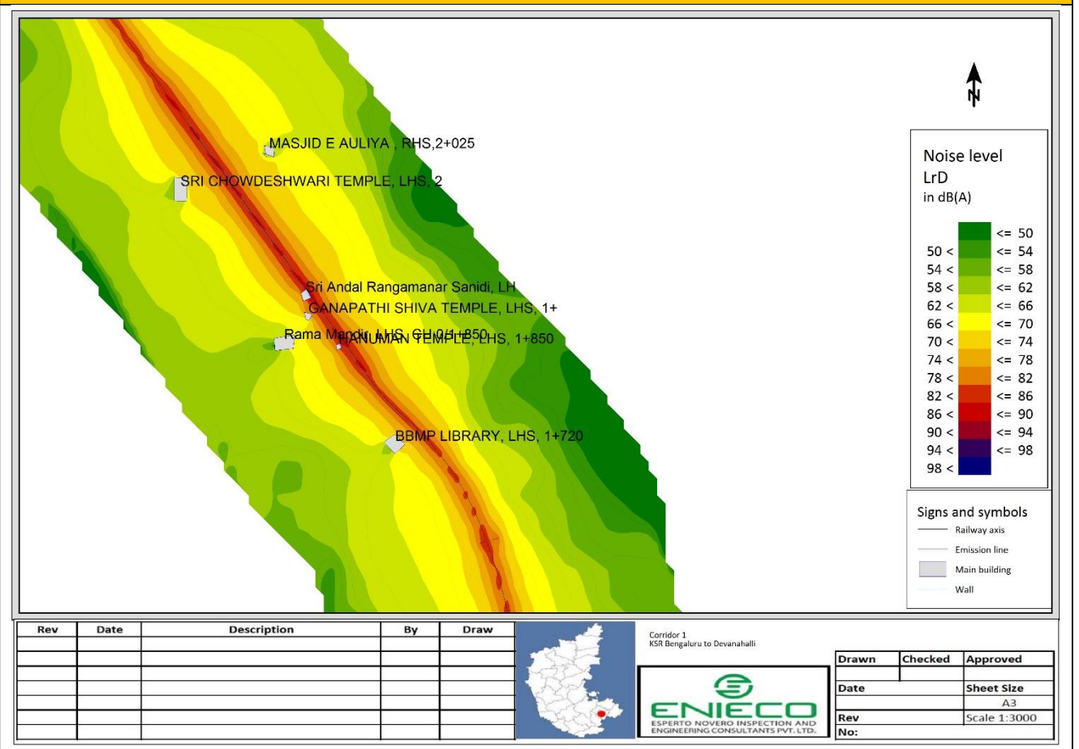
Annexure 8.6. Noise Contour Maps Showing Environmental Features including Sensitive Receptors for With Barrier and Without Barrier Scenario for the Projected Year 2025, 2031 and 2041 for BSRP Corridors

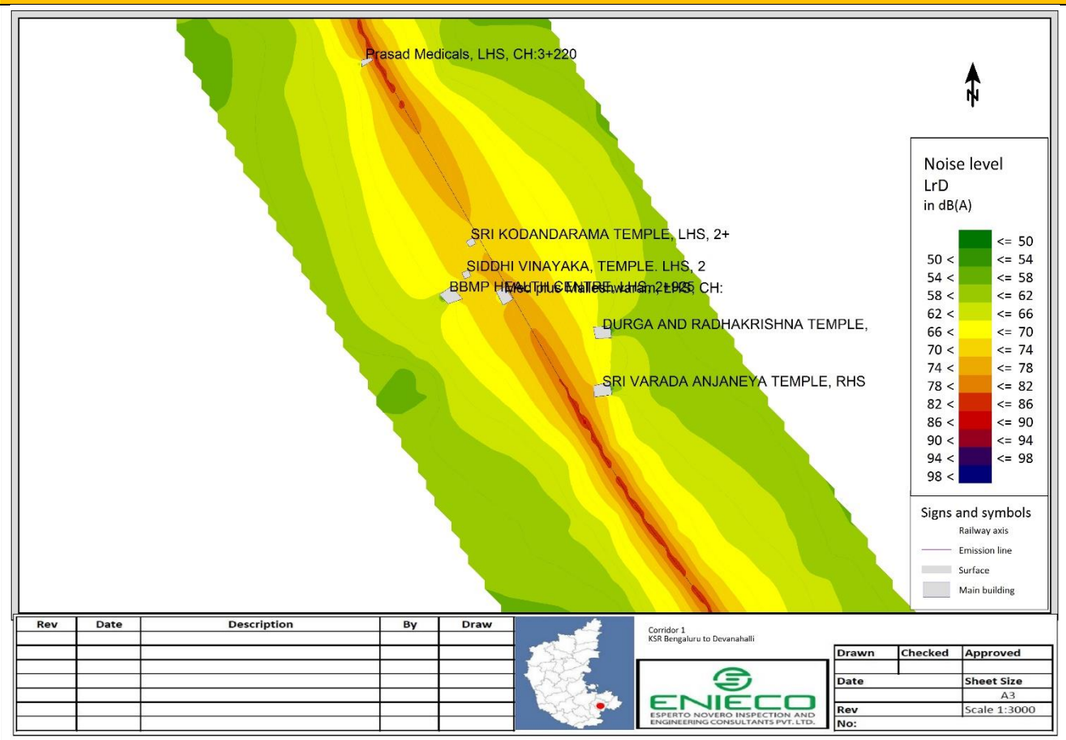
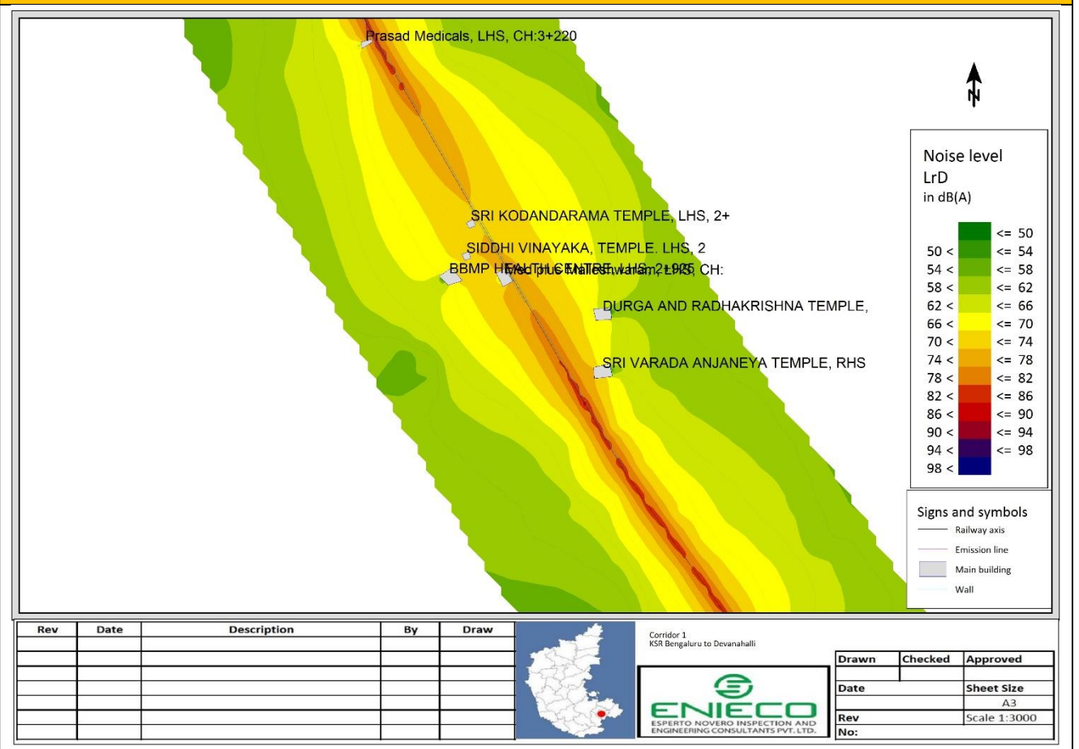
A. Noise contours for Corridor 1 for the Year 2025

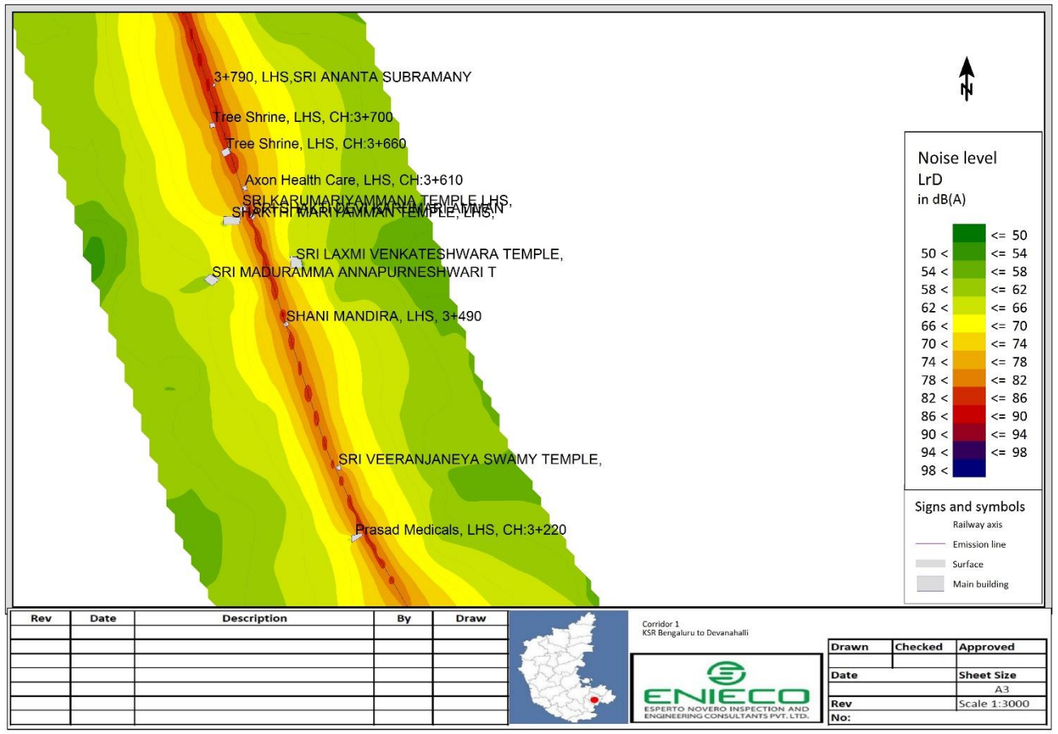
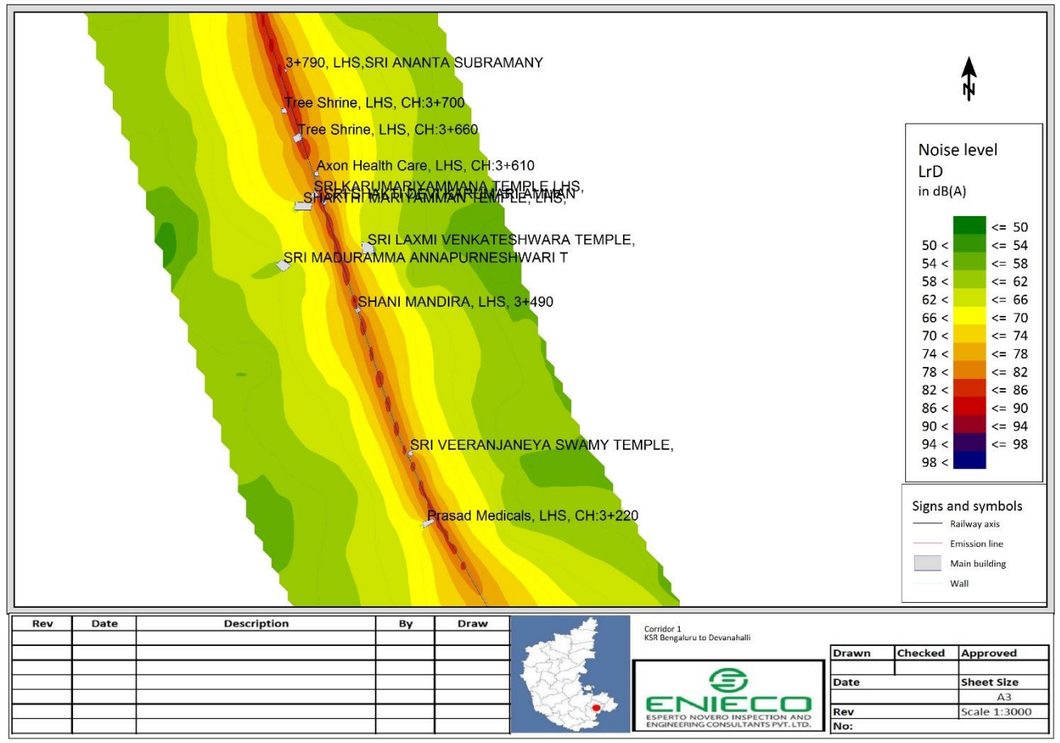
S.No	Without Barrier	With Barrier
1.		

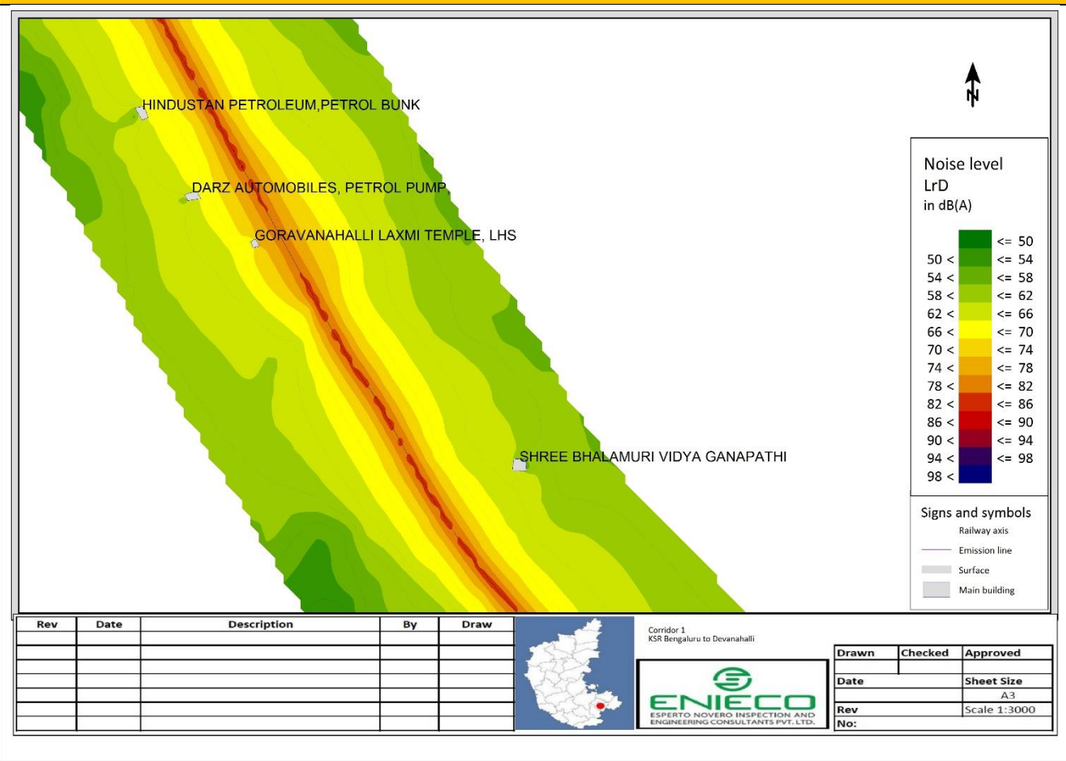
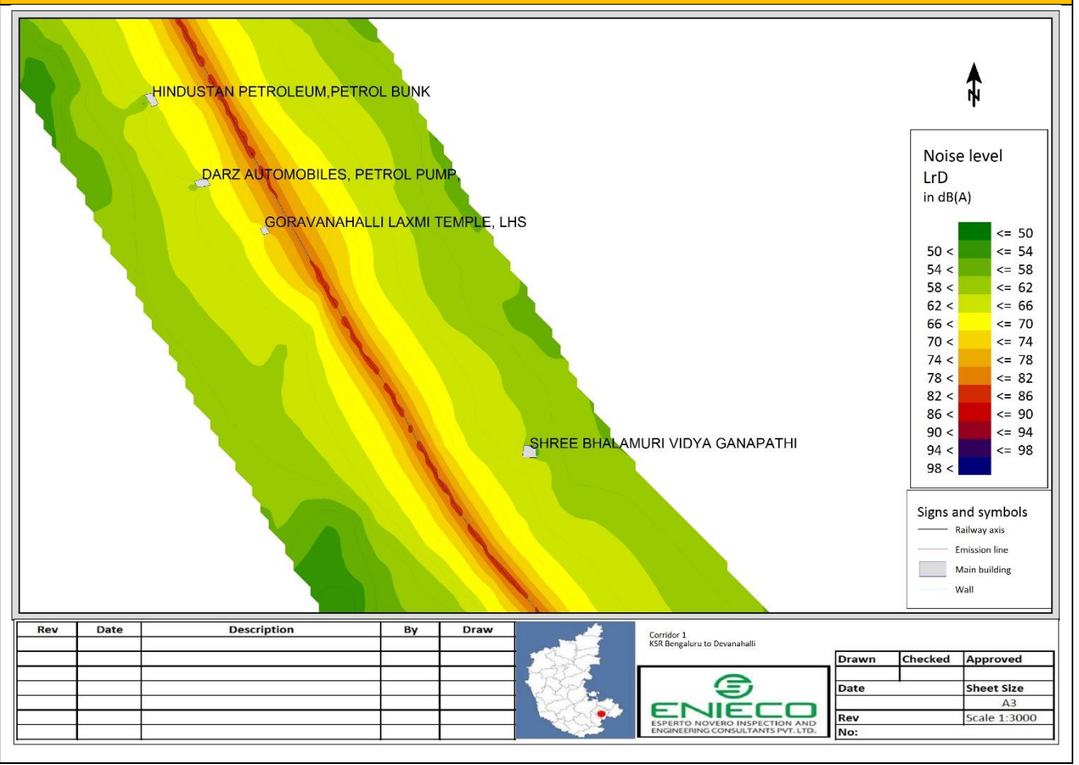
S.No	Without Barrier	With Barrier
2.		

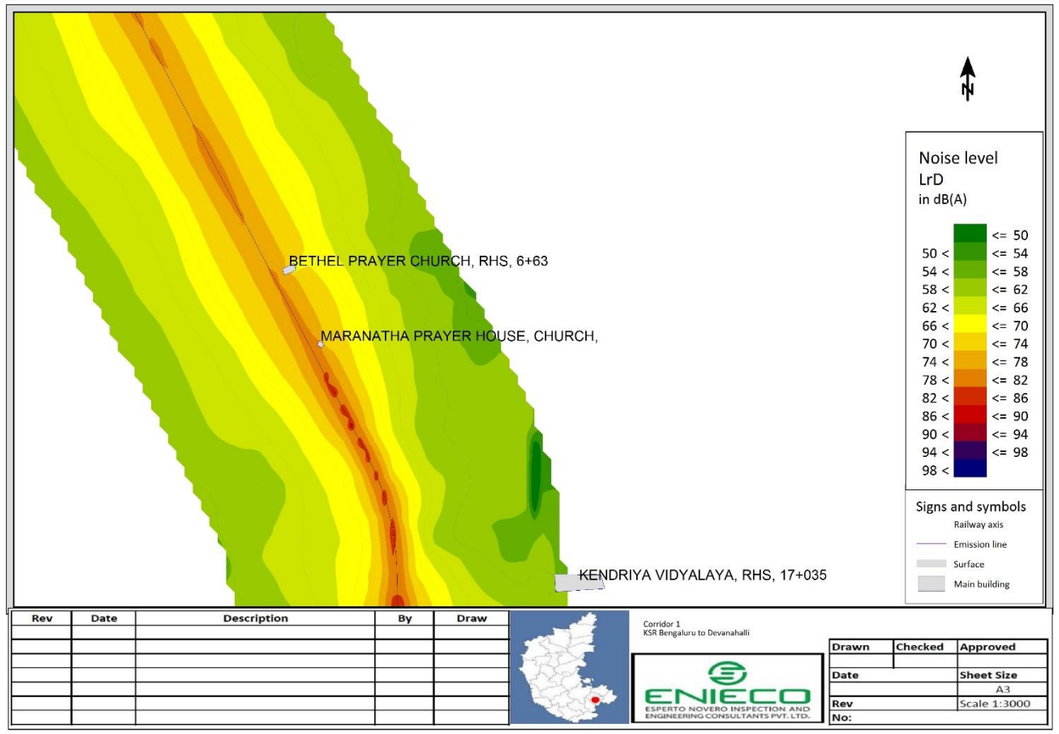
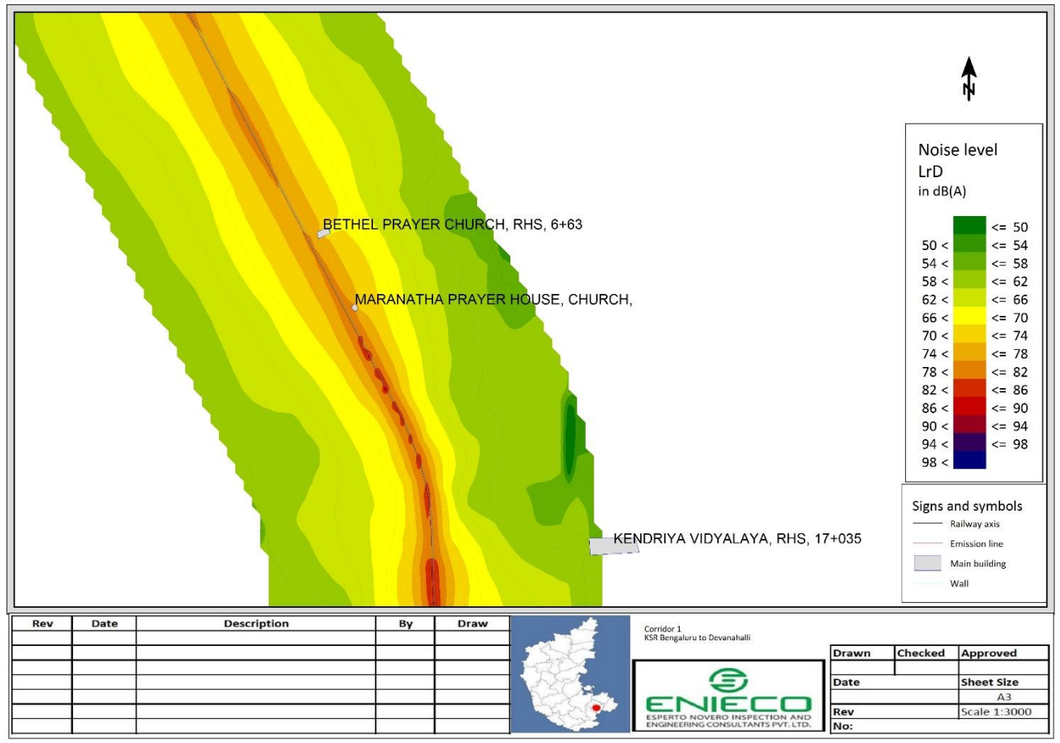
S.No	Without Barrier	With Barrier
3.		

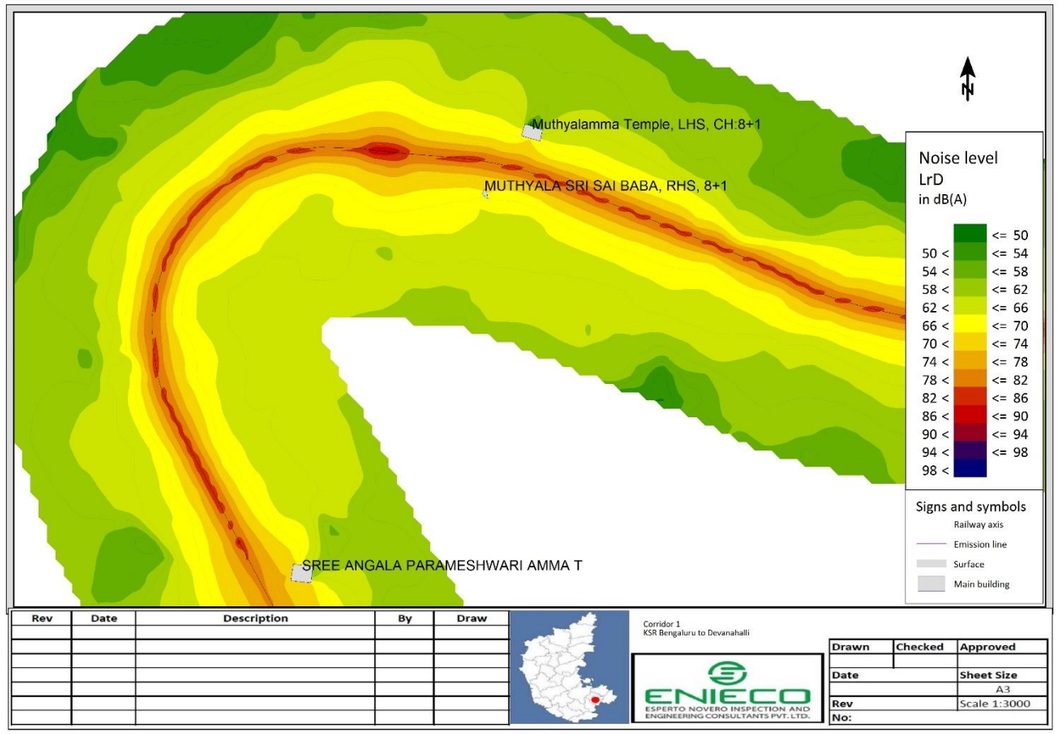
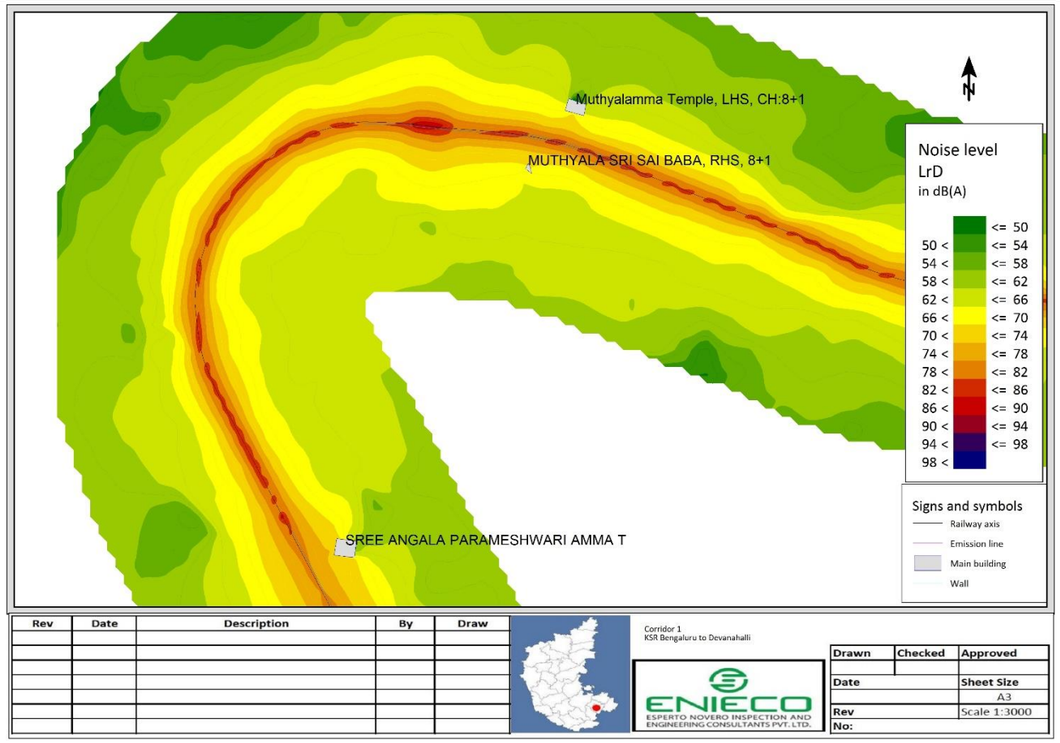
S.No	Without Barrier	With Barrier
4.		

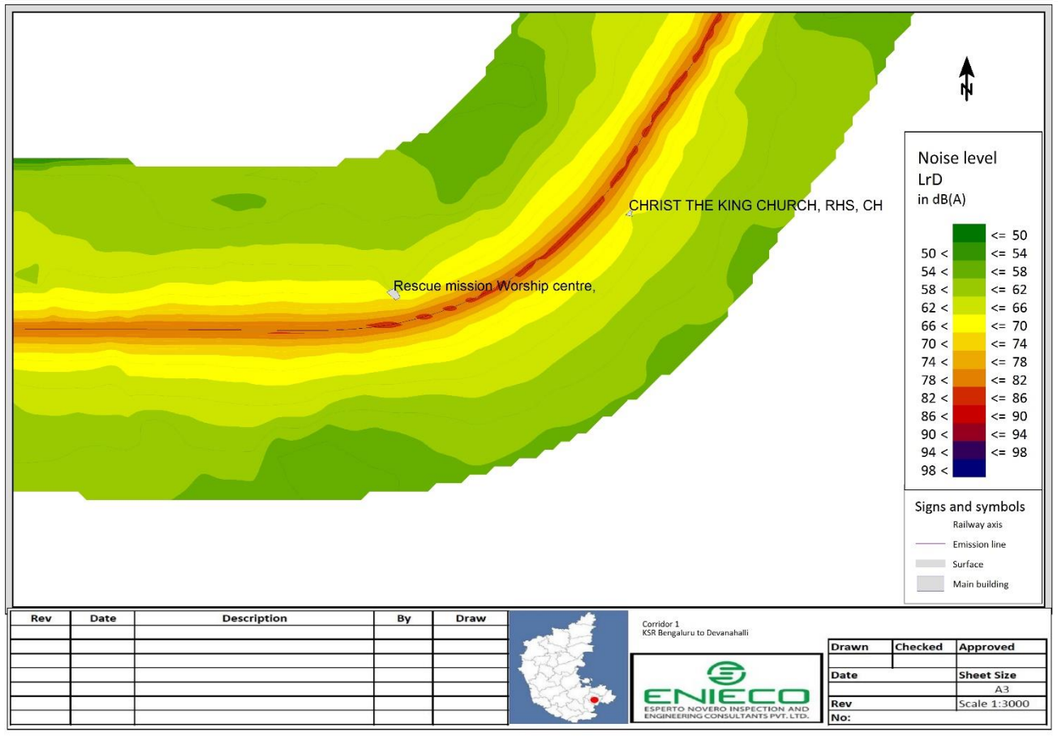
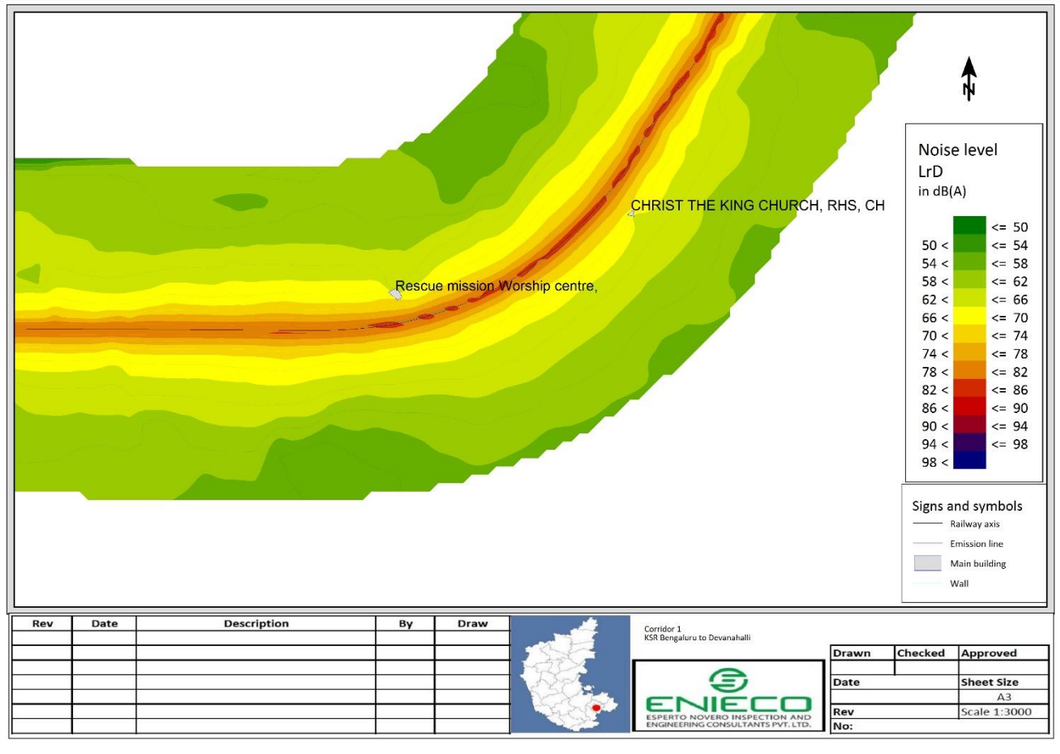
S.No	Without Barrier	With Barrier
5.		

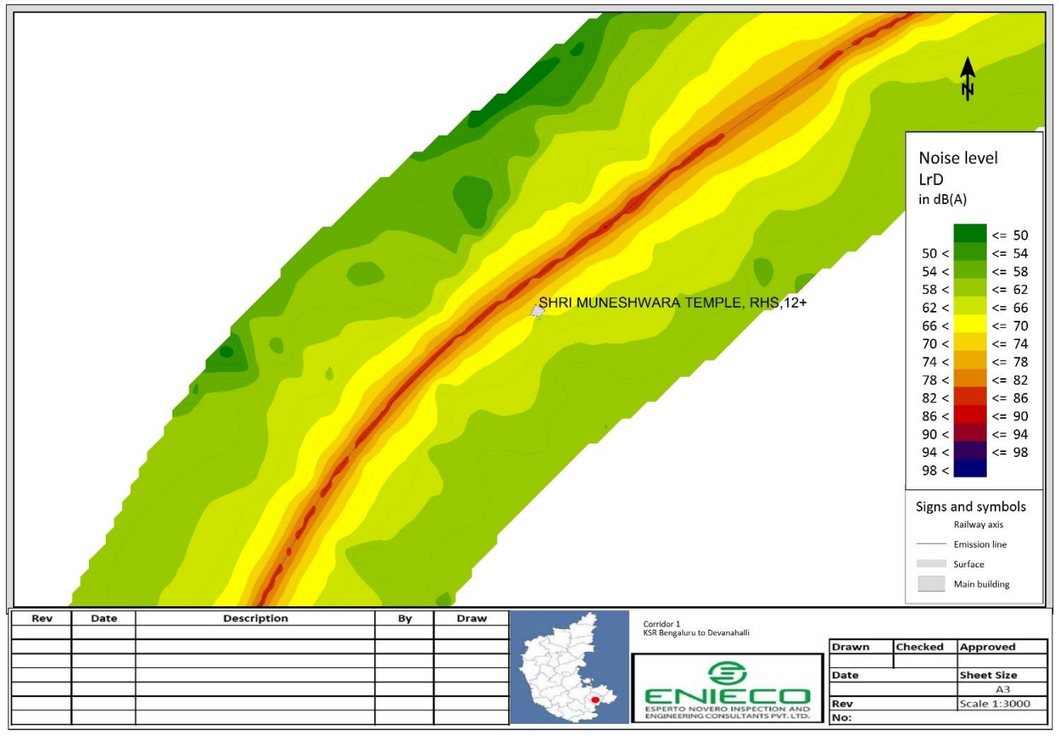
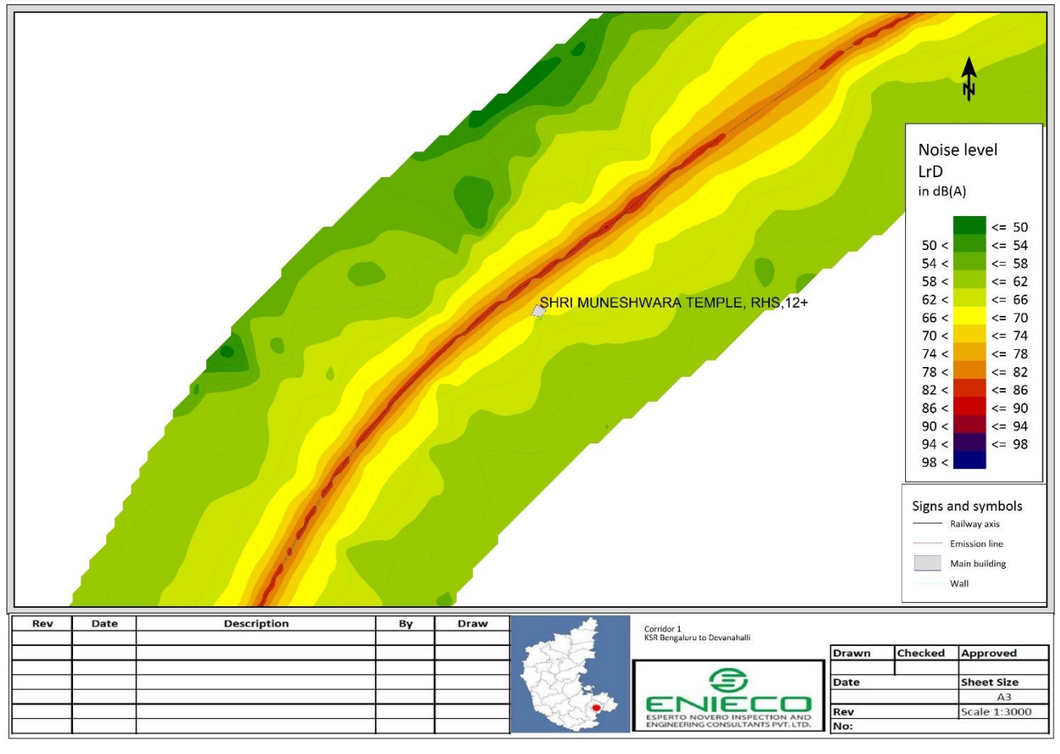
S.No	Without Barrier	With Barrier
6.		

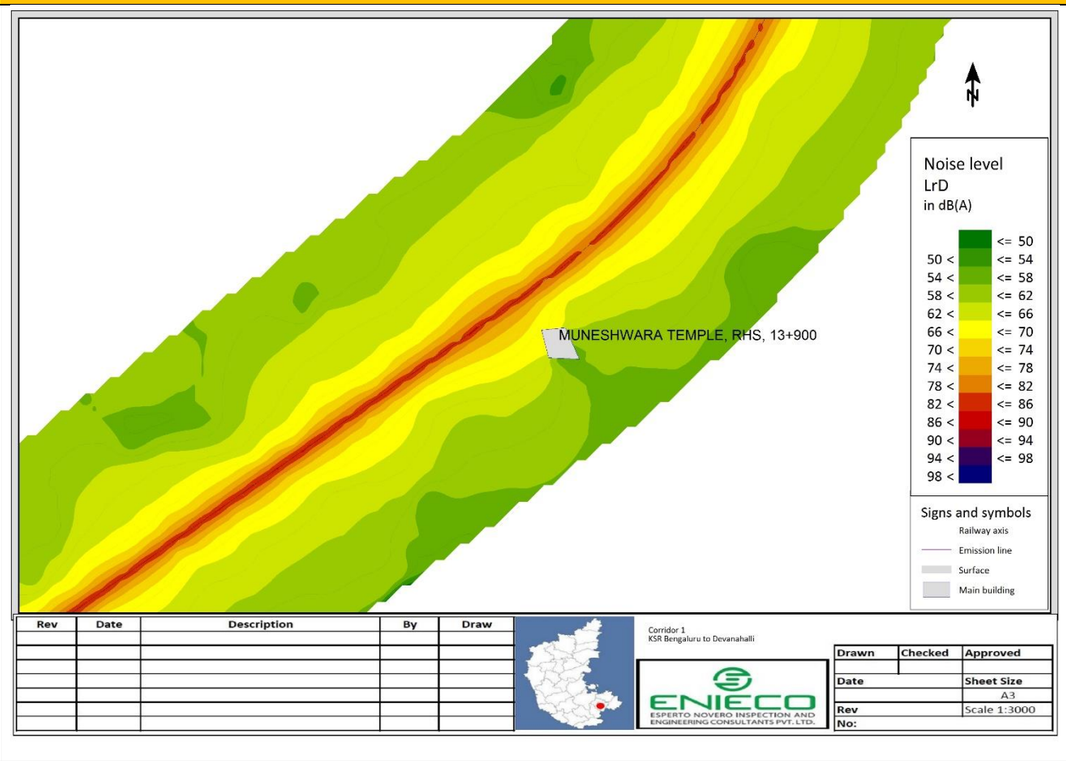
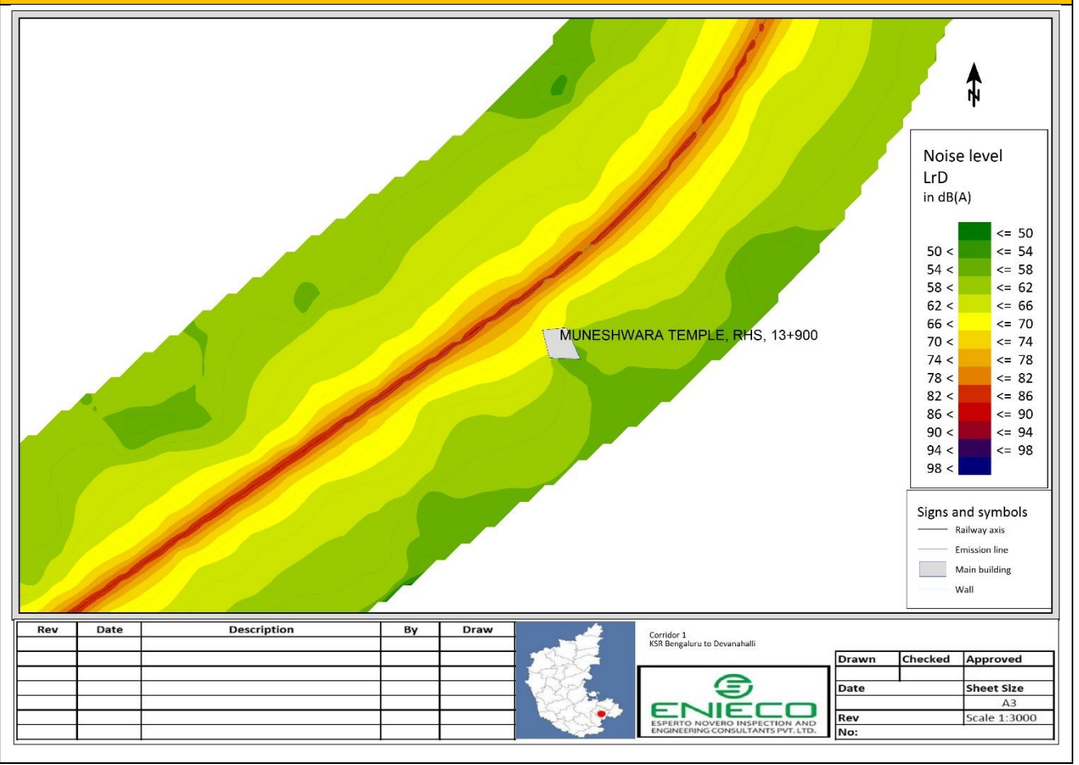
S.No	Without Barrier	With Barrier
7.		

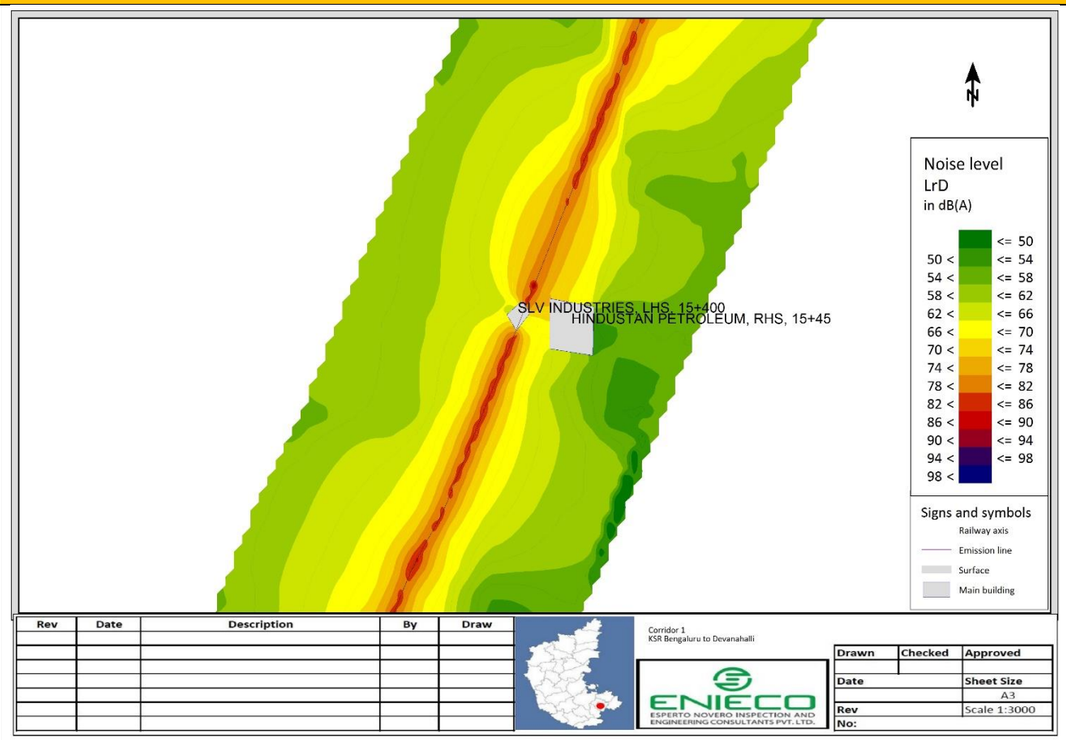
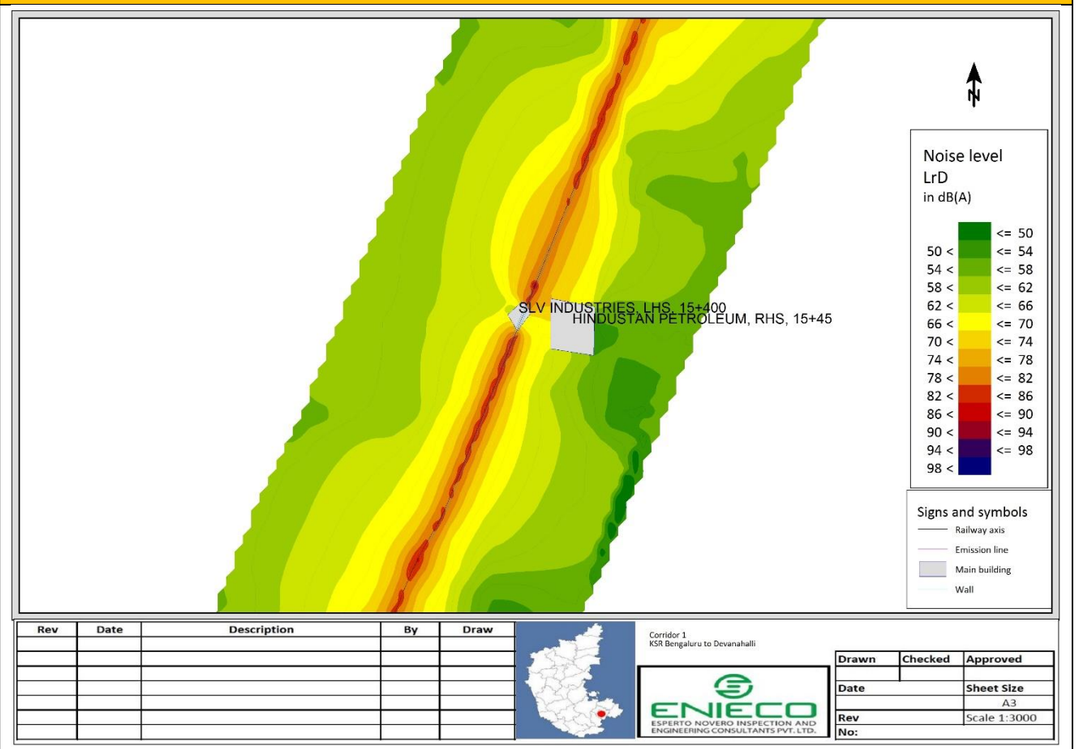
S.No	Without Barrier	With Barrier
8.		

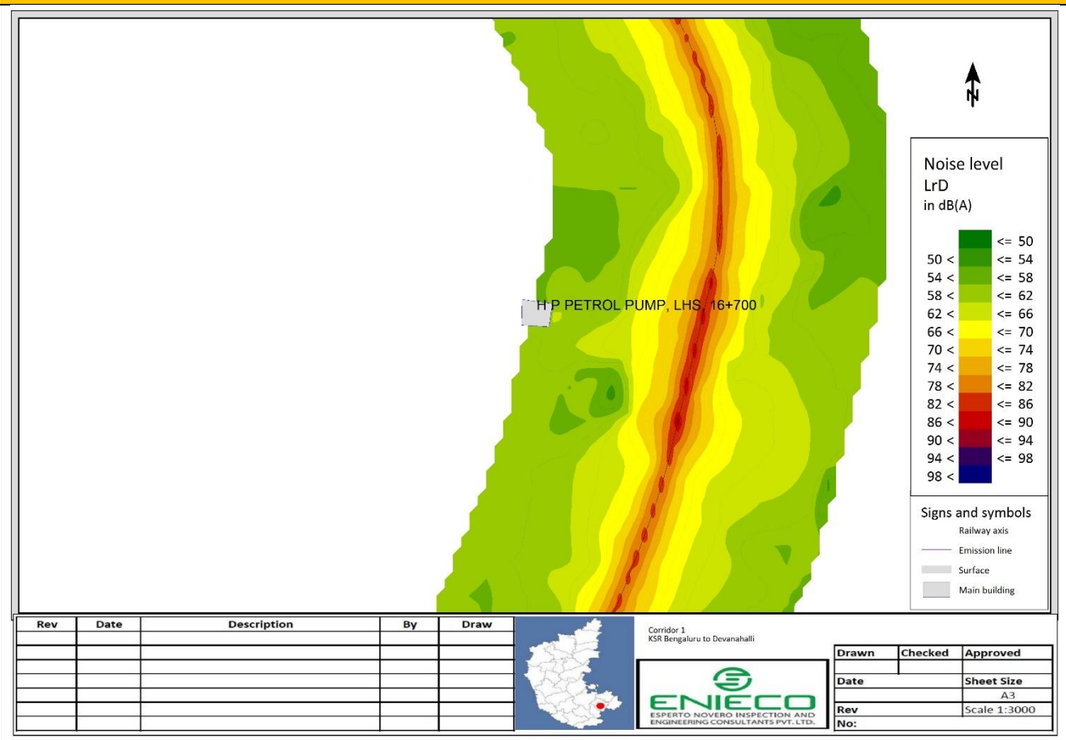
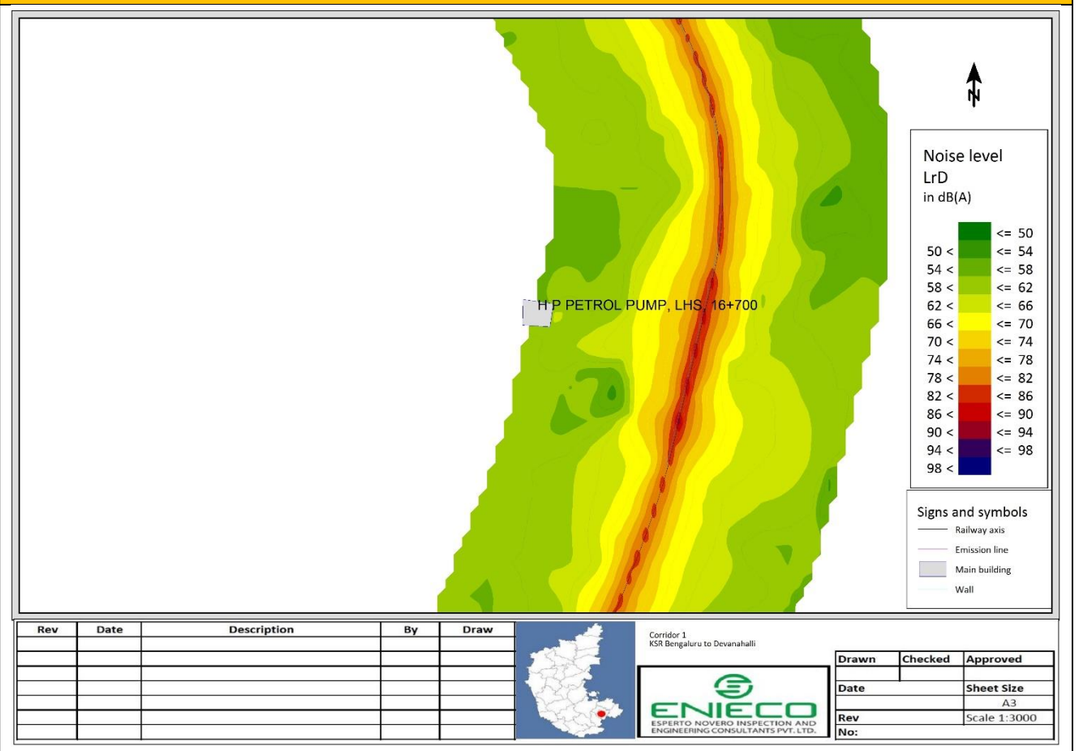
S.No	Without Barrier	With Barrier
9.		

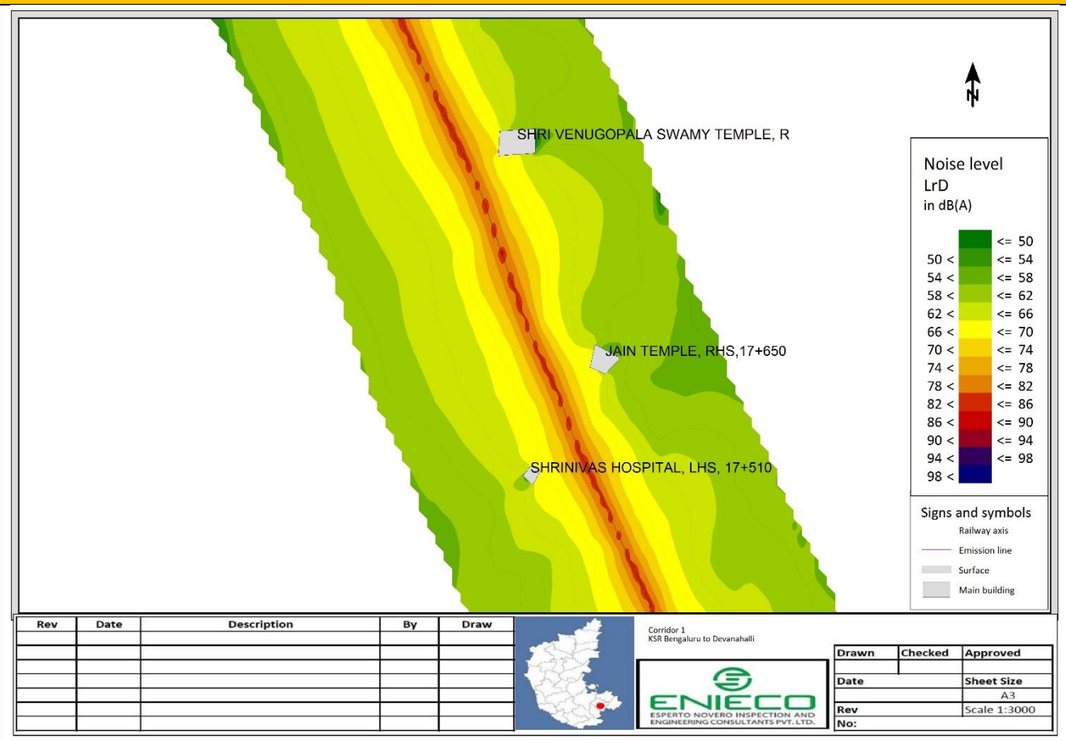
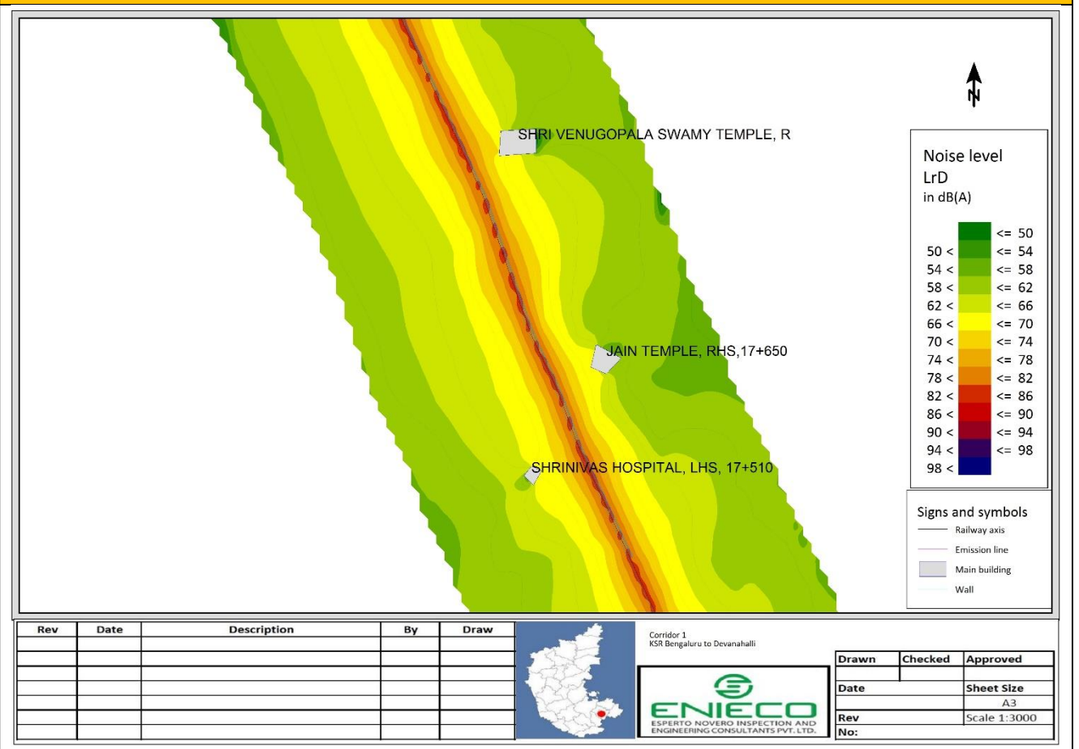
S.No	Without Barrier	With Barrier
10.		

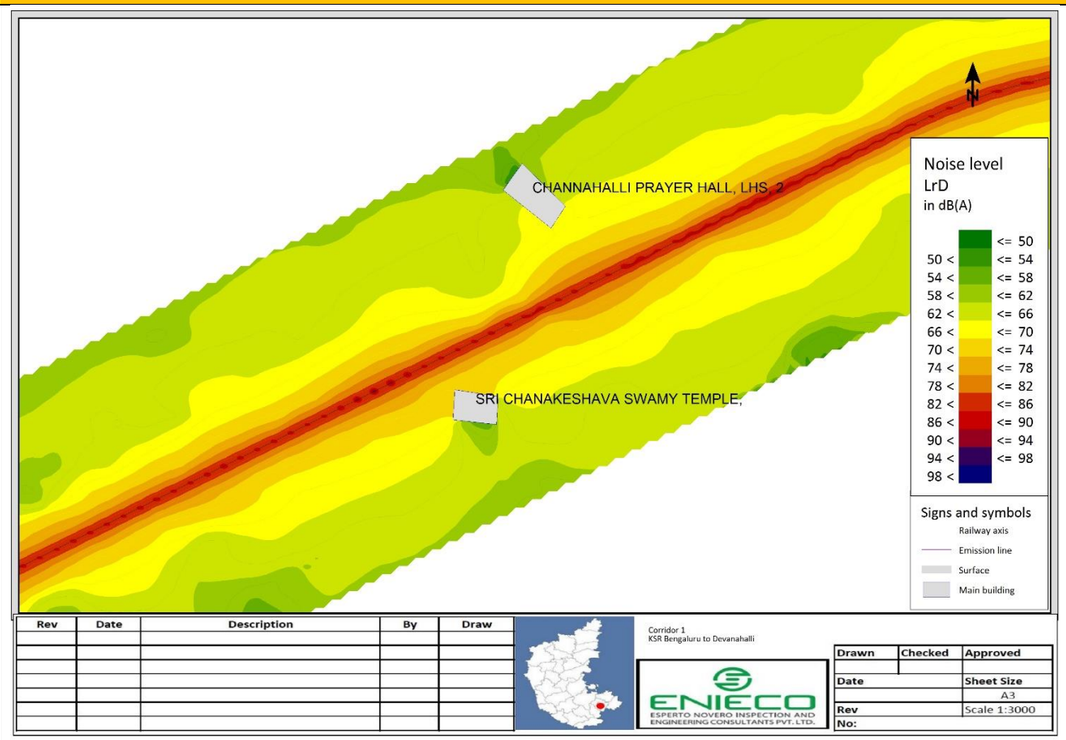
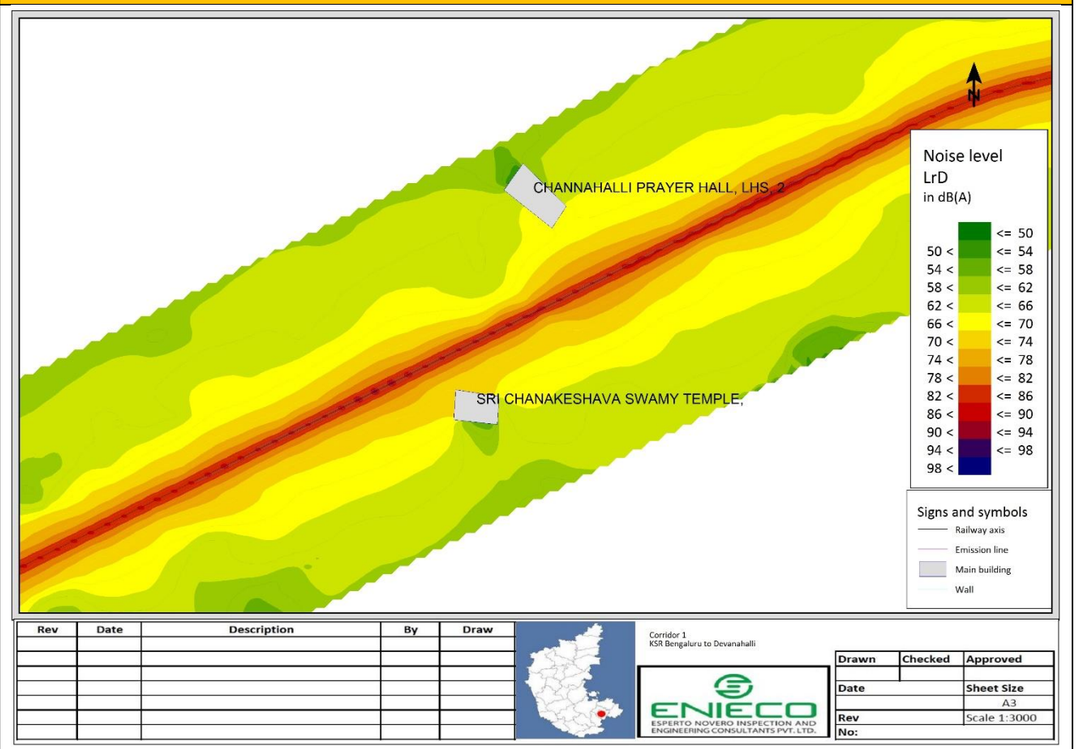
S.No	Without Barrier	With Barrier
11.		

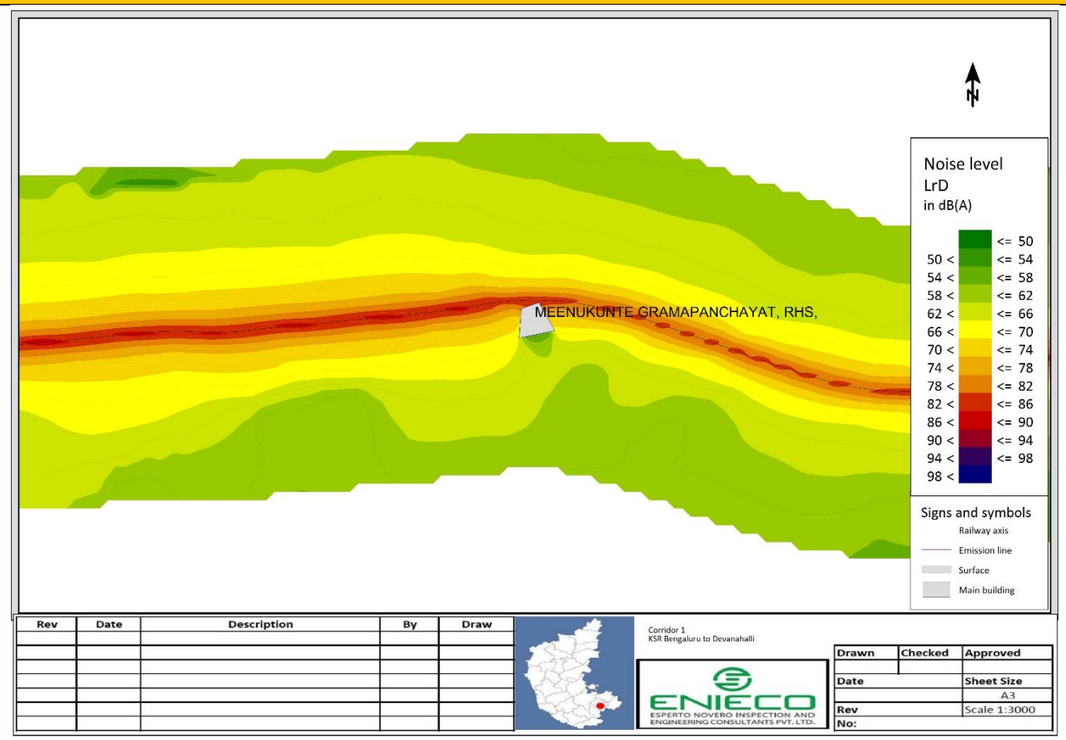
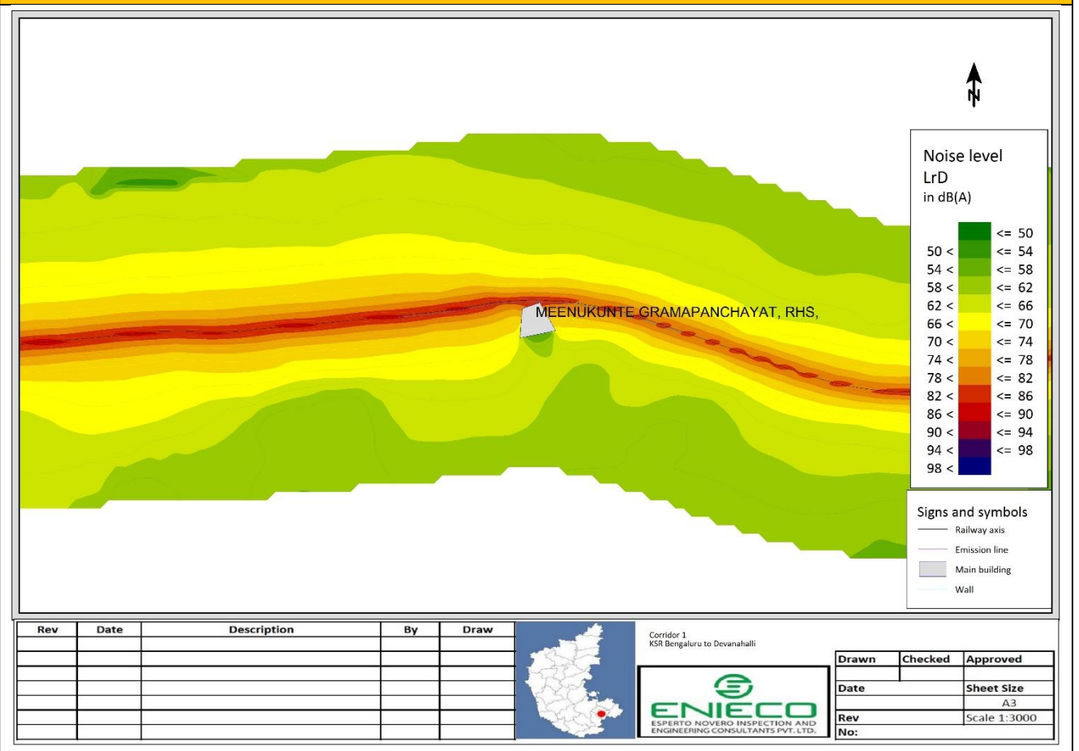
S.No	Without Barrier	With Barrier
12.		

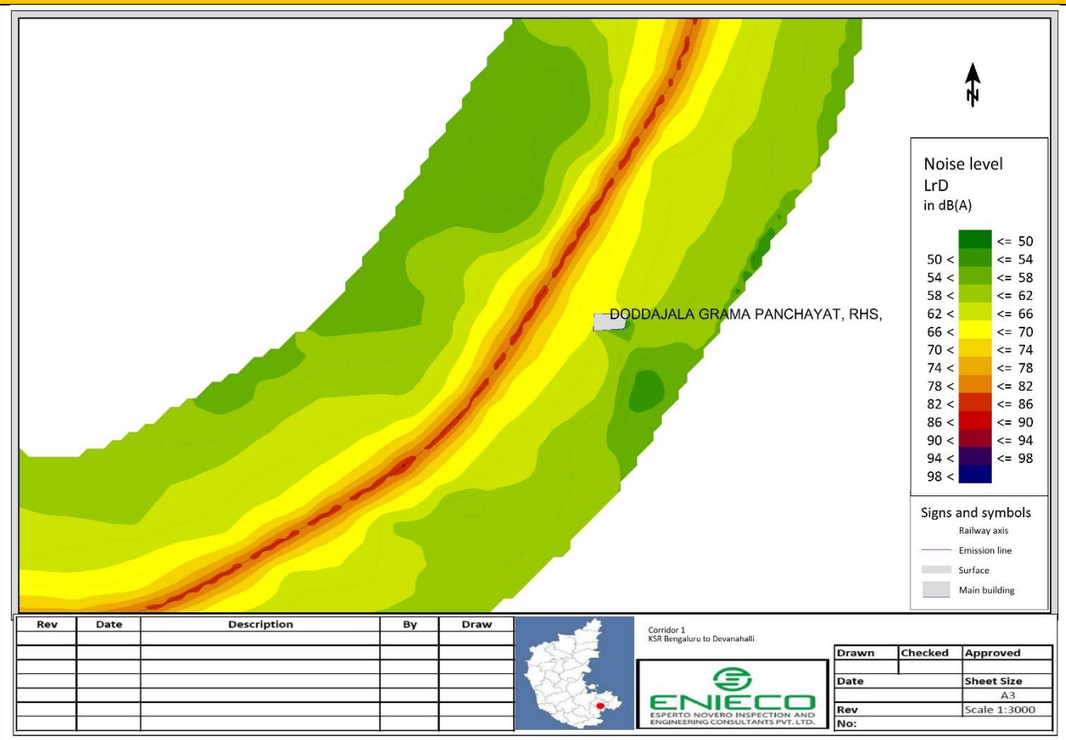
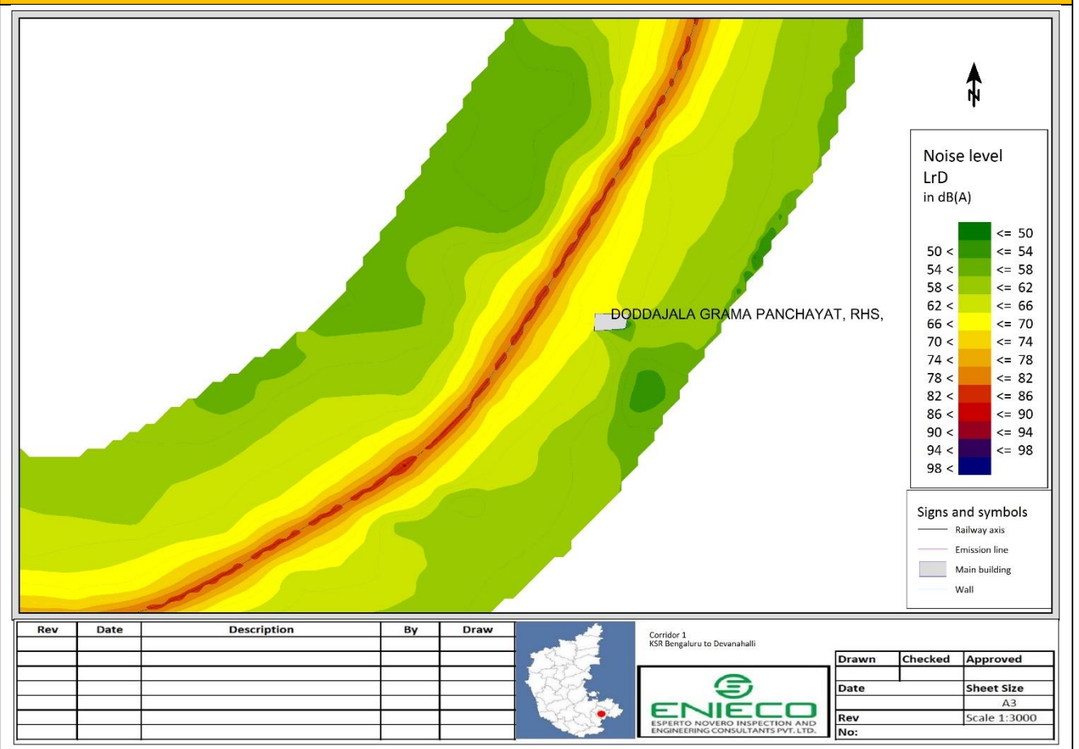
S.No	Without Barrier	With Barrier
13.		

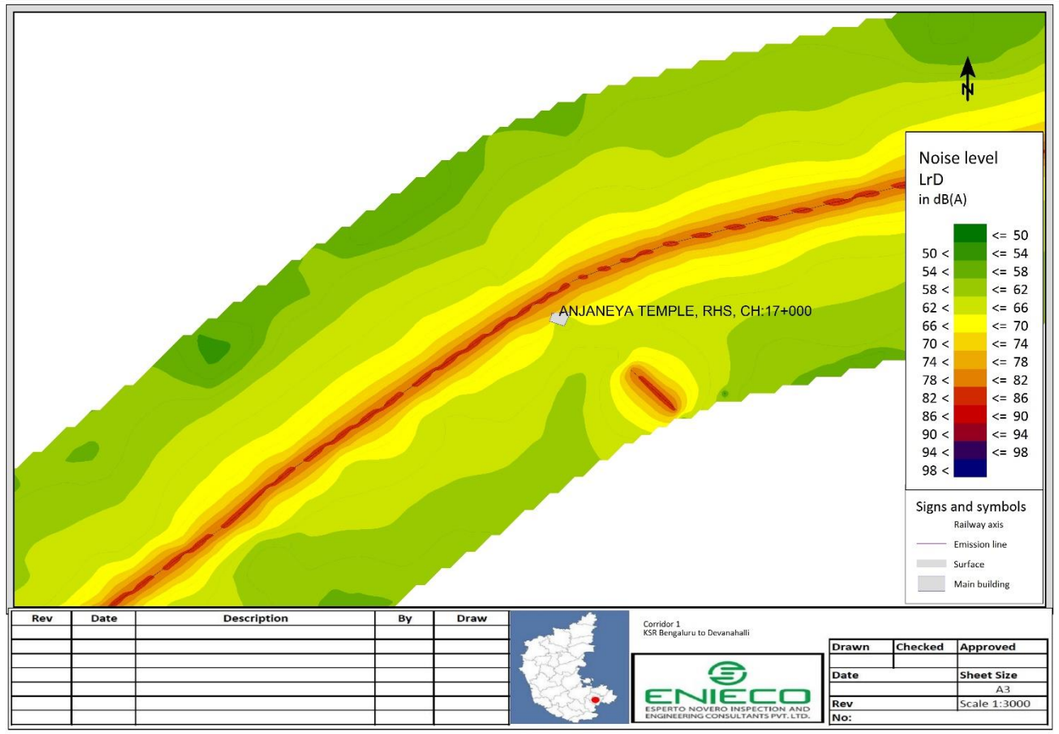
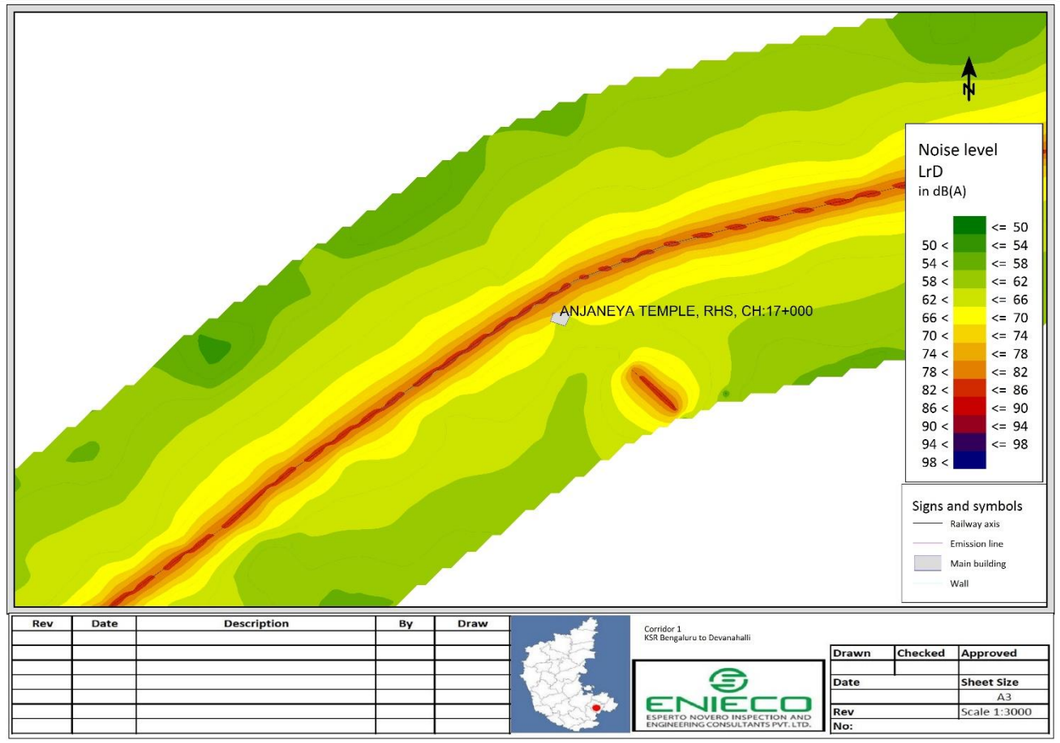
S.No	Without Barrier	With Barrier
14.		

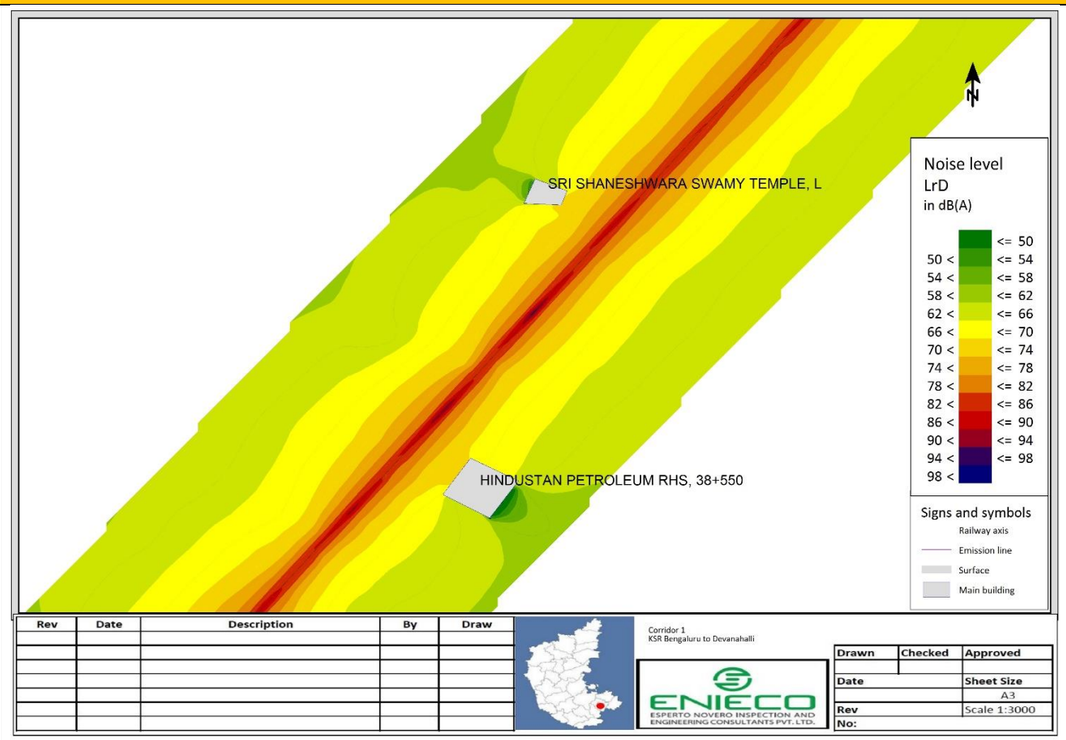
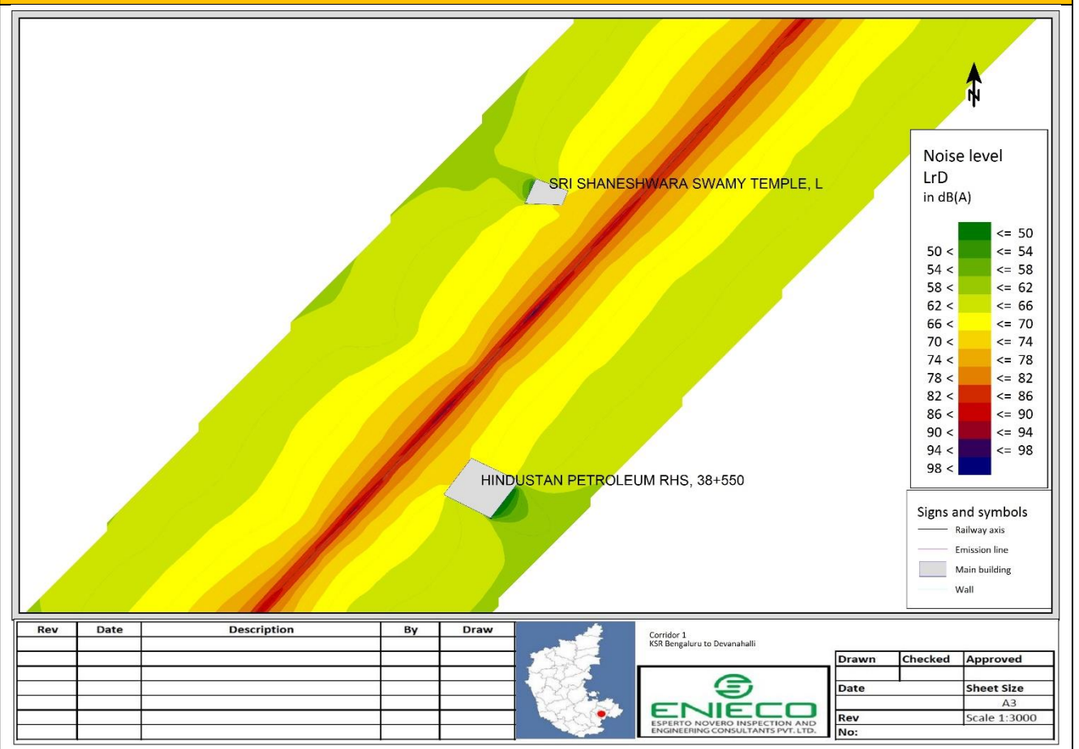
S.No	Without Barrier	With Barrier
15.		

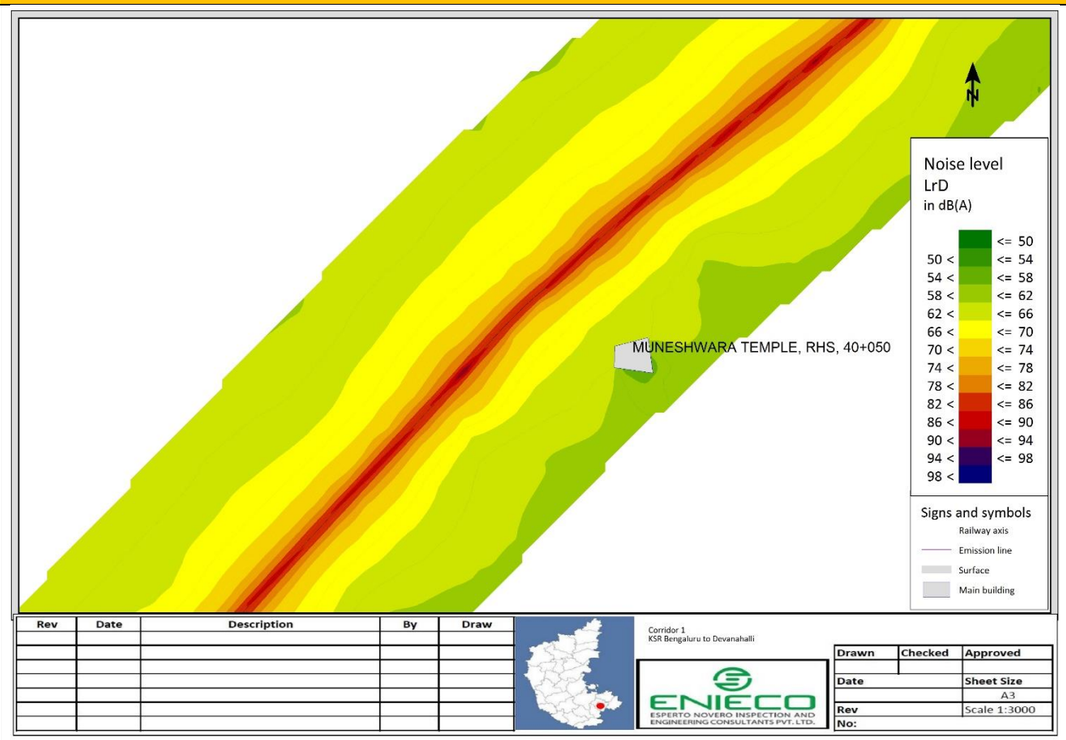
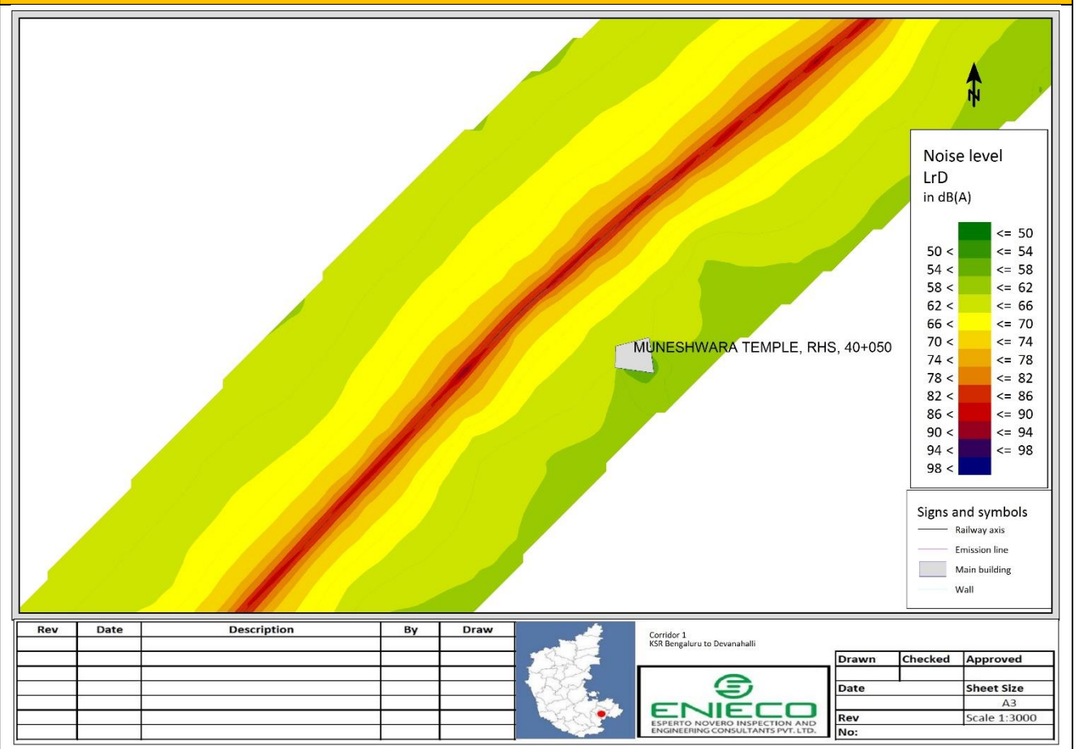
S.No	Without Barrier	With Barrier
16.		

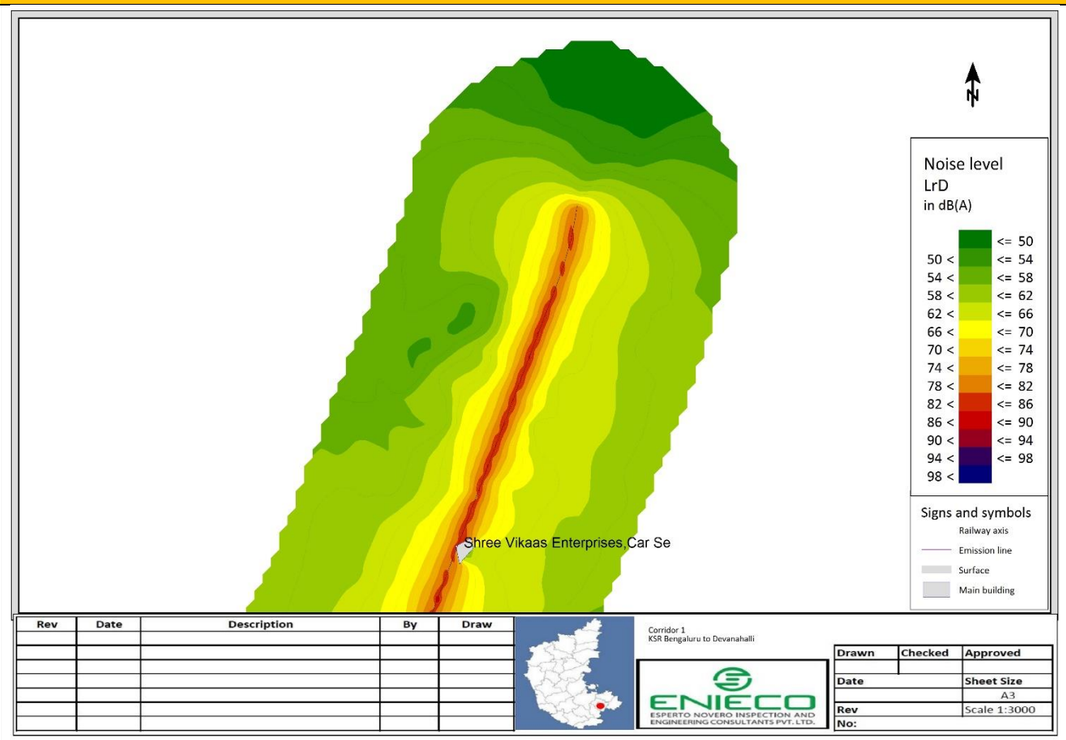
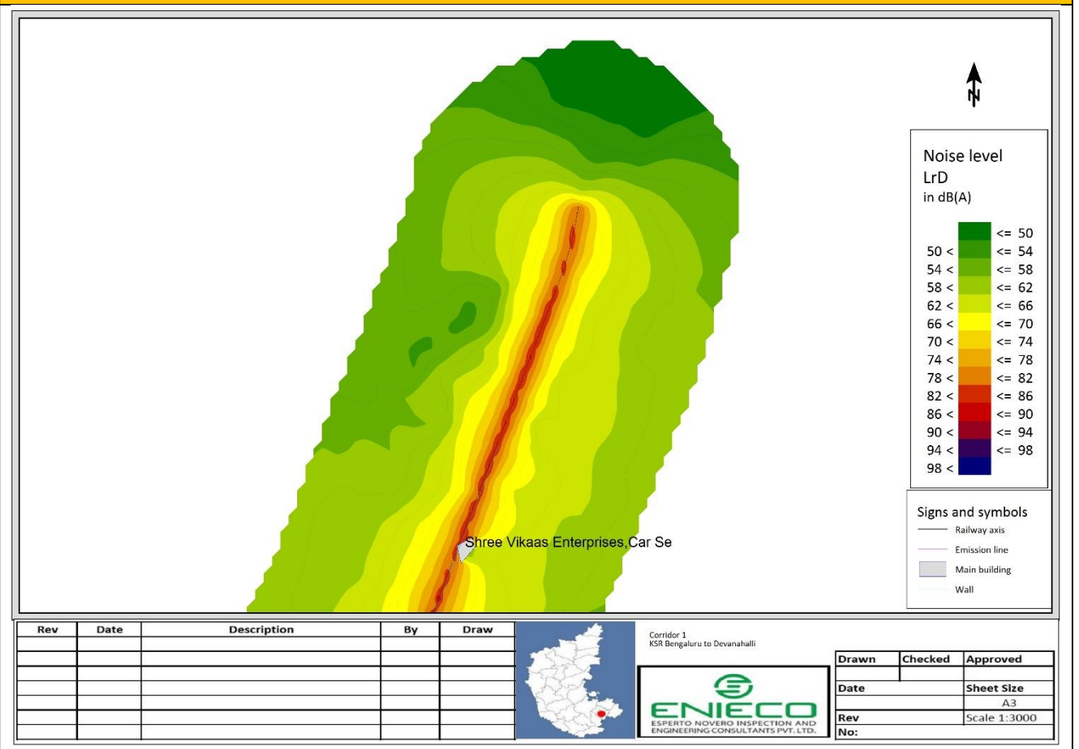
S.No	Without Barrier	With Barrier
17.		

S.No	Without Barrier	With Barrier
18.		

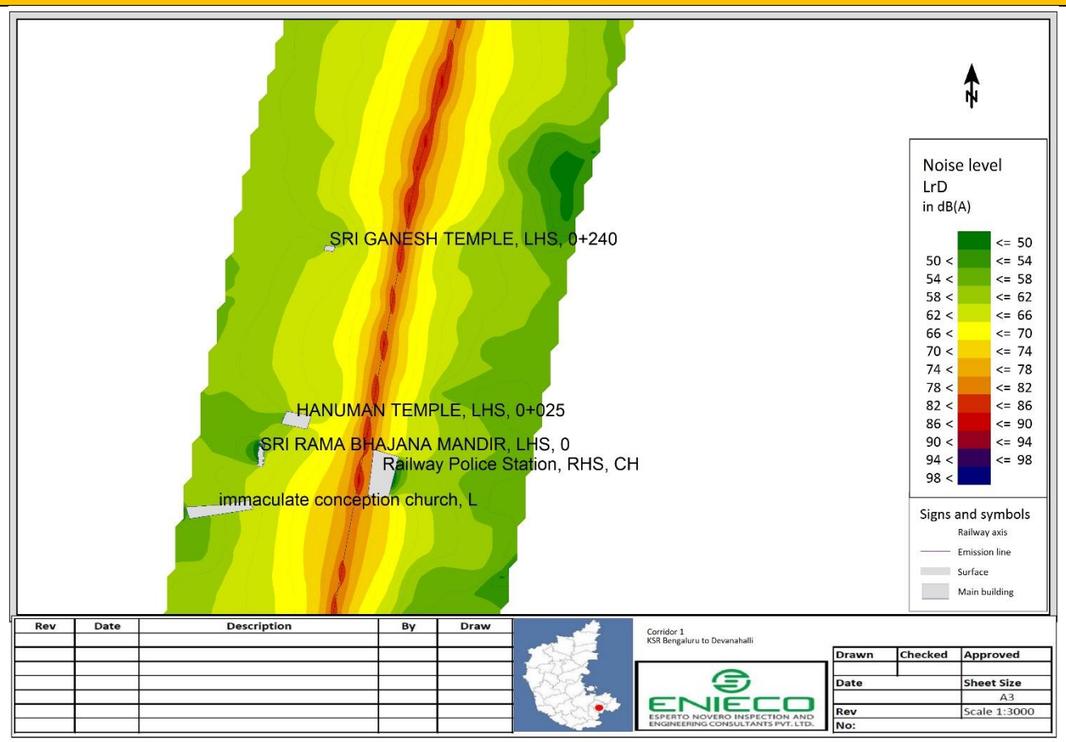
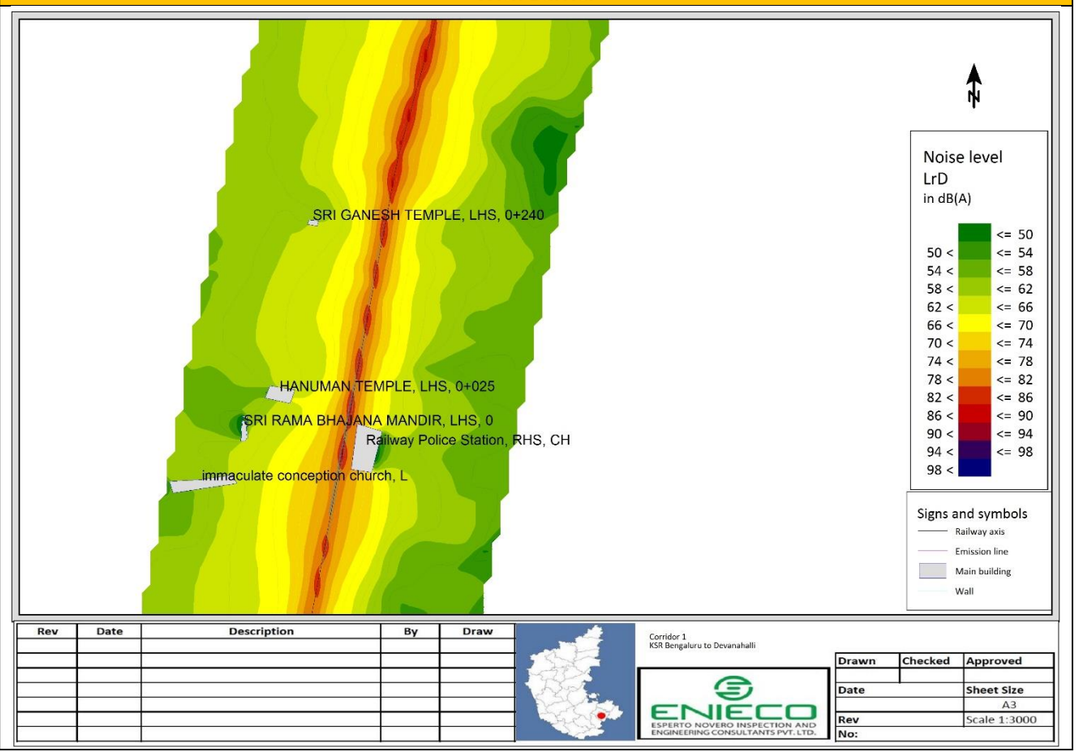
S.No	Without Barrier	With Barrier
19.		

