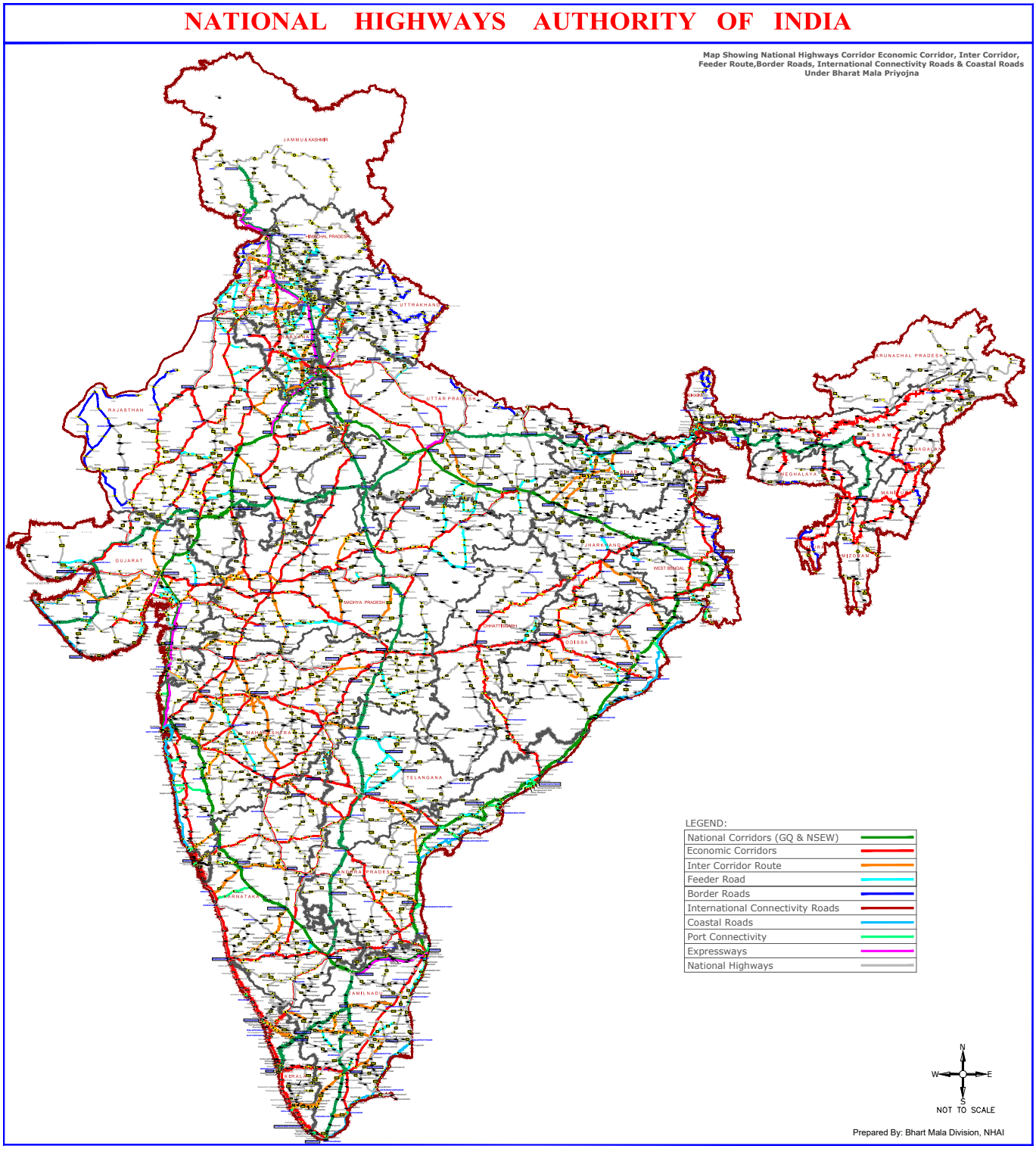
भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
सड़क परिवहन एवं राजमार्ग मंत्रालय, भारत सरकार
National Highways Authority of India
Ministry of Road Transport and Highways, Government of India

NHAI's CONTRIBUTION TO INDIA's SUSTAINABLE INFRASTRUCTURE, CIRCULAR ECONOMY AND MISSION LiFE

A JOURNEY TOWARDS AMRIT KAAL

SUSTAINABILITY REPORT
FY 2023-2024


राजमार्ग प्राधिकरण
NATIONAL HIGHWAYS AUTHORITY OF INDIA
NHAI


NATIONAL HIGHWAYS AUTHORITY OF INDIA
Map Showing National Highways Corridor Economic Corridor, Inter Corridor, Feeder Route,Border Roads, International Connectivity Roads & Coastal Roads Under Bharat Mala Priyojna
JAMMU & KASHMIR
HIMACHAL PRADESH
UTTRAKHAND
RAJASTHAN
UTTAR PRADESH
ARUNACHAL PRADESH
ASSAM
NAGALAND
MEGHALAYA
MANIPUR
MIZORAM
GUJARAT
JHARKHAND
WEST BENGAL
MADHYA PRADESH
CHHATTISGARH
ODISSA
MAHARASHTRA
TELANGANA
ANDHRA PRADESH
KARNATAKA
TAMILNADU
KERALA
LEGEND:
National Corridors (GQ & NSEW)
Economic Corridors
Inter Corridor Route
Feeder Road
Border Roads
International Connectivity Roads
Coastal Roads
Port Connectivity
Expressways
National Highways
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NOT TO SCALE
Prepared By: Bhart Mala Division, NHAI

ABOUT THE REPORT

- GRI Standards Overview
- How GRI Standards Inform Our Reporting
- The relevance of GRI framework for NHAI
- Scope of Report
- External Assurance
- Feedback and Response
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About the Report

The National Highways Authority of India (hereafter referred to as "NHAI", "Organisation" in the report), is guided by the motto of *'Building a Nation, Not Just Roads'.* In affiliation with the Ministry of Road Transport and Highways (MoRTH), Government of India, NHAI conceptualises, constructs, maintains, and oversees management of the National Highways and associated infrastructure, that connect people and places. Given India's focus on long-term sustainability and increasing regulatory requirements, the organisation is making every effort to align operations with international best practices for sustainable road infrastructure development.

NHAI has published this Sustainability Report to transparently disclose its Environmental, Social, and Governance (ESG) performance, and complement the Annual Report FY 2023-24 of MoRTH/NHAI. This is the second sustainability report of NHAI, reiterating the continued significance of ESG to the operations and long-term vision. The report attempts to holistically showcase the interconnectedness of governance structure, NHAI stakeholders as well as the commitment to environmental and social performance.

REPORTING PERIOD

This report covers information pertaining to the period 01 April 2023, to 31 March 2024, unless stated otherwise.

REPORTING STANDARDS

The National Highways Authority of India (NHAI) recognises the growing importance of transparency, accountability, and sustainability in today's business landscape. To ensure that the Sustainability Report reflects the highest standards of disclosure and offers stakeholders comprehensive insights into the environmental, social, and governance (ESG) commitment, practices, and progress, NHAI has voluntarily adopted the Global Reporting Initiative (GRI) 2021 Standards as the reporting framework.

Figure 1: Kaashi Toll Plaza

GRI STANDARDS OVERVIEW

The GRI Standards are the world's most widely adopted framework for sustainability reporting. Developed by the Global Reporting Initiative, they provide a structured methodology for organisations to report on their impacts on the economy, environment, and society in a standardised and comparable manner. The GRI framework encourages organisations to disclose their material topics, impacts, and risk management strategies transparently, ensuring that stakeholders-including governments, investors, communities, and employees are well-informed about the organisation's sustainability efforts.

HOW GRI STANDARDS INFORM REPORTING

Materiality and Stakeholder Inclusiveness

The GRI Standards emphasise the importance of identifying and reporting on material topics, which are areas that reflect NHAI's significant economic, environmental, and social impacts, or influence the decisions of stakeholders. This ensures that the report addresses the concerns and expectations of all stakeholders.

GRI Reporting Structure

The sustainability report adheres to the GRI core where the organisation has disclosed information around organisation profile, strategy, ethics, and governance, as well as impacts related to environmental, social, and economic performance.

Alignment with Sustainable Development Goals (SDGs)

The GRI Standards also facilitate alignment with the United Nations Sustainable Development Goals (SDGs). Through this report, key information highlights how NHAI's activities contribute to achieving key global goals such as SDG 9 (Industry, Innovation, and Infrastructure), SDG 13 (Climate Action), and SDG 11 (Sustainable Cities and Communities). By using GRI's globally accepted framework, NHAI ensures that the contributions to national and international sustainability targets are clearly communicated and measured.

Data-driven Environmental Management

Environmental responsibility is a cornerstone of NHAI's strategy. Adherence to GRI Environmental Standards ensures that NHAI discloses detailed data on energy use, water consumption, Greenhouse Gas (GHG) emissions, waste management, and biodiversity conservation. GRI Standards guide the organisation in providing quantifiable, verifiable, and comparable data on environmental performance. This enables stakeholders to access NHAI's contribution to mitigating climate change, conserving natural resources, and enhancing ecological balance.

Social Performance and Labour Practices

The GRI framework helps transparently disclose how NHAI is addressing labour practices, human rights, diversity, and local community engagement. This report includes data on employment practices, health and safety, training, diversity, and efforts to support communities affected by NHAI's projects. By following GRI's social standards, NHAI ensures that impact on people- whether employees, contractors, or local communities- is measurable, accountable, and reflective of best practices.

Governance and Anti-Corruption

NHAI's sustainability report includes a section on governance, ethics, and integrity, aligned with GRI 205: Anti-Corruption and other governance-related standards. The organisation provides detailed disclosures on policies and systems to prevent corruption in all facets of operations.

Integrated Approach to Risks and Opportunities

The GRI Standards provide guidance for identifying and disclosing the risks and opportunities associated with the operations. The report also covers efforts to seize opportunities that arise from adopting green technologies, circular economy practices, and innovations in road infrastructure.

Third-Party Assurance and Verification

To enhance the credibility of the data presented in this report, NHAI seeks third-party assurance for indicators selected on an arbitrary basis, particularly around environmental and social performance. Adhering to the GRI Standards ensures that data is verifiable, robust, and independently assessed, providing stakeholders with confidence in the accuracy and reliability of the information.

THE RELEVANCE OF GRI FRAMEWORK FOR NHAI

By adopting GRI Standards, NHAI ensures that the sustainability reporting is not only in line with international best practices but also fully transparent and accessible to all stakeholders. The structured approach of the GRI framework helps track, measure, and improve sustainability performance year on year, fostering a culture of continuous improvement and accountability. Furthermore, it allows for benchmarking of performance against both national and global standards, highlighting NHAI's role as a responsible leader in the infrastructure development sector.

The use of GRI Standards underscores NHAI's commitment to transparency, sustainable growth, and long-term value creation for the benefit of the stakeholders and the environment.

Overview of GRI 2021: Reporting Framework

The GRI Sustainability Reporting Standards (GRI Standards) are designed to be used by organisations to report about their most significant impacts on the economy, the environment, and people, including impacts on their human rights and how organisation manages these impacts. These standards are structured as a set of interrelated standards. They have been **developed primarily to be used together to help an organisation prepare a sustainability report** which is based on the Reporting Principles and focuses on material topics.

Preparing a report in accordance with the 102 indicators demonstrates that the report provides a full and balanced picture of an organisation's material topics and related impacts, as well as how these impacts are managed.

Figure 2: Hon'ble PM Shri Narendra Modi inspects Dwarka Expressway

GRI Reporting Principles

Accuracy
The information reported should be sufficiently accurate and detailed for stakeholders to assess the organisation's performance. NHAI ensures accuracy by using reliable data collection systems and third-party verification for key indicators, particularly related to emissions, resource use, and social impacts.

Balance
The report should reflect both positive and negative aspects of the organisation's performance to enable a reasonable assessment of overall sustainability. NHAI maintains balance by acknowledging challenges—such as construction delays or environmental impacts—alongside the successes, such as the implementation of green cover initiatives and smart infrastructure technologies.