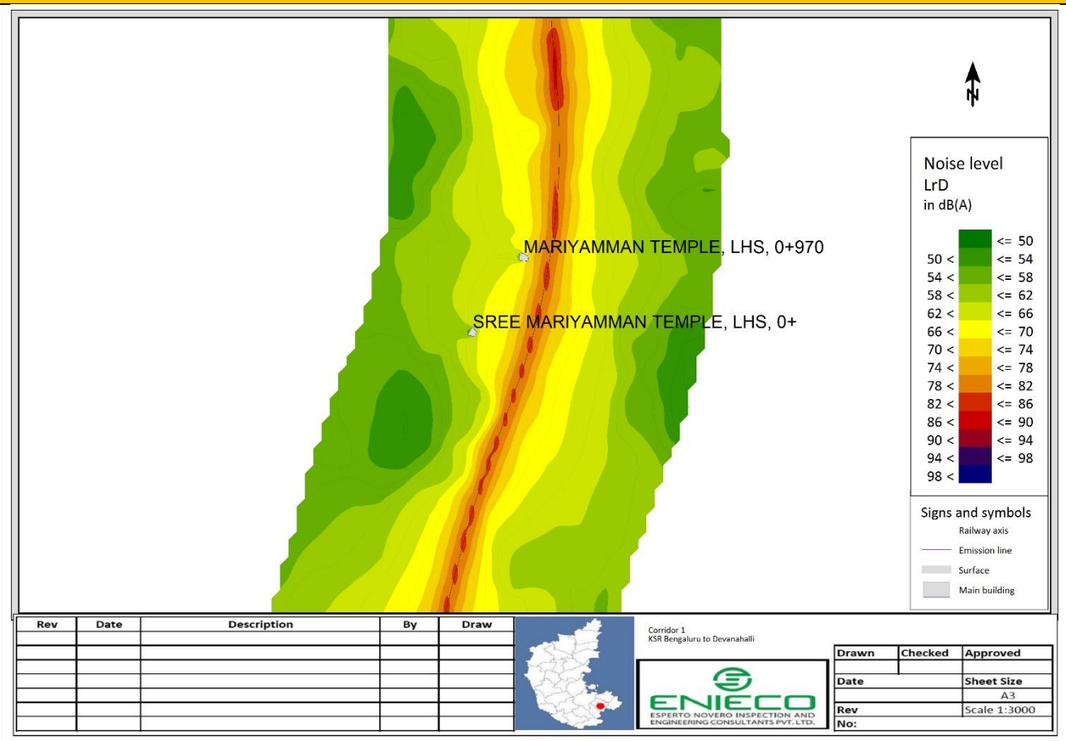
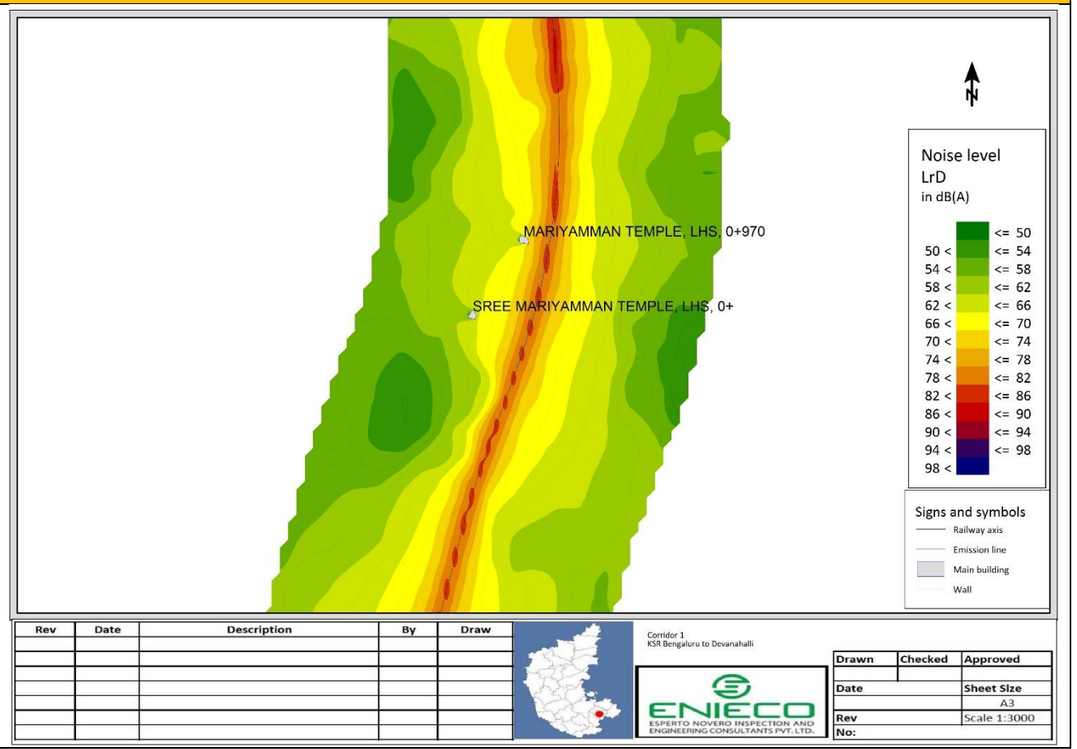
S.No	Without Barrier	With Barrier
20.		

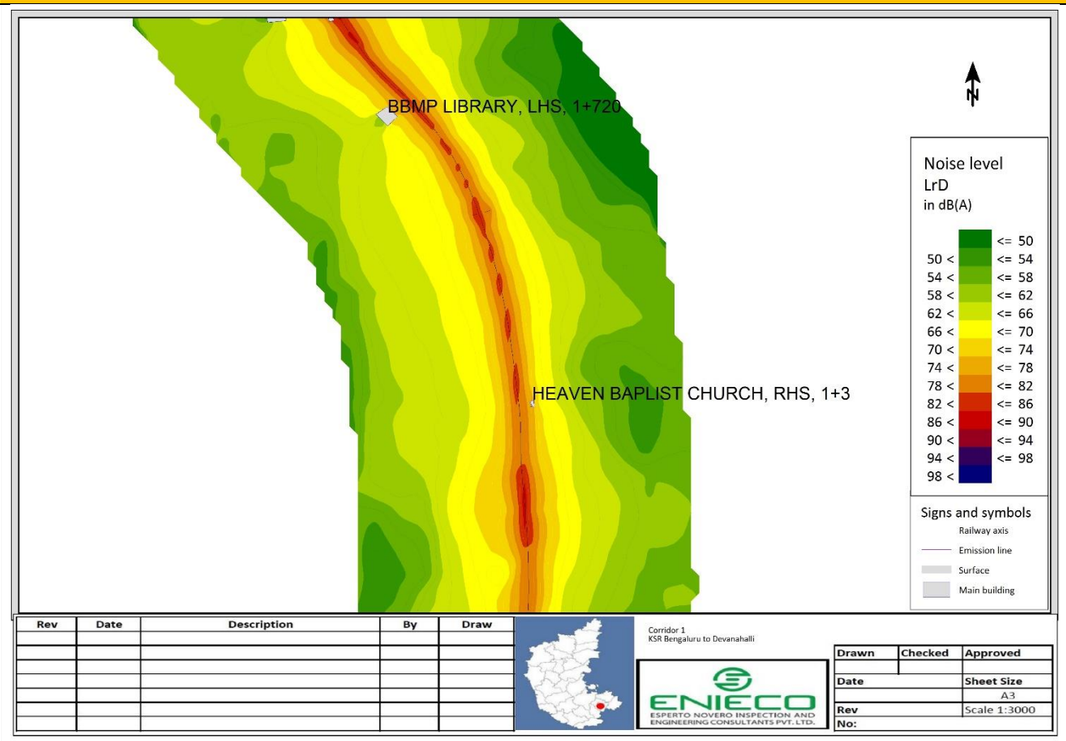
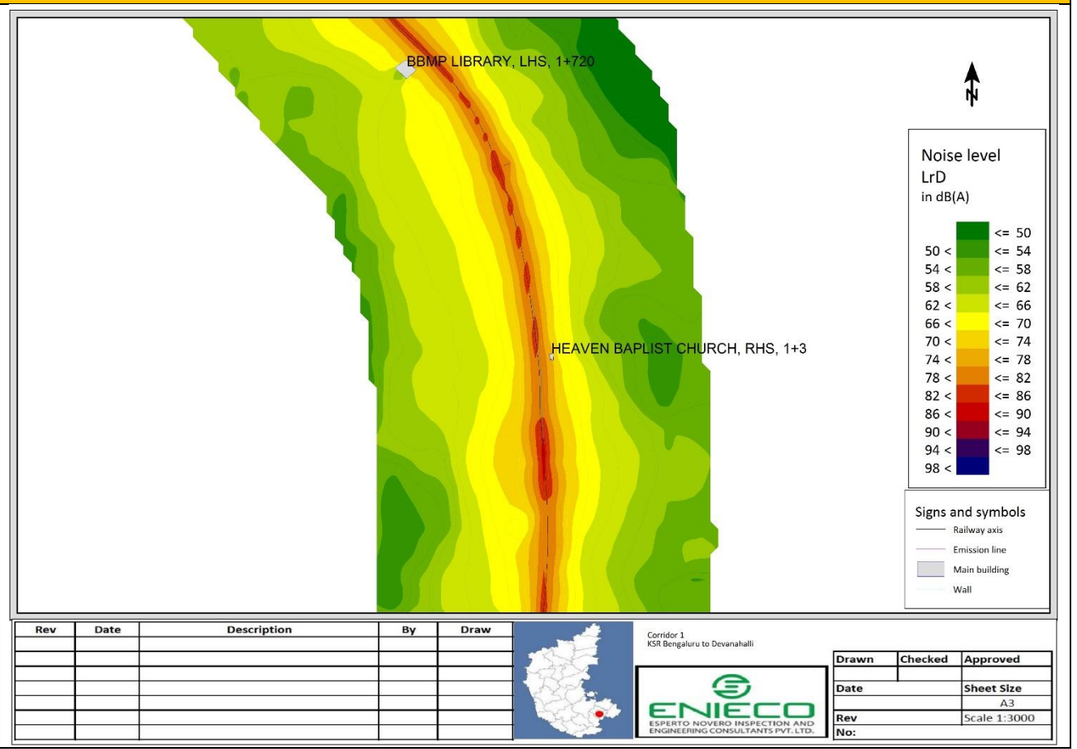
S.No	Without Barrier	With Barrier
21.		

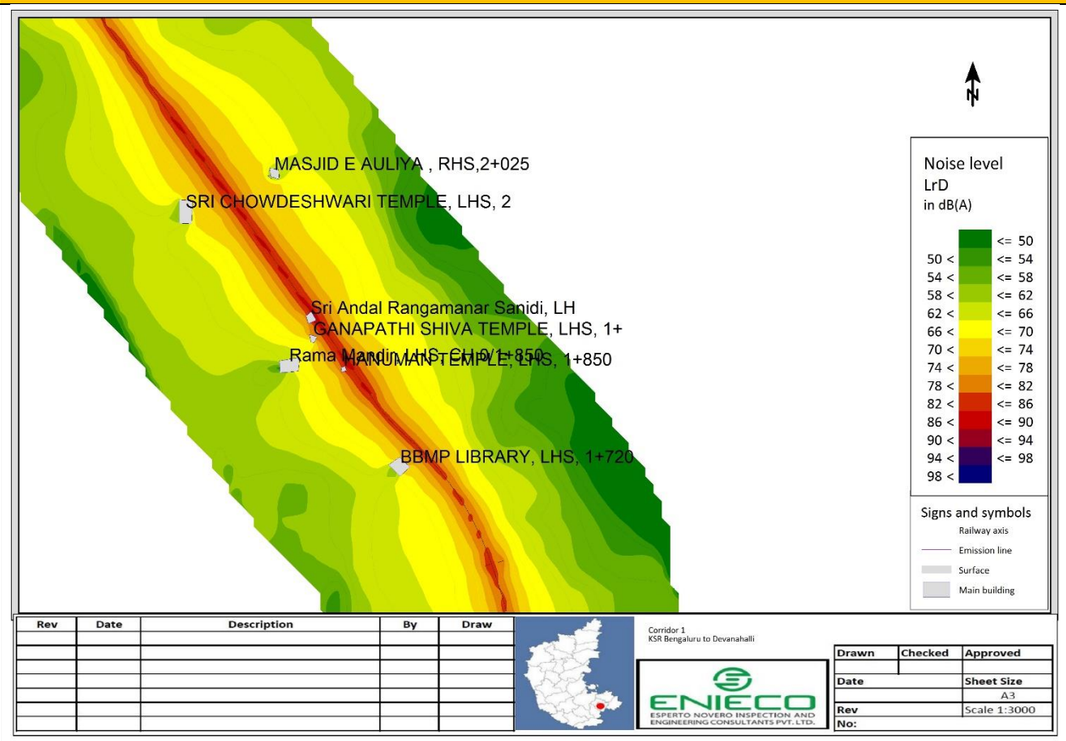
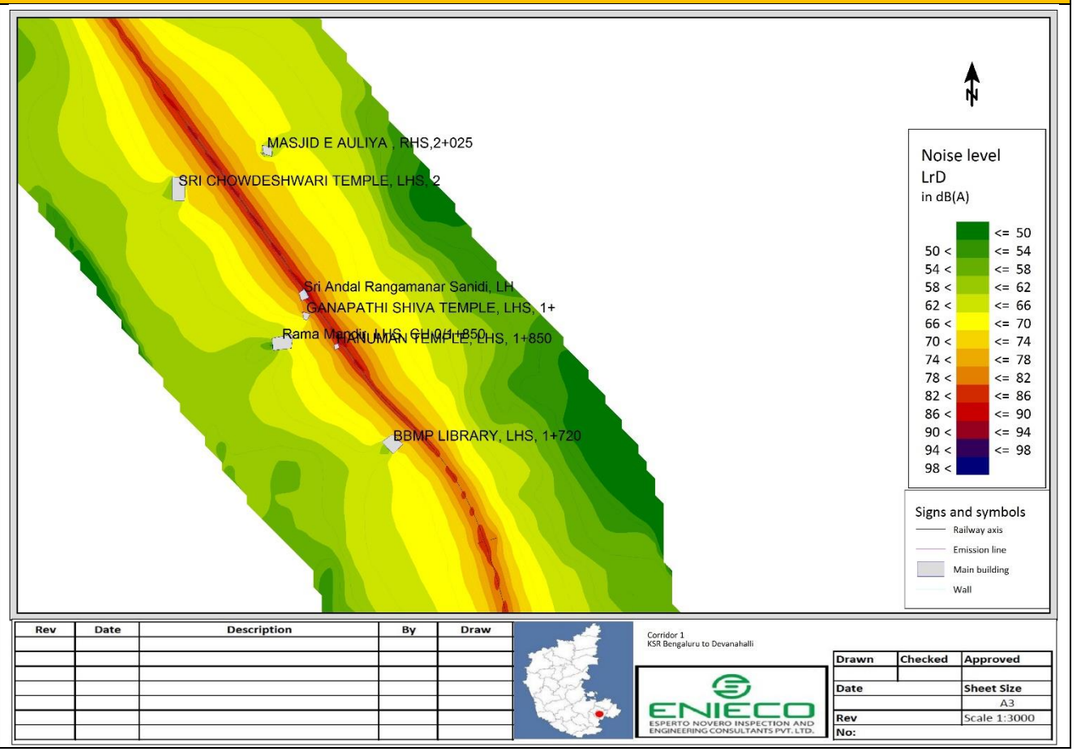
S.No	Without Barrier	With Barrier
22.		

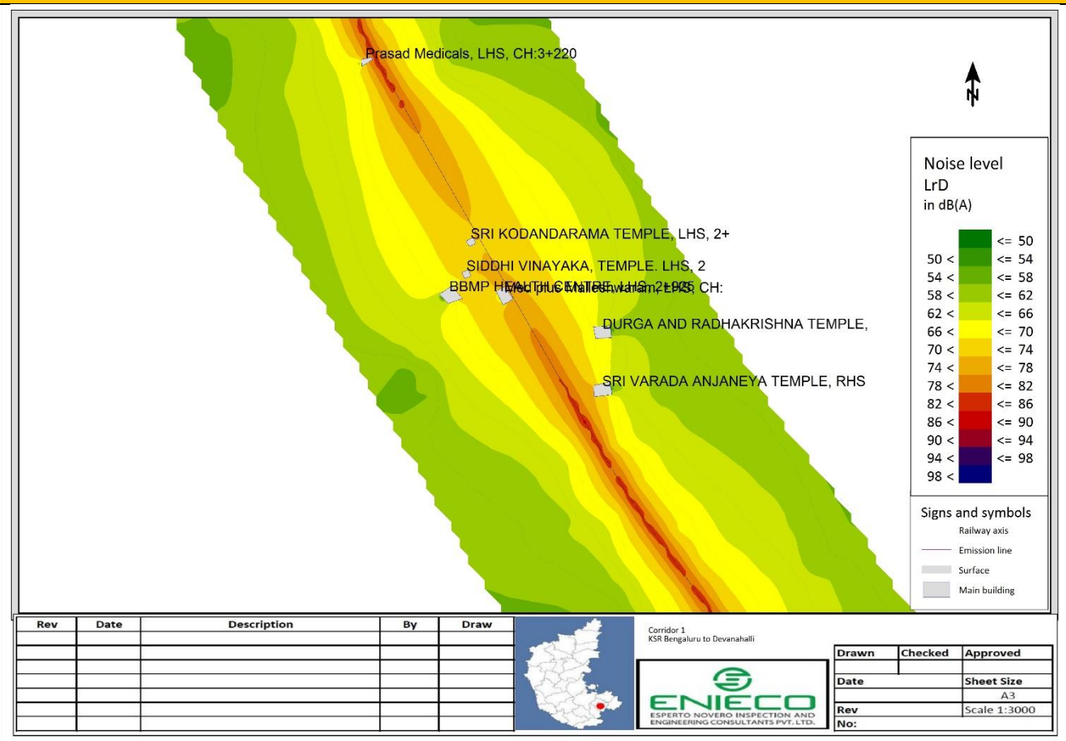
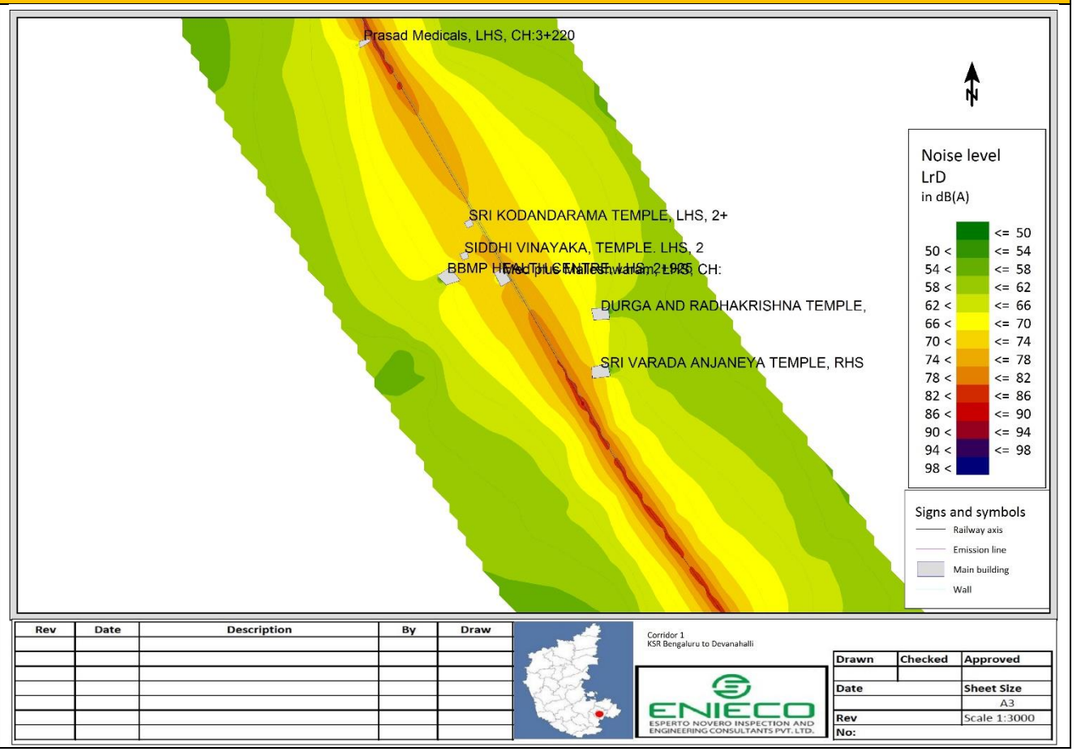
B. Noise contours for Corridor 1 for the Year 2031

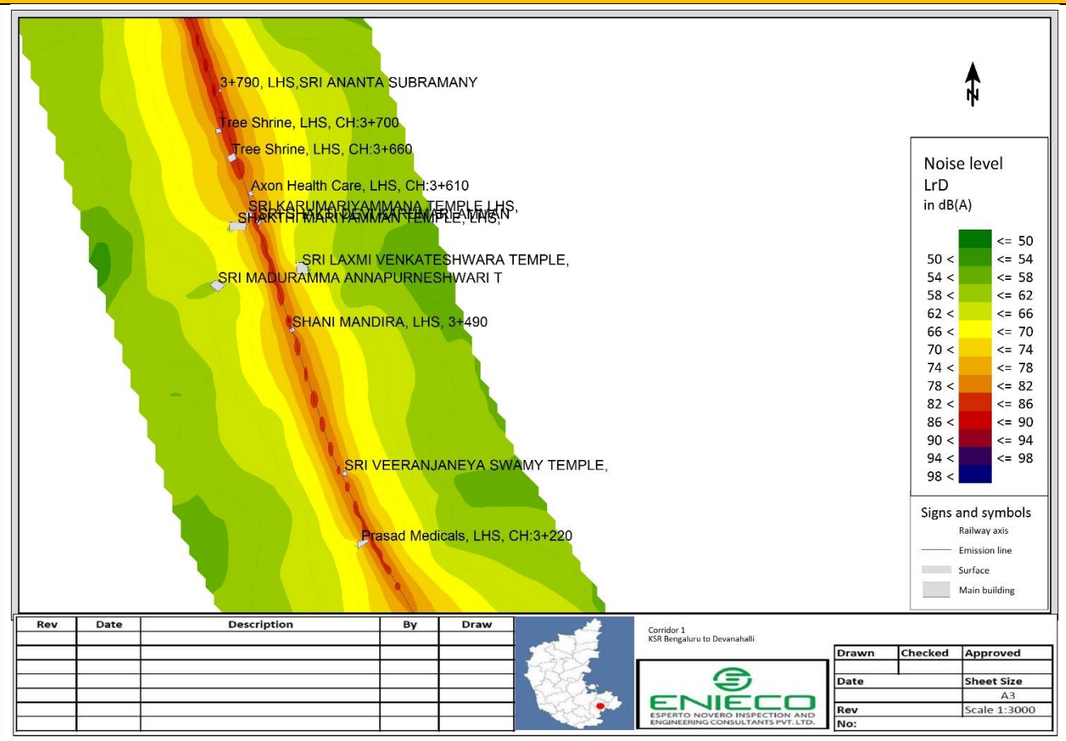
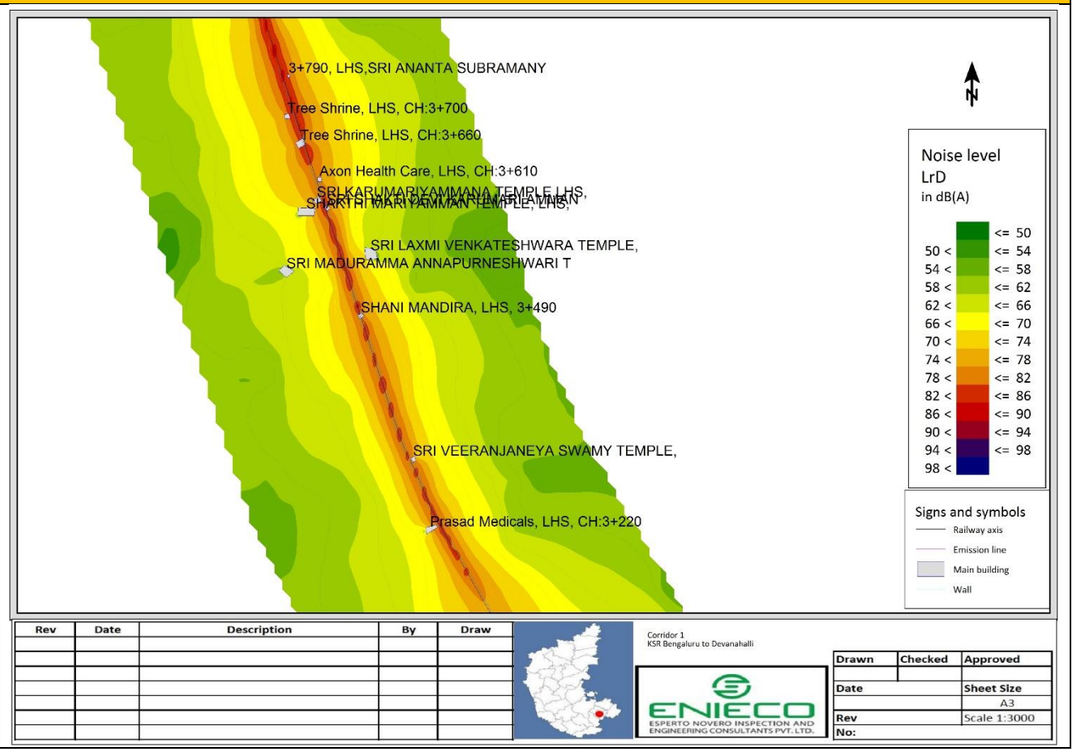
S.No	Without Barrier	With Barrier
1.		

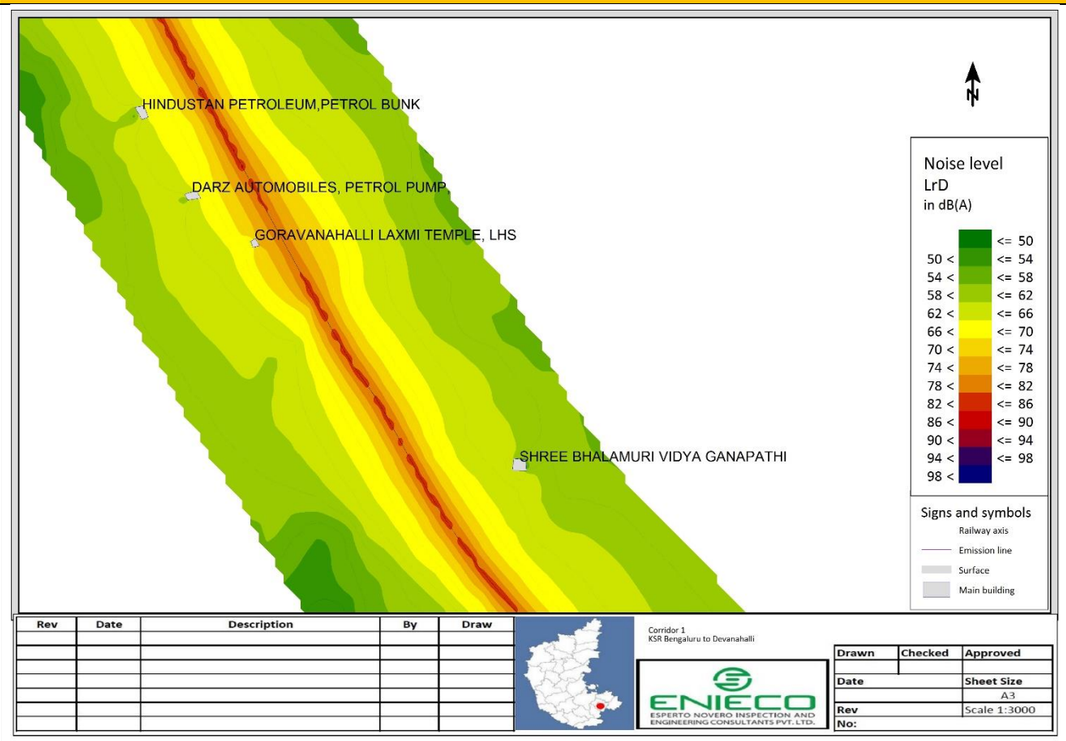
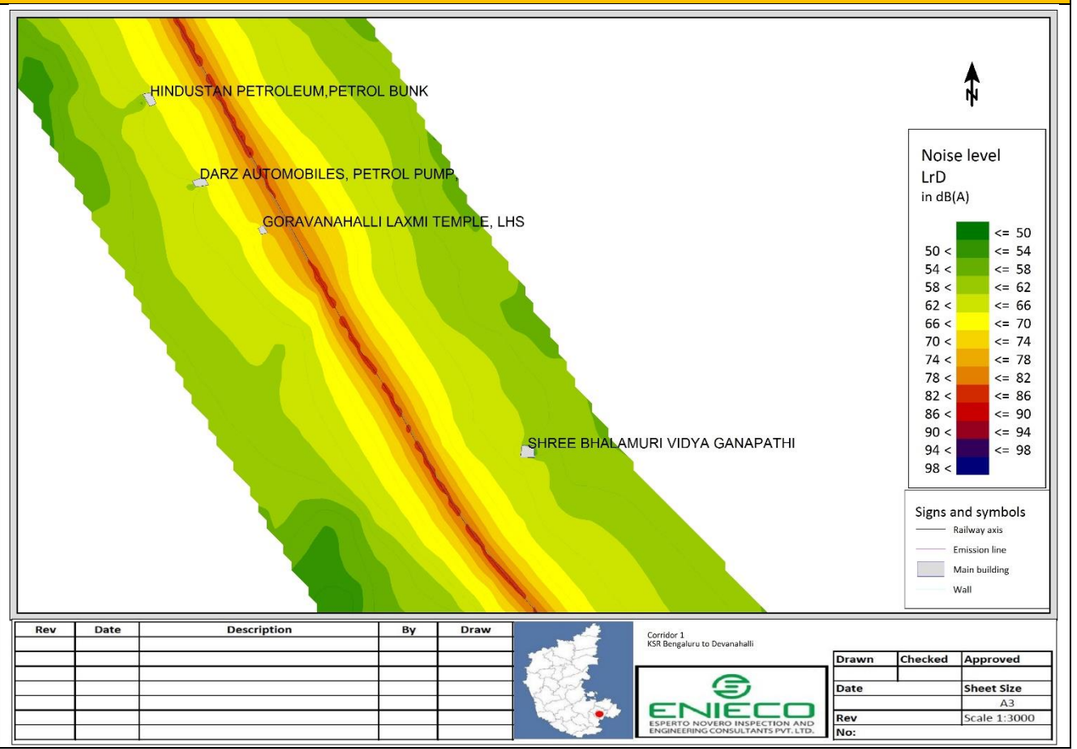
S.No	Without Barrier	With Barrier
2.		

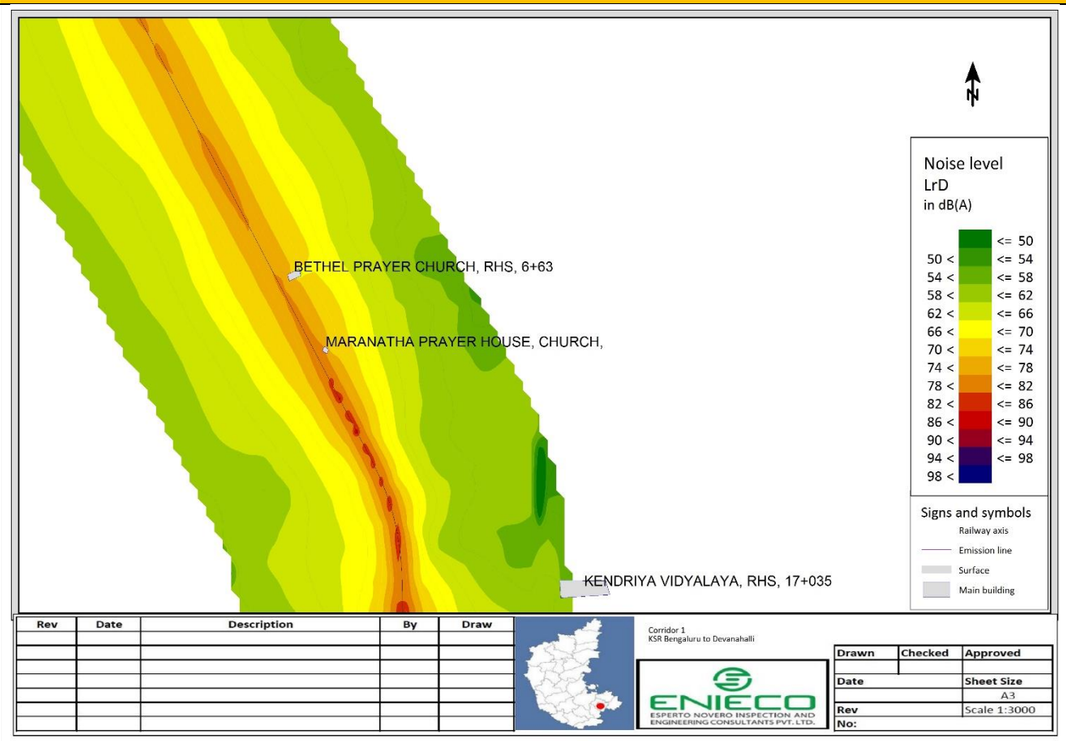
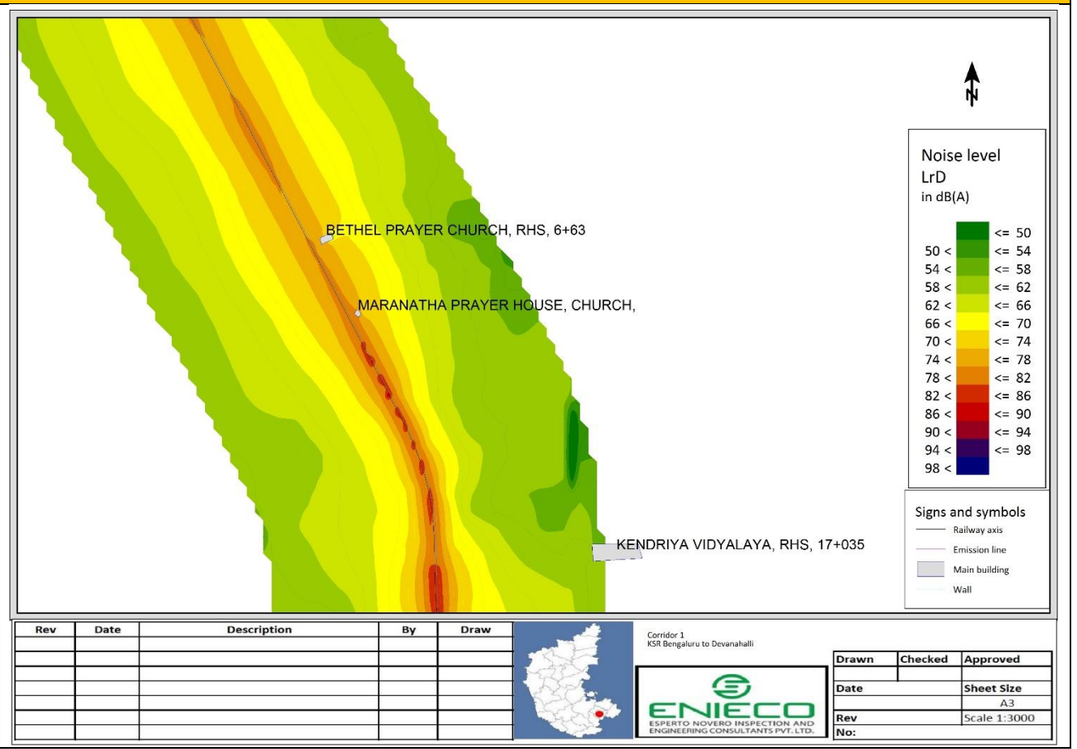
S.No	Without Barrier	With Barrier
3.		

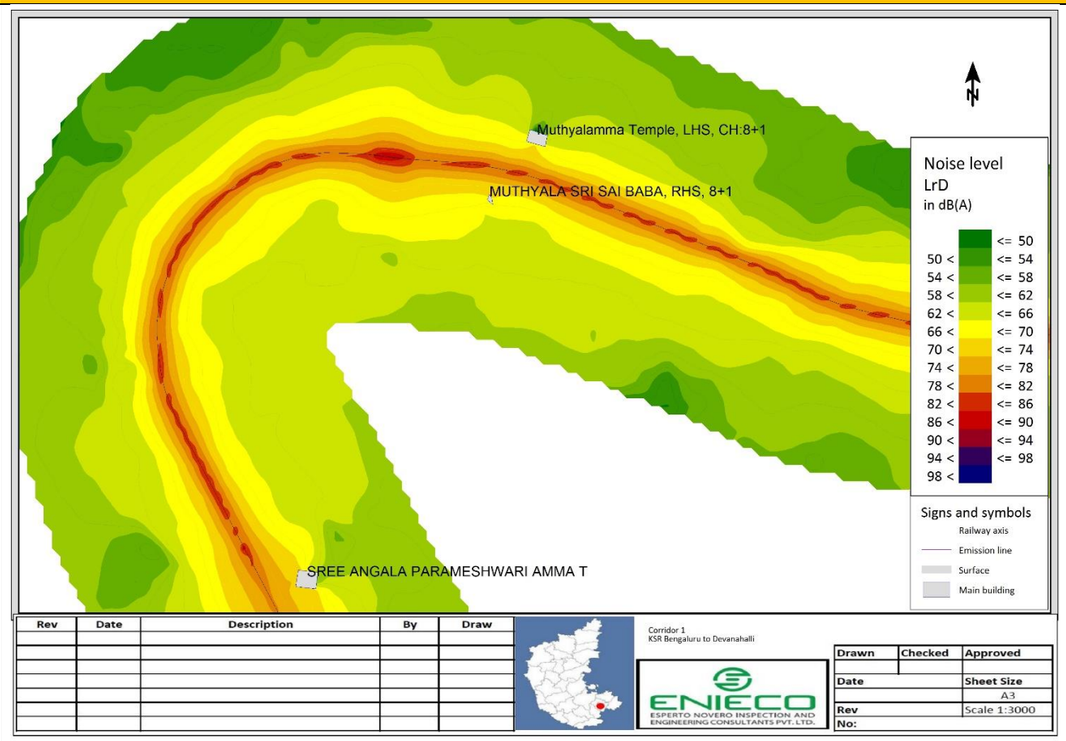
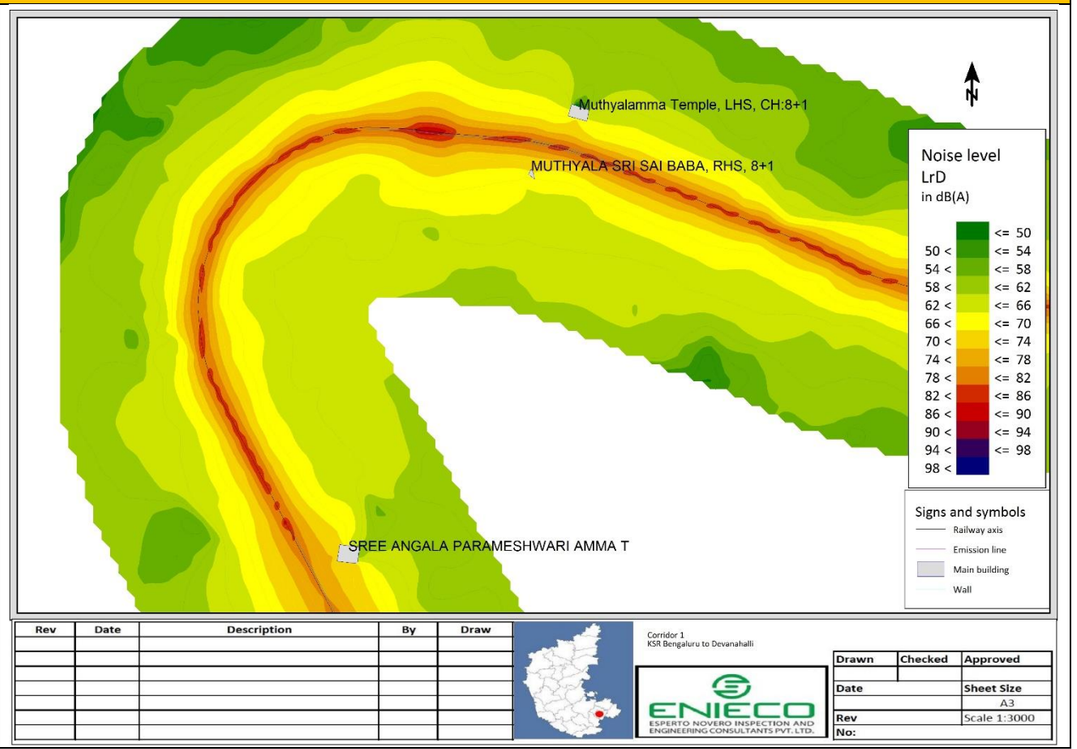
S.No	Without Barrier	With Barrier
4.		

S.No	Without Barrier	With Barrier
5.		

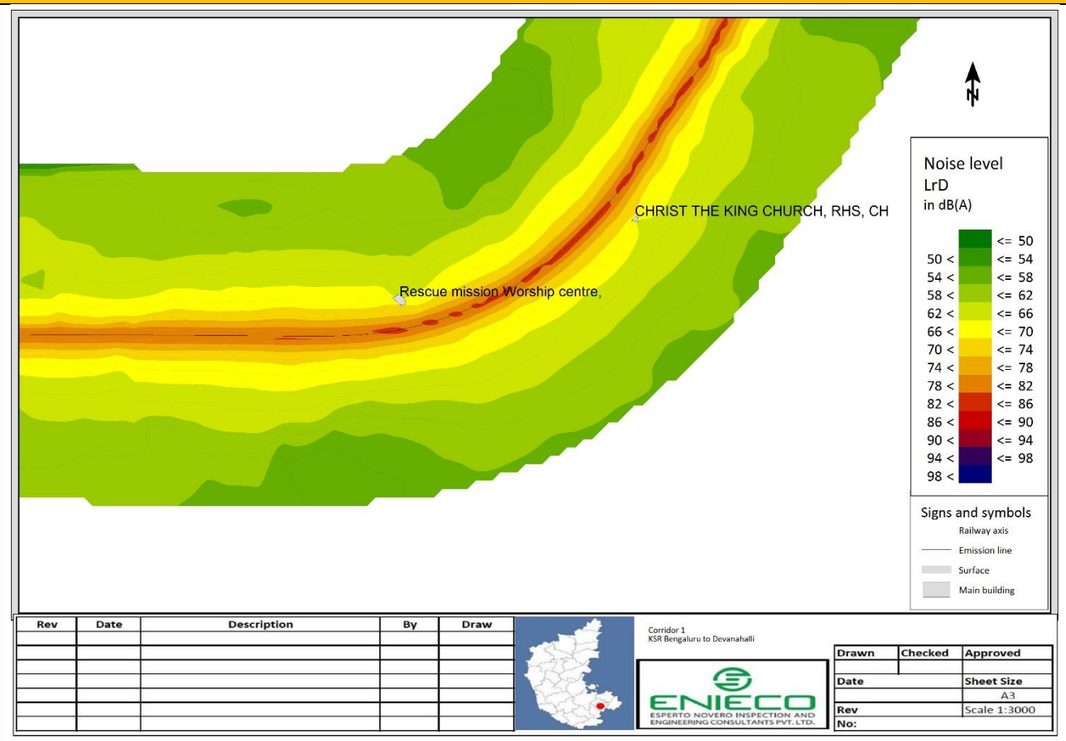
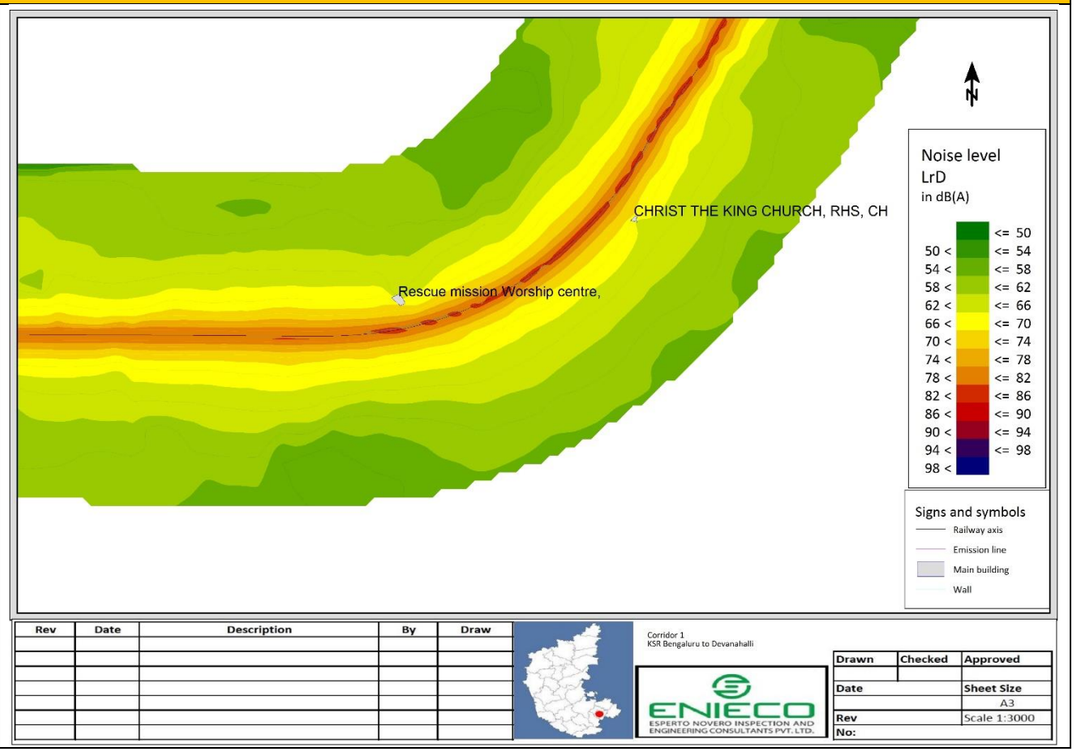
S.No	Without Barrier	With Barrier
6.		

S.No	Without Barrier	With Barrier
7.		

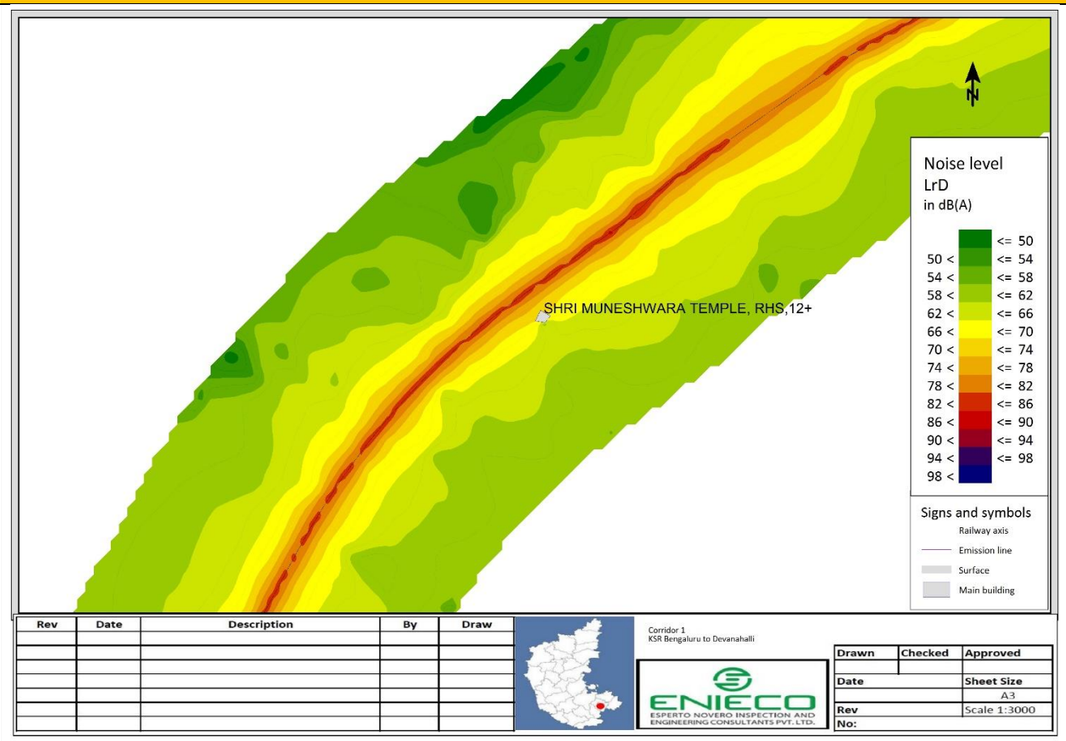
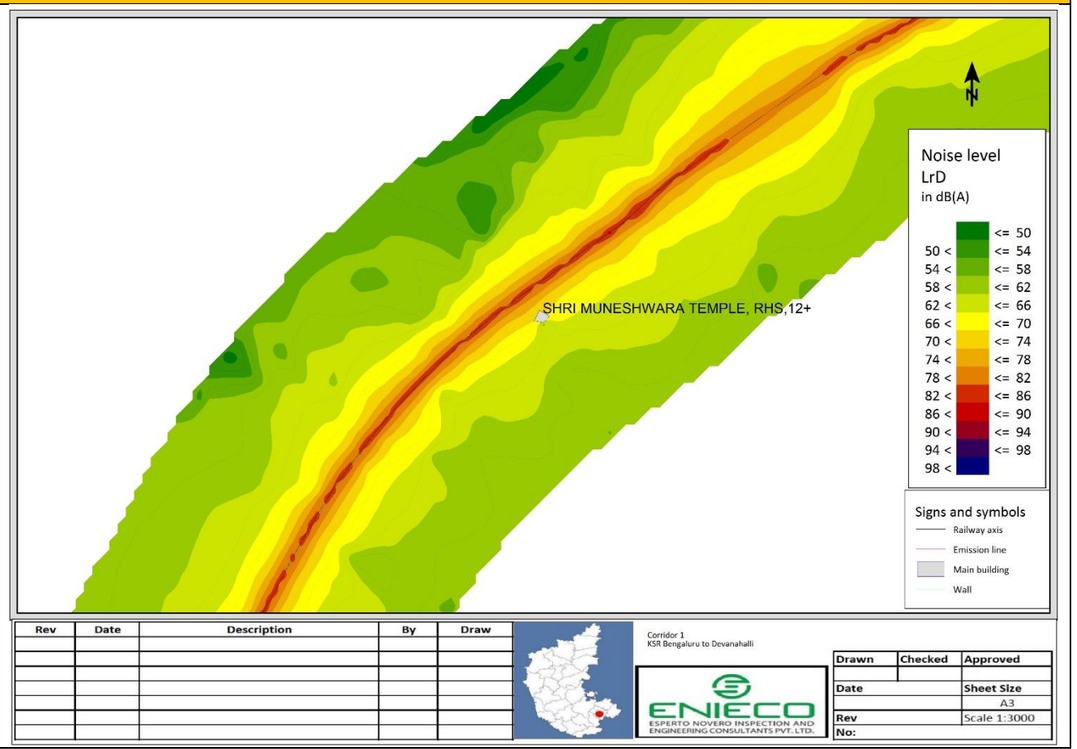
S.No	Without Barrier	With Barrier
8.		

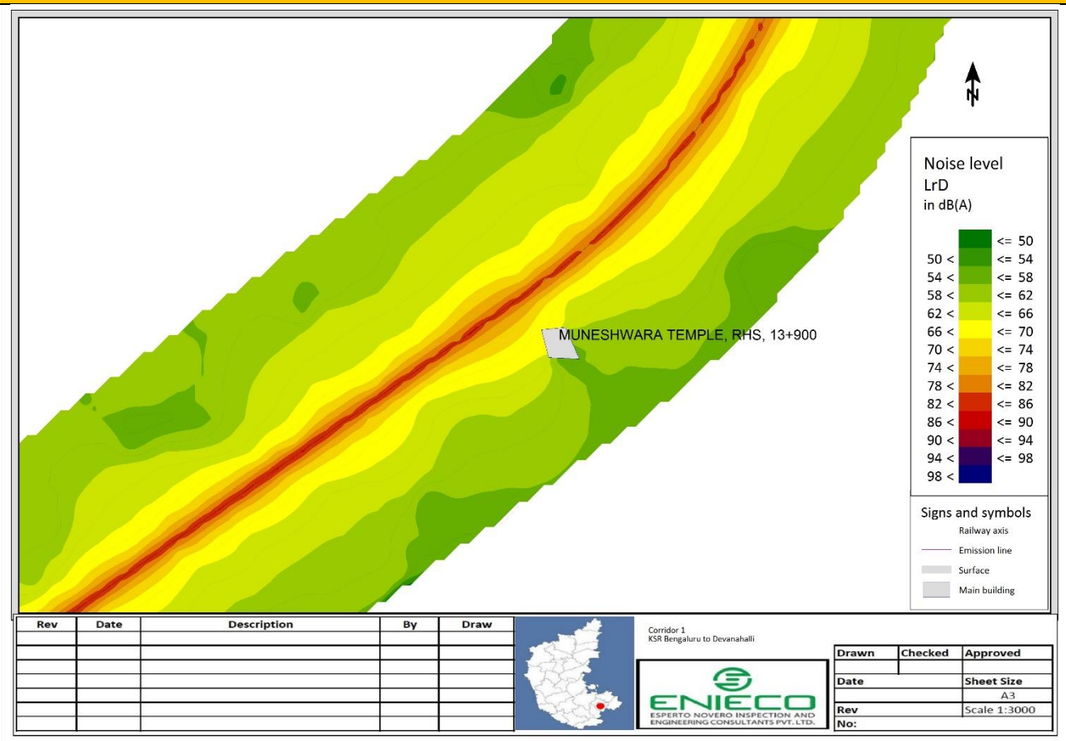
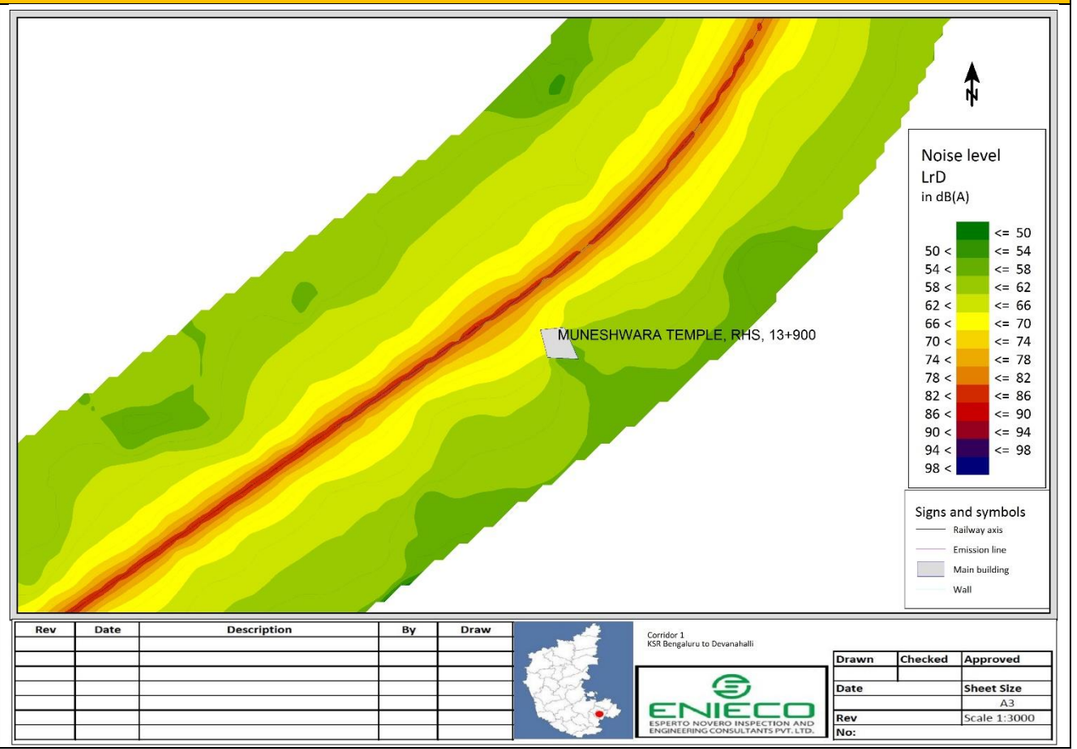
S.No	Without Barrier	With Barrier
9.		

1100

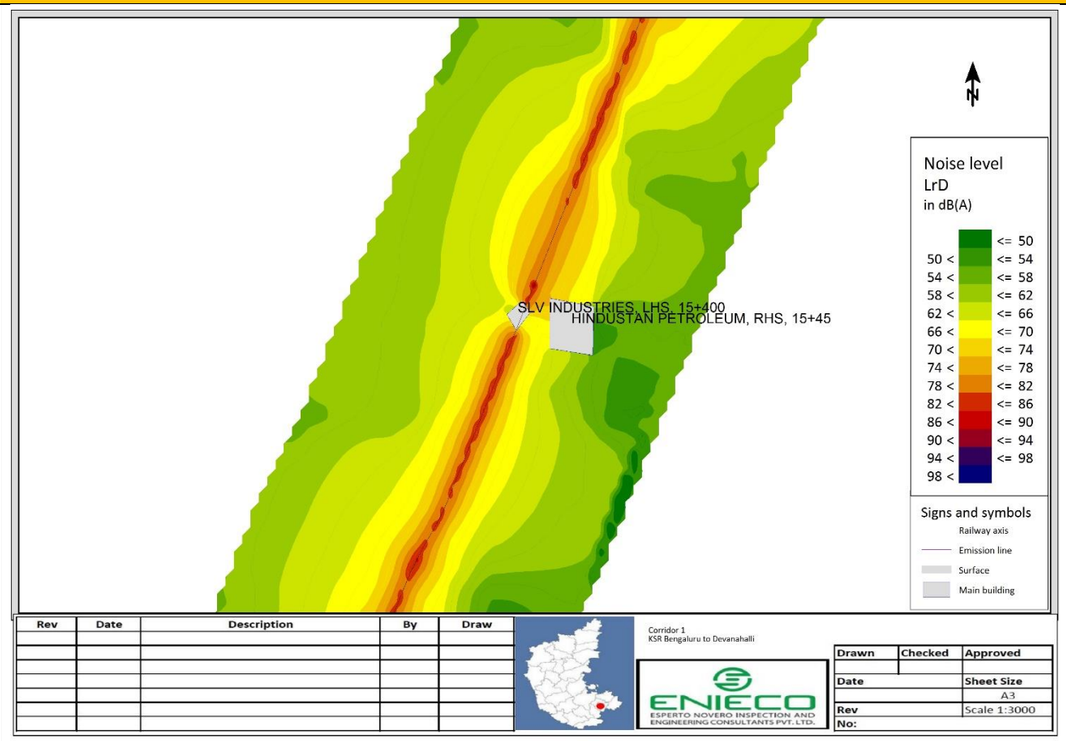
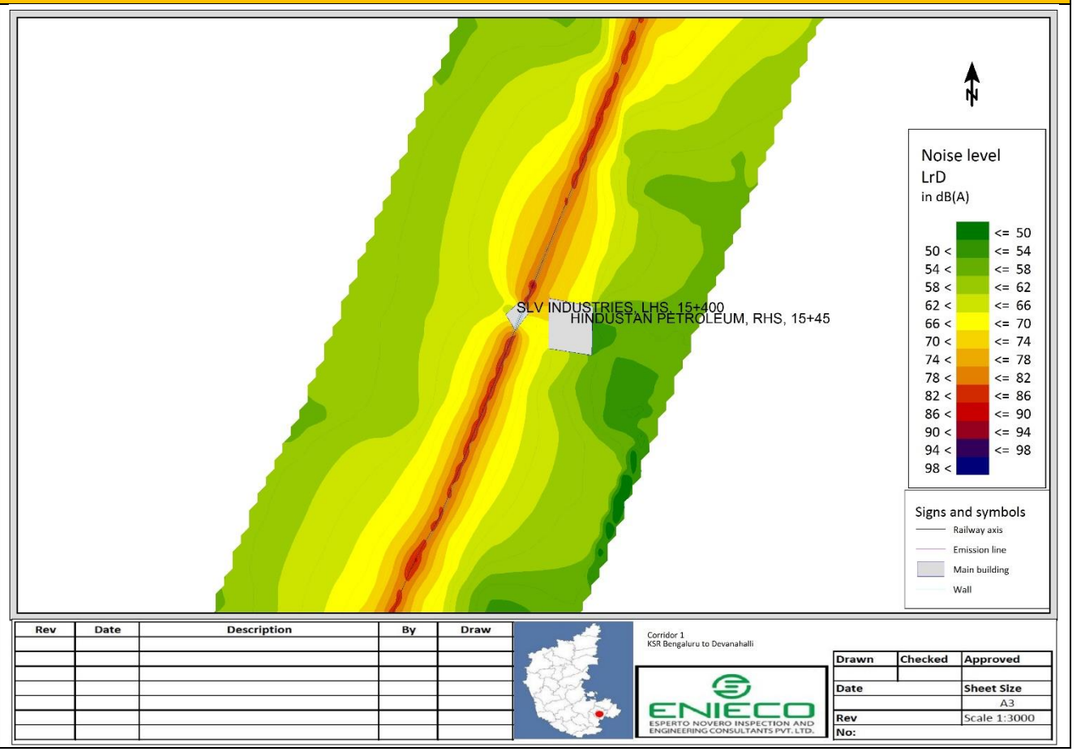
S.No	Without Barrier	With Barrier
10.		

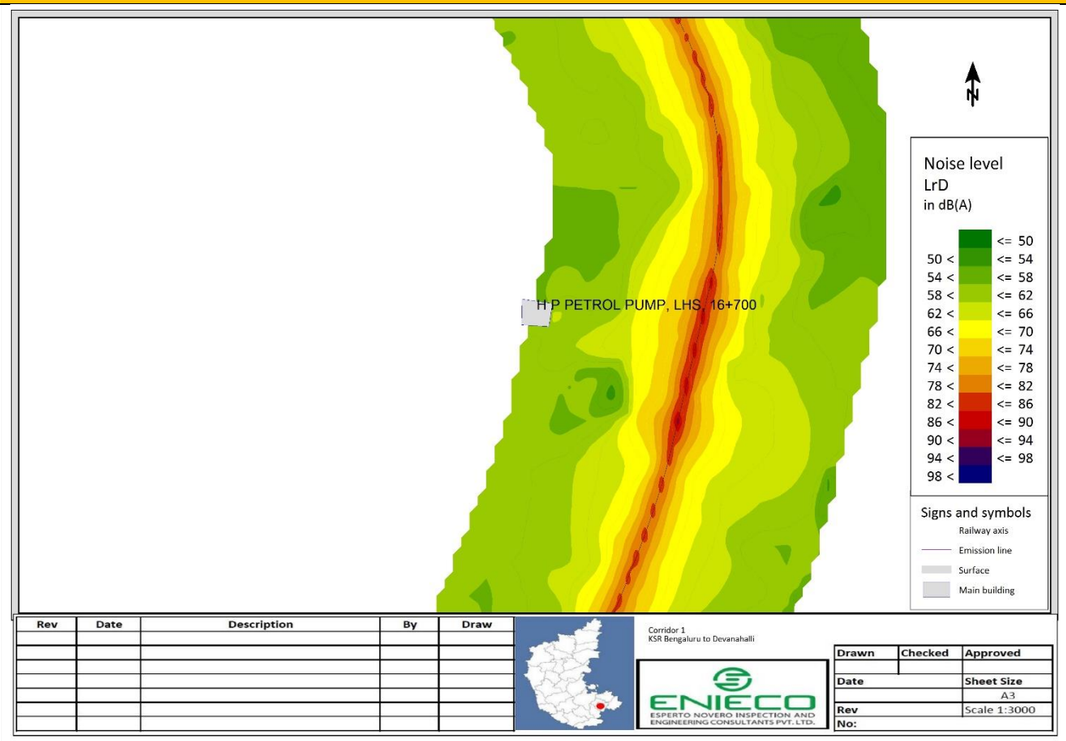
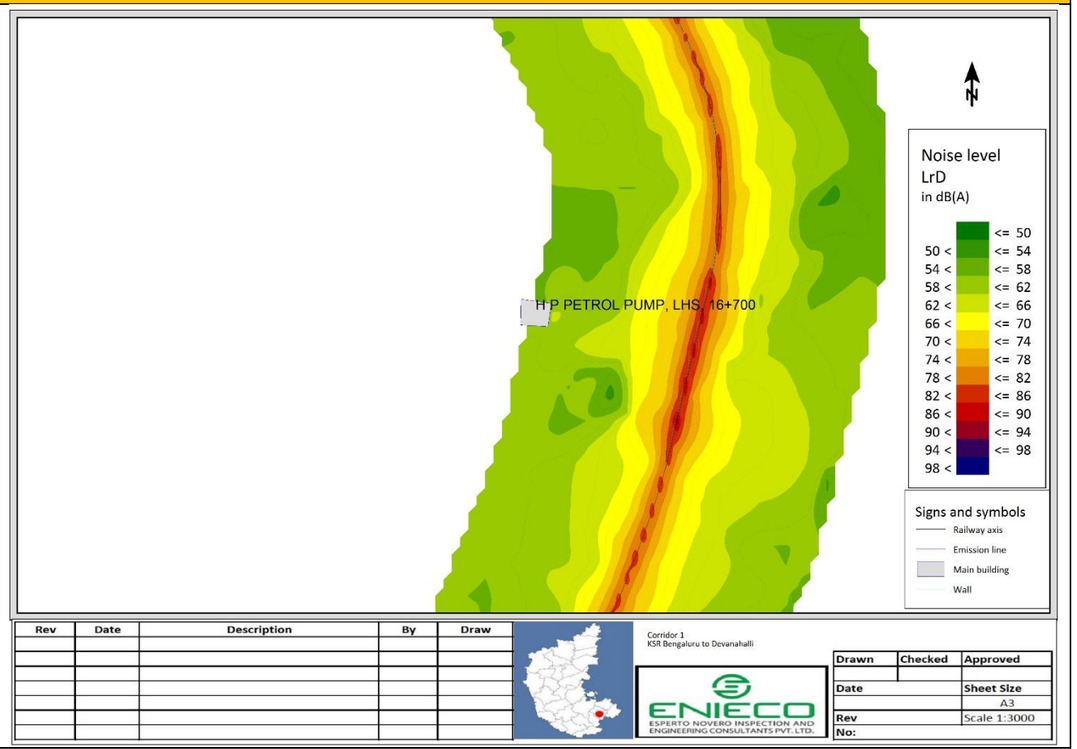
1101

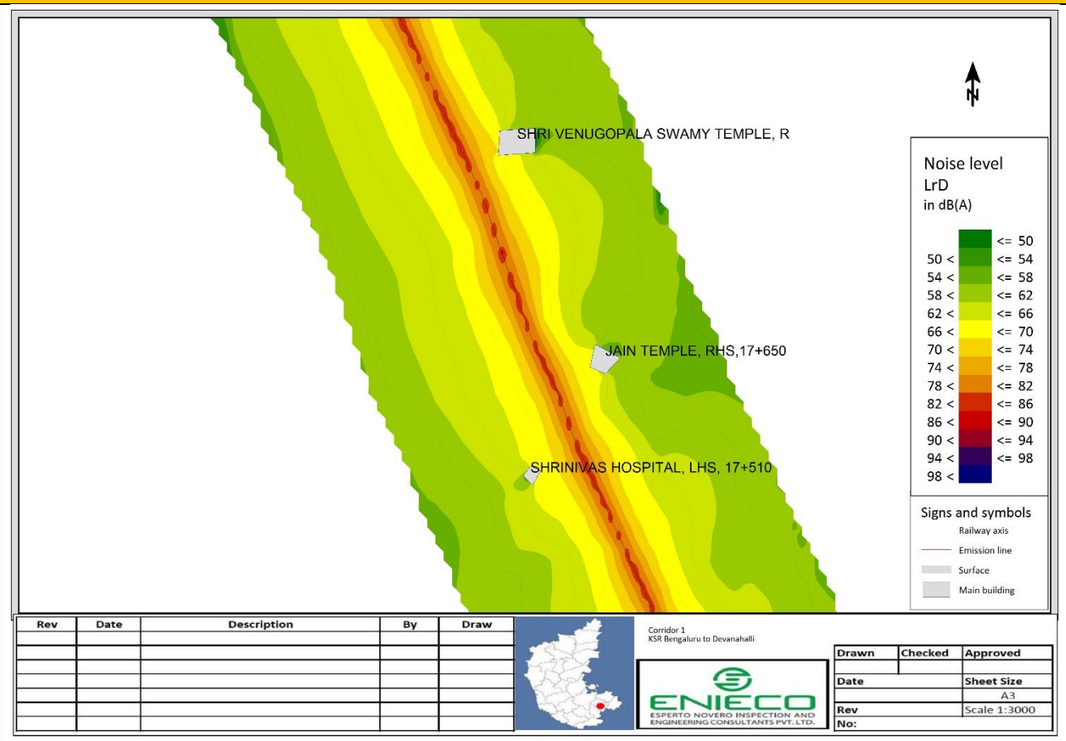
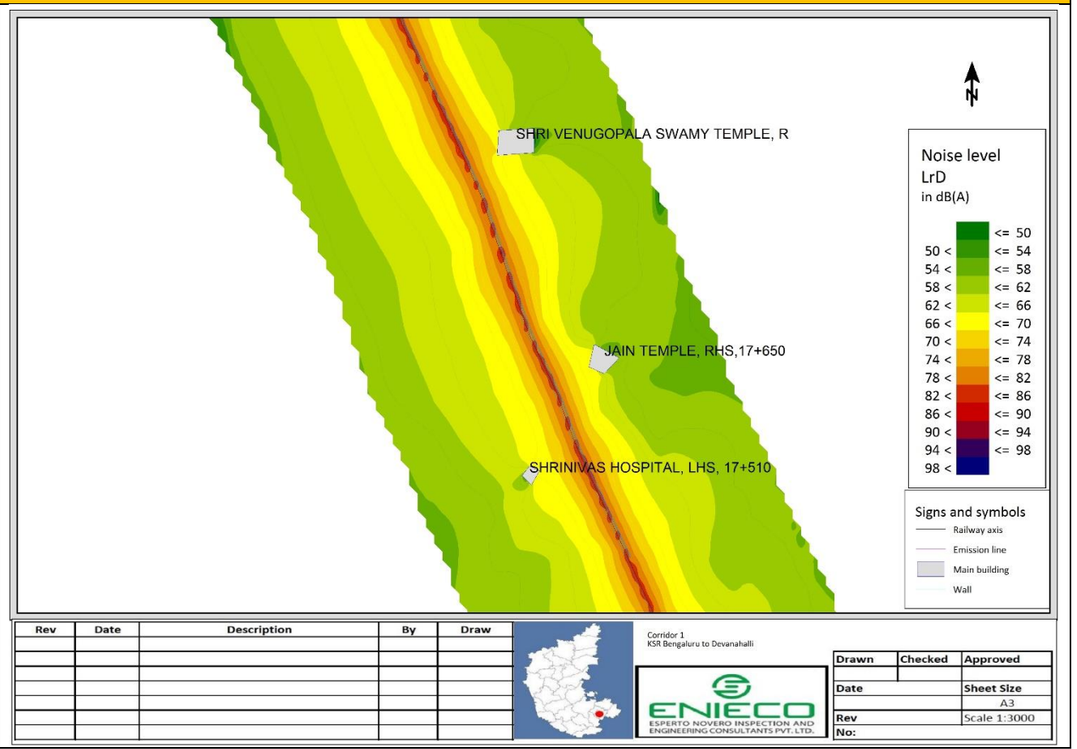
S.No	Without Barrier	With Barrier
11.		

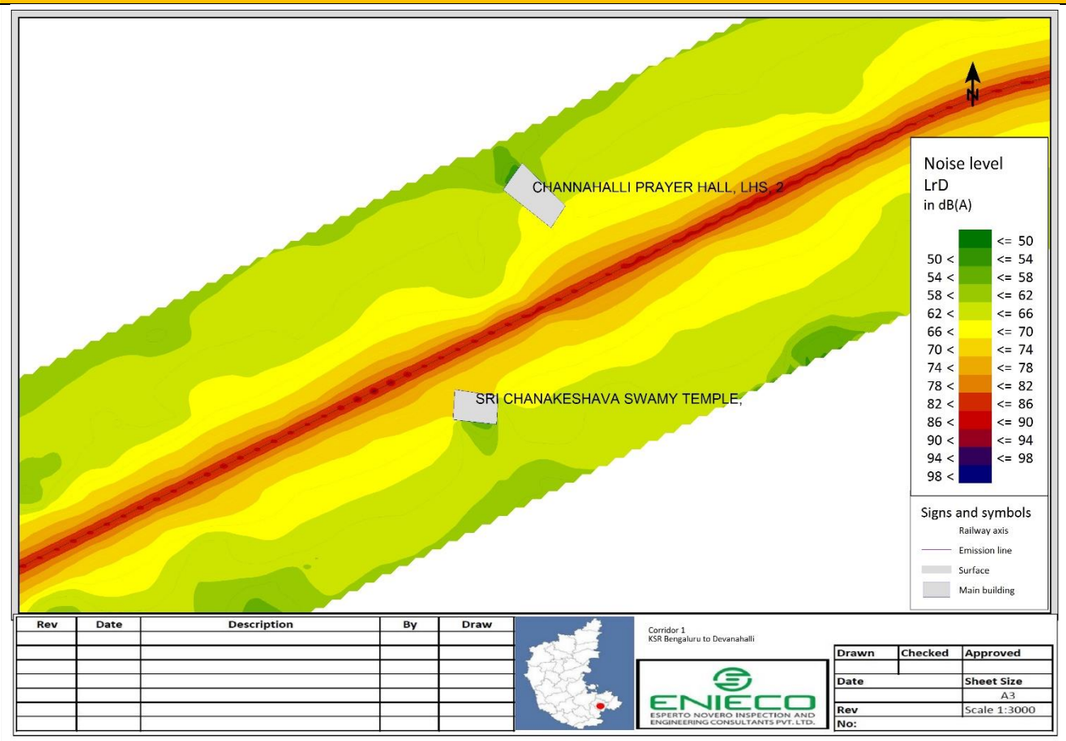
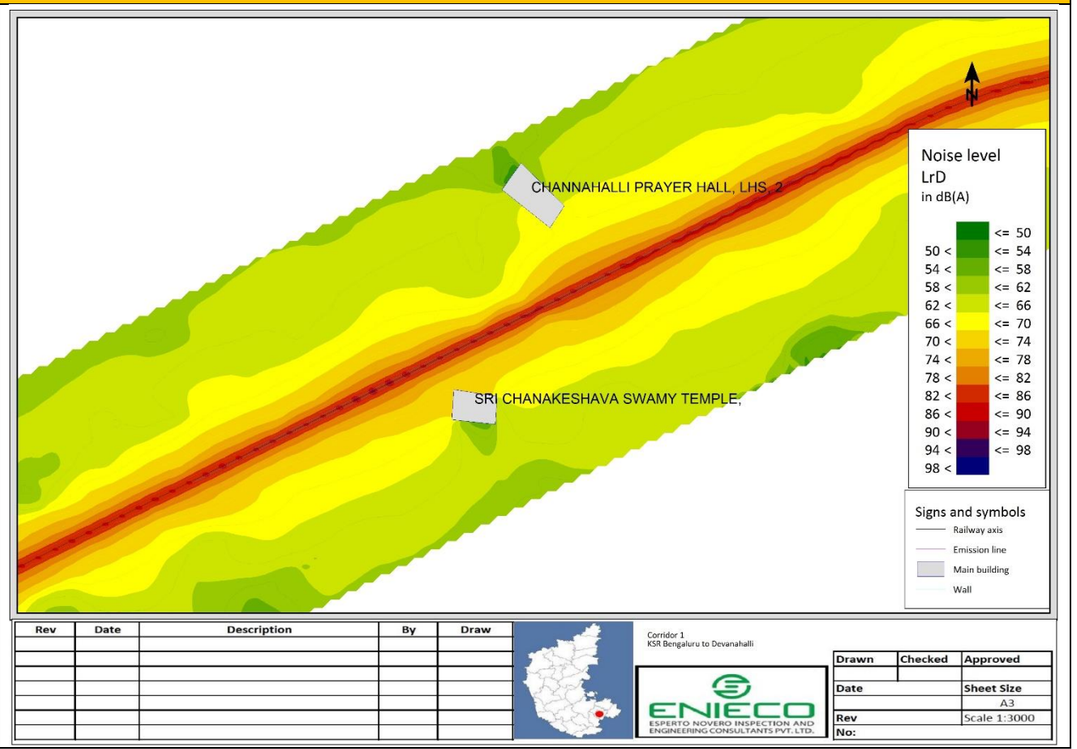
S.No	Without Barrier	With Barrier
12.		

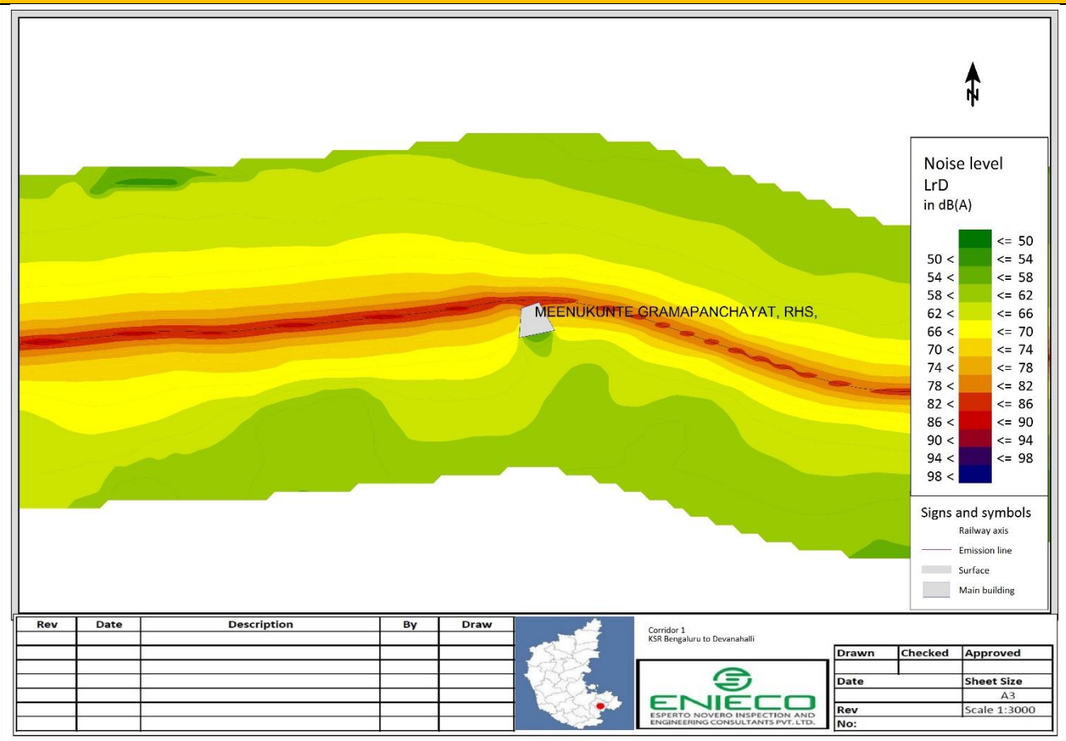
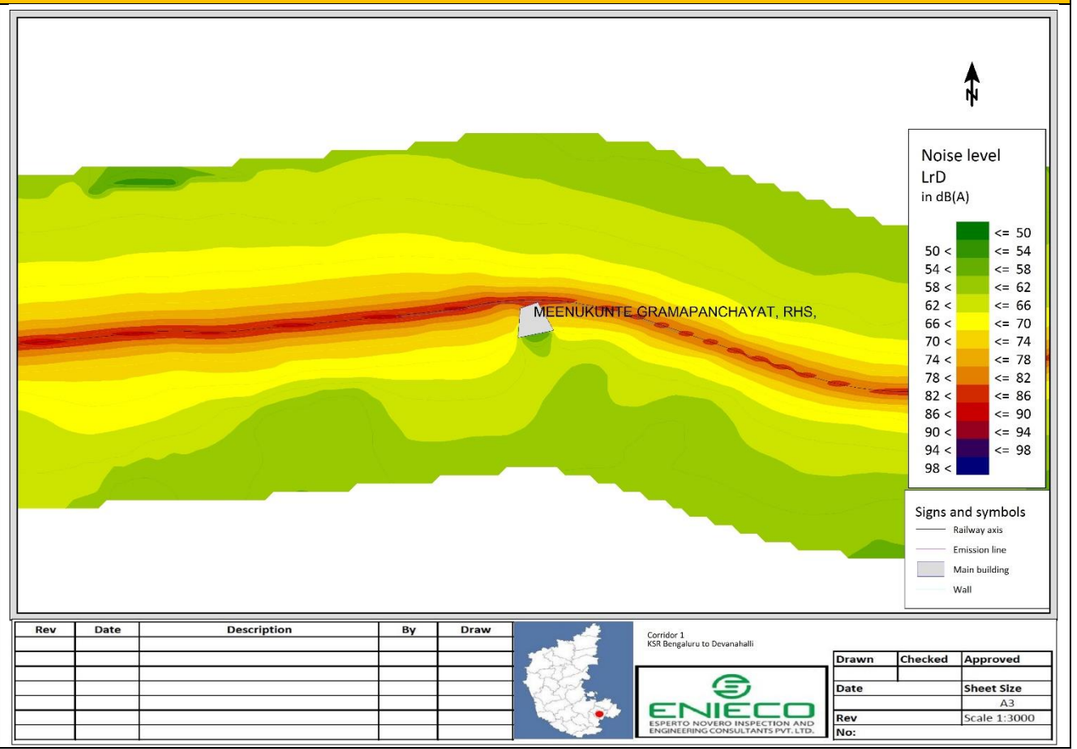
1103

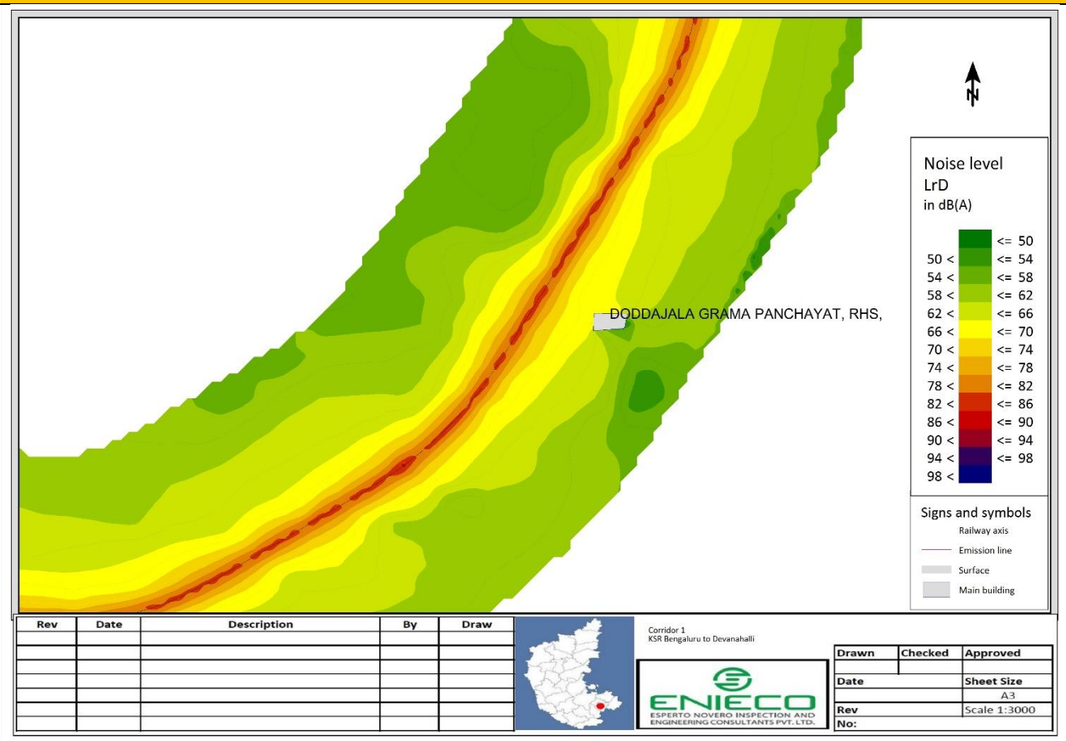
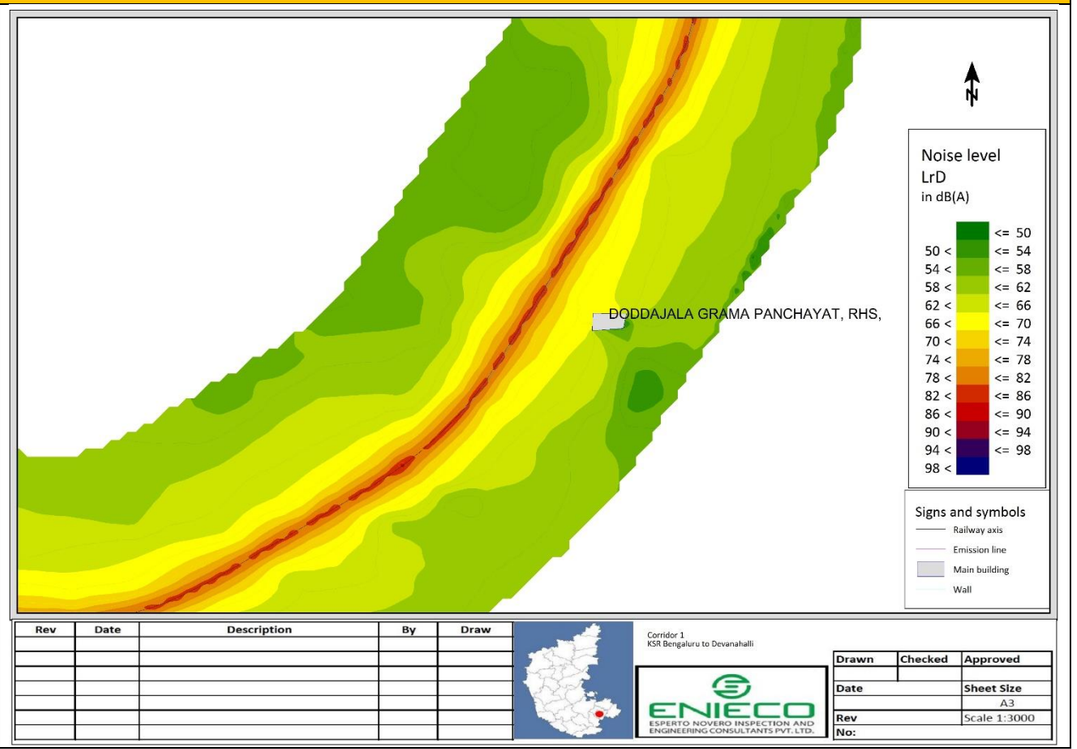
S.No	Without Barrier	With Barrier
13.		

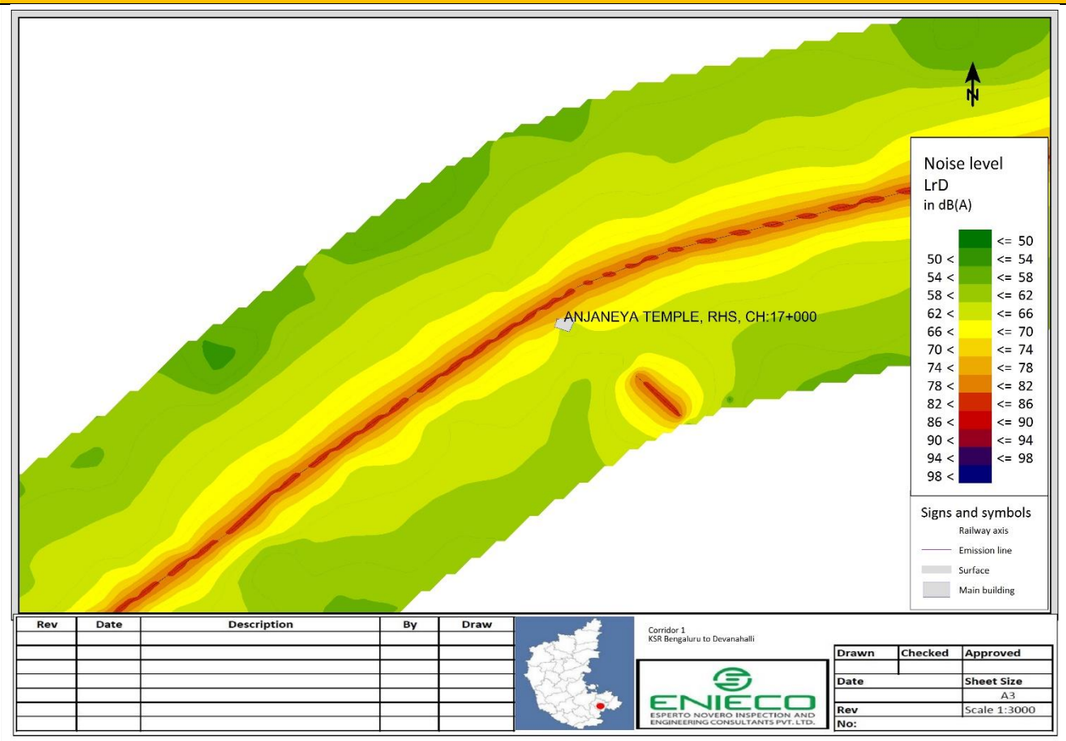
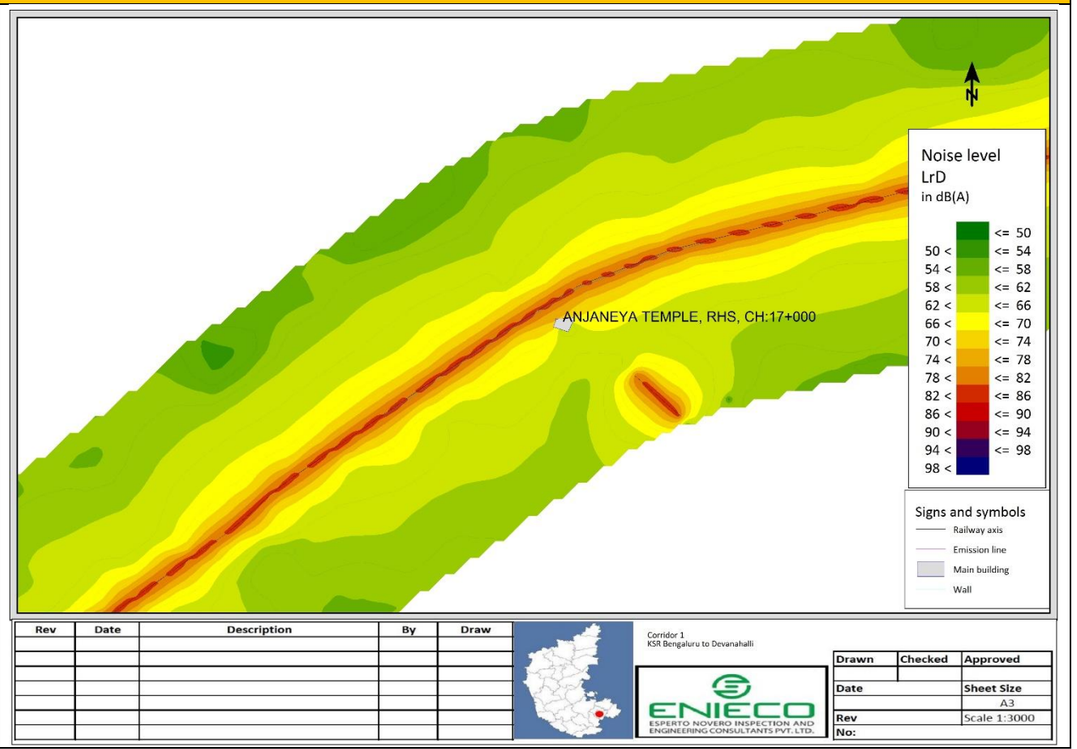
S.No	Without Barrier	With Barrier
14.		

S.No	Without Barrier	With Barrier
15.		

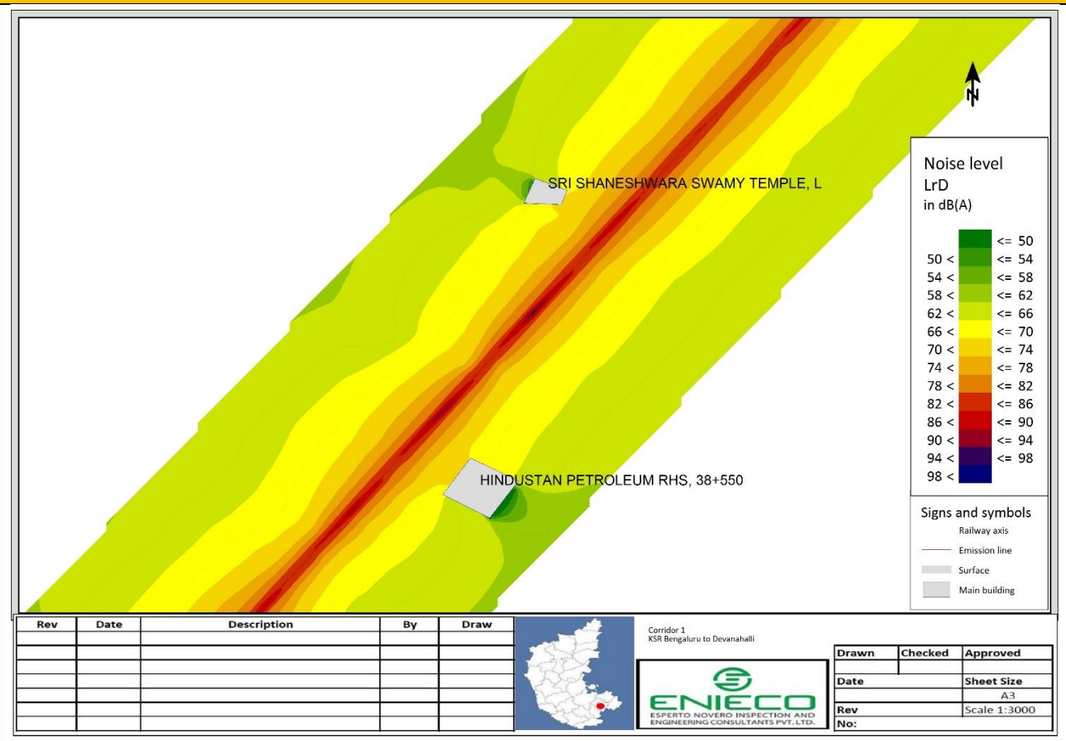
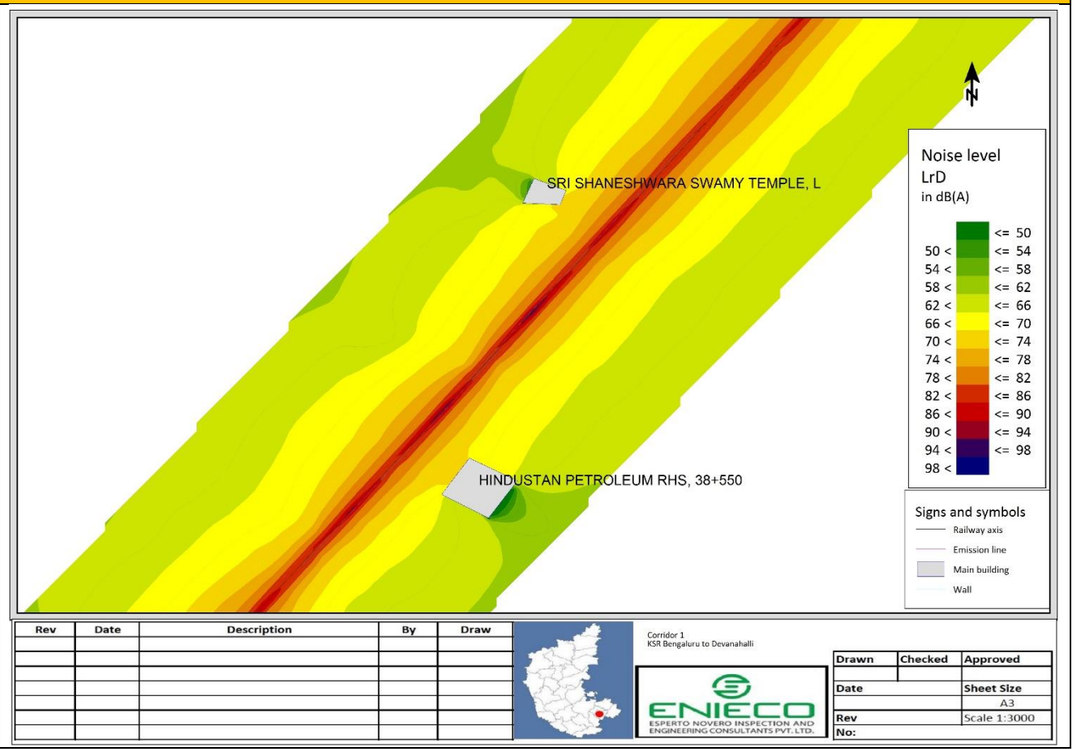
S.No	Without Barrier	With Barrier
16.		

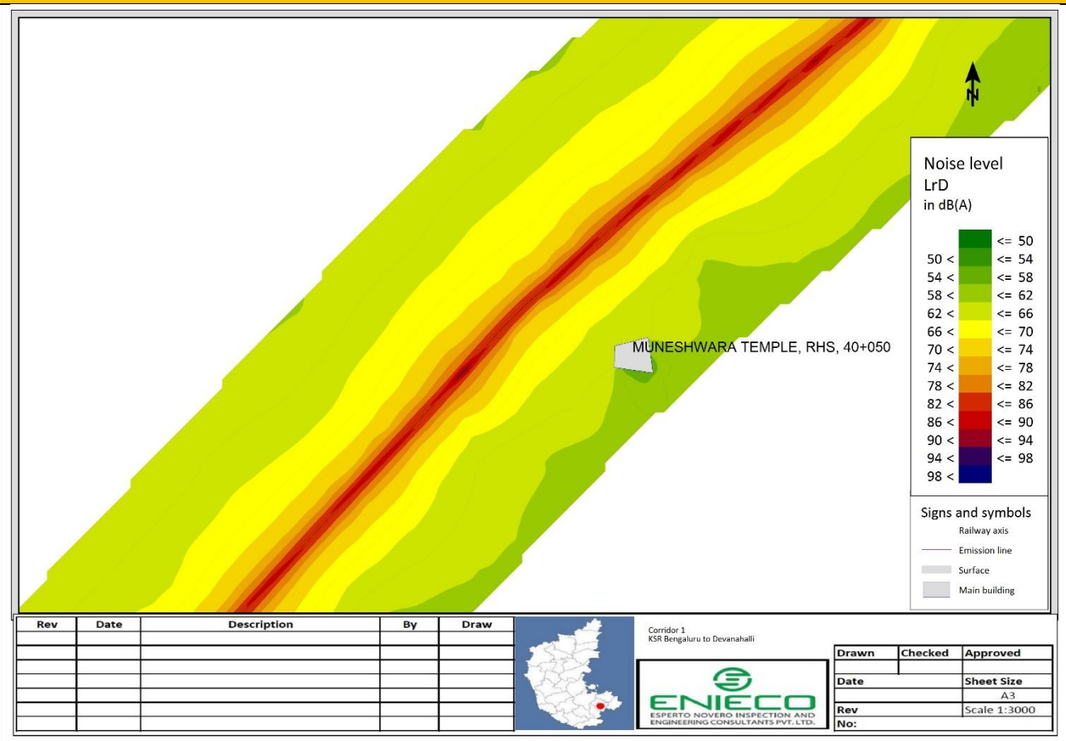
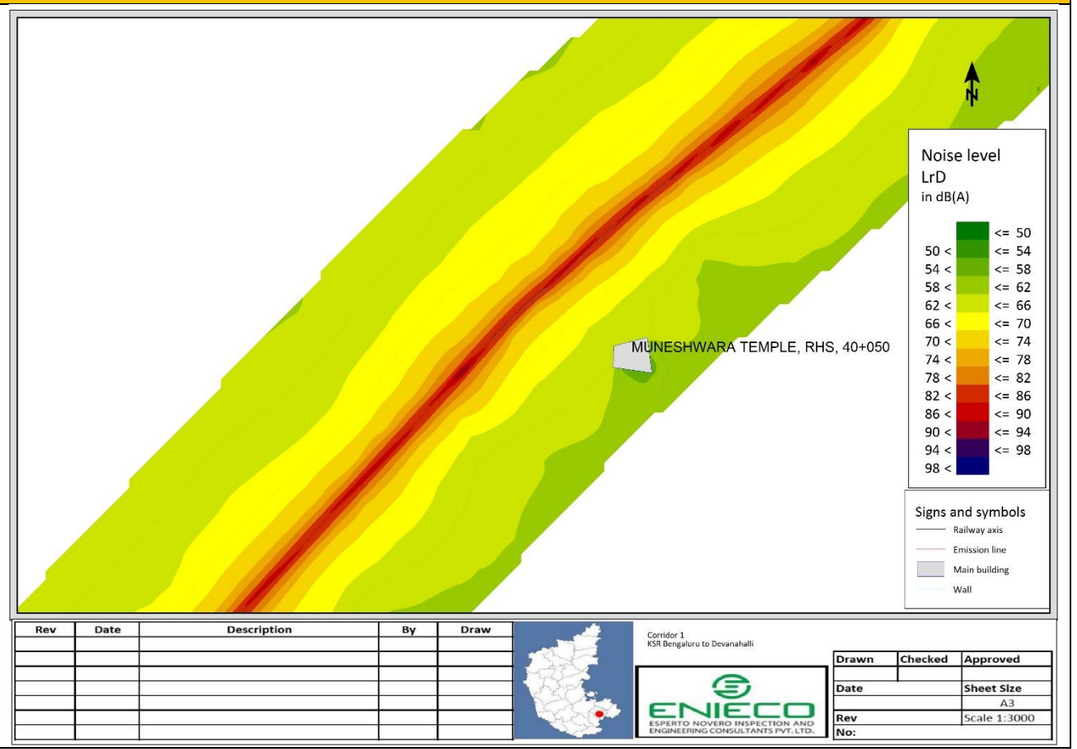
S.No	Without Barrier	With Barrier
17.		

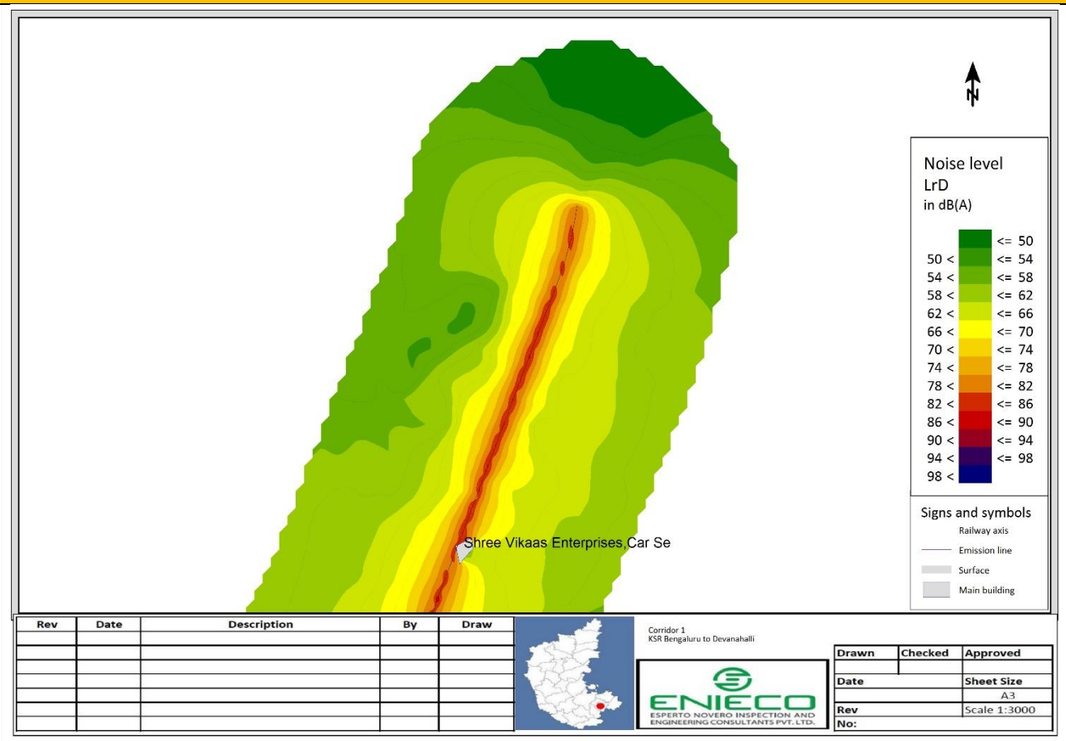
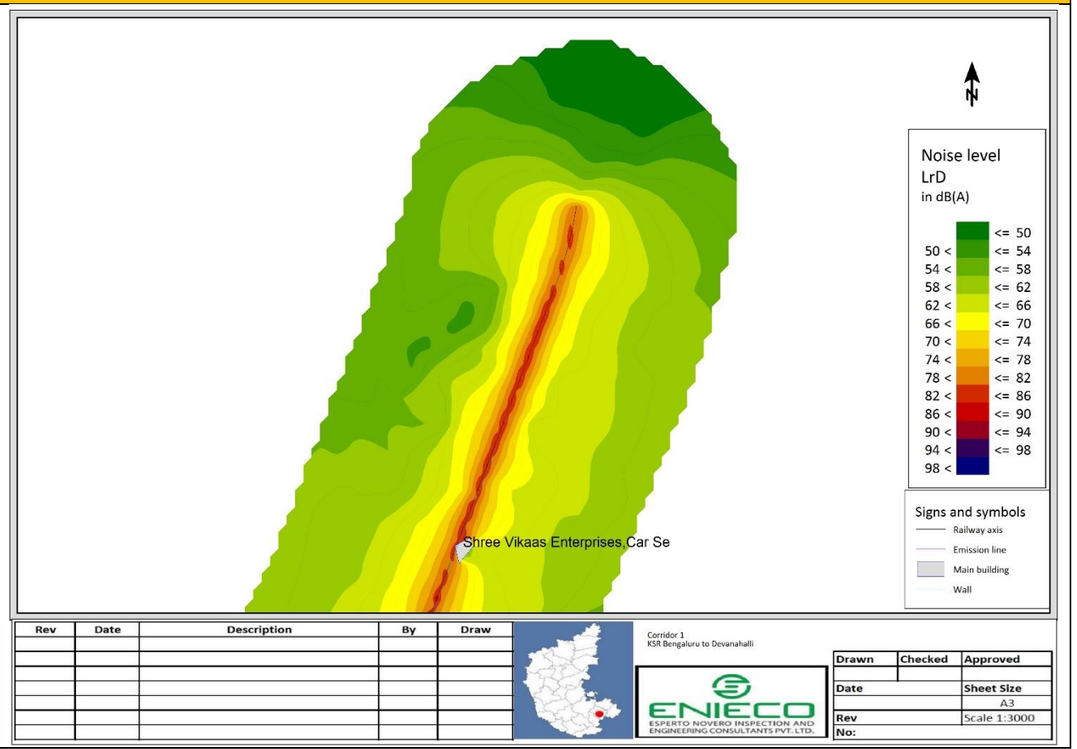
S.No	Without Barrier	With Barrier
18.		

S.No	Without Barrier	With Barrier
19.		

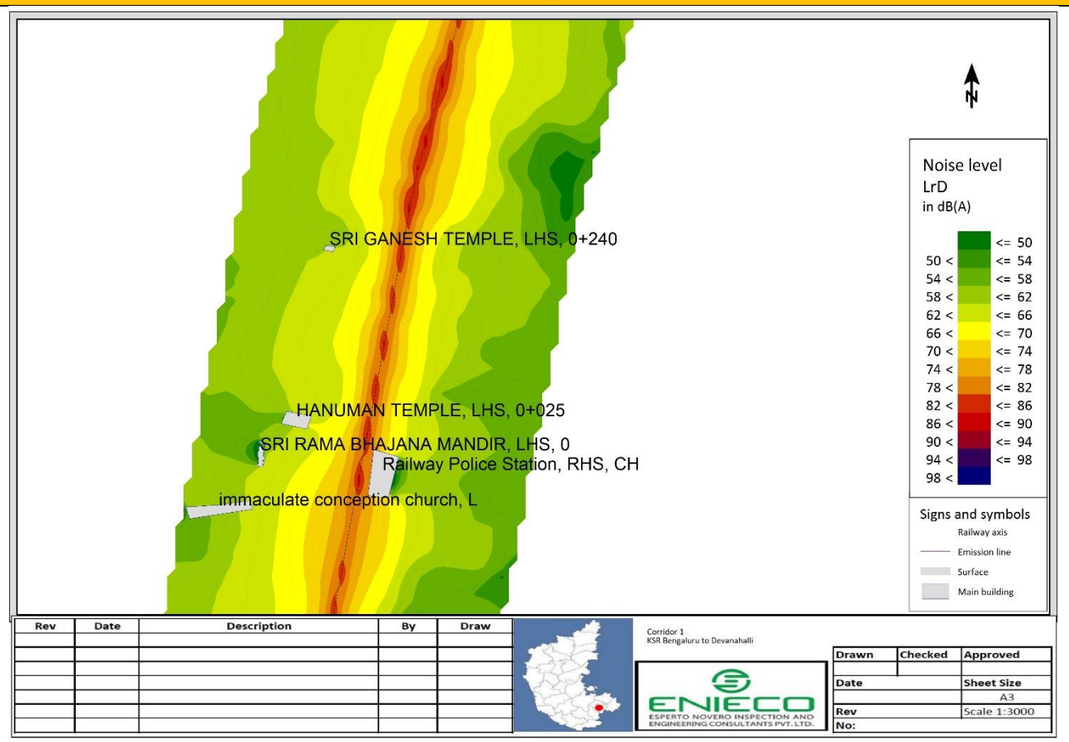
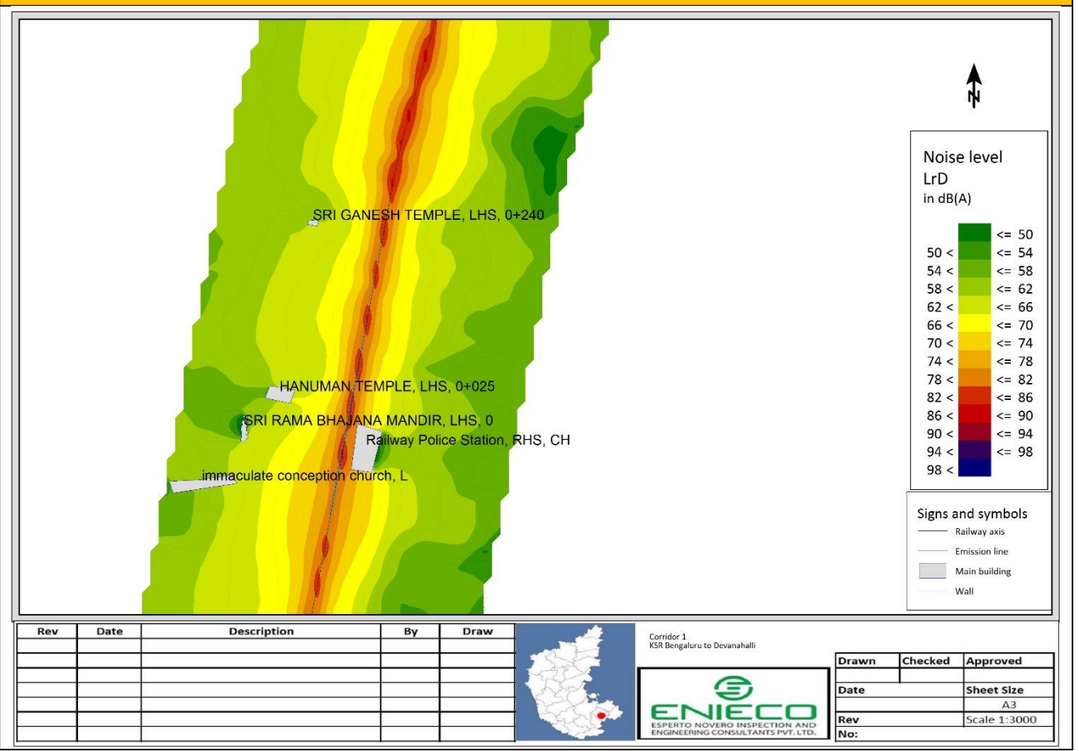
1110

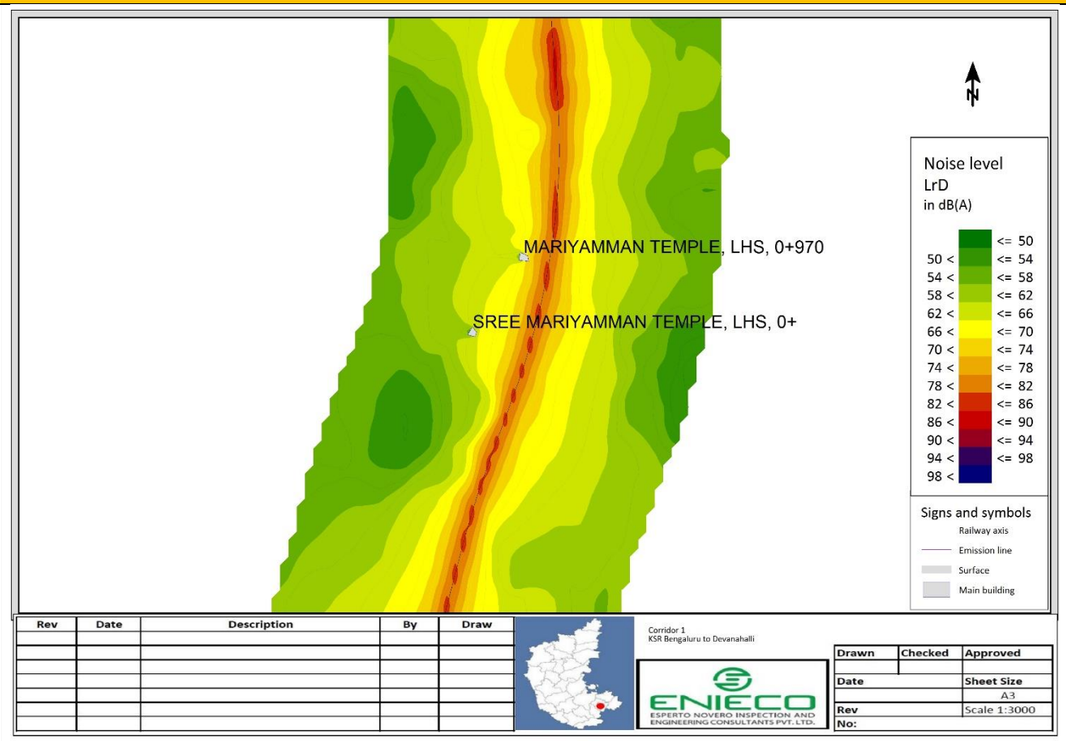
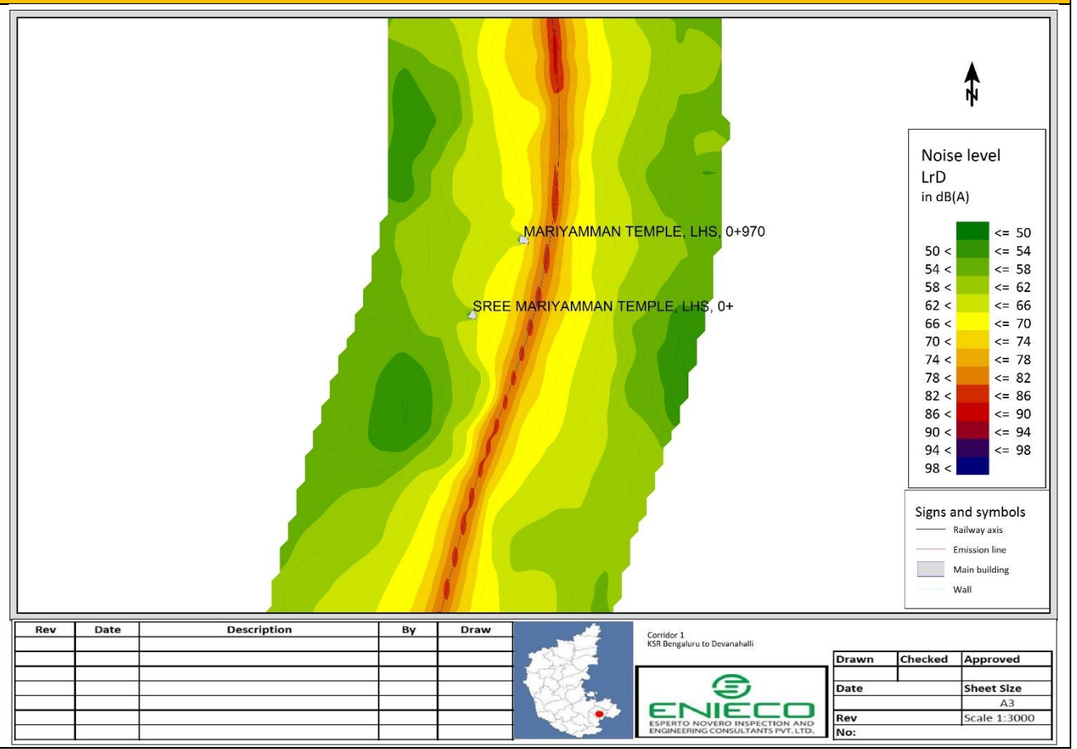
S.No	Without Barrier	With Barrier
20.		

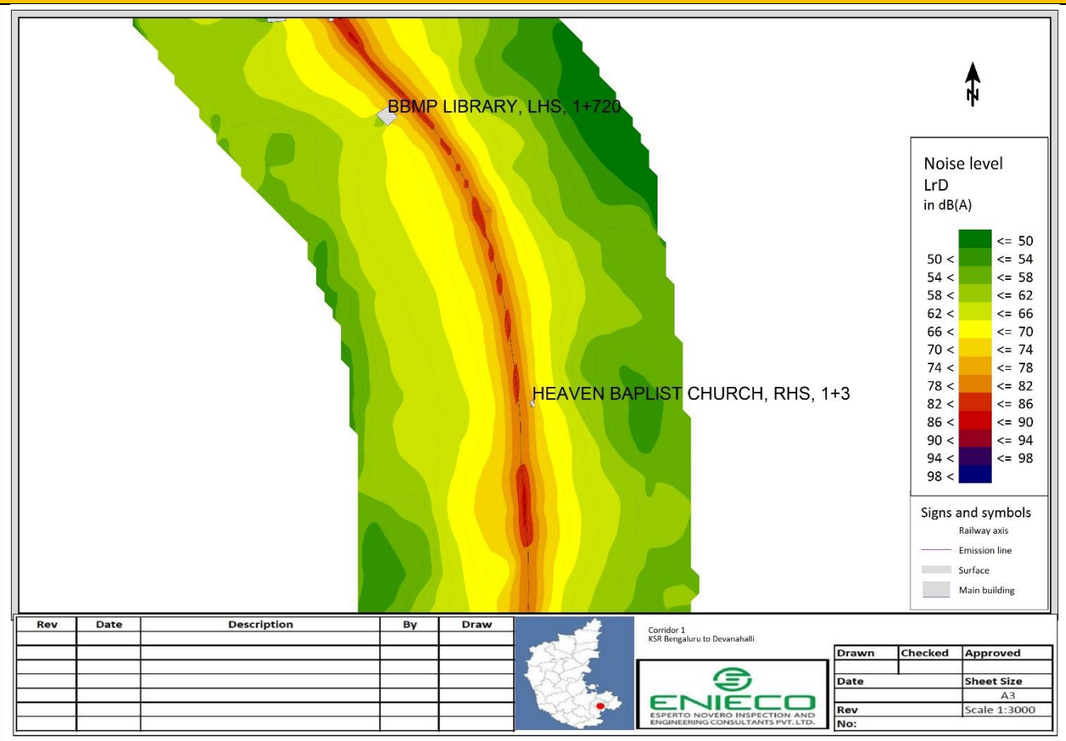
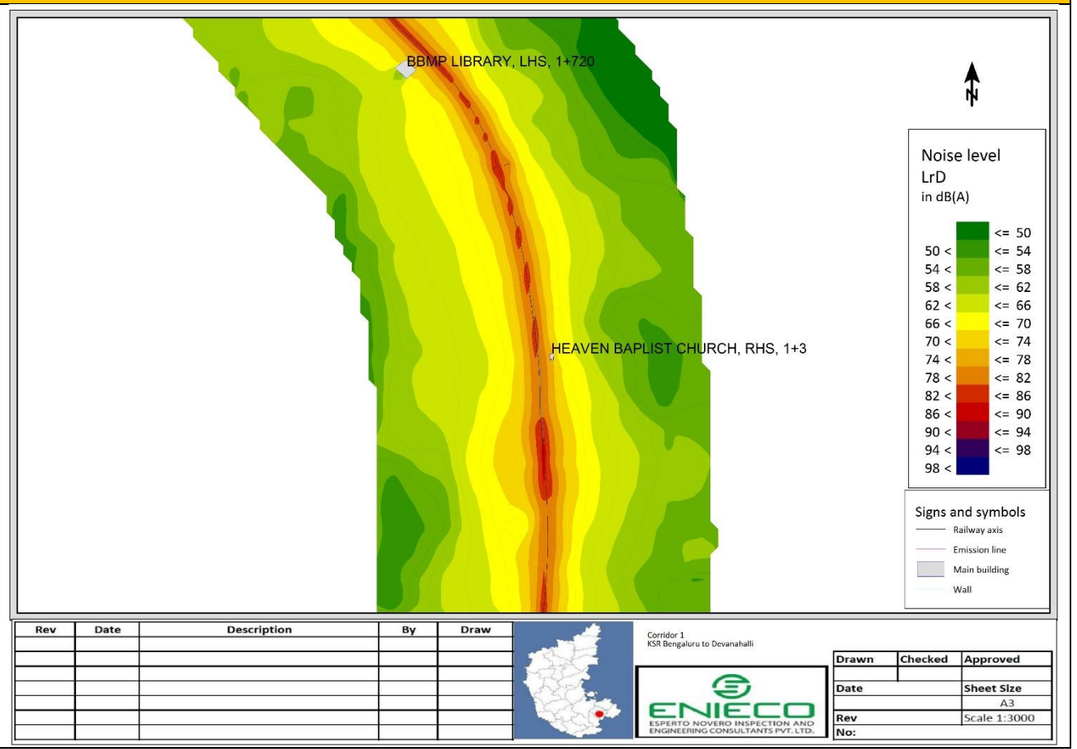
S.No	Without Barrier	With Barrier
21.		

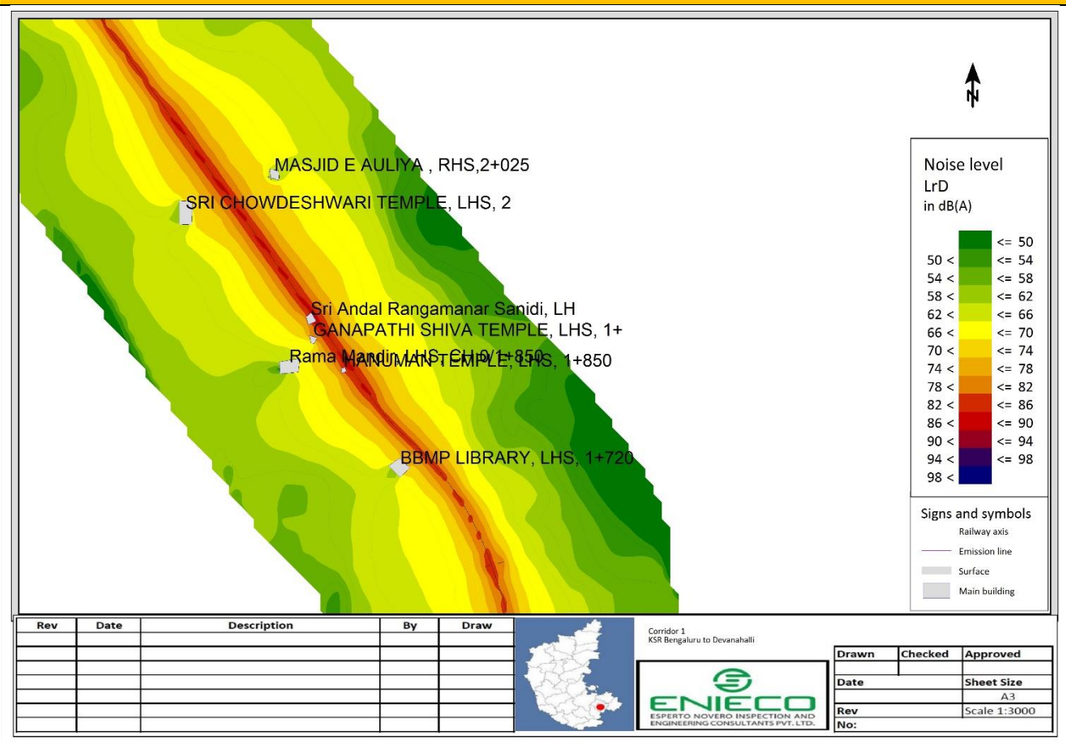
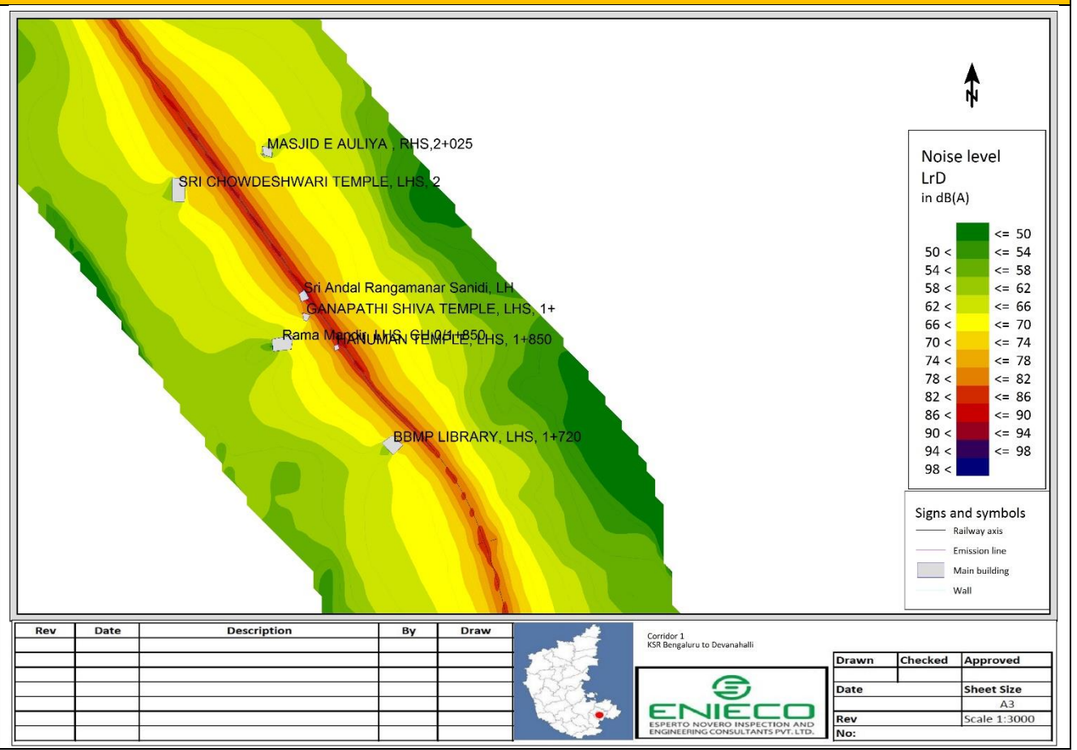
S.No	Without Barrier	With Barrier
22.		

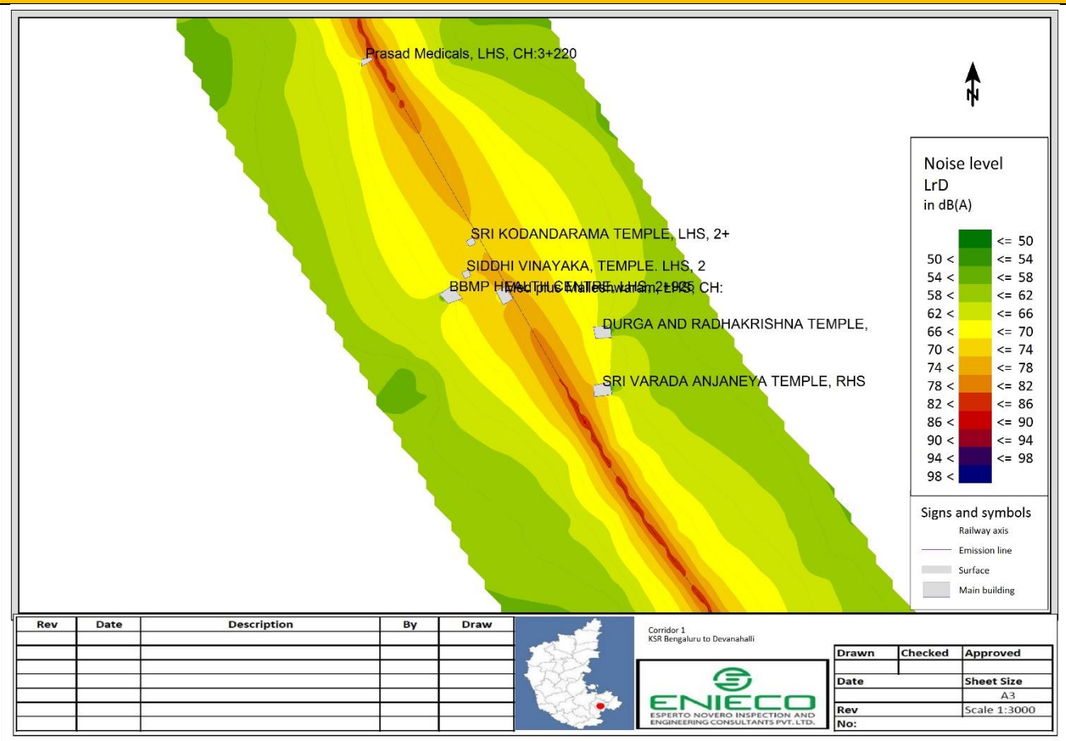
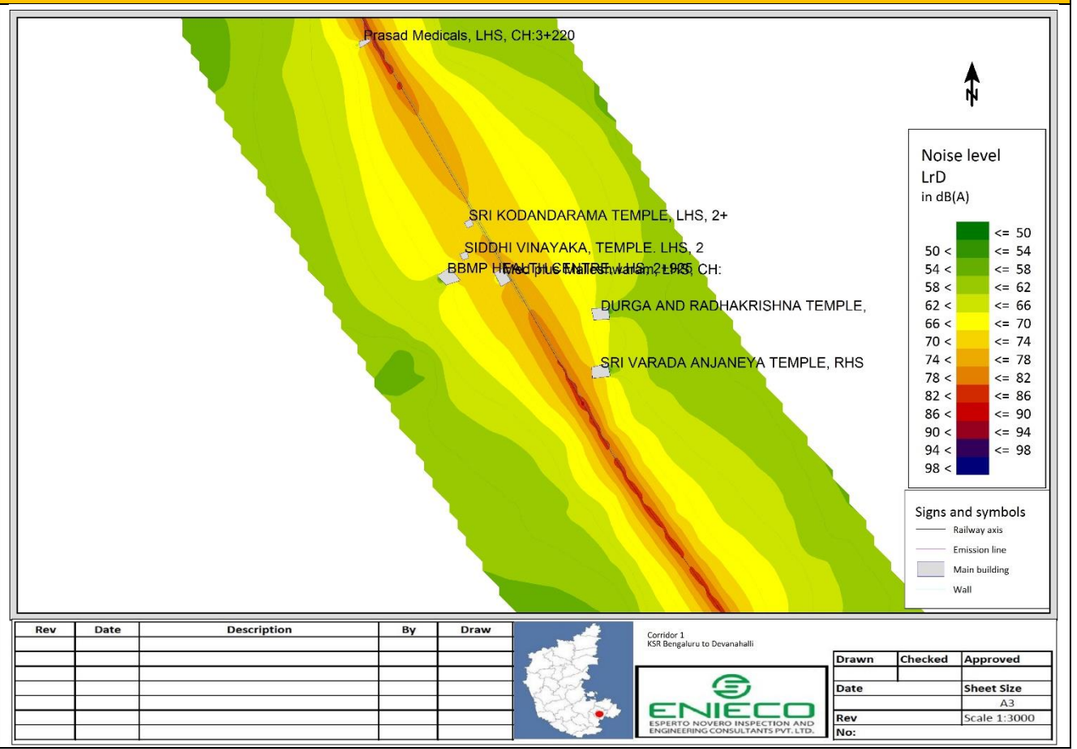
C. Noise contours for Corridor 1 for the Year 2041

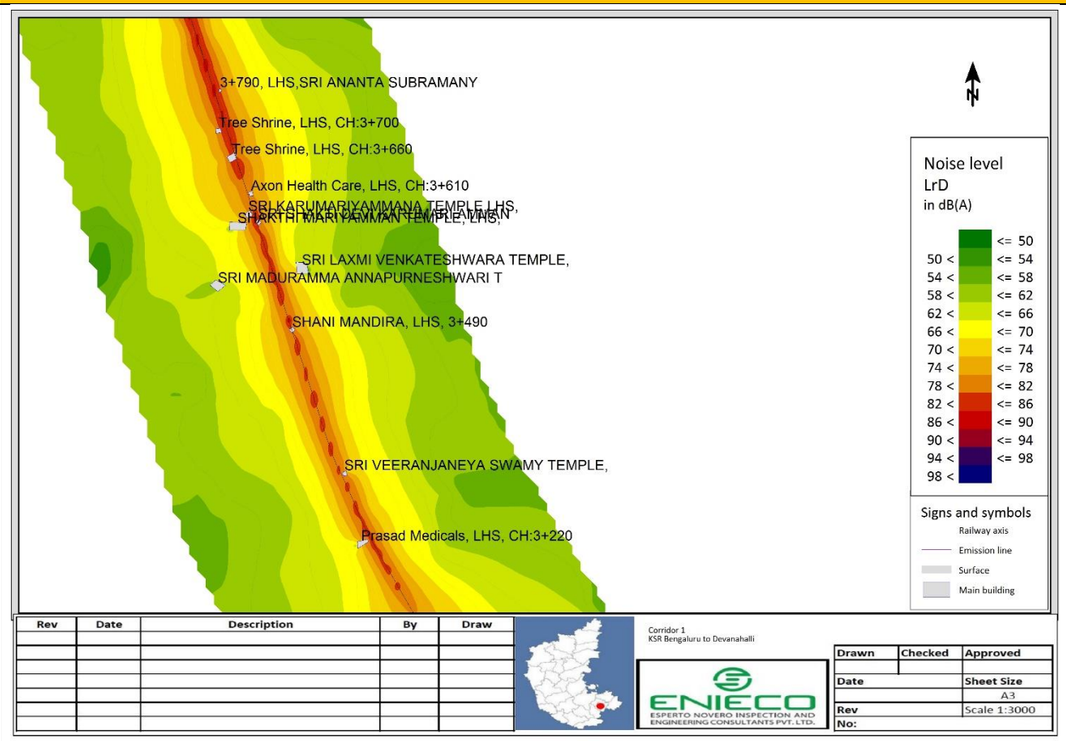
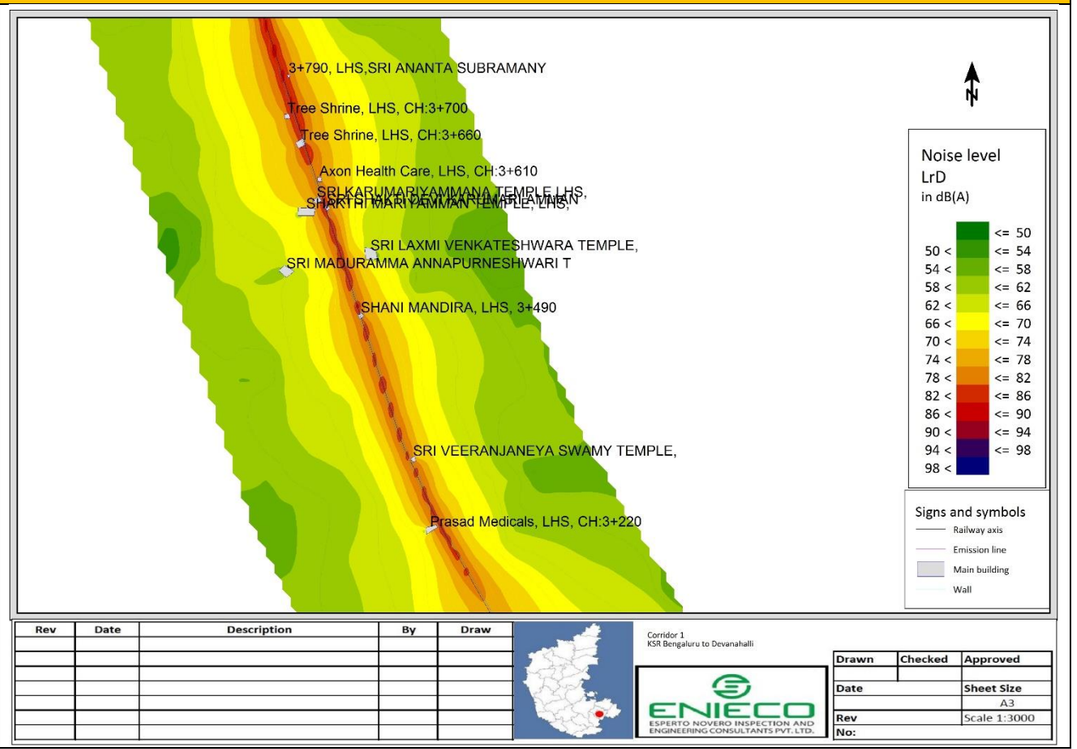
S.No	Without Barrier	With Barrier
1.		

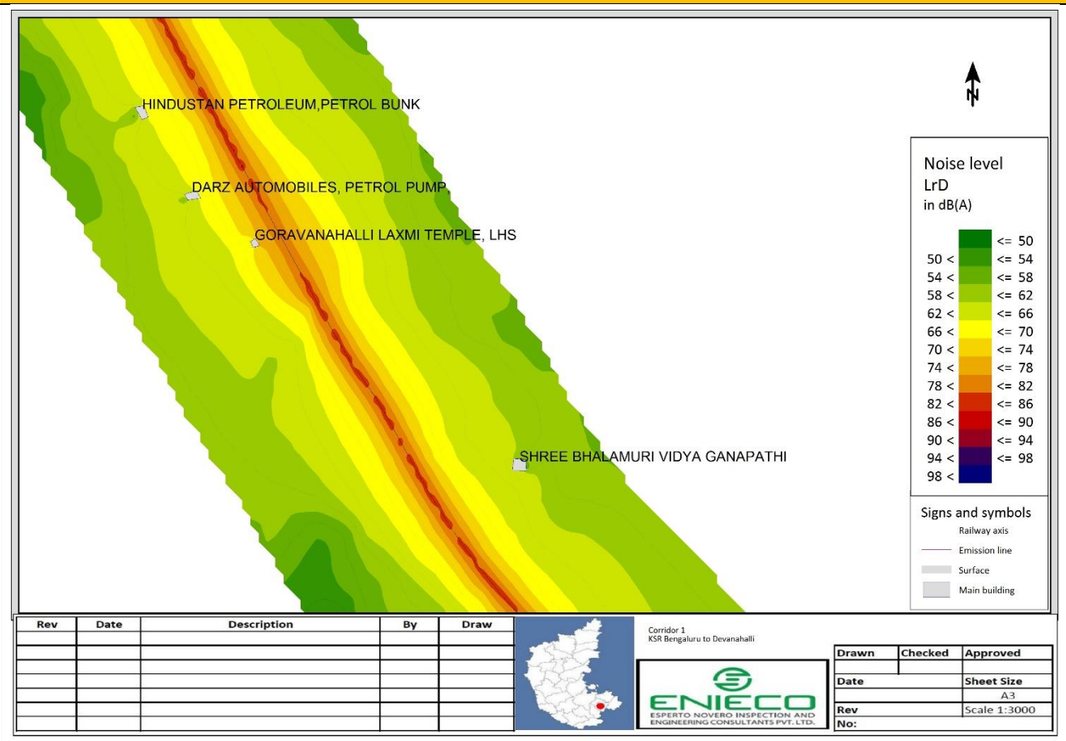
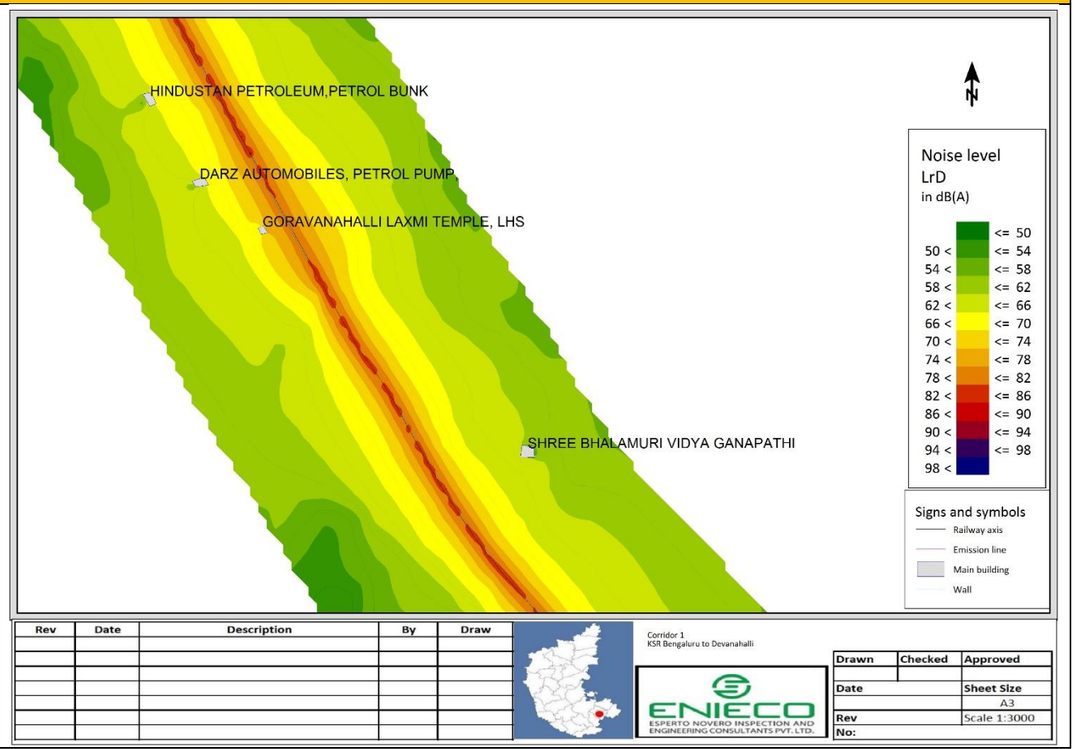
S.No	Without Barrier	With Barrier
2.		

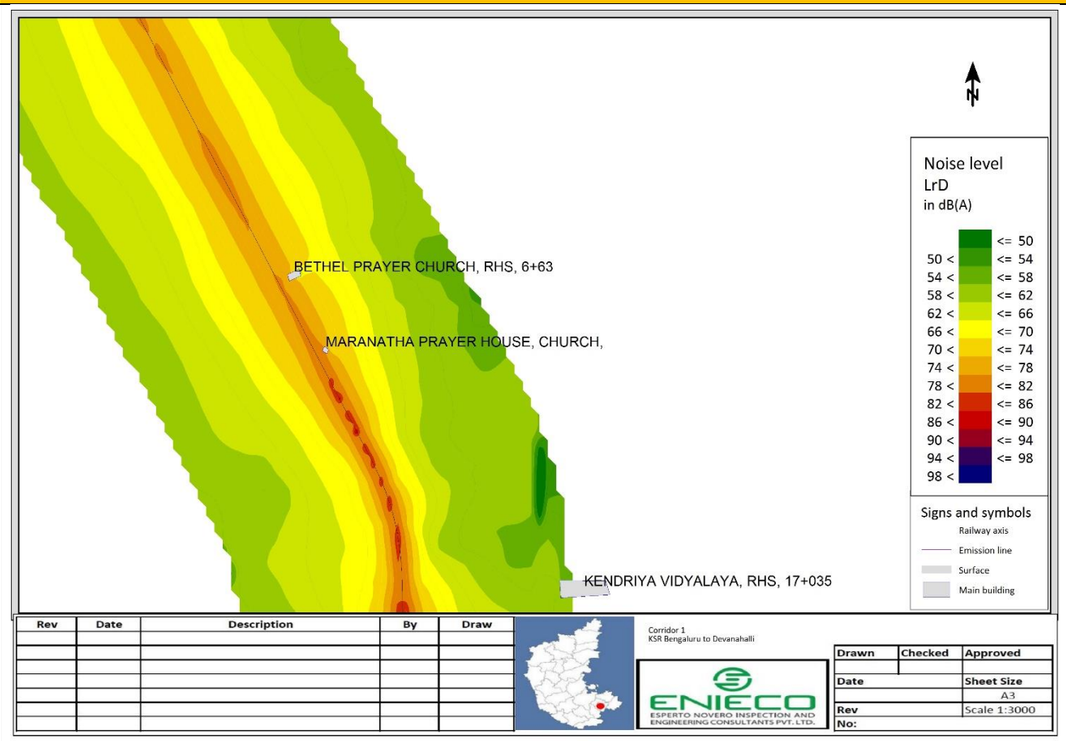
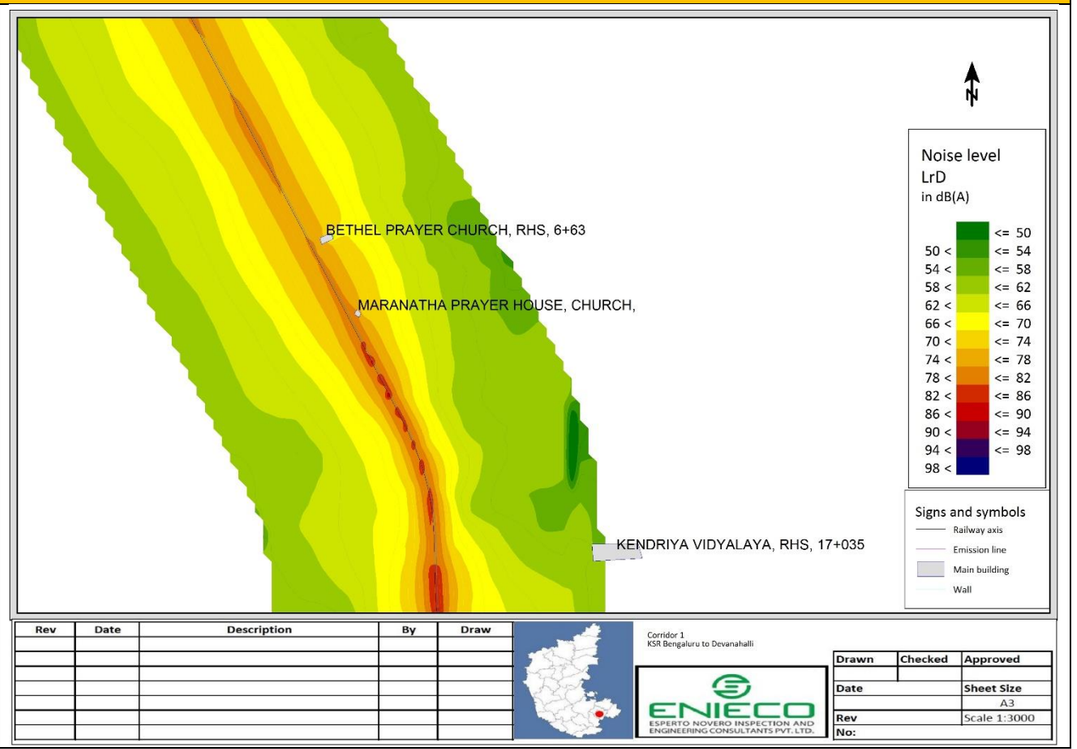
S.No	Without Barrier	With Barrier
3.		

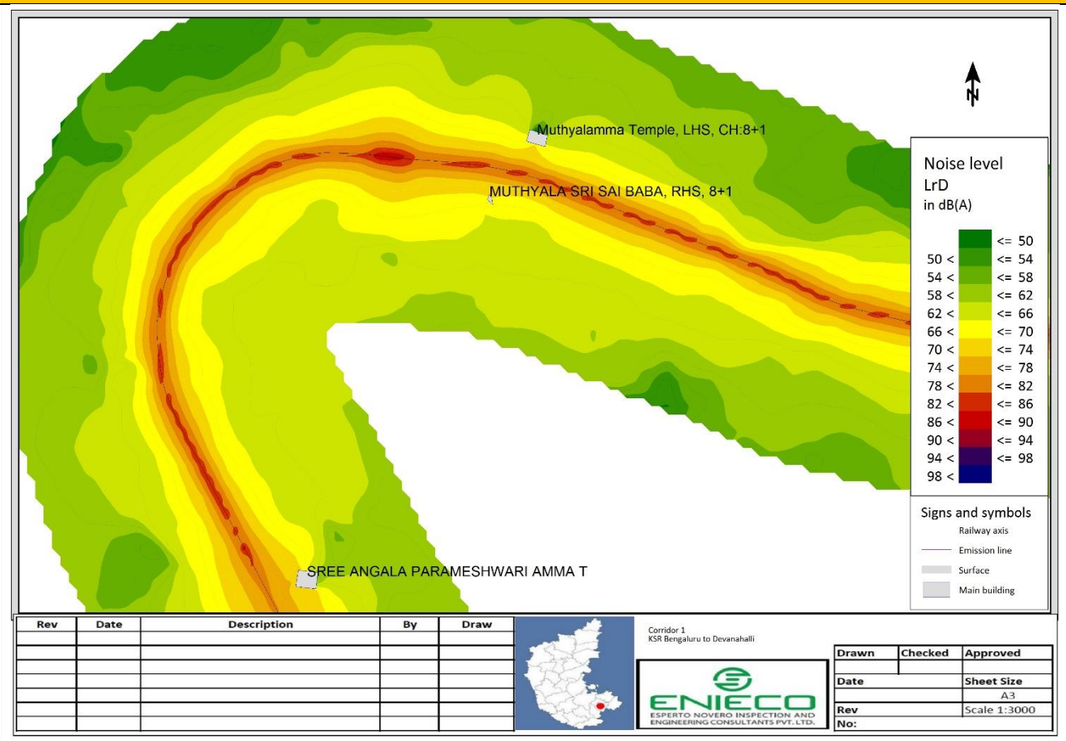
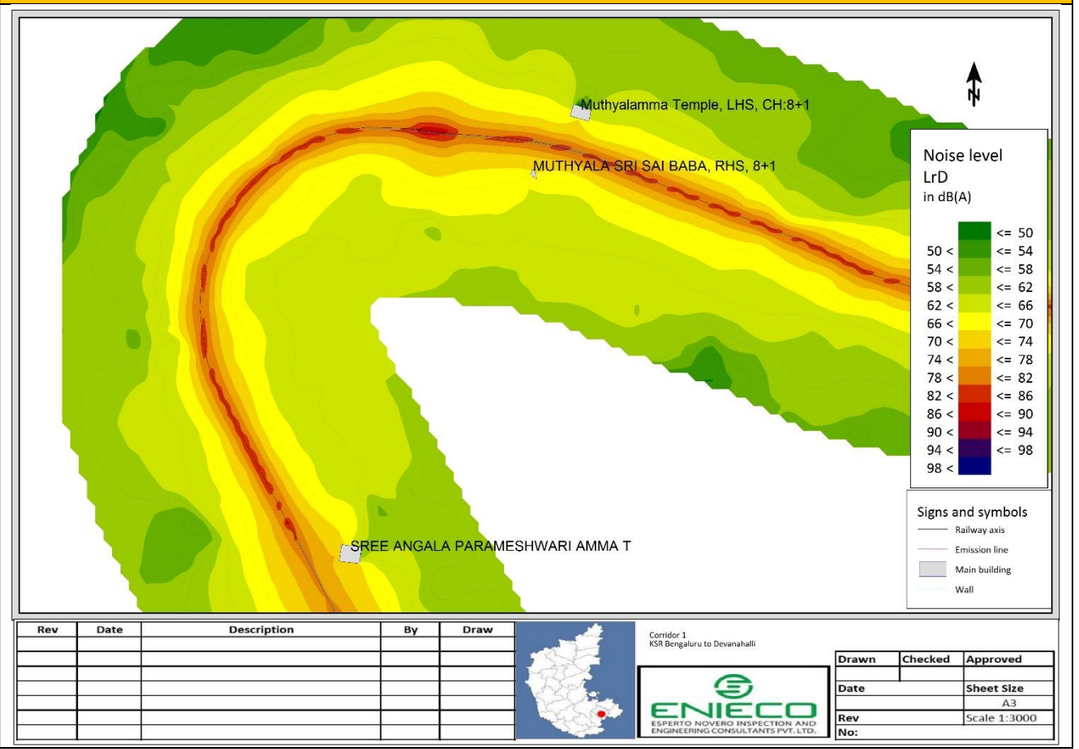
S.No	Without Barrier	With Barrier
4.		

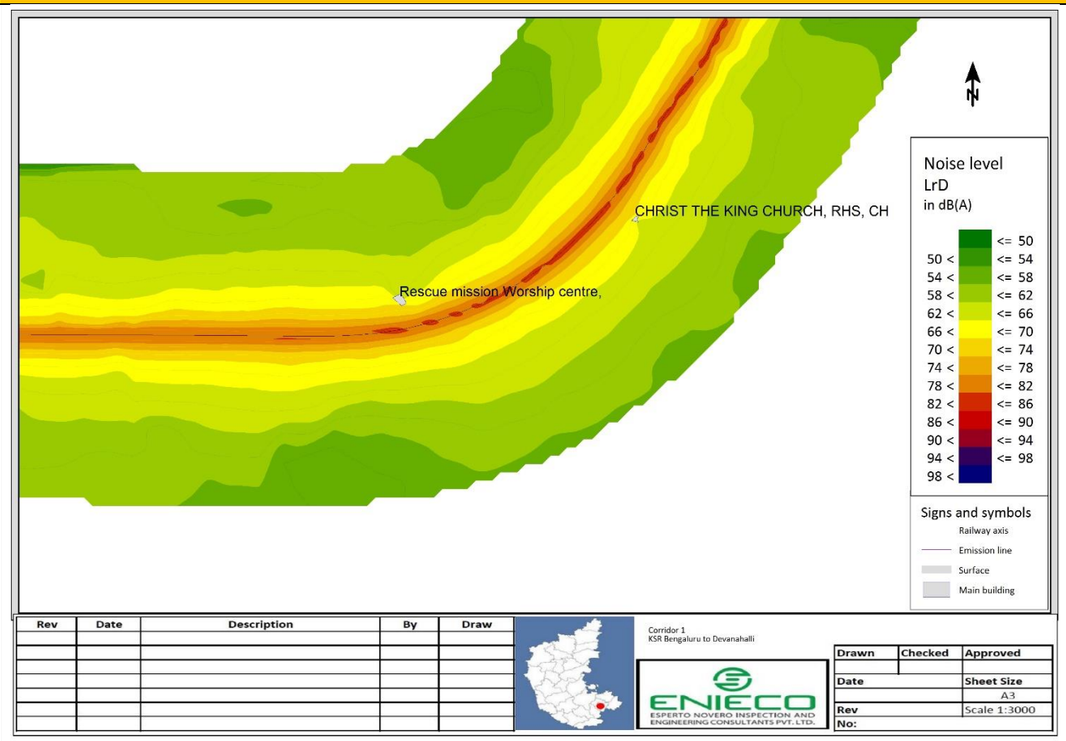
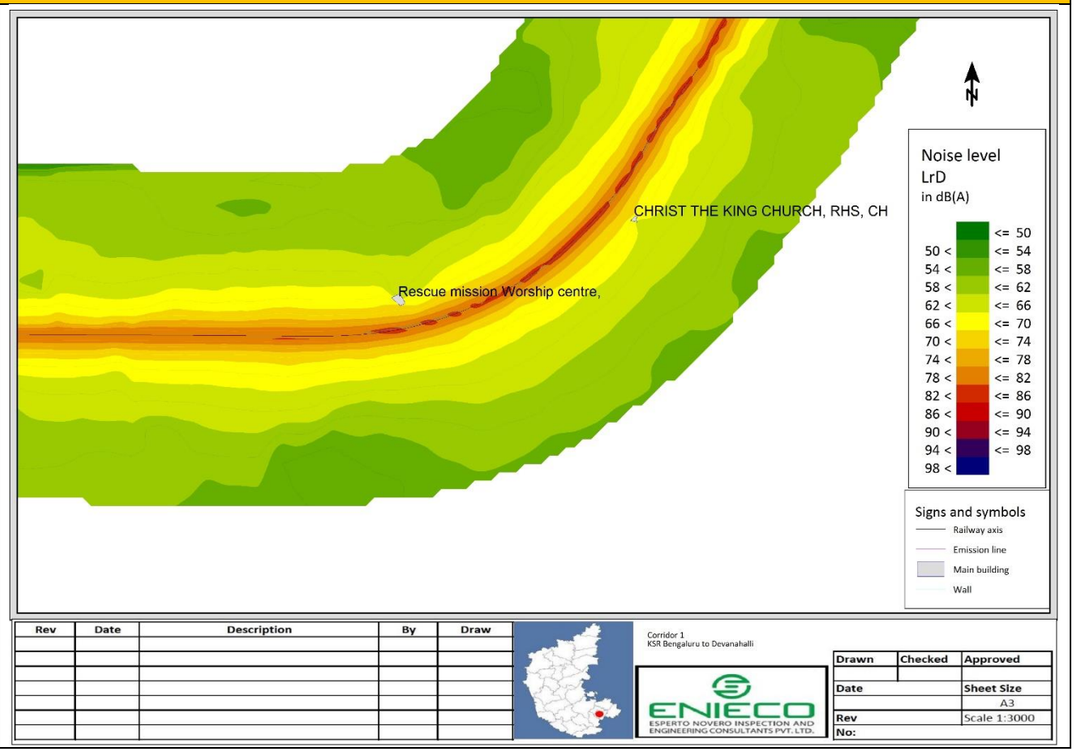
S.No	Without Barrier	With Barrier
5.		

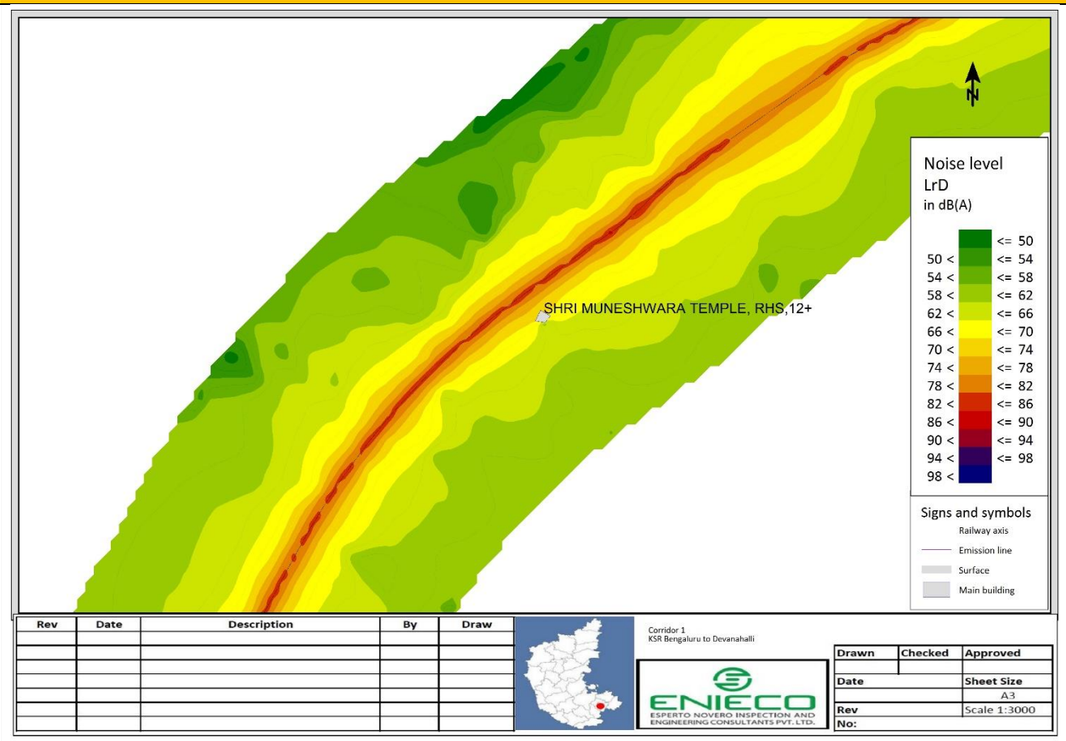
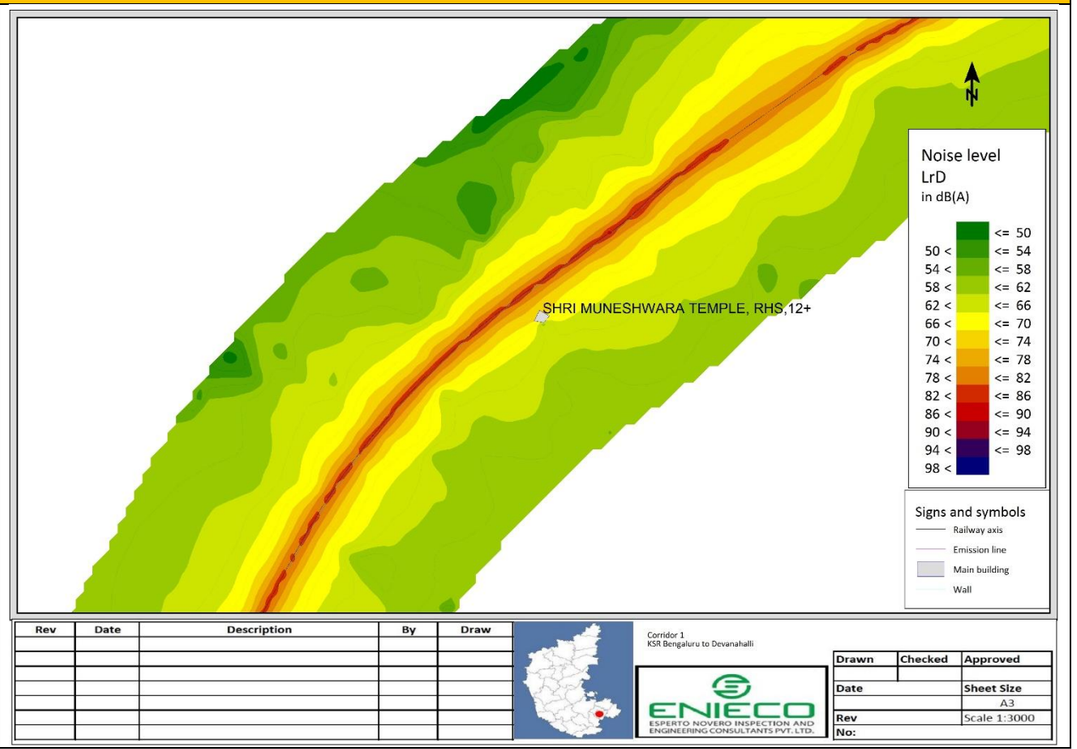
S.No	Without Barrier	With Barrier
6.		

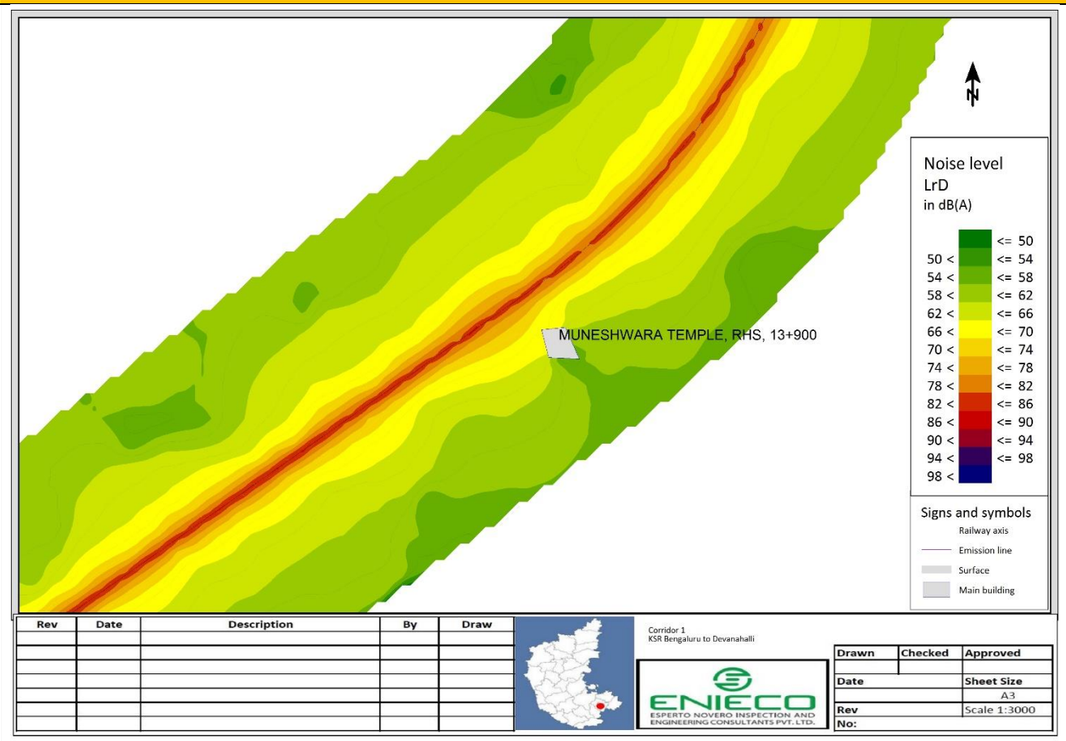
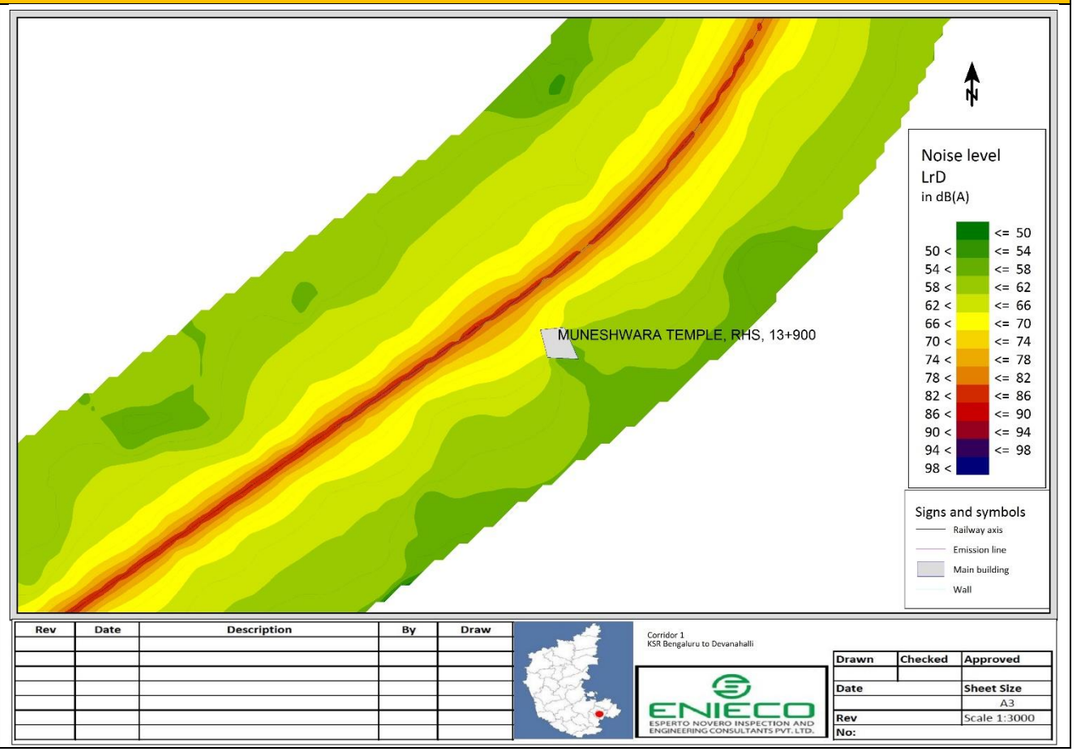
S.No	Without Barrier	With Barrier
7.		

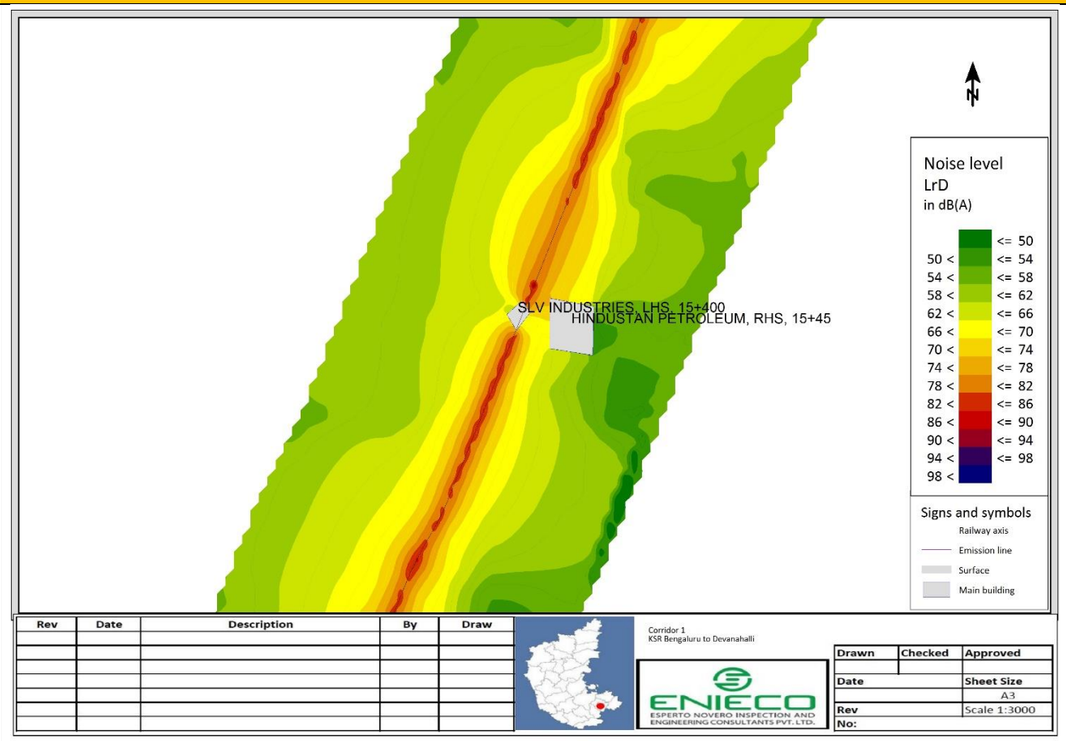
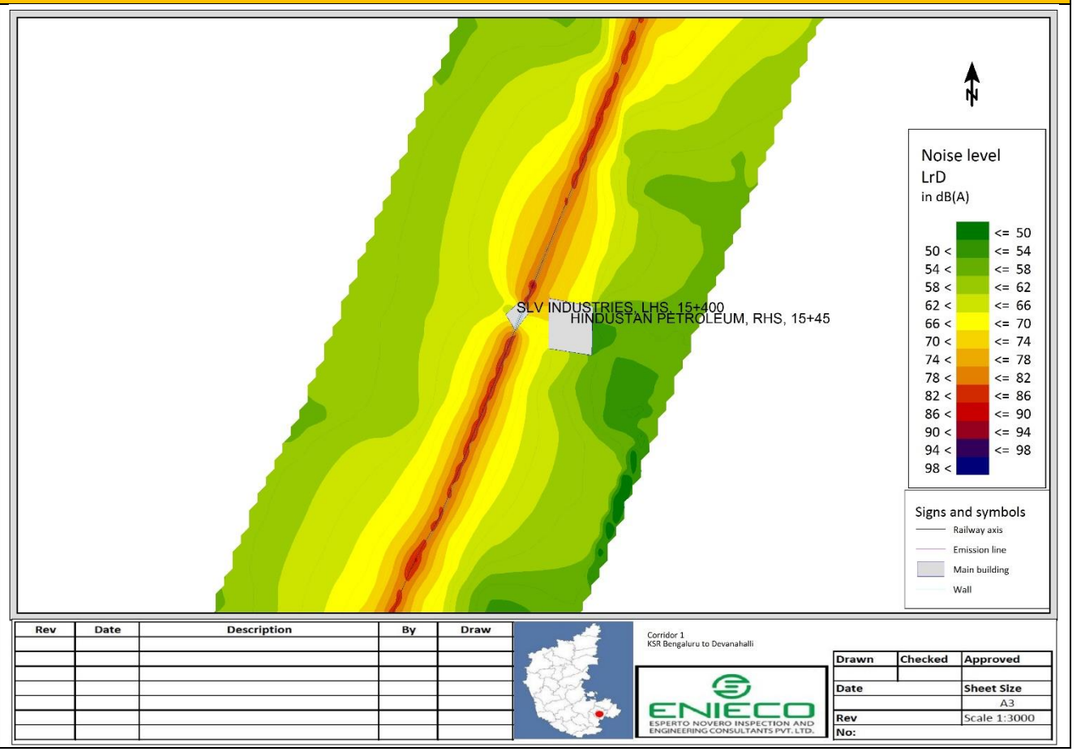
S.No	Without Barrier	With Barrier
8.		

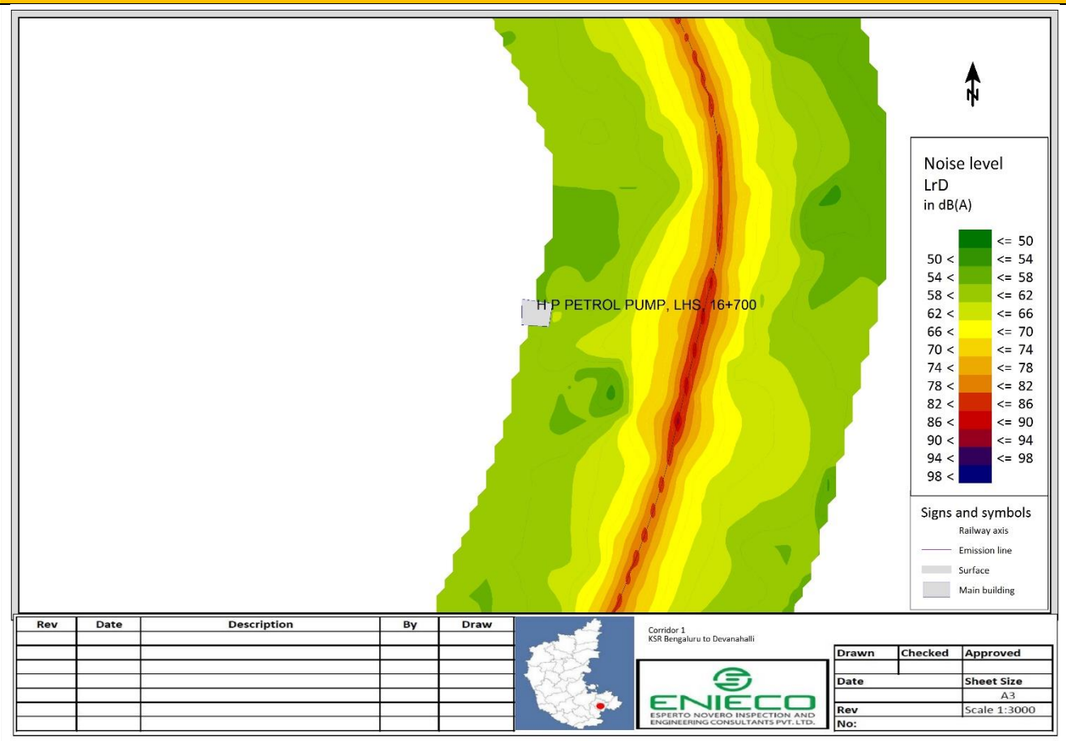
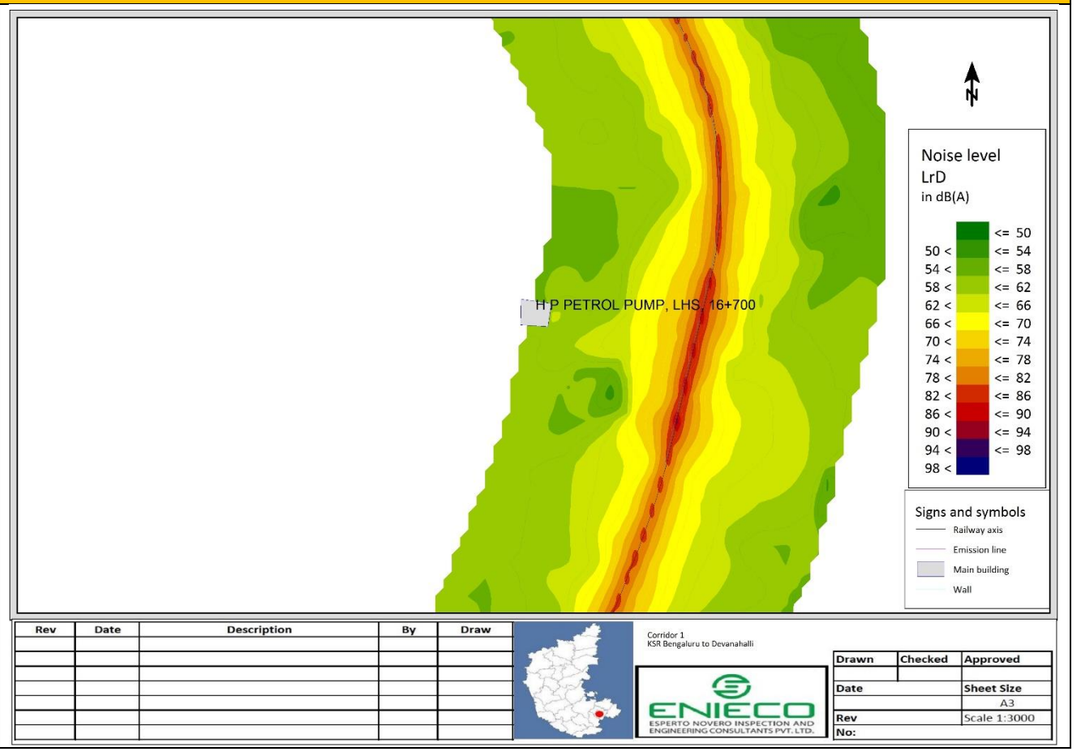
S.No	Without Barrier	With Barrier
9.		

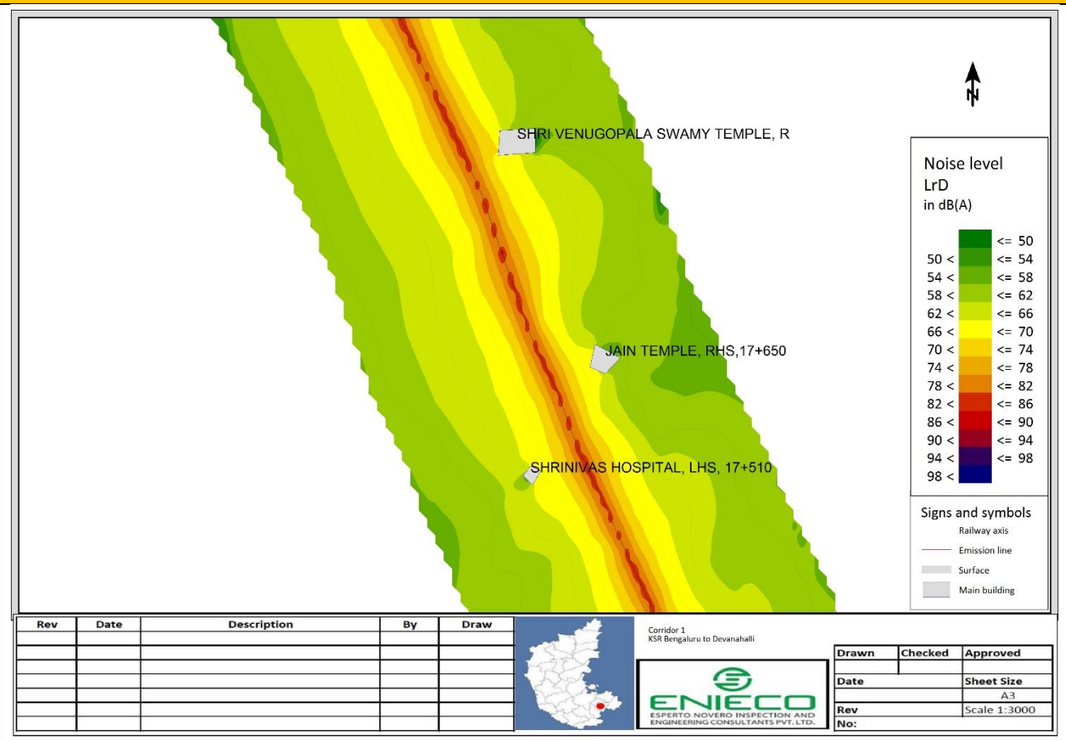
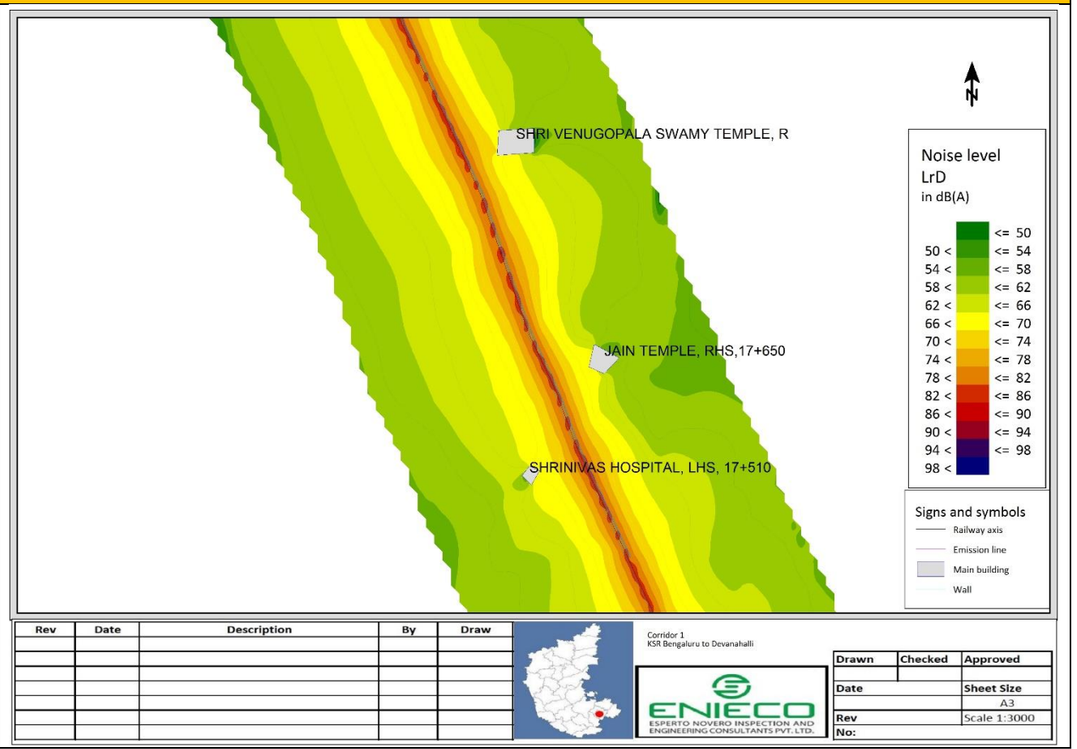
S.No	Without Barrier	With Barrier
10.		

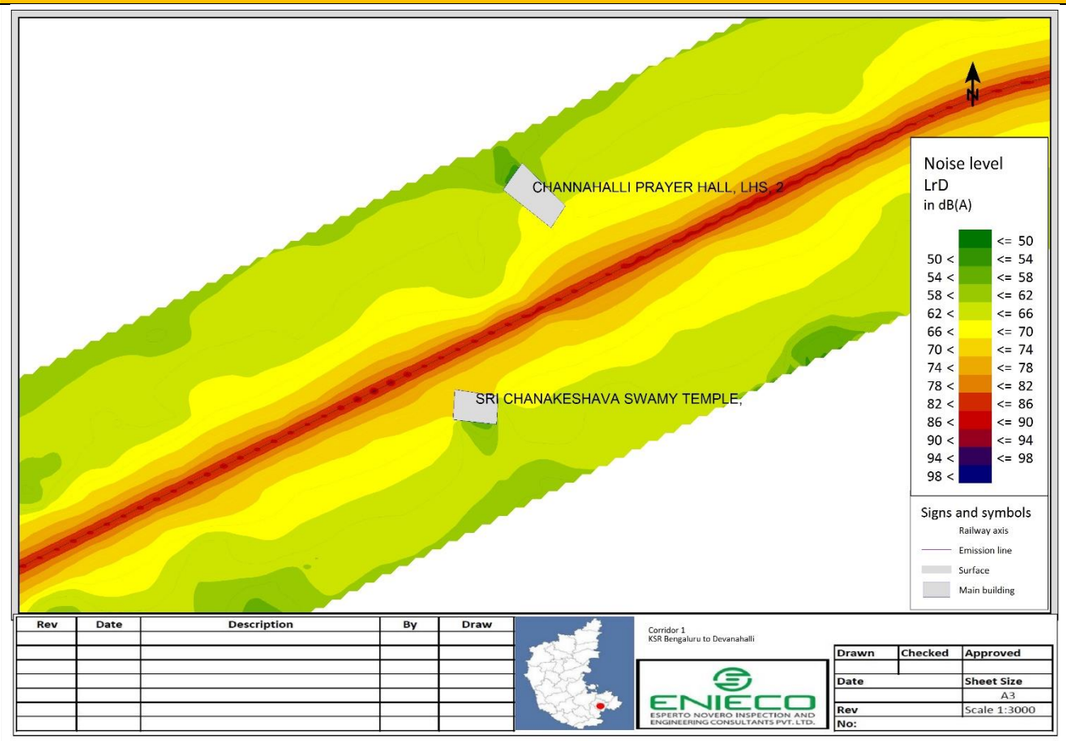
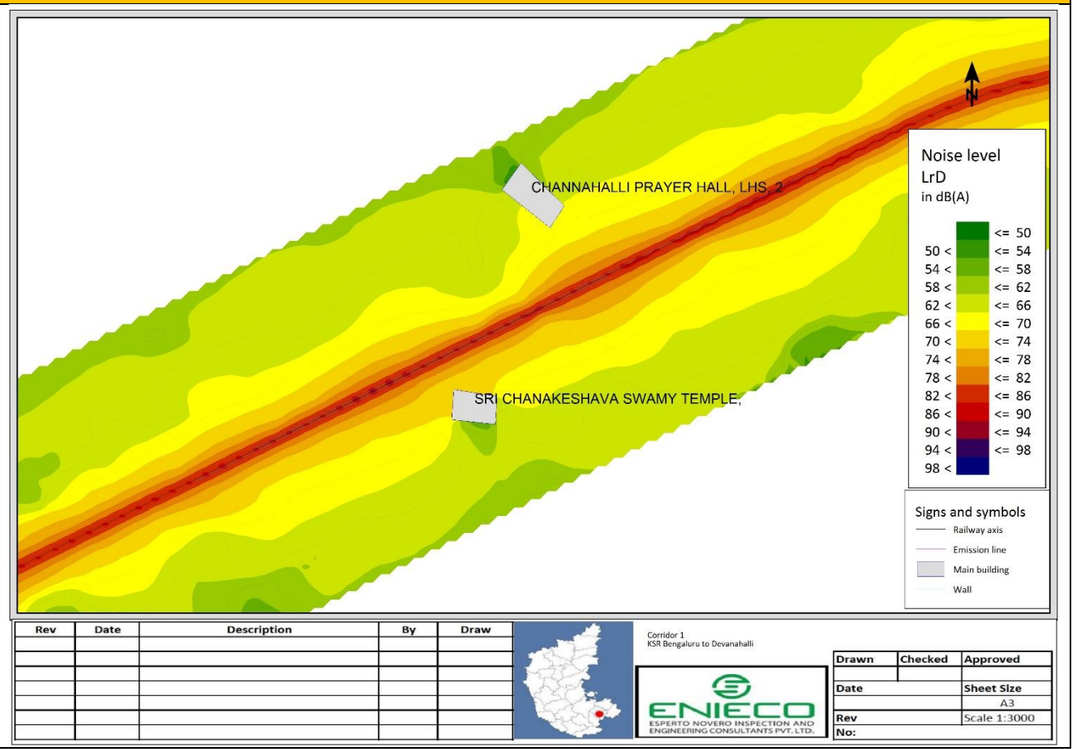
S.No	Without Barrier	With Barrier
11.		

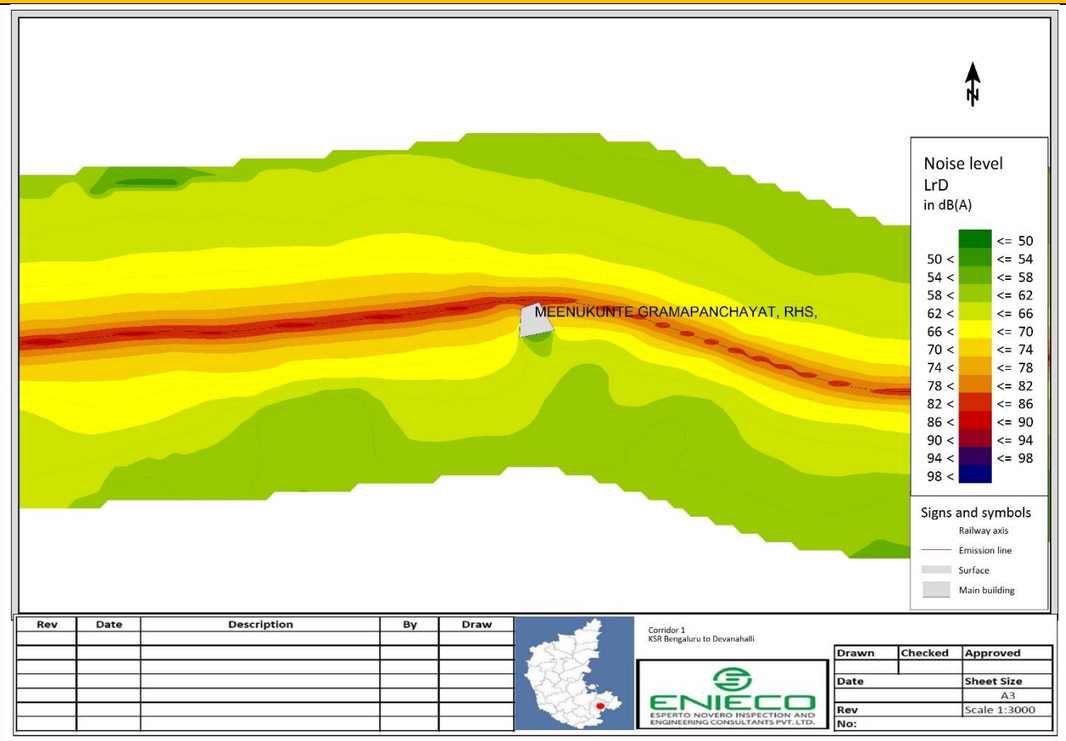
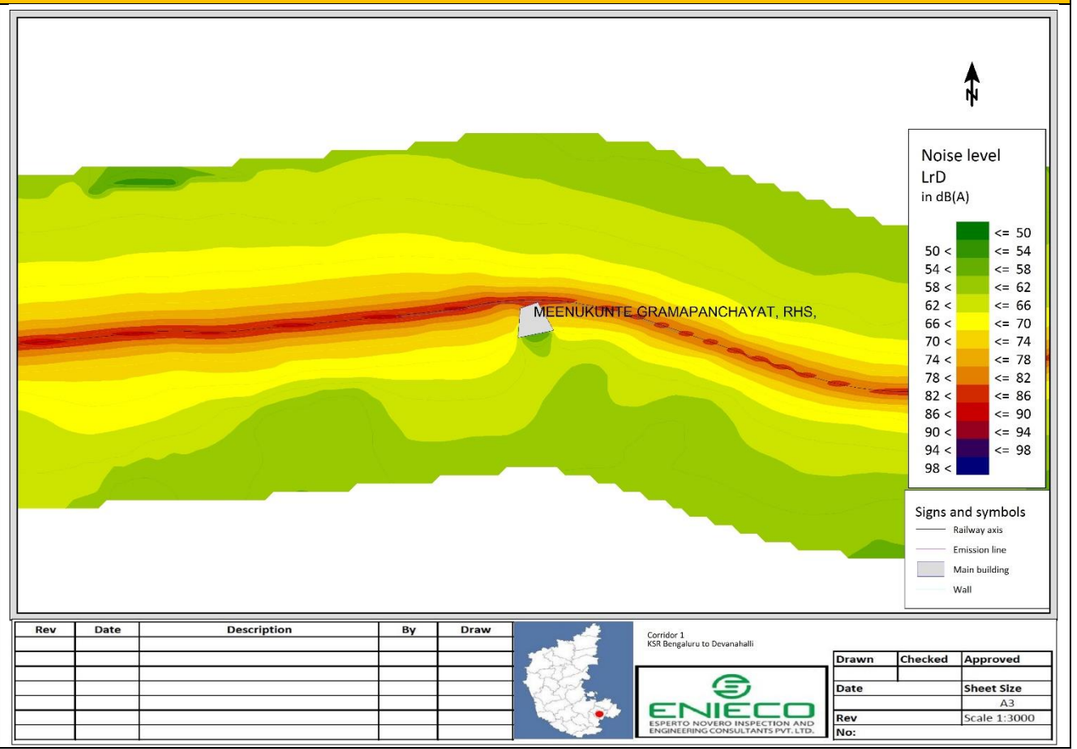
S.No	Without Barrier	With Barrier
12.		