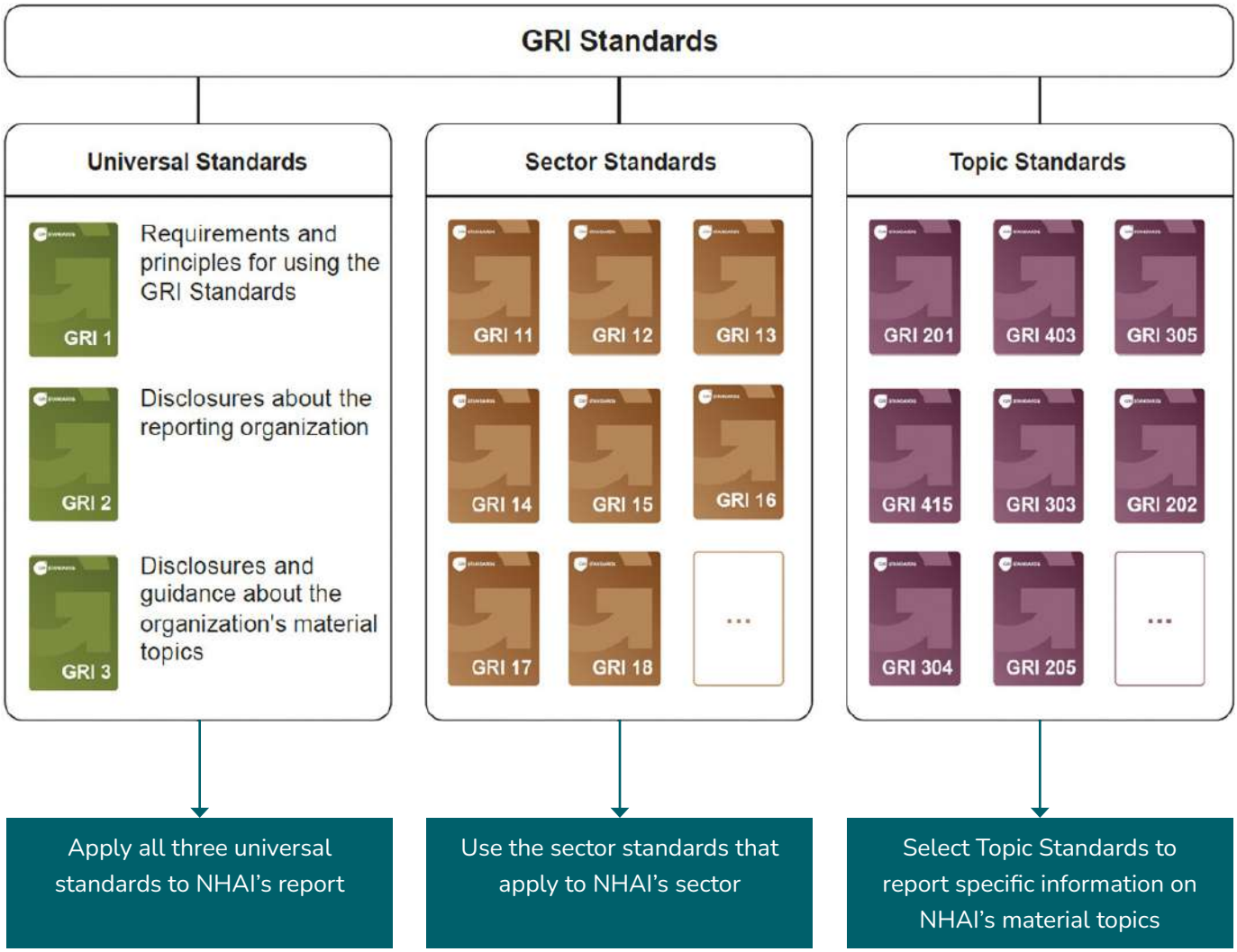
Clarity
The report should be understandable and accessible to stakeholders, with information presented in a clear, concise, and jargon-free manner. NHAI strives to make the report easy to read by using visuals, charts, and plain language to explain technical topics, allowing all stakeholders to comprehend the sustainability efforts.

Comparability
The report should allow stakeholders to compare the organisation's performance over time and against other organisations. By adhering to the GRI Standards, NHAI provides standardised data that can be compared across years, enabling stakeholders to assess progress in areas such as road safety, emissions reduction, and community engagement.

Reliability
The report should include accurate and reliable information that can be verified by third parties. NHAI ensures reliability by using standardised methodologies for data collection and analysis and by obtaining independent assurance for key performance indicators, such as greenhouse gas emissions.

Timelines
The report should be produced regularly and on time, ensuring that stakeholders have up-to-date information for decision-making. NHAI adheres to an annual reporting schedule to provide stakeholders with timely updates on the sustainability initiatives, performance, and future plans.

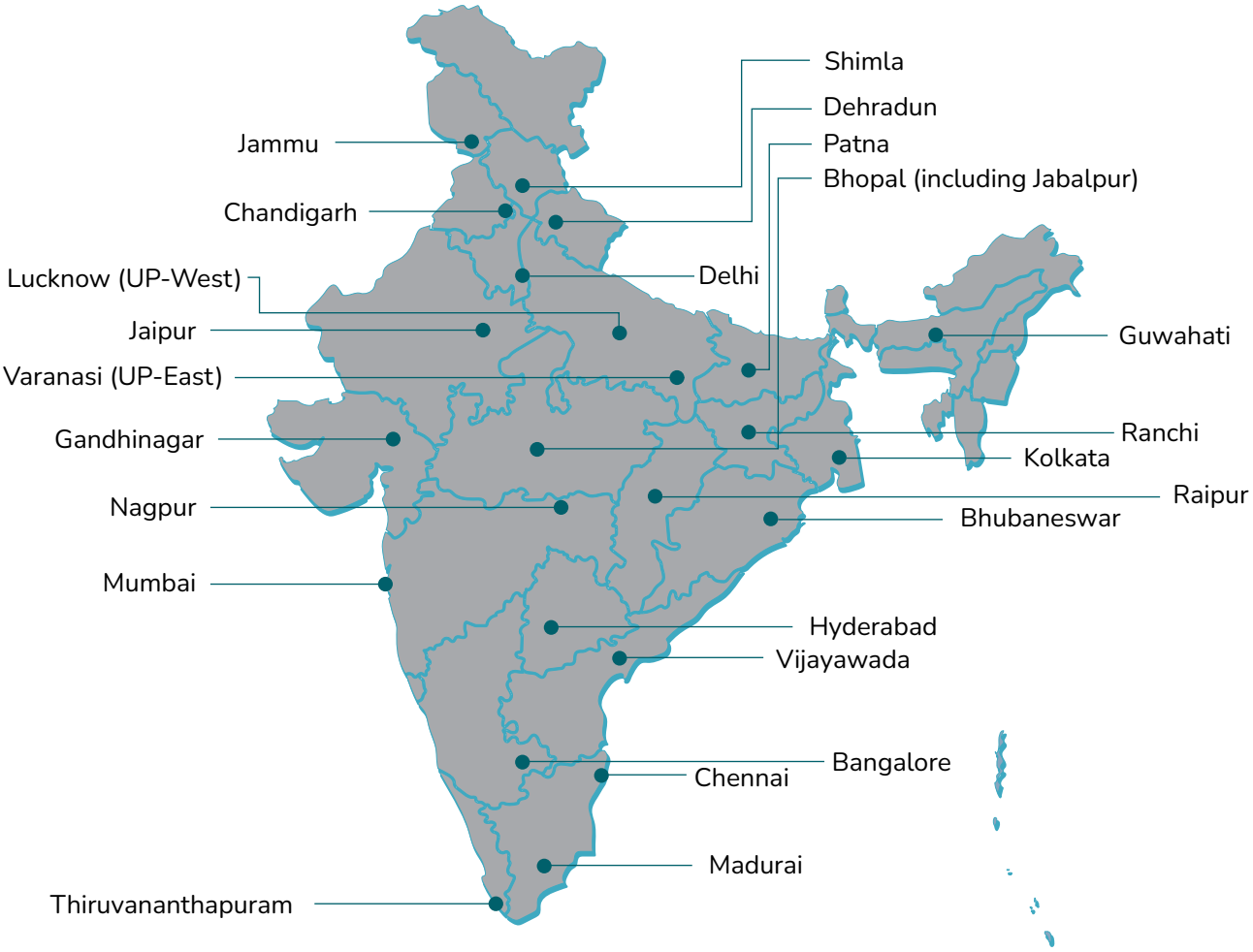
Verifiability
Data and information in the report should be traceable and capable of being audited. NHAI follows standardised reporting procedures and ensures that the data included in the report can be independently verified by third-party auditors for credibility and accuracy.



SCOPE OF REPORT

In the current scope of the Sustainability Report, NHAI has focused on streamlining its data collection and management processes, ensuring comprehensive representation of all material topics. The reporting framework has been expanded beyond NHAI's direct operations to offer a broader perspective. For FY 2023-24, the scope of the report encompasses NHAI's head office (HO), 25 regional offices (ROs), as well as the activities and processes of Concessionaires/Contractors engaged in the construction, operation, and maintenance of road infrastructure. NHAI has also reviewed the GRI indicators reported for FY 2021-22 and updated them to align with the expanded reporting boundaries for both NHAI and its Concessionaires/Contractors, where appropriate.

REGIONAL OFFICES OF NHAI



*Map not to Scale

EXTERNAL ASSURANCE

This report is assured by M/s. Bureau Veritas (India) Pvt. Ltd., as an independent third-party organisation to establish the credibility of the report content. The Assurance Partner appointed through a standard e-tendering process, followed at NHAI has adhered to the International Standards ISAE 3000 and AA1000 for the assurance (limited scope) process. For further details on assurance standards and conclusions, please refer to page 261 onwards of this report.

FEEDBACK AND RESPONSE

NHAI welcomes observations and suggestions about this report from stakeholders, at the following point of contact:

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I/c Chief General Manager (Technical) &
Coordinator for Sustainability Report
Email: alokkumar@nhai.org
Telephone: 011 25074100 Ext 1007

General Manager (Tech.), Environment Division,
National Highways Authority of India,
Sector 10 Dwarka, Delhi-110075
Email: mkbansal@nhai.org
Telephone: 011 25074100 Ext. 1381

CONTRIBUTION TO UN SUSTAINABLE DEVELOPMENT GOALS

Given the global focus on sustainability, NHAI aims to align practices to the United Nations Sustainable Development Goals (UN SDGs). The efforts not only enhance mobility but also contribute to broader social, economic, and environmental objectives. By improving access to jobs and education, promoting safety and health, and fostering equitable transportation systems, NHAI helps create resilient communities. Additionally, the commitment to sustainable practices in construction and maintenance address climate change and environmental protection.

This multifaceted approach enables NHAI to make significant contributions across all 17 SDGs, ultimately fostering inclusive and sustainable development for all. A snapshot of the organisation's contribution to the UN SDGs through commitments, initiatives, projects, and development initiatives is given below:

NHAI'S CONTRIBUTION

Improved road infrastructure is expected to enhance access to jobs, services, and markets, helping to alleviate poverty by connecting communities with economic opportunities. Infrastructure development also leads to job creation and GDP enhancement.

Efficient road networks facilitate the optimised transportation of food products, reduces waste and simultaneously improves access to markets, contributing to food security.

By ensuring safe road conditions and implementing measures through the 4Es (Education, Engineering, Enforcement, and Emergency Care), NHAI aims to reduce road traffic injuries and fatalities.

NHAI provides its employees (internal stakeholders) with access to healthcare services, regular checkups, and medical benefits that contribute to their overall health and well-being.

Dependable road infrastructure allows students across the country to access educational institutions more easily, ensuring better educational outcomes and opportunities.

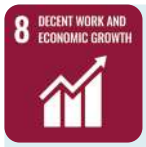
In addition, NHAI has numerous training and development opportunities for its employees with regard to different work aspects, Human Resource (HR) policies, safety procedures and job-specific skilling.

Creating safe and accessible road systems can empower women by improving their mobility and access to work, education, and healthcare. At NHAI, occasions such as International Women's Day are celebrated through various events and programs. The organisation's Diversity, Equity & Inclusion (DEI) efforts ensure there are no instances of discrimination, harassment, and biasness at the workplace on account of gender.

Proper planning of road and highway infrastructure prevents pollution and protects water resources through implementation of effective drainage, water recovery, and erosion control measures.

Through the Amrit Sarovar initiative, NHAI aims to facilitate sustainable water management practices.

The utilisation of sustainable energy sources in highway infrastructure development, such as solar power especially at toll plazas has been a continuous effort of NHAI. Notably, RO-Bengaluru has successfully implemented solar power systems at toll plazas along the Bijapur-Hungund Section of NH-13.



Improved highway systems facilitate trade and connectivity, boosting local economies translating to impact both at regional as well as at national level. NHAI has in place designated safety officers for each project and aims to ensure a safe and conducive work environment for all. NHAI has designated Road Safety Officers in place, who are trained in road safety audits, in addition to appointing independent road safety auditors for each PIU, with the aim of ensuring a safe and conducive working environment for all .

NHAI fosters sustainable infrastructure development by designing and maintaining safe, resilient, and eco-friendly road networks. The applicability and use of sustainable materials are further advanced through various Research & Development (R&D) projects supported by MoRTH.

Improving transportation access for underserved areas and communities to help reduce inequalities in mobility and access to services.

NHAI's Diversity, Equity & Inclusion (DEI) efforts reflect the belief that everyone must be treated equally in the workplace, regardless of their background, gender, or caste.

Enhanced road and highway infrastructure and non-motorised transport options, reducing congestion and improving urban mobility.

Implementation of sustainable materials and practices in road construction minimises waste and promotes efficient resource use. A key indicator is the use of recycled asphalt concrete, iron slag, fly-ash, rubberised bitumen, silica fume, fibre reinforced concrete, GEP-composite, Geo-synthetic and aggregates as input materials, along with plastic waste and inert materials in road construction.

The integration of climate adaptation strategies in planning and construction to ensure road resilience against climate impacts is a focus area for NHAI. Additionally, implementing green technologies and the use of sustainable materials and practices, helps reduce the carbon footprint of road development. This aligns with India's Mission LiFE objectives, strengthening NHAI's contribution to the same.

Properly designed and maintained drainage systems and erosion controls on highways helps protect aquatic ecosystems by minimizing surface water runoff pollution. These measures help prevent the contamination of water bodies and maintain water quality standards.

Incorporating wildlife corridors and green spaces in highway design helps preserve biodiversity and mitigate habitat fragmentation. Under the PM GatiShakti National Master Plan, MoRTH is planning the development of these corridors.

In addition, green cover is enhanced through avenue and median plantations besides Miyawaki Plantations (influenced by a Japanese afforestation technique).

NHAI has established robust governance monitoring mechanisms to ensure that operations are ethical, transparent, and accountable. Due diligence is conducted to ensure ethical compliance and all contractors and concessionaire adhere to anti-bribery and anti-corruption policy and norms.

Collaborating with other stakeholders, including other government agencies, NGOs, Concessionaires/ Contractors, and road users, enhances the NHAI's progress in aligning to the SDGs.

Message from Hon'ble Minister, Ministry of Road Transport and Highways

SHRI NITIN JAIRAM GADKARI

Minister of Road Transport and Highways of India

> "Sustainability shapes every aspect of our lives, making it our responsibility to act today for a better, more resilient world for future generations."

Dear Citizens,

I extend my heartfelt congratulations on the publication of the Sustainability Report of the National Highways Authority of India (NHAI), a testament to our commitment to sustainable infrastructure under the visionary leadership of Hon'ble Prime Minister Shri Narendra Modi Ji.

NHAI's commitment to sustainability is deeply integrated into its operational framework, extending beyond environmental compliance to fostering **social equity and economic resilience.** Our approach emphasises the **development of accessible, climate-resilient road networks** while implementing **resource-efficient construction methodologies and low-carbon technologies. We aim to reduce environmental impact, improve connectivity, and promote inclusive growth by focusing on sustainability, eco-friendly design, low carbon emissions, efficient transport, and social well-being.**

With sustainability at the forefront, NHAI has adopted eco-friendly construction practices in infrastructure development, utilising recycled materials, inert waste from landfills, setting up solar power plants, creating

surface water bodies, and implementing rainwater harvesting measures. Green technologies and comprehensive environmental management strategies have been integrated to address concerns related to biodiversity, wildlife, and local communities. Additionally, NHAI has fully embraced the **Mission LiFE (Lifestyle for Environment),** a key aspect of India's Nationally Determined Contributions (NDCs). This is reflected in initiatives such as the construction of Amrit Sarovars, planting saplings along highways, and incorporating recycled materials in construction, all in line with the vision of Hon'ble Prime Minister Shri Narendra Modi Ji.

I am elated to share that we have reached remarkable milestones in expanding the country's road network, with a nearly 60% increase in the National Highway network between 2014 and 2023. We remain committed to continuously setting higher benchmarks for highways constructed per day, surpassing previous achievements, and creating new milestones in our developmental journey.

This second Sustainability Report from NHAI showcases our progress in integrating sustainability into every facet of our operations, from **environment-friendly construction practices** and **resource efficiency to biodiversity conservation, community development** and **stakeholder engagement.** It reflects our commitment to building a road infrastructure that is **Clean, Green, and Resilient,** aligned with India's broader sustainability goals. As we advance, we will continue to enhance our **climate resilience, promote circular economy principles, and adopt innovative technologies** to minimise our environmental footprint. I invite you to explore our journey and join us in shaping a more **sustainable and inclusive future.**

Jai Hind!

Nitin Jairam Gadkari

Minister of Road Transport and Highways of India

Message from Hon'ble Minister of State, Ministry of Road Transport and Highways

> "Sustainability is not just a goal; it is our responsibility. At NHAI, we are committed to building greener, smarter, and more resilient infrastructure that serves both present and future generations. Together, let us pave the way for a sustainable and prosperous India."

SHRI AJAY TAMTA
Minister of State, Ministry of Road Transport and Highways

Dear Readers,

I am immensely proud to witness the release of the Second Sustainability Report of the National Highways Authority of India (NHAI), which highlights our continuous progress and firm dedication to building a sustainable road infrastructure. This commitment aligns seamlessly with the vision of our Hon'ble Prime Minister of India in promoting the 'Lifestyle for Environment' (LiFE) initiative, encouraging responsible consumption and conservation practices. I passionately believe that sustainable development holds the key to securing a better future for us and generations to come.

At NHAI, our focus on sustainability is deeply ingrained in our policies, strategies, and programs, all of which aim to strike a balance between economic growth, environmental preservation, and social development. I am particularly honoured to mention that NHAI has expanded its vision by developing **Greenfield corridors** across the nation, enhancing logistics efficiency, reducing travel time, and minimising vehicular emissions.

Furthermore, we are making strides in creating **eco-friendly highways, ropeways, and multimodal logistics parks,** integrating clean energy solutions such as **solar-powered toll plazas, rainwater harvesting systems, and large-scale tree plantation drives** along highways to further advance our environmental stewardship.

NHAI's unwavering efforts toward environmental sustainability are evident in every project we undertake, ensuring the mitigation of adverse environmental impacts. Our initiatives, such as **the use of plastic waste and fly ash in road construction, adoption of energy-efficient LED lighting, and promotion of electric vehicle charging infrastructure,** not only lower the carbon footprint of road networks but also contribute significantly to the conservation and protection of our invaluable natural resources and biodiversity. By collaborating with citizens, communities, and industries, we are building a transportation ecosystem that is resilient, efficient, and future-ready.

I am confident that our ongoing efforts will lead to long-term benefits for the environment, society, and economy, strengthening India's position as a global leader in sustainable infrastructure. Together, let us pledge to build a greener, more inclusive, and future-proof transportation network for our nation.

Sincerely,
Ajay Tamta
Minister of State, Ministry of Road Transport and Highways

Message from Hon'ble Minister of State, Corporate Affairs & Ministry of Road Transport and Highways

> "Sustainable infrastructure is the foundation of a resilient future. At NHAI, we are committed to building roads that drive progress while preserving our planet."

SHRI HARSH MALHOTRA
Minister of State, Corporate Affairs &
Ministry of Road Transport and Highways

Dear Readers,

I am pleased to witness the release of the Second Sustainability Report of the National Highways Authority of India (NHAI), a testament to our unwavering commitment to sustainable infrastructure development. As we work towards strengthening India's road network, it is imperative that we integrate environmental consciousness with technological advancements to create a resilient, future-ready transportation ecosystem. Sustainable infrastructure is not just about roads and highways—it is about fostering economic progress while safeguarding our natural resources for generations to come.

At NHAI, we are committed to embedding sustainability into every stage of infrastructure planning, construction, and operation. Our initiatives are aligned with the government's ambitious National Green Hydrogen Mission and the National Action Plan on Climate Change, ensuring that we actively contribute to India's long-term environmental goals. From incorporating fly ash and plastic waste in road construction to deploying energy-efficient LED lighting along highways and developing

large-scale tree plantation drives, we are dedicated to reducing our environmental footprint. Additionally, the expansion of electronic toll collection through FASTag has not only improved efficiency but also significantly reduced vehicular emissions by minimising congestion at toll plazas.

Beyond environmental initiatives, our focus remains on enhancing connectivity, reducing travel time, and building a robust logistics network that contributes to India's economic and social well-being. The development of Greenfield expressways, sustainable multimodal logistics parks, and solar-powered highway infrastructure reinforces our vision of an eco-conscious transportation network. By leveraging intelligent transportation systems and digital innovations, we aim to create smart highways that are not only efficient but also aligned with India's broader sustainability objectives.

Sustainability is a collective responsibility, and the role of collaboration cannot be overstated. By engaging with industry leaders, local communities, and key stakeholders, we ensure that our projects generate long-term environmental, social, and economic benefits. As we move forward, our mission is clear—to build roads that drive prosperity while preserving our planet. With a steadfast commitment to sustainable progress, NHAI will continue paving the way for a greener and more inclusive future.

Green wishes for a sustainable tomorrow!

Harsh Malhotra

Minister of State, Corporate Affairs &
Ministry of Road Transport and Highways

Message from Secretary, Ministry of Road Transport and Highways

SHRI V. UMASHANKAR, IAS
Secretary, Ministry of Road Transport and Highways

> "Sustainable highways are the pathways to progress of a country. NHAI is committed to building roads that drive economic growth while safeguarding our environment."

Dear Readers,

I am pleased to witness the release of NHAI's second Sustainability Report. India's highways serve as the backbone of economic progress, with National Highways accounting for nearly **2% of the total road network but carrying over 40% of the country's road traffic.** I am happy to note that in FY 2023-24, NHAI strengthened its focus on **green and resilient infrastructure,** consolidating key policy initiatives and maintaining its record-breaking pace of road development. NHAI remains committed to embedding sustainable practices in infrastructure expansion.

Our second Sustainability Report for FY 2023-24 underscores significant progress in **enhancing connectivity, embracing advanced technologies, integrating environmental stewardship, and fostering operational excellence.** These efforts reflect our alignment with **both national and global sustainability frameworks,** including the Government of India's vision for a cleaner, greener future.

Our commitment to sustainability extends across multiple fronts—from **road safety enhancements to utilising recycled materials such as plastic waste, fly**

ash, and reclaimed asphalt in construction to repurpose inert waste from landfills to minimise environmental impact. Additionally, initiatives such as **solar-powered toll plazas, rainwater harvesting, and energy-efficient lighting** continue to reduce the carbon footprint of our highways.

The Sustainability Report places the action being taken by Government through NHAI to further India's commitments to the sustainable development goals in highways construction as the nation moves towards achieving the dream of Viksit Bharat.

As we move forward, I am confident that these efforts will not only contribute to a **resilient and inclusive transportation network** but also unlock new opportunities in **green finance,** aligning with India's broader sustainability goals.

Best wishes for a sustainable and prosperous future!

V. Umashankar, IAS

Secretary, Ministry of
Road Transport and Highways

Message from Chairman, National Highways Authority of India

SHRI SANTOSH KUMAR YADAV, IAS
Chairman, National Highways Authority of India

Dear Stakeholders,

I am pleased to present the second Sustainability Report of the National Highways Authority of India, covering activities for the period 2023-24. As a key player in the planning, execution, operation, and maintenance of India's road infrastructure, NHAI continues to integrate sustainability into all aspects of its operations. This report provides a transparent overview of our initiatives and demonstrates our ongoing commitment to creating value for society, policymakers, and the nation.

KEY MILESTONES AND STRATEGIC DIRECTIONS

Aligned with the Global Reporting Initiative (GRI) sustainability reporting standards, this report outlines the wide range of actions we have taken to enhance environmental, social, and economic outcomes across our projects. It is also my privilege to share that this **Sustainability Report has been independently assured** by a credible third party, ensuring transparency and alignment with **GRI protocols.** This validation reinforces our dedication to robust sustainability practices and meaningful stakeholder engagement.

This report comes at an opportune moment for three key reasons. First, NHAI has reached unprecedented milestones in road construction each year, while increasingly incorporating green highway concepts to support environmental conservation. Second, NHAI has set ambitious goals for road connectivity with a comprehensive approach to developing a sustainable road network. Lastly, we have aligned our efforts with India's Nationally Determined Contributions (NDCs) under the Paris Agreement and the vision of our Hon'ble Prime Minister for the 'Lifestyle for Environment' (LiFE) initiative as a key strategy to combat climate change.

Building on this strategic vision, NHAI has achieved significant growth this year, constructing 6,634 kms of roads in FY 2023-24, demonstrating continued progress year after year. This milestone highlights our unwavering focus on infrastructure development and our contribution to enhancing connectivity across the nation.

ADVANCING SUSTAINABILITY THROUGH INNOVATION AND ECO-FRIENDLY PRACTICES

This year, we have placed special emphasis on the circular economy, a model that prioritises resource efficiency, waste reduction, and the reuse of materials. NHAI has taken significant steps to incorporate recycled materials, such as plastic waste and reclaimed asphalt, into road construction. These initiatives not only reduce the environmental impact of our projects but also contribute to the larger goal of minimising waste and promoting sustainable consumption.

Aligned with the LiFE (Lifestyle for Environment) mission championed by our Honourable Prime Minister, Shri Narendra Modi, NHAI has embraced eco-friendly practices and encouraged sustainable lifestyles among its stakeholders. From the use of renewable energy sources like solar power to the implementation of water conservation measures, we are committed to reducing the carbon footprint of our operations. The Mission LiFE reminds us that sustainability begins with individual actions, and NHAI is proud to lead by example in this transformative journey.

The **Amrit Kaal** vision envisions an India that is self-reliant, technologically advanced, and environmentally conscious. NHAI's efforts in adopting cutting-edge technologies, such as intelligent transportation systems, drone surveys, and green construction techniques, are paving the way for a smarter and more sustainable road network. These advancements not only enhance the efficiency of our infrastructure but also ensure that it is future-ready and resilient to the challenges of climate change.

NHAI remains steadfast in its commitment to building sustainable infrastructure and continuously enhancing our sustainability performance. By integrating environmental responsibility, social equity, and economic resilience into our projects, we aim to set new benchmarks for sustainable road development in India.