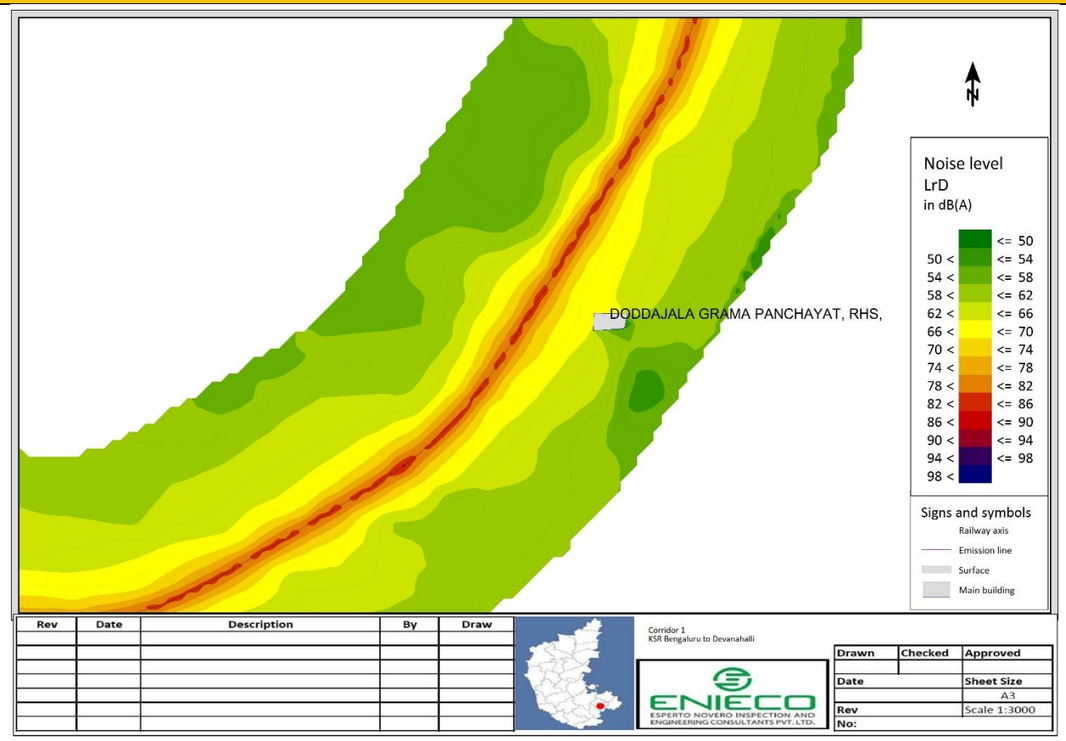
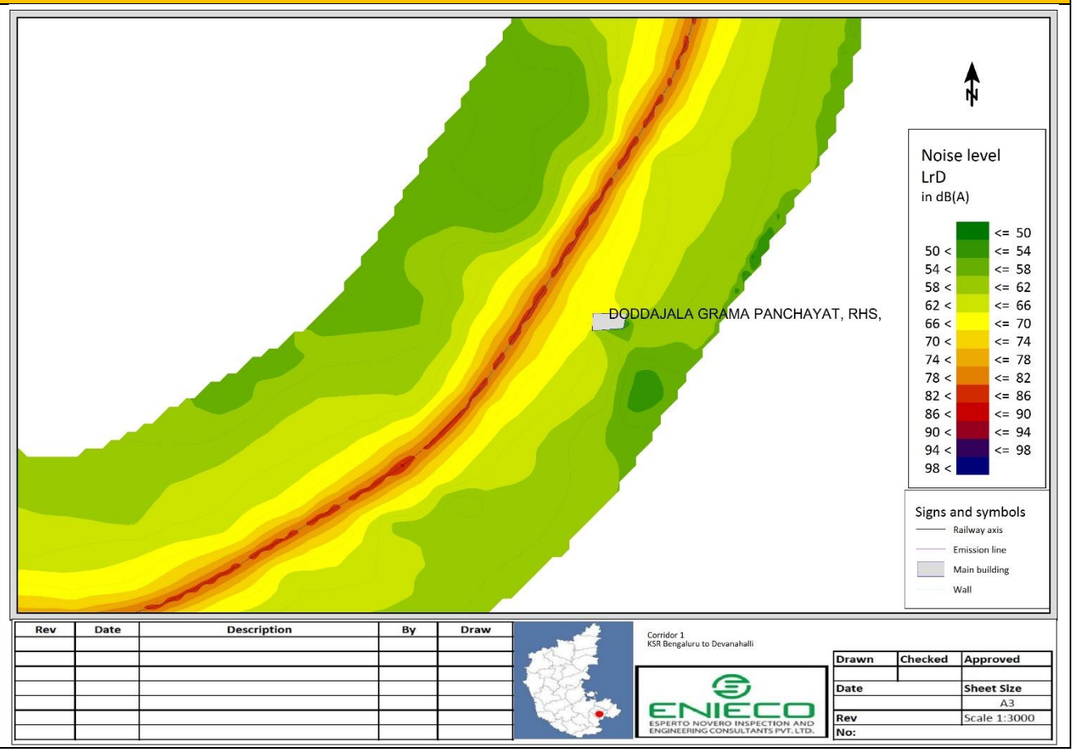
S.No	Without Barrier	With Barrier
13.		

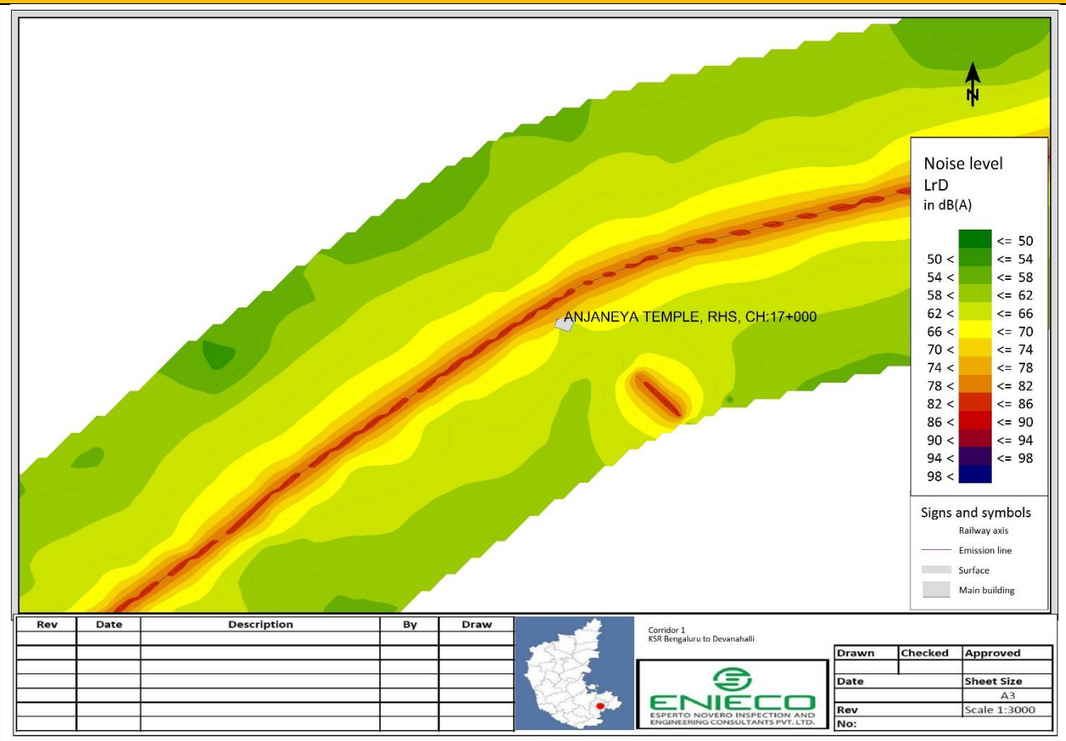
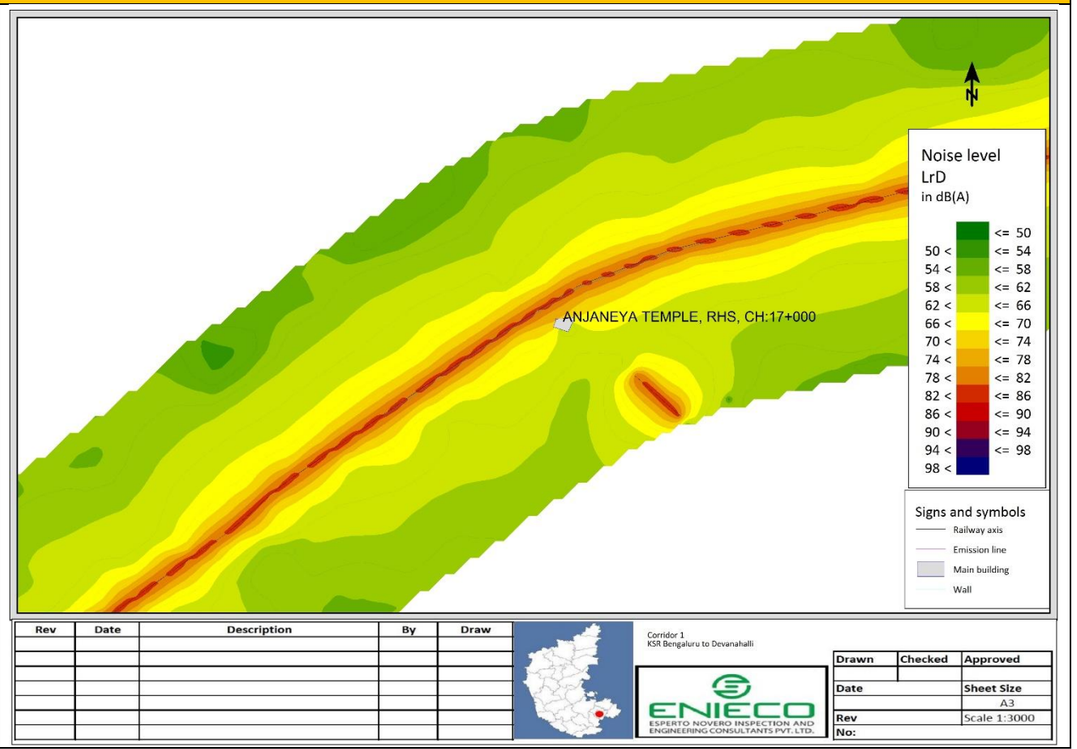
S.No	Without Barrier	With Barrier
14.		

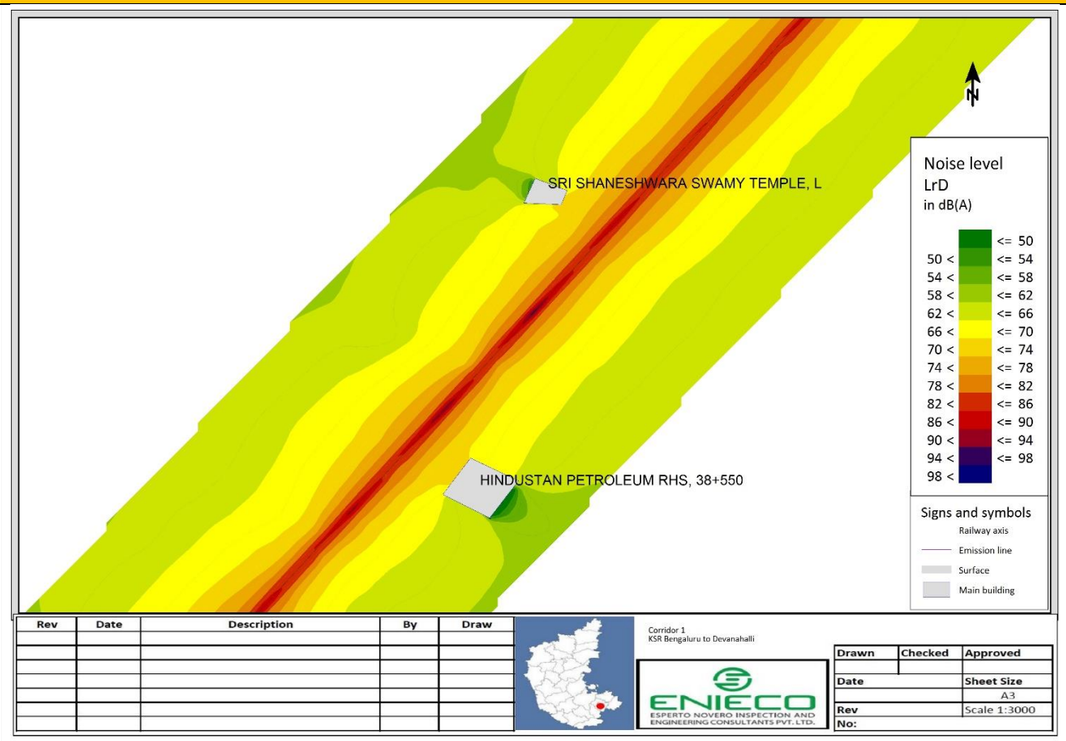
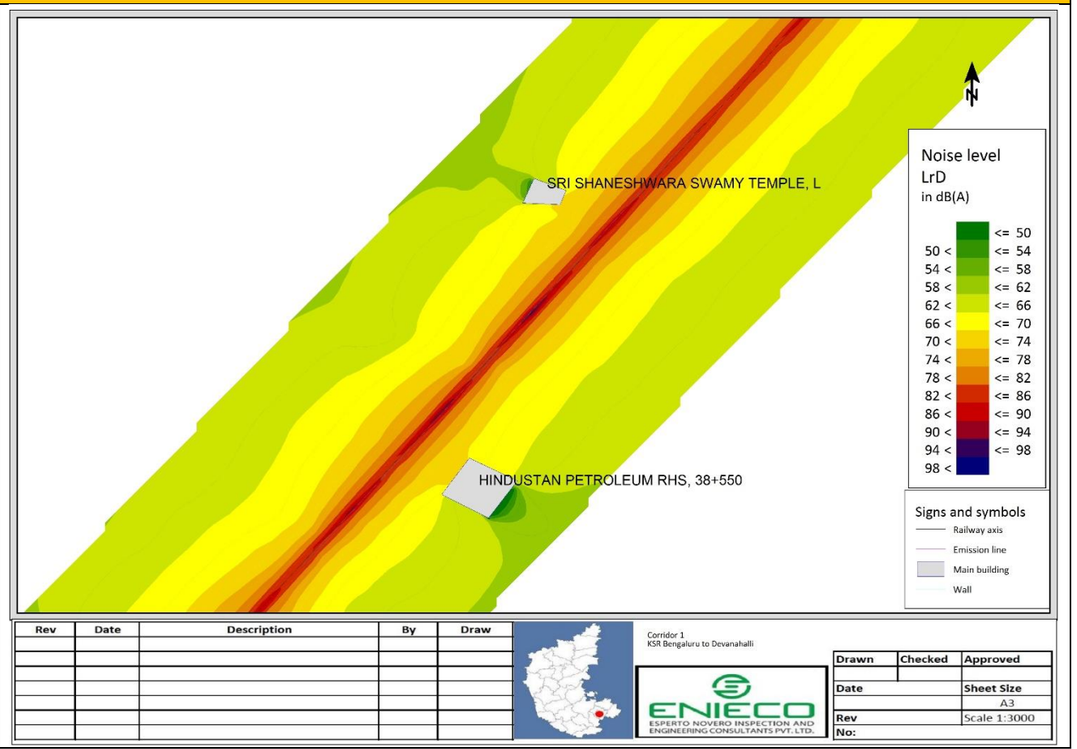
S.No	Without Barrier	With Barrier
15.		

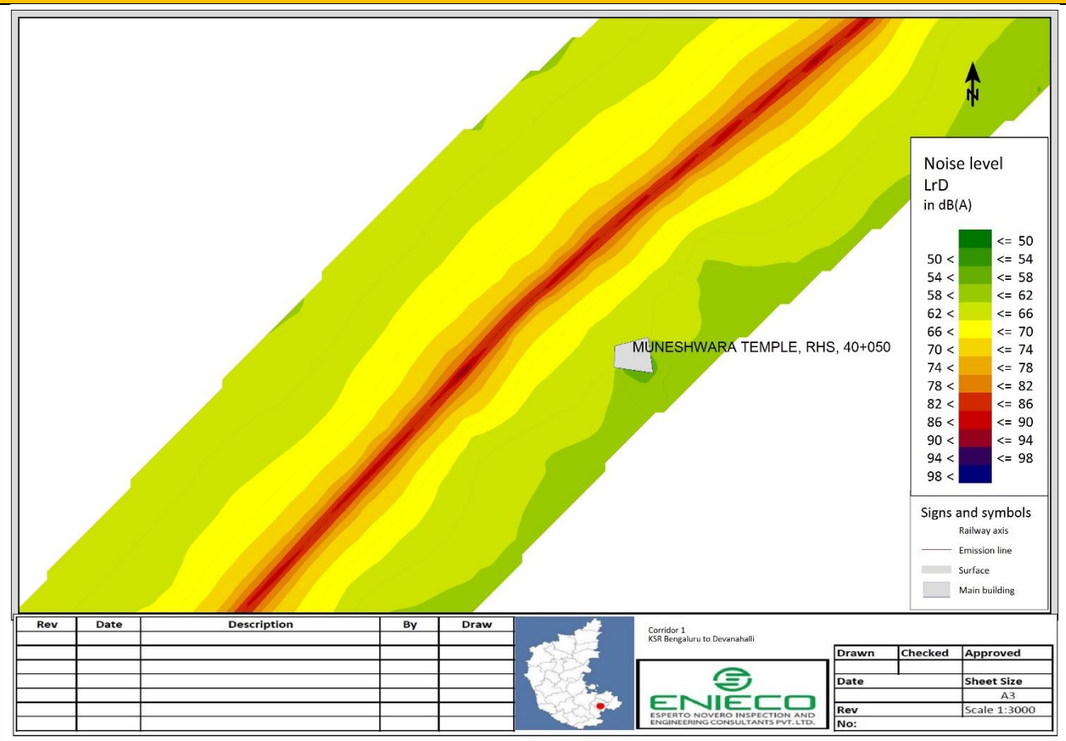
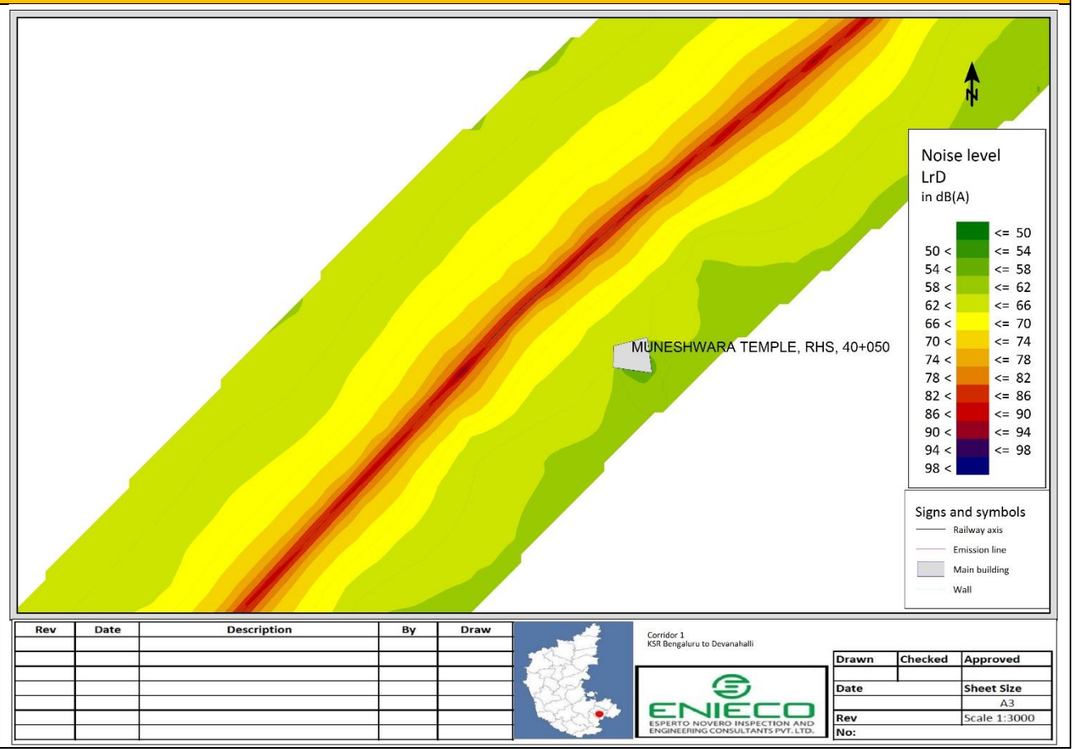
S.No	Without Barrier	With Barrier
16.		

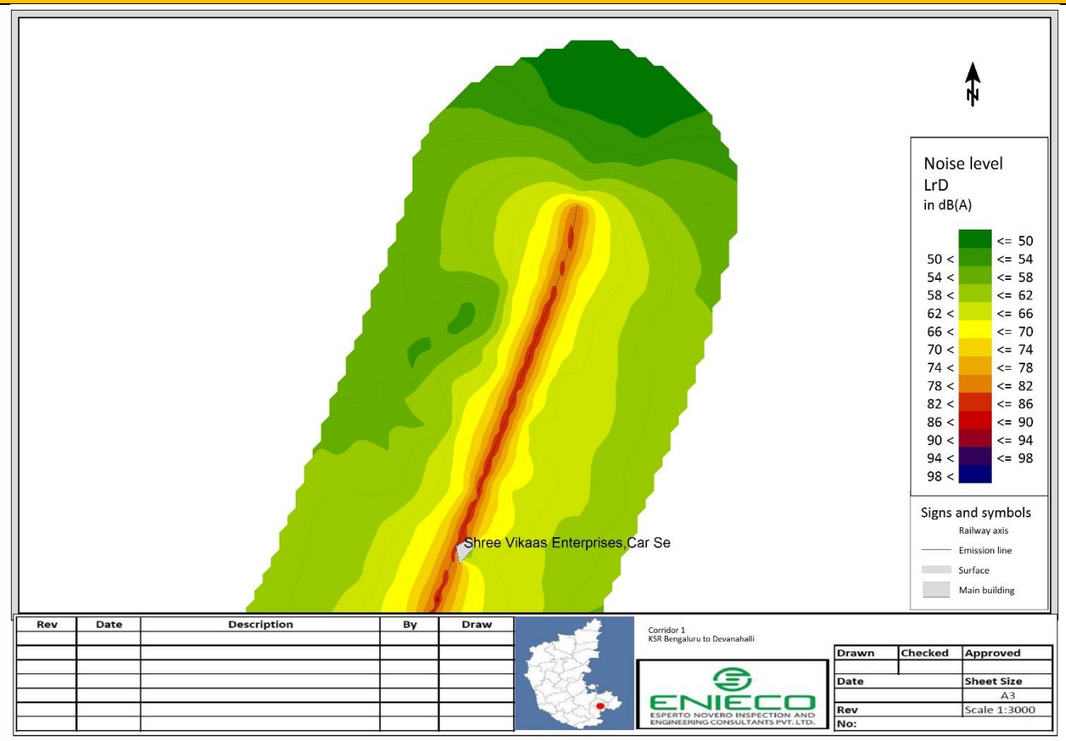
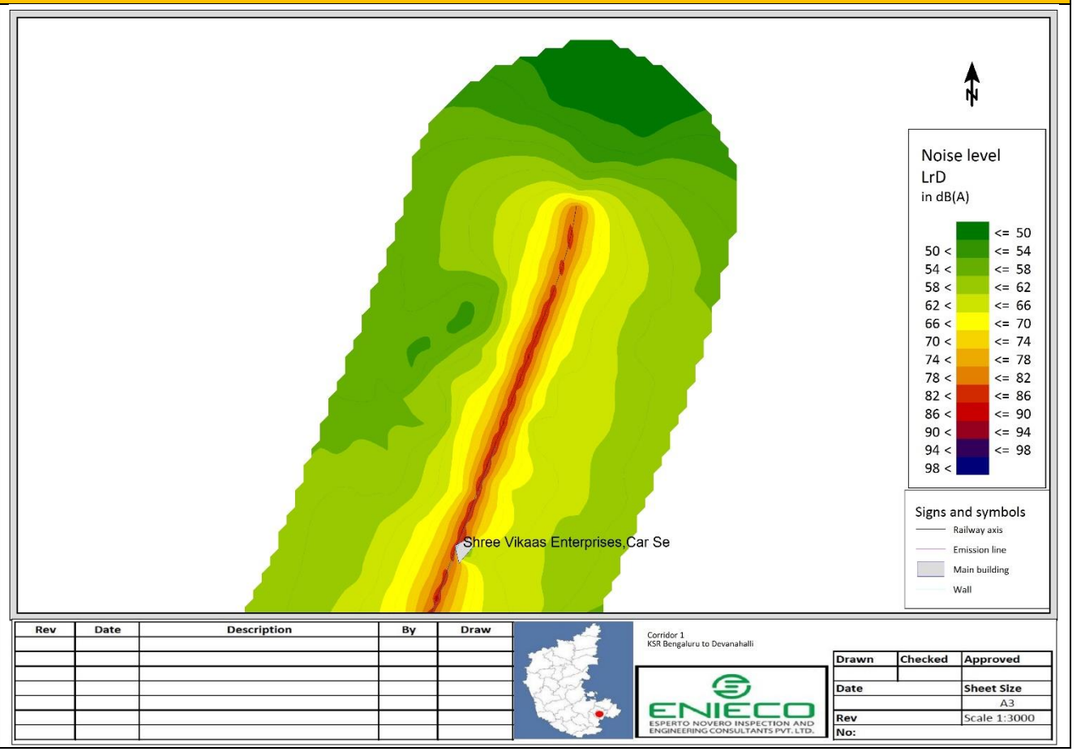
S.No	Without Barrier	With Barrier
17.		

S.No	Without Barrier	With Barrier
18.		

S.No	Without Barrier	With Barrier
19.		

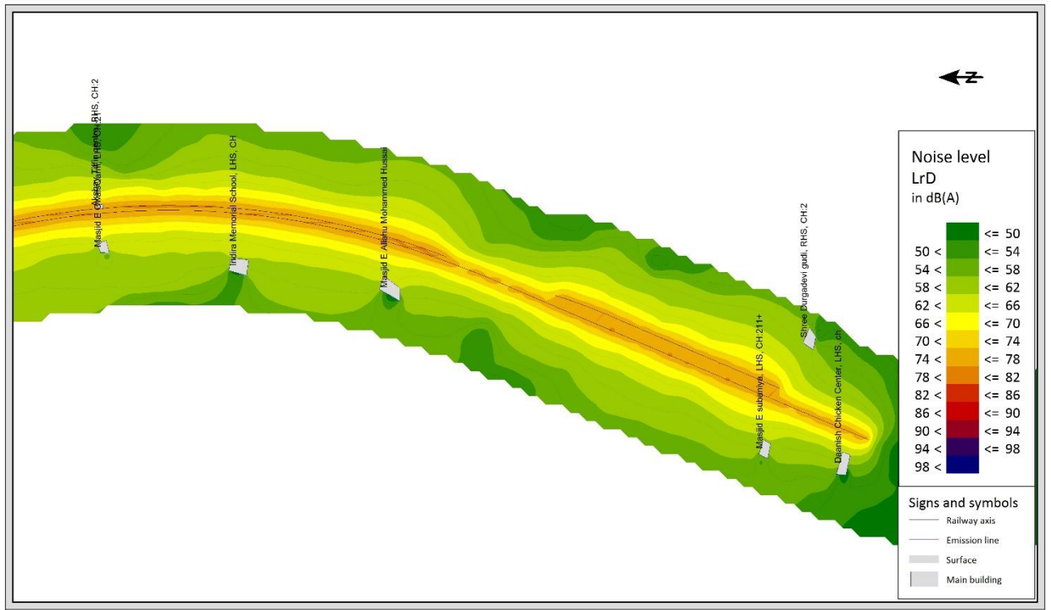
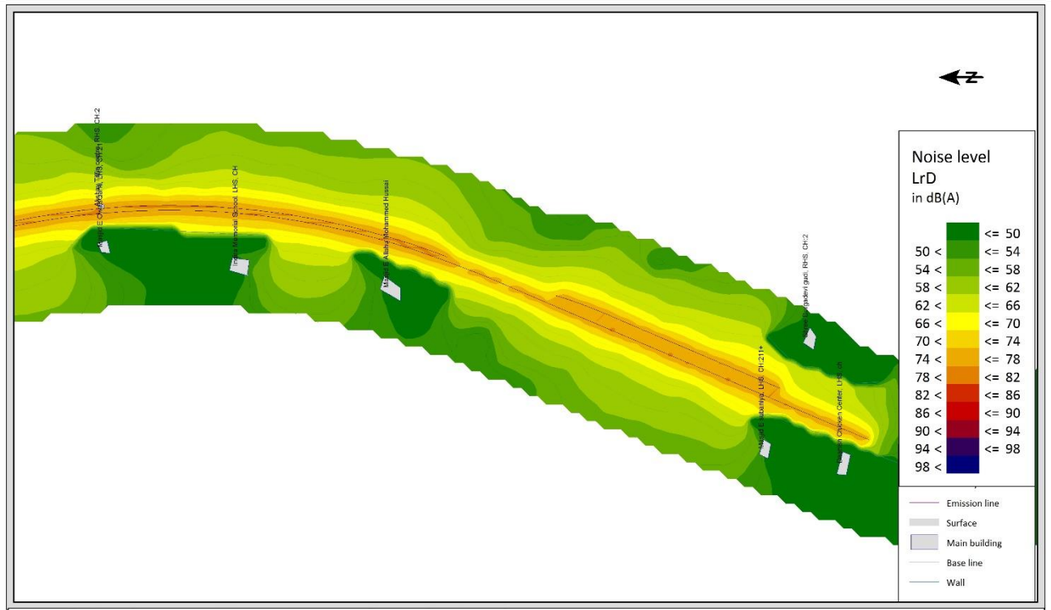
S.No	Without Barrier	With Barrier
20.		

S.No	Without Barrier	With Barrier
21.		

S.No	Without Barrier	With Barrier
22.		

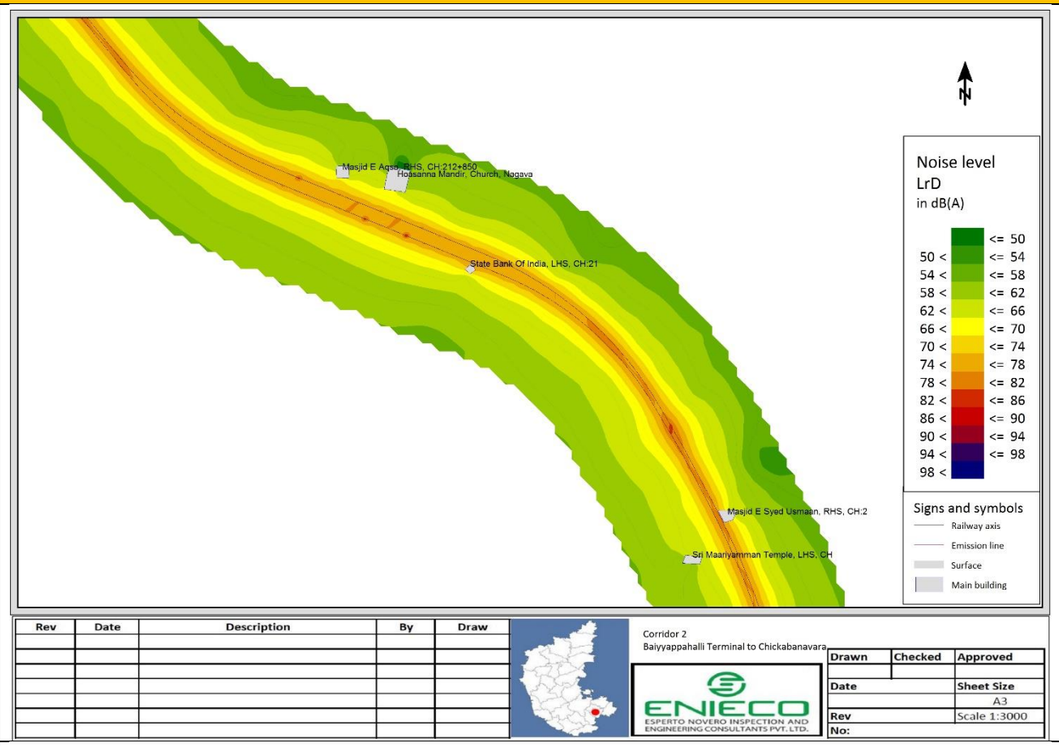
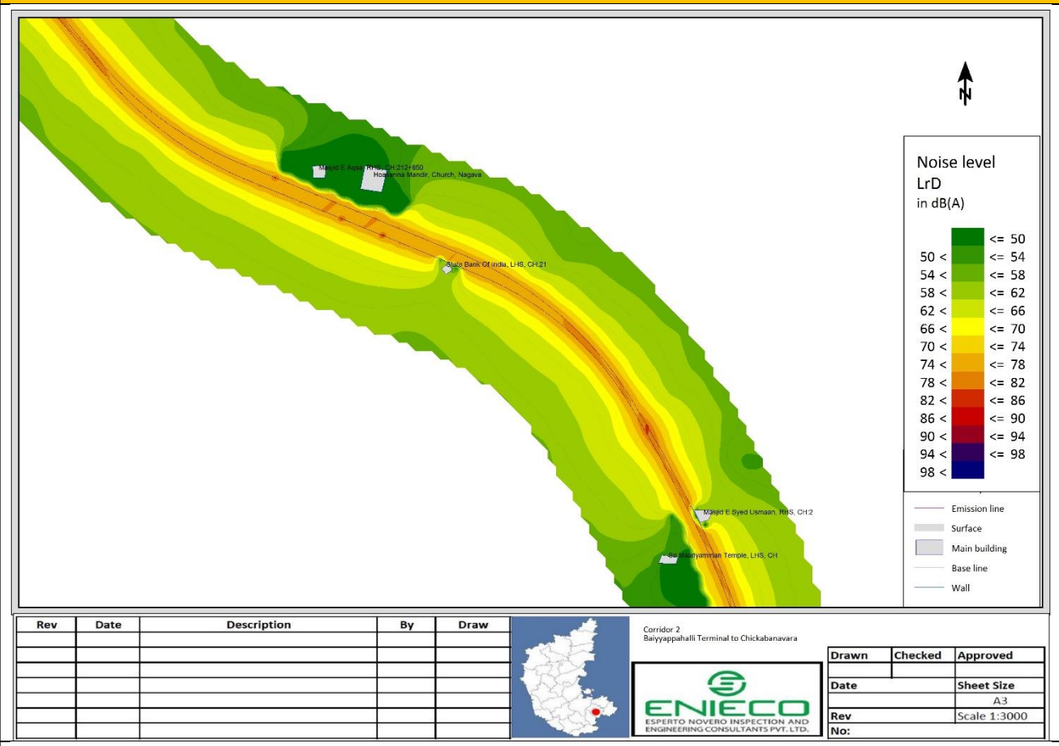
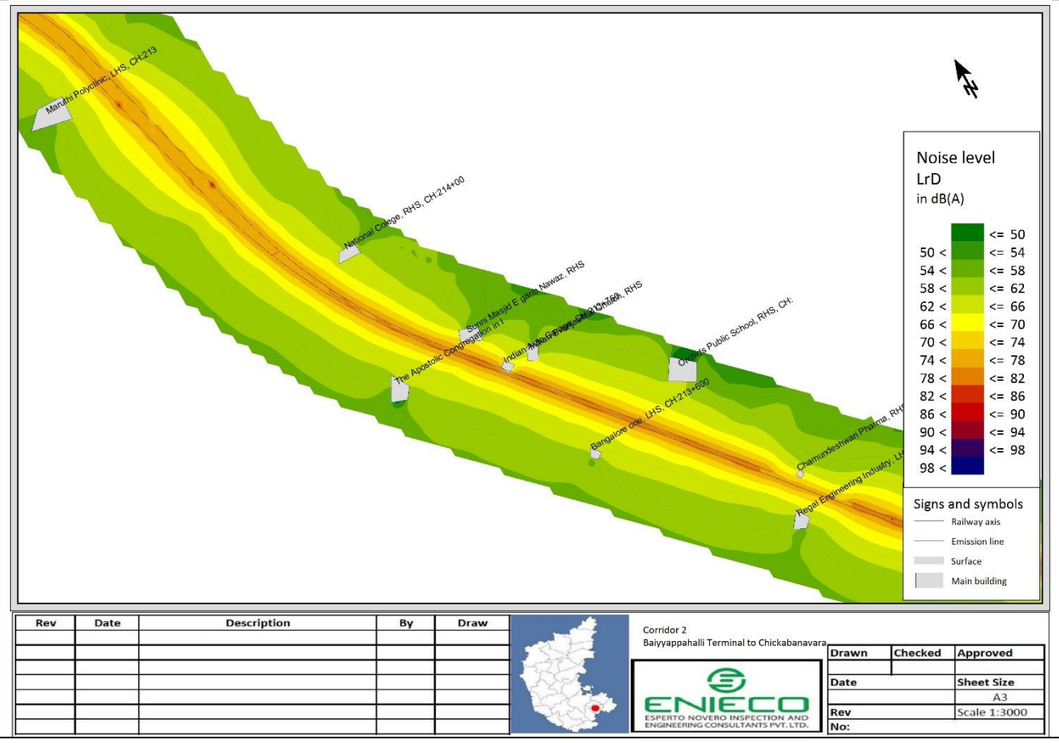
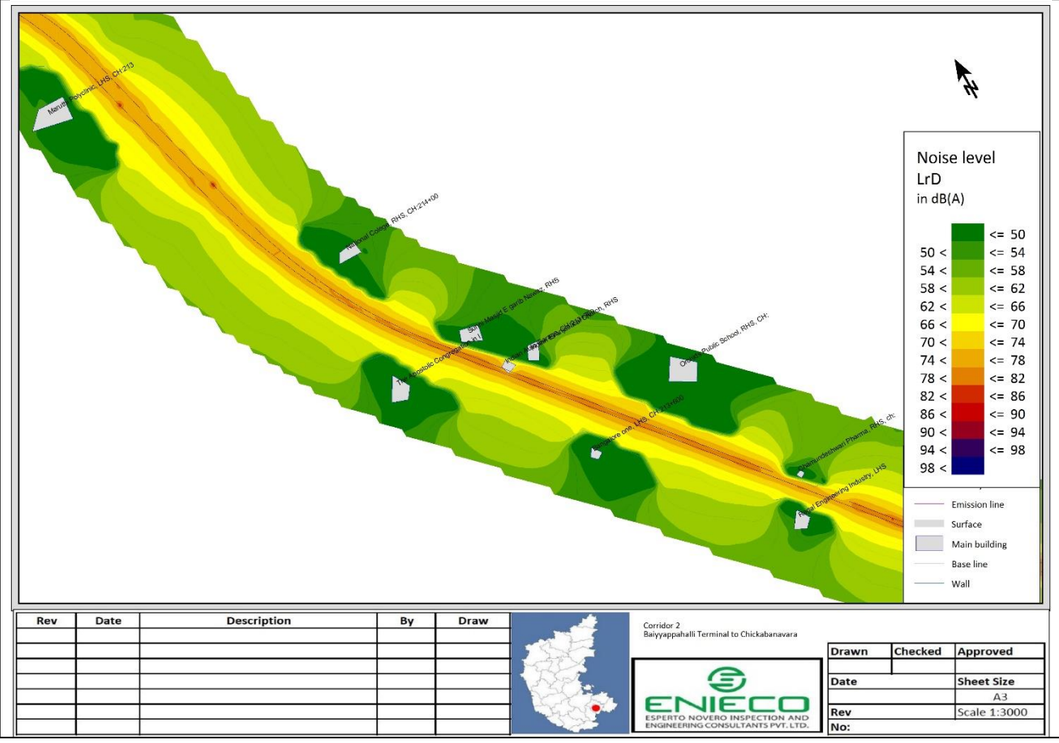
1135

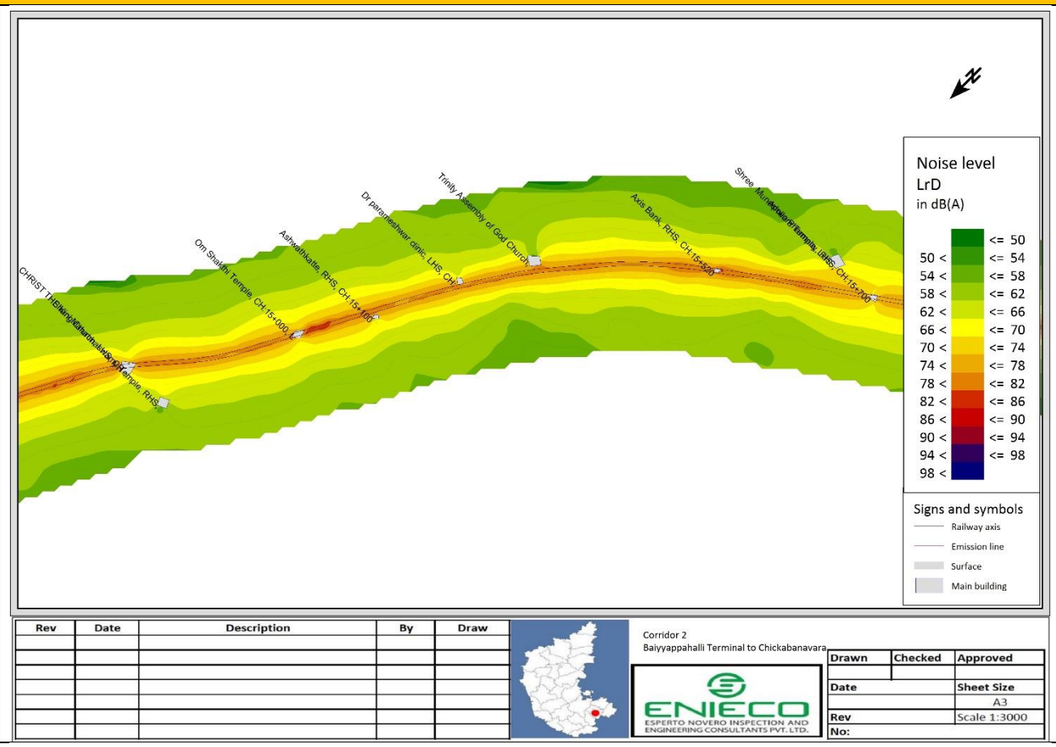
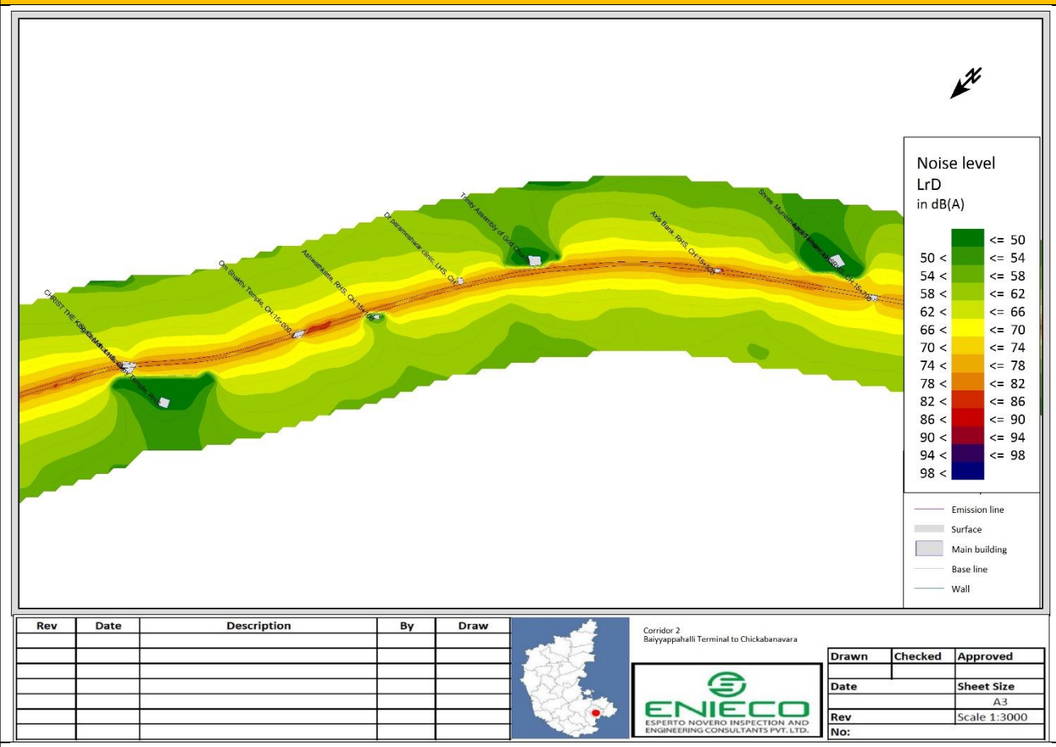
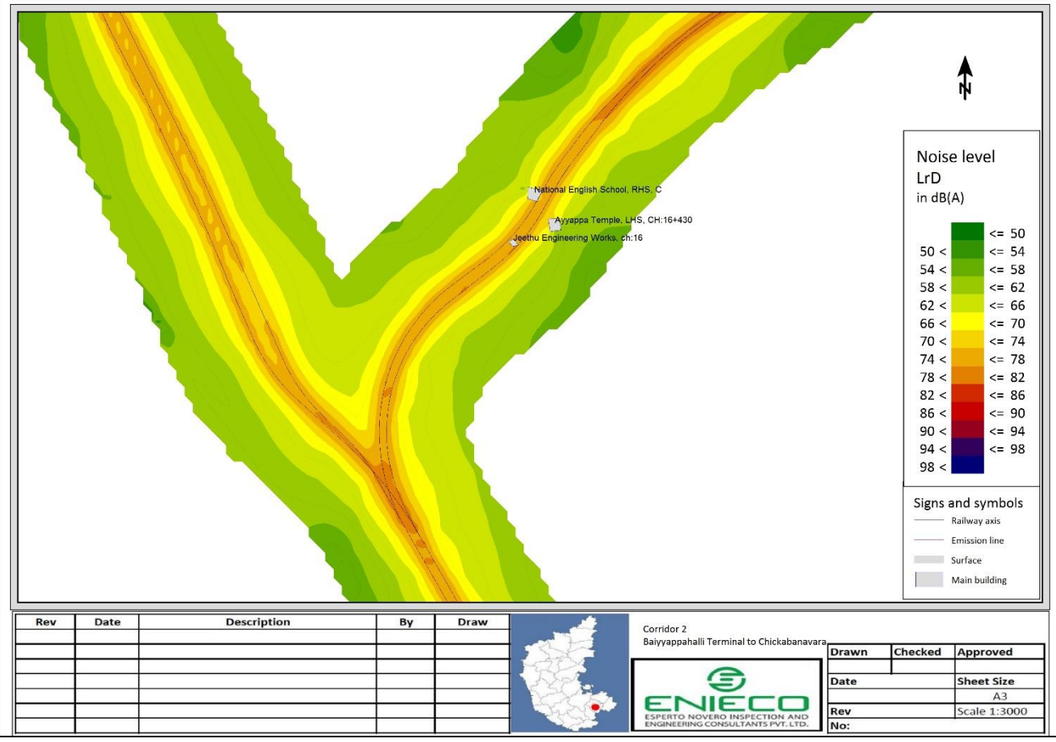
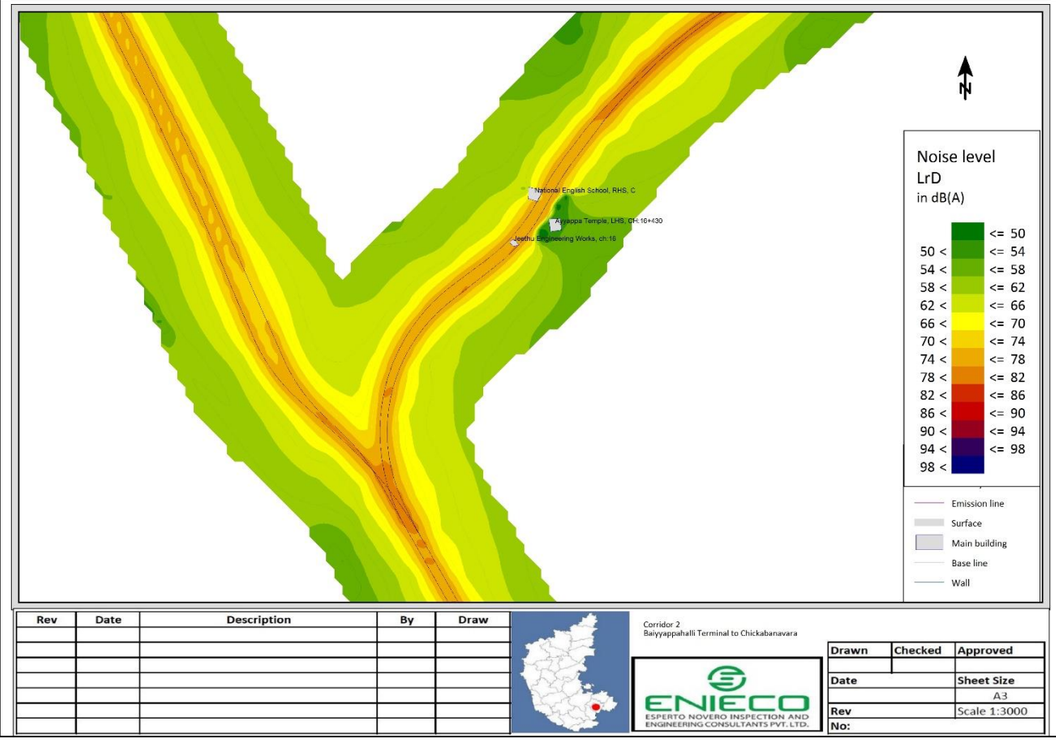
A. Noise contours for Corridor 2 for the Year 2025

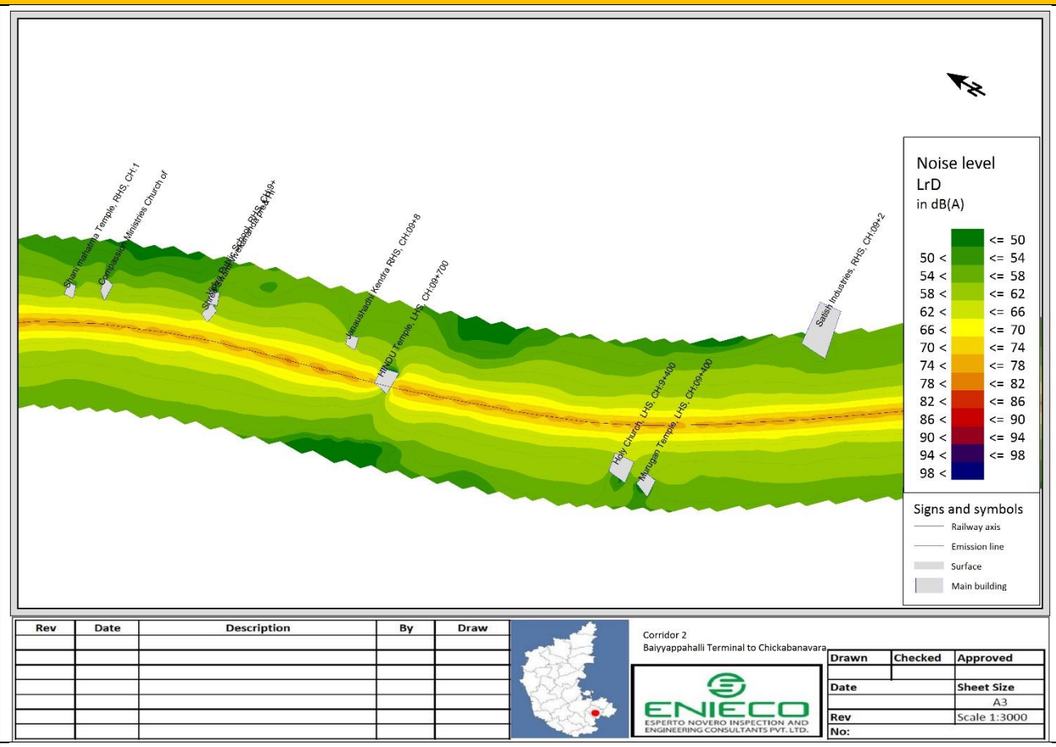
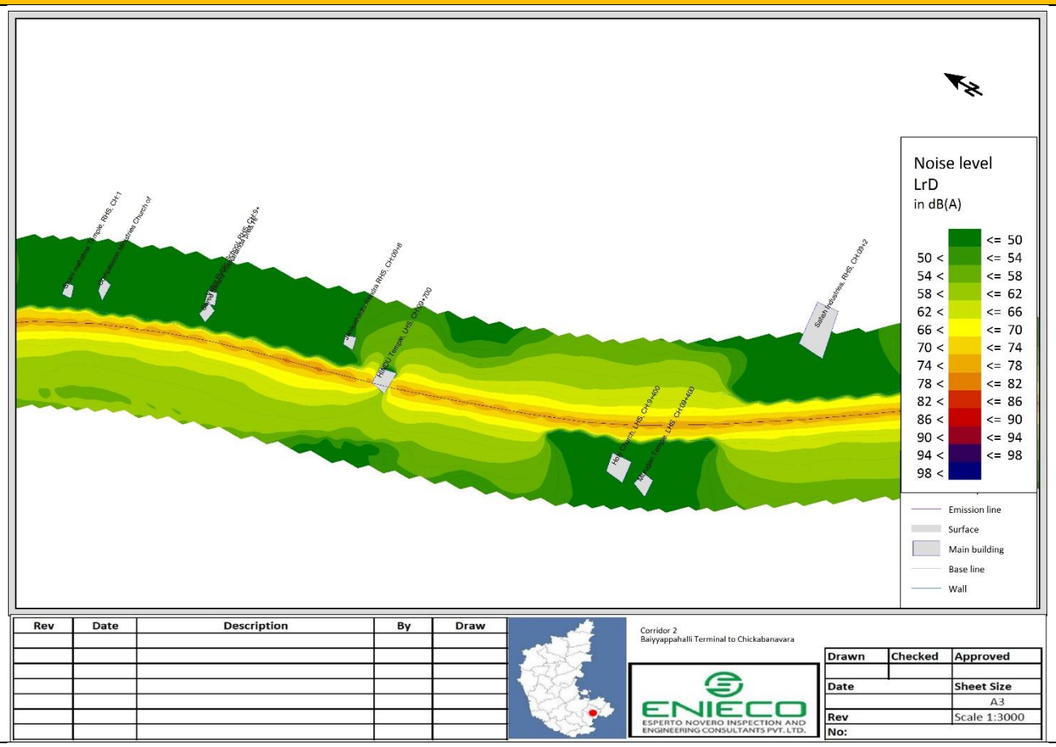
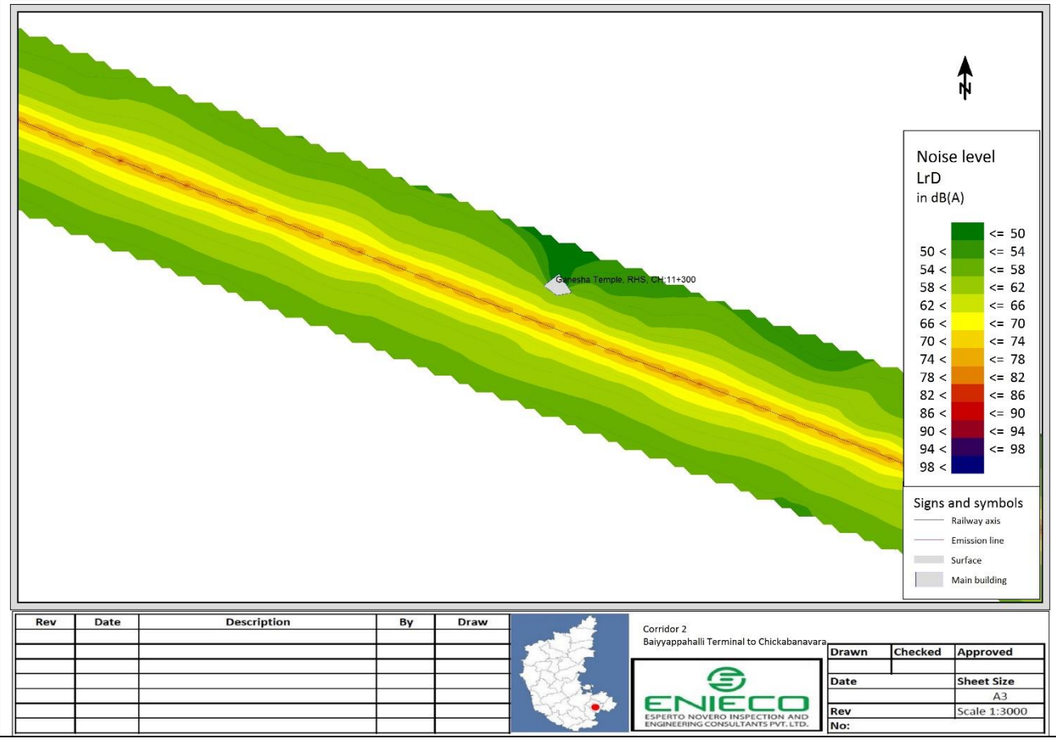
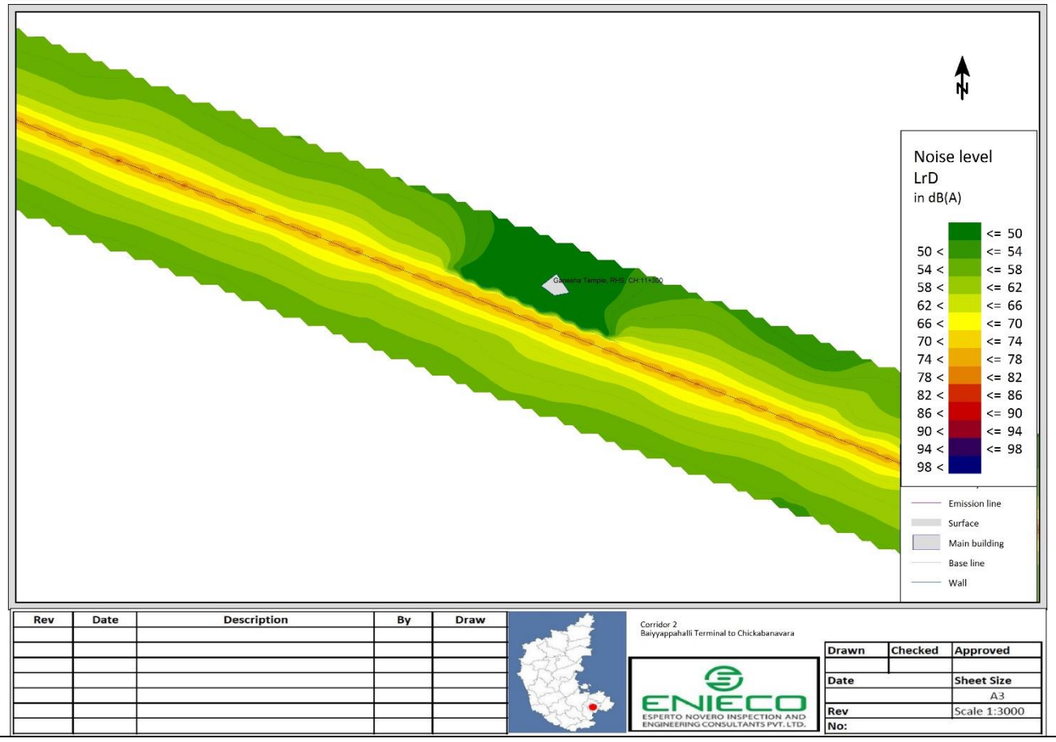
S.No	Without Barrier	With Barrier
1.		

Rev	Date	Description	By	Draw

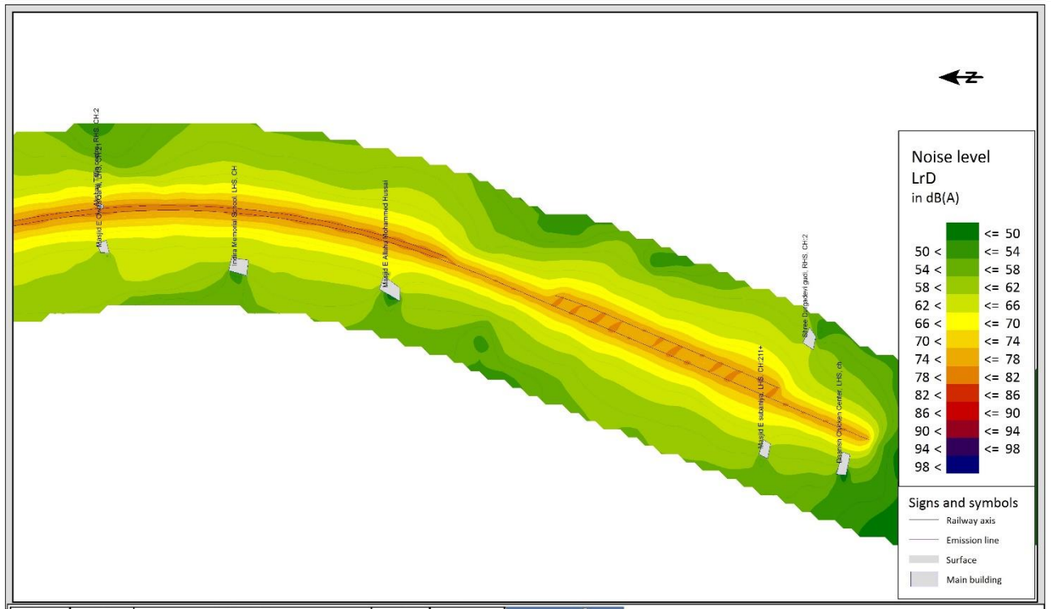
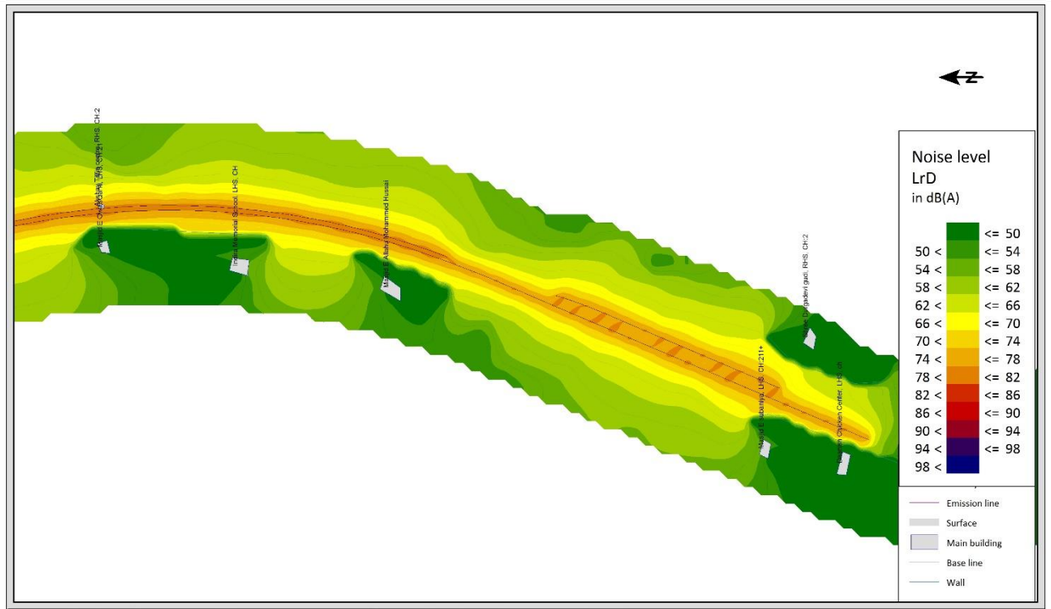
Drawn	Checked	Approved
Date		Sheet Size
		A3
Rev		Scale 1:3000
No:		

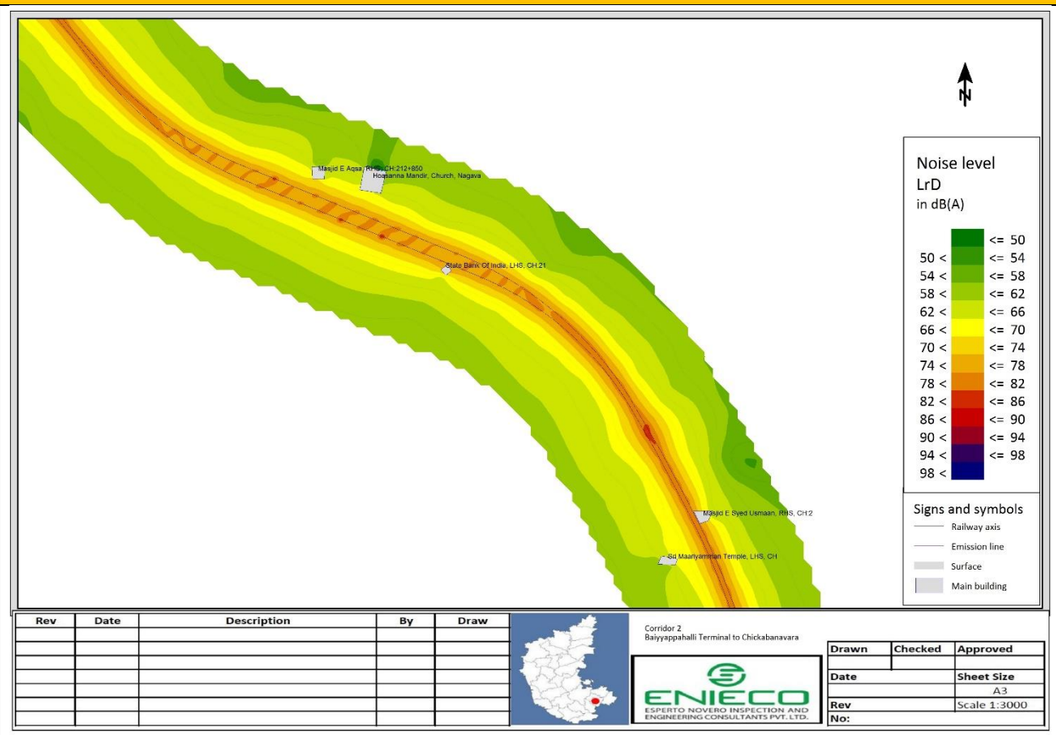
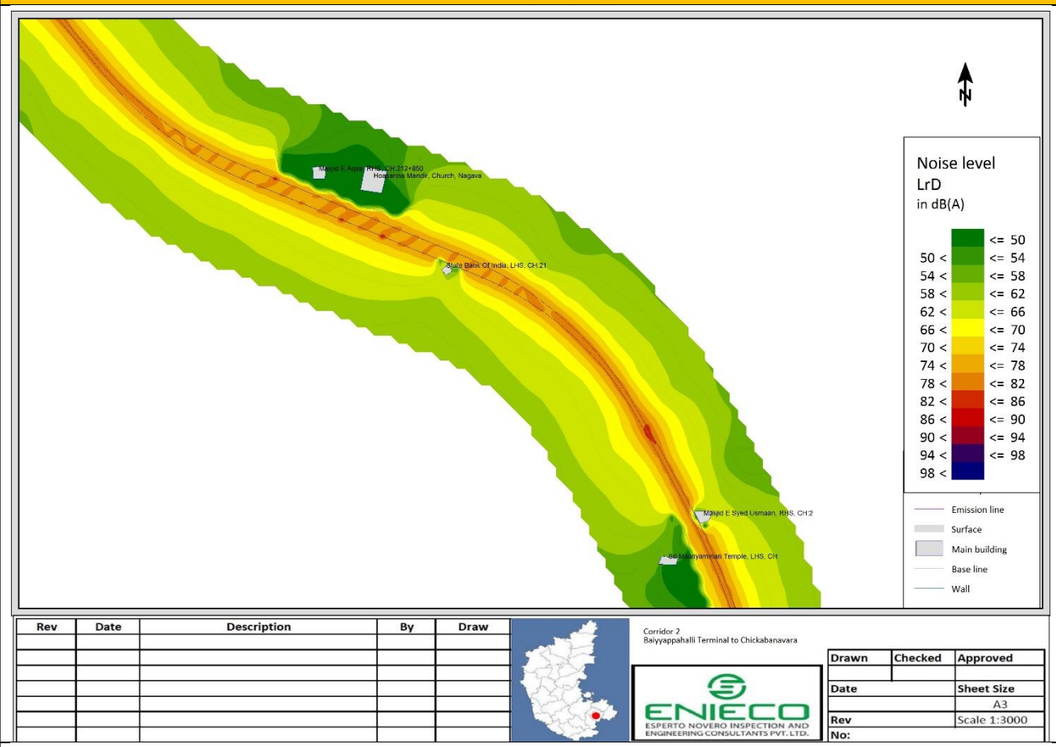
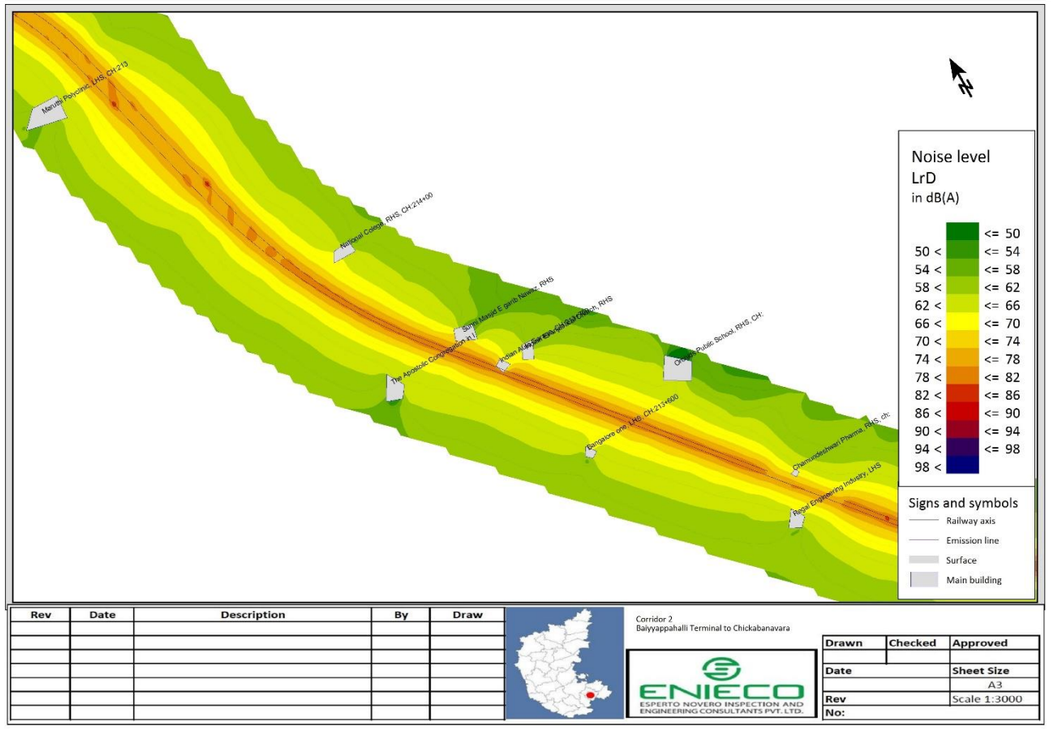
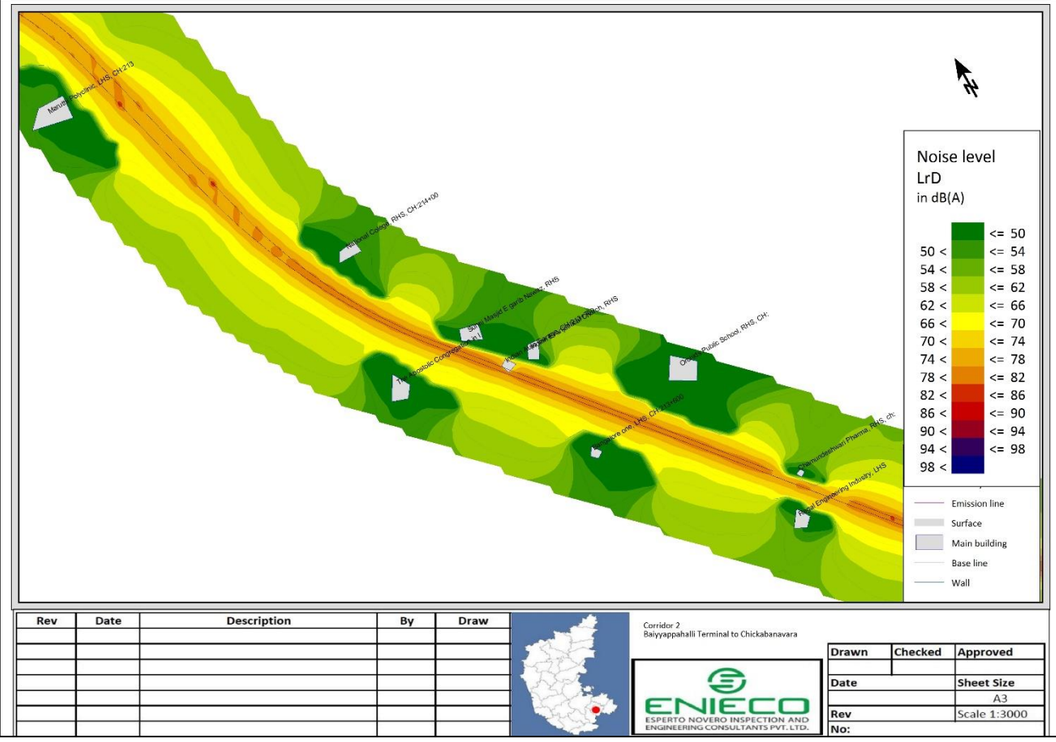
S.No	Without Barrier	With Barrier
2.		
3.		

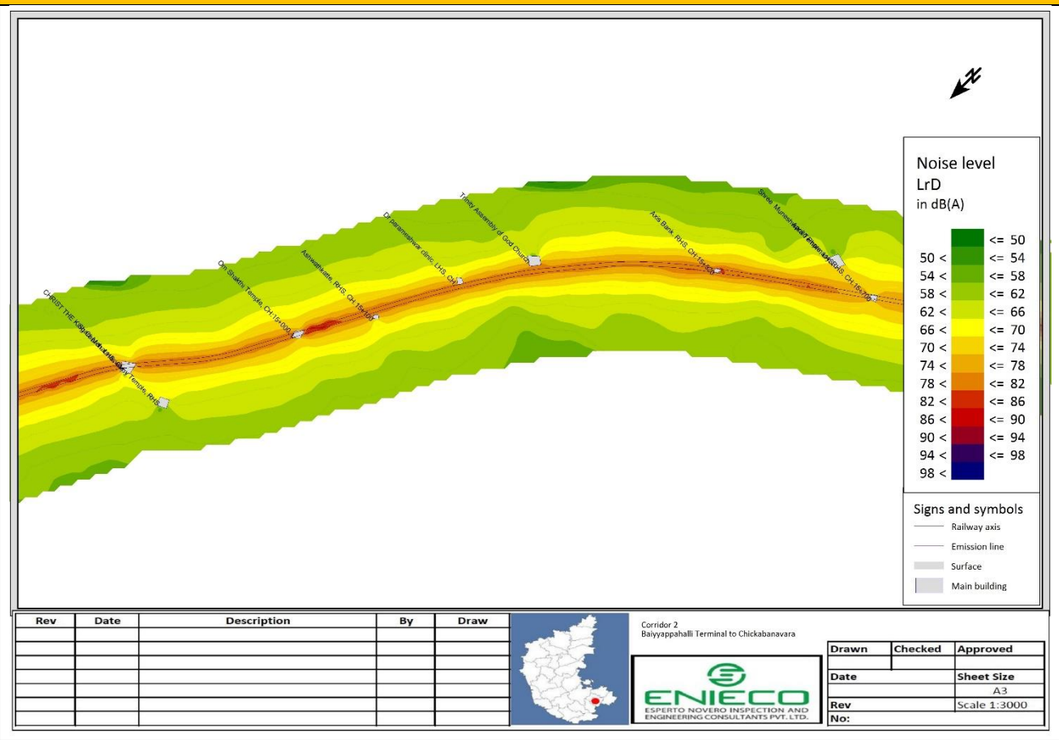
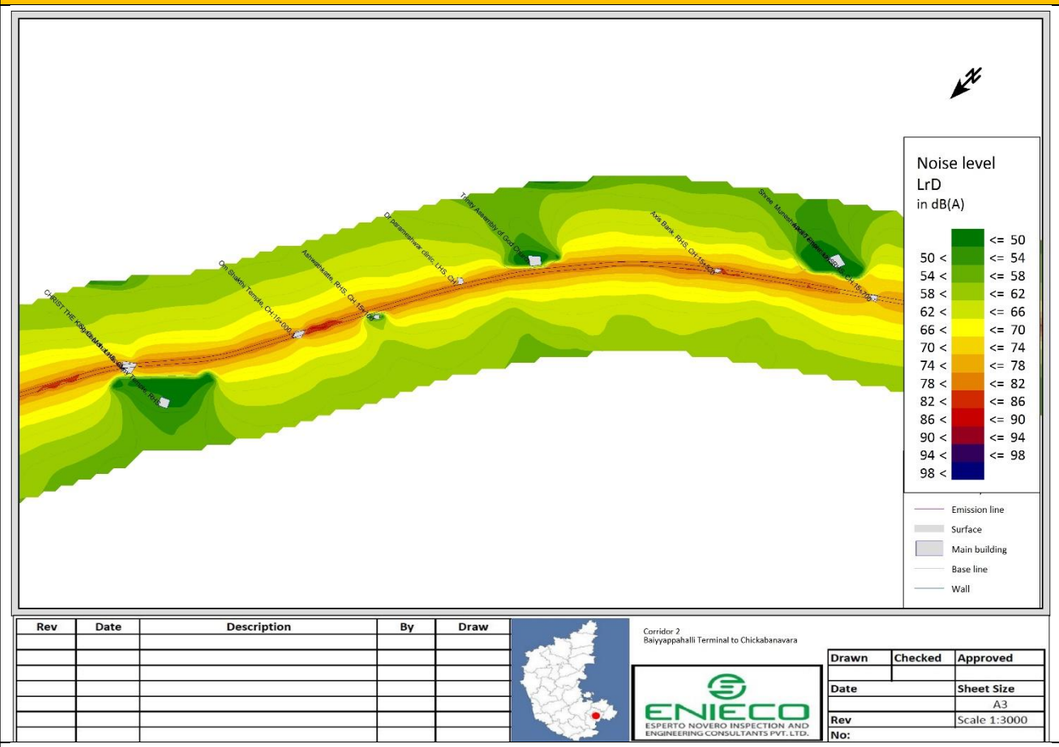
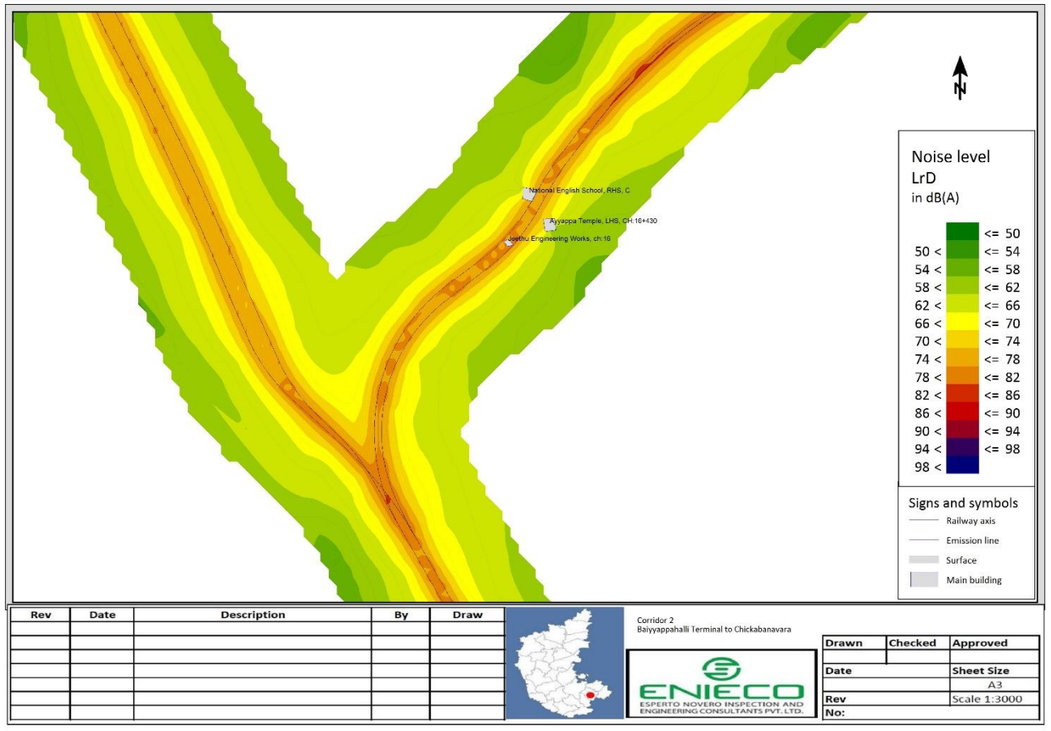
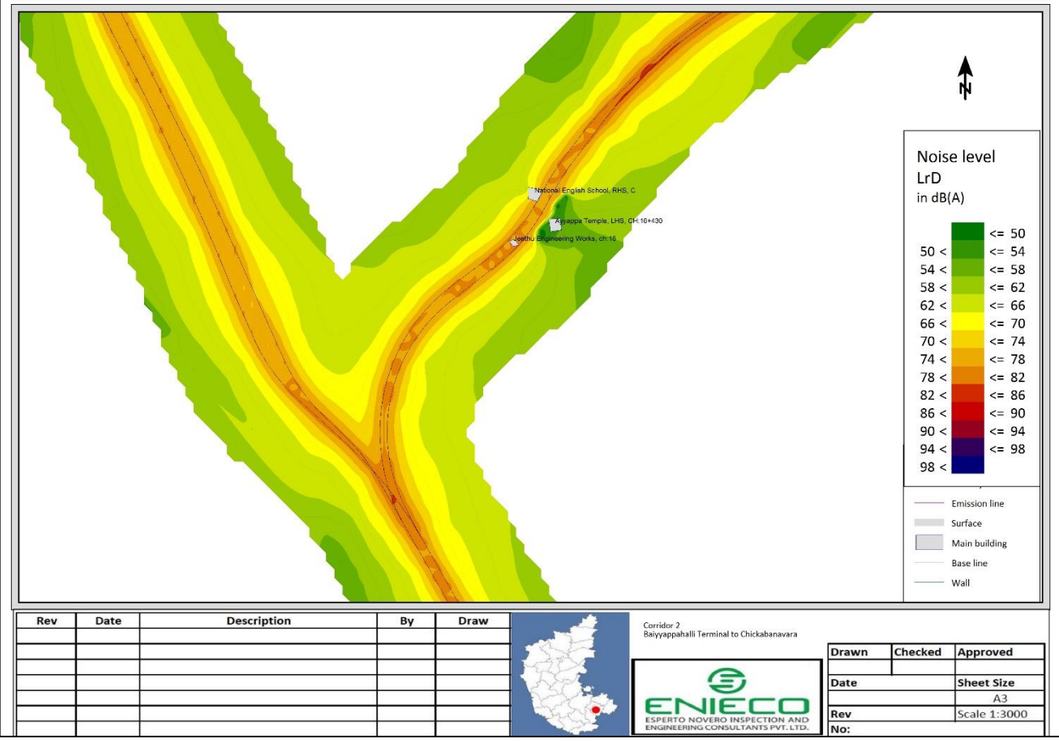
S.No	Without Barrier	With Barrier
4.		
5.		

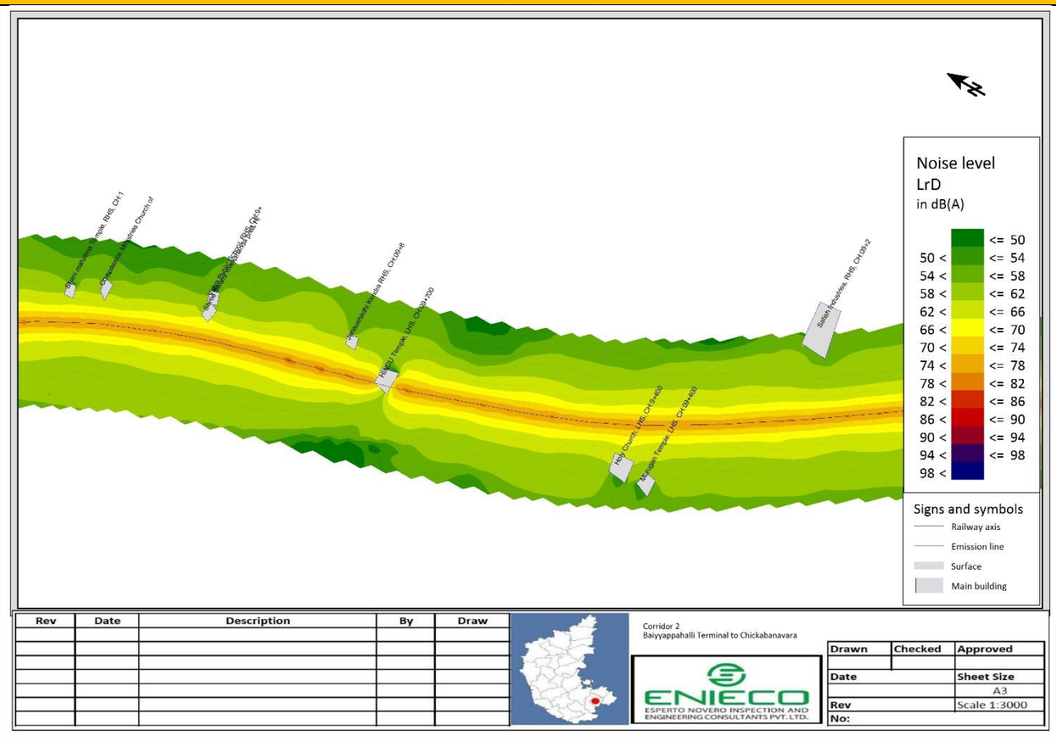
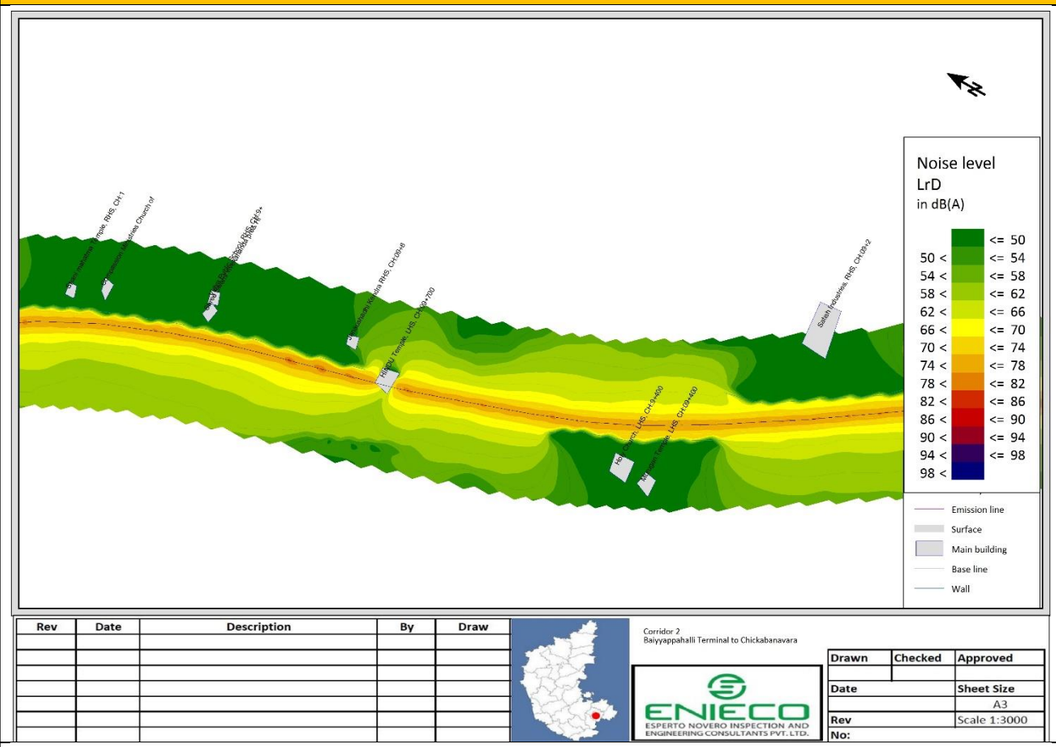
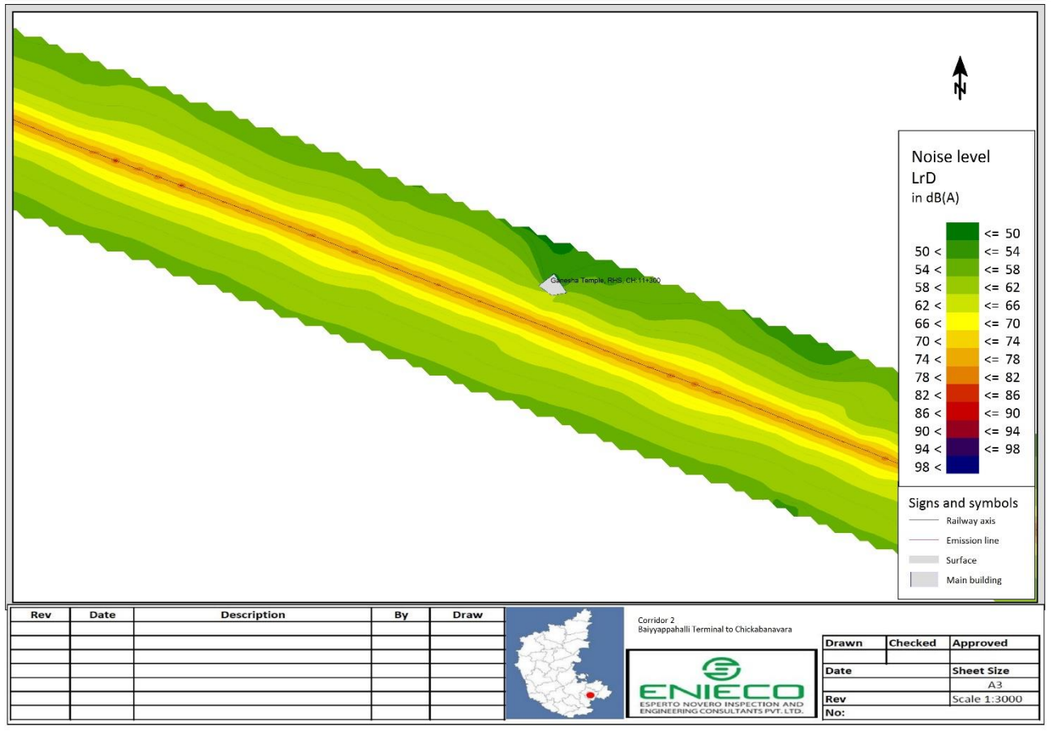
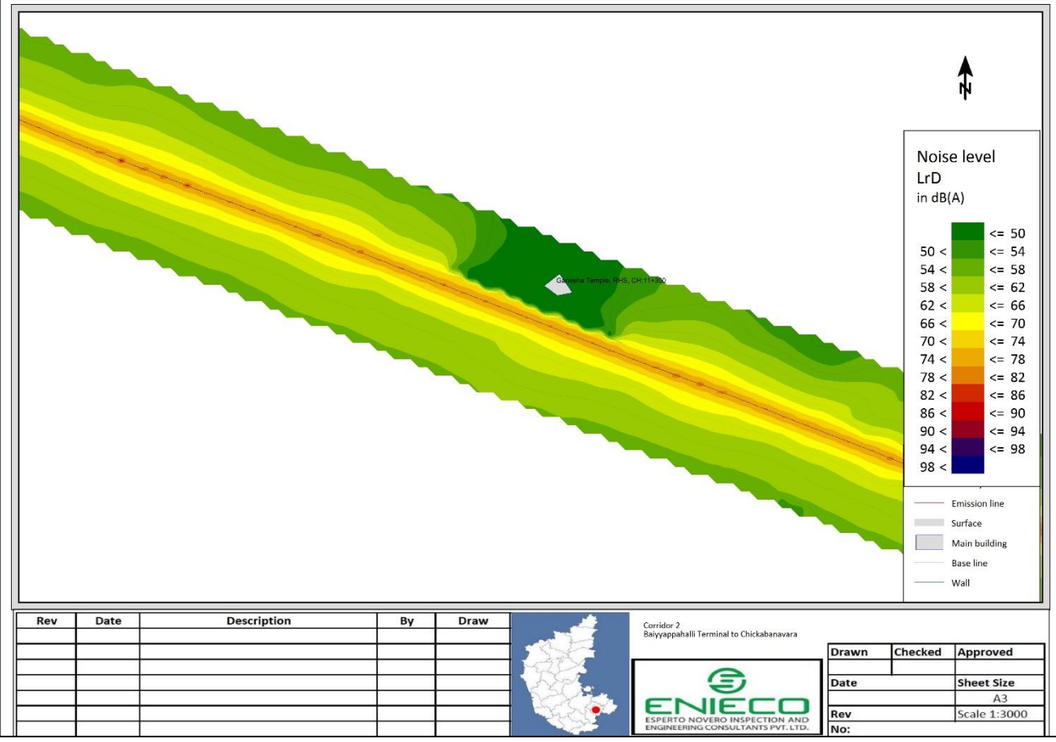
S.No	Without Barrier	With Barrier
6.		
7.		

A. Noise contours for Corridor 2 for the Year 2031

S.No	Without Barrier	With Barrier
1.		