PEOPLE, GOVERNANCE, AND VISION: THE PILLARS OF NHAI'S PROGRESS

Our success in ESG parameters is strongly driven by our belief that employees are our most valuable asset, and effective governance is the backbone of our efforts towards environmental and social welfare. By fostering a culture of excellence through employee-centric policies and development programs, we have nurtured talent and provided an empowering work environment that enables our teams to perform at their best. Simultaneously, our commitment to robust governance practices ensures that we operate with integrity, transparency, and accountability, creating long-term value for all our stakeholders. This dual focus on people and governance strengthens our ability to drive sustainable outcomes across all aspects of our operations.

I extend my heartfelt thanks to the Environment Division for their unwavering dedication in producing this second Sustainability Report. I would also like to acknowledge the invaluable contributions of our field teams and headquarter staff, whose collective efforts have made this report possible. This report not only builds on our previous efforts but also introduces new and enhanced sustainability initiatives, reflecting our continued growth and commitment to transparency.

We believe this report provides deeper insights into NHAI's sustainability journey and highlights the progress we have made, while setting new benchmarks for the years ahead. We welcome your feedback and look forward to continually improving our sustainability practices as we move forward.

Sincerely,

Santosh Kumar Yadav, IAS

Chairman, National Highways Authority of India

Message From Member (Admin), National Highways Authority Of India

SHRI VISHAL CHAUHAN, IAS

Member (Admin), National Highways Authority of India

Dear Readers,

With immense pride and satisfaction; it is to state that Environment & Green Highways Division of NHAI has prepared the Second Sustainability Report of the National Highways Authority of India (NHAI) for the financial year 2023–24. This report is a comprehensive reflection of NHAI's commitment to embedding sustainability into the core of its operations. Developed in alignment with the Global Reporting Initiative (GRI) 2021 Standards, the report provides a transparent account of our performance across key Environmental, Social, and Governance (ESG) dimensions.

The report details the sustainability efforts of NHAI's Head Office, 25 Regional Offices, and Concessionaires, emphasising initiatives for emission reduction, plantation initiatives, and endeavours to promote circular economy which are in alignment with the LiFE (Lifestyle for Environment) mission. The report also showcases the initiative under the Digital India Mission, notable FASTag and digital transformation through platforms like Data Lake, Drone Analytics Monitoring System (DAMS), and e-Office.

As we continue to expand India's highway network, we remain steadfast in our resolve to do so responsibly, ensuring that our infrastructure is not only world-class but also clean, green, and resilient. We have outlined our contributions to the UN Sustainable Development Goals (SDGs), particularly in areas such as climate action, sustainable infrastructure, biodiversity conservation, and inclusive growth.

We invite all stakeholders to explore this report and join us in our journey through a more sustainable and inclusive future.

Vishal Chauhan, IAS
Member (Administration), NHAI

Message from the Board Members

MEMBER PROJECTS

SH. V.K. RAJAWAT

The Then Member Projects & Currently DG&SS, RT&H

Sustainability is a key driver of operations at NHAI, where we focus on reducing the carbon footprint of our highway projects. Our team works diligently to implement green construction techniques, improve energy efficiency, and incorporate renewable energy solutions across our operations. By adopting these measures, we are not only meeting the transportation needs of today but also ensuring that future generations inherit a healthier and more resilient environment.

MEMBER PROJECT

SH. ANIL CHOUDHARY, IRSE

At NHAI, we are dedicated to implementing sustainable practices across all stages of highway development. We strive to minimise environmental impacts through effective planning and execution of projects, incorporating eco-friendly technologies and promoting biodiversity conservation. From noise barriers and wildlife crossings to pollution control and water conservation measures, our approach ensures that infrastructure growth goes together with environmental protection and the well-being of communities.

MEMBER FINANCE

SH. NRVVMK RAJENDRA KUMAR

At NHAI, we recognise that sustainable financial management is crucial for fostering long-term value for our stakeholders. We are committed to ensuring that our financial practices support sustainable infrastructure development by integrating environmental, social, and governance (ESG) considerations into our decision-making processes. Through prudent resource allocation and responsible fiscal strategies, we aim to ensure that every rupee spent contributes to both economic progress and environmental preservation, aligning our financial goals with our sustainability vision.

MEMBER PPP

SH. K. VENKATA RAMANA

At NHAI, public-private partnerships (PPP) serve as a critical mechanism for advancing sustainable infrastructure development. We are committed to fostering partnerships that prioritise environmental and social sustainability, while delivering value to both the public and private sectors. Through collaborative efforts, we leverage innovative financing models and green technology to build roads that enhance connectivity, while preserving natural habitats and reducing our environmental footprint.

MEMBER TECHNICAL

SH. ALOK DEEPANKAR

At NHAI, we play a key role in embedding sustainability into the design and execution of our highway projects. We focus on incorporating advanced technologies such as energy-efficient lighting, eco-friendly materials, and innovative construction methods to reduce environmental impact. By integrating sustainability into our technical specifications, we aim to build infrastructure that meets the highest engineering standards while safeguarding the environment and promoting responsible development.

Salient Features of the Report

Decrease in Scope 1 Emissions from FY 2019-20 to FY 2023- 24 by 20.75%. Further, NHAI's emissions are offset by initiatives to enhance green cover along the highways and other environment enhancement activities.

Reduction in GHG Emissions Intensity of NHAI from 1.0 in FY 2022-23 to 0.8 in FY 2023-24 (in $MTCO_2e$/km) despite an increase in kilometres constructed FY 2023- 24 to 6,634 km from 5,551 km in FY 2022-23.

Water use intensity of NHAI has reduced by 74% in water-stress regions as compared to FY2021-22.

First recorded usage of 1GJ of renewable electricity in FY2023-24 at NHAI marking a significant step in green energy.

A total of 4.02 crore saplings have been planted from 2016- 17 to 2023-24 to mitigate Scope 1 emissions (direct emissions). In FY 2023-24 alone, over 56 lakh saplings were planted.

Wildlife Crossings are created as a measure for wildlife protection and conservation and to reduce the instances of man-animal conflict and reduce wildlife mortality.

As a key enabler of Mission LiFE, NHAI has actively integrated sustainable practices into its infrastructure development through continued use of recycled and sustainable materials for highways construction such as fly ash, plastic waste, steels slag, silica fume, geo composite, geo synthetic, recycle asphalt pavement, rubberised bitumen, recycled glass aggregate, bio-cement, and bio-bitumen. A total of 631.92 lakh MT of recycled materials used in FY 2023-24.

NHAI has successfully diverted 3,300 tonnes of non-hazardous waste from disposal within its own operations, reinforcing its dedication to circular economy principles.

Eastern Peripheral Expressway utilised about 1.2 cr. cu. m of fly-ash generated from nearby thermal plants of Dadri, Badarpur, Pali and Panipat.

RO-Bengaluru has successfully implemented solar power systems at Bijapur Toll Plaza and Nagarhalla Toll Plaza along the Bijapur-Hungund Section of NH-13, generating 99,564 kWh and avoiding 72,383 $MTCO_2e$ GHG Emissions. This has resulted in ₹ 9,15,350 combined savings from the two-toll plazas.

The energy consumption from renewable fuels was recorded as 127 GJ for NHAI, whereas for ccontractors/concessionaires it was 2,15,262 GJ.

NHAI is committed to its journey towards carbon neutrality, in alignment with India's national target of achieving Net Zero emissions by 2070. It adheres to the 'IRC SP:122 – Guidelines on Reduction of Carbon Footprint in Road Construction Projects' to ensure sustainable and environmentally responsible infrastructure development.

As part of the Amrit Sarovar Abhiyan Phase I initiative of MoRTH, NHAI has committed to develop 510 water bodies, out of these 467 have already been completed.

Coverage of FASTag for toll collection is 98.5%, which contributes to the reduction in NHAI's carbon footprint.

100% of direct employees, as well as workers engaged through contractors managing work or workplaces on behalf of NHAI, were covered under Occupational Health and Safety (OHS) Management Framework.

During 2023–24, NHAI employees participated in the training programmes conducted by the Indian Academy of Highway Engineers (IAHE), including a 16-week foundation training programme specifically designed for Deputy Managers.

Zero instances of discrimination in the workplace reported in FY 2023-24.

In FY 2023-24, NHAI enhanced its collaborative framework by signing Memoranda of Understanding (MoUs) with several government-backed entities and strategic partners. These partnerships aim to boost operational efficiency, leverage technological advancements, and support sustainable infrastructure development. Key MoUs signed during the year include those with Digital India Corporation, Geological Survey of India, Indraprastha Institute of Information Technology, Delta Bulk Shipping India Pvt. Ltd., Delhi Metro Rail Corporation, and the National Remote Sensing Centre.

The Data Lake system of NHAI also helps provide a platform for dispute resolution and land acquisition arbitration, which has already helped NHAI resolve 155 conciliation claims, saving approximately INR 25,680 crore.

In FY 2023-24, research schemes sanctioned include "Development of Green and Sustainable Bio-Bitumen" by IIT Roorkee and "Utilisation of Waste Plastic in Bituminous Mixes (Wet Process)" by IIT BHU, MoRTH nominated Chair Professor.

Percentage of females as new hires stood at 14.71% of the total female employees in FY2023-24.

NHAI has raised ₹ 41,153.98 crore under Asset Monetisation mode during 2023-24 (highest ever) against the target of ₹ 34,000 crore.

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List of Abbreviations

Abbreviation	Full form
NHAI	National Highways Authority of India
AA	AccountAbility Standard
A&N Islands	Andaman and Nicobar Islands
ADB	Asian Development Bank
AI	Artificial Intelligence
APAR	Annual Performance Appraisal Reports
BC	Bituminous Concrete
BIS	Bureau of India Standards
BOT	Build-Operate-Transfer
C&D	Construction and Demolition
CAQM	Commission of Air Quality Management
CCL	Childcare Leave
CEO	Chief Executive Officer
CER	Corporate Environment Responsibility
CESS	Central Excise and Service Tax
CGM	Chief General Manager
CGWA	Central Groundwater Authority
CMD	Centre for Management Development
CNG	Compressed Natural Gas
CO_2	Carbon dioxide
COP	Conference of the Parties to the United Nations Framework Convention on Climate Change
CPCB	Central Pollution Control Board
CPR	Common Property Resource
CRF	Central Road Fund
CRMB	Crumb Rubber Modified Bitumen
CRRI	Central Road Research Institute
CRZ	Coastal Regulation Zone
CSR	Corporate Social Responsibility
CTB	Cement-Treated Base
CTSB	Cement-Treated Sub-Base
CVC	Central Vigilance Commission
CVO	Central Vigilance Officer
D&I	Diversity and Inclusion
DAMS	Drone Analytics Monitoring System
DBM	Dense Bituminous Macadam
DCP	Dry Chemical Powder
DEI	Diversity Equity and Inclusion
Delhi-NCR	Delhi National Capital Region
DGCA	Directorate General of Civil Aviation
DGM	Deputy General Manager

Abbreviation	Full form
DIC	Digital India Corporation
DM	Deputy Manager
DME	Delhi-Mumbai Expressway
DMRC	Delhi Metro Rail Corporation
DoPT	Department of Personnel and Training
DPR	Detailed Project Report
Env. & GHD	Environment and Green Highway Division
EAP	Externally Aided Project
EC	Empowered Committee
EESL	Energy Efficiency Services Limited
EI	Economic Importance
EIA	Environmental Impact Assessment
EMF	Environment Management Framework
EMP	Environment/al Management Plan
EPC	Engineering, Procurement, Construction
EPF	Employee Provident Fund
ESG	Environmental, Social, and Governance
ESI	Employees' State Insurance
EV	Electric Vehicle
EW	East West
EXIM	Export-Import
F&A	Finance and Accounting
FIDIC	Fédération Internationale Des Ingénieurs-Conseils
FOB	Foot Over Bridges
FY	Financial Year
GBS	Government Budgetary Support
GCI	Green Cover Index
GHD	Green Highway Division
GHG	Greenhouse Gases
GIS	Geographic Information System
GIS	Group Insurance Scheme
GJ	Gigajoule
GM	General Manager
GQ	Golden Quadrilateral
GRAP	Graded Response Action Plan
GRC	Grievance Redressal Committee
GRI	Global Reporting Initiative
GSI	Geographical Survey of India
HIRA	Hazard Identification and Risk Assessment
HO	Head Office
HP	Himachal Pradesh
HQ	Headquarters
HR	Human Resources
HR	Haryana
IAHE	Indian Academy of Highway Engineers

Abbreviation	Full form
IAS	Indian Administrative Service
IE	Independent Engineering
IEBR	Internal Extra Budgetary Resources
iGOT	Integrated Government Online Training
IIIT	Indraprastha Institute of Information Technology
IIM	Indian Institutes of Management
IIT	Indian Institute of Technology
IMS	Integrated Management System
inVIT	Infrastructure Investment Trust
IRC	Indian Road Congress
IRSE	Indian Railway Service of Engineers
ISAE	International Standard on Assurance Engagements
ISC	Inter-State Connectivity
ISO	International Organisation for Standards
ISRO	Indian Space Research organisation
IT	Information Technology
IUCN	International Union for Conservation of Nature
J&K	Jammu and Kashmir
JGT	Jute Geotextile
JH	Jharkhand
JICA	Japan International Cooperation Agency
JNPA	Jawaharlal Nehru Port Authority
JV	Joint Venture
kL	Kilolitre
km	Kilometre
KMP	Key Management Personnel
KMS	Knowledge Management System
kWh	Kilowatt Hour
LED	Light-Emitting Diode
LiFE	Lifestyle for Environment
LOA	Letter of Award
LPG	Liquified Petroleum Gas
LWE	Left Wing Extremism
M&E	Monitoring and Evaluation
MCA	Model Concession Agreement
MHA	Ministry of Home Affairs
ML	Machine Learning
MLA	Member of Legislative Assembly
MMLP	Multi-Modal Logistics Park
MMT	Million Metric Tonnes
MoEFCC	Ministry of Environment Forest and Climate Change
MoF	Ministry of Finance
MoRTH	Ministry of Road Transport and Highway
MoU	Memorandum of Understanding
MP	Member of Parliament