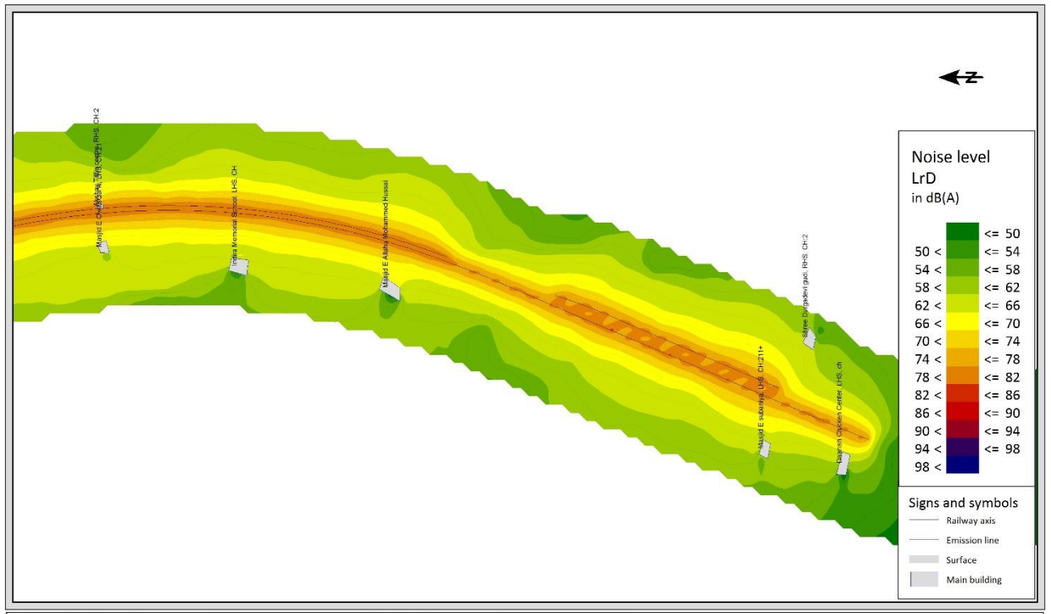
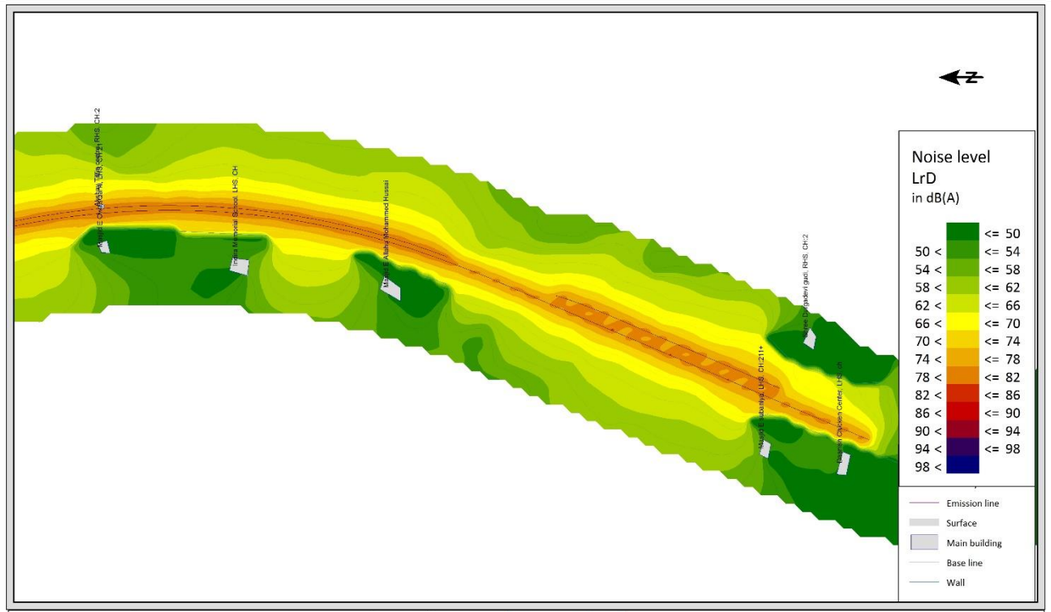
S.No	Without Barrier	With Barrier
2.		
3.		

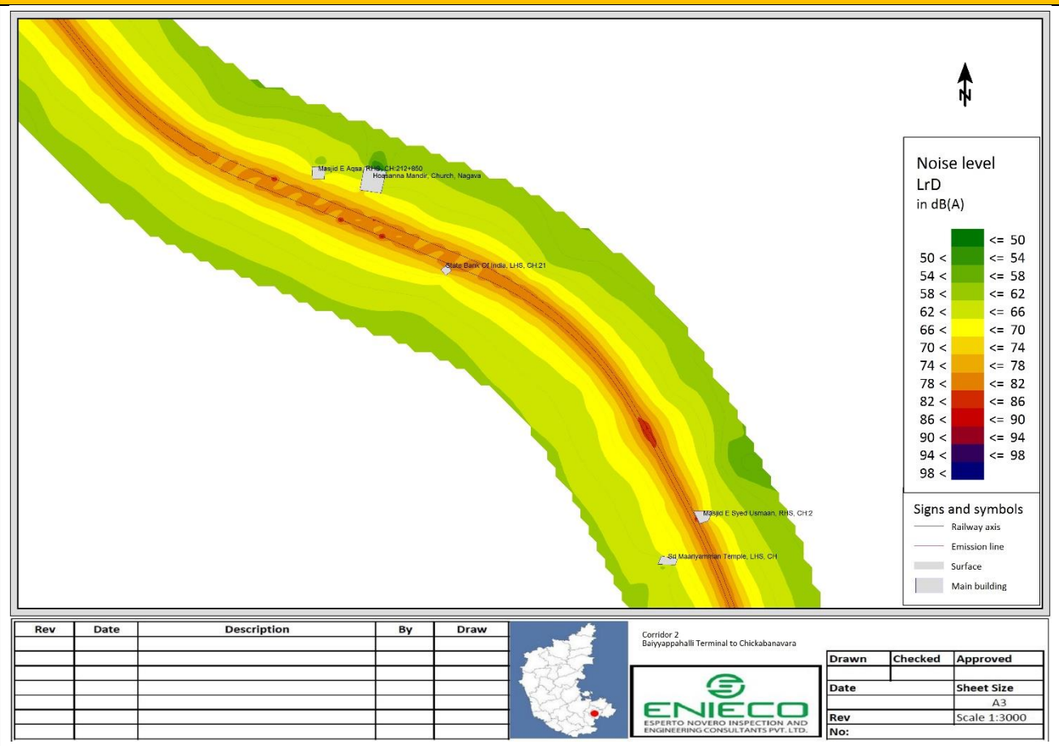
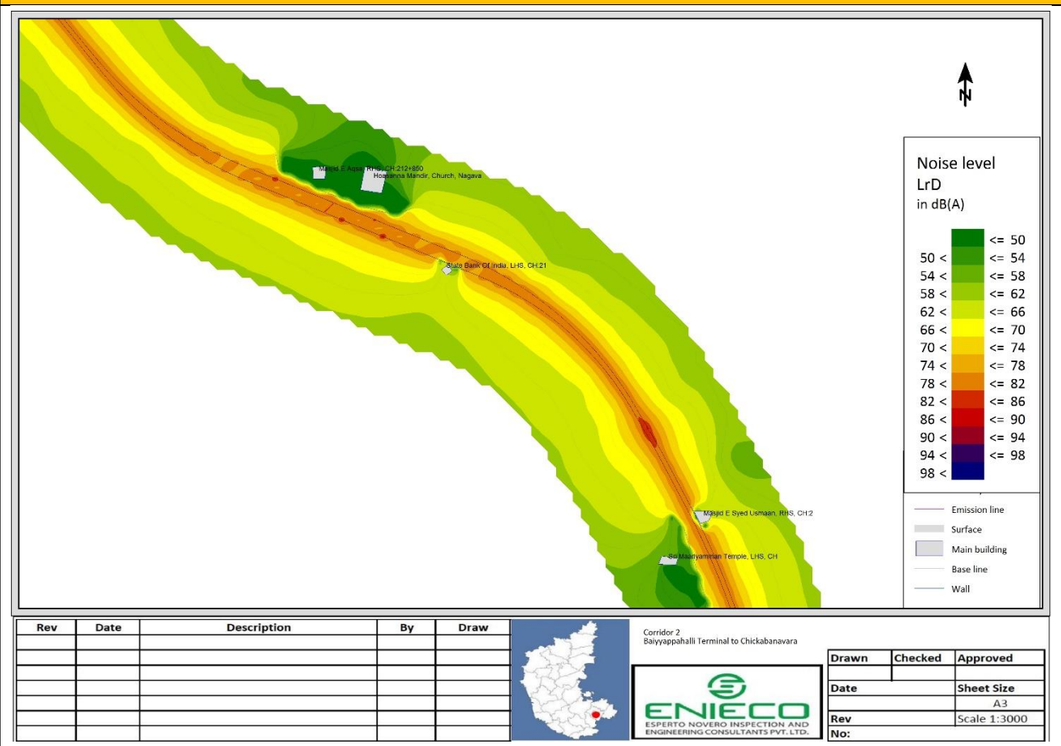
S.No	Without Barrier	With Barrier
4.		
5.		

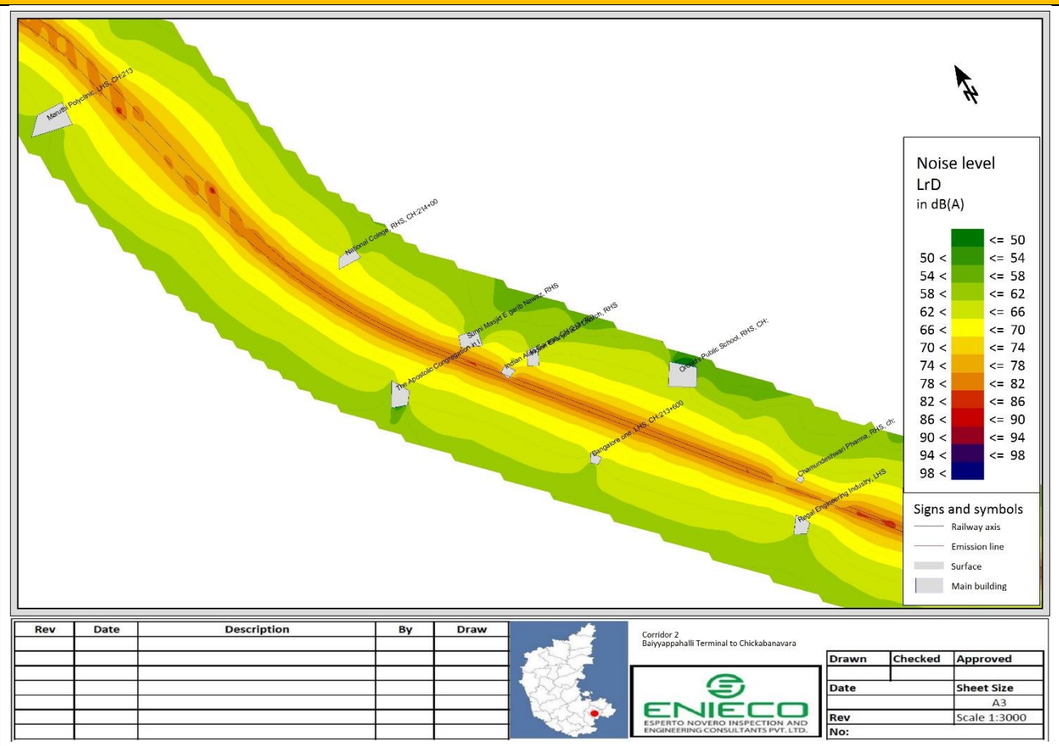
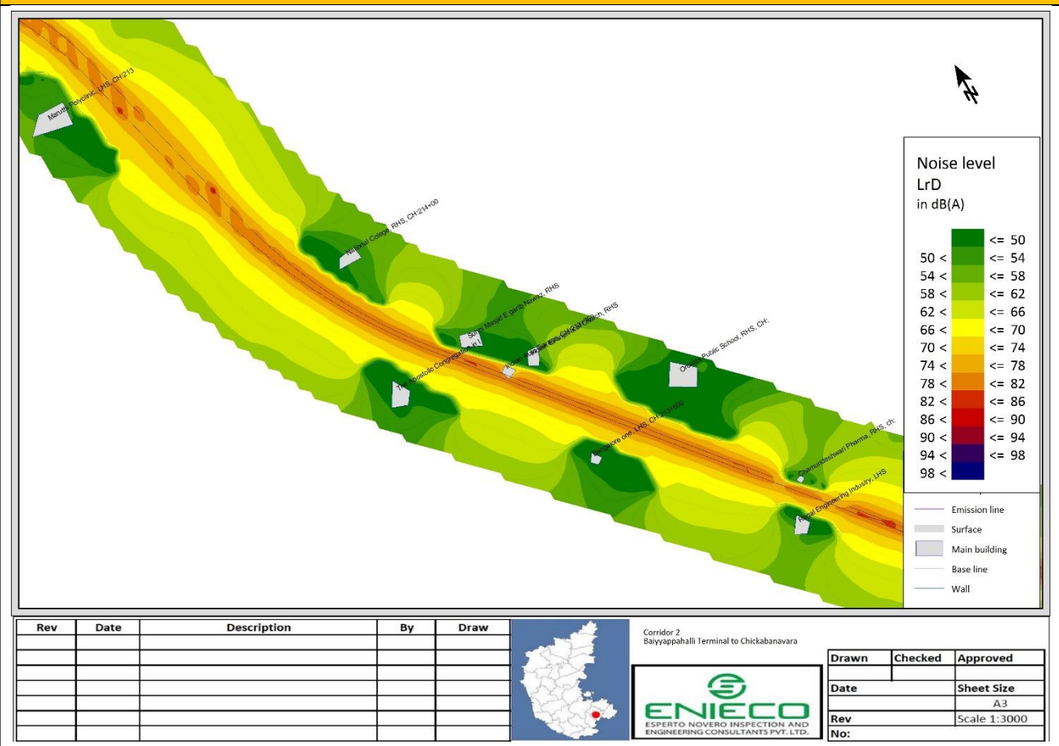
S.No	Without Barrier	With Barrier
6.		
7.		

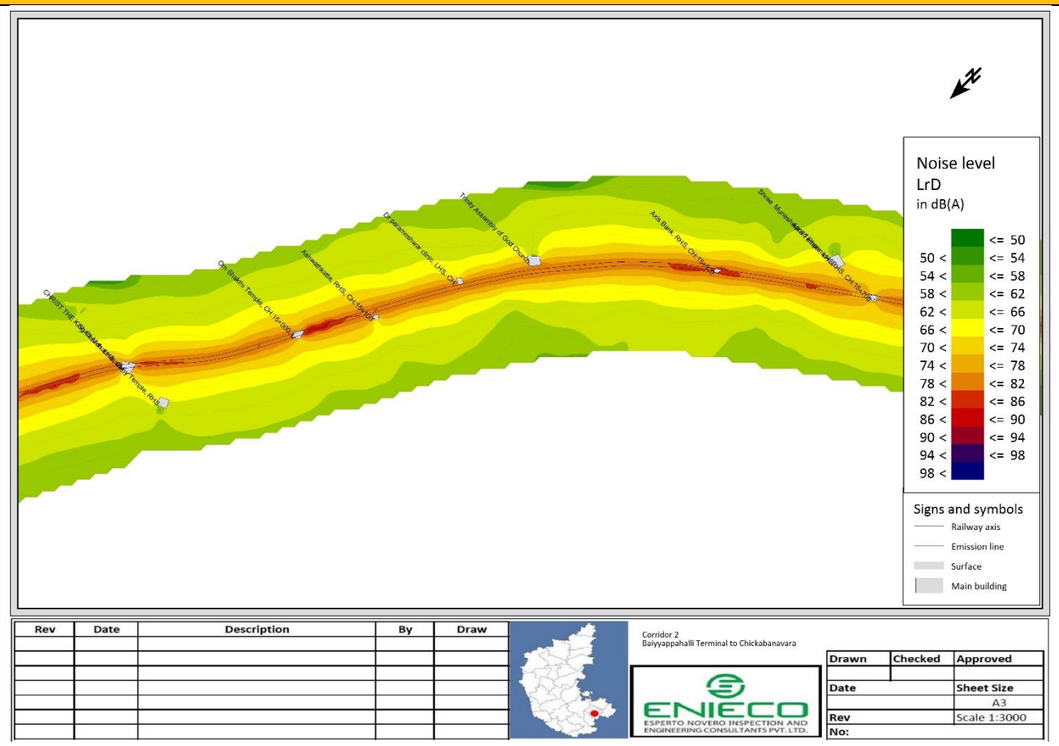
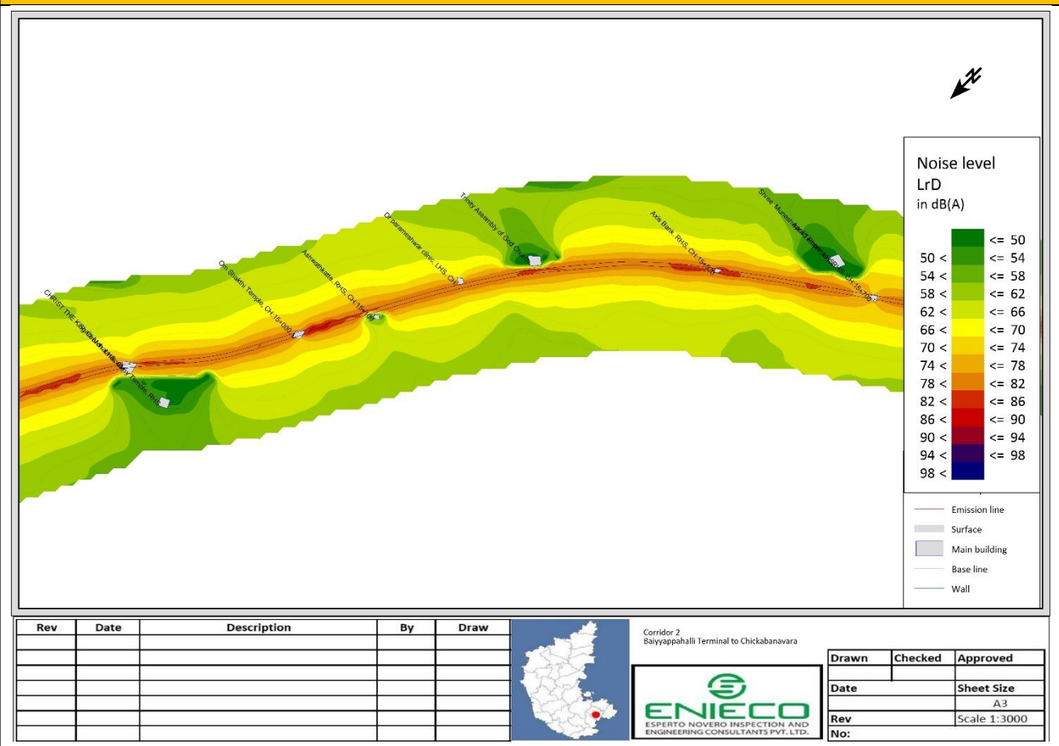
1143

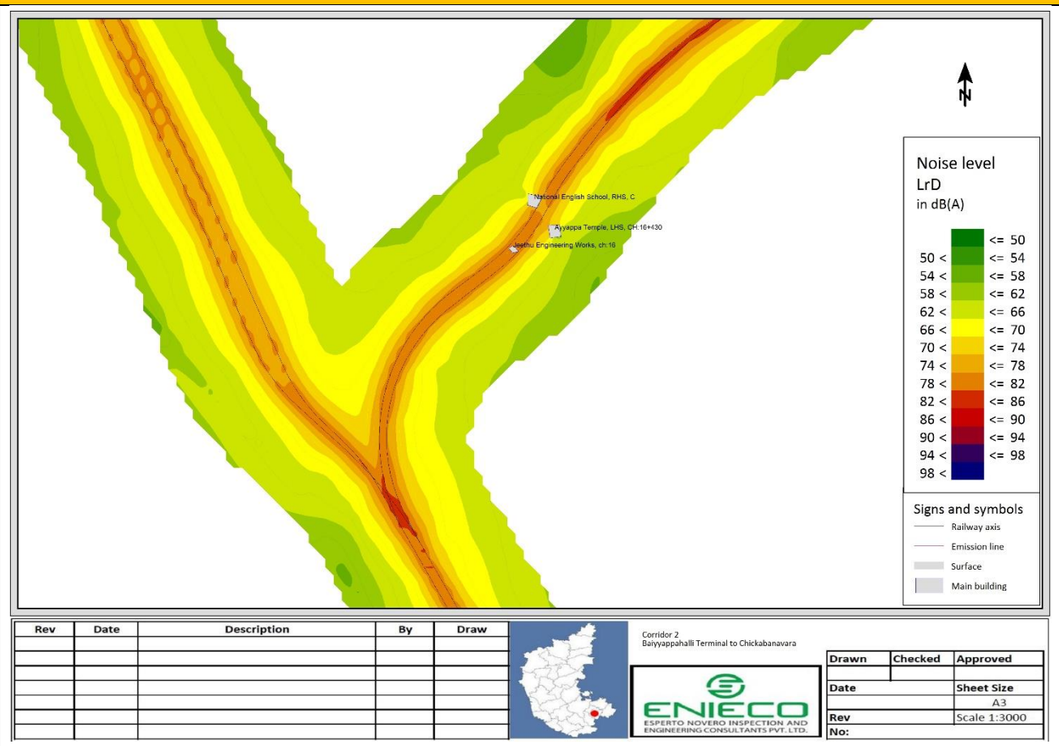
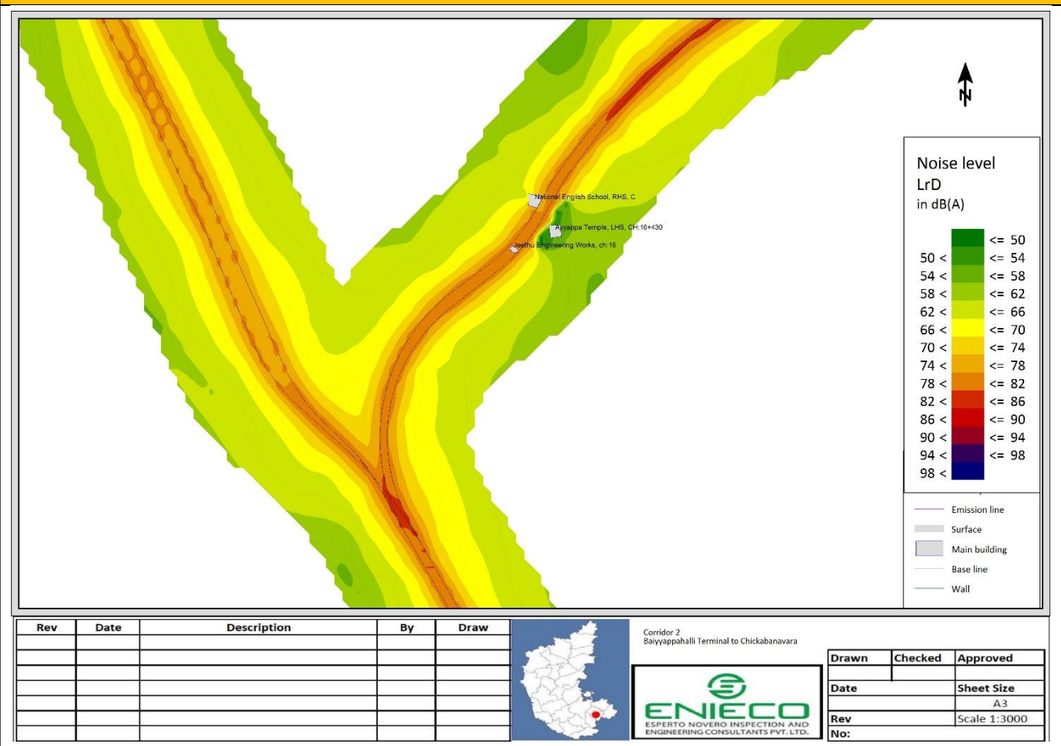
A. Noise contours for Corridor 2 for the Year 2041

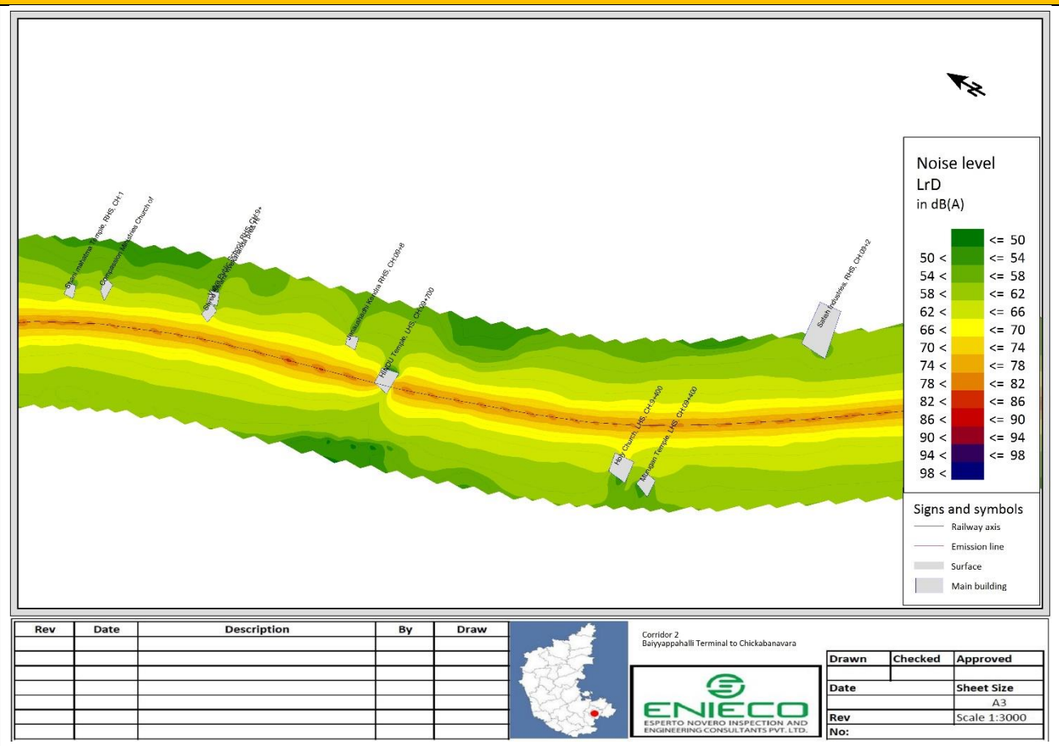
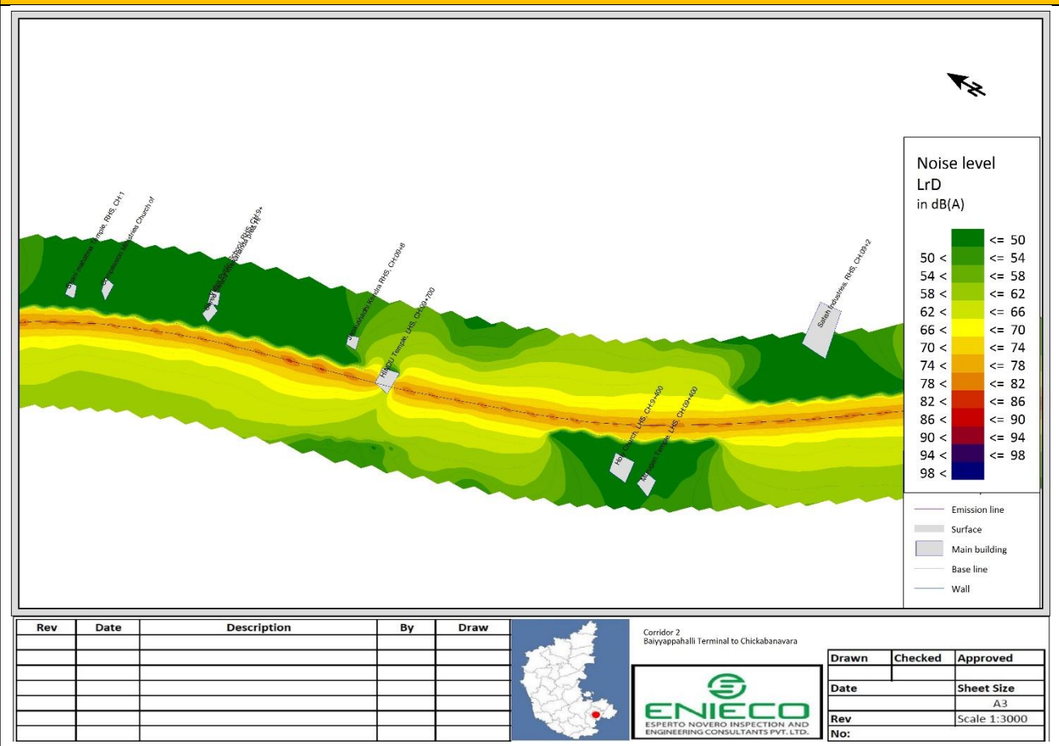
S.No	Without Barrier	With Barrier
1.		

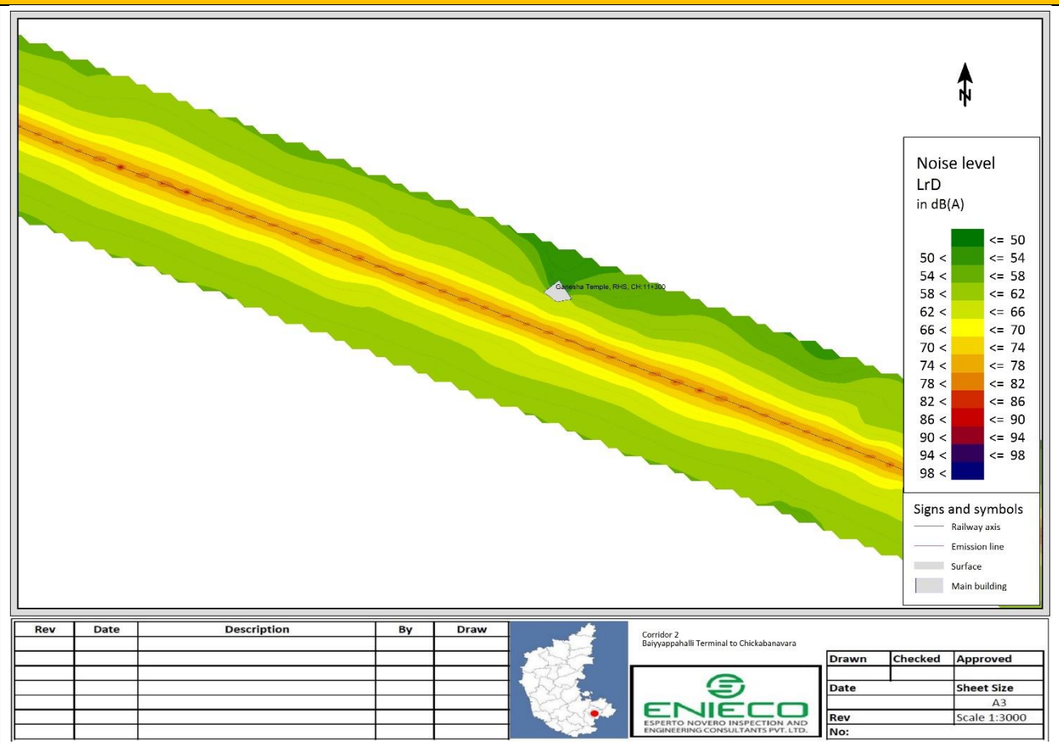
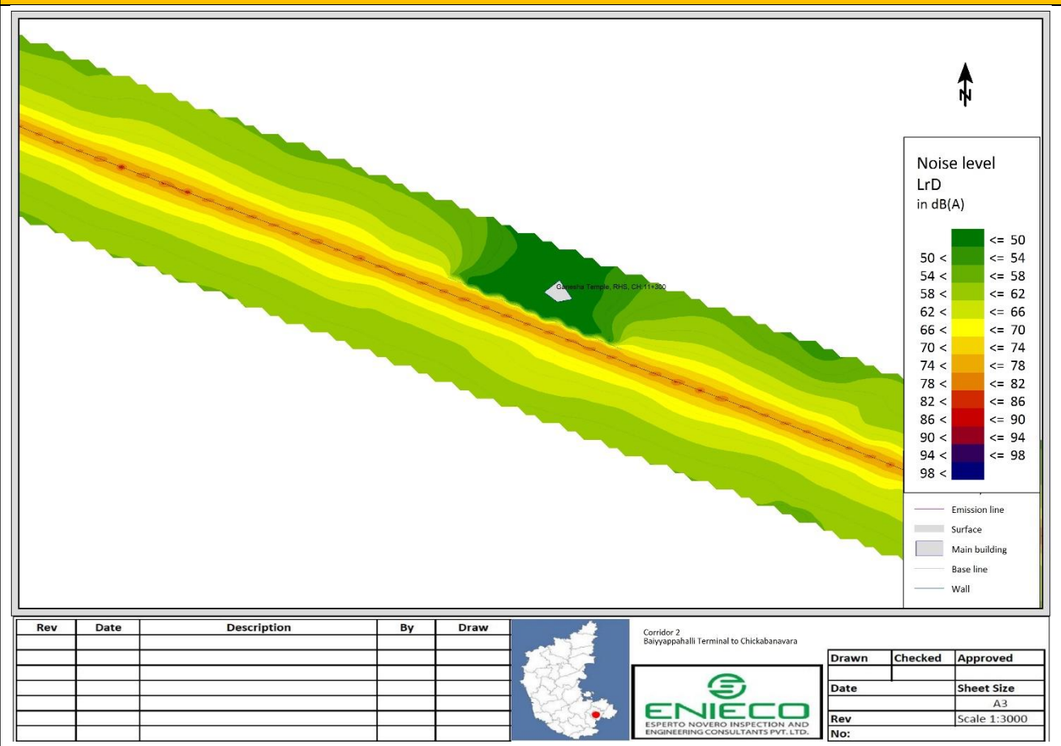
S.No	Without Barrier	With Barrier
2.		

S.No	Without Barrier	With Barrier
3.		

S.No	Without Barrier	With Barrier
4.		

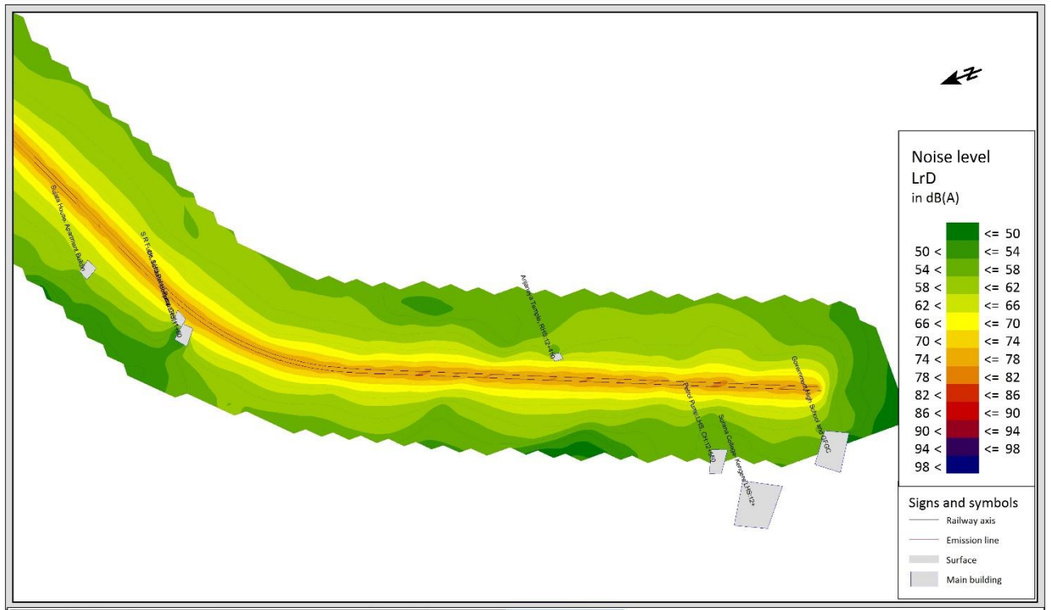
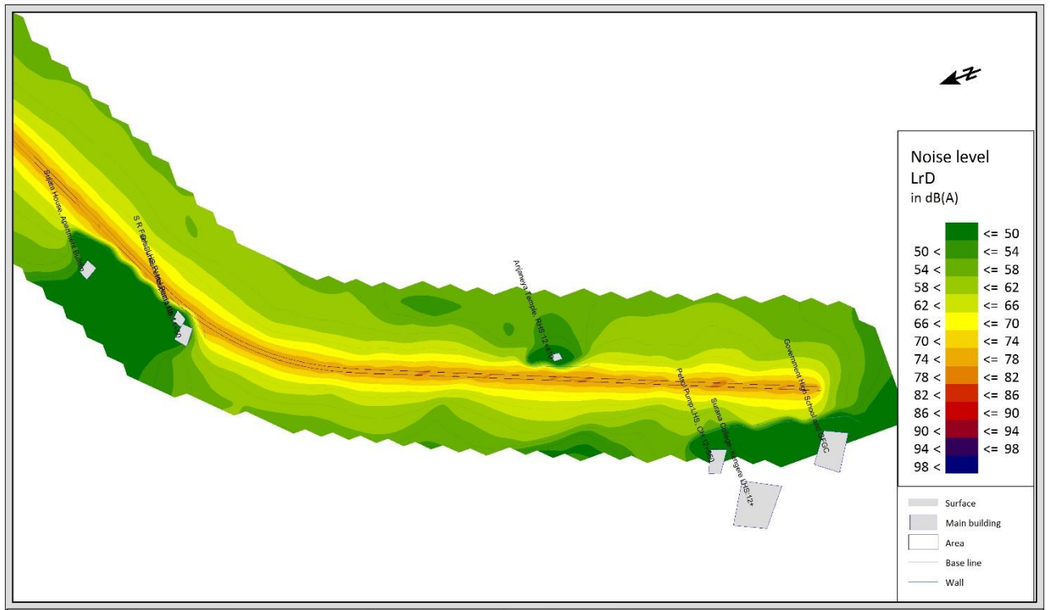
S.No	Without Barrier	With Barrier
5.		

S.No	Without Barrier	With Barrier
6.		

S.No	Without Barrier	With Barrier
7.		

1150

A. Noise contours for Corridor 3 for the Year 2025

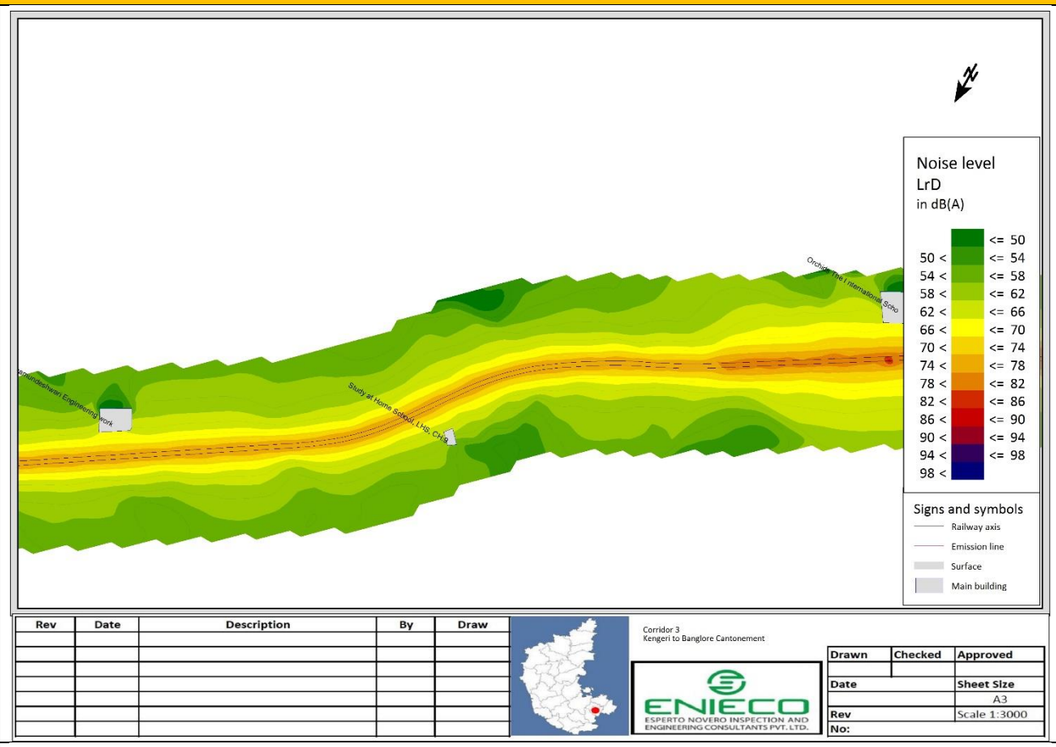
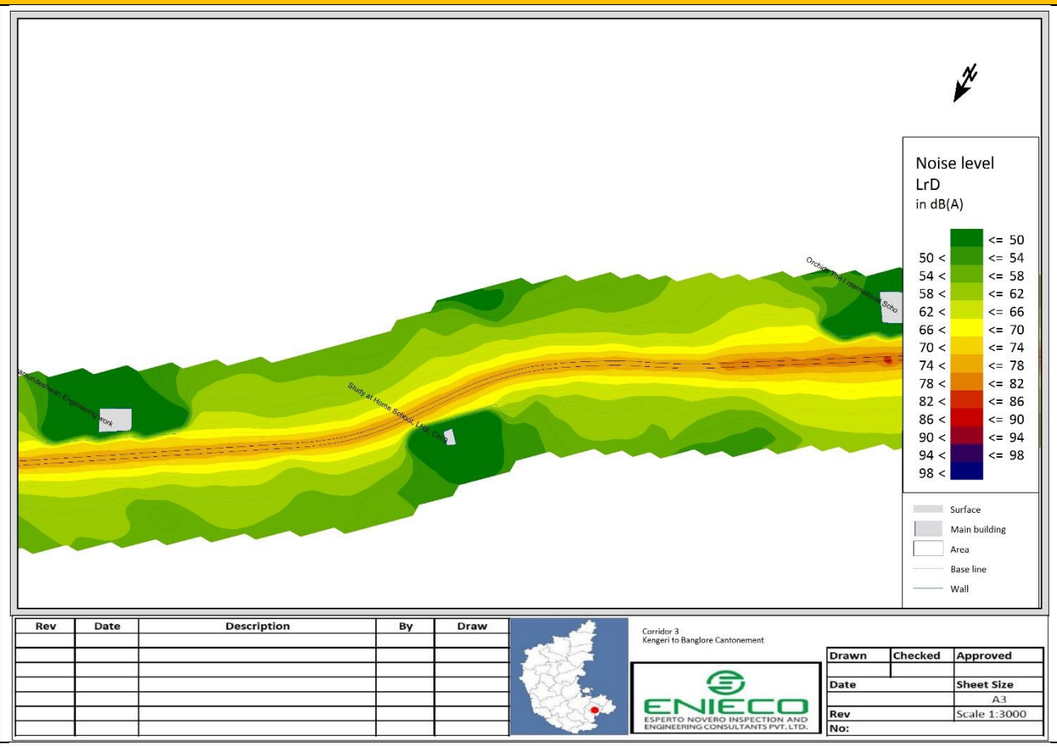
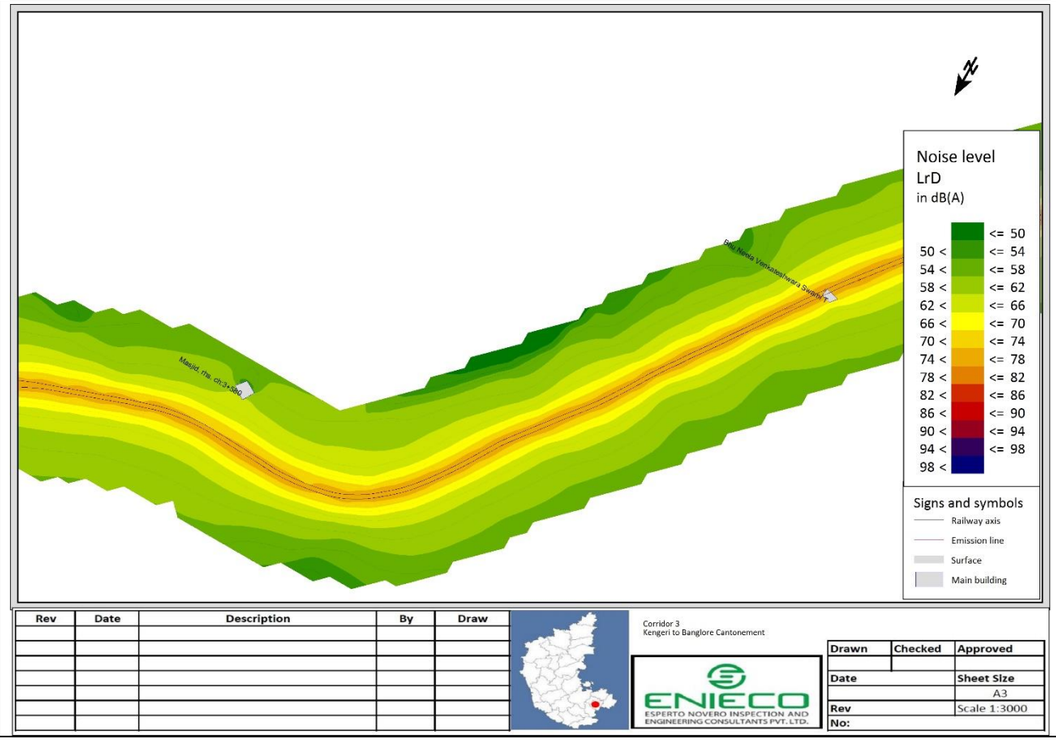
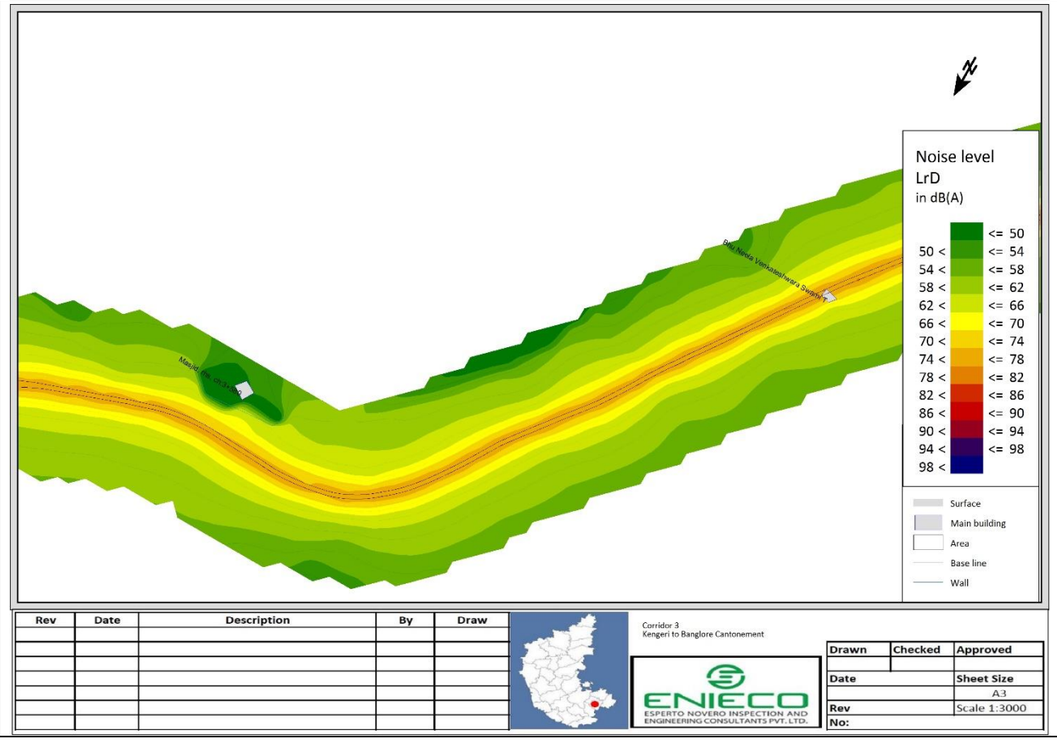
S.No	Without Barrier	With Barrier
1.		

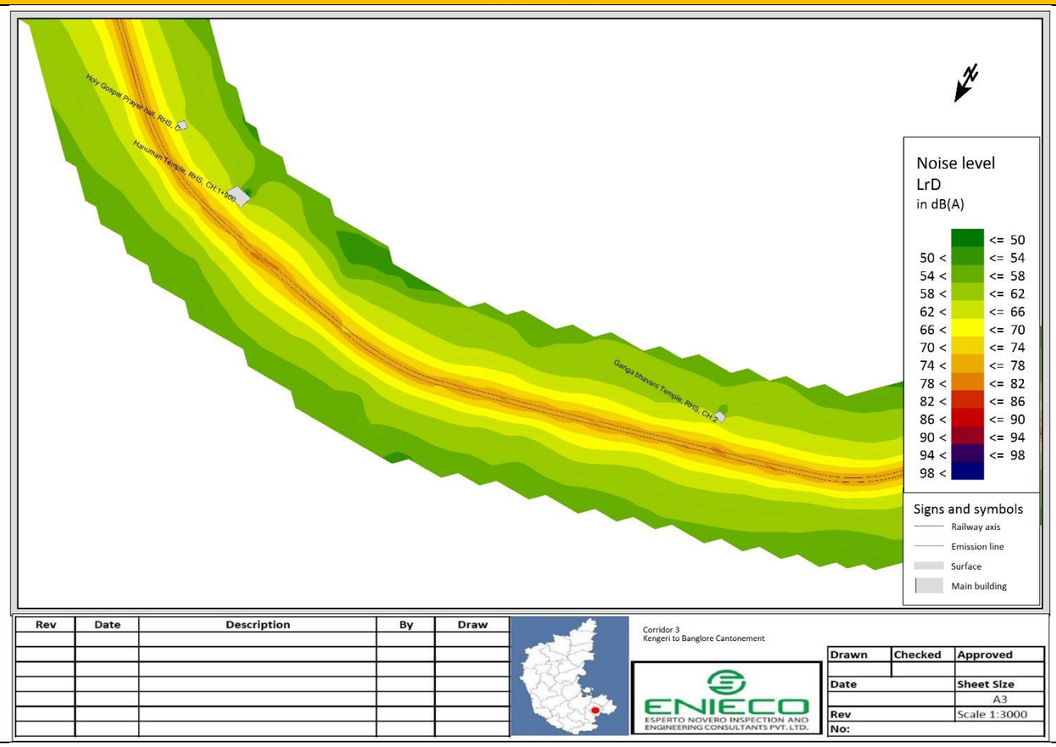
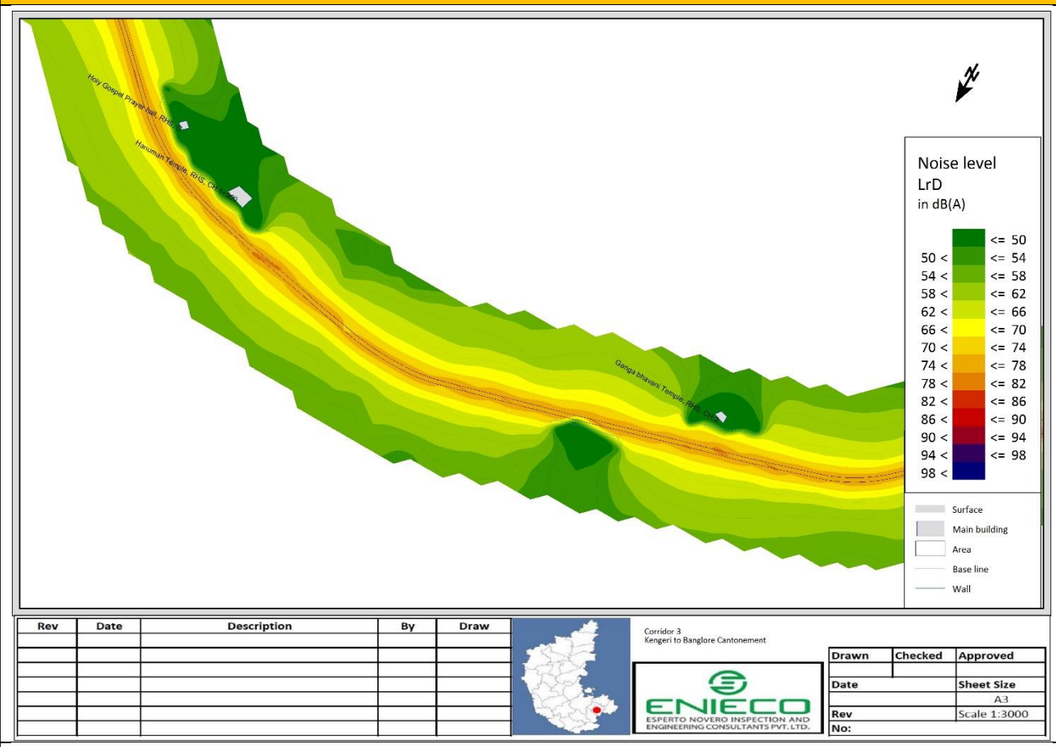
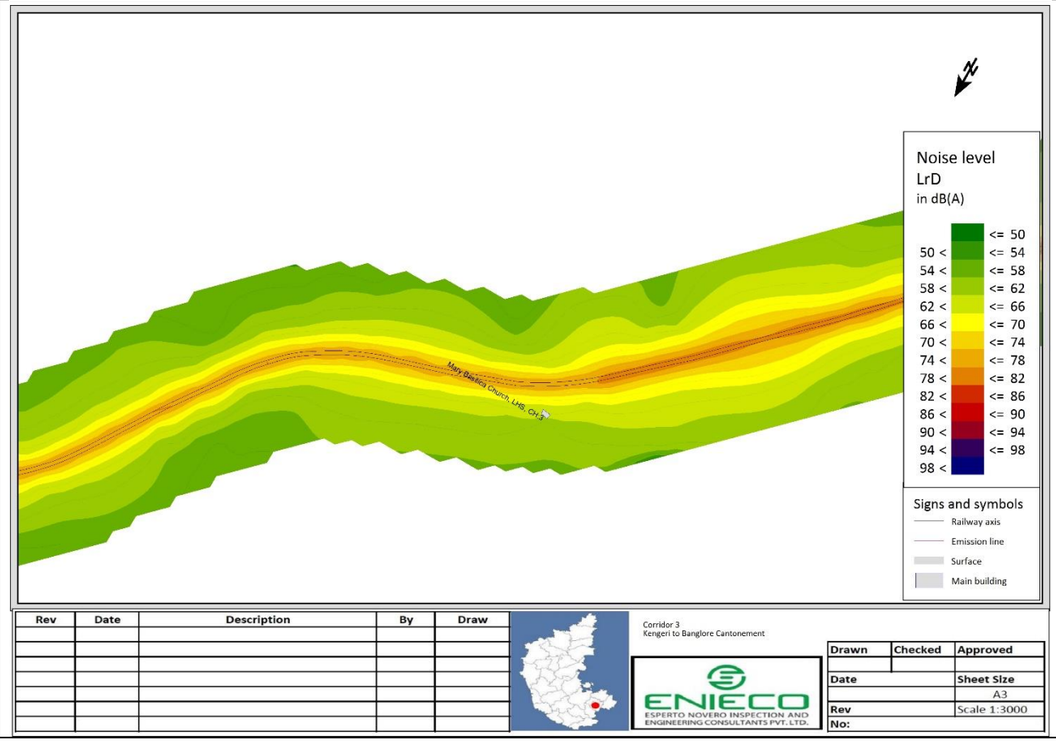
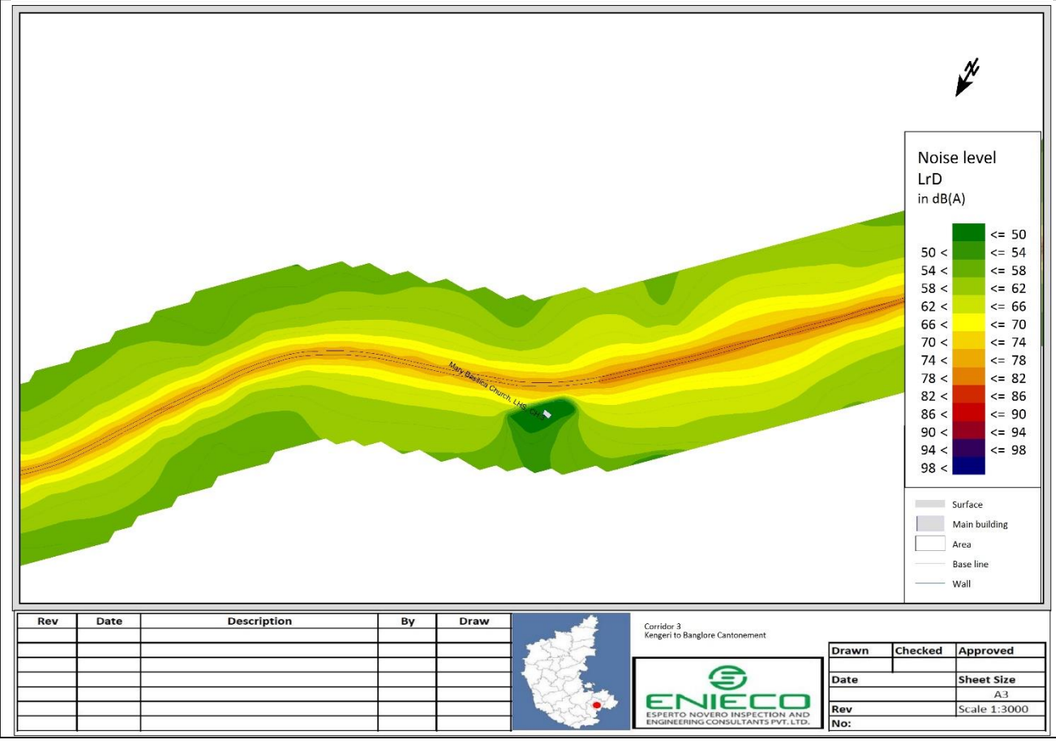
Rev	Date	Description	By	Draw

Corridor 3
Kengeri to Banglore Cantonement

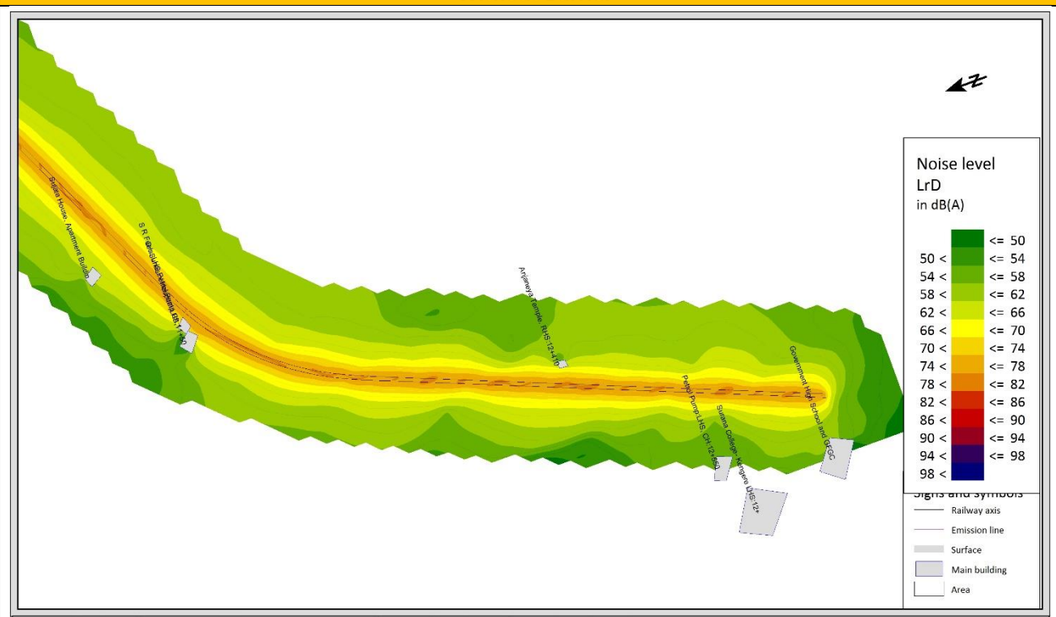
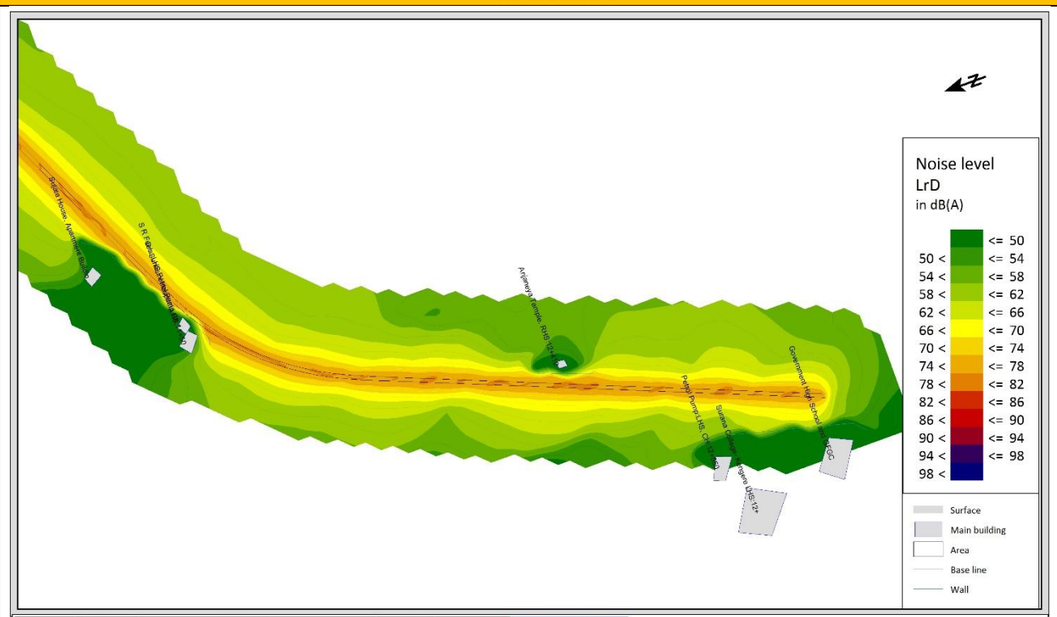
ENIECO
ESPERTO NOVERO INSPECTION AND ENGINEERING CONSULTANTS PVT. LTD.

Drawn	Checked	Approved
Date		Sheet Size
		A3
Rev		Scale 1:3000
No:		

S.No	Without Barrier	With Barrier
2.		
3.		

S.No	Without Barrier	With Barrier
4.		
5.		

B. Noise contours for Corridor 3 for the Year 2031

S.No	Without Barrier	With Barrier
1.		

Rev	Date	Description	By	Draw

Corridor 3
Kengeri to Banglore Cantonement

ENIECO
ESPERTO NOVERO INSPECTION AND ENGINEERING CONSULTANTS PVT. LTD.

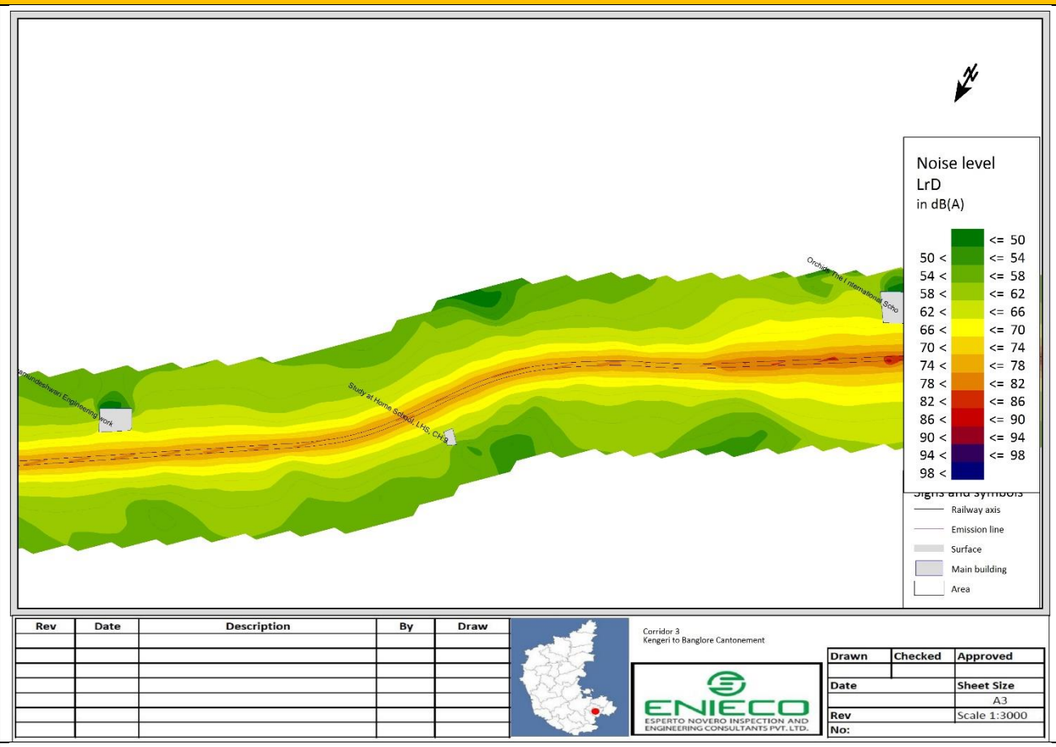
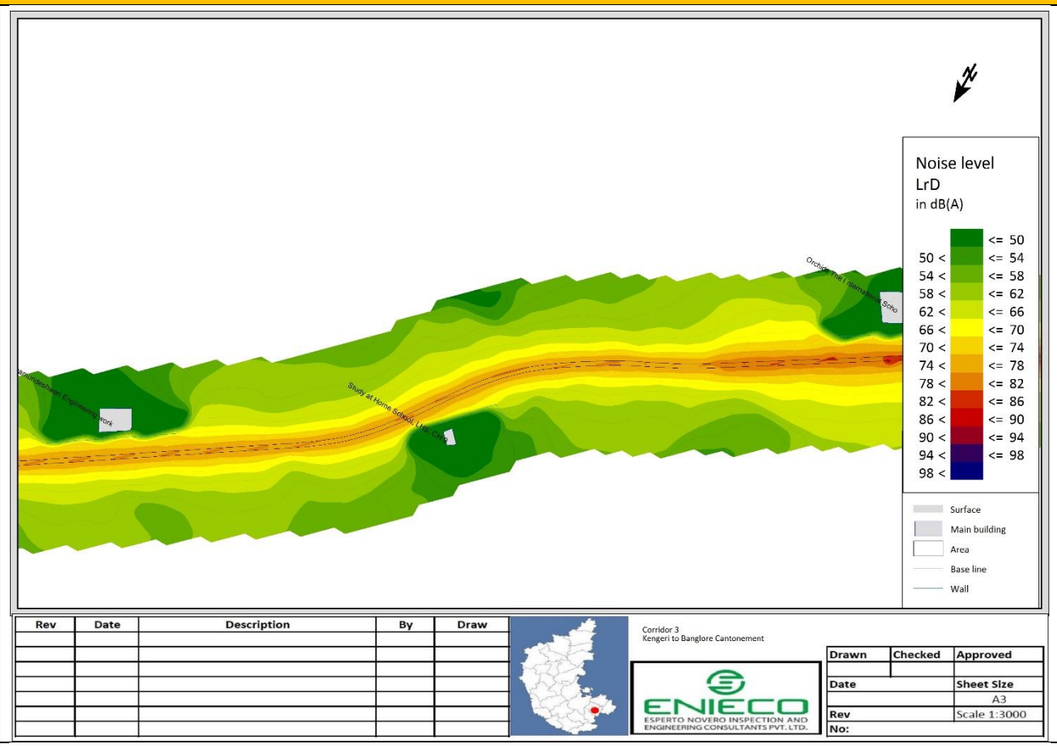
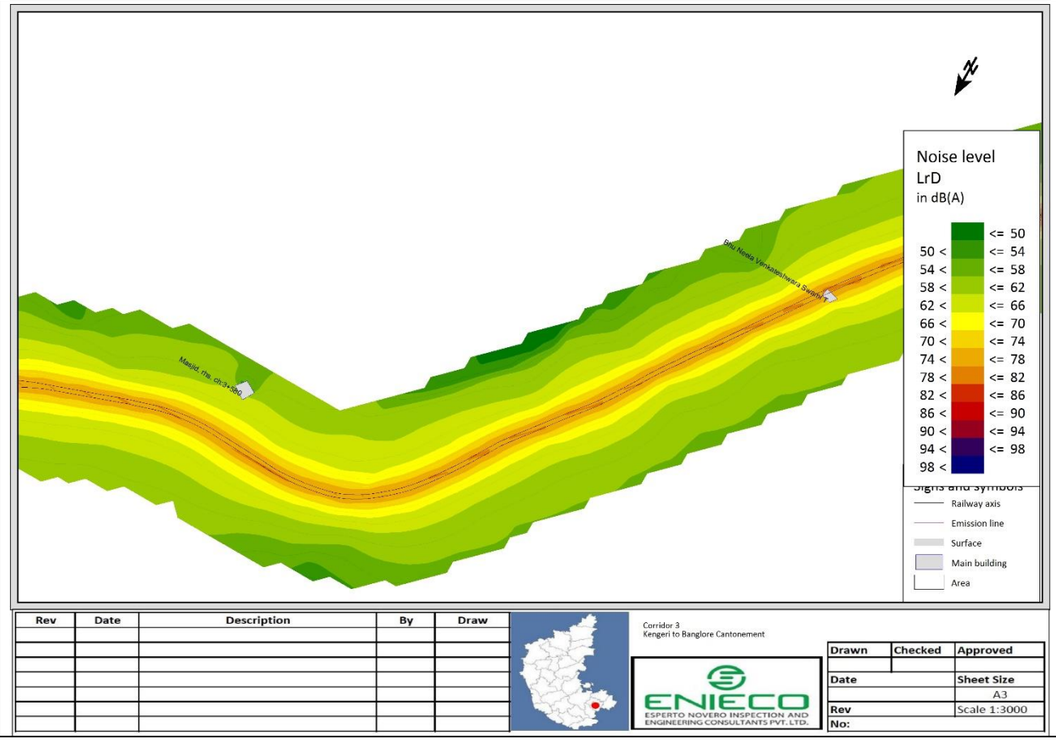
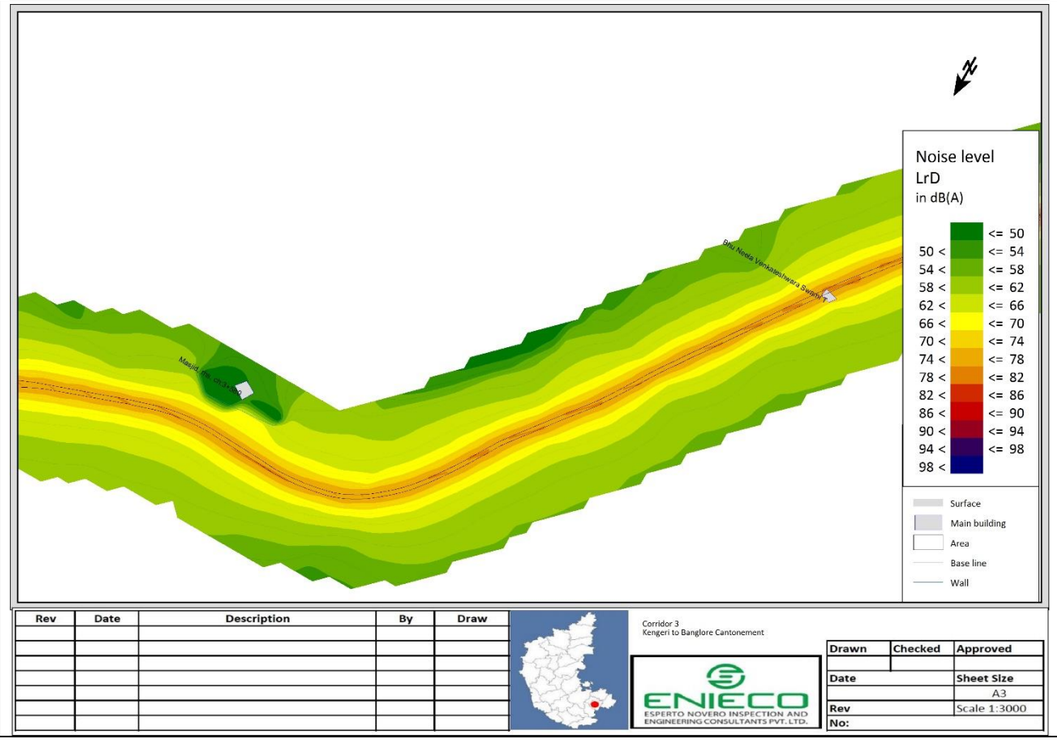
Drawn	Checked	Approved
Date		Sheet Size
		A3
Rev		Scale 1:3000
No:		

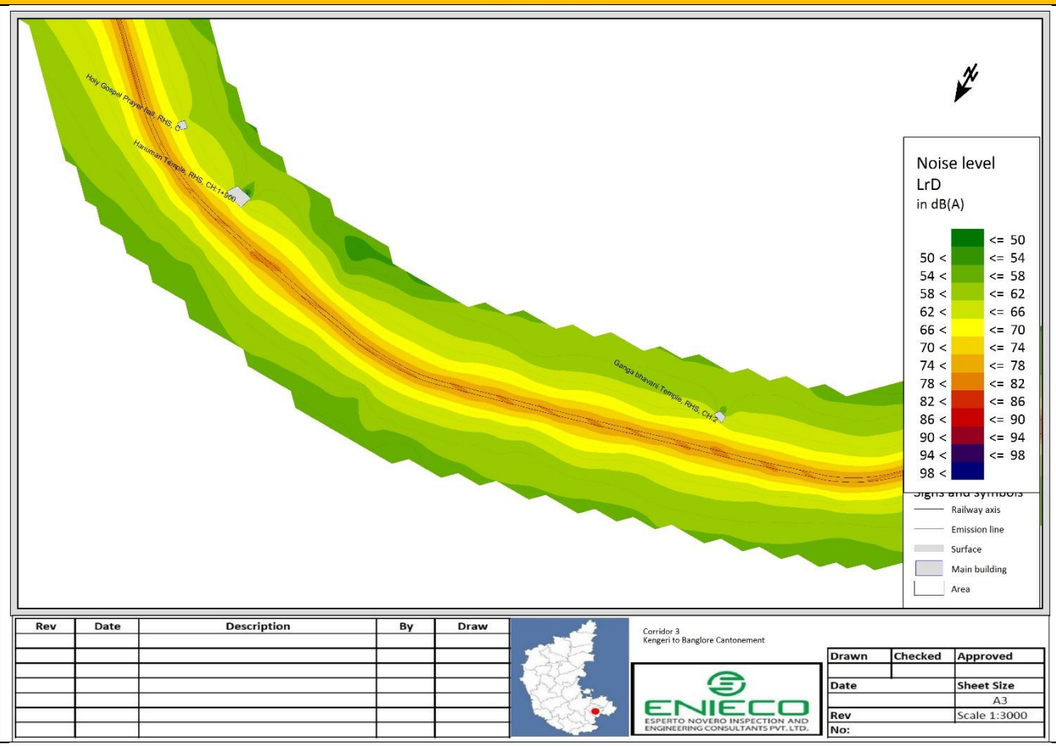
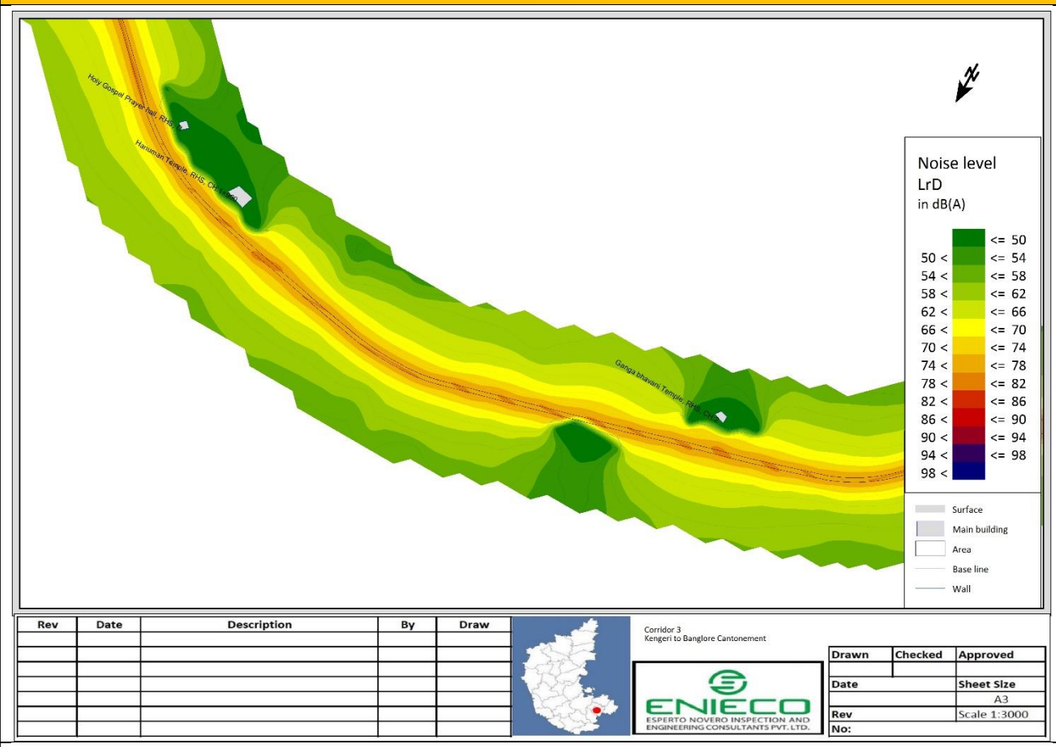
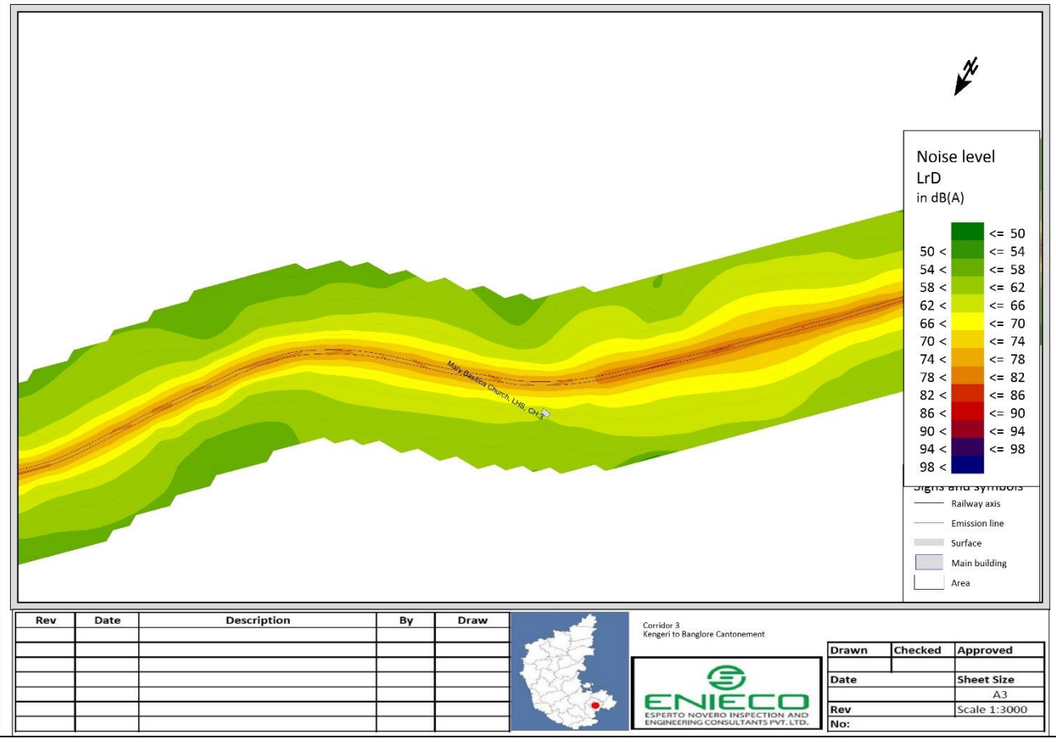
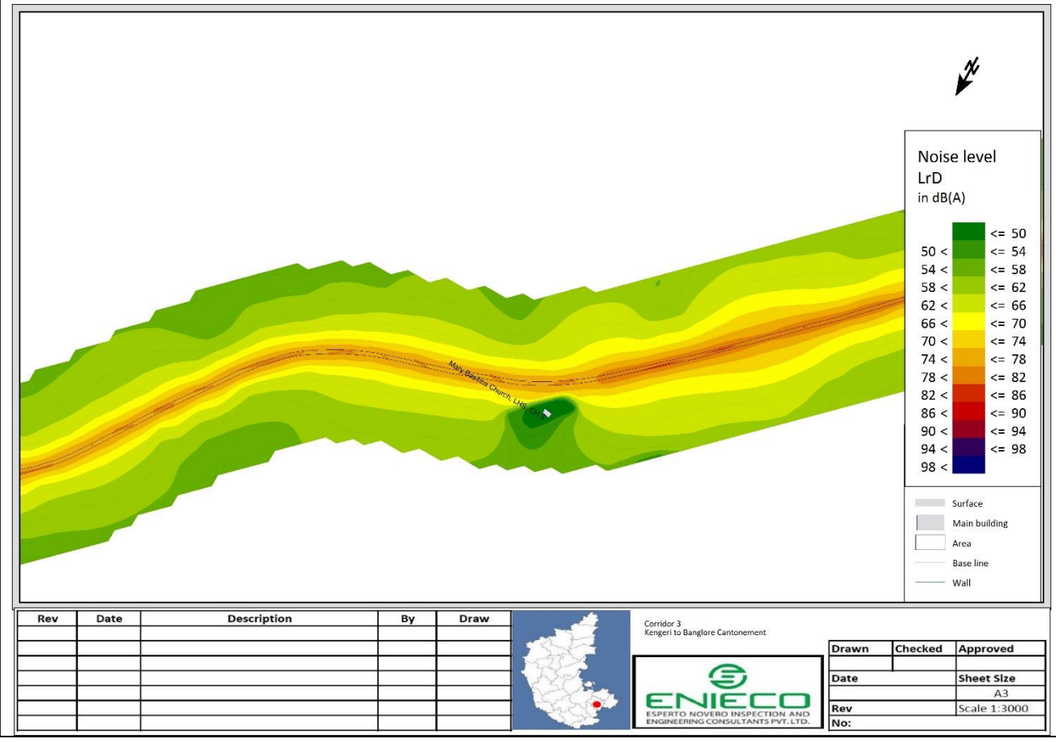
Rev	Date	Description	By	Draw

Corridor 3
Kengeri to Banglore Cantonement

ENIECO
ESPERTO NOVERO INSPECTION AND ENGINEERING CONSULTANTS PVT. LTD.

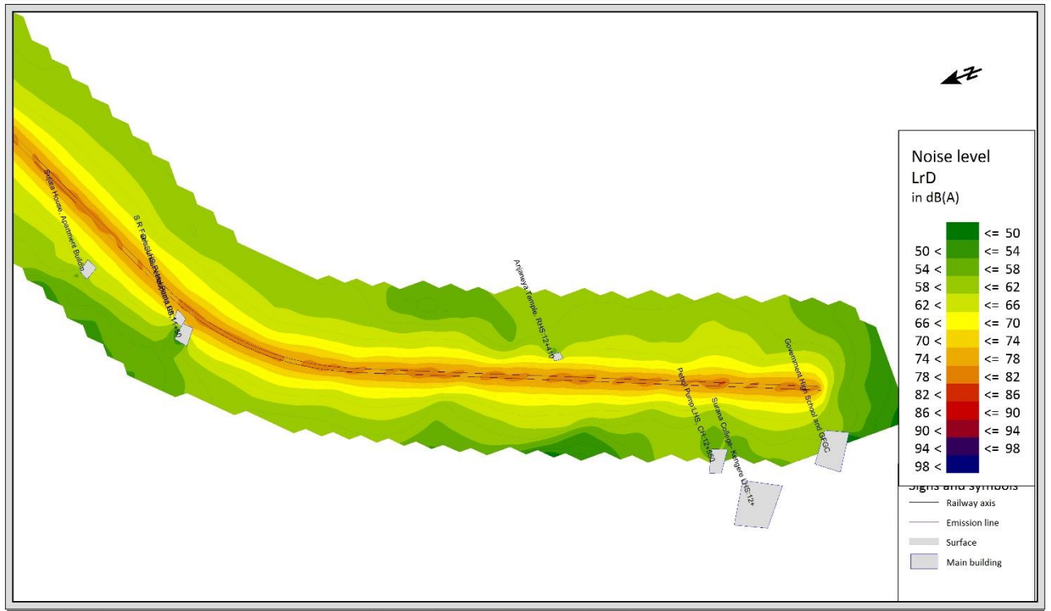
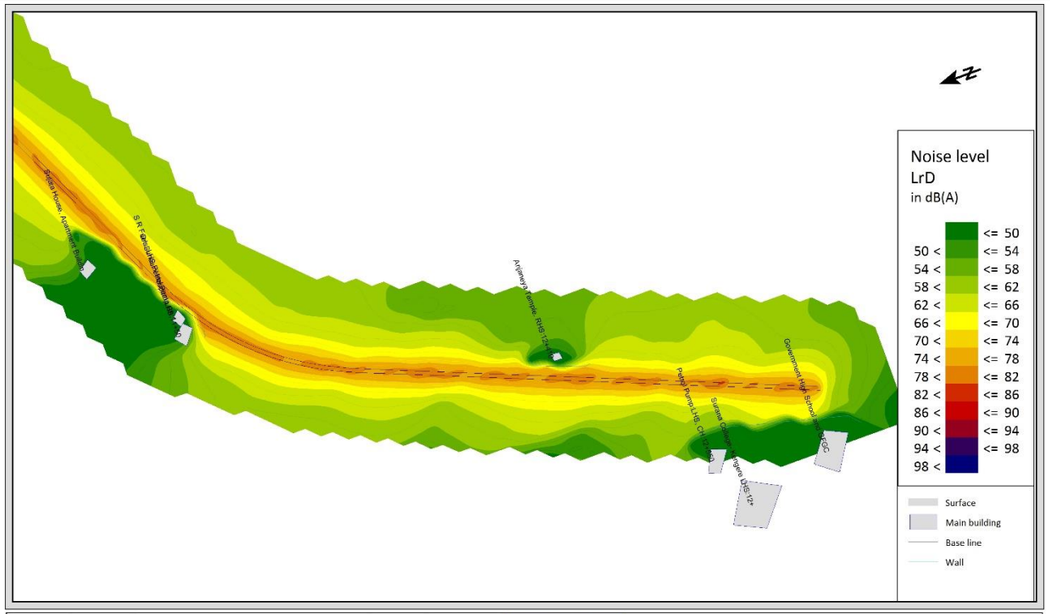
Drawn	Checked	Approved
Date		Sheet Size
		A3
Rev		Scale 1:3000
No:		

S.No	Without Barrier	With Barrier
2.		
3.		

S.No	Without Barrier	With Barrier
4.		
5.		

1156

C. Noise contours for Corridor 3 for the Year 2041

S.No	Without Barrier	With Barrier
1.		

Rev	Date	Description	By	Draw

Corridor 3
Kengeri to Banglore Cantonement

ENIECO
ESPERTO NOVERO INSPECTION AND ENGINEERING CONSULTANTS PVT. LTD.

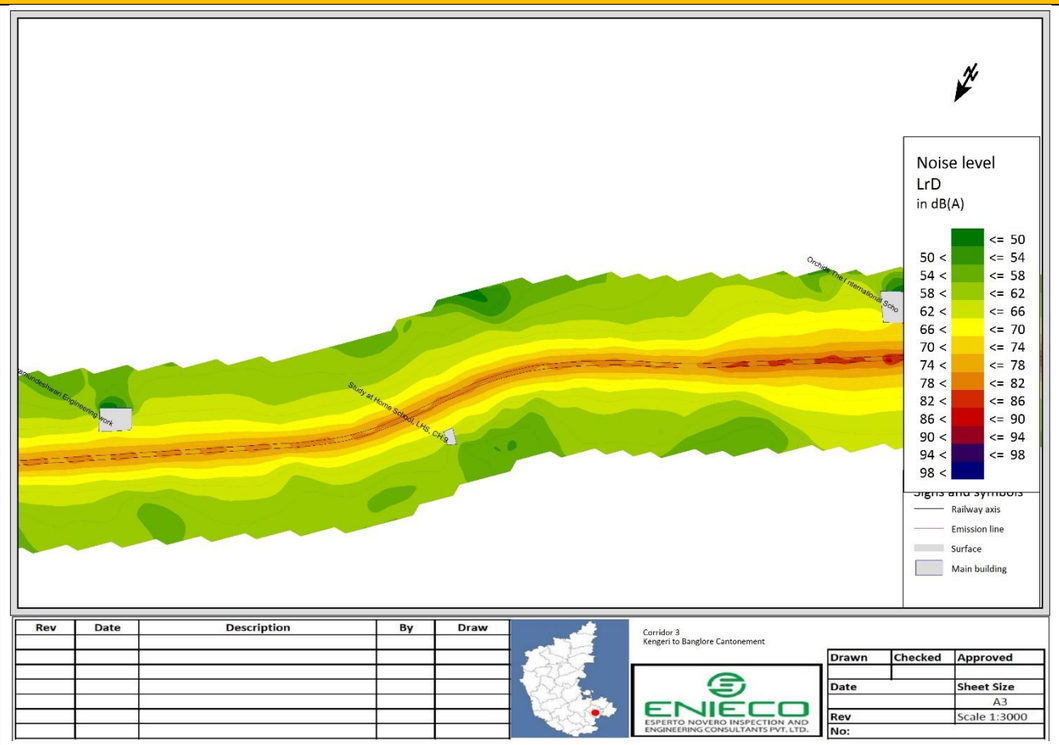
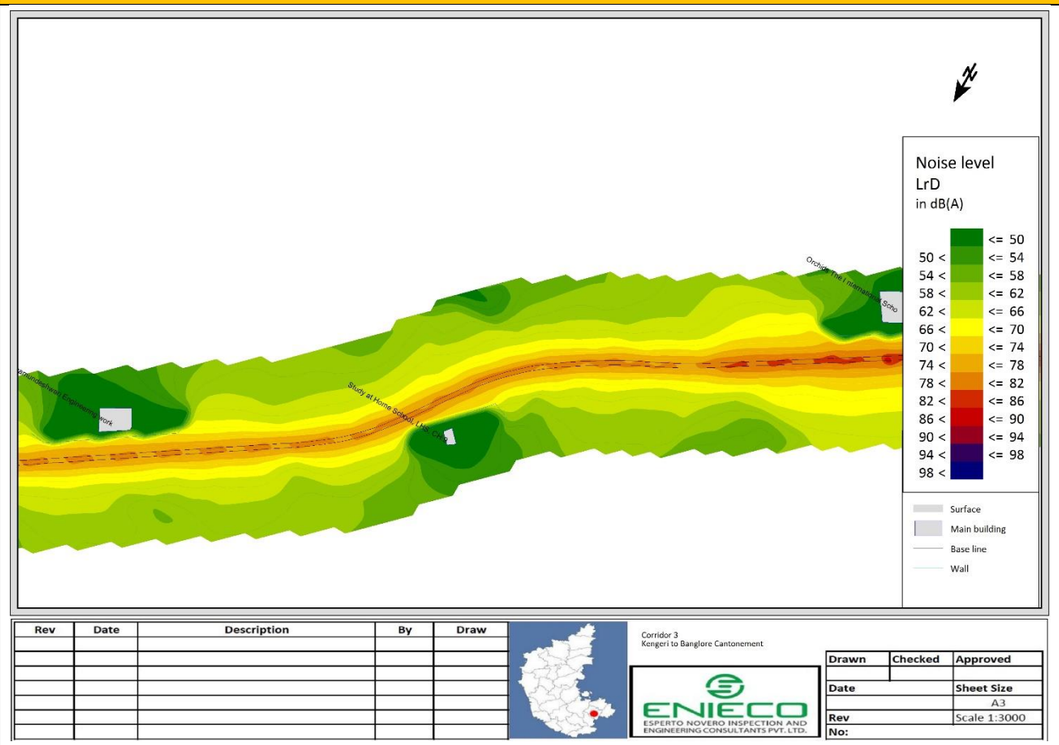
Drawn	Checked	Approved
Date		Sheet Size
		A3
Rev		Scale 1:3000
No:		

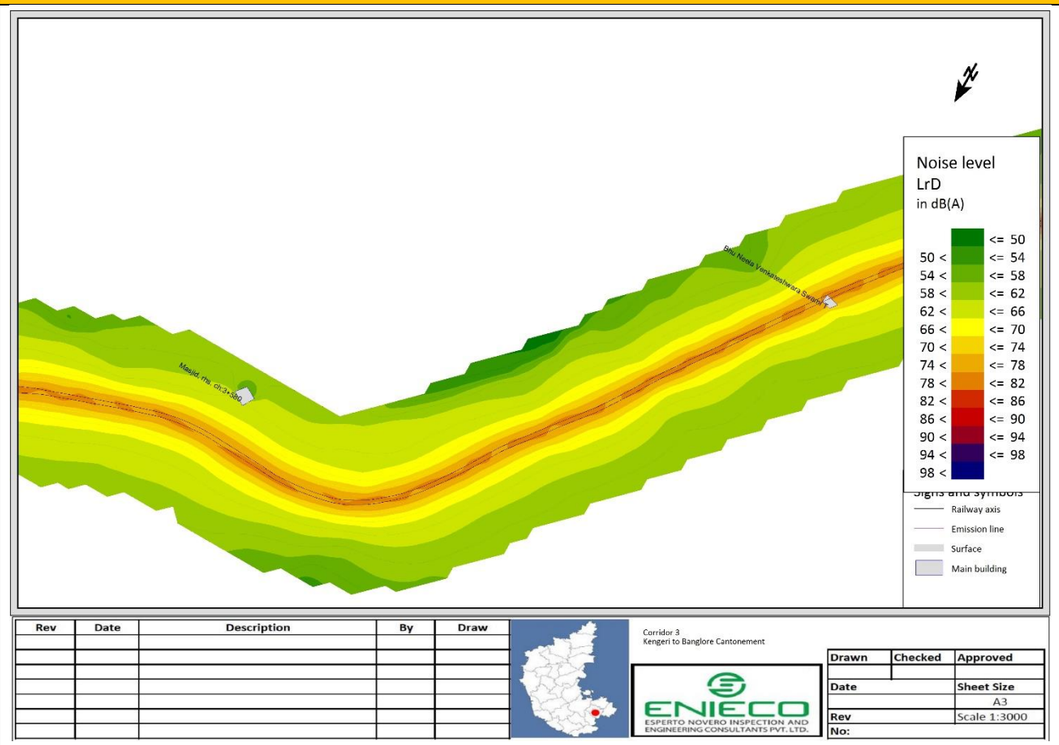
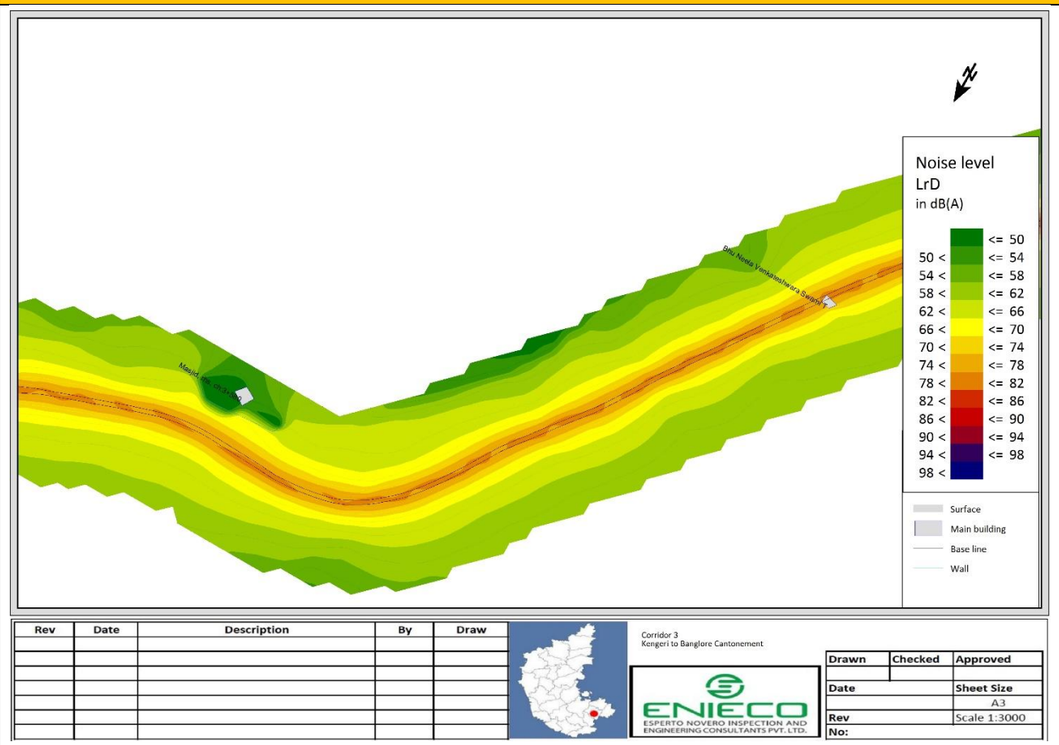
Rev	Date	Description	By	Draw

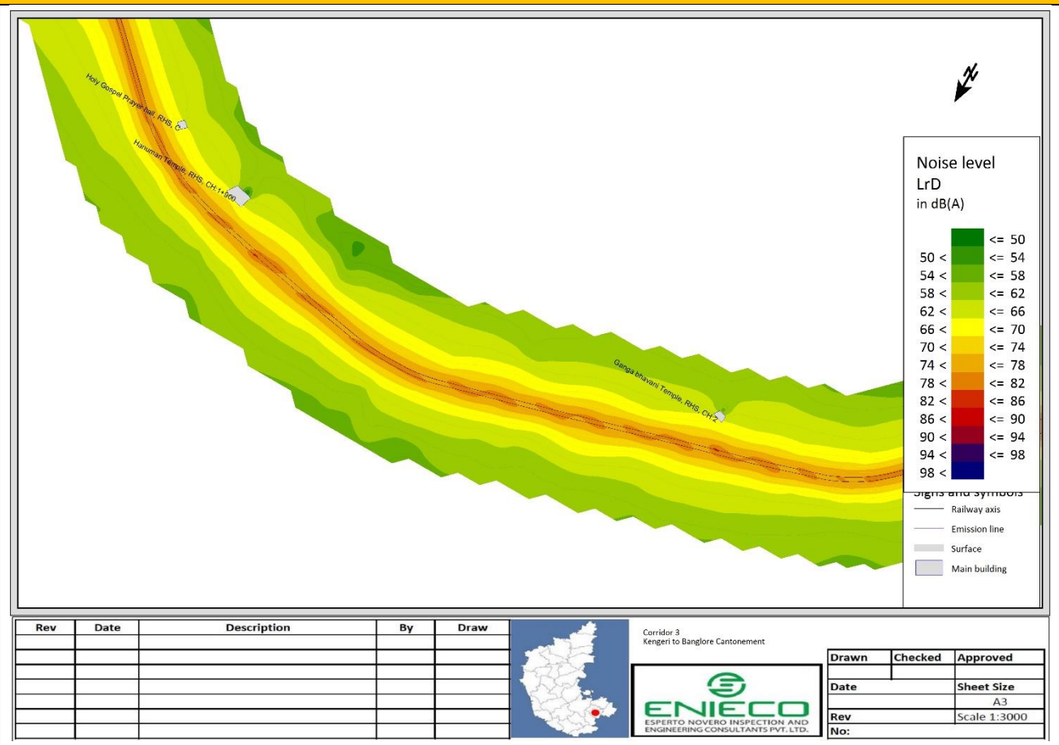
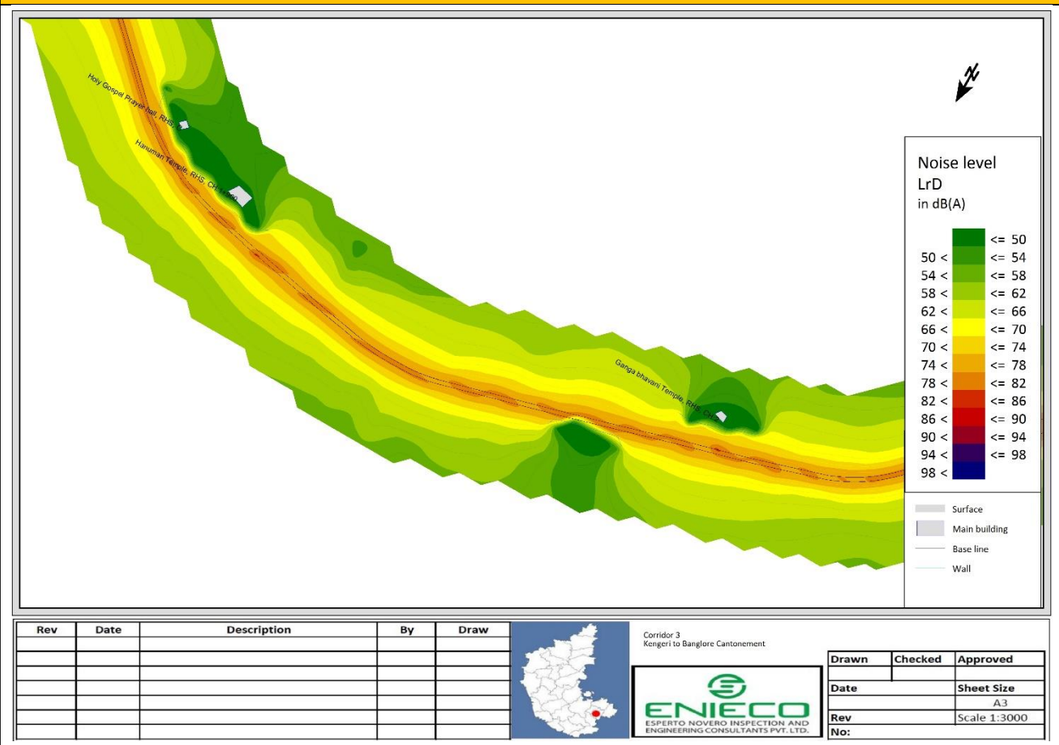
Corridor 3
Kengeri to Banglore Cantonement

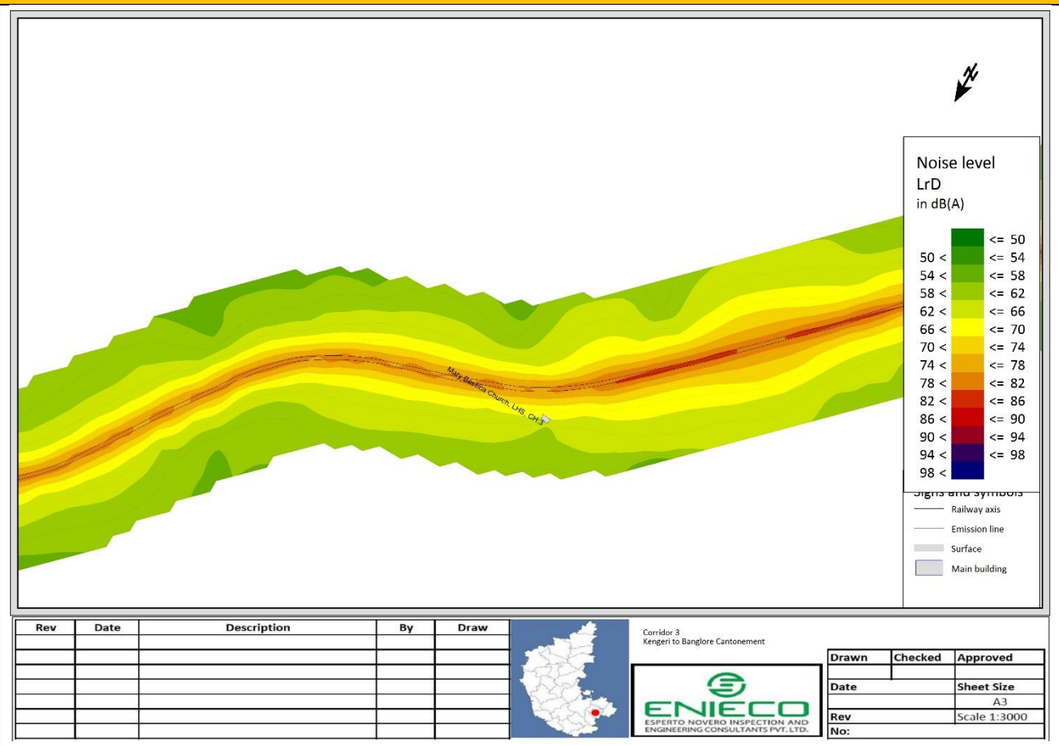
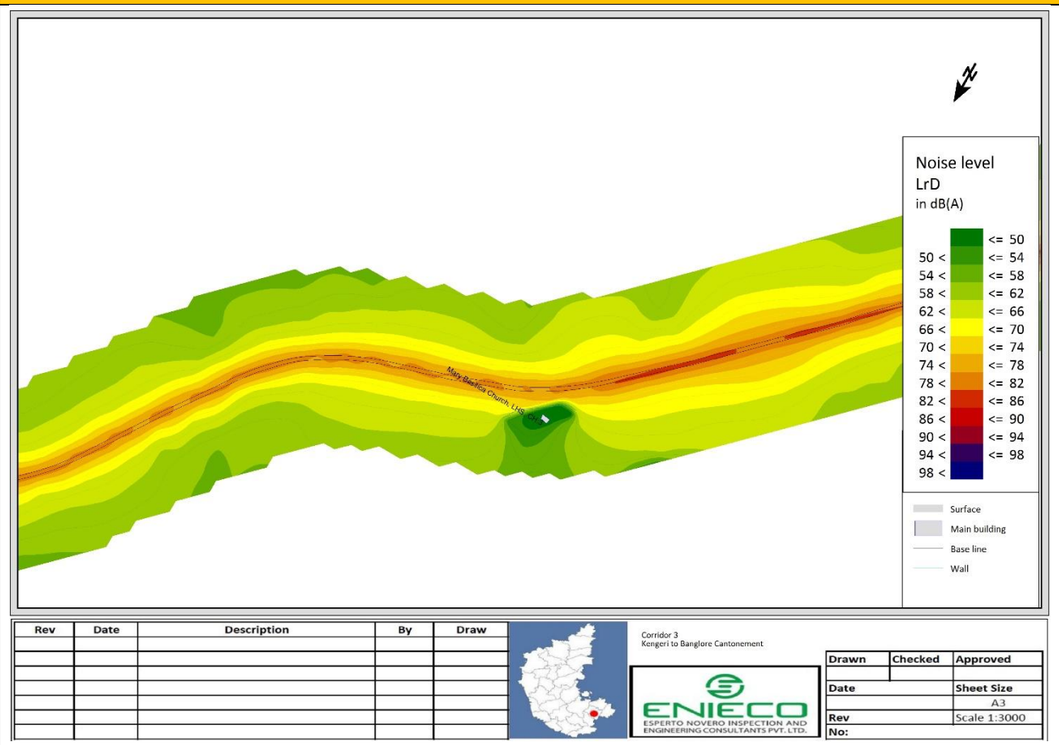
ENIECO
ESPERTO NOVERO INSPECTION AND ENGINEERING CONSULTANTS PVT. LTD.