Abbreviation	Full form
MSME	Micro, Small and Medium Enterprises
MT	Metric Ton
$MTCO_2e$	Metric Tonnes of Carbon Dioxide Equivalent
NABH	National Accreditation Board for Hospitals
NABL	National Accreditation Board for Testing and Calibration Laboratories
NAPCC	National Action Plan on Climate Change
NBC	National Building Code
NDC	Nationally Determined Contribution
NGO	Non-Governmental organisation
NH	National Highway
NHDP	National Highway Development Project
NHLML	National Highways Logistics Management Limited
NIC	National Informatics Centre
NITI Aayog	National Institution for Transforming India Aayog
NOx	Oxides of Nitrogen
NRM	Natural Resource Management
NRSC	National Remote Sensing Centre
NS	North-South
O&M	Operations and Maintenance
OBC	Other Backward Classes
OHS	Occupational Health and Safety
OHSMS	Occupational Health and Safety Management System
PAC	Public Accounts Committee
PB	Punjab
PCU	Passenger Car Unit
PD	Project Director
PF	Protected Forest
PIU	Project Implementation Unit
PM	Prime Minister
PM	Particulate Matter
PMU	Project Management Unit
POSH	Prevention of Sexual Harassment
PPE	Personal Protective Equipment
PPP	Public-Private Partnership
PSU	Public Sector Undertaking
PSW	Pedestrian Subway
PUC	Pollution Under Control
PUP	Pedestrian Underpass
PWD	Public Works Department
R&D	Research and Development
RA	Recycled Aggregates
RAP	Reclaimed Asphalt Pavement
RBM	Riverbed Material
RD	Road Development
RE	Reinforced Earth

Abbreviation	Full form
RF	Reserved Forest
RFI	Request for Inspection
RFID	Radio Frequency Identification
RFP	Request for Proposal
RJ	Rajasthan
RO	Regional Office
RoW	Right of Way
RPL Scheme	Recognition of Prior Learning Scheme
RSE	Road Safety Education
SAP	Systems, Applications and Products in Data Processing
SARDP-NE	Special Accelerated Road Development Programme for Northeast
SAROD	Society for Affordable Redressal of Disputes
SBI	State Bank of India
SC	Scheduled Caste
SEBI	Securities and Exchange Board of India
SHG	Self-Help Group
SME	Subject Matter Expert
SOP	Standard Operating Procedure
SOS	Save Our Soul
SOx	Oxides of Sulphur
SPCB	State Pollution Control Board
SPM	Suspended Particulate Matter
SPV	Special Purpose Vehicle
SS	Special Secretary
ST	Scheduled Tribe
TG	Telangana
TIS	Toll Information System
TJ	Terajoule
TN	Tamil Nadu
TNI	Training Need Identification
TOT	Toll, Operate and Transfer
UER	Urban Extension Road
UHPFRC	Ultra-High Performance Fiber Reinforced Concrete
UK	Uttarakhand
UNFCCC	United Nations Framework Convention on Climate Change
UNSDG	United Nations Sustainable Development Goals
UPC	Unique Project Code
UT	Union Territory
VIP	Very Important Person
WAW	Work from Anywhere
WB	World Bank
WMM	Wet Mix Macadam
WSA	Wayside Amenities

Figure 3: Inauguration of Dwarka Expressway-Haryana Section by Hon'ble PM Shri Narendra Modi (March 2024)


ನೆಲಮಂಗಲ ದೇವಿಹಳ್ಳಿ ಎಕ್ಸ್‌ಪ್ರೆಸ್‌ವೇ ಪ್ರೈವೇಟ್ ಲಿಮಿಟೆಡ್
Nelamangala Devihalli Expressway Private Limited
LANE - 3
LANE - 4
AMBULANCE
STOP
STOP

ABOUT NHAI

- Mandates of NHAI
- Governance at the NHAI
- Functions of the NHAI
- Organisational structure at NHAI
- Decision making process at the NHAI
- Decentralized Governance
- Knowledge Initiatives by Governance Body
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- NHAI Policies
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- Bharatmala project
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- Governance with Integrity
- Stakeholder Management
- Stakeholder communication and responses
- NHAI's approach to stakeholder engagement:

The Ministry of Road Transport and Highways (MoRTH) was established in 2009 following the division of the former Ministry of Shipping, Road Transport, and Highways into two distinct entities: the Ministry of Road Transport and Highways and the Ministry of Shipping. National Highways Authority of India (NHAI) is a nodal agency of MoRTH and is mandated to implement National Highways Development Project (NHDP) in a phased manner.

Road transport plays a pivotal role in the economic growth of a nation, influencing the speed, structure, and trajectory of development. National Highways are the arterial roads of the country for inter-state movement of passengers and goods. They traverse the length and width of the country connecting the National and State capitals, major ports and rail junctions and link up with border roads and foreign highways.

The National Highways Authority of India (NHAI) was established under the National Highways Authority of India Act, 1988, enacted by Parliament. NHAI is tasked with the development, maintenance, and management of the National Highways assigned to it, as well as handling related and incidental matters. The organisation became fully operational in February 1995 and serves as a nodal agency under the Ministry of Road Transport and Highways (MoRTH).

National Highway (NH) network has increased by 60% from 91,287 kms in 2014 to 1,46,145 kms as of 31st March 2024.

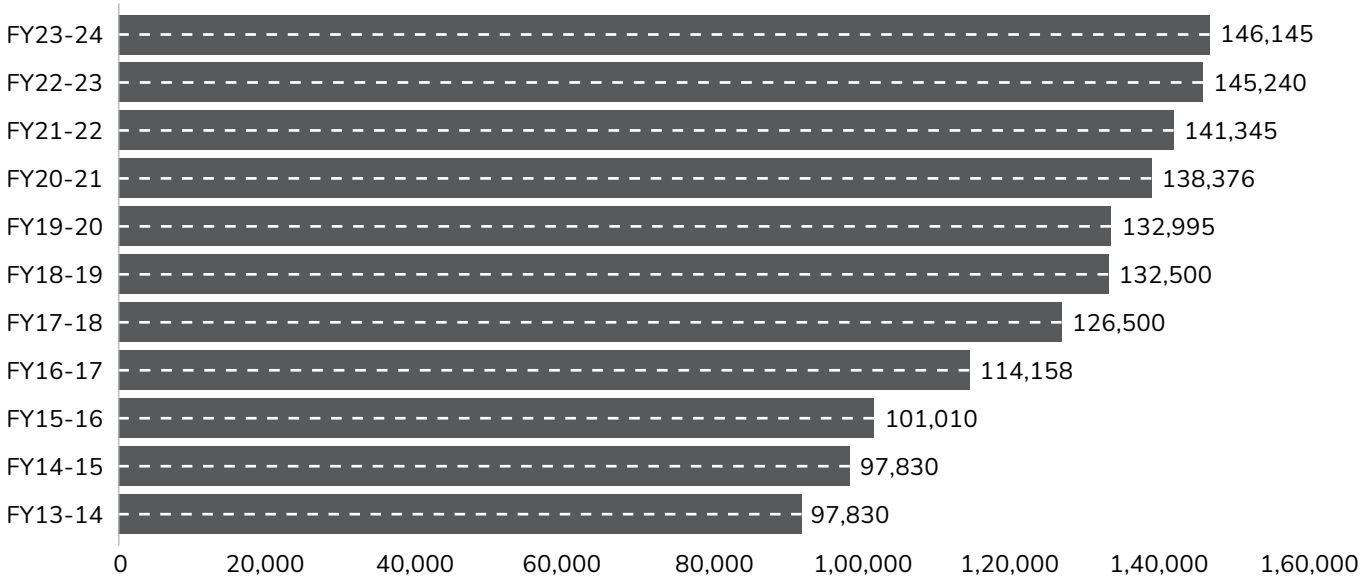


Figure 4: National Highways in India FY 14 - FY 24

The total length of National Highways in State/Union Territory (UT) of India as on 31st March 2024 for the reporting period.

Table 1 State wise length of highway (in kms)

Sr. No.	State/UT	Highways/Length (km)
1.	Andhra Pradesh	8,683.15
2.	Arunachal Pradesh	4,285.39
3.	Assam	4,076.91
4.	Bihar	6,131.80
5.	Chandigarh	15.28
6.	Chhattisgarh	3,620.45
7.	Delhi	157.1
8.	Goa	299.3
9.	Gujarat	8,098.8
10.	Haryana	3,391.10
11.	Himachal Pradesh	2,606.88
12.	Jammu and Kashmir	1,876.16
13.	Jharkhand	3,632.66
14.	Karnataka	8,190.69
15.	Kerala	1,857.57
16.	Ladakh	806.45
17.	Madhya Pradesh	9,104.64
18.	Maharashtra	18,459.25
19.	Manipur	1,840.34
20.	Meghalaya	1,155.6
21.	Mizoram	1,498.67
22.	Nagaland	1,670.47
23.	Orissa	5,897.08
24.	Puducherry	64
25.	Punjab	4,239.32
26.	Rajasthan	10,706.34
27.	Sikkim	709.07
28.	Tamil Nadu	7,000.20
29.	Telangana	4,925.76
30.	Tripura	888.61
31.	Uttar Pradesh	12,292.23
32.	Uttarakhand	3,664.27
33.	West Bengal	3,909.97
34.	A&N Islands	330.7
35.	Dadra & Nagar Haveli	37
36.	Daman & Diu	22
Total		**1,46,145**

Figure 05: Hon'ble PM Shri Narendra Modi inaugurates Bangalore-Mysuru Highway

Table 2 Highway construction by NHAI regional offices (FY23-24)

Sr.No.	NHAI-Regional Offices	Construction by NHAI regional offices in FY23-24 (km)
1.	RO-Bengaluru	427
2.	RO-Bhopal	632
3.	RO-Bhubaneswar	255
4.	RO-Chandigarh (HR)	294
5.	RO-Chandigarh (PB)	263
6.	RO-Chennai	379
7.	RO-Dehradun	104
8.	RO-Delhi	295
9.	RO-Gandhinagar	458
10.	RO-Guwahati	59
11.	RO-Hyderabad	152
12.	RO-Jaipur	434
13.	RO-Jammu	77
14.	RO-Kolkata	125
15.	RO-Madurai	205
16.	RO-Mumbai	408
17.	RO-Nagpur	288
18.	RO-Patna	406
19.	RO-Raipur	90
20.	RO-Ranchi	140
21.	RO-Shimla	109
22.	RO-Thiruvananthapuram	231
23.	RO-UP East	140
24.	RO-UP West	341
25.	RO-Vijayawada	322
	TOTAL	**6634**

Since its establishment, NHAI has aimed to ensure that all contract awards and procurement processes adhere to industry best practices. This includes maintaining transparency, adopting clear and competitive bid criteria, implementing projects that meet the highest quality standards, and ensuring the highways are well-maintained to provide optimal comfort and convenience for users.

Mandates of NHAI

The NHAI operates as an autonomous organisation under the MoRTH and is responsible for the development, maintenance, and management of national highways and any other highways vested in or entrusted to it by the Government. NHAI is mandated to implement National Highways Development Project (NHDP) which is India's largest ever Highways Project in a phased manner. Although National Highways constitute only about 2% of the road network, it carries 40% of the total road traffic. Rapid expansion of passenger and freight traffic makes it imperative to improve the road network in the country. Accordingly, the Government of India (GoI) launched major initiatives to upgrade and strengthen National Highways through various phases of the National Highways Development Project (NHDP). Along with other minor projects, a total of 50,329 km of National Highways has been entrusted to NHAI for development, maintenance, and management.

Figure 6: Road Construction Activities at Delhi Dehradun Economic Corridor

Figure 7: Toll management system

NHAI's Vision

NHAI envisages the Vision to meet the Nation's need for development and maintenance of National Highway network to global standards and to meet the user's expectations in the most time-bound and cost-effective manner, within the strategic policy framework set by the Government of India and thus, promote economic well-being and quality of life of the people.

NHAI's Mission:

01 To develop, maintain and manage National Highways vested in it by the Government.

02 To regulate and control the plying of vehicles on National Highways for its proper management.

03 To develop and provide consultancy and construction services in India and abroad and carry-on research activities in relation to the development, maintenance and management of highways or any other facilities there at.

04 Provide such facilities and amenities for the users of the highways vested in, or entrusted to, it as is, in the opinion of the authority, necessary for the smooth traffic flow on such highways.

05 Construct offices or workshops and establish and maintain hotels, motels, restaurants, and rest rooms at or near the highways vested in or entrusted to.