Drawn	Checked	Approved
Date		Sheet Size
		A3
Rev		Scale 1:3000
No:		

S.No	Without Barrier	With Barrier
2.		

S.No	Without Barrier	With Barrier
3.		

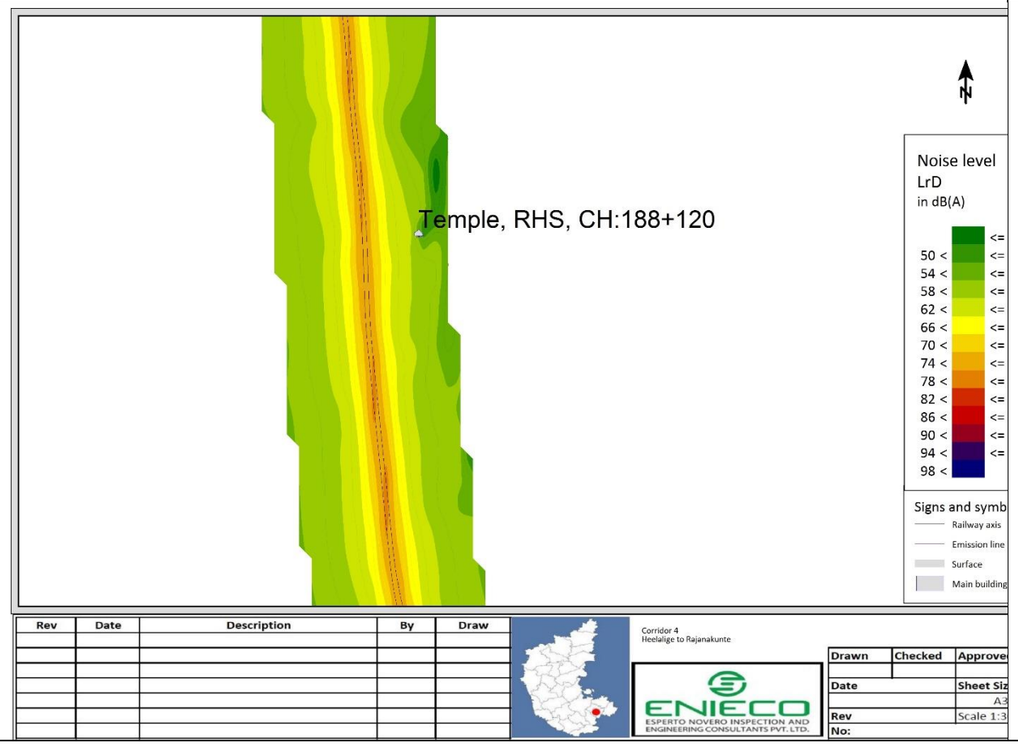
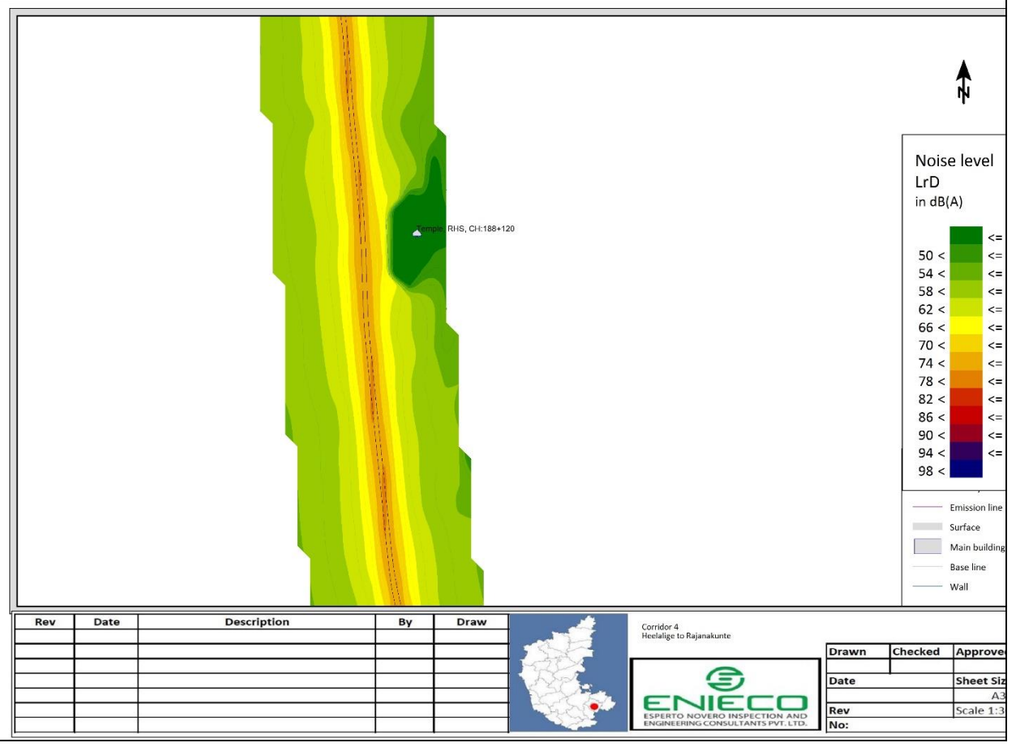
S.No	Without Barrier	With Barrier
4.		

S.No	Without Barrier	With Barrier
5.		

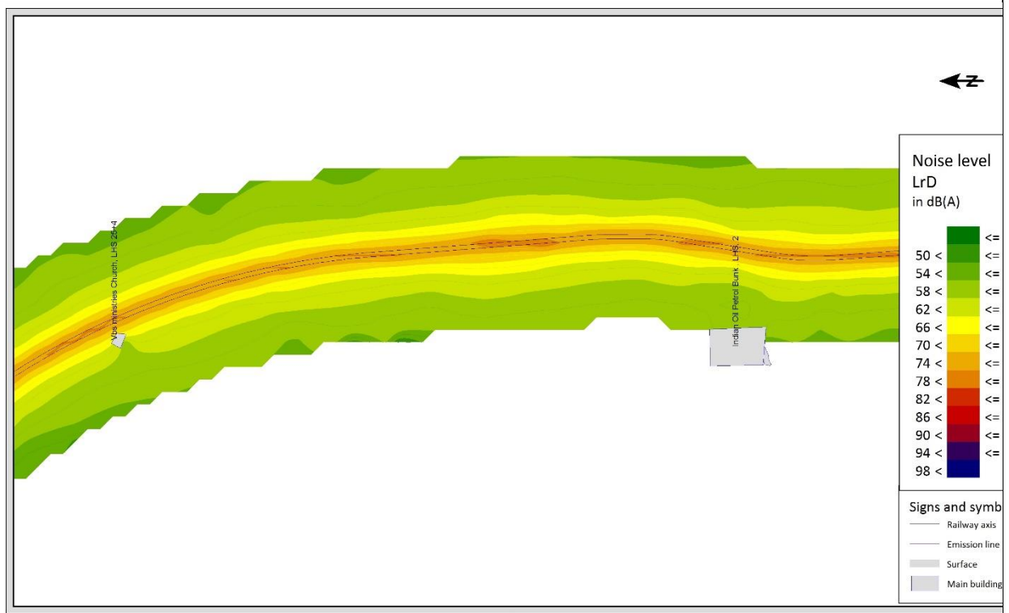
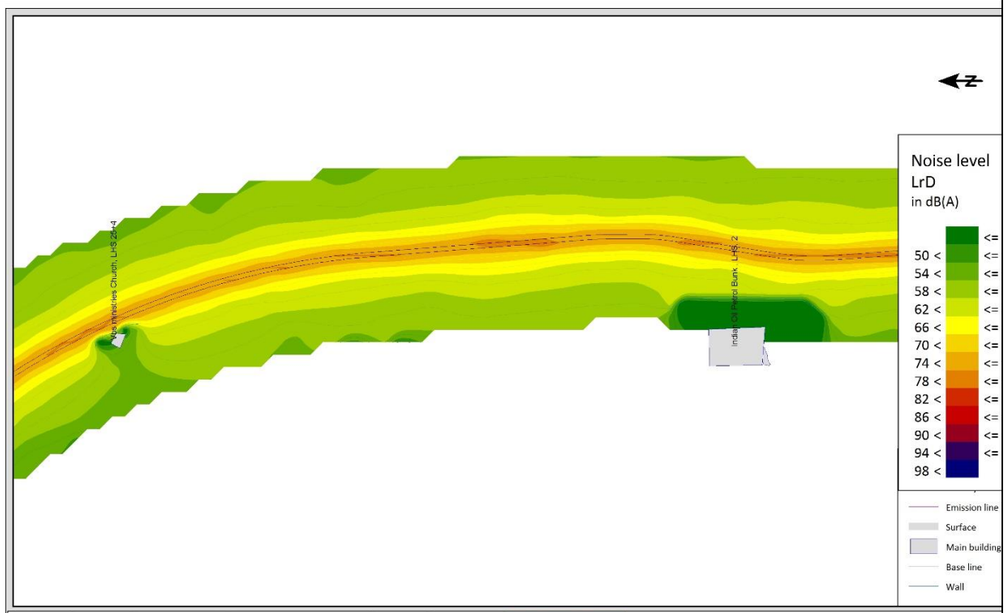
1161

A. Noise contours for Corridor 4 for the Year 2025

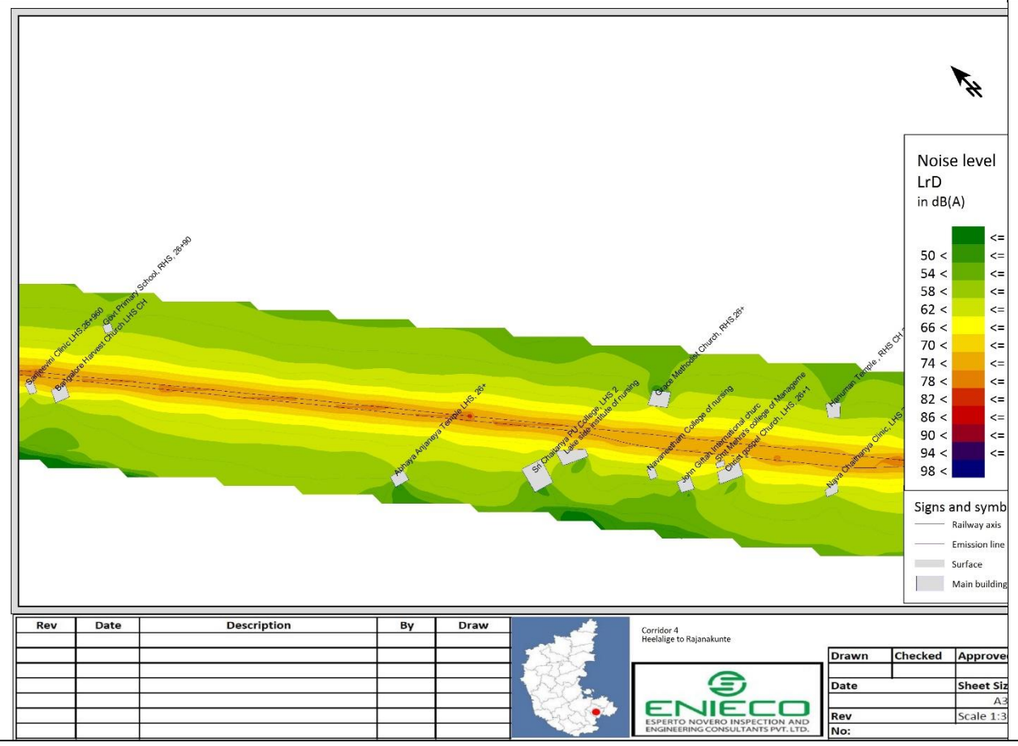
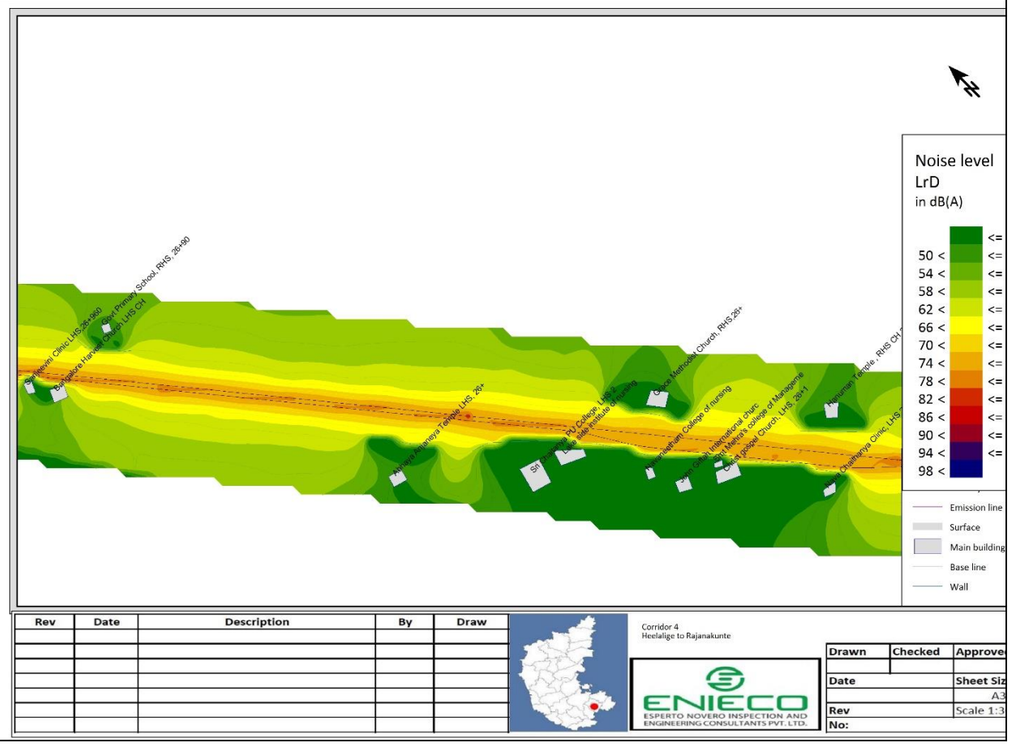
1162

1. S.No	2. Without Barrier	3. With Barrier
1.		
4.		5.

1163

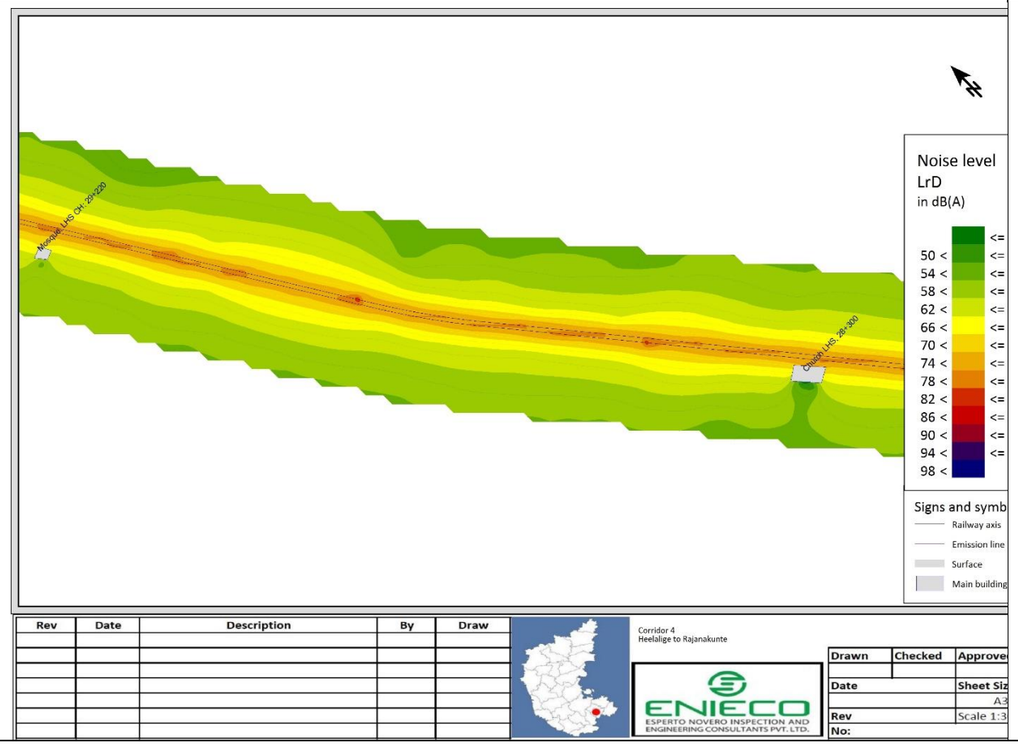
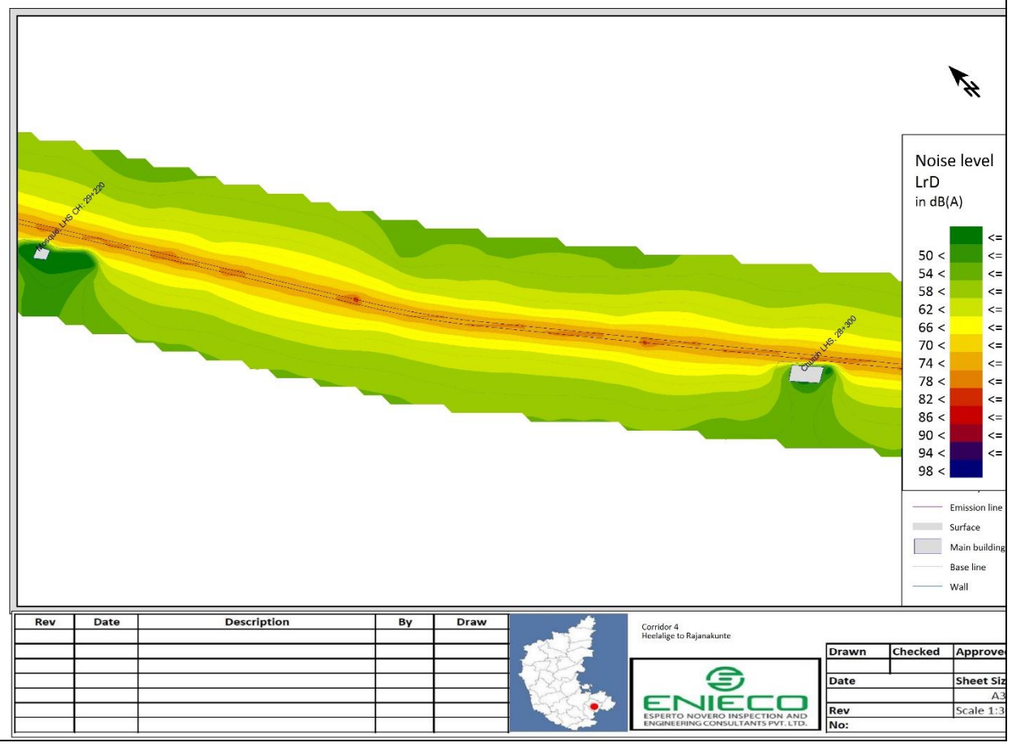
1. S.No	2. Without Barrier	3. With Barrier
2.		
6.		7.

1164

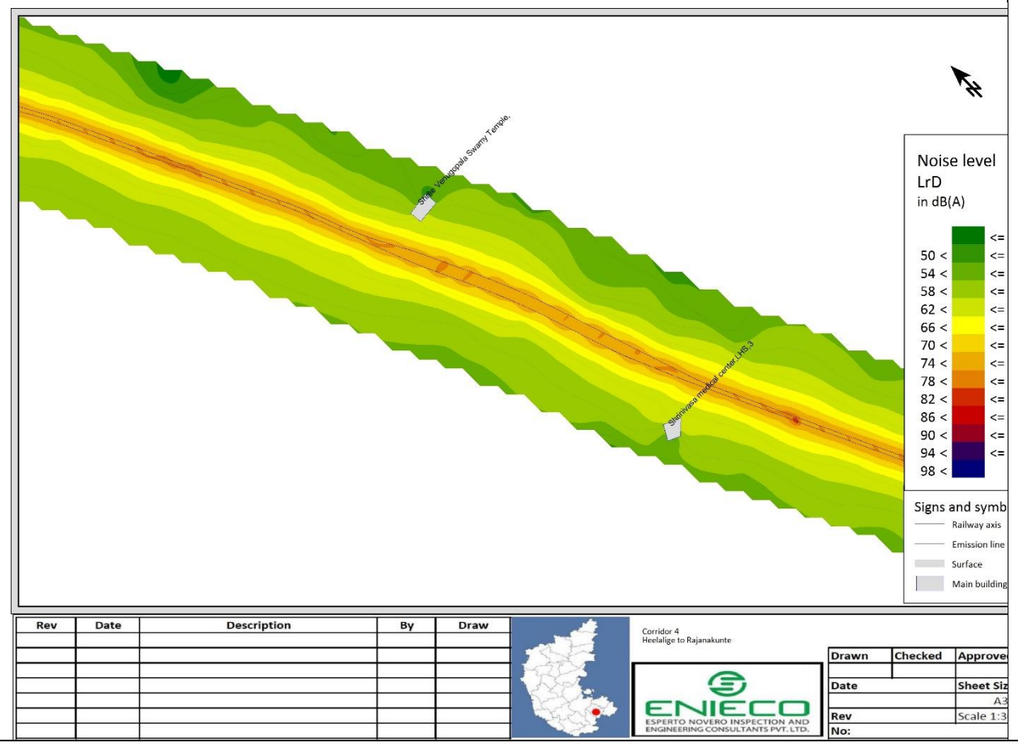
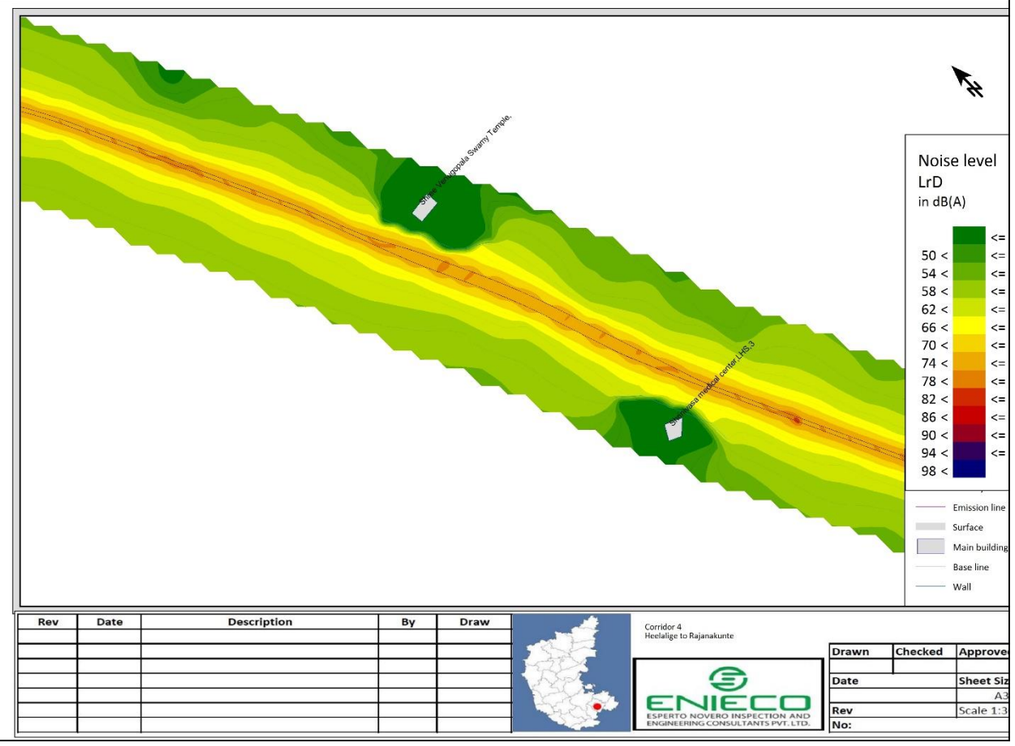
1. S.No	2. Without Barrier	3. With Barrier
3.		

8. 9.

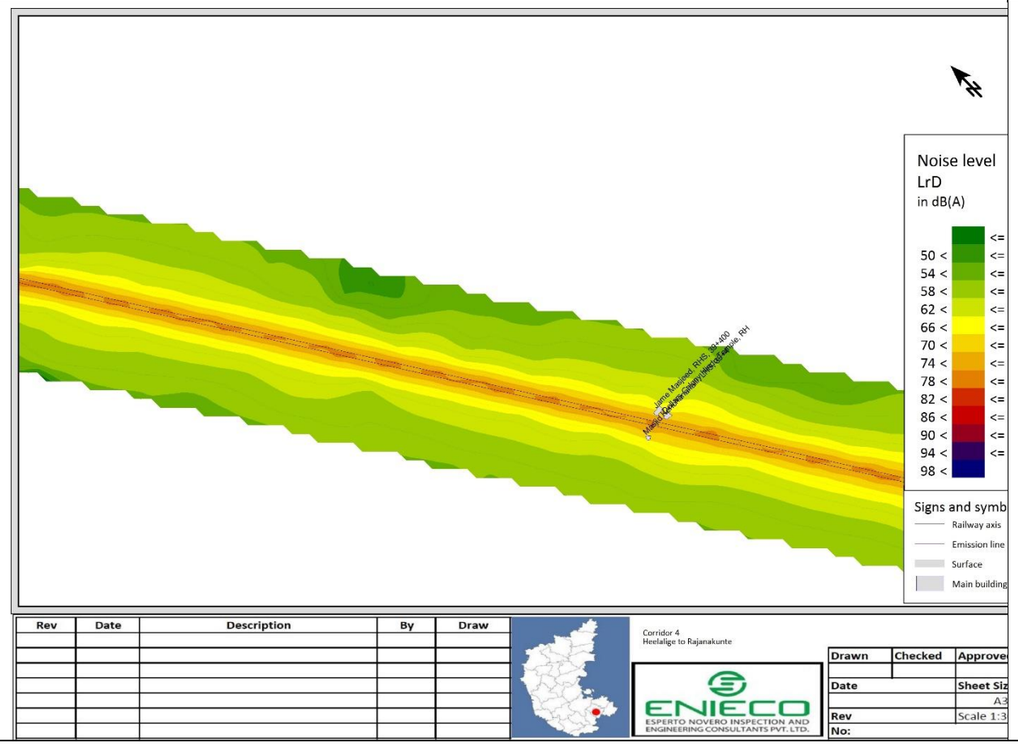
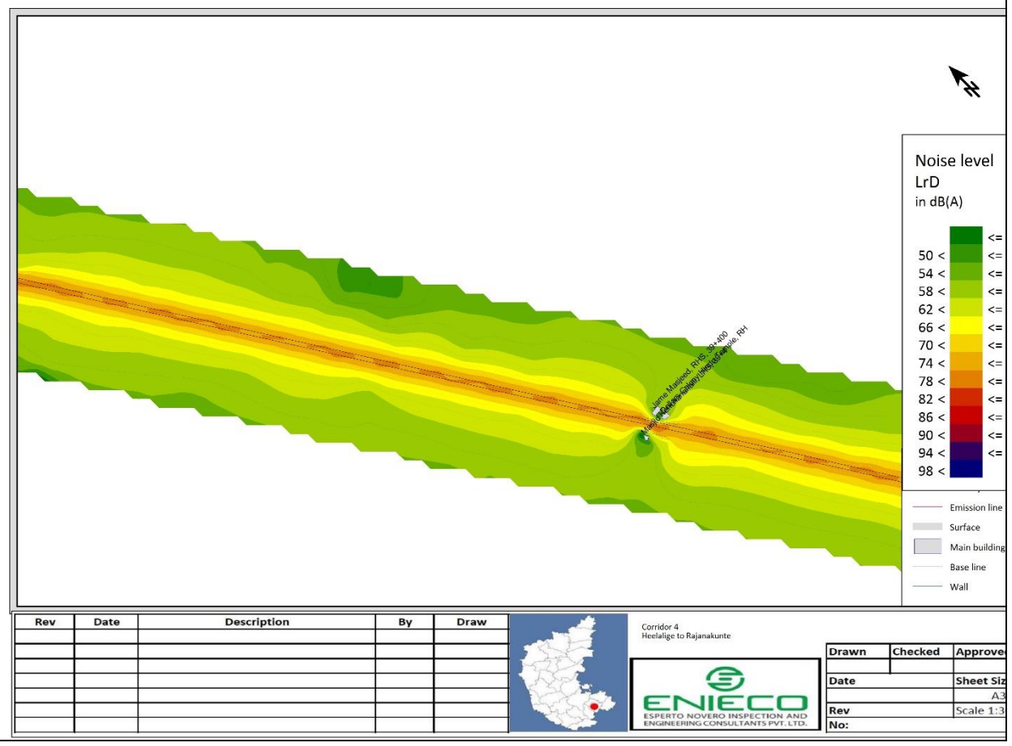
1165

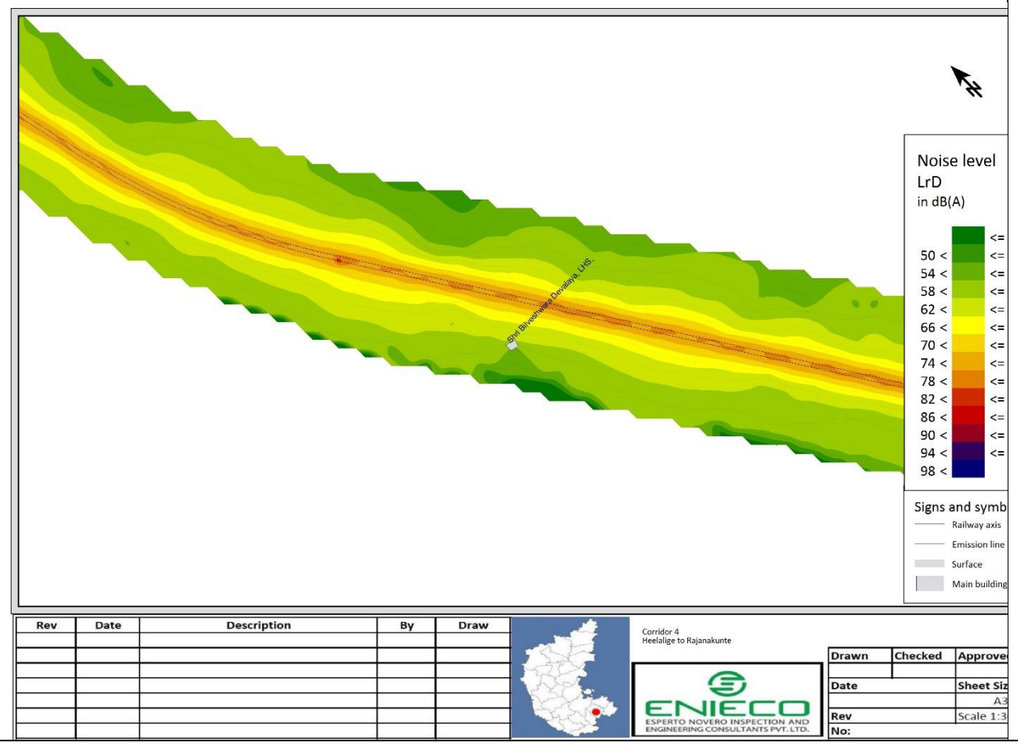
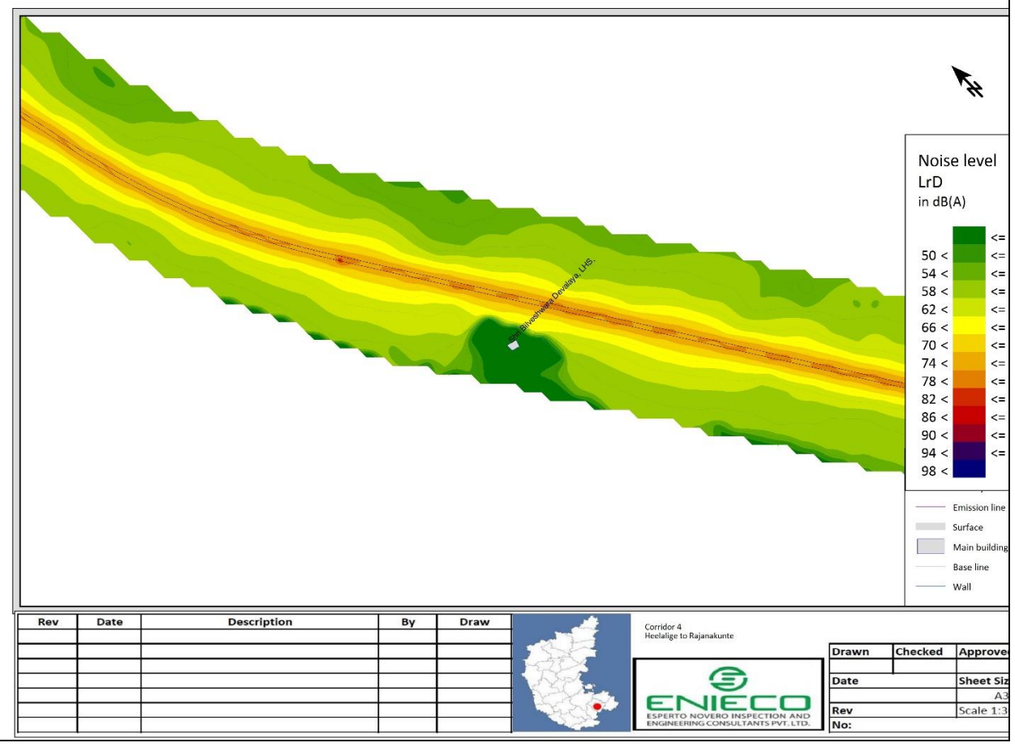
1. S.No	2. Without Barrier	3. With Barrier
4.		

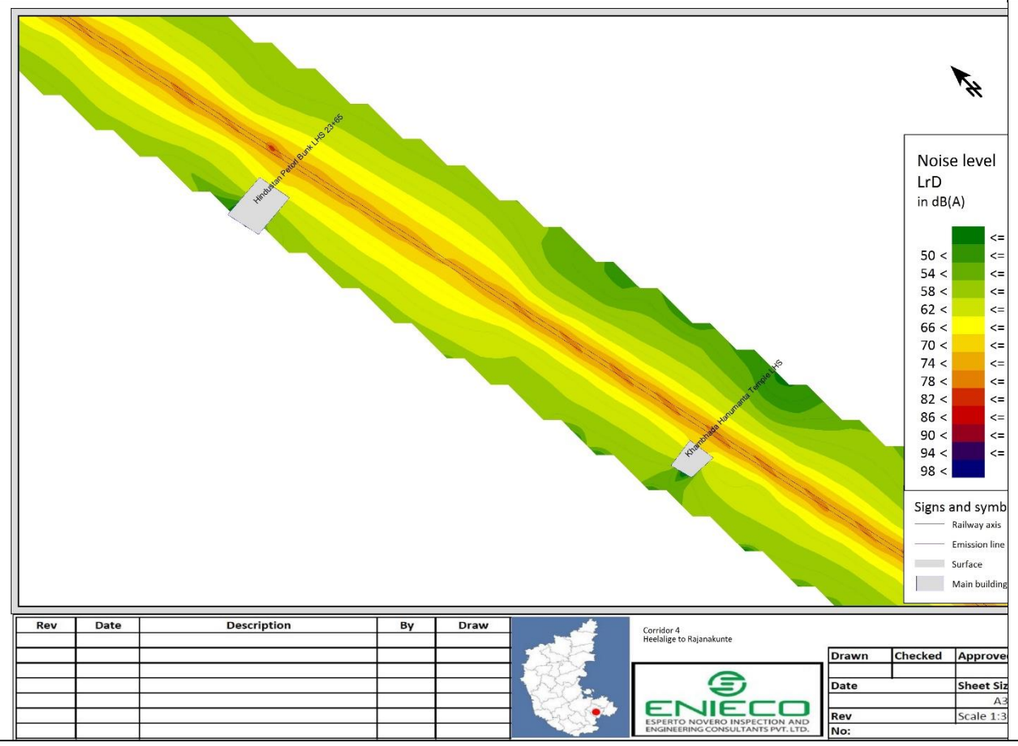
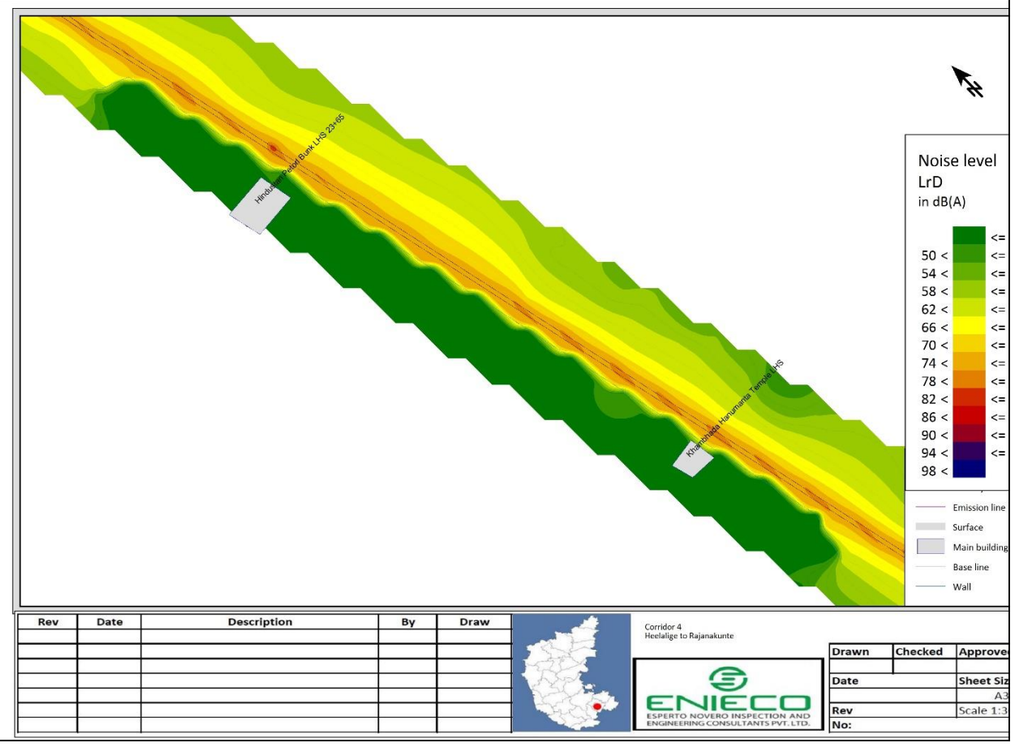
10. 11.

1. S.No	2. Without Barrier	3. With Barrier
5.		
12.		13.

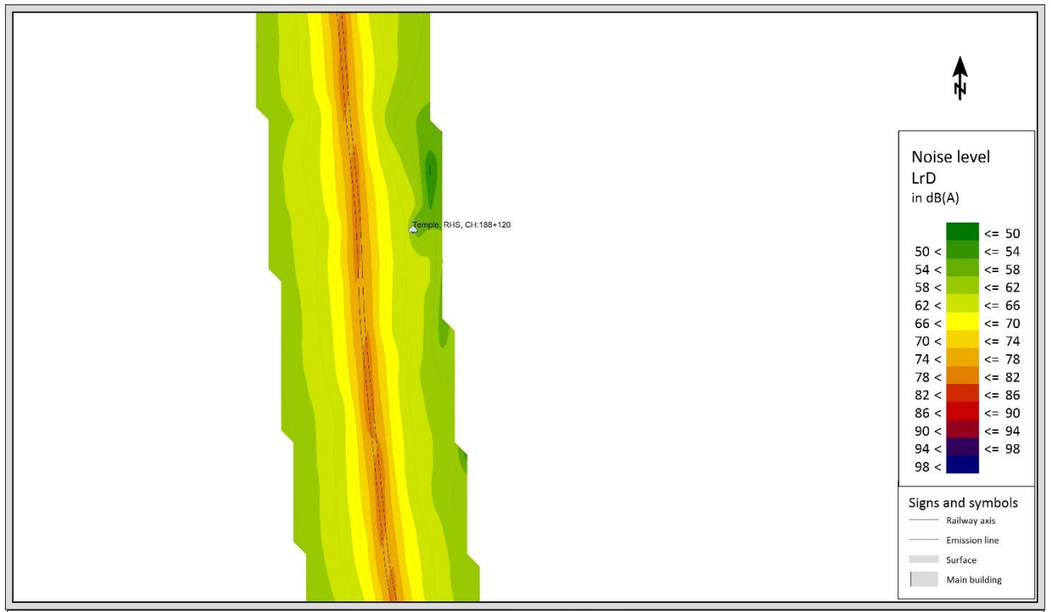
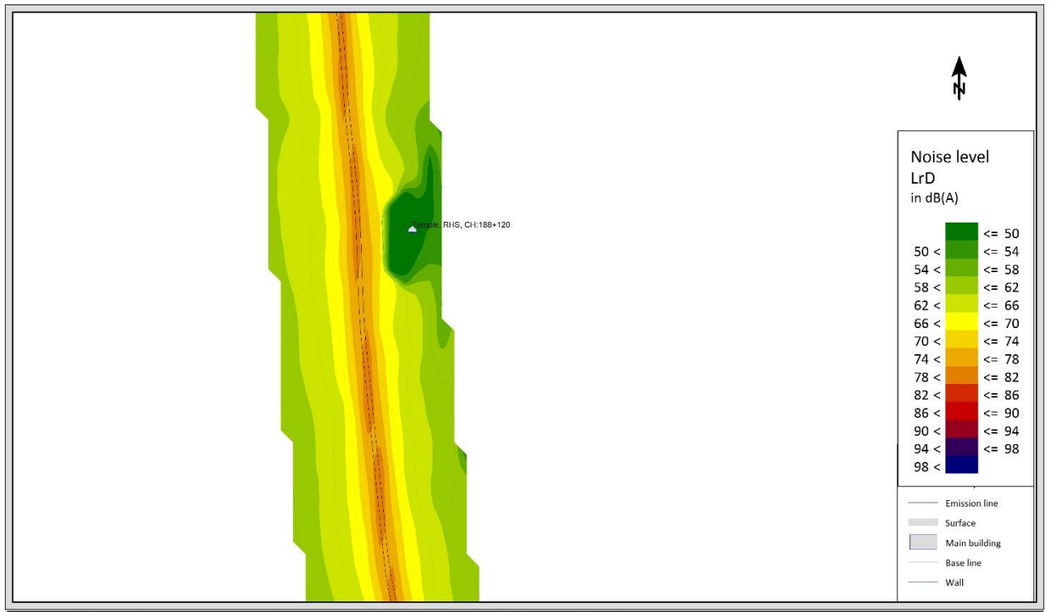
1167

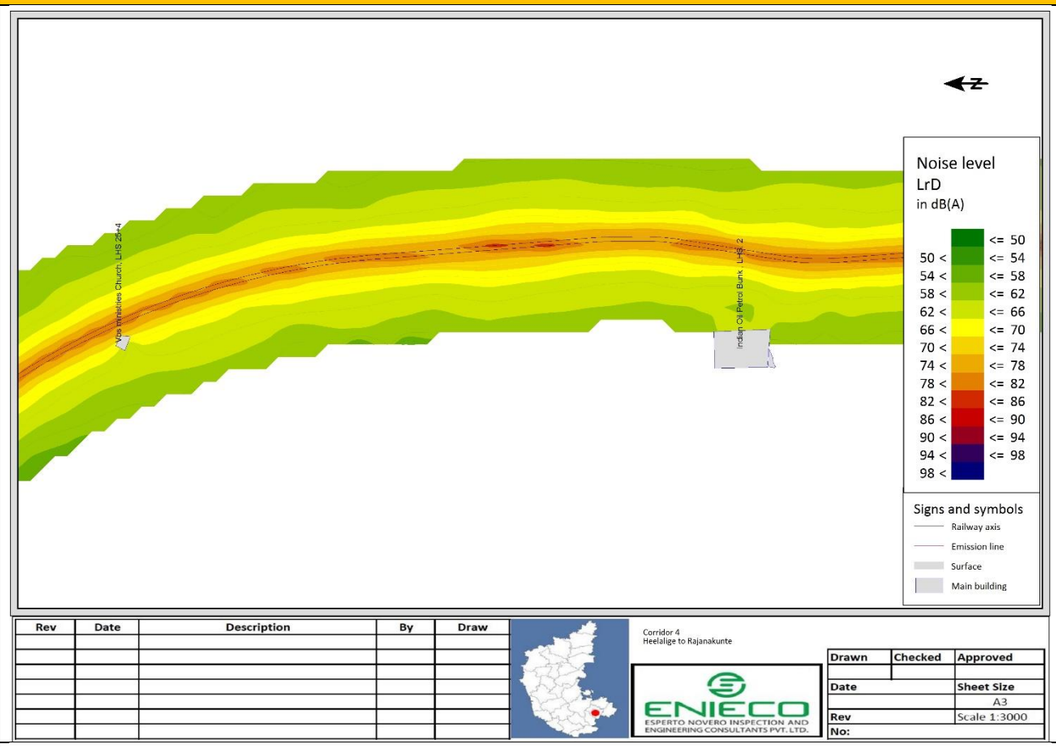
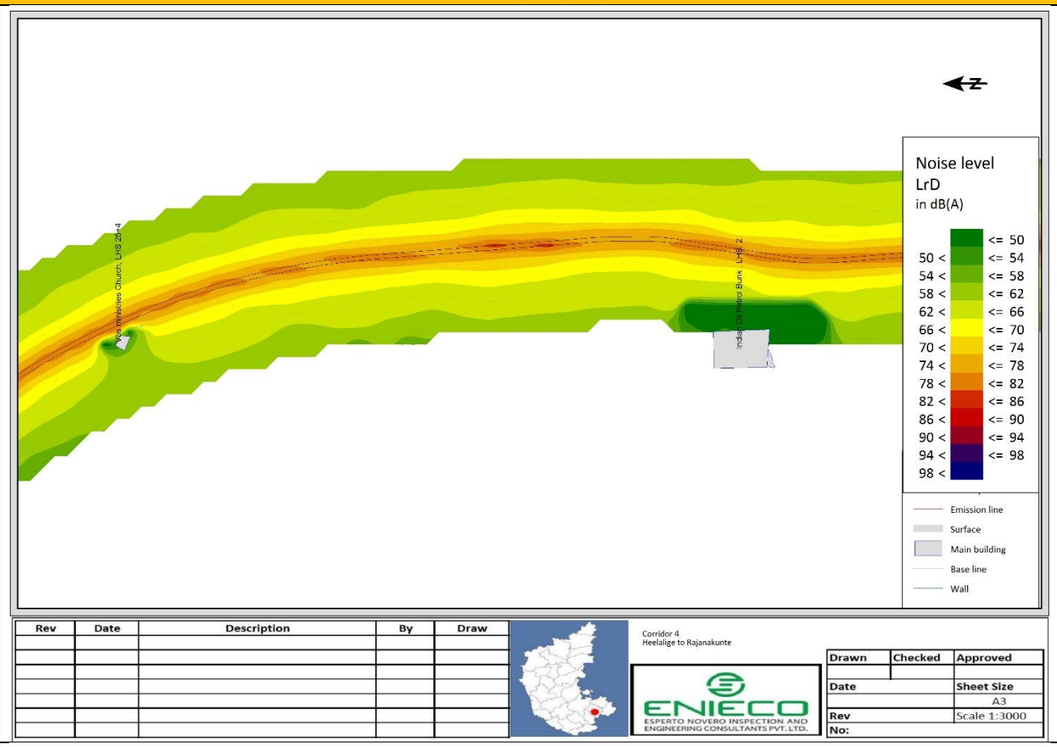
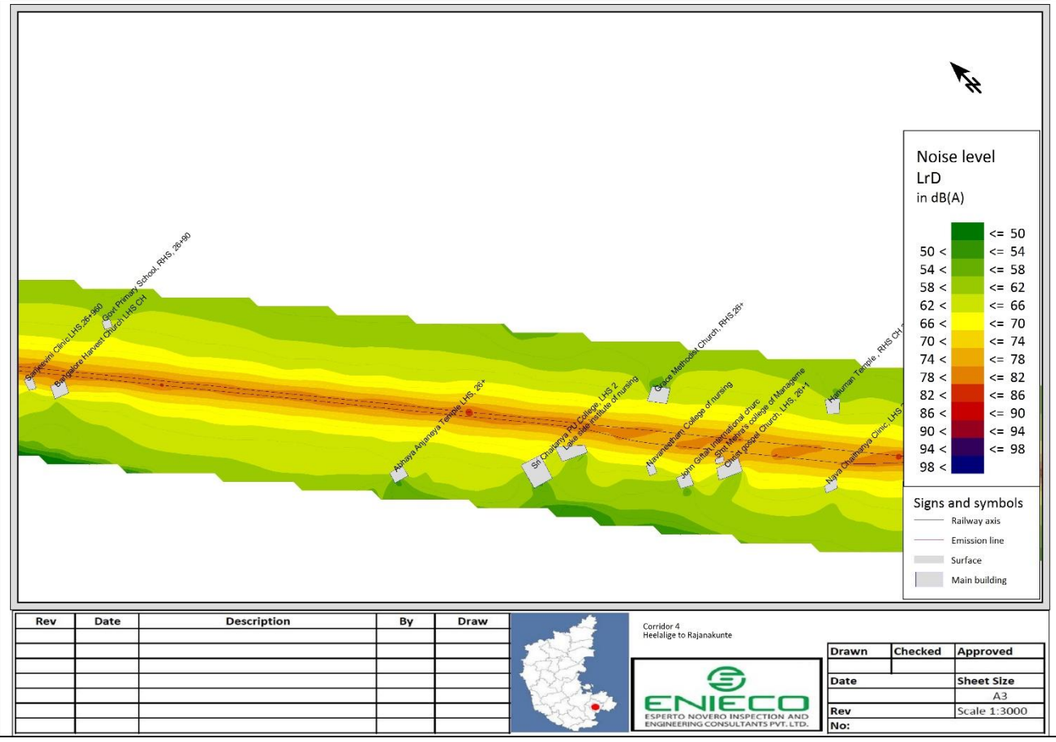
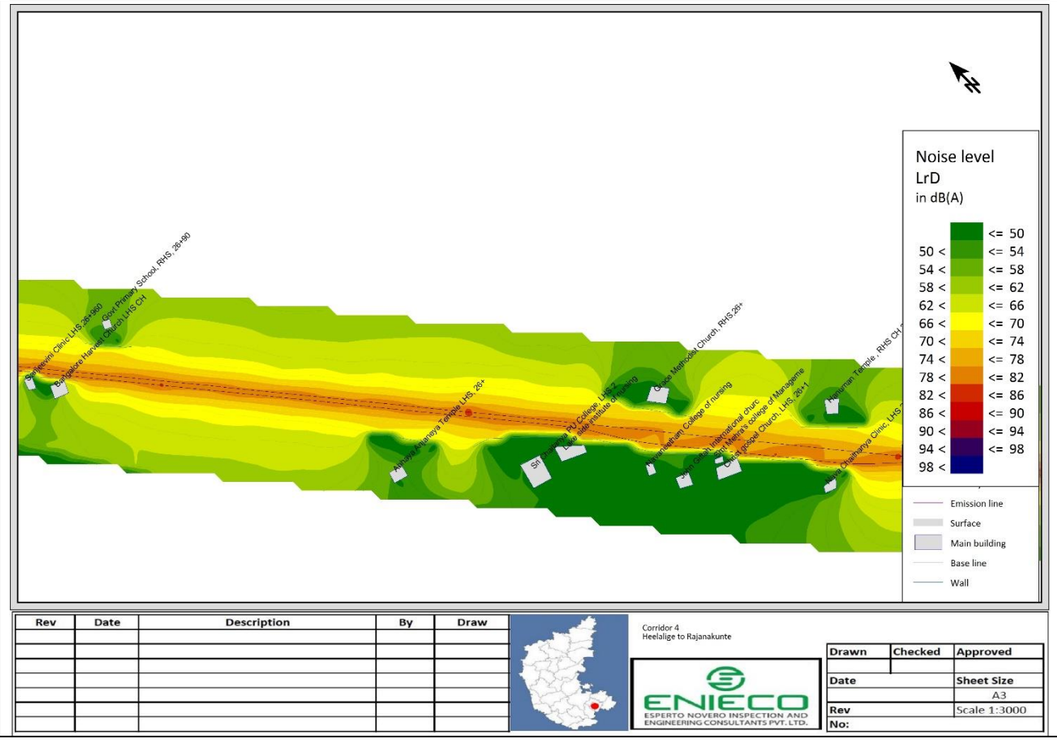
1. S.No	2. Without Barrier	3. With Barrier
6.		
14.		15.

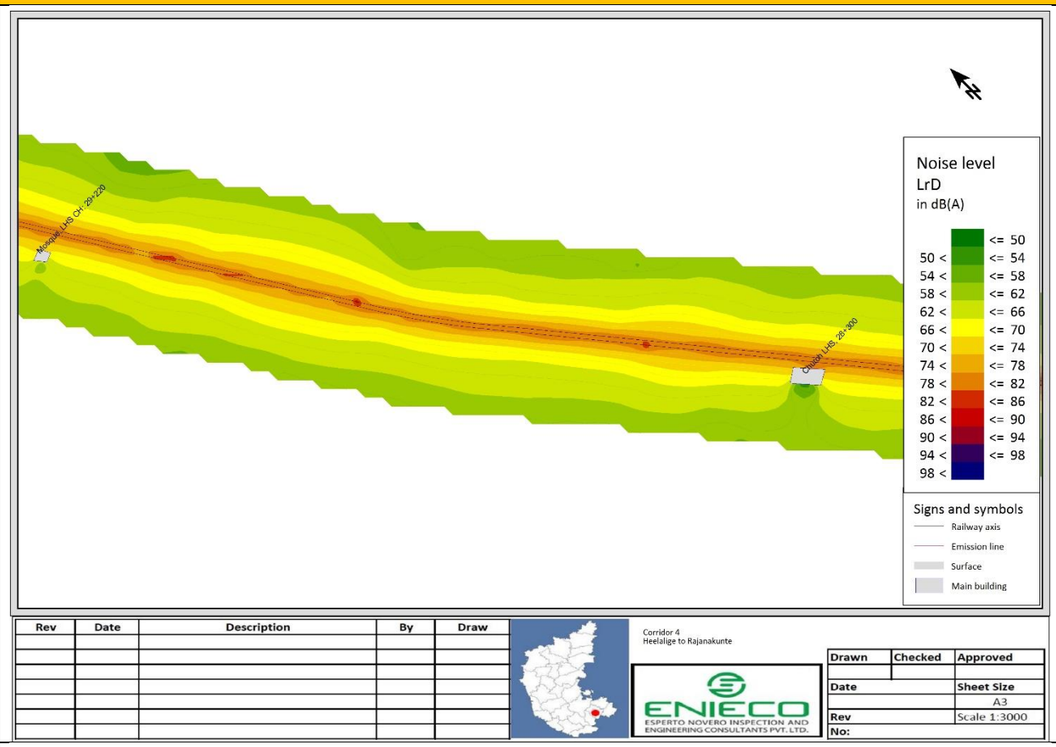
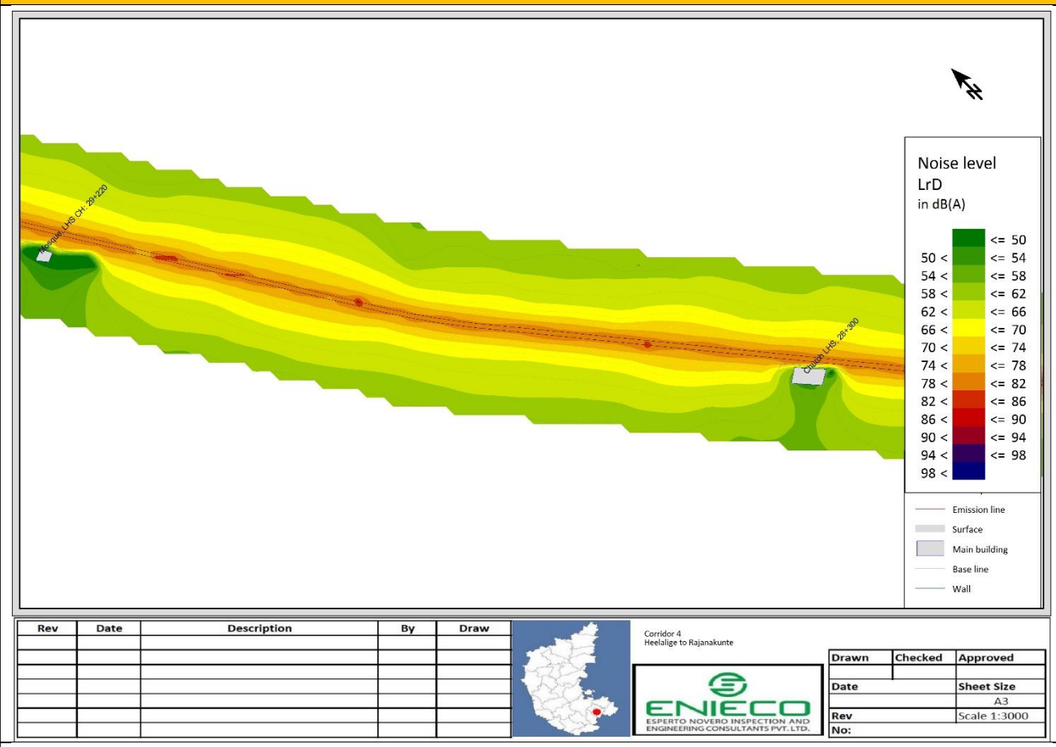
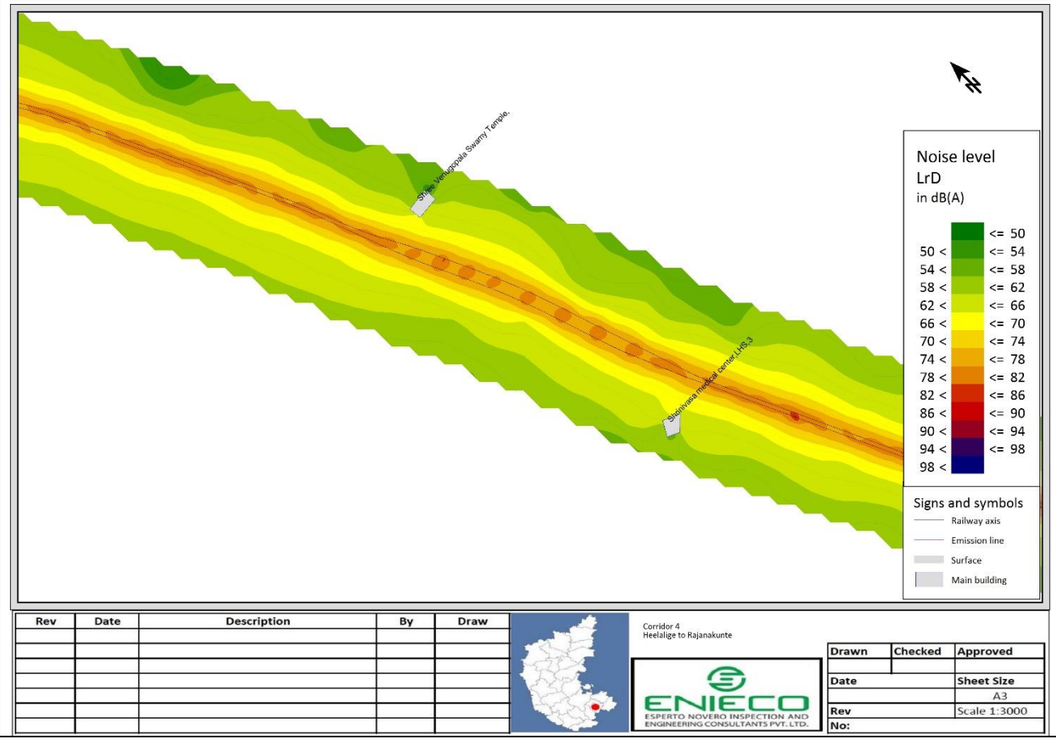
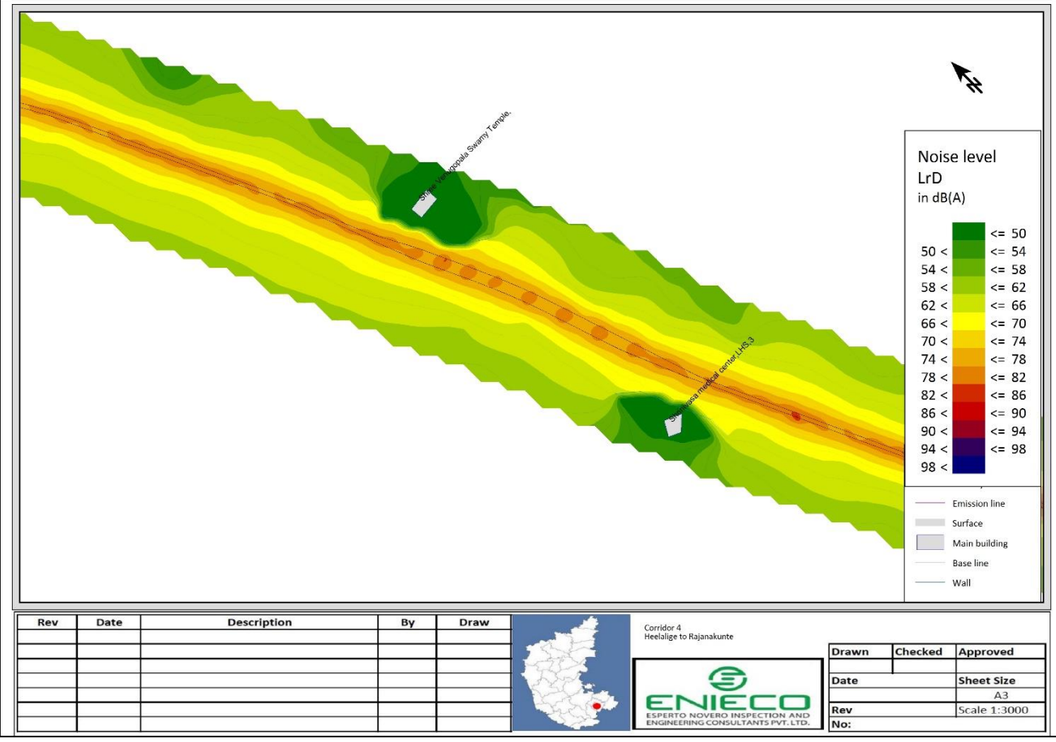
1. S.No	2. Without Barrier	3. With Barrier
7.		
16.		17.

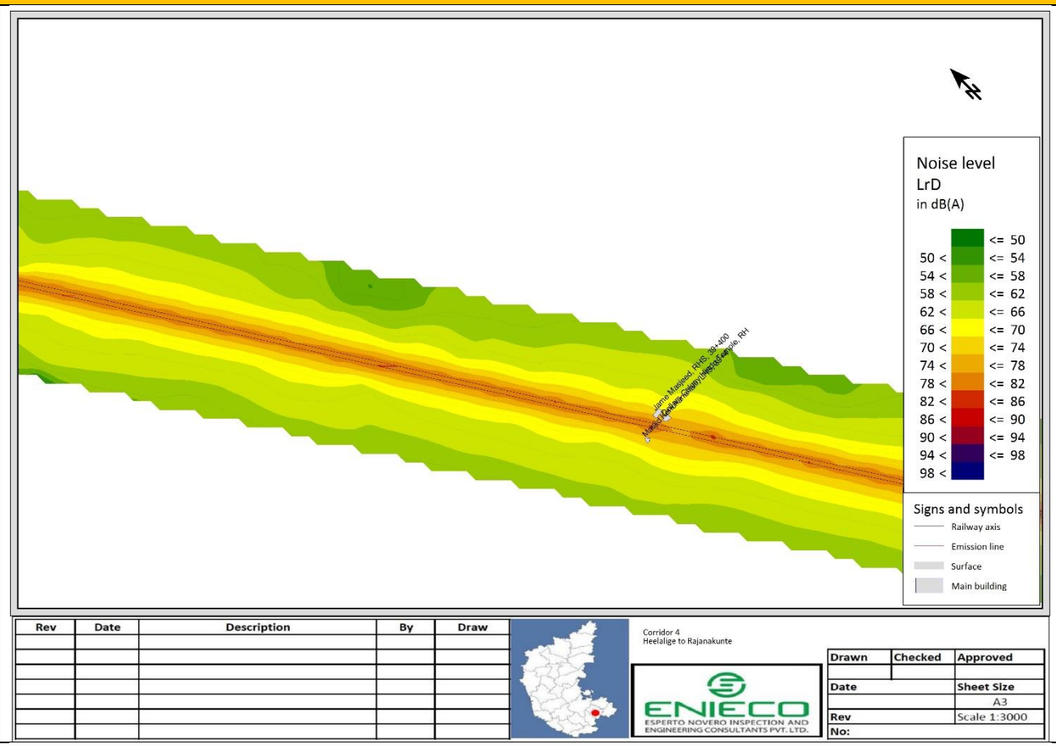
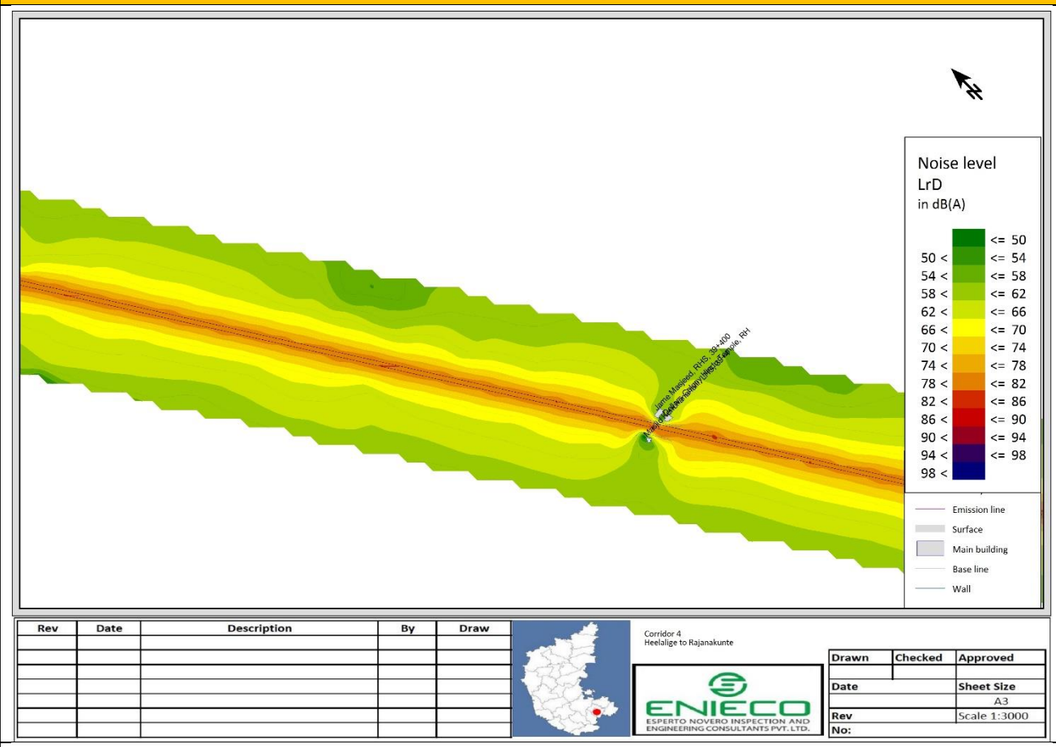
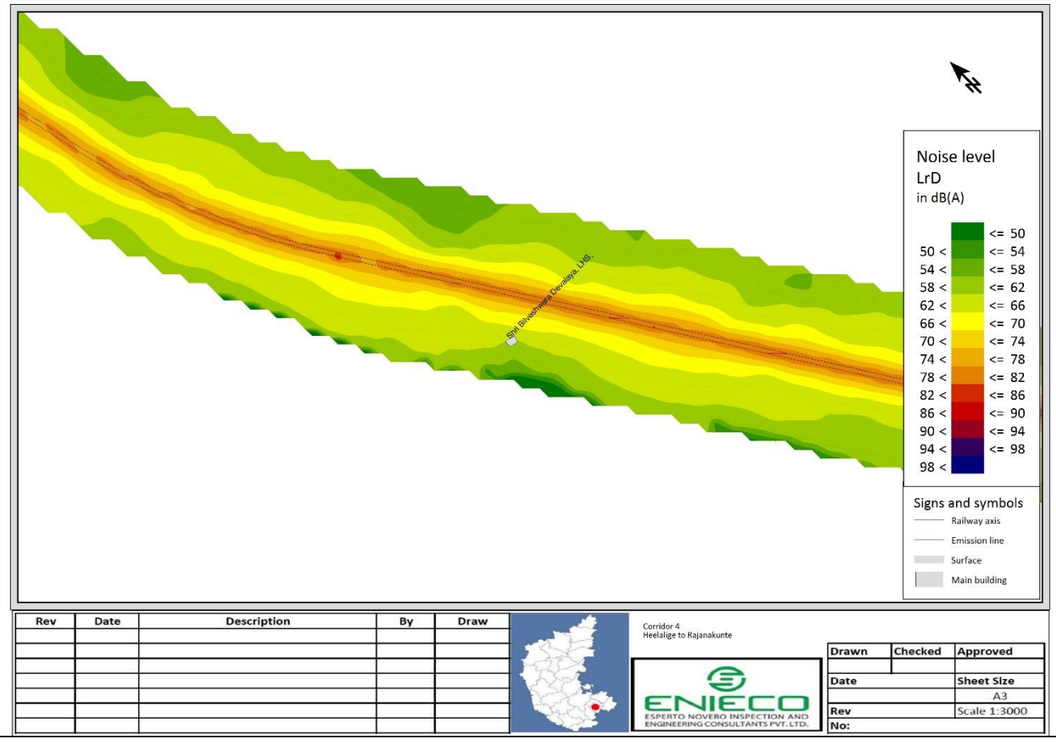
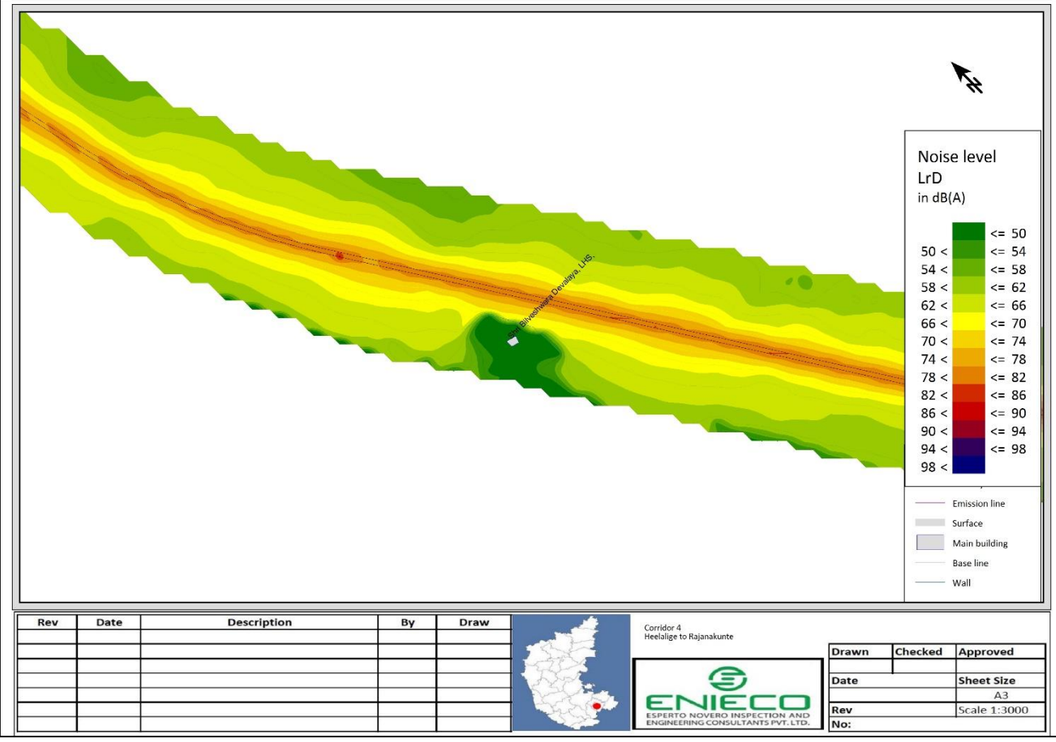
1. S.No	2. Without Barrier	3. With Barrier
8.		
18.		19.

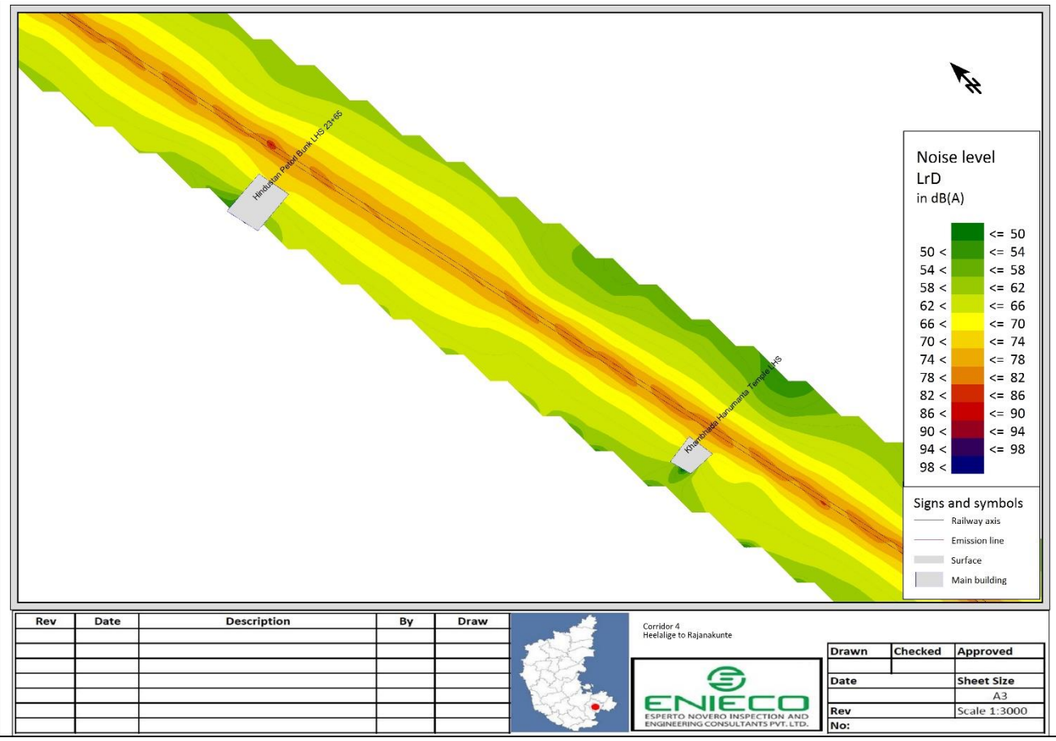
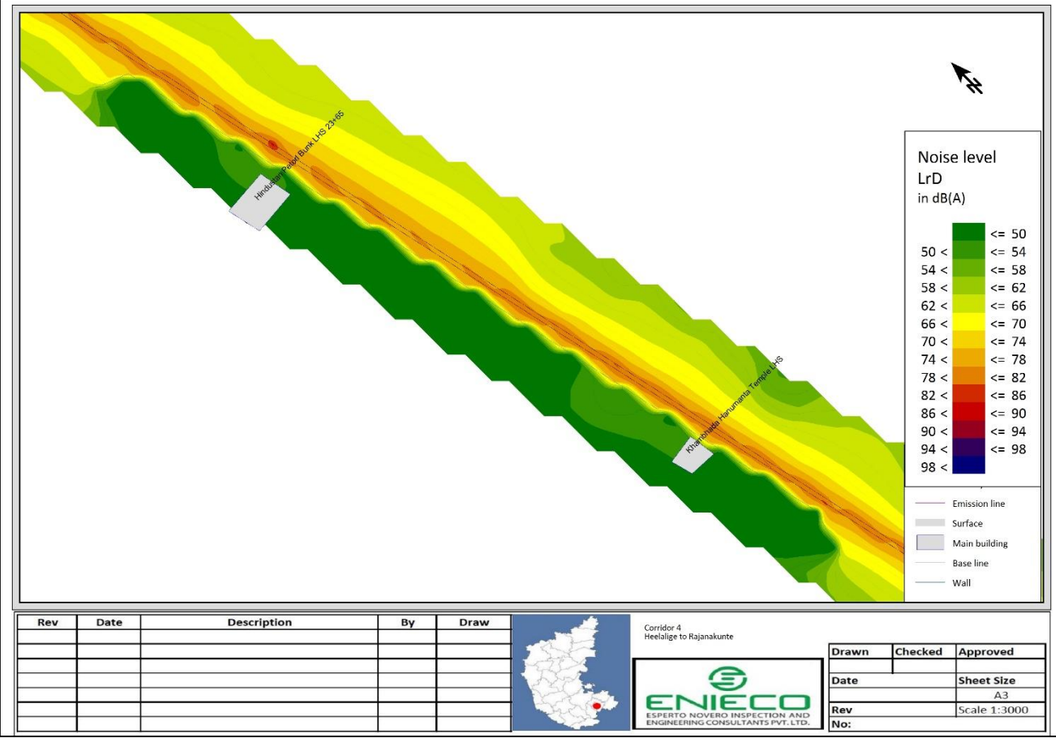
B. Noise contours for Corridor 4 for the Year 2031

S.No	Without Barrier	With Barrier
1.		

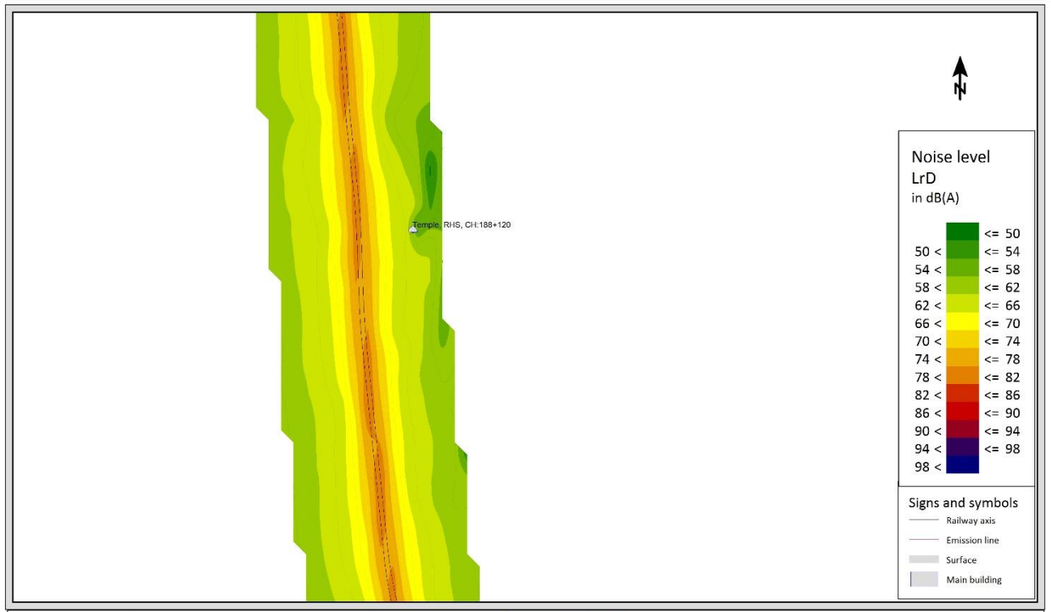
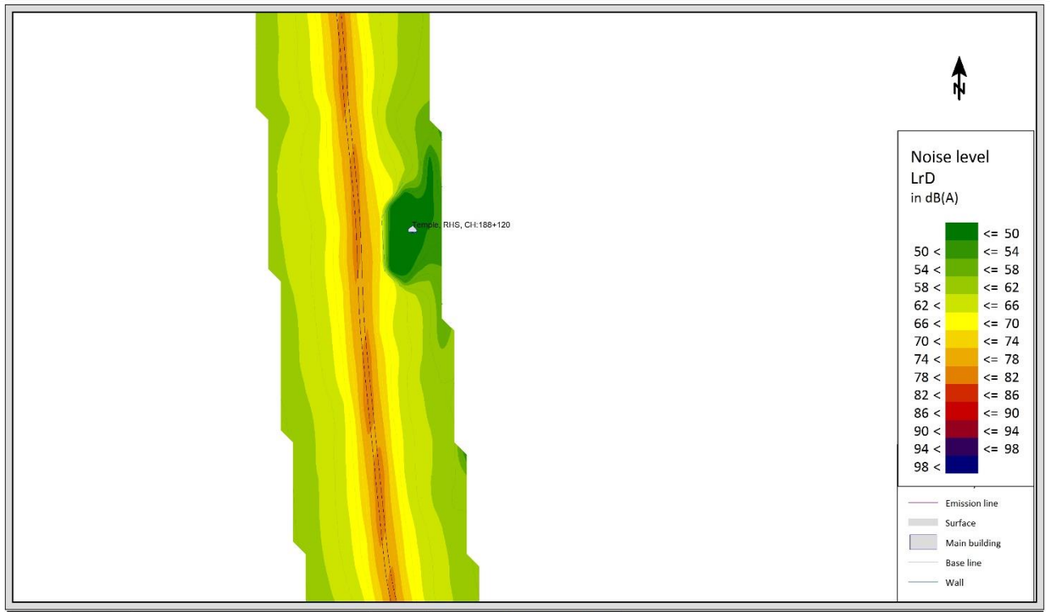
S.No	Without Barrier	With Barrier
2.		
3.		

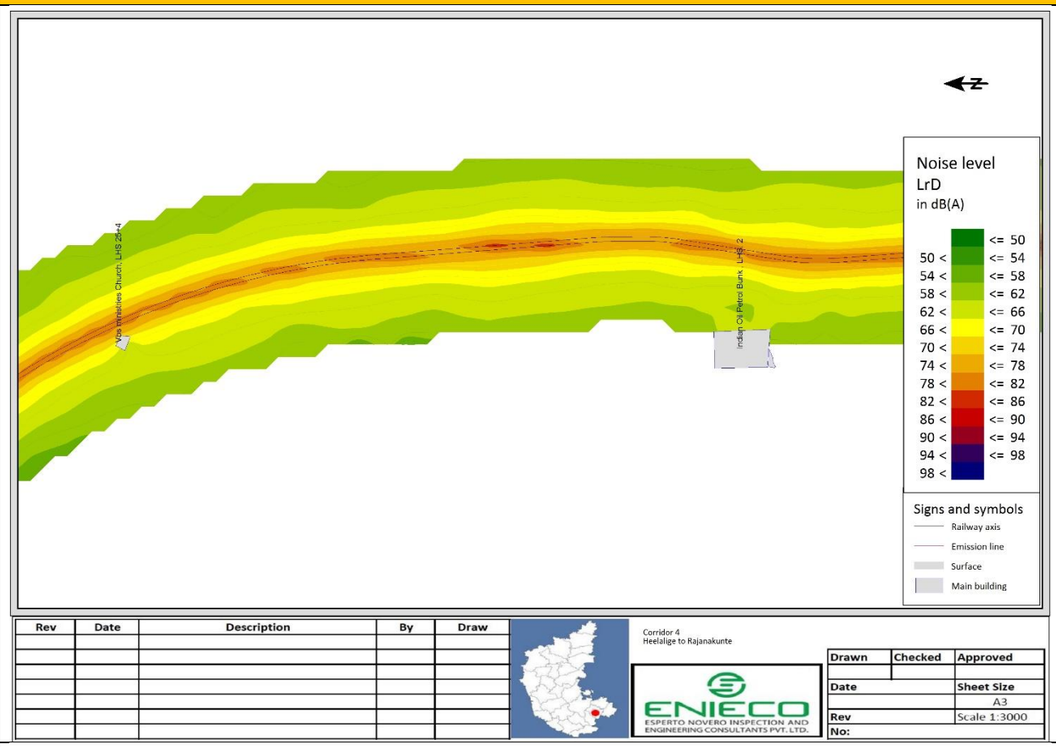
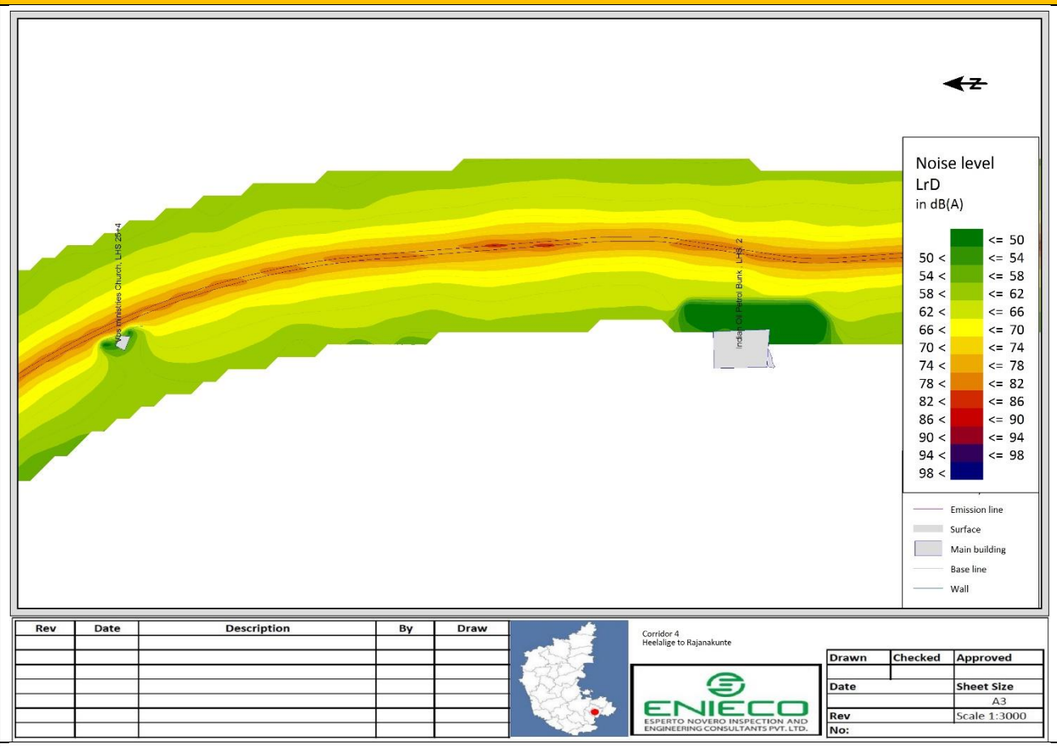
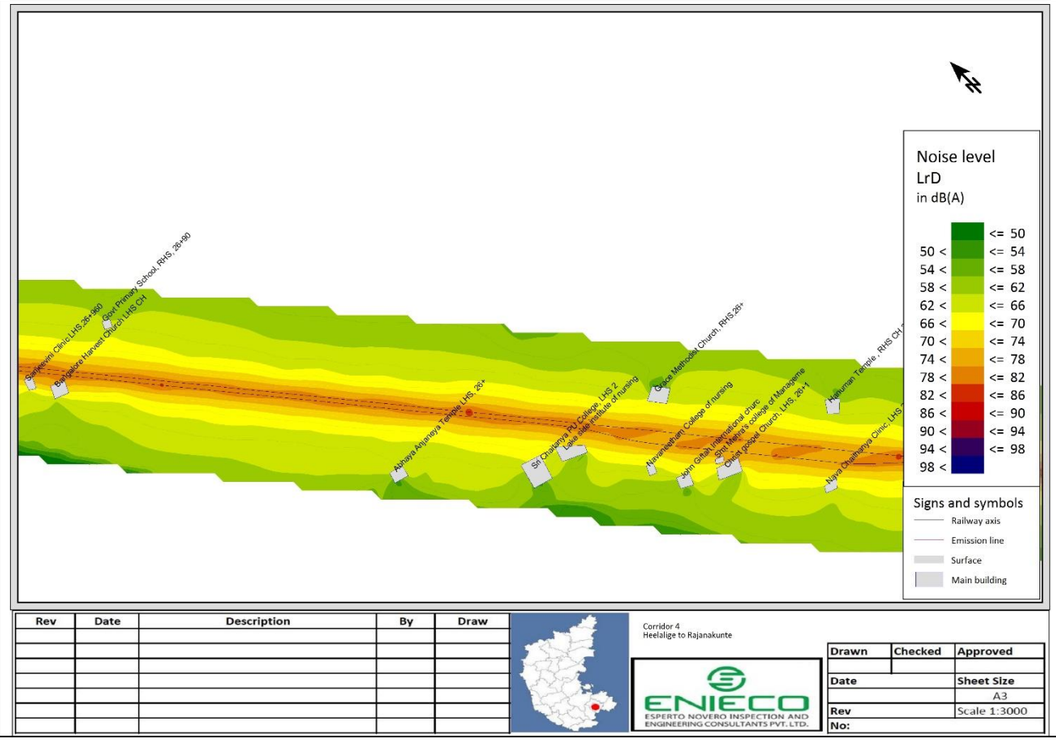
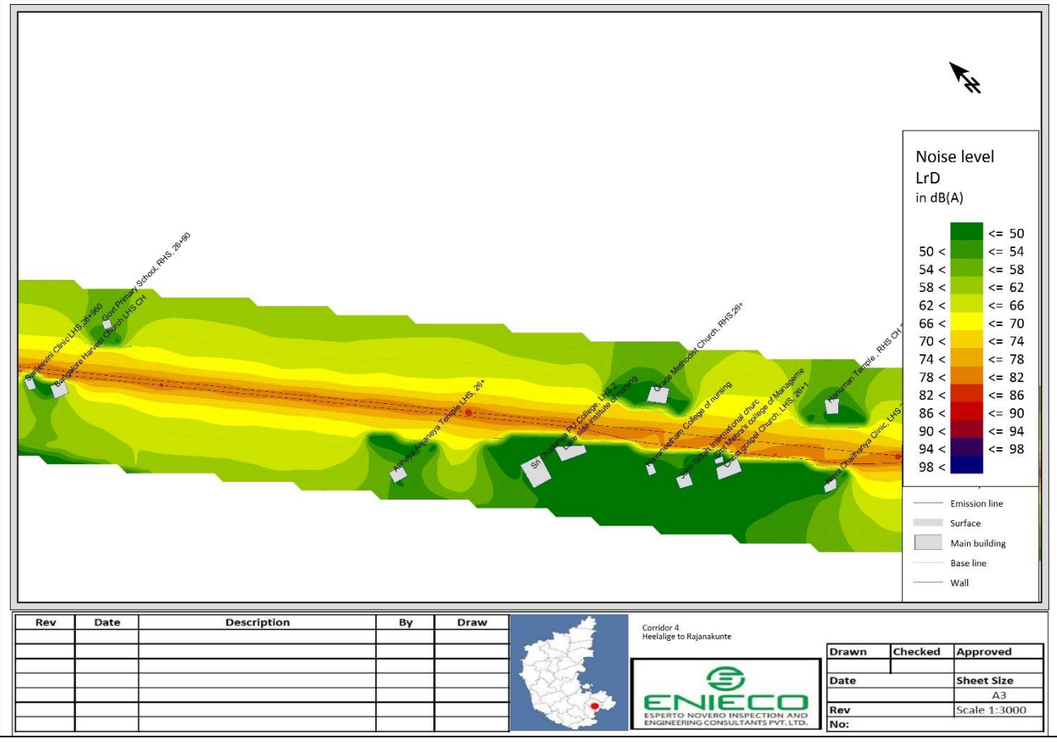
S.No	Without Barrier	With Barrier
4.		
5.		