06 To advise the Central Government on matters relating to highways.

07 To assist on such terms and conditions as may be mutually agreed upon, any State Government in the formulation and implementation of schemes for highway development.

Governance at the NHAI

NHAI's operations are governed by six (6) principal Acts: National Highways Authority of India Act, 1988 and rules framed thereunder govern the overall functioning of NHAI.

01

National Highways Act, 1956 governs land acquisition and tolling.

02

Control of National Highways (Land and Traffic) Act, 2002 governs matters related to encroachment and regulating the traffic on highways and control of land within National Highways.

03

The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 provides for payment of compensation, resettlement, and rehabilitation.

04 Motor Vehicles Act, 1988

05 Road Transport Act, 1981

Figure 8: Road Safety Pledge

These Acts provide the governing framework for NHAI for the development, maintenance, and management of National Highways. In addition, policies, guidelines, and rules have been formulated to govern NHAI's day to day operations. Furthermore, the Green Highways (Plantation & Maintenance) Policy of 2015 was introduced to promote the development of eco-friendly National Highways with the participation of the community, farmers, NGOs, self-help groups, private sector, institutions, government agencies, and the Forest Department. These aforementioned aspects have been further explored in subsequent sections of this Report.

The nomination and the selection of the highest governance body at NHAI is done by Government of India through notification in the Official Gazette, as governed by NHAI (the term of Office and Other Conditions of Service of Members) Rule, 2003 as amended vide Notification No. 128 dated 5th March 2015. These rules lay out specific criteria for each Member on the Board, as well as the Chairman of the Board. In addition, the appointment of the Chairman is made post obtaining specific recommendations of the Search Committee that consists of:

01 The Cabinet Secretary

02 The Secretary, MoRTH

03 The Secretary, Planning Commission

04 The Director, Indian Institute of Management (IIM) Ahmedabad or Bangalore or Kolkata or Indore or Kozhikode or Lucknow

05 The Chairman-cum-Managing Director, India Infrastructure Finance Corporation Limited or State Bank of India or Punjab National Bank or Bank of India or Bank of Baroda

The role of the highest governance body in overseeing the management is governed by the National Highways Authority of India Act, 1988 (68 of 1988) and the National Highways Authority of India (Amendment) Act, 2013 NO. 19 of 2013 [10th September 2013.][2]

The performance of the highest governance body in the organisation is evaluated through structured review mechanisms as prescribed by the government, including the Annual Performance Appraisal Report (APAR).

Additionally, the plantation endeavours in NHAI are managed through the Green Highways Policy, 2015. This Policy is made available to all NHAI's stakeholders in the public domain.

[1]https://morth.nic.in/sites/default/files/NHAI_Rules.pdf
[2]https://nhai.gov.in/nhai/sites/default/files/NHAI_Act_1988.pdf

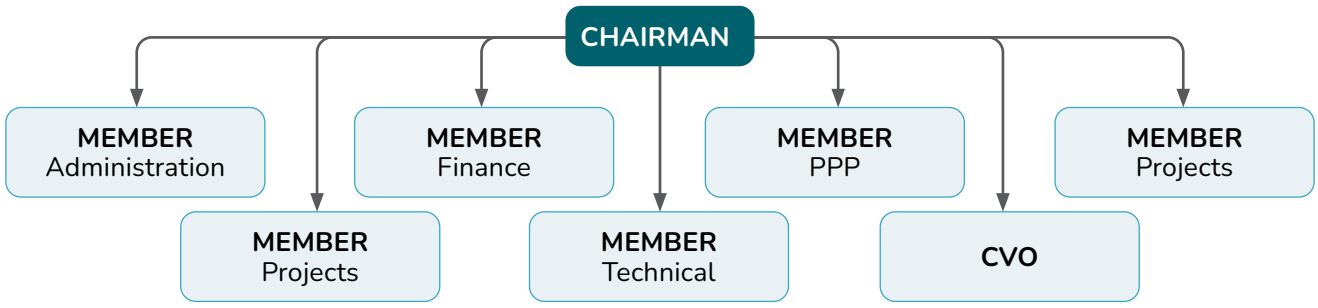
FUNCTIONS OF THE NHAI

NHAI benefits from the extensive expertise of professionals from various sectors. The organisation includes both permanent officers and officers on deputation, with the latter drawn from the MoRTH, Ministry of Defence, State Public Works Departments (PWDs), and other relevant organisation.

NHAI Board consists of a chairperson, six full-time and six part-time Members (including non-government part-time Members). The Chairperson leads the organisation, supported by Members responsible for key areas like Administration, Finance, Public-Private Partnership (PPP), Projects, Technical, and the Chief Vigilance Officer (CVO), all of whom report to the Chairperson. As the highest governing body, the Board plays a crucial role in defining the organisation's purpose, values, and strategy, while overseeing and monitoring the progress of NHAI's projects and initiatives. Each fulltime Board Member heads their own department, with each department consisting of a Chief General Manager (CGM), who supervises the various General Managers (GMs), Deputy General Managers (DGMs), Managers and Deputy Managers (DMs) in their respective departments.

Figure 9: Review meeting with Regional Officers & Project Directors, chaired by Hon'ble Minister, MoRTH

ORGANISATIONAL STRUCTURE AT NHAI



NHAI is guided by six part-time members. The details are as follows:

Table 3 Part-time members of NHAI

Part-time members
CEO NITI Aayog
Secretary, Department of Expenditure, Ministry of Finance (MoF)
Secretary, MoRTH
Director General, (RD) and SS, MoRTH
Prof. Manoj Kumar Tiwari Director, IIM, Mumbai (Non -Government Members)
Shri Rajnish Kumar, Former Chairman, State Bank of India (SBI) (Non -Government Member)

DECISION MAKING PROCESS AT THE NHAI.

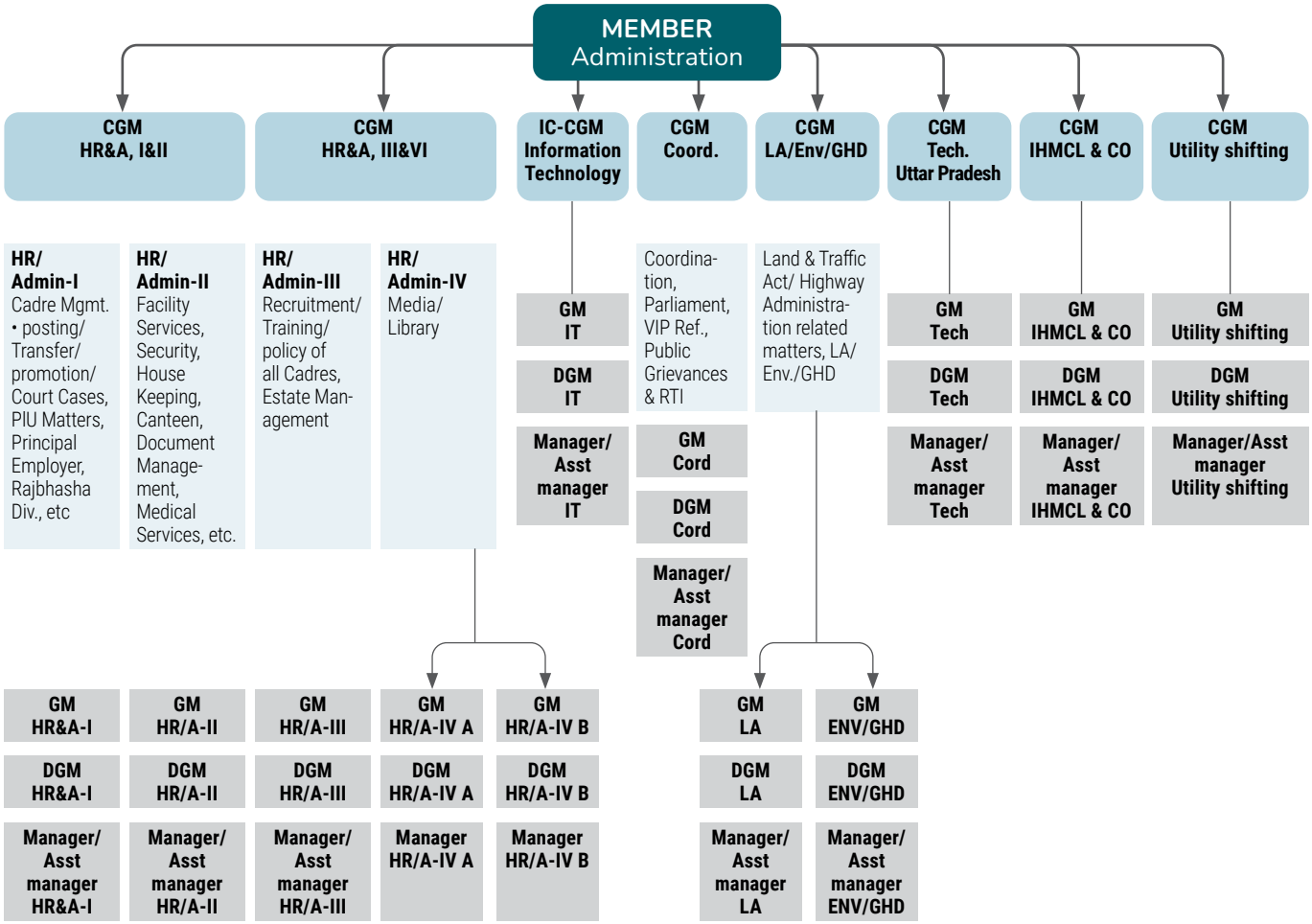
The NHAI operates as an efficient organisation, with employee appointments made in line with the National Highways Authority of India (Recruitment, Seniority, and Promotion) Regulations, 1996. The Administrative Division manages recruitment, led by the Member (Admin), and supported by the CGM (Admin), GM (Admin), DGM (Admin), Manager (Admin), and Assistant Manager (AM) (Admin).

NHAI typically outsources the supervision and management of civil contracts based on (International Federation of Consulting Engineers) FIDIC standards. However, in Indian context the contracts are developed based on the guidelines and specifications laid down by MoRTH and NHAI conditions of contract. The selection of Supervision Consultants/Engineers is done through a thorough international competitive bidding process. Similarly, civil work contracts are awarded via international competitive bidding, following global procedures. In this arrangement, NHAI acts as the 'Client,' while the Supervision Consultant serves as the 'Engineer,' managing daily contract operations and ensuring quality. Contractor/Concessionaire is responsible for completion of project works at site through its designated team and funds for a particular project. On-site project management is handled by the Project Director, who represents the client. Project monitoring is conducted at NHAI's Headquarters by the Technical Divisions, which are led by a member and supported by the CGM (Tech), GM (Tech), DGM (Tech), Manager (Tech), and Deputy Manager (Tech). Financial decisions are made in coordination with the Finance Division, headed by the Member (Finance) and backed by CGM (F&A), GM (F&A), DGM (F&A), Manager (F&A), Deputy Manager (F&A) and Assistant Manager(F&A).

The Vigilance (Vig) Division, headed by a CVO appointed by the Central Government in consultation with the Central Vigilance Commission (CVC), manages complaints and investigations. This division is supported by GM (Vig), DGM (Vig), Manager (Vig), and DM (Vig) and submits periodic reports to the Commission in accordance with the Vigilance Manual.