S.No	Without Barrier	With Barrier
6.		
7.		

S.No	Without Barrier	With Barrier
8.		

C. Noise contours for Corridor 4 for the Year 2041

S.No	Without Barrier	With Barrier
1.		

S.No	Without Barrier	With Barrier
2.		
3.		

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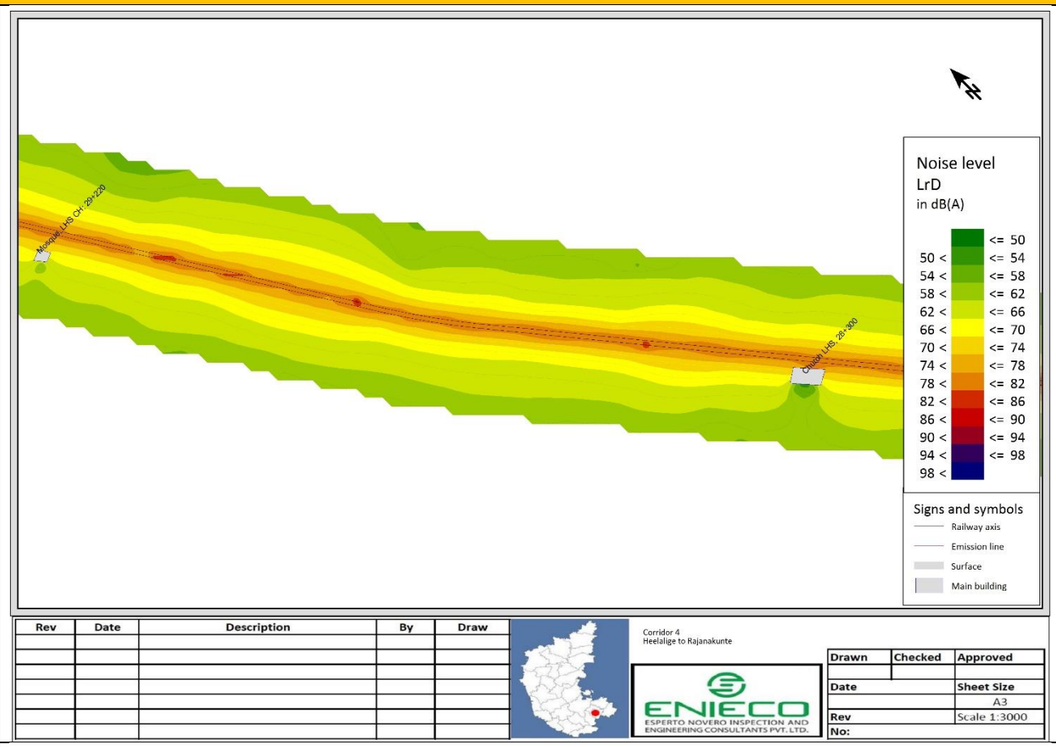
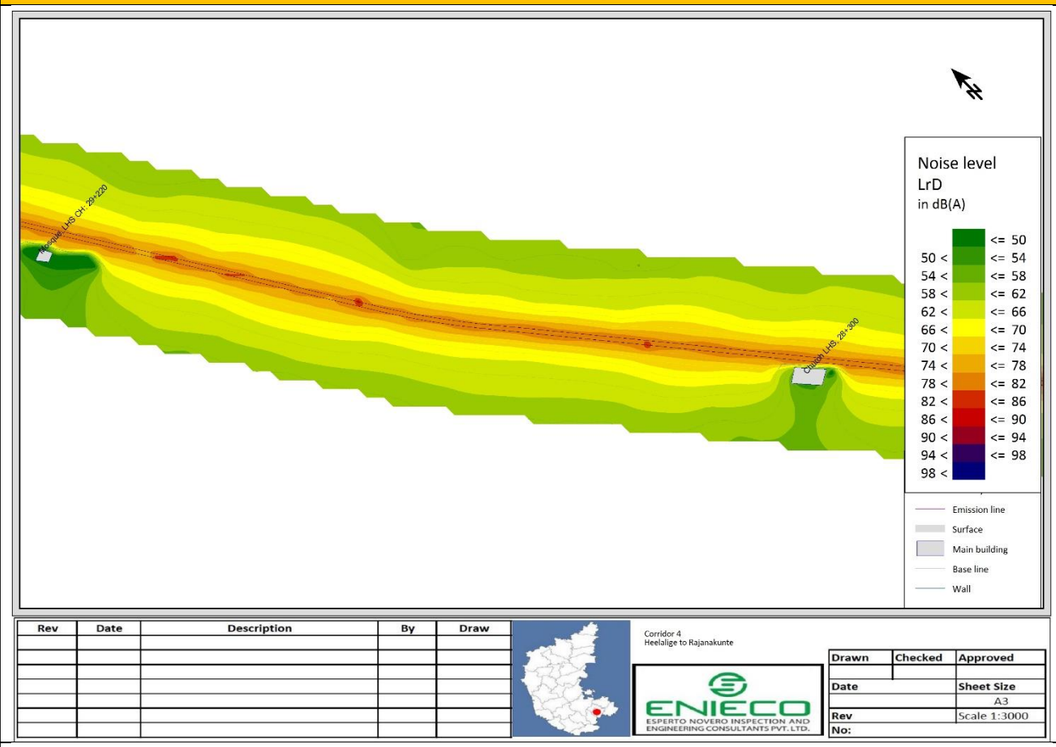
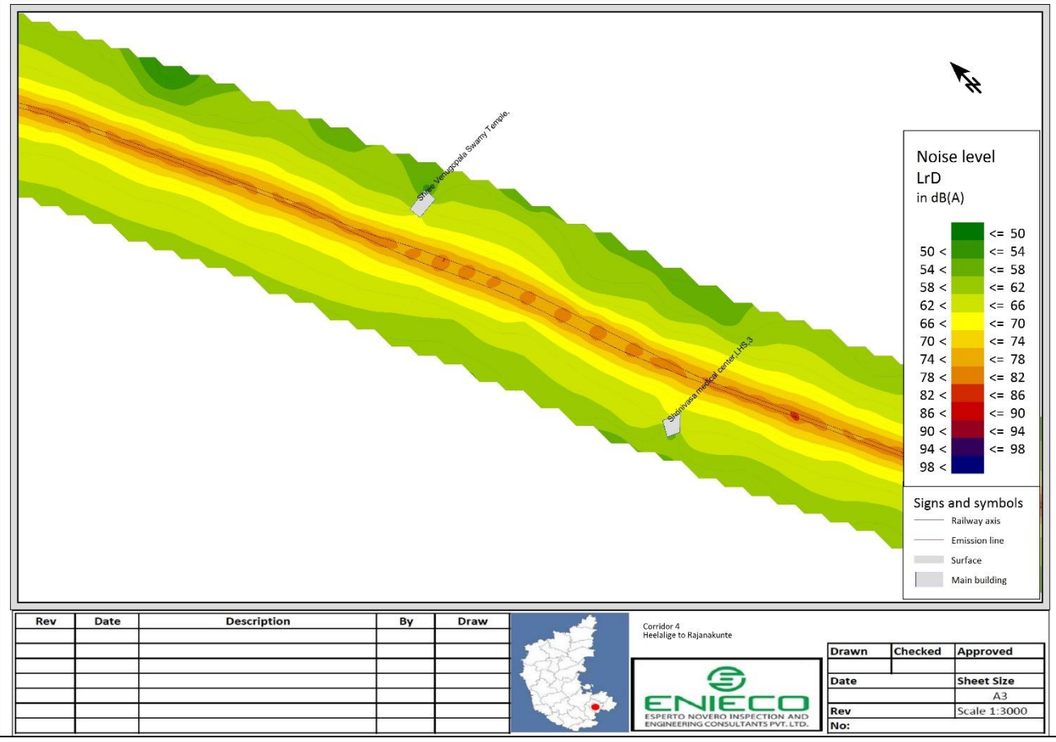
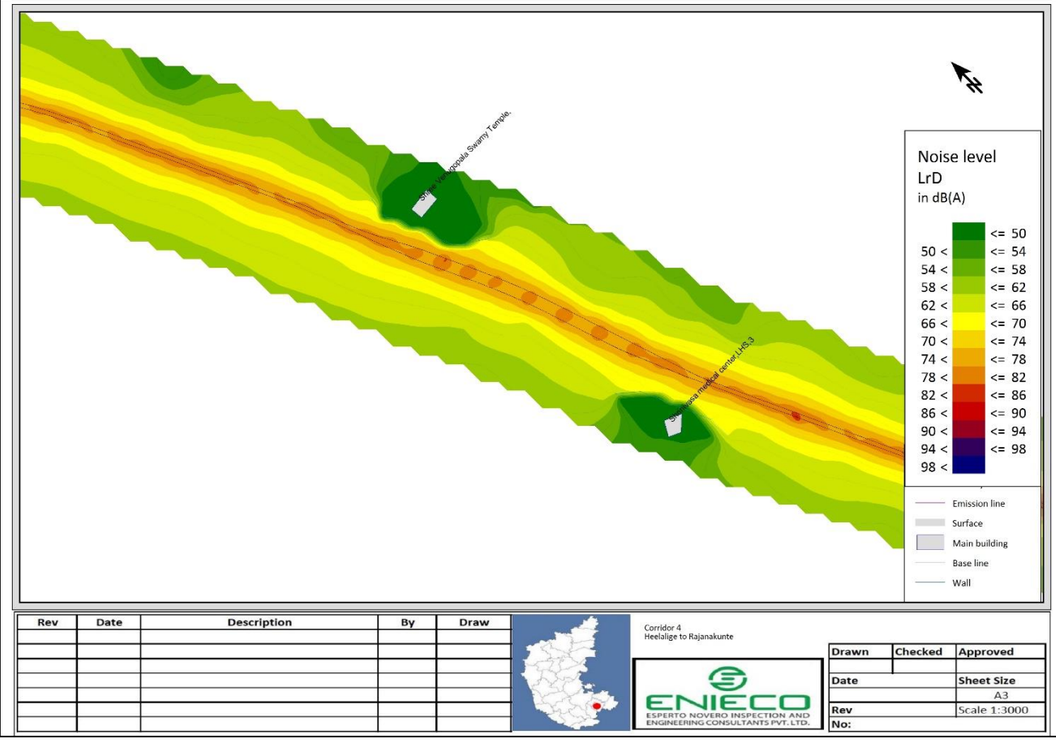
4.		
5.		

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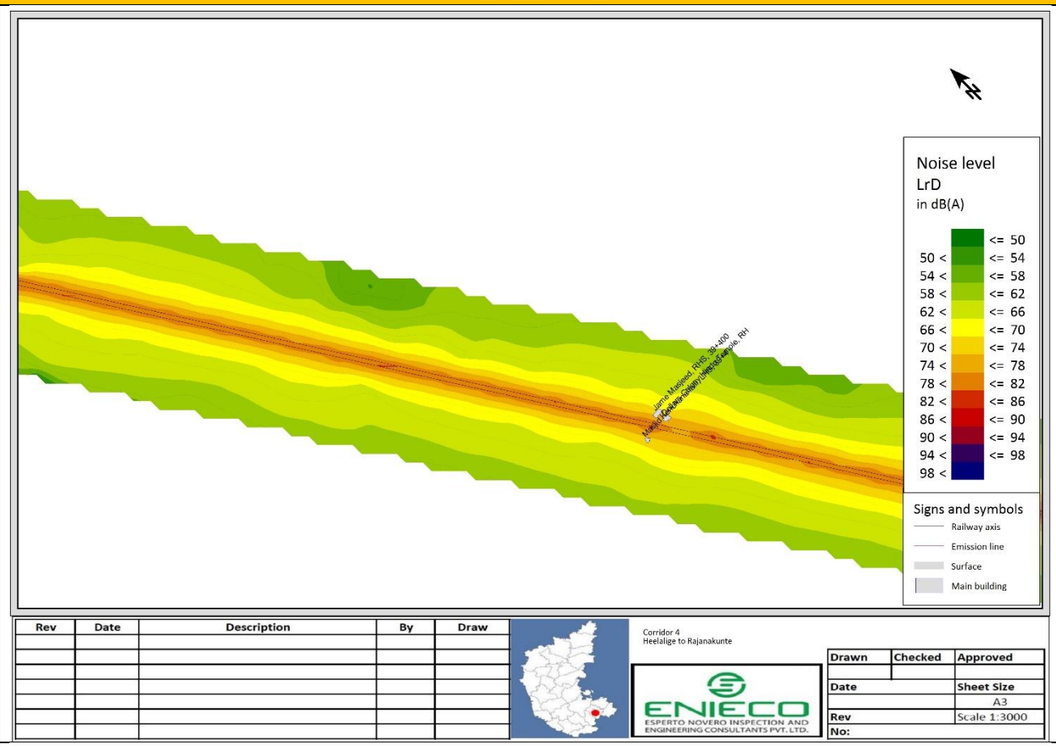
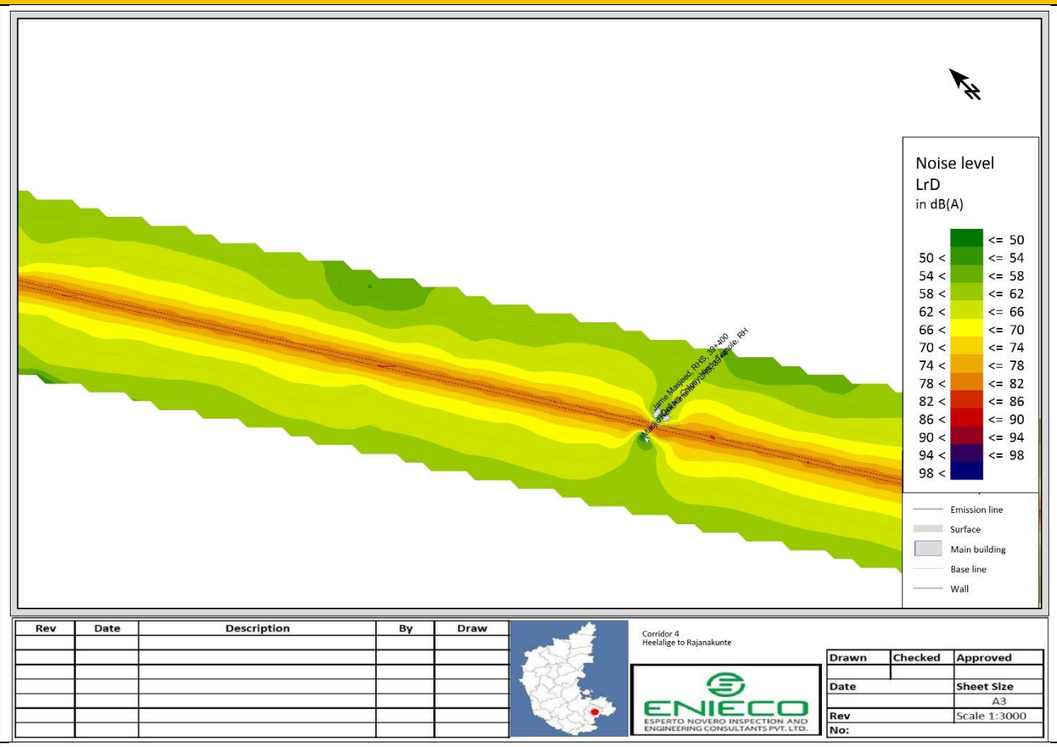
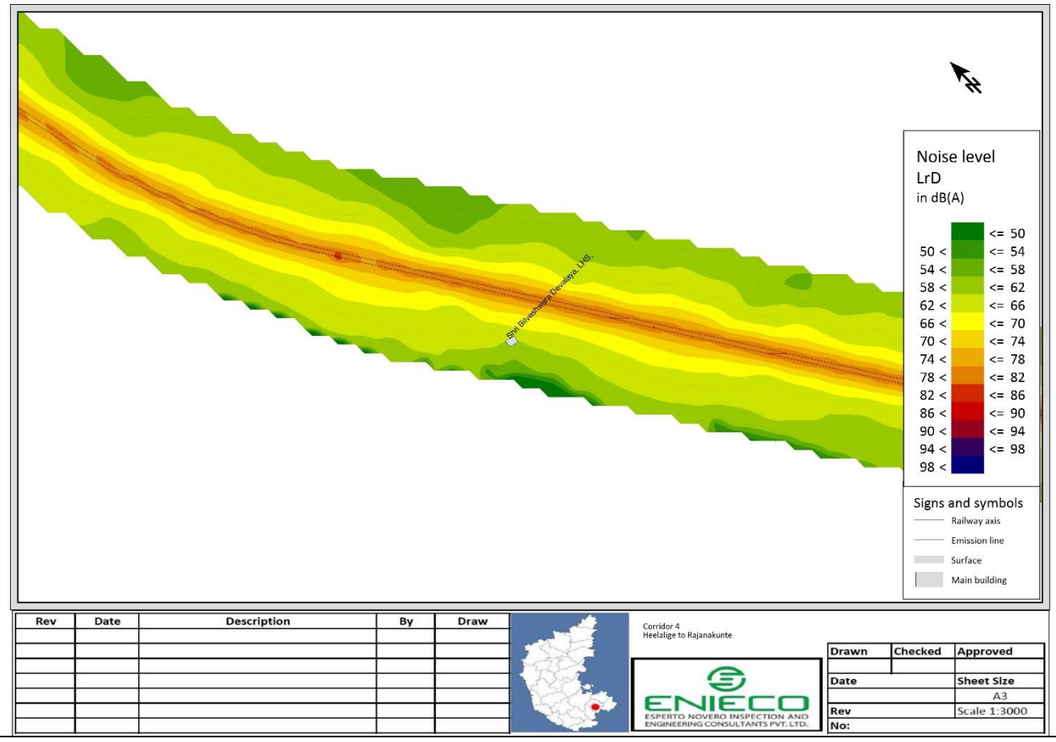
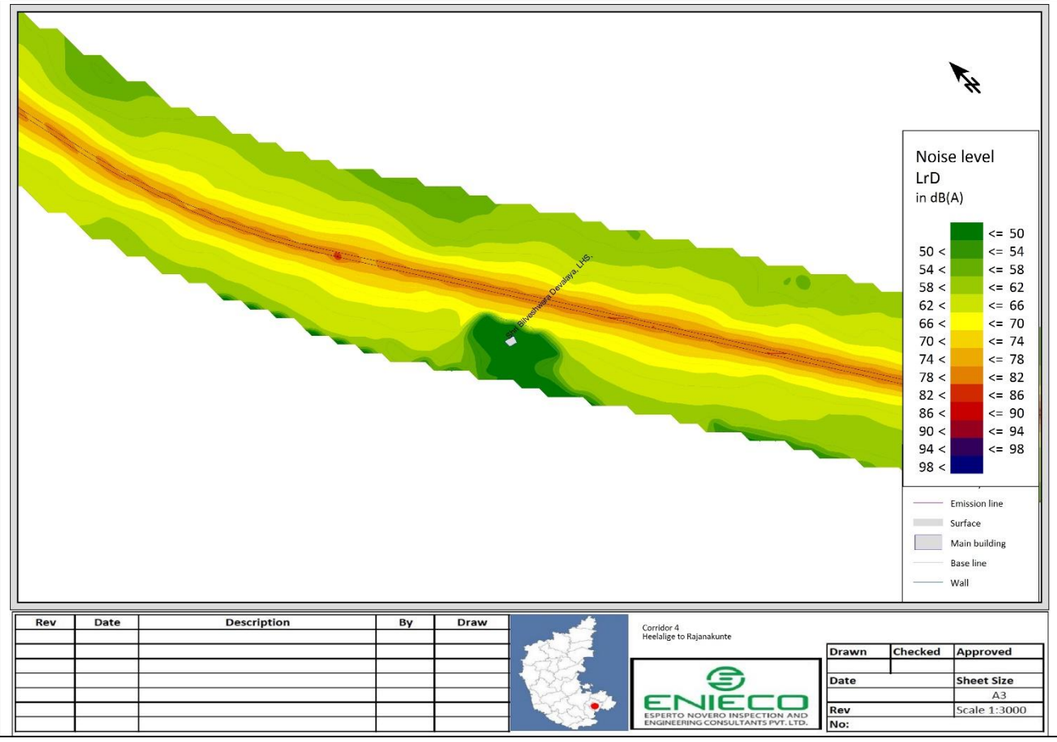
6.		
7.		

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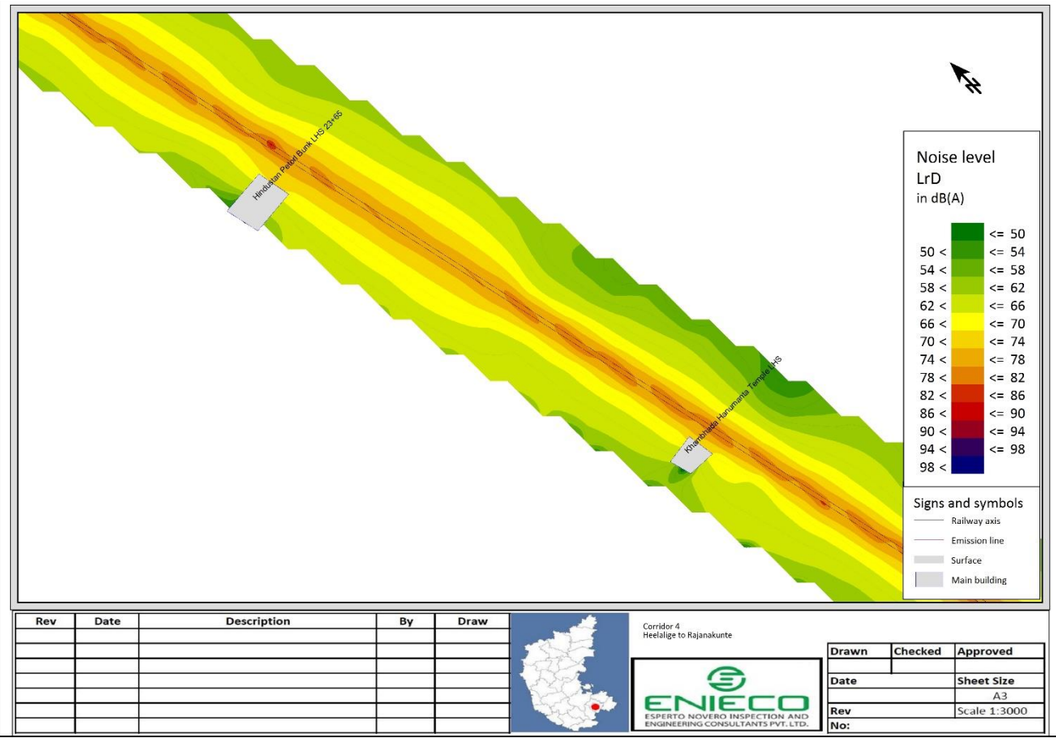
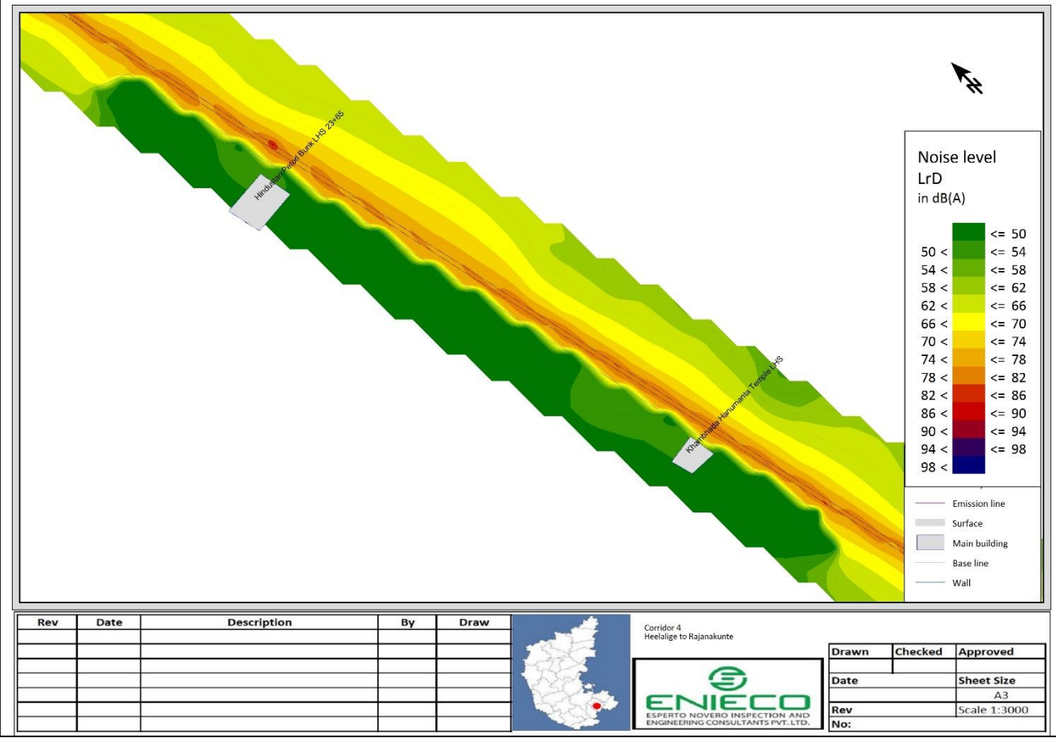
8.		

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Annexure 10.1. Guidelines for Top Soil Conservation and Reuse

The top soil from all sites including all working area, cutting areas, quarry sites, borrow areas, construction camps, haul roads in agricultural fields (if any) and areas to be permanently covered shall be stripped to a specified depth of 15 cm and stored in stock piles for reuse.

At least 10% of the temporary acquired area for construction purposes shall be earmarked for stockpiling of fertile top soil

The locations for stacking will be pre-identified in consultation and with approval of Environmental Specialist of the Independent Engineer.

The following precautionary measures will be taken by the contractor to preserve the stock piles till they are re-used:

- Slop of the stockpiles should not exceed 1:2 (vertical to horizontal), and height is restricted to 2m to retain soil and allow percolation of H_2O.
- The edges of pile should be protected by silt fencing and allow percolation of water, which will help to retain soil
- Multiple handling kept to a minimum to ensure that no compaction occurs.
- Stockpiles shall be covered with empty gunny bags or will be planted with grasses to prevent the loss during rains.

Such stockpiled topsoil will be utilized for:

- Covering reclamation sites or other disturbed areas including borrow areas (not those in barren areas).
- Top dressing and raising turfs in embankment slopes
- Filling up of tree pits
- For developing median plantation
- In the agricultural fields of farmers, acquired temporarily that needs to be restored.

Residual top soil, if there is any, shall be utilized for the plantations works along the corridor. The utilization as far as possible shall be in the same area from where top soil was removed. The stripping, preservation and reuse shall be carefully inspected, closely supervised and properly recorded by the Environmental Specialist of the Independent Engineer.

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Annexure 10.2. Guidelines for Siting and Layout of Construction Camp

A. Siting

The following guidelines shall be followed while siting the construction camps:

- The construction camps shall be located at least 500 m away from habitation. The living accommodation and ancillary facilities for labour shall be erected and maintained to approved standards and scales.
- Non-agricultural land should be used, as for as possible
- Not within 1,000 m of either side of locations of Forest areas.
- All sites used for camps must be adequately drained. They must not be subject to periodic flooding, nor located within 300 feet of pools, sink holes or other surface collections of water unless such water surface can be subjected to mosquito control measures.
- The camps must be located such that the drainage from and through the camps shall not endanger any domestic or public water supply.
- All sites must be graded, ditched and rendered free from depressions such that water may get stagnant and become a nuisance.

B. Layout

Contractor shall follow all relevant provisions of the Factories Act, 1948 and the Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for development and maintenance of construction camp. A conceptual layout of a typical construction site has been presented in **Figure-A.** The contractor during the progress of work shall provide, erect and maintain necessary (temporary) living accommodation and ancillary facilities for labor to standards and scales approved by the Engineer of IE. The site must be graded and rendered free from depressions such that water does not get stagnant anywhere. The entire boundary of the site should be fenced all around with barbed wire so as to prevent the trespassing of humans and animals. All temporary accommodation must be constructed and maintained in such a fashion that uncontaminated water is available for drinking, cooking and washing. Safe drinking water should be provided to the dwellers of the construction camps. Adequate washing and bathing places shall be provided and kept in clean and drained condition. Construction camps are to be sited away from vulnerable people and adequate health care is to be provided for the work force. Vehicle parking area is to be made impervious using 75 mm thick P.C.C. bed over 150 mm thick rammed brick bats. The ground will be uniformly slopped towards to adjacent edges towards the corridor. A drain will take all the spilled material to the oil interceptor.

C. Drinking Water

The contractor should provide potable water within the precincts of every workplace in a cool and shaded area, which is easily accessible. All potable water storage facilities must be on a safely raised platform that is at least 1m above the surrounding ground level. Such facilities shall be regularly maintained from health and hygiene point of view. If necessary, water purifier units shall be installed for providing potable water. As far as possible, shallow wells

should not be used as potable source of water. However, if water is drawn from any existing well, irrespective of its location from any polluting sources, regular disinfection of the water source (which may include application of lime, bleaching power and potassium permanganate solution) has to be ensured at weekly/fort nightly interval. All open wells will be entirely covered and will be provided with a trap door to prevent accidental fall and contamination from dust, litter etc. The trap door will be kept locked and opened only for cleaning or inspection, which will be done at least once in a month. A reliable pump will be fitted to each covered well. A drain shall be constructed around the well to prevent flow of contaminated water into the well from railways, camp or other sources.

Contractor's vehicles shall not be allowed to wash in the river / stream / pond. This is to avoid potential pollution from oil residues.

D. Sanitation Facilities

Construction camps shall be provided sanitary latrines and urinals. Adequate number of toilets shall be provided separately for men and women depending on their strength. Sewerage drains should be provided for the flow of used water outside the camp. Drains and ditches should be treated with bleaching powder on a regular basis. The sewage system for the camp must be properly designed, built and operated so that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place. Compliance with the relevant legislation must be strictly adhered to. Garbage bins must be provided in the camp and be regularly emptied at designated disposal place in a hygienic manner.

Portable toilets may be brought to use and the night soil from such units has to be disposed through designated septic tanks so as to prevent pollution of the surrounding areas. All these facilities shall be inspected on a weekly basis to check the hygiene standards.

E. Shelter at Workplace

At every workplace, there shall be provided free of cost, four suitable shelter, two for meals and two others for rest, separately for use of men and women laborers. The height of shelter shall not be less than 3 m from floor level to lowest part of the roof. Sheds shall be kept clean and space provided shall be the basis of at least 0.5 m2 per head.

F. Canteen Facilities

A cooked food canteen on a reasonable scale shall be provided for the benefit of workers wherever it is considered necessary and should generally conform to sanitary requirements of local medical, health and municipal authorities including such precautionary measures as necessary to prevent soil pollution of the site.

G. First Aid Facilities

At every workplace, a readily available first-aid unit including an adequate supply of sterilized dressing materials and appliances shall be provided as per the Factory Rules. Workplaces in remote location and far away from regular hospital shall have indoor health units with one bed

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for every 250 workers. Suitable transport shall be provided to facilitate taking injured and ill persons to the nearest hospital. At every work place an ambulance room containing the prescribed equipment and nursing staff shall be provided.

H. Health Care Facilities

Health problems of the workers should be taken care of by providing basic health care facilities through health centres temporarily set up for the construction camp. The health centre should have at least a doctor, nurses, duty staffs, medicines and minimum medical facilities to tackle first aid requirements or minor accidental cases, linkage with nearest higher order hospital to refer patients of major illnesses or critical cases.

The health centre should have MCW (Mother & Child Welfare) units for treating mothers and children in the camp. Apart from this, the health centre should provide with regular vaccinations required for children.

I. Day Care Facilities

At every construction site, provision of a day care shall be worked out so as to enable women to leave behind their children. At construction sites where 20 or more women are ordinarily employed, there shall be provided at least a hut for use of children under the age of 6 years belonging to such women. Huts shall not be constructed to a standard lower than that of thatched roof, mud walls and floor with wooden planks spread over mud floor and covered with matting. Hut shall be provided with suitable and sufficient openings for light and ventilation. There shall be adequate provisions of sweepers to keep the places clean. There shall be two maid servants (or aayas) in the satisfaction of local medical, health, municipal or cantonment authorities. Where the number of women workers is more than 25 but less than 50, at least one hut and one maid servant should be provided to look after the children of women workers. Size of cares shall vary according to the number of women workers employed.

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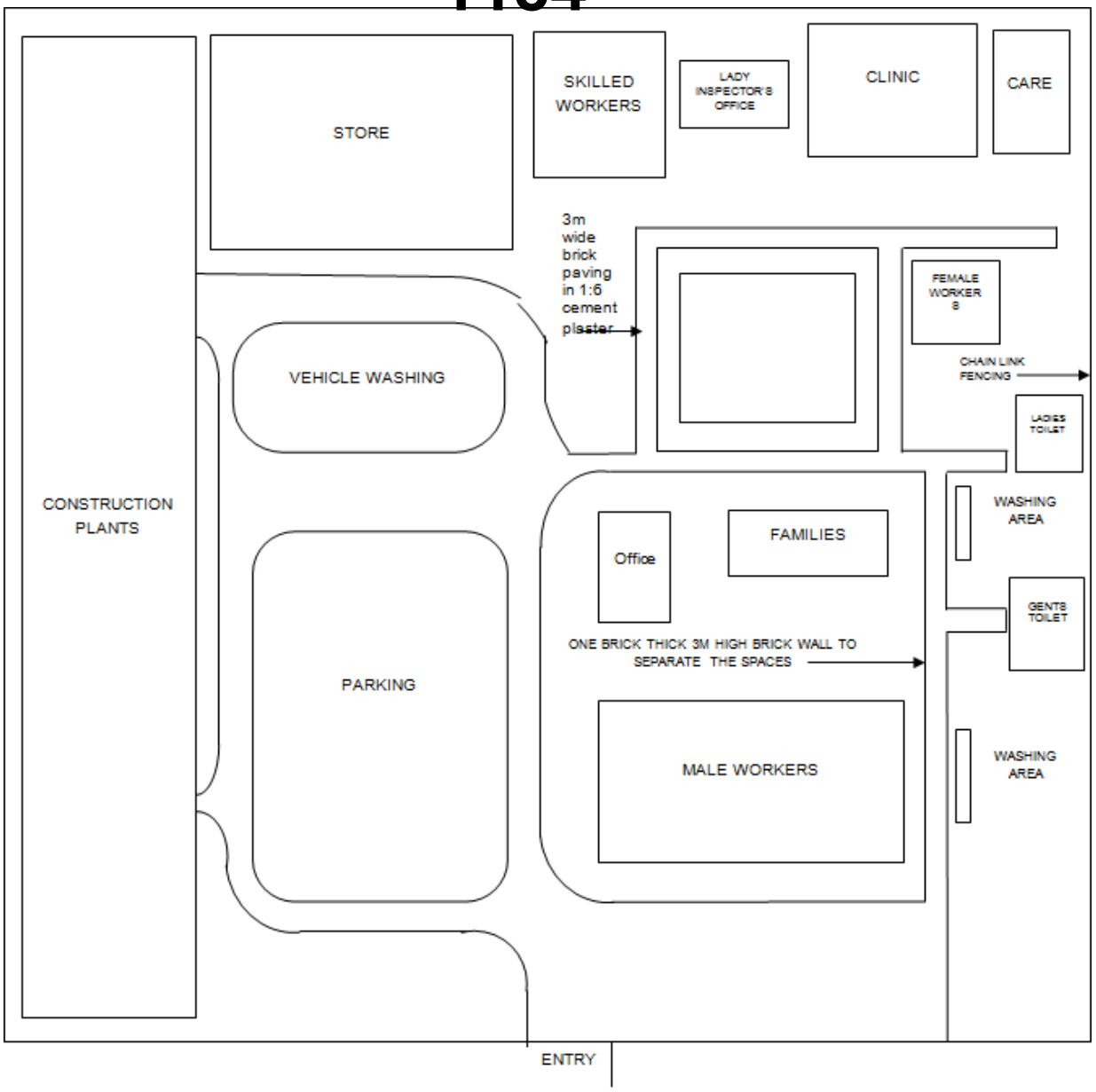

Figure-A Typical Layout of Construction Camp

Annexure 10.3. Guidelines on Slope Stabilization

Erosion Control measures are basically required for the protection of quality of water and the soil. The adoption of Soil erosion control and stabilization practices is being well received these days to avoid the soil exposure.

Bare ground should be covered, typically with grass seed and some form of matting or mulch. This will help prevent erosion and subsequent movement of sediment into river, streams, lakes and ponds. This movement of sediment can occur during and after suburban rail corridor construction. Erosion control measures need to be implemented immediately following construction and every time an area is disturbed.

A. Soil Erosion Control

When the intensity of rainfall increases surface run-off velocity accelerates and facilitates carriage of subsequent particles and ultimately results in disorders in the form of rill to gully and finally to erosion ditches. These disorders will impair slope stability worst if not controlled with proper protective measures.

Erosion control systems for the treatment of exposed slopes could be classified into three broad categories:

- Agronomic or biological
- Non –agronomic or conventional
- Engineered innovative

Agronomic or biological methods make use of vegetative or other forms of protective cover to check erosion. Protection of bare soil is effected by live plant cover afforded by maturing crops or by mulching derived from crop residue such as straw, wood shavings, sawdust, etc.

Ground cover is considered as the most suitable solution for erosion protection. Tress, grass and other plant species are natural soil-binders and provide the best natural solution against erosion.

Non-agronomic treatments include asphalting, aprons, pitching, soil cement stabilisation, etc. Large scale adoption of these techniques is often restricted on economic considerations, even though some of them may offer long lasting solutions.

In bio-engineering, plants have mainly two functions viz. hydrological and mechanical. Hydrological effects of plants are many such as interception (rain drops strike the leaves first before striking the ground soil), storage (leaves and stems hold water for some time before it eventually reaches the ground), infiltration (stems and shoots roughen and loosen the ground, enabling water to infiltrate more easily) etc. Mechanical function of plant is to reinforce the

soil by binding the loose soil particles with its fibrous root system.

Engineered systems of erosion control, largely bio-technical systems include geo-synthetics, geojute, etc. In case, long term soil protection is afforded by vegetative cover alone, biodegradable nets and meshes, usually derived from natural fibre, are used to provide short term protection. In situations, where vegetative cover alone is inadequate or cannot be ensured for long periods of time and high velocity overland flow is anticipated, synthetic roots reinforcing mats are advocated.

Bio-engineering is the technique of utilizing vegetation in addressing geotechnical problems. Environmental uncertainties are prompting engineers to favour bioengineering measures. Vegetation as an aid to artificial methods in controlling surficial soil erosion is gaining larger acceptability among engineers all over the world. Growth of appropriate vegetation on exposed soil surface is facilitated by use of natural geotextiles such as Coir Geotextiles. Properly designed Coir Geotextiles laid on slopes or any other exposed soil surface provides a cover over exposed soil lessening the probability of soil detachment and at the same time reduces the velocity of surface runoff, the main agent of soil dissociation. Natural geotextiles bios-degrade quicker than man-made counterpart, but facilitate growth of vegetation quicker and better due to its inherent characteristics. Bridge slope stabilization can range from allowing **native grass (Vetiver grass)** to re-establish on a disturbed slope to building an engineered wall.

B. Role of Coir Geotextile in Slope Stabilization

Coir is a biodegradable organic fibre material which is coarse, rigid and strong. The constituents of coir have been found to be mostly cellulose and lignin. Coir fibre is weather resistant and resistant to fungal and bacterial decomposition. The rate of decomposition of coir is much less than any other natural fibre. These characteristics are attributed due to the high lignin content in the fibre. Coir in the form of woven mesh mattings or non-woven stitch bonded blankets are used in engineering applications in the geotechnical field. Due to growing awareness to preserve environment, use of biodegradable natural material has gained popularity. The natural fibre, coir, which has been used in geotextiles for the past 20 years, has already proved its worth.

Coir geotextiles are made from coconut fibre extracted from the husk of coconut. Like other polymeric counterparts, coir geotextiles are developed for specific application in civil engineering like erosion control, ground improvement, filtration, drainage, river bank protection, road pavements, slope stability, etc. This biodegradable and environment friendly material is virtually irreplaceable by any of the modern synthetic substitutes.

Environment friendly Coir Geotextile can be laid on the shoulder and slope surface helped retain the soil particles and prevented detachment of soil particles from the prepared slope. Establishment of vegetation ensured stabilization of the soil on the slope surface. It is a bio-degradable natural geotextile, can conveniently be used for controlling surface soil erosion and help growth of vegetation as a bio-engineering measure. After biodegradation coalesces with the soil and adds nutrient to the soil and fosters growth of vegetation.

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C. Role of Vetiver Grass in Slope Stabilization

Vetiver grass (Chrysopogon zizanioides) is native to India. It has been has been shown to be a simple and economical method to conserve soil by slowing the velocity of water and trapping sediment, filtering out nutrients, and stabilizing steep slopes. In western and northern India, it is popularly known as khus. Vetiver is an excellent erosion control plant in even warmer climates.

As typical tropical grass, Vetiver is intolerant to shading. Shading will reduce its growth and in extreme cases, may even eliminate Vetiver in the long term. Therefore, Vetiver grows best in the open and weed free environment, weed control may be needed during establishment phase. On erodible or unstable ground Vetiver first reduces erosion, stabilizes the erodible ground (particularly steep slopes), then because of nutrient and moisture conservation, improves its microenvironment so other volunteered or sown plants can establish later. Because of these characteristics Vetiver can be considered as a nurse plant on disturbed lands.

Vetiver is useful to treat pollution due to its capacity to quickly absorb nutrients and heavy metals, and its tolerance to elevated levels of these elements. Although the concentrations of these elements in Vetiver plants is often not as high as those of hyper-accumulators, it's very fast growth and high yield allows Vetiver to remove a much higher volume of nutrients and heavy metals from contaminated lands than most hyper-accumulators.

When planted closely together, Vetiver plants form dense hedges that reduce flow velocity, spread and divert runoff water and create a very effective filter that controls erosion. The hedges slow down the flow and spreads it out, allowing more time for water to soak into the ground.

Acting as a very effective filter, Vetiver hedges help to reduce the turbidity of surface run-off.

Since new roots develop from nodes when buried by trapped sediment, Vetiver continues to rise with the new ground level. Terraces form at the face of the hedges, this sediment should never be removed. The fertile sediment typically contains seeds of local plants, which facilitates their re- establishment.

D. Cost Analysis

Cost of slope stabilization using Coir Geo-textile and Vetiver Grass is approximately **Rs. 450/- per square meter**, which includes coir geo-textiles (erosion control blanket) 600 to 700 GSM woven or non-woven type (inclusive of transportation to site), GI hooks of 4 mm diameter U-Shaped point sharp edges of 300 mm length, installation charges, coir mat spreading, cutting, seeds mix broadcasting, over lapping, watering for 7-9 days twice per day and after complete installation of work get the quality certification from the authorized technical agency.

E. Where to Approach

Karnataka State Coir Co-Operative Federation an Enterprise of Government of Karnataka can be approached, the address of which is given below. Karnataka State Coir Co-Operative Federation was established in the year 1961 with the main objective of developing coir industry through co-operative movement in Karnataka state.

Address :
The Karnataka State Coir Co-operative Federation Ltd. (Govt. of Karnataka Enterprise) #953/A, 2nd Main, 4th Block, Rajajinagar, Bangalore - 560 010
Phone No: 080 – 23154220; Fax No. 080 - 23154231

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Annexure 10.4. Guidelines for Siting, Operation and Re-Development of Borrow Areas

Potential sources of earth (borrow areas) for the construction of embankment and subgrade shall be identified by the Contractor in consultation with Sr. Environmental Specialist of CSC or IE in accordance with the specifications. However, borrow areas for the project will be finalized by the Contractor. All provisions stipulated in this guideline shall be strictly adhered to. The finalization of all such locations will depend on the approval given by the Sr. Environmental Specialist of the Independent Engineer (IE) on technical and environmental grounds. This includes on-site verification by the IE to cross-check the correctness of details provided by the Contractor in the prescribed format. Only after receipt of the written approval from the IE, the Contractor shall enter into a formal agreement with landowner.

The details of proposed borrow areas investigated with their respective locations; corresponding chainages and lead from nearest point to project corridor shall be reported as given in the Format below:

Location of Proposed Borrow Areas

S. No.	Chainage of Nearest Point on Project Corridor (km)	Side	Location / Village Name	Lead From Nearest Point on Project Corridor (km)	Type of Land	Approx. Quantity (m^3)
1.						
2.						
3.						
4.						
5.						
6.						
7.						
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A. Siting

The selection of borrow areas shall be based on environmental considerations apart from civil engineering considerations. Environmental considerations dictate that:

- Borrow areas should be located away from human habitation (1 km away) to avoid breeding of mosquitos and other organisms during monsoon when the borrow areas are flooded.
- Borrow areas should be at a distance of about 1.5 km from ecologically sensitive area i.e. Reserve Forest, Protected Forest, Sanctuary, National Park and any archaeological sites
- Borrow areas should be generally on degraded land unsuitable for any productive purpose. Government or community land should be preferred to private land. Productive agricultural land should not as far as possible, be used for borrowing earth and where it is used, the productive top soil must be stored and reuse.
- Borrow areas should not, as far as possible, obstruct the natural drainage of the ground and bunds and/or boundary drains should be created on their periphery to restore the flow of natural run off.
- Borrow areas should not be selected near sensitive locations such as banks or beds of rivers or channels, which can adversely affect the river hydrology and hydraulics, or along the road or rail embankment, which, apart from threatening the embankment may enhance the severity of accidents if these happen, or close to public structures such as transmission towers whose foundation can be endangered.
- Borrow area sites must be authorized sites. If located on private land, there should be written consent of the owner in the form of lease agreement permitting the use of the land for borrowing earth. If located on government or community land, the permission should be of the appropriate authority.

Avoid locating borrow area close to any road (maintain at least 30m distance from ROW and 10 m from toe of embankment, whichever is higher);

B. Borrow Area Operations

- Excavation in the areas should be planned keeping in view the end use of the borrow area land the shape and dimensions of the area to be excavated from (length, breadth and depth) should be accordingly decided. Generally the depth of excavation should not be deeper than 2 m from the consideration of safely of the humans or animals against accidental fell into the ditch.
- The eventual slope of the excavation should be 2 (H):1(V) from the consideration of safety of the slopes as well as humans.
- There should be safe access to the earth moving equipment and transport vehicles into the borrow areas
- The approach to the borrow areas from the public or private haul roads should have a reasonable design to withstand the movement of transport vehicles.Dust palliation measures should be taken to minimise dust pollution on the approach roads (e.g. watering, spraying of lime or cement slurry or bitumen emulsion, etc.)
- Spillage of materials under transit on to the haul roads or main roads through

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gaps in the transport vehicles should be guarded against buy plugging such gaps. Similarly, Wind blowing of the materials in transit should be checked by suitable covers.

- Where productive agricultural land is used for borrow areas, the top soil in 150 mm thickness should be scrapped, stock piled and re-used for rehabilitation of borrow areas. At least 10% of the temporary land should be earmarked for stockpiling. The top soil should be seeded and mulched to cover the slopes, or any degraded area in thickness between 75 -150 mm.

C. Borrow Area Rehabilitation Plan

The borrow area must be rehabilitated after completion of the work and rehabilitation plan should be prepared in advance in consultation with the community. The area shall be restored to a safe and secure area usable to the public enabling safe access and entry to the restored site by filling the borrow pit floor to approximately the access road level. Some indicative rehabilitation measures could be community water storage facility, pisciculture ponds, recreational spots, landscape enhancement, or rehabilitation by re-vegetation of the borrow area. Where re-vegetation is done, it should be ensured that:

- Vegetative cover is established on all affected land
- Topsoil is placed, seeded and mulched within 30 days of final grading if it is within a current growing season or within 30 days of the start of the next growing season.
- Vegetative materials to be used are grasses, legumes, herbaceous or woody plants or a mixture thereof
- Plant material must be planted during the first growing season following the reclamation phase
- Selection and use of vegetative cover should take into account soil and site characteristics such as drainage, pH, nutrient availability and climate to ensure permanent growth. Choice of plant species for the planting program shall be made in consultation with ecological consultant and local forest department.
- The planning of trees and shrubs results in a permanent stand or regeneration and succession rate, sufficient to assure a 75% survival rate
- The planning results in 90% ground coverage
- The site should be inspected when the planting is completed and again at one year to ensure compliance whit the reclamation plan

D. Borrow Area Documentation

1) Location reference and potential yield: The information as per the table below should be contained in the documentation:

Sample No.	Name of Village	Material Type	Site identification		
			Nearest Chainage (Km)	Left / Right Hand Side	Offset from nearest Chainage (m)

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1	2	3	4	5	6

Approximate Quantity (Cum)				Available land / Terrain	Surrounding Land / Terrain	Remarks
Length (m)	Breadth (m)	Depth (m)	Total (cum)			
7	8	9	10	11	12	13

2) Land use and vegetative cover (exiting)

- Existing land use (agricultural/barren/scrub/grazing/any other type)
- Vegetation /trees to be removed
- Erosion /degradation potential
- Distance and name of the nearest settlement
- Distance from the nearest surface water body
- Drainage pattern of the area
- Distance of the nearest reserve forest / eco-sensitive area (if any)
- Distance of the nearest sacred tree (if any)
- Distance from the nearest school/hospital/primary health center
- Daily / occasional or avenues for generation of income for adjoining community

3) Borrow area and community features

- Area (in Sq. m)
- Type of Access / width / kutcha / pucca etc. from carriageway
- Soil type
- Slope / drainage characteristics
- Water Table of the area or identify from nearest well etc. /ask people
- Land-use type such as barren / agricultural / gazing land
- Social features of settlement / community and its proximity to
- Present use of the borrow area by the community
- Identification of any other community facility in the vicinity of the borrow pit

4) Plans and photographs

- Borrow area site plans showing the land use, habitation, drainage pattern and structures and other physical features such as access roads, haul roads, existing community facilities (roads, schools, play grounds, community facilities, religious places etc.)
- Before and after photographs of the borrow areas.

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Annexure 10.5. Chance Find Procedure

Purpose of the chance find procedure

The chance find procedure is a project-specific procedure that outlines actions required if previously unknown heritage resources, particularly archaeological resources, are encountered during project construction or operation.

A Chance Find Procedure, as described in IFC Performance Standard 8 and EBRD Performance Requirement 8 and law on Cultural Heritage of Georgia, is a process that prevents chance finds from being disturbed until an assessment by a competent specialist is made and actions consistent with the requirements are implemented.

Scope of the chance find procedure

This procedure is applicable to all activities conducted by the personnel, including contractors that have the potential to uncover a heritage item/site. The procedure details the actions to be taken when a previously unidentified and potential heritage item/site is found during construction activities. Procedure outlines the roles and responsibilities and the response times required from both project staff, and any relevant heritage authority.

Induction/Training

All personnel, especially those working on earth movements and excavations, are to be inducted on the identification of potential heritage items/sites and the relevant actions for them with regards to this procedure during the Project induction and regular toolbox talks.

Chance find procedure

If any person discovers a physical cultural resource, such as (but not limited to) archaeological sites, historical sites, remains and objects, or a cemetery and/or individual graves during excavation or construction, the following steps shall be taken:

1) Stop all works in the vicinity of the find, until a solution is found for the preservation of these artefacts, or advice from the relevant authorities is obtained;
2) Immediately notify a foreman. The foreman will then notify the Construction Manager and the Environment Officer (EO)/Environmental Manager (EM);
3) Record details in Incident Report and take photos of the find;
4) Delineate the discovered site or area; secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities take over;
5) Preliminary evaluation of the findings by archaeologists. The archaeologist must make a rapid assessment of the site or find to determine its importance. Based on this assessment the appropriate strategy can be implemented. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage such as aesthetic, historic, scientific or research, social and economic values of the find;
6) Sites of minor significance (such as isolated or unclear features, and isolated finds) should be recorded immediately by the archaeologist, thus causing a minimum

disruption to the work schedule of the Contractor. The results of all archaeological work must be reported to the Ministry/Agency, once completed.

7) In case of significant find the Agency/Ministry (Agency for Protection of National Heritage or Archaeological Research Centre, should be informed immediately and in writing within 7 days from the find (ref. law on heritage protection).
8) The onsite archaeologist provides the Heritage team with photos, other information as relevant for identification and assessment of the significance of heritage items.
9) The Ministry must investigate the fact within 2 weeks from the date of notification and provide response in writing.
10) Decisions on how to handle the finding shall be taken by the responsible authorities. This could include changes in the layout (such as when finding an irremovable remain of cultural or archaeological importance) conservation, preservation, restoration and salvage;
11) Construction works could resume only after permission is granted from the responsible authorities.
12) In case no response received within the 2 weeks period mentioned above, this is considered as authorisation to proceed with suspended construction works. One of the main requirements of the procedure is record keeping. All finds must be registered. Photolog, copies of communication with decision making authorities, conclusions and recommendations/guidance, implementation reports ± kept. Additional information Management options for archaeological site x Site avoidance. If the boundaries of the site have been delineated attempt must be made to redesign the proposed development to avoid the site. (The fastest and most cost-effective management option)

Mitigation - If it is not feasible to avoid the site through redesign, it will be necessary to sample it using data collection program prior to its loss. This could include surface collection and/or excavation. (The most expensive and time-consuming management option)

- Site Protection - It may be possible to protect the site through the installation of barriers during the time of the development and/or possibly for a longer term. This could include the erection of high visibility fencing around the site or covering the site area with a geotextile and then capping it with fill. The exact prescription would be site- specific.

Management of replicable and non-replicable heritage: Different approaches for the finds apply to replicable and non-replicable heritage. Replicable heritage Where tangible cultural heritage that is replicable and not critical is encountered, mitigation measures will be applied. The mitigation hierarchy is as follows:

- Avoidance;
- Minimization of adverse impacts and implementation of restoration measures, in situ;
- Restoration of the functionality of the cultural heritage, in a different location;

Replicable cultural heritage is defined as tangible forms of cultural heritage that can themselves be moved to another location or that can be replaced by a similar structure or natural features to which

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the cultural values can be transferred by appropriate measures. Archaeological or historical sites may be considered replicable where the particular eras and cultural values they represent are well represented by other sites and/or structures.

- Permanent removal of historical and archaeological artefacts and structures ;
- Compensation of loss - where minimization of adverse impacts and restoration not feasible.

Non-replicable heritage - Most cultural heritage is best protected by in situ preservation, since removal is likely to result in irreparable damage or even destruction of the cultural heritage. Nonreplicable cultural heritage must not be removed unless all of the following conditions are met:

- There are no technically or financially feasible alternatives to removal;
- The overall benefits of the project conclusively outweigh the anticipated cultural heritage loss from removal; and Any removal of cultural heritage must be conducted using the best available technique advised by relevant authority and supervised by archaeologist.

Annexure 10.6. Guidelines for Sediment Control

Right at the initial stage of the work, the operations such as clearing and grubbing, corridors, roadway and drainage excavation, embankment / sub-grade construction, bridges and other structures across, pavement courses and shoulders are undertaken. These activities generate huge wastes and debris, which should not find their way into drainage channels and water courses nor should remain exposed to wind at the site and allowed to erode and contaminate productive soils or generate windblown dust particles in the atmosphere.

Erosion and sediment control measures shall, therefore, be planned to prevent soil erosion and sedimentation. These measures may involve temporary measures at construction stage, such as of temporary berms, dikes, sediment basins, slope drains, use of temporary mulches, fabrics, mats, seeding or other control devices .Permanent erosion control measures aim at preventing erosion during the project life cycle and should be planned as a part of the project design. These may involve turfing or pitching the embankment Slopes, turfing / mulching / vegetating the exposed areas, vegetating or reinforcing the cut slopes by appropriate methods such as shot-creting, rock bolting, soil-nailing, gabions etc.

Sediment control, whether temporary or permanent, would be mostly project and site specific. However, some of the generic measures shall be as follows.

- Debris generated at construction site must be removed immediately and dumped at the designated dump sites after useful recyclable materials are sorted out, and properly stocked or stacked.
- The site cleared after removal of debris would usually be prone to erosion. These areas should be treated by mulching and other dust palliation measures.
- There could be many mulching options such as seeding top soil and spreading the mulch (organic) to permit growth of grass, or other methods like mulches of tiles, brick bats, stone chips, or any other non-erodible wastes, which cover the exposed soil, allow moisture to be retained within soil and prevent erosion.
- Dust palliation measures by any suitable commercially available dust palliatives, application of water, cement and lime emulsion in thin application to bind the dust particles together.
- All slush at construction sites, which after drying up become erodible must be either dredged and removed or treated appropriately in-situ (say by mulching).
- Temporary drains combined with sedimentation tanks should be created at the periphery or edge of the work sites to arrest the sediments brought by rains or construction activities requiring water and discharge only sediment free water into the water courses.

Annexure 10.7. Guidelines for Muck Disposal and Site Management

The following points shall be considered and followed as guidelines for finalization of the areas to be used as dumping sites:

- The dumping sites shall be selected as close as possible to the project area to avoid long distance transport of muck.
- The site shall be free from any landslides or creep and care shall be taken that the sites do not have a possibility of toe erosion and slope instability.
- There shall be no active channel or stream flowing through the dumping sites. The site should be away from human settlement areas and it is to ensure that no residential areas are located downwind side of these locations.
- Dumping sites shall be located at least 1000 m away from sensitive locations like Settlements, Water body, notified forest areas, Sanctuaries or any other sensitive locations.
- Public perception about the location of debris disposal site has to be obtained before finalizing the location.
- Permission from the Villager/local community shall be obtained for the Disposal site selected.
- The Plan must be approved by IE/CSC/PMC and/or KRIDE.

A. PRECAUTIONS TO BE ADOPTED DURING DISPOSAL OF MUCK

The contractor shall take the following precautions while disposing off the muck/debris:

- Contractor will look into wind direction during disposal and ensure that no dust issues arise
- During the site clearance and disposal of muck, the contractor will take full care to ensure that public or private properties are not damaged/ affected.
- Contractor will dispose-off muck/debris at the identified places or at other places only with prior permission of Engineer-in-Charge of works.
- In the event of any muck or debris from the sites being deposited on any adjacent land, the contractor will immediately remove all such spoil debris and restore the affected area to its original state to the satisfaction of the Engineer-in-Charge of works.
- At all times, the contractor will ensure that the canals and drains within or adjacent to the site are kept safe and free from any debris.
- Contractor will utilize effective water sprays during the delivery and handling of materials when dust is likely to be created and to dampen stored materials during dry and windy weather.
- Materials having the potential to produce dust will not the loaded to a level higher than the side and tail boards and will be covered with a tarpaulin in good condition.
- Any diversion required for traffic during disposal of debris shall be provided with traffic control signals and barriers after the discussion with local people

and with the permission of Engineer-in-Charge of works.

- ❖ During the debris disposal, contractor will take care of surrounding features and avoid any damage to it.
- ❖ Some of the dumpsites could be used either for plantation or for growing agricultural produce
- ❖ Care should always be taken to maintain the hydrological flow in the area.
- ❖ Display Boards: The capacity of the disposal locations, name of the location, etc. shall be written in an Information board at each identified disposal locations.

B. PROPOSED DESIGN

Contractors need to get approvals for specific design for each identified disposal area.Contractor needs to plan the disposal in the following way.

- Identify the disposal area
- Need to record the present land use and condition of the area
- Consult with all stake holders
- Get written agreements from all concerned
- Prepare a suitable design for the safe disposal
- Construct all required structures (e.g. retaining wall)
- Planting of fast growing poplar trees on the outer portion of the retaining wall in theform of a linear wall parallel to the retaining wall
- Estimate the quantities
- Compact of the materials after disposal
- Prepare a Contractors muck debris disposal plan with design drawings for each identified area

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Annexure 10.8. Guidelines for Debris Disposal and Site Management

SELECTION OF DISPOSAL SITES:

The locations of Disposal sites have to be selected such that:

- No residential area are located downwind side of these locations,
- Disposal sites are located at least 1000 m away from sensitive locations like Settlements, Water body notified forest areas, Sanctuaries or any other sensitive locations.
- Disposal sites do not contaminate any water sources - rivers, lakes, etc. for this site should be locatedaway from water body and disposal site should be lined properly to prevent infiltration of water.
- Public perception about the location of debris disposal site has to be obtained before finalizing thelocation.
- Permission from the Village/local community is to be obtained for the Disposal site selected.
- Environment Engineer of CSC and Executive Engineer of Contract Management Unit mustapprove the Plan.

PRECAUTIONS TO BE ADOPTED DURING DISPOSAL OF DEBRIS / WASTE MATERIAL

The Contractor shall take the following precautions while disposing off the waste material

- During the site clearance and disposal of debris, the Contractor will take full care to ensure that public or private properties are not affected, there is no dwellings below the dumpsite and that the traffic is not interrupted.
- The Contractor will dispose-off debris only to the identified places or at other places only with prior permission of Engineer-in-Charge of works.
- In the event of any spoil or debris from the sites being deposited on any adjacent land, the Contractor will immediately remove all such spoil debris and restore the affected area to its original state to the satisfaction of the Engineer-in-Charge of works.
- The Contractor will at all times ensure that the entire existing canal and drains within and adjacent to the site are kept safe and free from any debris.
- Contractor will utilize effective water sprays during the delivery and handling of materials when dust is likely to be created and to dampen stored materials during dry and windy weather.
- Materials having the potential to produce dust will not the loaded to a level higher than the side and tail boards and will be covered with a tarpaulin in good condition.
- Any diversion required for traffic during disposal of debris shall be provided with traffic control signals and barriers after the discussion with local people and with the permission of Engineer-in- Charge of works.
- During the debris disposal, Contractor will take care of surrounding features and avoid any damage to it.

While disposing debris / waste material, the Contractor will take into account the wind direction and location of settlements to ensure against any dust problems.

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GUIDELINES FOR REHABILITATION OF DISPOSAL SITES

The dumpsites filled only up to the ground level could be rehabilitated as per guidelines below and to be decided by the Engineer and the supervision consultant

- The dumpsites have to be suitably rehabilitated by planting local species of shrubs and other plants. Local species of trees has also to be planted so that the landscape is coherent and is in harmony with its various components.
- In cases where a dumpsite is near to the local village community settlements, it could be converted into a play field by spreading the dump material evenly on the ground. Such playground could be made coherent with the landscape by planting trees all along the periphery ofthe playground.
- Some of the dumpsites could be used either for plantation or for growing agricultural producesuch as ginger, turmeric or oranges etc.
- Care should always be taken to maintain the hydrological flow in the area.

Possible impacts due to the excavated debris materials:

If not disposed-off properly what would be the expected scenario? This is described in the following sections.

1 Obstruction to natural watercourses

The materials if not disposed off properly would be taken by the running water to the lowest portionof the valleys/streams creating huge obstruction to free flow of natural stream water. If people were residing nearby that would affect their life by way of flooding or by spoiling the premises.

2 Siltation in surface water reservoir

Most of the materials would be ultimately taken down stream through rivers and ultimately depositingin to reservoirs leading to heavy siltation. This in turn would reduce the reservoir capacity substantially within a very short span. This could incur huge losses to the exchequer. Desiltation isalso expensive and normally carried out after many years of operation of reservoirs in the natural circumstances.

3 Soil Erosion

Massive soil erosion is the most direct impact of the debris excavation. The precipitation and the consequent run off would erode the loose materials by way of suspension and solution. Once reached up to the mainstream courses even the big boulders would be transported down due to the steep gradients available along the stream courses.

4 Spoiling of Agricultural land

As a usual practice mainly due to poor planning and limited resources, the Contractor usually throw the materials to the nearby valley areas. This would be taken down to the private agricultural areas. The farmer will incur huge losses and may even sue the Contractor. As a result the project could be stopped indefinitely leading to losses for the people of the State.

5 Destruction of Agricultural crops

Destruction of agricultural crops immediately down the hill will require crop compensation

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there by reducing the profit margin of the Contractor.

Identification of Disposal Areas:

The Contractor should also try to make use of all disposal areas identified during the project preparation stage. If the corridor execution is approaching hilly area, rolling terrain, mountainous area or rocky area then importance should be given to screening i.e., to screen the debris into useful materials.Useful stones can be utilized as construction material and non-useful can be used as development of the public, social and cultural properties as already written above such as parking places, school playground, bus bays, ground near any temple and Mosque so that people participation can be assuredin the implementation of the project. So it would be good if NGOs are introduced to perform this task more efficiently.

In order to maximize the profits or at least to reduce the expenditure, the contractor usually resorts tohis own methods. In that process Contractor could find a more number of feasible areas.

Disposal methods and its limitations:

There are several constraints in the disposal of materials in the identified locations. Required measures to be followed include the following :

- Most of the disposal areas would require construction of retaining walls, as per site requirement.
- Disposal areas would require compaction
- Disposal areas would require plantation
- No overloading and should be in small trucks or dumpers
- Need to transport safely with covered trucks using tarpaulin
- Consultation with all concerned
- Written permission form all concerned
- To transport through difficult haul roads- may require maintenance

Local community Groups

At each identified debris disposal locations, it is necessary to form local community groups. Entrust the duty of the supervision and all other assistance to dumping process. Ultimately the disposed area should be compacted using road rollers.

Information display boards

The capacity of the disposal locations, name of the location, etc. shall be written in an informationboard at each identified disposal locations.

Proposed design:

Contractor needs to plan the disposal in the following way

- Identify the disposal area
- Need to photograph the present land use and condition of the area
- Consult with all stakeholders
- Get written agreement from all concerned
- Prepare a suitable design for the safe disposal
- Construct all required structures (e.g. retaining wall)

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- Planting of fast growing popular trees on the outer potion of the retaining wall in the form ofa linear wall parallel to the retaining wall
- Compact of the materials after disposal
- Prepare a Contractors debris disposal plan with design drawings for each identified area
- With regards to plan, there would be only one disposal plan with small changes for each location. Contractors need to get approvals for specific design for each identified disposal area.

Penalties:

Stringent action & penalties for dumping of materials in locations other than the pre-identified locations is to be worked out to avoid clandestine disposal in the midnight hours. There are several cases of dumping of material randomly in many locations.

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Annexure 10.9. Guidelines for Preparing Comprehensive Waste Management Plan

A. Overview

A comprehensive waste management plan shall be prepared by the contractor prior to initiation of any works. The purpose of the plan is to provide standardized procedures for the clearance, removal and disposal of waste generated during the construction work as well as to establish the most efficient and cost effective methods to resolve waste disposal issues.

B. Preparation of Comprehensive Waste Management Plan

The Contractor should prepare a Comprehensive Waste Management Plan to be submitted to Sr. Environmental Specialist of the Independent Engineer for approval prior to setting up of construction and labour camp and it should comprise the following details:

- Categorization of waste into degradable, biodegradable and hazardous categories and list out different types of waste that falls in each of these categories
- Estimates about the quantity of waste generated in each category and type of storage units required.
- Detail the provisions for storage and handling of waste until disposed. A plan of the respective camps / areas like construction camp, labour camp etc. to be attached indicating the space allocated for storage and handling of wastes.
- Detail the precautions to be taken while storing, handling and disposing each type of waste, trainings to be imparted to workers to create awareness about waste management.
- Details of each debris disposal site
- Copy of approved site identification report along with location plan on a village map showing the waste disposal sites, its survey no., access road, project stretch, distance from the project stretch, surrounding features and land use (like residences, agricultural land, water bodies etc.), photograph of the site showing the topography and other existing features.
- All staff and workers involved in the highway construction should be imparted training about comprehensive waste management plan including the need for such a plan, its components and measures adopted by the contractor for implementing it. In addition, all personnel involved should be made aware about various steps and measures each of them has to follow so as to ensure the compliance to the comprehensive waste management plan.
- Precautions to be adopted during disposal of waste material

The contractor shall take the following precautions during transportation and disposal of

waste material:

- A register should be kept for recording the details of the waste generated and their disposal.
- The pre-designated disposal sites should be a part of Comprehensive Solid Waste Management Plan and should be identified prior to initiation of any work on a particular section of the corridor.
- The contractor will take full care to ensure that public or private properties are not damaged/ affected during the site clearance for disposal of debris and the traffic is not interrupted.
- In the event of any accidental spill or spread of wastes onto adjacent parcels of land, the contractor will immediately remove all such waste material/s and restore the affected area to its original state to the satisfaction of Sr. Environmental Specialist of the Independent Engineer.
- Contractor should ensure that any spoils / materials unsuitable for embankment fill shall not be disposed off near any water course; water body; agricultural land; flood plains, forests etc. pasture; eroded slopes; and in ditches, which may pollute the surrounding.
- Contractor should ensure effective water sprinkling during the handling and transportation of materials where dust is likely to be created.
- Materials having the potential to produce dust will not be loaded beyond the side and tail board level and will be covered with a tarpaulin in good condition.

C. Waste Disposal in Construction Camp

- Concrete flooring and oil interceptors should be provided for hot mix plant area, workshops, vehicle washing and fuel handling area.
- POL (petroleum, oil and lubricants) waste shall be stored safely in separate containers and should be disposed-off by transfer only to recycler / re-refiners possessing valid authorization from the State Pollution Control Board.
- Used lead batteries, if any, should be disposed as per the Batteries (Management and Handling) Rules 2001.
- Water separated and collected from oil interceptor should be reused for dust suppression.
- There should be a register to record the details of the oil wastes generated at the workshops and oil storage areas.
- The Contractor will provide separate garbage bins in the camps and ensure that these are regularly emptied and disposed-off in safe and scientific manner as per the Comprehensive Solid Waste Management Plans approved by the IE.
- No incineration or burning of wastes shall be carried out.

- Discarded plastic bags, paper and paper products, bottles, packaging material, gunny bags, hessian, metal containers, strips and scraps of metal, PVC pipes, rubber and poly urethane foam, auto mobile spares, tubes, tires, belts, filters, waste oil, drums and other such materials shall be either reused or will be sold / given out for recycling.
- Septic tank must be provided for toilets and the sludge should be cleared by municipal exhausters.

D. Waste Disposal in Labour Camp

- The Contractor should provide separate garbage bins in the camps for bio- degradable, non-biodegradable and domestic hazardous waste and ensure that these are regularly emptied and disposed-off in safe and scientific manner.
- The disposal of kitchen waste and other biodegradable matter shall be carried out in pits covered with a layer of earth within the camp site to avoid smell and pests. The contractor may use the compost from such wastes as manure in the plantation sites.
- Noon-biodegradable waste like discarded plastic bags, paper and paper products, bottles, packaging material, gunny bags, metal containers, strips and scraps of metal etc. and other such materials shall be either reused or should be sold /given out for recycling.
- No incineration or burning of wastes should be carried out.
- Effluent treatment system like septic tank with soak pits provided for toilets should be sited, designed, built and operated in such a way that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place.
- Soak pits must be provided to collect waste water from bathrooms and kitchen.

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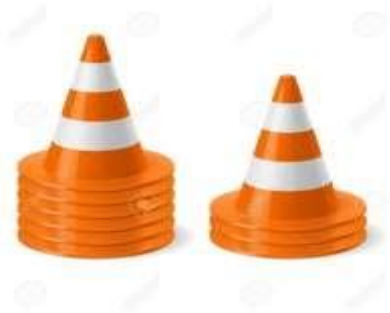
Annexure 10.10. Guidelines for Preparation of Traffic Management Plan

The Contractor shall at all times carry out work on the corridor in manner creating least interference to the flow of traffic with the satisfactory execution. For all works involving improvements to the existing state highway, the Contractor shall, in accordance with the directives of the Sr. Environmental Specialist of the Independent Engineer (IE), provide and maintain, during execution of the work, a passage for traffic either along a part of the existing carriageway under improvement, or along a temporary diversion constructed close to the state highway. The Contractor shall take prior approval of the IE regarding traffic arrangements during construction.

Traffic Safety and Corridor Works



- Delineate advance warning zones, transition zones and construction zones at both ends of a work front. Use devices such as regulatory signs, delineators, barricades, cones, pavement markings, lanterns and traffic control lights, reflectors and signal men in appropriate manner round the clock.
- No work front should be 'touched' without putting appropriate safety measures in place. Sr.
- Environmental Specialist of the Independent Engineer will be responsible to ensure that the permission for any activity is not given without the required safety plan and practices in place.

- Put signage at appropriate locations as per the Corridor construction activity plan to warn the road users, construction vehicles / equipment operators, pedestrians and local residents about the work in progress, speed controls, hindrances / blockages, diversions, depressions etc. in lines with contract requirements and IRC guidelines.

- Signage has to be: (i) simple, easy-to-understand and should convey only one message at a time; (ii) has florescent and reflective properties of the paints; (iii) broad, prominent and with appropriate size of letters and figures;
(iv) placed at the appropriate 'point/s' as specified in the IRC guidelines to allow proper stoppage / reaction time to approaching vehicles.

- Express a regret signage for the inconvenience caused and alert about the dangers ahead on account of construction

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activity.

- Different sign boards shall have a mix of pictorial signs and messages in local language, Hindi and English.
- While using barricades, ensure that traffic is kept away from work areas and the road user is guided to the safe, alternative movement track.
- Ensure that excavation sites are provided with effective barriers and reflecting signage to prevent any accidental approach by vehicles during the day or night.
- Provide proper uniform (light reflecting garments) to flagmen engaged in traffic control at diversions so that they can be singled out from the moving traffic.
- Prevent entry of cattle and wildlife through proper fencing / barricading around the excavation sites.
- Provide wide red and green flags or red and green lights to flagmen for controlling traffic. In high traffic zones and congested areas, use of wireless communication devices with protective headgear and shoes by flagmen has to be ensured to prevent confusion and minimize the risk of accidents.

Ensuring Traffic Control

- Where the execution of the works requires temporary closure of road traffic use, the Contractor should provide and maintain temporary traffic diversions. The diversions should generally consist of 200 mm thickness of gravel laid directly upon natural ground and earthworks.
- Where the execution of the works requires single-lane operation on public road, the Contractor should provide and maintain all necessary barriers, warning signs and traffic control signals.
- At the points where traffic is to deviate from its normal path (whether on temporary diversion or part width of the Carriageway) the lane width path for traffic should be clearly marked with the aid of pavement markings and painted drums or a similar device. At night, the passage should be delineated with lanterns or other suitable light source.
- One-way traffic operation shall be established whenever the traffic is to be passed over part of the carriageway inadequate for two-lane traffic. This should be done with the help of temporary traffic signals or flagmen kept positioned on opposite sides during all hours. For regulation of traffic, the flagmen should be equipped with red and green flags and lanterns / lights.
- On both sides, suitable regulatory / warnings signs as approved by the IE shall

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be installed for the guidance of road users. On each approach, at least two signs shall be put up, one close to the point where transition of carriageway begins and the other 120 m away. The signs should be of design and of reflector type.

- Upon completion of the works for which the temporary traffic arrangements or diversions have been made, the Contractor should remove all temporary installations and signs and reinstate all affected roads and other structures or installations to the conditions that existed before the work started.

Annexure 10.11. Guidelines to Ensure Worker's Safety During Construction

Construction site safety is a very significant facet of construction-related activities with great concern towards protection of construction site workers and others from death, injury, disease or other health-related risks. Construction is land-based activity where site workers may be exposed to various risks and hazards. Site risks can include working at height, moving machinery (vehicles, cranes, etc.) and materials, power tools and electrical equipment, hazardous substances, plus the effects of excessive noise, dust and vibration. The leading causes of construction site fatalities are falls, electrocutions, crush injuries, and caught-between injuries. Following are the good and mandatory Worker's Safety practices to be adopted at work sites by all workers and the Contractor should ensure the adoption of all safety practices at site and aim for zero accident project activities.

A. Tree Felling

- Use hard hats during tree felling
- Ensure safe use and storage of tools such as axes, power chain saw, hand saw of different types, HDPE ropes of approved thickness to drag felled trees and logs.
- Keep the saw blades in proper lubrication and sharpened state for efficient workability.
- Determine proper foot and body position when using the implements for felling, cutting and dragging.
- Wear appropriate foot protection
- Avoid cutting overhead branches
- Keep first aid kits ready at the site.
- Determine possible hazards in the area, e.g. electrical or telephone or other utility lines, buildings, vehicles and domestic cattle that may create unsafe work situations.
- Prior to felling, determine the safest direction of fall and orient fixing of ropes and cutting positions accordingly.
- Determine the proper hinge size before directing the fall.
- Keep machineries and workers ready for speedy removal of the tree from the main traffic movement area.
- Keep flag men and warning signal signage at either end of felling area to control movement of traffic and warn passers-by

B. Plant Sites, Construction Camp and Quarry Areas

- Install perimeter fencing
- Ensure good visibility and safe access at site entrances
- Provide adequate warning signs at the entrance and exit, as necessary
- Provide adequate space / area for loading and unloading, storage of materials, plant and machinery
- Display emergency procedure and statutory notices at conspicuous locations
- Provide areas for collecting garbage and other waste material, and also arrange for their regular / periodic disposal.
- Arrange appropriate storage, transportation and use of fuel, other flammable materials and explosives in line with the license requirements obtained from concerned authorities
- Provide defined access roads and movement areas within the site
- Ensure availability of first aid facilities and display notices at various work

places showing the location of first aid facilities and emergency contact numbers

- Provide and enforce use of PPE at plant and quarry sites

C. House Keeping Practices

- Provide proper slope in kitchen, canteens, washrooms, toilets and bathrooms for easy and immediate draining of water
- Keep all walkways and circulation areas clear and unobstructed at all times
- Ensure that spillages of oil and grease are avoided and in case of accidental spills, these should be collected immediately
- Use metal bins for collection of oily and greasy rags
- Stack raw materials and finished products out of walkways
- Do not leave tools on the floor or in any location where they can be easily dislodged
- Keep windows and light fittings clean
- Maintain the workplace floors dry and in a non-slippery condition
- Provide and maintain proper drainage system to prevent water logging and unhygienic conditions
- Ensure that protruding nails in boards or walls are moved or bent over or removed so that they do not constitute a hazard to people
- Store all flammable materials in appropriate bins, racks or cabinets with proper cover and labels as required for various products
- Make sure that hazardous / dangerous chemicals are kept in the goods stores with the appropriate labeling, display of the material-safety-data-sheet (MSDS) and other precautionary measures.
- Display 'no smoking' signs in areas with high risks of fire, (e.g. near fuelling areas, diesel /oils / lubricant /paint storage area, hessians, rubber, wood and plastic etc.) in and around working area

D. Safety during Excavation

- The risk of accidents involving people and vehicles remains high in excavated sites. All pits or excavations shall to be barricaded to warn the road users and residents and to avoid any unauthorized entry of persons, children, domestic cattle or wildlife. For deep excavations and culvert construction sites, painted GI sheets, delineators, lamps (as required) and retro-reflective signage shall be used.
- Excavation more than 1.5 m is to be done in steps of minimum 500 mm offsets with plank and stuttering support, as required under contract clauses.
- For excavation in slippery or water logged area, try to dewater the area and spread minimum 150 mm thick sand layer to avoid slipping.
- For excavation for drain, the area should be properly barricaded with sign boards and illumination / lamps for night time safety. In congested stretches, watchmen / guards can also be placed for vigil.
- Snake bites or Scorpion stings during excavation - in areas with vegetation, tall grasses and forest cover, the contractor shall provide the labour with gum boots and gloves. He shall also make snake antidotes available on site. Emergency vehicles should also be kept ready to rush the patient to the nearest hospital.

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E. Safety during Some Typical Construction Work

Centering and Scaffolding

- Many a times ballies joined together give away due to weak joints. Use of metal scaffolding and centering plates with metal fasteners are the safest and highly recommended materials for use in all project construction works for ensuring safety, stability and casting of structures. All such scaffolding should be placed on a firm and a level base on the ground for ensuring stability. No wooden scaffolding or bamboo scaffolding is to be used for any casting of heavy (RCC) structural construction as the risk to safety of workers is higher.
- Railings are to be provided along working platforms and ladders for better safety. Nets shall be hung below the scaffolding or structures where work is on-going to prevent fall of debris, stones, bricks, equipment and other heavy to retain soil objects and even workmen, which could be fatal.

Form-work for small/light beams and slabs

- The collapse of bottom of the beam that may bring down the slab as well is a risk in such operations, which may injure the labour or supervision staff. Slender ballies without bracing are not be allowed for such works. No concreting should be allowed without bracing at 300 mm above ground and at midway for normal beams and slabs. The bracings should be for the support of beams as well as the slabs.
- Direct ballies support from the ground and the practice of tying planks with binding wire to the steel reinforcement shall not be allowed. A temporary railing and properly based working platforms along the periphery of slab reduces risk to the life of labour and supervision staff.

Dismantling of Scaffoldings

- Dismantled materials may fall on passer-by and workers. Workers could also get injured during the removal of such materials. Prior to dismantling of scaffoldings / working platforms, the area of operation should be closed for all outsiders. No one should be allowed within 50 m. from the place of demolition.
- Helmets, safety belts and other PPE must be worn by all the workers engaged in such a work. This work requires careful handling by an experienced supervisor / work force and should be executed with utmost caution. Gradual dislodging and use of PPE is required.

Column Reinforcements

- The tendency of bar-benders is to tie the vertical steel with coir rope or 8 mm steel rods as ties on all four sides of the column reinforcements. Reinforcement to columns shall be by welding MS rods with metal scaffolding to keep it in position till the final casting of RCC is done.

Falling of Objects or Debris from a Height

- At bridges construction sites (or in work areas at a height above ground level) thick nylon net or hessian barriers shall be used to prevent any splinter, debris, mortar or concrete from falling onto the passersby or workmen around.

Site Cleaning

- Throwing of waste materials, broken concrete pieces, brick bats, sand etc. straight from the top of a structure onto the ground can injure a worker or a passerby. Such materials should be brought to the ground with the help of lift or the use of rope over pully with a bucket.

Operation of Excavators

- Ensure that excavators are operated by authorized persons who have been adequately trained.
- Prevent any unauthorized use of the excavators.
- Ensure that only experienced and competent persons are engaged in supervising all excavations and leveling activity.
- Check and maintain as per the manufacturer's manual.
- Issue relevant information, including that related to instructions, training, supervision and safe system of work in writing and provides expert supervision for guidance.
- Ensure that the operation and maintenance manuals, manufacturer's specifications, inspection and maintenance log books are provided for the use of the mechanics, service engineers or other safety personnel during periodic maintenance, inspection and examination.
- During tipping or running alongside the trenches, excavators must be provided with stop blocks.
- Excavators must be rested on firm ground after field operation away from the road
- Locate and identify underground services including telephone cables, OFC cables, sewerage and drainage lines, water supply, electrical cables etc. by checking with all concerned underground utility providers.
- When reversing or in cases where the operator's view is restricted, adequate supervision and signaling arrangements shall be provided.
- Ensure that the type and capacity of the excavator are properly chosen for the intended purposes and site conditions. Never use a machine for any purposes other than it is designed for.
- Check and report for excessive wear and any breakage of the bucket, blade, edge, tooth and other working tools of the excavator and ensure replacement / repair to avoid mishap and break down.
- Check that all linkages / hinges are properly lubricated and linkage pins are secured. Never use improper linkage pins.

Operation of Trucks and Dumpers

- Ensure that only trained, authorized and licensed drivers operate the vehicles.
- Switch-off the engine when not in use to save fuel, prevent accidents and unnecessary noise and air pollution.

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- Lower the tipping bodies when the machine is unattended, but if it is necessary to leave them in the raised position they should be blocked to prevent their fall by fixing a sturdy support below.
- Carryout periodic servicing as per the manufacturer's requirements
- All records of maintenance and repairs should be in writing and available for verification.
- Keep the vehicle tidy and the cabin free from clumsy utilities, which might obstruct the controls and create hazards.
- Follow safe driving principles including speed limits as per traffic signage.
- Avoid carrying additional passengers in the cabin or on the body of the dumper, while in field operation other than the connected workers.
- Provide stop blocks when the vehicle is tipping into or running alongside excavations or when it is parked.
- Do not overload the vehicle.
- Carry only well secured loads and use proper covers and fasteners.

Manual Handling and Lifting

- Avoid manual handling of heavy and hazardous objects and chemicals.
- Pre-assess the actual requirement of manpower in case of emergency situations.
- The hazardous and poisonous materials should not be manually handled without proper equipment /gears and prior declaration of the risks needs to be made to the involved workers.
- All concerned persons shall be trained in proper methods of lifting and carrying.
- In all manual operations where groups of workers are involved, a team leader with necessary training to handle the entire work force in unison has to be provided for.
- Watch and ward to control / supervise / guide movement of equipment and machineries, loading and unloading operations, stability of the stockpiled materials and irregularly shaped objects have to be provided for safety and security of workers.
- Carriageway used by the workers must be free from objects, which are dangerous.
- Loading and unloading from vehicles shall be under strict supervision.

Gas Welding

- The welders and welding units should follow all the basic principles of welding for safety and security
- Use face shield to protect the eyes
- Use goggles, particularly when chipping slag and cutting strips.
- Use gloves long enough to protect wrists and forearms against heat, sparks, molten metal and radiation hazards.
- Use high-top boots / gum

boots to prevent sparks, splinters, sharp edges of metal and hot welded strips, welding rods, electric cables etc. from injuring the legs.

- Avoid inhaling the noxious fumes and gasses from burning electrodes by using gas masks and screen of the work area to prevent the glare moving outside it.
- Keep the key hung from the regulator control for split seconds operations to stop the valve in case of any accidental damage or leakage to supply pipeline that may catch fire and cause accidents in case acetylene or LPG cylinder.
- The welding area should have sufficient openings with fixed exhaust ventilators or adequate air flow openings to remove poisonous fumes and gases.
- Take precautions of wearing hard hats or fiber helmets to prevent injury due to fall of any object and accidental injury from projections while welding.
- Welders operating above ground should have adequate safety belt secured to stable platform to prevent accidental fall or injury from the scaffold. All electrical and gas connection lines up to the welder should be sufficiently insulated and protected from sharp edges and sharp objects. These shall not come into contact with hot metal.
- Do not use gas cylinders for supporting work or as rollers. While using LPG or CNG cylinders for welding, follow all safety precautions as has been prescribed by the supplier company.
- Avoid fire hazards and accidents by posting safety supervisors to oversee the activities of workers.
- Do not store explosives, high inflammable materials, loose hanging overhead objects, hot welded strips etc. near gas cylinders.
- Close all valves, switches and circuits while leaving the work place under proper lock and key. In case of mobile units, proper carriage procedure has to be followed for safety and security of men and materials.

F. Electrical Hazards in Construction Areas

- Statutory warning leaflets / posters are to be distributed / displayed by the Contractor in the vicinity of work sites for the benefit of all workers, officers and supervisors as well as the public, indicating the do's and don'ts and warning related to electrical hazards associated with operations to be executed / in progress.
- All wires shall be treated as live wires
- Report about dangling wires to the site-in-charge and do not touch them.
- Only a qualified electrician should attempt electrical repairs.
- Train all workers about electrical safety.
- Shut down the equipment that is sparking or getting over heated or emitting smoke at the time of operation, if it is not the normal way of working of such machines.
- Inform technical person/s for required maintenance.
- Never used damaged wires for electrical connection
- Demolition, tree felling and removal of overhead transmission lines shall be undertaken with strong, efficient and closely monitored arrangements to avoid accidents.

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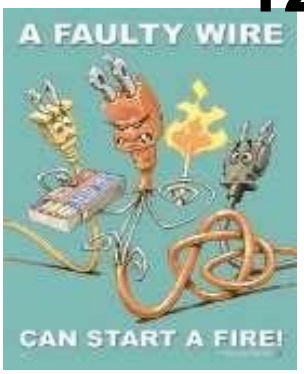

G. Use and Storage of Gas (LPG)

- Store filled LPG cylinder in a secure area – mark this as a no smoking area.
- Transport, store, use and secure cylinders in upright position
- Ensure proper ventilation at the ground level in locations where LPG is in use.
- Avoid physical damage to the cylinders
- Never weld near the cylinder
- Store empty cylinders secured and upright
- Make sure that the cylinder is closed immediately after use
- Investigate immediately if there is the smell of LPG or gas
- Make sure that there is no other unrelated fire in the vicinity of the cylinder.

H. Fire Safety Practices

- Store flammable material in proper areas having adequate fire protection systems
- Display sufficient warning signs
- Install fire alarm wherever required and test regularly.
- Inspect fire extinguishers regularly and replace as necessary.
- Train selected personal on use of fire extinguishers
- Fire escape route should be kept clear at all times and clearly indicated
- Train workers about the escape route and assembly point/s.
- Carryout fire drill periodically When fire breaks out alert all persons through fire alarms or other methods.
- Put off the fire with appropriate fire extinguishers only when you are sure that you are safe to do so.
- Escape if you are in danger through the fire escape route to assembly point.

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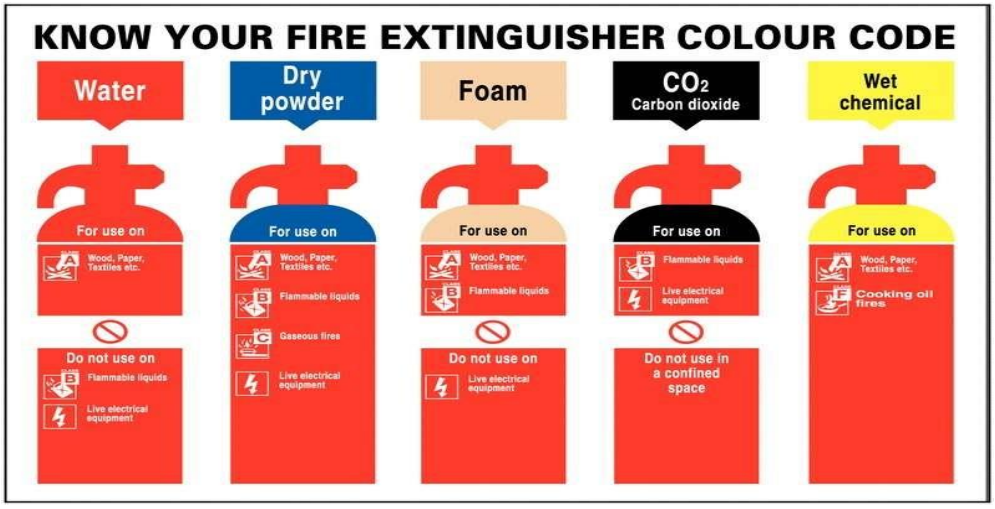
- Call-up Fire Service
- Fire officers to carryout head count at the assembly point.



I. Noise Hazards and its Control

- Plan camp lay-out in a manner that ensures barriers /buffers between residential / office units and high noise generating zones.
- Use sound meters to measure the level of noise and if it exceeds 75 dB (A), then ensure preventive measures.
- Make personnel aware of noisy areas by using suitable warning signs and insist on use of ear protectors / ear plugs to prevent excess noise affecting the workmen.
- Reduce noise at source by: use of improved equipment; regular and proper maintenance of the machinery as per the manufacturer's manual; by replacing rickety and noisy equipment and machineries.
- Screening locations with noise absorbing material; making changes in the process / equipment; controlling machine speeds; ensuring that two noise-generating machines are not running at the same time close to each other at same location; using cutting oils and hydraulic noise breakers; providing vibration and noise absorbing platform and firm embedding of equipment with fasteners.
- Appoint a competent person to carry out a detailed noise assessment of the site; designate ear protection zone/s; give training / instructions on the necessary precautionary measures to be observed by site personnel including using suitable type of ear protection equipment.

J. Personal Protective Equipment (General)

- Ensure that sufficient personal protective equipment are provided and that they are readily available for every person who may need to use them.
- Provision of personal protective equipment has to be made over and above all measures taken for removing or controlling safety hazards on a work site.
- The Contractor's Project Manager shall ensure that all persons make full and proper use of the personal protective equipment provided.
- Provide instruction/s and training for the proper use and care of personal protective equipment.
- Ensure that the personal protective equipment is in good condition.

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- Do not willfully misuse, interfere with or mis-handle any protective clothing and equipment provided.
- Ensure that the personal protective equipment is in good condition. Report immediately any damage to the management for replacement. Always keep the personal protective equipment as clean as possible.
- Train workers to report unintentional damages for replacement and to always keep the personal protective equipment clean. PPE includes the following, but may not be limited to the same.

List of personal protective equipment (PPE)

Sl. No.	Part of the body	Personal protective Equipment
1	Eye	Safety glasses, Goggles
2	Face	Face shields
3	Nose	Nose masks
4	Head	Helmets
5	Feet	Safety shoes
6	Hands and Arms	Gloves
7	Body	Vests
8	Hearing	Earplugs, Earmuffs

IMAGES FOR PERSONAL PROTECTIVE EQUIPMENT (PPE)

Eye Protection

- Project construction work sites, quarries and crushers are full of dust particles, sand, splinter, harmful gases, bright light and welding arc lights, which are injurious for the eyes. Therefore, eye protection and adequate lighting in work areas is required. All workers, supervisors and inspection officers and dignitaries coming over for study of works should be compelled to wear eye protecting glasses /goggles properly fitting the eye sockets to prevent damage due to dust, gases and other particles.

Head Protection

- Hard hats are compulsory for all workers, supervisors and managers /officials while working and / or inspecting a work sites. Hard hat areas shall be

demarcated clearly.

Hearing Protection

- Provide ear plugs or ear muffs to the workers and to those who need to get in and out of a high noise area frequently.
- Use re-usable earplugs when the reduction required (15-25 dBA) is not excessive.
- Use earmuffs where a large attenuation of up to 40 dBA is demanded.
- Do not use dry cotton wool for hearing protection because it doesn't provide any such protection.
- Provide disposable ear plugs for infrequent visitors and ensure that these are never re-used.
- Replenish ear plugs from time to time for those who need to work continuously for a long period in a high noise area/s.
- Use ear muffs with replaceable ear cushions because they deteriorate with age or may be damaged in use.
- Avoid wearing spectacles with ear muffs. Use soap and water or the recommended solvent for cleaning ear muffs.

Respiratory (Protective) Equipment

- Wear suitable masks for protection when there is a potential for small particles entering the lungs, e.g. emptying of cement bags, working at crusher sites etc.
- Provide training to all persons using the masks / respirators for their correct fitting, use, limitations and symptoms of exposure.
- Clean and inspect all respirators before and after use
- Store respirators properly when

not in use Safety Footwear

- Wear suitable footwear for work
- Wear suitable safety shoes or ankle boots when working anywhere where there is high risk of foot injuries from slippery or uneven ground, sharp objects, falling objects etc.
- All safety footwear, including safety shoes, ankle boots and rubber boots, should be fitted with steel toecaps.
- Avoid wearing flip flops, high heeled shoes, slippers, light sport shoes in situations where there is a risk of foot injury and keep shoelace knots tight.

Hand Protection

- Wear suitable gloves for selected activities such as welding, cutting and manual handling of materials and equipment.
- Do not wear gloves where there is a risk of them becoming entangled in moving parts of machinery.
- Wash hands properly with disinfectant soap and clean water before drinking or eating.
- Wash hands immediately after each operation on site when the situation warrants.

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K. First Aid

- Provide first aid boxes at every work site in a cool and shaded place.
- Ensure that training on the use of the first aid box is provided to at least every supervisor on the site.
- Display the list of persons along with their contact numbers who are trained on providing first aid.
- Ensure that every first aid box is marked "First Aid" in English and in local language.
- Check for expiry dates and replace the contents, as necessary.
- Maintain a register on health records including injuries / accidents.