Figure 10: Bituminous Concrete (BC) laying during road construction

MEMBER – ADMIN



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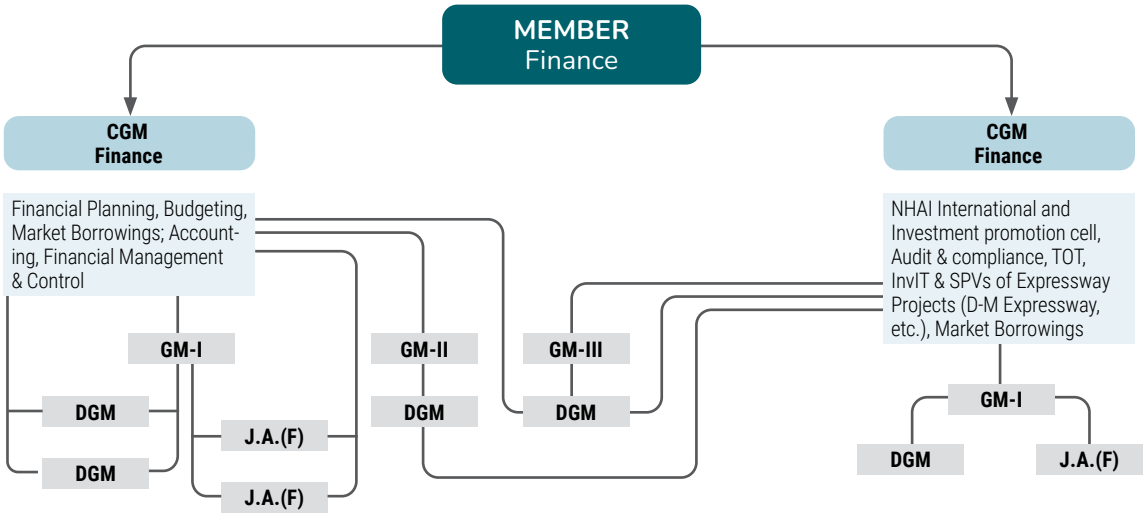
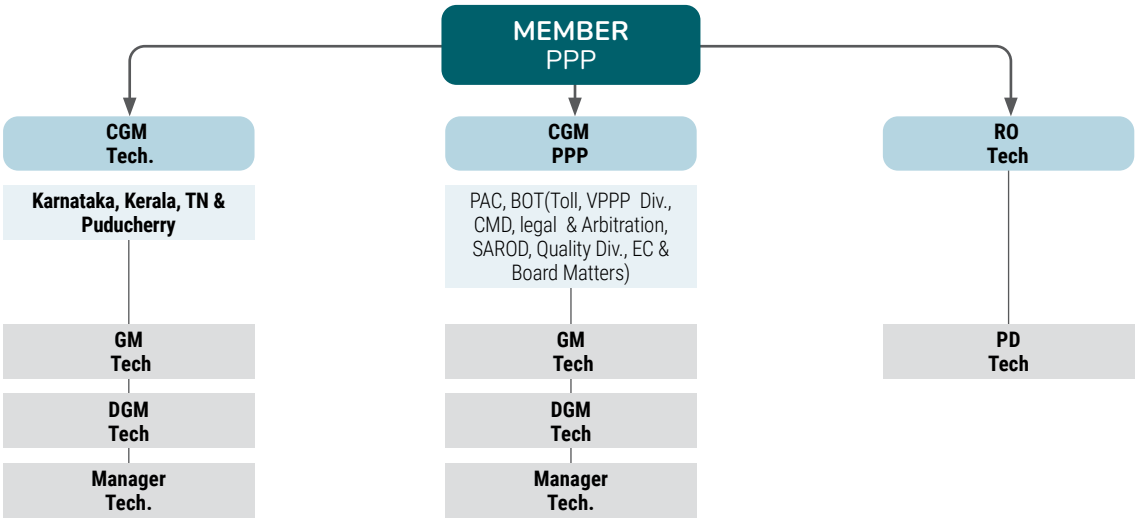
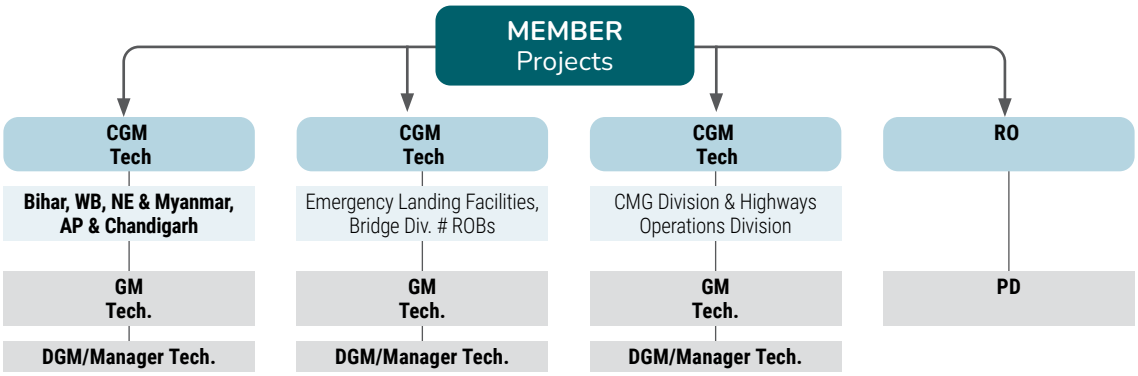


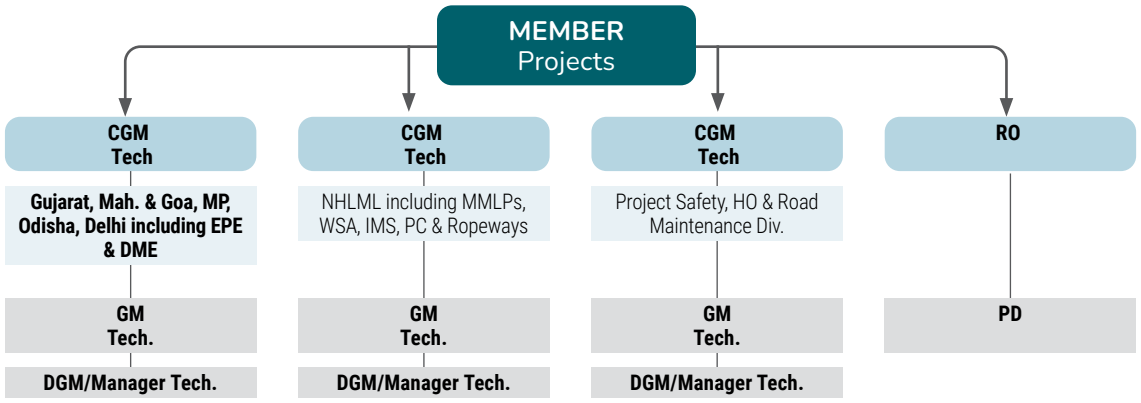
MEMBER – PPP



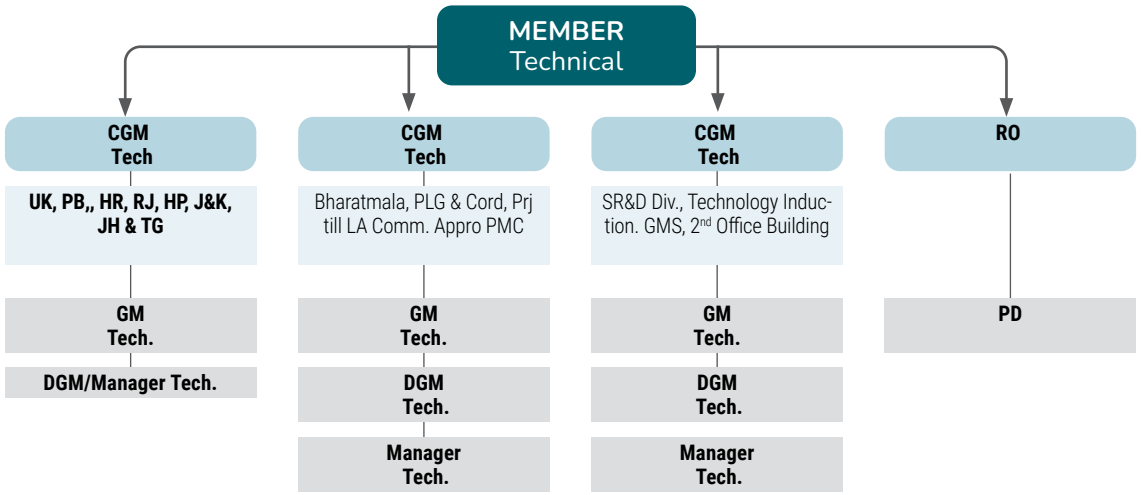
MEMBER – PROJECTS



MEMBER – PROJECTS



MEMBER – TECHNICAL



CHIEF VIGILANCE OFFICER (CVO)

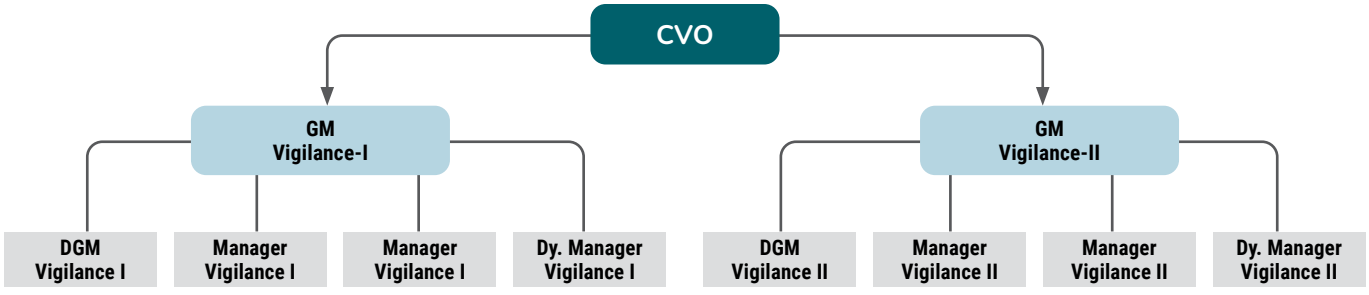
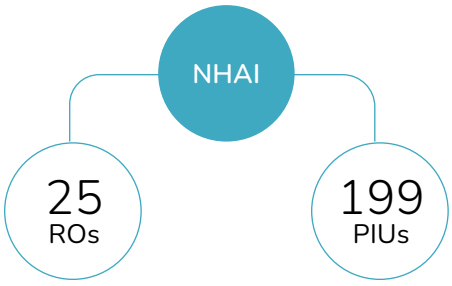


Figure 11 Hon'ble PM Shri Narendra Modi inspecting Madurai Chettikulam section of NH-785

Decentralised Governance

The governance is spread as a three-tier structure at NHAI to manage the projects across India, i.e., Headquarters (HQ), ROs, and Project Implementation Units PIUs. The majority of the correspondence is through the Head Quarters (HQ) in New Delhi. NHAI has 25 Regional Offices (RO) that supervise 199 PIUs across India and Myanmar.



NHAI has set up ROs, headed by a CGM-level officer, in various parts of the country to decentralise and strengthen field-level operations. The HQ management is responsible for the overall supervision of the works assigned to NHAI. The ROs through respective subject matter experts, are responsible for executive-level decision-making pertaining to economic, environmental, and social topics related to projects under their respective jurisdiction.

The PIUs, headed by project directors, are responsible for the implementation of projects assigned to them. Each PIU manages projects within their jurisdiction, as well as the Concessionaires/Contractors of respective projects and their subcontractors, suppliers, and vendors, with NHAI being the delegating authority.

Table 4 List of ROs of NHAI

Sr. No.	Regional Office
1.	Madurai
2.	Mumbai
3.	Nagpur
4.	Patna
5.	Raipur
6.	Ranchi
7.	Shimla
8.	Thiruvanantha-puram
9.	Varanasi
10.	Lucknow
11.	Vijayawada
12.	Kolkata

Sr. No.	Regional Office
13.	Bengaluru
14.	Bhopal
15.	Bhubaneswar
16.	Chandigarh
17.	Chennai
18.	Dehradun
19.	Delhi
20.	Gandhi Nagar
21.	Guwahati
22.	Hyderabad
23.	Jabalpur
24.	Jaipur
25.	Jammu

Knowledge Initiatives by Governance Body

NHAI is actively striving to enhance the collective competence of its highest governing body on economic, environmental, and social issues. Experts provide support in the development of new strategies to extend existing environmental management and social inclusion efforts. These programs prioritise planning and execution while simultaneously attempting to reduce costs. Members of the governing body provide advice to management teams on how to develop a feasibility plan, focusing on expanding the work to include environmental and social activities, as well as managing associated initiatives.

NHAI has established a specialised committee to manage these new projects, entrusting it with the task of evaluating proposals based on their potential impact and financial implications. Following a rigorous process of verification, analysis, and feasibility evaluation, an action plan is developed and implemented.

PROJECT IMPLEMENTATION AND DEVELOPMENT MECHANISMS

NHAI employs a comprehensive, consultative approach to road conceptualisation and development. Before initiating a Greenfield project, NHAI is required, under the EIA Notification 2006, to conduct an EIA, prepare an EMP, and hold public hearings. The organisation's Sustainability Strategy and Approach further elaborates on these processes, which include the implementation of the EMP and land acquisition.

Once land acquisition commences, NHAI develops a strategy to oversee the construction and operation of the project throughout its life cycle. NHAI issues a tender to select a Concessionaire (Road Developer) for the Engineering, Procurement, Construction (EPC), and Operations & Maintenance (O&M) of the project, based on specific qualification criteria. After a detailed selection process, NHAI awards the Letter of Award (LOA) to the chosen Concessionaire. The Concession Agreement outlines the scope of work, terms, and payment milestones based on project progress.

NHAI also appoints an Independent Engineer (IE)/ Authority Engineer (Consultant) to oversee and monitor the project, providing monthly and annual reports. Additional experts, consultants, and advisors are engaged as needed to support project management.

The Concessionaire/Contractor develops the projects per the following four (4) modes implemented by NHAI:

01 Build, Operate, Transfer (BOT) Toll Mode

02 Build, Operate, Transfer (BOT) Annuity Mode

03 EPC Mode

04 Hybrid Annuity Mode

BOT (Toll) Model

- Under the BOT model, a private player (road developer) is granted a concession to finance, build, and operate a project for a specified period of time (e.g., 20- or 25-year concession period)
- The developer recoups their investments by way of user charges or tolls charged from customers using the facility there.

BOT (Annuity) Model

- In the BOT model of infrastructure construction, the road developers are involved for an extended period.
- They deal with constructing, operating, and maintaining the roads for a specific period, i.e., 15-25 years.
- The roads are then handed back to NHAI.
- The road developers are paid a pre-fixed amount as an annuity.
- The government bears the risk of toll revenue

EPC Model

- The EPC model denotes a process of infrastructure construction in which the government pays private parties to build roads.
- The responsibility of the road developer ends after EPC.
- They are not involved in road maintenance, toll collection, or road ownership. The government remains responsible for these things.