L. Accident Investigations

- Carryout the investigation/s as quickly as possible
- Investigation should be carried out both internally as well as through third party.
- Conduct interviews with as many witnesses as necessary including the affected persons and supervising officials.
- Do not rely on any one / limited source of evidence.
- Check all the log books, stock registers, issue registers and movement registers on site
- Safety regulations, traffic signals and signal men activities, signage, as well as other field positions and keep a record of all investigations through audio-visual and electronic medium for presenting an evaluation of the incident/s.
- After completion of the investigation / enquiry, a summary of the facts recorded, sequence of happenings, persons-in-charge, persons examined, equipment and machineries tested, follow-up of action as per legal requirements, copy of station diary entry, hospital entry, safety regulations etc. to be prepared with a comparative analysis for proper assessment.

Annexure 10.12. Guidelines for Storage, Handling, Use and Emergency Response for Hazardous Substances

A. Handling Hazardous Substances (including Chemicals)

- As far as practicable the hazardous materials will be stockpiled under proper mechanical loading, unloading and stacking aided by manual labour where necessary.
- Exercise great care in the storage and use of chemicals because they may be explosive, poisonous, corrosive or combustible.
- Separate different chemicals physically and store accordingly after proper labeling.
- Stock taking of all hazardous will be mandatory together with enforcement of manufacturer's or supplier's safety standard/s and drill exercises.
- New and less known chemicals and building materials, for which toxicological studies are wanted, need to be properly evaluated prior to their inclusion in the materials list.
- All containers should be clearly labeled to indicate contents.
- Maintain the Material Safety Data Sheet of all chemicals for reference on safety precautions to be taken and the use of suitable PPE.
- Ensure use of correct personal protective equipment before allowing workers to handle chemicals.
- When opening containers, ensure holding of a rag over the cap / lid or use of safety gloves, as some volatile liquids tend to spurt up when released.
- Eye fountain, emergency shower and breathing apparatus should be available near the workplace.
- Ensure immediate medical attention in case of spill / splash of a chemical.
- Safety instructions for handling emergency situations shall be displayed prominently at both the storage and use locations.

B. Refueling / Maintenance procedure

- Truck or suitable containers will bring in all fuel and fluids. There will be no storage of fuel, oil or fluids within 200m of a water line.
- Prior to re-fueling or maintenance, drip pans and containment pans will be placed under the equipment. Absorbent blankets may also be required to be placed under the equipment and hoses where there is a possibility of spillage to occur.
- All used oils or fluids will be properly contained and transported to appropriately licensed (authorized) disposal facilities;
- Following re-fueling and maintenance, the absorbent blankets (if any) and spill pans will be picked up and the fuel truck or container moved outside of the 200m wide area.

C. Emergency Spill Procedure

The applicable emergency spill procedure as outlined below and / or as directed by the manufacturer / supplier shall be followed:

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Spill Procedure (inside the stream)

In the case of a spill, overflow or release of fluid into the stream waterway (whether water is flowing during the spill or not), do what is practical and safely possible to control the situation, then get help.

1) Stop the flow

- Stop the release into the stream waterway
- Shutdown equipment
- Close valves and pumps
- Plug hoses

2) Remove Ignition sources

- Shut off vehicles and other engines
- Do not allow tiger torches, vehicles, smoking or other sources of ignition near the area. Keep a fire extinguisher on hand but keep it a safe distance away from the potential ignition source (if a fire starts, the extinguisher must be easily accessible)

3) Contact the Environmental Officer and initiate emergency response

- Notify the site supervisor and the Contractor's Environmental Officer as soon as possible
- The Environmental Officer will review the situation and decide if emergency services like fire brigade are required
- Appropriate parties to be notified of the spill are:
  - The contractor's Project Manager
  - The Engineer through his designated Environmental Officer
  - The Client
  - Regulatory Agencies like Pollution Control Board, Municipal Authorities, as applicable.
  - Site safety Officer

4) Cleanup and Disposal

- Emergency Services will be engaged for the containment, cleanup and disposal of contamination release into the environment.

5) Reporting

- The Contractor's Environmental Officer will document the event and submit repots to the Engineer, the client and appropriate regulatory agencies like the Pollution Control Board.

6) Procedure Review

- The Engineer will review the report, determine if changes are required to be incorporated in the plan of activity under the revised guidelines and recommendation/s that have been suggested by the technicians / manufacturer / supplier / fire brigade / SPCB / Environment Expert of the PIU, as the case may be.

Spill Procedure (on Land)

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In the case of a spill, overflow or release fluid onto land, do what is practical and safety possible to control the situation and then get help.

1) Avoid the flow

- Avoid the release into the water body
- Shutdown equipment
- Close valves and pumps
- Plug hoses

2) Remove Ignition sources

- Shut off vehicles and other engines
- Do not allow tiger torches, vehicles, smoking or other sources of ignition near the area. Keep a fire extinguisher on hand but keep it a safe distance away from the potential ignition source (if a fire starts, the extinguisher must be easily accessible)

3) Contain the Spill

- Dike around the spill to contain the material
- Spread absorbent or place a spill blanket on the spill
- Enlist the help of personnel on site
- Notify your supervisor as soon as possible

4) Notification

Appropriate parties to be notified of the spill are

- The Contractor's Project Manager
- The Engineer through his designated Environmental officer
- The Client
- Regulatory Agencies like Pollution control Board, Municipal Authorities, as applicable
- Site Safety coordinator

5) Cleanup and Disposal

- The Engineer's Environmental officer will ensure that a proper cleanup and disposal method is determined. Absorbent pads will soak up the spilled material. The pads will be contained and removed from site for disposal at a licensed (authorized) facility.

6) Reporting

- The Contractor's Environmental Officer will document the event and submit reports to the Engineer, the Client and appropriate regulatory agencies like the Pollution control Board(s)

7) Procedure Review

- The Engineer will review the report, determine if changes are required to procedures and recommend implementation of all required changes.

Annexure 10.13. Environmental Non-conformity, Corrective & Preventive Action

1.0 Purpose

The purposes of this procedure is to define a system for,

a) To establish compliance with regulations and requirements of EMS policies,

b) Handling and investigation of incidents; mitigation of consequences of incidents,

c) To maintain records for analyzing the data related to nonconformities, incidents and toinitiate appropriate corrective and preventive actions.

d) To take appropriate corrective and preventive action

2.0 Scope

Applicable to all areas, activities and operations carried out by K RIDE, includingactivities carried out by suppliers' contract personnel.

3.0 Associated and reference documents

a) ISO 14001:2004 clause 4.5.3

b) ISO 14001:2014 EMS

4.0 Definitions

c) **Nonconformity** (ISO 14001:2004): Non-fulfillment of a requirement.

d) **Correction:** Action taken to eliminate a detected nonconformity (mitigating an identifiednonconformity)

e) **Corrective action:** Action to eliminate the cause of a detected nonconformity or other undesirable situation (i.e., action taken to prevent recurrence)

f) **Preventive action:** Action taken to eliminate the cause of a potential nonconformity orother undesirable situation (i.e., action taken to prevent occurrence)

5.0 Responsibility

Responsibility is described in the procedural part.

6.0 Procedures

6.1 Operational Nonconformities

Nonconformities with regard to EMS system implementation are

a) Deviation from operational control / system procedures, and

b) Deviation from EMS Management Programs

The above nonconformities may get identified through

a) Monitoring and measurement of key characteristics of EMS elements,

b) Internal audits,

c) Review of emergency preparedness and response,

d) Complaints received from interested parties, and

e) Management review

6.1.1 Nonconformities identified through monitoring and measurement

Whenever nonconformities are identified through monitoring and measurement, the personnel responsible for the monitoring and measurement of a key characteristic should immediately inform it to the concerned Head of dept.

Examples:

1) If smoke emissions from DG set found to be abnormal, it should be informed to the Head of Administration / Site in charge who in turn will take up the issue with concerned contractor forits repair/maintenance.
2) It may be observed during inspection of fire safety control that a particular fire extinguisher found to be damaged / unfit for use; it should be reported to location /area head as well as EMR.

6.1.2. Nonconformities identified through internal audits

Nonconformities identified through internal audits are reported through either NC Report or Audit Observation sheet. In either case, it is the responsibility of the respective auditee /respective HOD to take immediate action to mitigate the nonconformity. Further, corrective and preventive action may be initiated in accordance with procedure EMSP 14 - Corrective and preventive action.

6.1.3. Nonconformities identified through review of emergency preparedness and response

Mock drills are conducted for the identified emergencies as per defined response plan (see EMSP 06); response to an actual emergency is also done as per defined response plan. In both the cases, there is a possibility of some nonconformities gets identified. It can be ineffectiveness of the response plan or deficiency in the plan to mitigate the effects in a timely manner. Whenever such nonconformities are identified, the emergency response team shall report it to EMR who in turn review the causes of nonconformity and initiate appropriate action (Revising the emergency response plan, re-training the team members, improving the techniques / methods used).

6.1.4. Nonconformities identified through complaints received from interested parties

Whenever complaints are received from interested parties, the same should be reported to EMR. Most of the time, such complaints may be traceable to a legal requirement or a significant environmental aspect. EMR shall review the complaints and initiate appropriate actions to mitigate the problem as well as taking action to prevent their recurrences. In certain circumstances, it may have to be discussed in MRM.

6.1.5. Nonconformities identified through management review

Whenever nonconformities are identified though management review, the review committee shall ensure that such nonconformities are appropriately resolved, and necessary directionsare

provided for the executive management members on how similar issues in other operational areas have to be dealt with. EMR shall ensure that required communication takes place in this regard. Following are the typical nonconformities that may get identified inthe management review:

a) Supplier's / Contractor's EMS performance not up to the expectations of

b) EMS management program has observed some lapses;

c) Internal audit were not effective [to prevent the types of nonconformities reportedduring third party (certification body) audits];

d) Induction training given to new employees not effective

6.2. Incident management

6.2.1. Environmental incident

Where the result of an incident / accident has an impact on the Environment (e.g. chemical spills enters storm drain that has the potential to cause water pollution). In such cases, prescribed operational control procedure should be followed. In the absence of such procedure, the operational personnel shall seek advice from EMR.

6.3. Analysis of data

Coordinator(s) shall compile the data related to EMS nonconformities, incidents and analyzeto determine those requiring action or those that can be prevented or if the severity of impactcould be reduced. This information shall be forwarded to the MR for taking up the issue in the Management review .

7.0. Corrective and preventive action

Nonconformity is non-fulfillment of a requirement. A requirement may be stated in relation tothe management system or in terms of environmental performance. Situation may occur where part of the system may not function as intended or environmental performance requirements are not met. System for corrective and preventive action is described in two stages. This procedure addresses all types of nonconformities including, but not limited to,

a) Results of audits.

b) Inputs obtained from measurement & monitoring.

c) Regulatory non-compliances and incidents and accidents

d) Non-conformances with internal objectives and targets

e) Insufficient documentation to evaluate conformance with EMS

f) Non-conformances with respect to existing policies and procedures.

7.1. Corrective action

7.1.1. Below mentioned table details the type of nonconformity, source for its identification, and the mitigation action recommended. Criterion for taking corrective action is described in the subsequent paragraphs.

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Sl. No.	Type of nonconformity (NC)	Source for the identification and reporting of NC	Mitigation action
1	Documentation inadequacy toachieve policy and objectives,and to fulfill standards requirements	Audit – adequacy audit	Review and revision of identified document
2	Responsibilities not definedfor a system activity	Document review – part ofaudit	Review and revision of identified document
3	Pertinent operational document not available at thepoint of use	Audit	Ensure its availability
4	Non-compliance with EMS Legal requirement which wasnot identified	External Communication	Update legal register; establish compliance
5	Legal and other requirementsnot complied with	Evaluation of compliance	Establish compliance for the reported finding
6	Operational control not effective to achieve plannedresults	Management review inputs(related to process performance)	Review and ensure established operational controls are adequate; personnel are competent.
7	Objectives and targets notachieved	Management review inputs;Audit	As decided in the MRM
8	Emergency response noteffective	Emergency response report	Revise Emergency response procedures; trainpersonnel
9	Internal audits are noteffective	External audit	Review by top management and implement the actions proposed
10	Incident occurred is related toan unidentified aspect.	Internal communication	Implement operational controls; update aspect-impact.

7.1.2. Criterion for initiating corrective action

A corrective action is always preceded by cause analysis. Cause analysis may not feasible for all the identified / reported nonconformity. Following criterions shall be applied for variousstеps of corrective action.

Sl. No.	Corrective action steps	Criterion for initiating the corrective actionstep
1	Reviewing nonconformities (NC) forinitiating corrective action.	• If it is a major nonconformity; • It is a minor NC being recurred more than 3times • If it is related to achievement of objective and targets or a legal concern
2	Determining the causes of nonconformities	1) If it is a major nonconformity; 2) It is a minor NC being recurred more than 3times 3) If it is related to achievement of objective and targets or a legal concern
3	Evaluating the need for action to ensurethat nonconformities do not recur	○ If the NC is related to a critical legal requirement (subject for penalization) ○ If it is affecting the business performanceconsiderably
4	Determining and implementing actionneeded	▪ If the NC is related to a critical legal requirement (subject for penalization) ▪ If it is affecting the business performanceconsiderably ▪ Financial viability of the proposed action ascompared to consequences of taking no action
5	Maintaining records of the results ofaction taken	Mandatory for all CA taken
6	Reviewing corrective action taken	Mandatory for all CA taken; to be carried outduring subsequent internal audit

Once it is determined to complete the corrective action process, concerned process owner / functional head shall carryout the root-cause analysis, and further complete the corrective action process steps detailed above. Generally the root-cause of nonconformity will be one or more of the following:

a) Personnel – competence, awareness and training

b) Resources - deficient resources / constraints in resources provided

c) Policies and procedures – deficient / inadequate / inconsistent with organization'soverall policy

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7.2. Preventive action

Elements for which a preventive action can be implemented are similar to those described under corrective action. One or more of the following means can be utilized to identify opportunity for preventive action:

a) Trend analysis of element (of EMS system) wise nonconformities;

b) Trends in “no loss incidents”

c) Periodic inspection / “walk-through”

d) Suggestion from employees

e) Audit recommendations

Root-cause analysis shall be carried out for the identified / reported potential nonconformity. Preventive actions proposed for an identified / reported potential nonconformity shall be reviewed in the management review meetings or by the EMR for techno-commercial viability.The respective functional heads shall implement those that are approved. Records of the results of action taken shall be maintained.

8.0 Records

Sl. No	Name of the Record	Custodian	Retention Period
1	Summary of incidents / accidents.	Coordinator	3 Years
2	Corrective/Preventive action report	Concerned functional head; copy shall be given to MR	3 Years

Annexure 10.14. Guidelines for Provision of Noise Barriers

A. Typical Design for Noise Barriers

Mitigation at the sensitive receptor locations may include posting of signs prohibiting the use of horns and, to the extent possible planting of trees serve as green noise barriers. Effect of noise can be reduced considerably by the combined effect of sound insulating walls and green barriers. Nevertheless the green barriers require at least 2-5m additional space between the solid barrier and thereceptor. Proposed project mitigation actions should be cost effective and implementable when compared to the generally recommended expensive double glazed windows.

B. Sound insulating walls for silence zones

The design of these barriers is proposed with a brick wall to act as sound barrier. The Hospitals, Medical centre, Schools and other Educational institutions are affected by the traffic noise. A number of schools and a few hospitals are generally observed adjacent to the project corridor.

C. Green barriers for Silence zones

These are simply a thick layer of green plantation with small leaves acting as noise attenuates. These trees may be planted just inside and adjacent to the wall. Contractors will be responsible for the implementation of the civil works. Tree plantation will be carried out by the Forest department under the tree-planting scheme of the project. The implementation aspects are provided in the EMP. In addition to the noise mitigation, the thick green belt will act as an air quality filter for vehicular emissions. A typical green barrier of 100m lengths will have 200 trees in 4 rows.

Noise mitigation techniques will be employed as may be warranted at each of the sensitive receptor sites tabulated in the above table. Definitive noise levels will be empirically determined at each site and selection of the mitigation technique shall be made on a site- specific basis in consultation with property owners. Co-ordination and implementation will be the responsibility of the Environmental officer of the construction supervision consultants (CSC) or Independent Engineer (IE). Mitigation cost has been estimated as a part of the environmental costs of the project.

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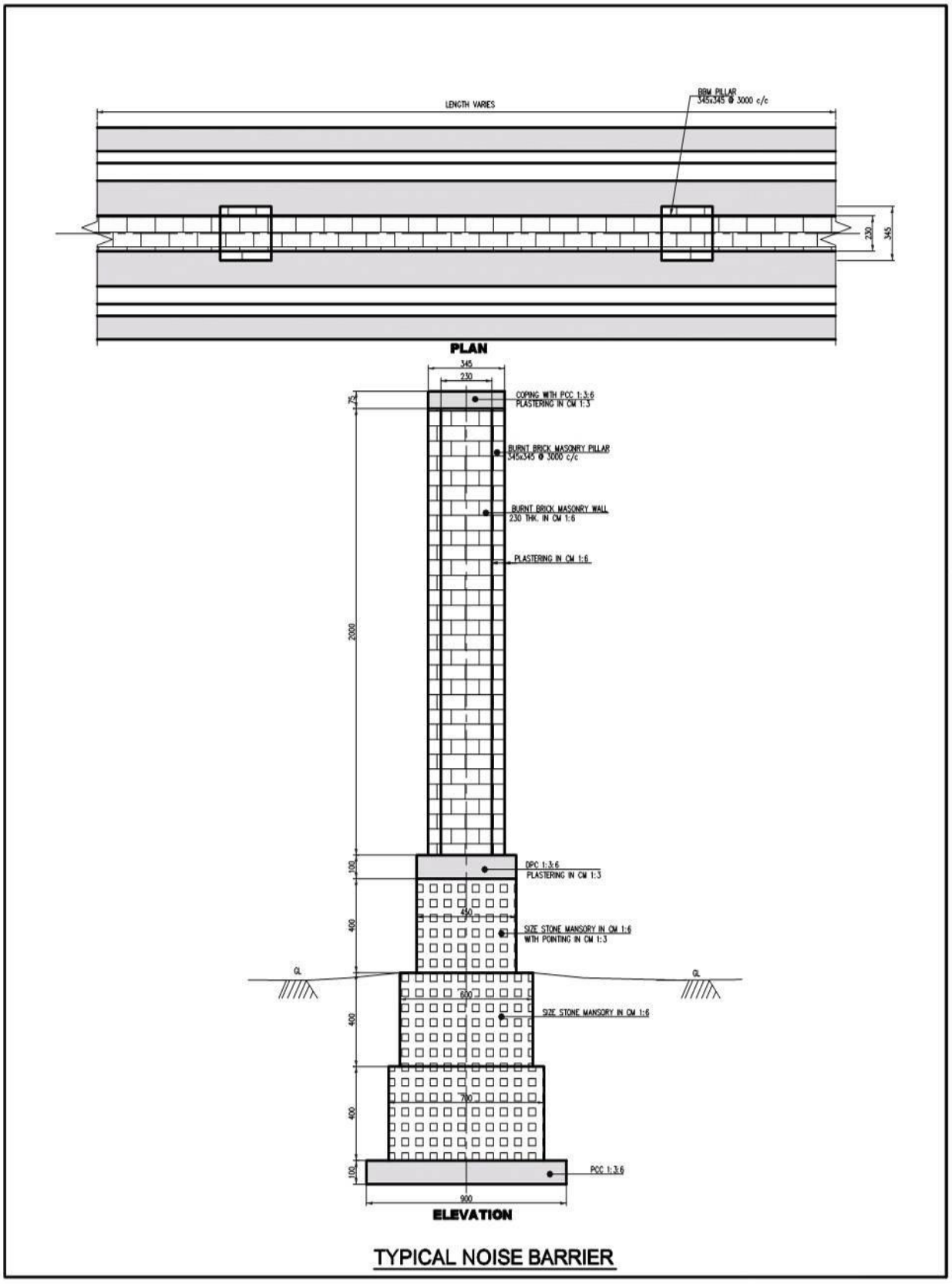

DIAGRAM SHOWING TYPICAL SOLID NOISE BARRIER

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Annexure 10.15. Format for Report Details of Batching Plant

(To be filled by the Contractor)

Name of Location _____

Reporting Month……..

Date of Submission……..

1. Environment Features of the surrounding area

1.1	Name and location of Batching Plant	
1.2	Coordinates	
1.3	Wind direction	
1.4	Name (s), distance population and type of Settlement/s in a 1.5 km radius of site.	

2. Details of Batching Plant and Mitigation Measures taken

2.1	Installed Capacity	
2.2	Average Utilization	
2.5	Last maintenance date	

3. Brief Air Pollution Control Measures taken at the Batching Plant site

4. Brief Noise Pollution Control Measures taken at the Batching Plant site

Remarks :

Submission Details	Submitted by : Contractor	Checked by: Sr. Env. Specialist of IE/CSC/PMC	Approved by: In-charge Officer, EMU, KRIDE
Signature			
Name			
Designation			

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Annexure 10.16. Reporting Format for Identification of Construction Camp Site

(To be filled by the Contractor)

Name of Project Corridor : _____

Construction Stage Report:

Date_____

Month: _____

Year: _____

Sl. No.	Project Details	Particulars		
1.	Name and address of the Contractor			
2.	Contact details of the Contractor			
3.	Name of Project Corridor			
4.	Stage of the Project			
5.	Site Details	Information (Coordinates)		
6.	Name of the Village		Panchayat	
7.	Name of the Taluk		District	
8.	Chainage (km)		Side	LHS/RHS
9.	Area of site		Current land use	
10.	Ownership of the land	Owned/Leased	Survey No.	
11.	If leased, name, address and contact details of			
12.	Distance from nearest settlement			
13.	Distance from surface water course or body			
14.	Distance from Ecologically Sensitive Areas			
15.	Width of access road			
16.	No of trees with girth > 0.3m			
17.	No. of trees to be cut			
18.	Is top soil conservation required (Yes/ No)			
List of Enclosure		Location Map		

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Remarks

Submission Details	Submitted by : Contractor	Checked by: Sr. Env. Specialist of IE/CSC/PMC	Approved by: In-charge Officer, EMU, KRIDE
Signature			
Name			
Designation			

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Annexure 10.17. Reporting Format for Setting-Up of Construction Camp

(To be filled by the Contractor)

Name of Project Corridor : _____

Construction Stage Report:

Date_____

Month: _____

Year: _____

(Site Layout of Construction camp and working drawings of dwelling units with allied facilities to be attached with format)

FORMAT TO BE SUBMITTED FOR ESTABLISHING CAMPS

Sl. No	Item	Unit	Details	Remarks by CSC/IE/PMC
1	Detail of item camp			
	Coordinates of the Camp			
	Size of camp	m x m		
	Area of camp	Sq. m		
	Distance from nearest settlement			
	Distance from nearest water source	Type / Size / Capacity / Present Use / Ownership		
	Date of camp being operational dd / mm / yy			
	Present land use			
	No of trees with girth > 0.3m			
	Details of Storage area (Availability of impervious surface)	m x m		
	Availability of separate waste disposal	Cum		
2	Details of topsoil stacking			
	Quantity of top soil removed	Sq. m		
	Detail of storage of topsoil	Describe stacking arrangement		
3	Details of workforce	Nos.		
	Total no. of Laborers	Nos.		
	Total no. of Male Workers	Nos.		
	No. of Male Workers below 18 years of age	Nos.		
	Total No. of Female Workers	Nos.		
	No. of Female Workers below 18 years of age	Nos.		

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Sl. No	Item	Unit	Details	Remarks by CSC/IE/PMC
	No. of children	Nos.		
4	Details of dwelling units			
	No of dwellings/huts			
	Minimum Size of Swelling	m x m		
	No. of openings per dwelling	Nos.		
	Minimum size of opening	m x m		
	Walls	Specifications		
	Roofing	Specifications		
	Flooring	Specifications		
	Drinking Water Tank	Specifications		
	Capacity of Drinking Water Tank	Cum		
	Size of Drinking Water Tank	m x m		
	Total no of WC	Nos.		
	No of WCs for female workers	Nos.		
	Minimum Size of WC	m x m		
	Total No of Bathrooms for female workers	Nos.		
	Size of septic tank for WC / Baths	m x m		
	Capacity of Water Tank for WCs / Bathrooms and general purpose			
	Fencing around camp	Yes / No		
5	Details of facilities			
	Availability of security guard 24 hrs. a day	Yes / No		
	Details of First Aid Facility	Yes / No		
	Availability of Day Care Centre	Yes / No		
	Availability of dust bins (capacity 60ltr)	Nos.		

Remarks

Submission Details	Submitted by : Contractor	Checked by: Sr. Env. Specialist of IE/CSC/PMC	Approved by: In-charge Officer, EMU, KRIDE
Signature			
Name			
Designation			

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Annexure 10.18. IFC's Environmental, Health, and Safety Guidelines for Railways

Environmental, Health, and Safety Guidelines for Railways

Introduction

The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP)[1]. When one or more members of the World Bank Group are involved in a project, these EHS Guidelines are applied as required by their respective policies and standards. These industry sector EHS guidelines are designed to be used together with the **General EHS Guidelines** document, which provides guidance to users on common EHS issues potentially applicable to all industry sectors. For complex projects, use of multiple industry-sector guidelines may be necessary. A complete list of industry-sector guidelines can be found at: www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines

The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. Application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets, with an appropriate timetable for achieving them. The applicability of the EHS Guidelines should be tailored to the hazards and risks established for each project on the basis of the results of an environmental assessment in which site-specific variables, such as host country context, assimilative capacity of the environment, and other project factors, are taken into account. The applicability of specific technical recommendations should be based on the professional opinion of qualified and experienced persons.

When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures than those provided in these EHS Guidelines are appropriate, in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternate performance levels is protective of human health and the environment.

Applicability

The EHS Guidelines for Railways are applicable to activities typically conducted by rail infrastructure operators dedicated to passenger and freight transport. The document is organized into two main areas, namely rail operations, covering construction and maintenance of rail infrastructure as well as operation of rolling stock, such as locomotives and rail cars; and, locomotive maintenance activities, including engine services, and other mechanical repair and maintenance of locomotives and railcars. This document is organized according to the following sections:

Section 1.0 — Industry-Specific Impacts and Management
Section 2.0 — Performance Indicators and Monitoring
Section 3.0 — References
Annex A — General Description of Industry Activities

[1] Defined as the exercise of professional skill, diligence, prudence and foresight that would be reasonably expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally. The circumstances that skilled and experienced professionals may find when evaluating the range of pollution prevention and control techniques available to a project may include, but are not limited to, varying levels of environmental degradation and environmental assimilative capacity as well as varying levels of financial and technical feasibility.

1.0 Industry-Specific Impacts and Management

The following section provides a summary of EHS issues associated with railways that may occur during the construction and operation phases of a project, along with recommendations for their management. Additional recommendations for the management of EHS issues during the decommissioning phase of railways are provided in the **General EHS Guidelines.**

1.1 Environment

1.1.1 Rail Operations

Environmental issues associated with construction and maintenance of rail infrastructure, as well as operation of rolling stock (e.g. locomotives and rail cars), may include the following:

- Habitat alteration and fragmentation
- Emissions to air
- Fuel management
- Wastewater
- Waste
- Noise

Habitat Alteration and Fragmentation

The construction and maintenance of railroad rights-of-way may result in alteration and disruption to terrestrial and aquatic habitats.

Construction of Rail Rights-of-Way[2]

Right-of-way construction activities along a railway alignment may adversely affect wildlife habitats depending on the characteristics of existing vegetation, topographic features, and waterways. Habitat alteration may include fragmentation of forested habitat; loss of nesting sites and other wildlife habitat through bush clearing; disruption of watercourses; establishment of non-native invasive plant species; creation of barriers to wildlife movement; and visual and auditory disturbance due to the presence of machinery, construction workers, and associated equipment. In addition, sediment and erosion from construction and stormwater runoff may increase turbidity of surface waters.

Recommended measures to prevent and control impacts to wildlife habitats during construction of rights-of-way include:

- Avoid fragmentation or destruction of critical terrestrial and aquatic habitats[3] by siting railways, rail yards, support facilities, and maintenance roads to avoid such locations or by utilizing existing transport corridors whenever possible. Where fragmentation of critical habitats cannot be avoided, maximize the availability of animal crossings (e.g. bridges, culverts, and over-crossings) and provide jointing chambers to allow small animals a means of escape from the railway;
- When rail crossings of watercourses are unavoidable, maintain water flow and fish access by utilizing clear-span bridges, open-bottom culverts, or other appropriate methods. Where sensitive habitats cannot be avoided by rail alignment, construction of bridges should be considered to span at-risk areas (e.g. wetlands);
- Minimize the clearing of riparian vegetation during construction;
- Avoid construction activities during the breeding season and other sensitive seasons or times of day, especially

[2] Also known as a 'wayleave' or 'easement' in some countries, but referred to in these guidelines as 'right-of-way".

[3] The term "critical habitats" is defined in IFC Performance Standard 6: Biodiversity Conservation and Natural Resource Management, along with other terminology related to the preservation of biodiversity. Available at: www.ifc.org/envsocstandards

where critically endangered or endangered species are concerned;

- Avoid the introduction of invasive species during reinstatement activities, preferably through the use of native plant species and, when feasible, clear invasive species during routine vegetation maintenance (see 'Right-of-way maintenance' section below);
- When procuring crossties for rail line construction, consider their source to ensure that it has not originated from unsustainable harvesting of forest products in a critical habitat.
- Additional recommendations on managing construction site activities are described in the **General EHS Guidelines.**

Right-of-Way Maintenance

Regular maintenance of vegetation within railroad rights-of-way is necessary to avoid interference with train operations and track maintenance. Unchecked growth of trees and plants can cover signals, fall onto the tracks and overhead power lines, and prevent workers from getting to places of safety when trains are passing. Regular maintenance of rights-of-way to control vegetation may involve the use of mechanical methods (e.g. mowing), manual methods (e.g. hand pruning), and use of herbicides. Vegetation maintenance beyond that which is necessary for safety may remove unnecessary amounts of vegetation, resulting in the continual replacement of successional species and an increased likelihood of the establishment of invasive species.

Recommended measures to prevent and control impacts from right-of-way vegetation maintenance include:

- Implementation of integrated vegetation management (IVM). The track area should be kept completely clear of vegetation. From the edge of the track area to the boundary of the right-of-way, vegetation should be structured with smaller plants near the line and larger trees further away from the line to provide habitats for a wide variety of plants and animals;[4]
- Native species should be planted and invasive plant species removed;[5]
- Railways should be designed and maintained to discourage plant growth in the track area (e.g. providing lateral barriers to plant migration and ensuring rapid drainage of the track area);
- Biological, mechanical, and thermal vegetation control measures should be used where practical, and use of chemical herbicides on the bank beyond the transition area should be avoided (approx. 5 meters from the track);
- Maintenance clearing in riparian areas should be avoided or minimized.

An integrated approach to vegetation management may indicate use of herbicides as a preferred approach to control fast-growing vegetation within railway rights-of-way. In this case, the recommended precautions include:

- Personnel should be trained in herbicide application, including applicable certification or equivalent training where such certifications are not required;[6]

[4] Mowing can be used to control growth of ground covers, minimize propagation of plants in the track area, and prevent the establishment of trees and shrubs in the right-of-way. Herbicides, in combination with mowing, can control fast-growing weedy species that have a potential to mature to heights over those permitted within the right-of-way. Trimming and pruning can be utilized at the boundaries of rights-of-way to maintain corridor breadth and prevent the encroachment of tree branches. Hand removal or removal of vegetation, while labor intensive, can be used in the vicinity of structures, streams, fences, and other obstructions making the use of machinery difficult or dangerous.

[5] Dense, thorny native shrubs can be used to help deter trespassers. Native plants can also help to stabilize clay soils, reducing the need for ballast maintenance. Leaves of some tree species with invasive root systems can cause traction problems for train wheels. Therefore, such trees are often removed, even if native to the area. Waste from removal of invasive species should be disposed of (e.g. by incineration or at a landfill) to avoid accidental spreading of the weeds to new sites.

[6] Examples of certification schemes are provided by the United States Environmental Protection Agency (US EPA) (2006), which categorizes pesticides as either "unclassified" or "restricted" and requires workers that apply unclassified pesticides to be trained according to the Worker Protection

- Avoid the use of herbicides that fall under or are listed under:
  - The World Health Organization Recommended Classification of Pesticides by Hazard Classes 1a and 1b
  - Avoid the use of pesticides that fall under the World Health Organization Recommended Classification of Pesticides by Hazard Class II if the project host country lacks restrictions on distribution and use of these chemicals, or if they are likely to be accessible to personnel without proper training, equipment, and facilities to handle, store, apply, and dispose of these products properly;
  - Annexes A and B of the Stockholm Convention, except under the conditions noted in the convention[7]
- Herbicides used should be manufactured under license, registered and approved by an appropriate authority, and in accordance with the Food and Agriculture Organization's (FAO) International Code of Conduct on the Distribution and Use of Pesticides;[8]
- Only herbicides that are labeled in accordance with international standards and norms should be used, such as the FAO Revised Guidelines for Good Labeling Practice for Pesticides;[9]
- Users should review manufacturers' directions on maximum recommended dosage or treatment, as well as published reports on reduced rates of herbicide application without loss of effect,[10] and apply the minimum effective dose;
- Herbicide application should be based on criteria (e.g. field observations, weather data, time of treatment, and dosage) with use of a pesticide logbook to record data;
- Application practices should be designed to reduce unintentional drift or runoff;
- Herbicide application equipment should be maintained and calibrated in accordance with manufacturers' recommendations;
- Untreated buffer zones or strips should be established along water sources, rivers, streams, ponds, lakes, and ditches to help protect water resources;
- Contamination of soils, groundwater, or surface water resources due to accidental spills during transfer, mixing, and storage of herbicides should be prevented by following the hazardous materials storage and handling recommendations presented in the **General EHS Guidelines**.

Forest Fires

If vegetation growth is left unchecked or slash from routine maintenance is left to accumulate within the right-of-way, sufficient fuel can accumulate that may promote forest fires. Recommended measures to prevent and control risk of forest fire include:

- Monitoring of right-of-way vegetation according to fire risk;
- Removal of blowdown and other high-hazard fuel accumulations;
- Timing of thinning, slashing, and other maintenance activities to avoid seasons when the risk of forest fires is high;
- Removal of maintenance slash or management by controlled burning.[11] Controlled burning should adhere to

Standard (40 CFR Part 170) for Agricultural Pesticides. It further requires restricted pesticides to be applied by or in the presence of a certified pesticide applicator.

[7] Stockholm Convention on Persistent Organic Pollutants (2001).

[8] Food and Agriculture Organization of the United Nations (FAO) (2002)

[9] FAO (2002)

[10] Danish Agricultural Advisory Service (DAAS), 2000.

[11] Controlled burning should only be performed after considering potential impacts to air quality and according to the local air quality management requirements.

applicable burning regulations, fire suppression equipment requirements, and typically should be monitored by a fire watcher;

- Planting and management of fire-resistant species (e.g. hardwoods) within, and adjacent to, rights-of-way.

Emissions to Air

Locomotive engines may be significant contributors to air pollution in urban areas, especially in the vicinity of rail yards. Worldwide, approximately 60 percent of passenger trains and 80 percent of freight trains are powered by diesel locomotives which emit combustion products, including nitrogen oxides (NO_X) and particulate matter (PM), both of which contribute to public health problems, and carbon dioxide (CO_2), a greenhouse gas.[12] Transportation and transfer of dry granular materials (e.g. minerals and grain) may result in dust emissions, while the storage and transfer of fuels or volatile chemicals may result in fugitive emissions. Recommended measures to prevent, minimize, and control air emissions include:

- Reduction of fuel consumption / increase of energy efficiency through:
  - Use of modern, fuel-efficient, low-emission locomotives or scheduled substitution or re-powering of existing fleets
  - Maximizing cargo and passenger space utilization within safety standards to minimize specific fuel consumption
  - Decreasing wind resistance (e.g. by grouping inter-modal loads with rail cars of height similar to the containers and filling empty slots with empty containers, covering of empty freight cars,[13] installing fairings on bogies (also known as trucks) of high-speed trains, and acquisition of new rolling stock with low wind resistance
  - Optimizing efficiency of passenger comfort functions during service and while parked (e.g. by installing demand-oriented ventilation controls and automatic control of comfort functions in parked trains);
  - Improving driving economy through staff training, incentive programs, driving advice systems, and improved traffic flow to minimize unnecessary acceleration and deceleration
  - In electrically powered locomotives, use of regenerative braking systems to recycle energy for use by other locomotives
- Depending on the potential impact of the operation in already degraded airsheds, consider the reduction and control of combustion source emissions through:
  - Use of, or conversion to, alternative fuels (e.g. low-sulfur diesel, bio-diesel)
  - Locomotive re-powering programs
  - Installation of high-efficiency catalytic exhaust emission control systems[14]
  - Use of alternative power sources for idling locomotives[15]
  - Improvements in ground service and field operations vehicle fleets as described in the **General EHS Guidelines**
- Depending on the potential impact of the operation in already degraded airsheds, considering the reduction and control of fugitive emissions through:

[12] Generation of electricity also results in emissions of NOx, PM, and other air pollutants, and, therefore, electric-powered trains result in indirect air emissions.
[13] Even at the relatively low speeds of freight trains, a locomotive pulling open, empty cars on level terrain consumes more energy than one pulling a heavy load.
[14] The US EPA is considering requiring such emission controls on new diesel locomotives. See 69 FR 39276 – 39289.
[15] Guidance for Quantifying and Using Long Duration Switch Yard Locomotive Idling Emission Reductions in State Implementation Plans. EPA 20-B-04-002. Office of Transportation and Air Quality, US EPA (2004)

- Use of enclosed cars or covering of open cars used to carry minerals and grains to reduce fugitive dust emissions
- Implementing measures presented in the **General EHS Guidelines** to minimize fugitive air emissions from diesel and other fuel storage and handling activities

Fuel Management

Rail operations with diesel locomotive engines depend on fueling stations strategically situated along the rail network. Fueling stations typically include aboveground storage tanks, piping, and filling equipment with the potential for soil and water resource contamination due to leaks and spills. Storm water falling on fueling areas and secondary containment systems may contain oil residues from incidental releases.

In addition to the recommendations for hazardous materials and oil management in the **General EHS Guidelines**, measures to manage these types of hazards include:

- Storage tanks and components should meet international standards for structural design integrity and operational performance to avoid catastrophic failures during normal operation and during exposure to natural hazards and to prevent fires and explosions;[16]
- Storage tanks should have appropriate secondary containment as discussed in the **General EHS Guidelines**, including procedures for the management of containment systems;
- Secondary containment in rail fueling areas should be appropriate for the size of the railcar, level, curbed, sealed, and draining to a sump connected to a spill retention area. The spill retention area should also be equipped with an oil / water separator to allow the routine discharge of collected rainwater;[17]
- Fueling facilities should develop a formal spill prevention and control plan that addresses significant scenarios and magnitude of releases. The plan should be supported by the necessary resources and training. Spill response equipment should be conveniently available to address all types of spills, including small spills.

Wastewater

Rail operations may generate sanitary wastewater primarily from passenger terminals and from passenger rail service. Wastewater from all sources should be managed according to the recommendations provided in the **General EHS Guidelines**.

Waste

Depending on the number of passengers handled and the services provided, trains and passenger train terminals may generate solid, non-hazardous, food waste from food establishments, in addition to packaging materials from retail facilities, and paper, newspaper, and a variety of disposable food containers from trains and common passenger areas. The maintenance and upgrade of rail infrastructure may also result in the generation of non-hazardous and hazardous waste including lubricants from field maintenance equipment and steel and wood from rails and rail ties. Recommended waste management strategies include:

Waste from Passenger Trains and Terminals

- Instituting a solid waste recycling program, depending on the existence of local facilities, involving the placement of

[16] Examples include American Petroleum Institute (API) Standard 620: Design and Construction of Large, Welded, Low-pressure Storage Tanks, 2002; and API Standard 650: Welded Steel Tanks for Oil Storage, 1998; in addition to European Standard (EN) 12285-2 Workshop fabricated steel tanks for the aboveground storage of flammable and non-flammable water polluting liquids, 2005.

labeled waste containers in passenger terminals for metals, glass, paper, and plastics. Food establishments should segregate compostable and other food waste for recycling as agricultural fertilizer and animal feed;

- Passenger train operators and cleaning contractors should be encouraged to segregate waste in the trains by separating the collection of newspapers / papers, plastic, and metallic containers.

Waste from Field Operations

- On-site generation and storage of hazardous wastes and their subsequent treatment and disposal should be managed according to the recommendations provided in the **General EHS Guidelines**;
- Where feasible, avoid use of crossties treated with chromated copper arsenate and consider use of copper azote for wood treatment as a substitute, or using concrete crossties;
- Recycling of crossties may involve crushing for recovery of the steel rebar and use of the crushed material in road construction. Wood crossties may be chipped for reuse, burnt, or disposed of in landfills. Landfill facilities should be capable of handling wastes that may have chemical leaching properties. Disposal of wood crossties by incineration or recycling should take into account associated air emissions and secondary product residues of preservative chemicals.

Noise and Vibrations

Railway noise is generated from a variety of sources, each contributing to the total noise output. Sources include rolling noise generated by the contact between wheel and rail during normal movement and braking; aerodynamic noise generated by the train pushing air (particularly for high speed trains); and traction noise generated by the engine and cooling fans.[18] Recommended noise management strategies include:[19]

- Implementation of noise reduction or prevention measures at the source including, including:
  - Use of modern non-metallic disc brakes, which can reduce rolling noise by 8-10 decibels (dB) compared to cast-iron block tread brakes utilized on older vehicles (non-metallic disc brakes also reduce wearing of wheels and rails)
  - Reducing the roughness of running surfaces through regular maintenance of wheels and tracks, and consideration for replacing traditional jointed track with continuously welded rail
- Installation of noise controls at the source for improved sound-proofing, and other noise reducing features (e.g. engine enclosures and exhaust muffling for diesel engines, and shielding of wheels with vehicle-mounted shrouds);
- Depending on the location of noise-sensitive areas, noise and vibrations should be considered in the design, construction, and operation of railways (e.g. through alignment choice, relocation of nearby buildings, and soundproofing, such as noise barriers, along railways or next to buildings).

1.1.2 Maintenance of Rolling Stock

The main environmental issues typically encountered in locomotive and railcar maintenance activities may include:

[17] API Standard 2610: Design, Construction, Operation, Maintenance, and Inspection of Terminal & Tank Facilities (2005).

[18] The most significant source of noise is rolling noise from contact between wheel and rail (lateral and longitudinal wheel and track friction from sideways wheel slide and from braking, respectively, including noise from contact between the brake pad and wheel), followed by engine noise and aerodynamic noise.

[19] For additional information, see Dittrich, Michael. 2003. Basic Targets and Conditions for European Railway Noise Abatement Strategies: Analysis of the Current Situation. Working Group (WG) on Railway Noise. European Commission (EC). Also, additional documents published by the WG on Railway Noise. Available at: http://ec.europa.eu/transport/rail/environment/noise_en.htm

- Hazardous materials
- Wastewater
- Waste management

Hazardous Materials

Hazardous materials, including solvents, coolants, acids, and alkalis, may be used in locomotives and rolling stock maintenance operations. Polychlorinated biphenyls (PCB) may be found in older electrical equipment (e.g. transformers and capacitors), and asbestos may be present in older parts such as wheel bearings and seals for steam engines. In addition to the applicable guidance provided in the **General EHS Guidelines**, recommended hazardous materials management strategies include:

- Use of aqueous detergent cleaning solutions or steam cleaning, or use and recycling of aliphatic cleaning solvents (e.g. 140 solvent), for example when removing axle protective coatings or for cleaning of large equipment;
- Use of water-based paints;
- Use of track mats to retain wayside grease and other contaminants;
- Avoiding use of new or replacement parts with asbestos-containing materials.

Wastewater

Rail car maintenance and refurbishment typically involves a high-pressure water wash which may contain residues from transported materials, paint, oil and grease, and other contaminants. Caustic solutions are often used to remove grease and dirt from axles and other metal parts. Acids and caustics may also be used for rust removal. Locomotive coolants are usually water-based with corrosion inhibitor additives. Passenger trains also generate domestic wastewater, which is sometimes discharged directly to the land surface.

Recommended measures to prevent, minimize, or control wastewater effluents include:

- Use of ultrafiltration to extend the life of washing solutions for aqueous parts or use of alternatives to water cleaning (e.g. dry cleaning by wire brush or bake oven);
- Plumbing connection of floor drains, if any, in maintenance areas to the wastewater collection and treatment system;
- Prevention of discharge of industrial wastes to septic systems, drain fields, dry wells, cesspools, pits, or separate storm drains or sewers. Keep wastewater from service bays out of storm drains by constructing berms or other barriers;
- Depending on the volume of contaminants present in the wastewater, and whether the rail facility is discharging into a municipal system or directly to surface waters, pretreatment of effluents may be necessary to reduce contaminant concentrations. Pretreatment systems typically consist of oil / water separators, biological and chemical treatment, and activated carbon systems.

Waste Management

Most wastes from railway operations are generated as a result of maintenance and refurbishment of locomotives and rolling stock and, to a lesser extent, from track maintenance. These wastes typically include solids from mechanical cleaning of rail cars; paint chips and sandblast grit; waste paint; spent solvent and solvent sludges (from painting and cleaning); sludge from cleaning and wastewater treatment; waste oil, hydraulic fluid, and other petroleum-based fluids; petroleum-contaminated solids (e.g. oil filters and saturated spill absorbent material); spent coolant; metal filings and scrap; spent locomotive and signal batteries; and spent brake shoes. These materials should be managed based on their characteristics (e.g. hazardous or non-hazardous) as described in the **General EHS Guidelines**.

1.2 Occupational Health and Safety

1.2.1 Rail Operations

Occupational health and safety hazards during the construction of railway systems are common to those of most large industrial facilities and their prevention and control is discussed in the **General EHS Guidelines**. Additional health and safety issues specific to railway operations include the following:

- Train / worker accidents
- Noise and vibration
- Diesel exhaust
- Fatigue
- Electrical hazards
- Electric and magnetic fields

Train / Worker Accidents

Railway workers in the vicinity of rail lines are exposed to moving trains. Recommended management strategies include:

- Training workers in personal track safety procedures;
- Blocking train traffic on lines where maintenance is occurring ("green zone working") or, if blocking the line is not feasible, use of an automatic warning system or, as a last resort, human lookouts;
- Design and construction of rail lines with adequate clearance for workers;
- Segregation of stabling, marshalling, and maintenance areas from the running lines.

Noise and Vibration

Crew members may be exposed to noise from locomotives, rolling stock, and machinery, as well as to significant repetitive mechanical shocks and / or vibrations.[20] Recommended management strategies include:

- Use of air conditioning systems to maintain cabin temperature and provide fresh air so that windows can remain closed, limiting wind and outside noise;[21]
- Reduction of internal venting of air brakes to a level that minimizes noise without compromising the crew's ability to judge brake operation;
- Installation of active noise cancellation systems;
- Use of personal protective equipment (PPE) if engineering controls are not feasible or adequate to reduce noise levels;
- Use of dampers at the seat post to reduce the vibration experienced by the operator;[22]
- Installation of active vibration control systems for locomotive suspension, cabs, or seat posts, as needed to comply with applicable international and national standards and guidelines.[23]

Diesel Exhaust

Railway workers, including locomotive crews and workers in stations, rail yards, and locomotive and car shops, may be exposed to exhaust from diesel locomotives and other diesel engines. Crew members riding immediately behind the lead engines of trains (e.g. trailing locomotives) and workers in indoor turnaround areas where locomotives are usually left operating, sometimes for prolonged periods, may be exposed to particularly high levels of diesel exhaust.

[20] Guidance for the evaluation of mechanical shock and vibration can be found in the International Organization for Standardization (ISO) 2631-1:1997, Mechanical vibration and shock: Evaluation of human exposure to whole-body vibration—Part 1: General requirements.

[21] Insulation from exterior sound may hinder hearing of exterior noises that provide important cues (e.g. horn loudness, torpedoes). Use of exterior sensors and interior annunciators may be required to compensate.

Measures to control air emissions from locomotives are discussed in Section 1.1 above. In addition, the following measures are recommended to prevent, minimize, and control workers' exposure to diesel exhaust:

- Limiting time locomotives are allowed to run indoors and use of pusher cars to move locomotives in and out of maintenance shops;
- Ventilation of locomotive shops or other enclosed areas where diesel exhaust may accumulate;
- Filtration of air in the train crew cabin;
- Use of PPE where engineering controls are not sufficient to reduce contaminant exposure to acceptable levels (see Section 2.2).

Fatigue

Locomotive engineers and other railway workers are often required to work irregular work hours which may result in fatigue. Fatigue may be affected by the length and time of the shift (e.g. long night shifts, shift start times); the nature of the changes between shifts (shift rotation); the balance in concentration and stimulation in the work activities being undertaken; insufficient rest breaks; and the time of day. Fatigue, particularly of drivers, signalers, maintenance workers, and others whose work is critical to safe operation, can pose a serious safety risk for railway workers and the general public.[24]

Railway operators should schedule rest periods at regular intervals and during night hours, to the extent feasible, to maximize the effectiveness of rest breaks, and in accordance with international standards and good practices for work time.[25]

Electrical Hazards

Electrified railways use either overhead wires or a conductor rail (e.g. third rail) to transmit electrical power to the train locomotive or multiple units. Overhead power lines may also be present near non-electrified rail lines. General electrical safety measures are addressed in the General EHS Guidelines. In addition, workers exposed to electrical hazards from electrified railways should be trained in personal track safety. Only workers who are specifically trained and competent in working with overhead lines and conductor rails should be allowed to approach these systems.

Electric and Magnetic Fields

Railway workers on electric railway systems may have a higher exposure to electric and magnetic fields (EMF) than the general public due to working in proximity to electric power lines.[26] Occupational EMF exposure should be prevented or minimized through the preparation and implementation of an EMF safety program including the following components:

- Establishment and identification of safety zones to differentiate between work areas with expected elevated EMF levels compared to those acceptable for public exposure, and limiting access to properly trained workers;

[22] Vibration dampening of the seats can create a difference in relative vibration of the operator and the controls and displays. Operation and legibility problems can result if the difference is large enough.

[23] See International Organization for Standardization (ISO) 2631-1:1997.

[24] Office of Rail Regulation.

[25] For example, see The Council of the European Union, Council Directive 93/104/EC, of 23 November 1993, concerning certain aspects of the organization of working time, amended by Directive 2000/34/EC of 22 June 2000 of the European Parliament and of the Council; and Transport Canada, Work / Rest Rules for Railway Operating Employees (2005).

[26] Detailed studies of workplace exposure to EMF in the United States, Canada, France, England, and several Northern European countries have found no conclusive link or correlation between typical occupational EMF exposure and adverse health effects. However, some studies have identified a possible association between occupational exposure to EMF and cancer, such as brain cancer (U.S. National Institute of Environmental Health Sciences 2002) indicating that there is evidence to warrant limited concern.

- Implementation of an action plan to address potential or confirmed exposure levels that exceed reference occupational exposure levels developed by international organizations such as the International Commission on Non-Ionizing Radiation Protection (ICNIRP), and the Institute of Electrical and Electronics Engineers (IEEE)[27].

1.2.2 Maintenance of Rolling Stock

Occupational hazards typcially associated with locomotive and railcar maintenance activities may include physical, chemical, and biological hazards as well as confined space entry hazards. Physical hazards may be associated with work in proximity to moving equipment (e.g. locomotives and other vehicles) and machine safety, including work-portable tools, and electrical safety issues. Chemical hazards may include potential exposures to a variety of hazardous materials (e.g. asbestos, PCB, toxic paint, heavy metals, and VOCs, including those resulting from the use of solvent-based paints and cleaning solvents in enclosed spaces). Other chemical hazards may include the potential for fire and explosion during the conduct of hot work in storage tank systems. Biological hazards may include potential exposures to pathogens present in sewage storage compartments. Confined spaces may include access to railroad tank and grain cars during repair and maintenance. All of these occupational health and safety hazards should be managed based on the recommendations provided in the **General EHS Guidelines.**

1.3 Community Health and Safety

Community health and safety impacts during the construction, rehabilitation, and maintenance of railways are common to those of most infrastructure or large industrial facility construction projects, and are discussed in the **General EHS Guidelines**. These impacts include, among others, dust, noise, and vibration from construction vehicle transit, and communicable diseases associated with the influx of temporary construction labor.

Health and safety issues specific to railway operations include:

- General rail operational safety
- Transport of dangerous goods
- Level crossings safety
- Pedestrian safety

General Rail Operational Safety

The most significant safety issue potentially affecting both crew and passengers is the threat of serious injury or the potential loss of life due to train collisions with other trains or with road vehicles, as well as the possibility of derailment due to these or other operational causes. Recommended management actions include:

- Implementation of rail operational safety procedures aimed at reducing the likelihood of train collisions such as a positive train control (PTC) system. If a full PTC system is not practical, automatic rail switches should be installed or, where manual switches remain, documenting when a manually operated switch in non-signaled territory is changed from the main track to a siding, and returned back to the normal position for main track movements. This information should be communicated to all crew members and the train dispatcher;[28]

[27] The International Commission on Non-Ionizing Radiation Protection (ICNIRP) exposure guidelines for Occupational Exposure are listed in Section 2.2 of this Guideline.

[28] PTC allows for the coordination of information to ensure proper train movements.

- Regular inspection and maintenance of the rail lines and facilities to ensure track stability and integrity in accordance with national and international track safety standards;[29]
- Implementation of an overall safety management program that is equivalent to internationally recognized railway safety programs.[30]

Transport of Dangerous Goods

Dangerous goods are frequently transported in bulk or packaged form by rail, representing a potential risk of release to the environment in the event of accidents on a number of other causes.[31] Examples include valve leakage or safety valve releases in pressurized and general-service tank cars or other hazardous material containers (e.g. covered hoppers, intermodal trailers and containers, or portable tanks). In intermodal containers, spills and leaks may result from improper packing and resultant load shifting during transport. Additionally, there is a potential for the release of diesel during fueling operations.[32]

In addition to guidance on hazardous materials management provided in the **General EHS Guidelines**, recommended measures to prevent, minimize, and control releases of hazardous materials during rail transportation and use include the following:

- Implementation of a system for the proper screening, acceptance, and transport of dangerous goods. Since these materials may be provided by third parties, the screening and acceptance process should confirm accordance with international standards applicable to packaging, marking, and labeling of containers (or placarding), as well the necessary certificates and manifests from the shipper.[33]
- Use of tank cars and other rolling stock that meet national and international standards (e.g. thermal protection and puncture resistance) appropriate for the cargo being carried,[34] and implementing a preventive maintenance program;
- Preparation of spill prevention and control, and emergency preparedness and response plans, based on an analysis of hazards, including the nature, consequence, and probability of accidents. Based on result of the hazard analysis, implementation of prevention and control measures which may include:
  - Routing and timing of hazardous materials transport to minimize risk to the community (e.g. restricting transport of hazardous materials on some routes)
  - Limiting train speed in developed areas
  - Construction of protective barriers and other technical measures (e.g. drainage / receptacle provisions) at sensitive locations (e.g. water resources and settlements)
- Dissemination of emergency preparedness and response information to the potentially affected communities (e.g. emergency notification systems and evacuation procedures);

[29] See U.S. Department of Transportation. Federal Railroad Administration. Track Safety Standards, Final Rule, 49 CFR Part 213 (1998)

[30] Examples include the elements of a safety management system specifically applicable to rail such as provided in the European Union Railway Safety Directive (Directive 2004/49/EC) or the Guidelines for the Safety Management System published by the Safety Management in Railways (SAMRAIL) group of the International Union of Railways (UIC).

[31] Although hazardous materials are shipped in various kinds of rail cars (e.g. tank cars, covered hoppers, boxcars, intermodal equipment) tank cars carry the major portion of the traffic.

[32] Gasoline use is typically limited in railroad operations.

[33] Examples of international standards include the Convention Concerning International Carriage by Rail (COTIF). Transport of dangerous goods is addressed in the Regulations Concerning the International Carriage of Dangerous Goods by Rail (RID). The most recent version of the Regulations concerning the International Carriage of Dangerous Goods by Rail (RID, 2006) came into effect on January 1, 2007. United Kingdom Department for Transport. Statutory Instrument No. 568. The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations (2004).

[34] See, for example, US Department of Transportation, Regulations on Use of Tank Cars, 49 CFR 173.31.

- Implementation of a hazardous material security plan and security awareness training, including provisions for personnel security, prevention of unauthorized access, and measures to reduce risks during storage and transport of hazardous materials;[35]
- Use of standardized fuel spill prevention system for locomotive fueling, including automatic shut-off systems.[36]

Level Crossings Safety

Level crossings (at-grade road / rail intersections) represent high-risk accident locations for railways. On railways with sparse traffic, a flagman may be used to stop all traffic at the crossing and clear the tracks before the approach of a train. Automatic warning lights and bells, and / or closable gates which barricade the roadway are more commonly used. The gates are intended to be complete barriers against intrusion of any road traffic onto the railway. Ungated crossings present the greatest potential risk. Recommendations to prevent, minimize, and control risks associated with level crossings include:

- Use of bridges or tunnels in place of level crossings. The removal of crossings may also improve train performance since most crossings have low speed limits to minimize risks to road traffic;
- Installation of automatic gates at all level crossings, and regular inspection/maintenance to ensure proper operation.

Pedestrian Safety

Trespassers on rail lines and facilities may incur risks from moving trains, electrical lines and equipment, and hazardous substances, among other issues. Measures to minimize, prevent, or control trespassing include:

- Posting of clear and prominent warning signage at potential points of entry to track areas (e.g. stations and level crossings);
- Installation of fencing or other barriers at station ends and other locations to prevent access to tracks by unauthorized persons;
- Local education, especially to young people, regarding the dangers of trespassing;
- Designing stations to ensure the authorized route is safe, clearly indicated, and easy to use;
- Use of closed-circuit television to monitor rail stations and other areas where trespassing occurs frequently, with a voice alarm system to deter trespassers.

[35] See U.S. Department of Transportation, Security Plans, 49 CFR Part 172, Subpart I.

[36] See Association of American Railroads, 2002. Manual of Standards and Recommended Practices Section M—Locomotives and Locomotive Interchange Equipment: RP-5503—Locomotive Fueling Interface.

2.0 Performance Indicators and Monitoring

2.1 Environment

Emissions and Effluent Guidelines

Emissions from new engines used for the propulsion of locomotives and railcars should be consistent with internationally recognized emissions limit values for nitrogen oxides (NOx), particulate matter (PM), carbon monoxide (CO), and Total Hydrocarbons (THC).[37] Railways operations should also target improvements in the efficient use of energy which may contribute to the overall reduction of polluting emissions.[38]

Effluents from maintenance facilities should be treated to a level consistent to the requirements of local sewer network operation or, if discharged into surface waters, according to the guideline values provided in the **EHS Guidelines for Metals, Plastics, and Rubber Products Manufacturing,** which provide treated effluent guideline values applicable to metals machining, cleaning, and plating and finishing processes, including painting. Site-specific discharge levels may be established for sewer and process effluents from maintenance facilities and terminals based on the availability of publicly operated sewage collection and treatment systems or, if discharged directly to surface waters, on the receiving water use classification as described in the **General EHS Guidelines**.[39]

Combustion source emissions guidelines associated with steam- and power-generation activities from sources with a capacity equal to or lower than 50 Megawatt thermal (MWth) are addressed in the **General EHS Guidelines** with larger power source emissions addressed in the **EHS Guidelines for Thermal Power**. Guidance on ambient considerations based on the total load of emissions is provided in the **General EHS Guidelines**.

Environmental Monitoring

Environmental monitoring programs for this sector should be implemented to address all activities that have been identified to have potentially significant impacts on the environment, during normal operations and upset conditions. Environmental monitoring activities should be based on direct or indirect indicators of emissions, effluents, and resource use applicable to the particular project. Monitoring frequency should be sufficient to provide representative data for the parameter being monitored. Monitoring should be conducted by trained individuals following monitoring and record-keeping procedures and using properly calibrated and maintained equipment. Monitoring data should be analyzed and reviewed at regular intervals and compared with the operating standards so that any necessary corrective actions can be taken. Additional guidance on applicable sampling and analytical methods for emissions and effluents is provided in the **General EHS Guidelines**.

2.2 Occupational Health and Safety

Occupational Health and Safety Guidelines

Occupational health and safety performance should be evaluated against internationally published exposure guidelines, of which examples include the Threshold Limit Value (TLV®) occupational exposure guidelines and Biological Exposure Indices (BEIs®) published by American Conference of

[37] Internationally recognized emissions values include the EU Stage III/IV emissions standards for non-road engines (Directive 2004/26/EC) and US Tier 3 / 4 standards (U.S. EPA 40 CFR Part 92). Achieving the most stringent values for NOx and PM may require the use of secondary controls.

[38] As a point of comparison, average energy use by large freight railroads in the United States in 2004 (the most recent year for which data is available) was 245 kilojoules / revenue freight ton-kilometer (US Department of Transportation, Bureau of Transportation Statistics. 2006. National Transportation Statistics, Table 4-25M).

[39] Effluent guidelines specifically applicable to rail tank car cleaning activities can be found at US EPA 40 CFR Part 442 Subpart B.

Governmental Industrial Hygienists (ACGIH),[40] the Pocket Guide to Chemical Hazards published by the United States National Institute for Occupational Health and Safety (NIOSH),[41] Permissible Exposure Limits (PELs) published by the Occupational Safety and Health Administration of the United States (OSHA),[42] Indicative Occupational Exposure Limit Values published by European Union member states,[43] or other similar sources.

Accident and Fatality Rates

Projects should try to reduce the number of accidents among project workers (whether directly employed or subcontracted) to a rate of zero, especially accidents that could result in lost work time, different levels of disability, or even fatalities. Facility rates may be benchmarked against the performance of facilities in this sector in developed countries through consultation with published sources (e.g. US Bureau of Labor Statistics and UK Health and Safety Executive)[44].

Occupational Health and Safety Monitoring

The working environment should be occupational hazards relevant to the specific project. Monitoring should be designed and implemented by accredited professionals[45] as part of an occupational health and safety monitoring program. Facilities should also maintain a record of occupational accidents and diseases and dangerous occurrences and accidents. Additional guidance on occupational health and safety monitoring programs is provided in the **General EHS Guidelines**.

[40] Available at: http://www.acgih.org/TLV/ and http://www.acgih.org/store/
[41] Available at: http://www.cdc.gov/niosh/npg/
[42] Available at: http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9992
[43] Available at: http://europe.osha.eu.int/good_practice/risks/ds/oel/
[44] http://www.bls.gov/iif/ and http://www.hse.gov.uk/statistics/index.htm
[45] Accredited professionals may include Certified Industrial Hygienists, Registered Occupational Hygienists, or Certified Safety Professionals or their equivalent.

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Annex A: General Description of Industry Activities

Typical railway components include locomotives and railroad cars, known as rolling stock, in addition to fixed infrastructure, including tracks, stations, fueling facilities, and maintenance and repair facilities.

Establishment of railway tracks and infrastructure include the siting of the railway right-of-way. The basic land requirement for a railway right-of-way is approximately 2.5 – 3.0 hectares of land per kilometer of track. Passenger rail systems may require three times this amount of land when including indirect land uses such as stations and parking areas. The land requirement per transport unit (e.g. passenger-km and tonne-km) is about 3.5 times lower for rail than for automobiles.[46]

Project development and construction activities typically include access road construction or upgrade, site preparation and development (e.g. construction of bridges and tunnels), removal of select vegetation, if any, and the grading and excavation of soils for the installation of structural foundations for tracks and site utilities, such as stations, workshop and railway maintenance yards / depots, signaling systems, electricity supplies, and fueling facilities.

Rolling Stock

Locomotives

Passenger and freight railcars are typically pulled or pushed by diesel-powered locomotives. Electric locomotives may be used on rail lines that have electric power supplied by means of overhead lines or a conducting third rail. Modern electrified railway systems typically operate on an alternating current, but many existing direct current (DC) systems are still in use worldwide. The operating voltage for DC systems is in the range of 750 to 3000 volts (V), while for AC systems 15 to 25 kilovolts (kV) is typical. Locomotives are often subdivided by their usage, namely passenger locomotives, freight locomotives, and switcher (or shunting) locomotives. These categories mainly depend on maneuverability, traction power, and speed. Electrically powered locomotives may be equipped with a regenerative brake system to recapture part of the kinetic energy that would otherwise be lost as heat when braking, transmitting it into the overhead wire for use by other locomotives. The locomotives provide the power to move a number of connected passenger or freight (cargo) railroad cars, and this unit is collectively known as a "train".

Passenger Cars

Most passenger cars are made of steel, and may consist of double decks to accommodate passengers. Passenger cars may serve multiple functions including dining and baggage storage. Toilet facilities for passenger cars may deposit waste directly onto the tracks or employ retention tanks that are emptied at stations.

Freight / Cargo Cars

There are a number of types of freight cars designed for specific functions. Common types include:

- *Lorries:* Open top railway cars with tipping troughs, often used for transport of ore or minerals
- *Boxcars:* Enclosed railway cars with side doors used for most kinds of cargo
- *Refrigerator cars:* Refrigerated boxcars for the transport of foodstuffs

[46] European Environment Agency, Spatial and Ecological Assessment of the TEN – demonstration of indicators and GIS methods, 1998.

- *Gondolas:* Railway cars with an open top, enclosed sides and ends, used for bulk commodities and other goods
- *Flatcars:* Open cars for transportation of standard shipping containers and semi-trailers
- *Tank cars:* Tanks for the transport of liquids

Railway Track

The rail track is constructed of two parallel steel rails attached to perpendicular crossties (sleepers) made of timber, concrete or steel. The crossties are mounted in a bed of ballast, with underlying sub-ballast and a fine-grained subgrade foundation. Traditionally, bolted rail joints have been used for all railways. However, continuous-welded rails are now commonly installed when constructing new tracks or replacing rails during track maintenance. Wooden crossties are resilient and tend to give a smooth ride, but require initial chemical treatment to prevent rot and are not structurally suitable for modern high-speed tracks. Ballast generally consists of a 150-225 millimeter (mm) deep layer of stone crushed to a size of 40-65 mm, and provides support for the crossties and promotes drainage.

Railway Operations

The operational activities of rolling stock include all aspects of the movement of locomotives and railcars over a section of track, including passenger and freight transport, loading and unloading of freight at stations, and locomotive fueling. Most modern railways use automatic systems to monitor the location of trains and to operate signal / rail switching infrastructure.[47] Operational and maintenance activities associated with rail infrastructure include the maintenance and clearance of tracks, signaling and switching systems, as well as associated roads, tunnels, bridges, and buildings.

Maintenance Activities

In addition to the track and track right-of-way maintenance activities, maintenance activities may consist of routine servicing or heavy mechanical maintenance activities. Routine maintenance activities may include lubricating oil changes and mechanical safety inspections, exterior washing of locomotives and wagons, and interior washing of rail tankers.

Heavy mechanical maintenance may include replacement of rolling and engine components, engine overhauls, mechanical tests and adjustments, among others. Heavy mechanical maintenance may also include parts machining, welding, cleaning (including degreasing), and other types of activities typically conducted in metal mechanics shops. Passenger and cargo wagons may also be cleaned and painted, including touch up painting, during heavy maintenance.

[47] The flow of train traffic is governed through a system of location and movement signal controls, which are mechanical or electronic and involve the use of time schedules, signs, colored lights, and rail track switching equipment. This system informs train operators regarding the status of the railway line and serves to prevent collisions.

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Annexure 10.19. Reporting Format for Borrow Areas Management

(To be filled and submitted by the Contractor for taking permission from GC)

Name of Project Corridor: _____

Name of Contractor : _____

Date :_____

Sl. No.	Approved Borrow Area (BA) No.	Village/ Locality	Ch. in Km & Side (LHS /RHS)	Type of material	Quantity of available material (cum)	Quantity of available material required (cum)	Quantity of available material utilized (cum)	Balance Quantity left out in B.A.	Top Soil conservation	Dust suppression of B.A. & haul Roads – (method & frequency)	Redevelopment (in to Leveled/Pond, etc. for Agriculture purpose)	Land Use		Remarks, if any
												Before	After	

List of Enclosure	Location Map
	Land Owner's Agreement/Consent/Approval
	Redevelopment Plan
	Photographs of Site before use, during operation and after Redevelopment

Remarks

Submission Details	Submitted by : Contractor	Checked by: Sr. Env. Specialist of GC/CSC/PMC	Approved by: In-charge Officer, EMU, KRIDE
Signature			
Name			
Designation			

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Annexure 10.20. IFC's Workers' Accommodation: Processes and Standards

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Workers' accommodation: processes and standards

A guidance note by IFC and the EBRD

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The EBRD is an international financial institution that supports projects from central Europe to central Asia. Investing primarily in private sector clients whose needs cannot be fully met by the market, we foster transition towards open and democratic market economies. In all our operations we follow the highest standards of corporate governance and sustainable development.

IFC, a member of the World Bank Group, creates opportunity for people to escape poverty and improve their lives. We foster sustainable economic growth in developing countries by supporting private sector development, mobilising private capital, and providing advisory and risk mitigation services to businesses and governments. Our new investments totalled US$ 15 billion in fiscal 2009, helping play a prominent role in addressing the financial crisis. For more information, visit www.ifc.org.

About this guidance note

This Guidance Note is aimed at providing practical guidance to IFC and EBRD specialists, consultants and clients on the processes and standards that should be applied to the provision of workers' accommodation in relation to projects funded by IFC or the EBRD. Applying appropriate standards to the construction and operation of worker housing falls within the performance requirements on labour and working conditions expected of clients by both institutions. The Guidance Note also provides examples of good practice approaches that businesses have successfully applied in their operations. IFC and the EBRD have not financed all the projects or companies mentioned in the Note. Some of the information in the Note originates from publicly available sources such as company web sites. IFC and the EBRD have not verified the accuracy of such information nor the companies' practices. This Guidance Note is not intended to establish policy itself; and any issues arising in an IFC- or EBRD-financed project will be assessed and addressed in the context of the particular circumstances of that project. The EBRD and IFC recognise that there are no comprehensive international regulations relating to workers' accommodation, and that good and best practices are constantly evolving. The EBRD and IFC intend to update this Guidance Note to reflect such developments, and would welcome feedback and comments from users to contribute to this process. Comments should be sent to environmentalandsocial@ebrd.com and asksustainability@ifc.org

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Workers' accommodation: processes and standards

Public guidance note by IFC and the EBRD

EXECUTIVE SUMMARY

This guidance note addresses the processes and standards that should be applied to the provision of workers' accommodation in relation to projects funded by the EBRD or IFC. Applying appropriate standards to the construction and operation of worker housing falls within the performance requirements on labour issues expected of clients by both organisations.

There is a range of different types of workers' accommodation that may be required by various projects and at different stages within projects, including temporary exploration camps, construction camps and permanent dormitories. Specific issues arise in relation to each of these. This note reviews various international, national, private sector and public sector standards and guidance that are more generally applicable. In some cases clear standards or good practice have been identified. In others, we present a range of standards that provide some flexibility and adaptability within the local context. In these cases, compliance with at least the minimum standard is expected.

Issues for consideration are organised in terms of a staged process to be undertaken in planning, constructing and then operating worker housing facilities. These issues may be relevant to the direct client or to (sub)contractors undertaking particular elements of a project, such as construction or management of facilities. In cases where contractors are used, it is important to set up appropriate mechanisms and processes (reporting/monitoring) to ensure that performance requirements are complied with.

At the initial stage of any project, there is a need to assess whether accommodation for workers is required, and if so, whether this can be provided within existing local communities or whether new facilities should be constructed. The likely impact on local communities and the housing market of either option should be assessed.

Before constructing any facilities, other potential impacts should be evaluated. These may include the impact of construction, and the effect of a new housed labour force on community services, such as health, and on community cohesion and safety. These assessments should form part of a project's Environmental and Social Impact Assessment.

The next step is to consider the standards to be applied for the location, arrangement and construction of any facilities. Issues here include consideration of a safe and healthy location, application of appropriate construction standards, provision of adequate and sanitary living conditions and provision of appropriate leisure and health facilities.

There are no universally applicable international regulations relating to workers' accommodation standards in general. However, there are some international standards/guidance on food safety, water sanitation and waste management that should be applied, and national or local building regulations that must be complied with.

Lastly, when the accommodation has been completed, there are issues around its operation and management. These include the type of staff who will manage it, development of appropriate management policies, such as security and grievance procedures, and ongoing liaison with local communities. All such policies should be subject to regular review.

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INTRODUCTION

This guidance note looks at the provision of housing or accommodation for workers by employers and the issues that arise from the planning, construction and management of such facilities.

Generally, workers are housed by their employers in cases where, either the number or the type of workers required cannot be sourced from or accommodated within local communities. Thus provision of workers' accommodation is often associated with the importation of an external workforce into an area. This can occur because the local labour supply or skills base is inadequate, because the workers are simply not available due to the remote location of the worksite or the particular skills required or because labour requirements can only be satisfied by migrant workers due to the nature of the work or the working conditions.

Provision of worker housing may relate to a temporary phase of a project (for example an exploration or construction camp) or may be more permanent (for example a factory dormitory or plantation camp). Depending on the type of accommodation, there are a range of considerations relating to both the living conditions of the workers themselves, and to the impact that workers' housing facilities may have on surrounding communities. The provision of workers' accommodation is a frequent component of large-scale projects funded by institutions such as the EBRD or IFC.

This note is aimed at providing practical guidance to IFC and EBRD specialists, consultants and clients on appropriate policies and standards relating to workers' accommodation. Both the EBRD and IFC apply environmental and social performance standards in relation to their investments that include provisions on labour and working conditions. The EBRD has included a specific provision in its *Environmental and Social Policy* addressing workers' accommodation; paragraph 16 of *Performance Requirement 2* (PR2) stipulates:

> *Where a client provides accommodation for workers, the accommodation shall be appropriate for its location and be clean, safe and, at a minimum, meet the basic needs of workers. In particular, the provision of accommodation shall meet national legislation and international good practice in relation, but not restricted, to the following: the practice for charging for accommodation; the provision of minimum amounts of space for each worker; provision of sanitary, laundry and cooking facilities and potable water; the location of accommodation in relation to the workplace; any health, fire safety or other hazards or disturbances and local facilities; the provision of first aid and medical facilities; and heating and ventilation. Workers' freedom of movement to and from the employer-provided accommodation shall not be unduly restricted.*

IFC *Performance Standard 2* (PS2) aims to promote "safe and healthy working conditions, and to protect and promote the health of workers." Arguably this covers living conditions as well when these are the responsibility of employers. *IFC Guidance Note 2 on Labour and Working Conditions* specifically mentions the potential danger of forced labour when housing is provided to workers in lieu of payment or where inappropriate charges for housing are levied.

In some instances, for example during construction phases of projects, workers will not be directly engaged by the EBRD's or IFC's clients, but by (sub)contractors. However, both the EBRD and IFC require their clients to ensure that non-employee

Box 1 - Construction camp built and operated by a Chinese contractor

This example illustrates the different mechanisms and processes which can be set up in order to ensure that workers' accommodation standards are being implemented by contractors.

Antea, a Greek client of the EBRD and IFC, and a subsidiary of Titan Cement Co, has contracted out the construction of a cement factory in Albania to a Chinese contractor. The construction involves bringing in 700 migrant workers and housing them in workers' accommodation. As part of the contract with the construction company, Antea has included a Code of Conduct and specific language referring to compliance with national labour law, ILO conventions and IFC PS2 and has developed a supervision and monitoring plan (including safety and labour audits) to ensure the construction company is in compliance with all requirements stated in PS2, that living conditions in particular comply with the guidance provided by the EBRD/IFC and that all conditions enhance a safe and good working and living environment. Safety training courses and integration of best practices in accident prevention have been instigated, while solid waste and wastewater generated in the camp is managed in accordance with Albanian regulations and IFC/EBRD guidelines.

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workers, engaged by contractors or other intermediaries to work on a project site to perform work related to the core function of the project, are covered by most of the provisions within PS2 and PR2, including (in the EBRD's case) paragraph 16 on workers' accommodation. To this end, clients should set up mechanisms and processes to ensure that contractors and other intermediaries comply with the EBRD's/IFC's standards. This should involve including contractual covenants related to workers' accommodation standards, reviewing contractor agreements, implementing reporting mechanisms and monitoring the implementation of workers' accommodation standards.

A process approach

There are several stages to the process of addressing issues raised by workers' accommodation. These are:

- assessing whether housing is needed for the project and if so, what sort
- assessing impacts on local communities and planning mitigation of potential negative impacts
- awareness of the national and local regulatory framework
- determining the standards to apply to the location of facilities, the construction of housing and provision of facilities
- managing accommodation.

There are no comprehensive international regulations relating to workers' accommodation. However, there are legal and regulatory instruments and guidance that relate to particular aspects of the provision of worker housing.[1] This guidance note is based on a review of these instruments and legislation, as well as guidelines and best practices produced by a range of different private and public sector actions at national and international level. As such, the processes and standards cited often represent a range of acceptable practice. Those correspond to the Benchmark paragraphs under each section. The particular standard to be applied will depend on criteria such as the type of project, location, climate and length of project. In all cases at least the minimum standard included in a given range should be applied. However, depending on the particular circumstances the minimum standard may not always be acceptable, in which case the EBRD/IFC will agree an appropriate higher standard with the client, based on the environmental and social due diligence.

Figure 1: Workers' accommodation, assessment and management process

Need assessment	Is there a need for workers' accommodation?	▸ Assess the availability of the local workforce ▸ Assess the availability of existing housing
Impact assessment	What are the expected impacts (positive and negative) on the communities?	▸ Determine specific impacts of the workers' accommodation construction phase (including security and involuntary resettlement) ▸ Assess existing community infrastructures, services and facilities ▸ Understand the local business and employment context ▸ Give special attention to community health and safety issues and social cohesion ▸ Think about the consequences of dismantling and reinstatement
Construction	Which accommodation standards are needed?	▸ Identify and review the international, national, regional and sectoral regulations which address workers' accommodation ▸ Apply mandatory provisions and use non-binding provisions as guidance ▸ Apply at least the minimum requirements set out in this guidance note
Management	What management systems are required?	▸ Design management plans covering health and safety, security, workers' and communities' rights ▸ Appoint the right staff or contract the right companies ▸ Implement management plans ▸ Set up complaint/grievance and conflict resolution mechanisms (for both workers and communities) ▸ Review policies

1. See footnotes under Part I, introductory remark

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PART I: PLANNING AND ASSESSING REQUIREMENTS FOR WORKERS' ACCOMMODATION

In considering worker housing, it is important to first be aware of the international, national and local regulatory framework. At a general level, several international instruments recognise a right to an adequate standard of housing for everyone or for specific categories of the population as part of respecting human rights.[2] To ensure the full realisation of this right, binding instruments generally require the State to take appropriate steps and measures. For workers, the recognition of such a right has been included in ILO Conventions and Recommendations for both Plantations and for Safety and Health in Agriculture, and in the ILO Recommendation 115 on Workers' Housing (1961) in particular. Although the latter is a non-binding recommendation providing guidance on policy, legislation and practice to the State and to the national authorities in charge of housing in particular, it offers useful guidance on what is expected from employers who provide housing to their employees, and it specifies a number of housing standards (See Box 2).

Box 2 - ILO Workers' Housing Recommendation 115

- It is generally not desirable for employers to provide housing for their workers directly and employers should use alternatives where possible. If there are no alternatives, specific attention should be paid to renting arrangements, workers' rights and housing standards. In addition, the possibility of worker-occupants acquiring, for a fair price, ownership of housing provided by the employer should also be examined.
- Renting arrangements should be fair. Adequate and decent housing should not cost the worker more than a reasonable proportion of their income and should never include a speculative profit.
- The employer should be entitled to repossess the accommodation within a reasonable time in the event of termination of the worker's contract of employment and the worker should be entitled to a reasonable period of continued occupancy and/or fair compensation when he ceases to exercise his employment.
- During the time workers spend in the workers' accommodation they should enjoy their fundamental human rights and freedom of association in particular. Workers' accommodation arrangements should not restrict workers' rights and freedoms.
- Housing standards should include special attention to the following:
  - minimum space allocated per person or per family (floor area; cubic volume; or size and number of rooms)
  - supply of safe water in the workers' dwelling in such quantities as to provide for all personal and household uses
  - adequate sewage and garbage disposal systems
  - appropriate protection against heat, cold, damp, noise, fire, and disease-carrying animals, and, in particular, insects
  - adequate sanitary and washing facilities, ventilation, cooking and storage facilities and natural and artificial lighting
  - a minimum degree of privacy both between individual persons within the household and for the members of the household against undue disturbance by external factors
  - the suitable separation of rooms devoted to living purposes from quarters for animals.
- Where accommodations are provided for single workers or workers separated from their families, additional housing standards should be considered:
  - a separate bed for each worker
  - separate gender accommodation
  - adequate sanitary conveniences
  - common dining rooms, canteens, rest and recreation rooms and health facilities, where not otherwise available in the community.

2. See for example
1948 Universal Declaration of Human Rights (Article 25)
1965 Convention on the elimination of all forms of racial discrimination (Article 5)
1966 International Covenant on Economic, Social and Cultural Rights (Article 11.1)
1979 Convention on the elimination of all forms of discrimination against women (Article 14.2)

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At a national or regional level, regulations tend to contain only general provisions requiring employers to provide a decent standard of accommodation to workers. However, in some jurisdictions there are detailed regulations or standards setting out a comprehensive framework to be applied.[3] There may also be building regulations relating to issues such as sanitation, safety or building materials that must be adhered to. Therefore, national regulations and standards are the first place to look when determining the necessary standards for living facilities. However, responsibility for planning and building standards may well lie with regional or local levels of government, so it is important that these local authorities are consulted. Provisions on workers' accommodation can also be found in policy, guidelines or codes of practice adopted by a wide variety of actors such as international bodies, industry associations, national, regional or local authorities.[4] Compliance with national and local law is the basic and essential requirement.

Benchmarks

1. The international/national/local regulatory frameworks on workers' accommodation have been reviewed.

2. Identified mandatory provisions on workers' accommodation are implemented thoroughly.

I. Assessing the need for workers' accommodation

Before building and running workers' accommodation, it is important to understand the local housing and labour markets and the potential effects the building of new facilities may have on the surrounding communities.

A. Availability of workforce

At the initial scoping phase of a project, it is important to consider whether workers' accommodation is needed at all. In this respect, it is worth analysing the project's workforce requirements including skills and likely numbers over the project cycle and to assess the capacity of the local population to meet those workforce requirements either from its current base or as a result of training. It is preferable to source labour from the local communities as this has many advantages; not only in terms of reducing the need for workers' accommodation, but also as it will increase the direct and indirect benefits to the community arising from the project. This approach is strongly supported by the EBRD and IFC. Any national/local requirements to promote local employment opportunities must also be taken into account. It should be noted that even in the absence of such requirements, new recruitment on EBRD/IFC-financed projects must not be discriminatory.

Benchmarks

1. There has been an assessment of workers' availability in the neighbouring communities.

2. There has been an assessment of the skills and competencies of the local workforce and how those skills and competencies fit the project needs.

3. There has been an assessment of opportunities to train the local workforce to fulfil the project's needs.

B. Availability of existing housing

If local workers are unavailable or not sufficiently skilled, the question arises of whether external workers can be accommodated within the existing local housing capacity or whether new facilities are needed. In general, the decision to utilise host-community accommodation or to develop on-site accommodation will be based on factors such as whether project development is occurring near to larger, established population centres and on the capacity of any nearby communities, quality of housing stock and the capacity of the environment to assimilate a new workforce.

If existing capacity is available, in the form, for example, of lodging with local families, hotels, hostels or rented housing, the impact on the local communities and housing market should be assessed. Such off-site housing may create a wide range of economic opportunities such as rental income for local people or development of local businesses (shops and restaurants for instance), which are positive project impacts, and may also result in improvements to existing housing stock. However, off-site housing may also be associated with a range of adverse social impacts including increased demands on infrastructure, services and utilities, development of illicit trade activities (drugs, prostitution, selling of stolen goods) and inflation in local rent and other subsistence items with detrimental

3. See for example:
United States - Occupational Health and Safety Act (Standards 29, paragraph 1910.142)
Brazil - Health and safety regulation in the agricultural, livestock farming, forestry and aquaculture sectors, 2005
Malaysia - Workers' minimum standards of housing and amenities Act, 1990
South Africa - Basic condition of employment Act, 1997
New South Wales, Australia - Rural Workers Accommodation Act, 1969
Western Australia - Construction camp regulations, 1970
Dubai Municipality - Labour camp specifications (last updated in 2007)

4. See for example:
New South Wales, Australia - Accommodation for rural agricultural work, code of practice, 2006
Singapore - Code of practice on environmental health, 2005
Israel - Guide for Migrant Workers, Housing
ILO - Code of Practice, safety and health in forestry work, 1998
City of Geraldton-Greenough, Western Australia, Local planning policy - Temporary accommodation camps, 2006
Sustainable Agriculture Network Standards, 5.14, 2009.

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consequences for the local population. If a project anticipates that the workforce is to be resident within the local communities it is good practice to provide financing options for local residents to develop and/or improve hostels for instance.

Conversely, to provide on-site housing opportunities minimises workforce-host community interactions and reduces the pressure on existing infrastructures and can also pre-empt the development of various external activities such as prostitution.

In some cases, it may be feasible and beneficial to offer workers or certain categories of workers an option between self-accommodation and company-provided accommodation with varying compensation accordingly.

To avoid or mitigate the most negative impacts, it is important to conduct a comprehensive assessment of the housing market and the likely impact of the various options for workers' accommodation. For larger projects, this assessment will best be done at the stage of the Environmental and Social Impact Assessment (ESIA). Measures resulting from this assessment will need to be incorporated in tendering and contracting documentation. Furthermore, in cases where local facilities are utilised, potential mitigation measures for adverse impacts such as increased inflationary rates on local costs must be assessed in the ESIA, and procedures that will be implemented to monitor this must also be presented.

Benchmarks

1. Prior to building any workers' accommodation, a comprehensive assessment of the local housing market has been conducted and the different types of housing available in the surrounding communities have been identified. For larger projects this assessment has been conducted at the stage of the project's Environmental and Social Impact Assessment.

2. There has been an assessment on communities of the impact of using existing housing opportunities.

3. Measures to mitigate adverse impacts on the local housing market have been identified and included in the Environmental and Social Action Plan (ESAP) or other relevant action plan.

II. Assessing impacts of workers' accommodation on communities

Where the need to provide new workers' accommodation is identified, it is important to consider how this will impact on the surrounding communities. This may be relevant both to the construction phase of the camp (or other accommodation) and during its operation. Risk identification and assessments specific to the workers' accommodation should be undertaken as part of the Environmental and Social Impact Assessment and any related development of an Environmental and Social Action Plan. This assessment can also be used to determine whether contact between non-local workforce and local communities should be encouraged or minimised.

Box 3 - Singapore National Environment Agency - Code of Practice on Environmental Health, 2005

The following guidelines shall be used for stand-alone dormitories.

- If the dormitory does not provide a separate space for cupboards/locker rooms, the minimum room space shall be 4 square metres per person (assuming a height of 2.4m).
- If the dormitory provides a separate space for cupboards/locker rooms, the minimum room space shall be 3 square metres per person (assuming a height of 2.4m).
- The room shall be adequately ventilated and lit.
- Adequate number of toilets and sanitary fittings shall be provided (1 toilet, 1 hand wash basin, 1 urinal and 1 bathroom with bench per 15 male workers).
- Where cooking area is to be provided in the dormitories, such provisions shall be in accordance with the requirements stipulated under Section 2.4 of the latest edition of Singapore Standard CP 102.

The above Singapore guidelines are mentioned as an example of "soft" regulations only. The standards described above may be inappropriate in different environments. Other standards apply in other countries.

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A. Specific impacts during the construction phase

The construction of workers' accommodation and its potential impacts on communities should be managed in the same way as for construction of the project itself. Impacts need to be identified and may include health and safety, disturbance issues arising from construction, including traffic (dust, noise and vibration), and involuntary resettlement issues (including physical and economical displacement) when the erecting of workers' accommodation entails land acquisition.

B. Community infrastructure

Workers' influx in the vicinity of a community may strain existing infrastructure, in particular the water and sanitation, electricity and transport systems. Impacts of the worker facility should be avoided or mitigated, and included within the assessment of the overall project.

In general, where facilities are developed close to local communities it is important to provide adequate transport systems to preserve the right of workers' freedom of movement if they are not to become effectively "trapped". This should be balanced against the need to prevent any unecessary disruption of and/or to the local communities. Therefore it may be appropriate to limit worker movements, but any restriction should be clearly justified by the need to avoid the disruption of local communities, in particular local communities' transport infrastructures – and to provide maximum security and safety to both workers and communities (see PART II, Section E "Workers' rights, rules and regulations on workers' accommodation", below at page 21).

C. Community services and facilities

Depending on the size of the workers' accommodation, conditions of engagement (accompanied or unaccompanied) and the level of services offered to those workers, it may be necessary to assess the impact of workers on local medical, social, educational and recreational services and facilities, potentially to the detriment of nearby communities. It must be ensured that such services and facilities can meet increased demand. If not, services must be available to the workers on site.

D. Local businesses and local employment

Local businesses such as shops, restaurants or bars are likely to benefit from their proximity to workers' living facilities. However, there may also be negative issues that need to be managed such as increases in local prices, crime, prostitution or alcohol consumption (see below Part II, section E).

E. Community health and safety

The presence of a large number of workers, principally males, can give rise to an increased spread of communicable diseases such as HIV/AIDS in particular and other sexually transmitted diseases. In addition, special attention should be paid to risks such as road accidents, and other detrimental consequences of increased traffic generated by the project (dust, noise, and pollution). If the proposed project has major-accident hazards associated with it, emergency response and evacuation plans in accordance to PS4/PR4 will also need to be in place.

F. Community cohesion

The impact of the presence of workers with different lifestyles or cultural backgrounds on the host community needs to be assessed and managed, in particular issues such as religious or other cultural proscriptions, local traditions and community structure and the relationship between men and women.

G. Land acquisition and resettlement

Impacts and mitigation plans relating to land used for workers' accommodation facilities should be managed in the same way as for the project as a whole. As far as possible, land acquisition should be avoided or minimised.

H. Dismantling and reinstatement

Dismantling and reinstatement of workers' accommodation should be taken into account at the outset of the project in order to avoid any unnecessary lasting impacts of the accommodations on the communities (land use for instance). Where possible and appropriate, the facilities can be handed over to the communities.

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Benchmarks

1. A community impact assessment has been carried out as part of the Environmental and Social Assessment of the overall project with a view to mitigate the negative impacts of the workers' accommodation on the surrounding communities and to enhance the positive ones.

2. The assessment includes potential health and safety impacts on the communities - including disturbances and safety issues caused by traffic (dust, noise, vibration, road accidents, disease) and consequences of land acquisition and involuntary resettlement occurring during the construction phase of the workers' accommodation.

3. Positive and negative impacts of workers' accommodation on community infrastructures, services and facilities have been included in the assessment, including specific attention to emergency responses and evacuation plans.

4. Impacts of workers' accommodation on community local businesses and local employment have been included in the assessment.

5. General impacts of workers' accommodation on the health of communities (notably the increased risk of road accidents and the increase of communicable diseases) and community social cohesion have been included in the assessment.

6. The assessment includes appropriate mitigation measures to address any adverse impacts identified.

Table 1: A typology of workers' accommodation

Category	Subcategory/examples	Common characteristics	Sectors covered	Key issues
Rural workers' accommodation	Logging camp Off-farm accommodation	Permanent or seasonal Remote	Forestry Agriculture	Worker access Monitoring difficulties
Plantation housing	Worker village Off-farm accommodation	Permanent and long term Families	Agriculture	Need to provide sustainable livelihoods Social infrastructures Living conditions
Construction camp	Worker camp Worker village Mobile worker camp	Temporary Migrant workers Gender separation	Extractives Utilities Infrastructure Manufacturing	Enforcement of standards and monitoring difficulties Relations with the communities Living standards Cost
Mine camp	Company towns Dormitories Integrated within existing communities Commuter (fly-in, fly-out)	Long term Remote location Gender separation	Extractives	Relations with communities Remoteness Living standards Worker access Long shifts No rest periods
Factory dormitory		Permanent Urban Internal migrants	Garments/textiles Manufacturing – toys, electronics	Space Privacy Living standards Deduction of excessive rent from wages

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III. Types of workers' accommodation

There is a large variety of workers' living facilities. These may be classified in a number of ways. Table 1 provides one typology. Key criteria may include whether the facilities are temporary or permanent, their location (remote or non-remote), size, or economic sector (agriculture, mining, oil and gas, construction, manufacturing).

The typology above is given as an example only; other classifications are possible. For instance, housing may be categorised in terms of project phases for example, exploration (fly-in, fly-out camps), construction (temporary construction camp often with large proportion of migrant workers) and operational (permanent, dormitory, possible family accommodation).

Depending on the type of project, specific attention should be given to either providing single workers' accommodation or family accommodation. As a general rule, the more permanent the housing, the greater considerations should be given to enabling workers to live with their families. Such consideration is important where the workforce is

Box 4 - Best practice on home-ownership

When access to property schemes is proposed it is important to guarantee the sustainability of workers' investments. To this end, the location of the project and of the workers' accommodation and their integration in existing communities are factors to take into consideration. Caution should be exercised when offering such schemes in remote locations as it might be impossible to create a sustainable community and to develop non-project-related sources of livelihood.

Affordable housing in a sustainable town: A provider of affordable housing in South Africa and a provider of housing development for the mining sector worked together on a project to move away from mining hostels and rental villages to providing home-ownership opportunities to workers. To this end they developed a 400-plus unit in a village 20 km from the mine with the idea to create an economically and socially viable community close to the mine. A concern was to integrate people within existing communities with the necessary social amenities and infrastructures and to put the emphasis on better housing conditions, home ownership and affordable housing for mining workers. The success of the project relied on the ability for the service provider to take into account the often difficult financial situation of workers. To overcome over-indebtedness of workers, specific access to property schemes and programmes have been designed including employer support, economies of scale, low interest rate and stepped payment options.

Affordable housing in a self-sustaining community: An FMO (Netherlands Development Finance Company) client operating a mine in a remote location intends to manage and develop a well-planned, secure and independent village for approximately 1,000 employees. The FMO client is expected to provide residents with basic services, including water, electricity and sewerage as well as education, health services, sports facilities, shops, green areas and places of worship. In addition, provision has been made for a light industrial and small business area to support local business development. The long-term vision is for the Village to grow into a self-sustaining community of over 4,000 houses, which is capable of supporting a variety of small businesses and local enterprises. To support the long-term vision of a self-sustaining village and to provide mine employees with an opportunity to build up cash equity (in the form of a house), the FMO client will promote home ownership. In this context, an employee housing scheme has been designed that allows mine employees in all income categories to acquire title to property through mortgage debt all associated rights and obligations. Participation in the scheme is not a prerequisite for employment. The scheme includes several provisions to ensure affordability of home ownership to all mine employees and to protect employees against downside risks.

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not sourced locally and in particular where migrant workers are used.[5] Provision for families will affect the other facilities necessary and the management of the accommodation. Best practice includes:

- To provide workers and their families individual family accommodation comprising bedrooms, sanitary and cooking facilities with an adequate level of privacy allowing families to have a normal family life.
- To provide nurseries, schools, clinics and recreational facilities for children, or to make sure that those services are readily available in the surrounding communities and of good quality.

Benchmarks

1. Consideration has been given to provision of family accommodation.

2. When arrangements for family accommodations are in place:
   - families are provided with individual accommodation comprising bedroom, sanitary and cooking facilities
   - adequate nursery/school facilities are provided
   - special attention is paid to providing adequate safety for children.

Additional issue

In projects located in rural and remote locations, issues around the question of how workers can travel to their communities/countries of origin might arise. Alternatively, the possibility to create a sustainable community and to bring in the workers' families might be considered.

Box 5 - Best practice on migrant workers' accommodation: Business in the Community - Voluntary Code of Practice on Employing Migrant Workers/Overseas Staff in Great Britain[6]

The Code, which is designed to guide and reinforce best practice in relation to the employment of migrant workers, points out that migrant workers will often have to travel long distances and be in need of accommodation when they take up a job. Consequently, the Code suggests the following.

- Employers should assist with travel costs incurred by migrant workers during the recruitment stage and the repayment of these costs should follow a clear process and the money paid back at an agreed affordable rate over a specified time period. The total amount repayable should be no more than that lent so that workers are not financially disadvantaged.
- Employers, where possible, should support migrant workers in finding suitable accommodation. Workers should not be required to stay in accommodation provided by the employer but should be free to choose their own if they wish to do so. Where employers do provide accommodation, they should ensure that they do not breach the rules relating to the apportionment of wages for payment for accommodation (the accommodation offset rules).
- Employers should help to ensure that, where workers obtain their own accommodation, they are not being exploited, and offer advice and help if requested.
- Employers should ensure that accommodation which is provided is not overcrowded and does not pose a risk to the health and safety of those living there, and that any agreed notice periods are observed.

5. On the increase in the recognition of workers' rights to family life, the ILO Migrant Workers Convention No 143 calls Member States to take all necessary measures which fall within its competence and collaborate with other Members to facilitate the reunion of the families of all migrant workers legally residing in its territory. In the same way, Art 44-2 of the International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families requires States Parties to take measures that they deem appropriate and that fall within their competence to facilitate the reunion of migrant workers with their spouses [...]as well as with their minor dependent unmarried children.

6. www.bitc.org.uk/resources/publications/migrant_workers_1.html