Hybrid Annuity Model

- NHAI pays 40% of the total project expenditure.
- This payment is released in five equal instalments based on the completion of project milestones.
- The remaining 60% amount must be arranged by the road developer through private financing.
- The developer finances around 20 to 25% of the total project cost. The remaining amount of money is raised as debt.

NHAI POLICIES

The formulated policies governing NHAI operations and functions are aligned with applicable policies and procedures of Government of India. These policies focus on diverse aspects, for example, admin, finance, public relations, vigilance, IT, construction, safety, quality, and commercials. Similarly, necessary policies are available for plantation, mandatory use of fly ash and consumption of Reclaimed Asphalt Pavement (RAP) for sustainable development. The current policies of NHAI have been added below. The link to the policies is https://library.nhai.org/.[3]

01 Administration policy
02 Dispute Resolution & Legal Matters policy
03 Finance & Accounts policy
04 Advertisement/Media Relation/Inauguration policy
05 Consultancy policy
06 Guidelines related to IT applications policy
07 Pre-construction policy
08 Public funded policy
09 Standard Documents policy
10 Road Safety policy
11 Technology Induction Cell policy
12 Commercial Operations policy
13 Miscellaneous Guidelines policy

NHAI adheres to guidelines set forth by the Central Government of India to ensure the highest standards of governance for its systems, processes, and operations. The governance body, appointed for this purpose, upholds strong ethical principles and governance standards. NHAI complies with various directives issued periodically by the Central Government and relevant agencies. Key ethics guidelines followed by NHAI include:

01 Central Civil Services (Conduct) Rules, 1964: As updated by the Central Government.
02 Central Vigilance Commission Guidelines: Issued periodically.
03 Department of Personnel and Training (DoPT) Guidelines: These regulate the conduct and management of human resources in the execution of duties.

To effectively manage conflicts of interest, the governance body ensures adherence to defined and regularly updated processes, ensuring transparency and minimising conflicts. Disclosures are made to relevant stakeholders, ensuring no material impact on institutions, particularly with regard to:

01 Cross-board memberships
02 Cross-shareholding with suppliers and other stakeholders
03 The presence of a controlling shareholder
04 Related party disclosures.

[3]Link last accessed on 12th June 2025

Programmes at the NHAI

BHARATMALA PROJECT

NHAI established its own objectives while also adhering to different Government of India initiatives aimed at enhancing the nation's road/highway infrastructure and connecting the most remote regions. The MoRTH reviewed the National Highways system to improve connections in border areas, build coastal roads (including links to smaller ports), increase the efficiency of main routes, and develop Eco-nomic Corridors, Inter-Corridors, and Feeder Routes. This work is part of the Bharatmala project, which is closely related to the Sagarmala initiative. This initiative seeks to create nearly 26,000 km of "economic corridors," which, along with the Golden Quadrilateral (GQ) and North-South and East-West (NS-EW) routes, will handle the majority of road freight traffic.

NHAI has targeted improvement of the Economic Corridors, GQ, and NS-EW Corridors with about 8,000 km of main highways and 7,500 km of secondary roads. The initiative also calls for the construction of ring roads, bypasses, and elevated corridors to reduce traffic congestion in cities and increase logistical efficiency. The initiative proposes ring highways for 28 cities, identifying 125 choke locations and 66 congestion areas for repair. To further decrease congestion, improve logistics efficiency, and minimise freight costs, NHAI has identified 35 sites for building multimodal logistics parks.

Figure 12: Quality and Safety Inspection Visit by Senior Officials, NHAI

The progress of various components of Bharatmala Pariyoa Phase-I and other schemes up to 31 March 2024, is detailed below:

Table 5 Overview of the Bharatmala Pariyoa

Components/Scheme	Total Length in km	Length completed during 01.04.2023 and 31.03.2024	Total Length completed up to 31.03.2024 in km
A.Bharatmala Pariyoa Phase-I			
Economic Corridors	9,000	1,625	5,432
Inter Corridors & Feeder Roads	6,000	631	2,245
National Corridor Efficiency Improvement	5,000	365	2,003
Border & International Road Connectivity	2,000	89	1,345
Coastal & Port Connectivity Roads	2,000	74	178
Expressways	800	607	1,565
Sub-total	24,800	3,392	12,769
Balance Road Works under NHDP	10,000	519	4,641
Grand Total	34,800	3,912	17,411
B.Other Schemes			
SARDP-NE (Phase A+Arunachal Pradesh)	5,598 (Original: 6,418)	387	5,661
LWE (including Vijayawada Ranchi Route)	6,014	47	5,757
EAP (WB+JICA+ADB)	2,910	487	2,450

Figure 13: Nelamangala - Devihalli section on NH-75

PM GATI SHAKTI

The PM Gati Shakti National Master Plan for Multi-modal Connectivity is a comprehensive infrastructure development plan launched by the Government of India to promote coordinated and efficient execution of major infrastructure projects across the country. The initiative aims to enhance the integration of various infrastructure sectors, including roadways, railways, ports, airports, and energy networks, to improve logistical efficiency and drive economic growth.

Key objectives of the PM Gati Shakti Initiative include:

Streamlined Infrastructure Planning
It integrates 16 ministries and departments for holistic infrastructure development, ensuring alignment and coordination between various sectors.

Boosting Economic Corridors
The plan focuses on the development of economic corridors, industrial hubs, and connectivity to rural and remote areas.

Efficient Project Execution
It incorporates the use of Geographic Information System (GIS)-based mapping and real-time monitoring of projects to reduce delays and cost overruns.

Job Creation and Economic Growth
By speeding up infrastructure development and enhancing logistical efficiency, PM Gati Shakti aims to attract investments, create jobs, and boost India's economic growth.

Figure 14: Amritsar - Jamnagar Expressway

This initiative aligns with India's vision to become a $5 trillion economy by addressing critical infrastructure gaps and improving connectivity across the nation. The PM Gati Shakti initiative stands tall on six pillars as listed below:

Comprehensiveness
All the existing as well as planned initiatives from various departments and ministries of the government can be accessed using one central portal. Every department can have access to other department's activities at the time of project planning and execution.

Prioritisation
Through this initiative, various departments can prioritise all their projects through cross-sectoral interactions.

Optimisation
The National Master Plan will help different ministries to plan for projects after identification of critical gaps. For goods transportation, this plan will help select the optimal route based on time and cost.

Synchronisation
Individual Ministries and Departments often operate independently, leading to a lack of coordination in project planning and implementation, which results in delays. PM Gati Shakti aims to harmonise the activities of each department and different levels of governance, fostering a more integrated and synchronised approach to ensure efficient collaboration and timely execution.

Analytical
The plan consolidates all relevant data in one location using GIS-based spatial planning and analytical tools with over 200 layers, providing the executing agency with enhanced visibility.

Dynamic
Ministries and Departments will now be able to visualise, review, and monitor the progress of cross-sectoral projects via the GIS platform. Periodic satellite imagery will display real-time on-ground progress, with regular updates to the portal. This will assist in identifying key interventions for improving and refining the master plan.

Sustainability at NHAI

NHAI has been increasingly aligning with Environmental, Social, and Governance (ESG) principles through various initiatives aimed at sustainable development, improving social outcomes, and ensuring transparent governance. NHAI has linked its operational obligations to include ESG principles in its operations, focusing on sustainable infrastructure, enhancing social benefits, and ensuring governance standards. These initiatives not only enhance India's resilient road network but also help to achieve the country's overall SDGs by making roads safer, greener, and more accessible.

Figure 15: Delhi Katra Expressway

The keyways in which NHAI has made progress in its ESG journey are:

Environmental Sustainability	Social Impact
Green Highways Initiative: NHAI has been promoting green highways by implementing extensive tree plantation along National Highways under the Green Highways (Plantation, Transplantation, Beautification & Maintenance) Policy.	**Employment Generation:** NHAI's highway projects create significant employment opportunities for local communities, contributing to economic development and poverty alleviation in rural and semi-urban areas.
Use of Renewable Energy: NHAI is incorporating solar energy for highway infrastructure, such as solar lighting systems and powering toll plazas with solar power. This helps reduce the carbon footprint of highway operations.	**Road Safety Initiatives:** NHAI has implemented several programs under the Road Safety Initiative, including improving road designs, accident prone-zone mapping, and conducting safety audits to reduce accidents and ensure safer travel for the public.
Waste Utilisation in Construction: NHAI is increasingly using industrial by-products like fly ash and plastic waste in road construction to promote principles of circular economy and reduce environmental degradation.	**Health and Education Support:** NHAI undertakes Corporate Social Responsibility (CSR) initiatives, such as providing medical facilities and education for local communities affected by highway projects.
Sustainable Materials & Technologies: The use of recycled materials and geosynthetics in road construction helps reduce resource consumption and increase road longevity.	**Infrastructure Accessibility:** NHAI works to ensure better connectivity through its projects, improving access to essential services such as healthcare and education for undeserved and remote populations.

Governance	Climate Resilience
Transparency and Accountability: NHAI has been working to enhance transparency and fair practices in project procurement, contract management, and PPP. This ensures compliance with ethical standards and fosters competition in contract awards.	NHAI is exploring ways to make highway infrastructure more climate-resilient by considering the impacts of floods, droughts, and extreme weather events on roads and bridges. This involves upgrading the design of highways and bridges to withstand changing climate conditions.
Use of Technology for Governance: NHAI's collaboration with the ISRO for satellite-based project monitoring ensures real-time tracking of road projects, enhancing transparency, efficiency, and timely delivery.	
Digital Transformation: NHAI has been leveraging technology to introduce e-tendering, online monitoring, and grievance redressal systems, which promote governance and reduce corruption.	
Public Grievance Redressal: NHAI is committed to addressing public concerns through platforms like NHAI Citizen App, which provides a channel for reporting road issues and grievances related to highways.	

Figure 16: Road user safety measures by NHAI - Highway Ambulance

NHAI's ESG GOALS

As India's leading authority on national highways, the NHAI is committed to fostering sustainable growth while ensuring the development of world-class infrastructure. With a mission to provide efficient, safe, and environmentally conscious road networks, NHAI aims to align its strategic objectives with the nation's broader goals for economic progress, social inclusion, and environmental stewardship. In line with these priorities, NHAI has outlined several key focus areas where it can make a significant impact. These areas include carbon neutrality, employee well-being, economic development, road safety, and digitalisation.

NHAI's forward-thinking approach is designed to not only address current challenges but also to future-proof India's road infrastructure. By integrating sustainable practices, enhancing governance, and embracing technological advancements, NHAI is poised to lead the transformation of India's highways into a safer, greener, and more inclusive network. The following sections outline the goals NHAI seeks to achieve in each of these critical areas.

Carbon Neutrality

As India advances towards its climate goals, NHAI can help minimise the carbon footprint of highway development and maintenance projects. This can be achieved through:

Net-zero carbon highways

NHAI is contributing to development of carbon-neutral highways by adoption of green technologies, including the use of renewable energy in highway construction, operations, and maintenance.

Sustainable Materials and Practices

NHAI is integrating sustainable construction materials such as recycled asphalt and eco-friendly alternatives, alongside efficient project management to reduce resource consumption and emissions.

Electric Vehicle (EV) Infrastructure

NHAI has helped accelerate the development of EV charging infrastructure along national highways in their wayside amenities to promote the transition to cleaner transportation and support India's electrification goals.

EMPLOYEE WELL-BEING

Employee well-being plays a critical role in overall success of NHAI. The organisation has in place the following objectives to enhance the welfare and satisfaction of its workforce:

Holistic Employee Welfare Program

NHAI can introduce comprehensive health and wellness programs that address both physical and mental health, including regular health check-ups, counselling services, and fitness initiatives.

Workplace Safety and Development

NHAI ensures a safe working environment for employees by adhering to strict safety protocols and offering continuous training for skill enhancement. Establishing employee assistance programs and recognising outstanding performance could also help foster a positive workplace culture.

Economic Development

The efficient movement of goods and services across regions, enabled by better road infrastructure, stimulates trade, and supports industries such as manufacturing, agriculture, and logistics. NHAI's projects significantly contribute to the growth of trade corridors and help reduce turnaround times for goods transportation, thereby boosting domestic and international trade.

ECONOMIC DEVELOPMENT

National Highways play a pivotal role in driving the country's economic growth by facilitating trade and connectivity. Further, the organisation has specific goals to boost the economic development, listed below:

Boosting Regional Development

By enhancing connectivity between urban and rural areas, NHAI has promoted the economic inclusion and encouraged growth in remote regions. Special focus is being placed upon projects in underdeveloped regions to create new opportunities for local businesses and employment.

Supporting Micro, Small and Medium Enterprises (MSMEs) and local enterprises

NHAI intends to collaborate with MSMEs in the supply chain, particularly in highway development and maintenance, to stimulate local economies and create jobs.

PPP

NHAI aims to strengthen PPP to leverage private sector expertise, technology, and capital to improve road infrastructure, while generating economic value through innovative models like BOT.

ROAD SAFETY

In 2020, the MoRTH acknowledged road accidents as one of the primary causes of fatalities in India. As a signatory to the 2015 ***'Brasilia Declaration,'*** India committed to reducing road accidents by 50% by 2020, a target which has now been extended to 2030.

NHAI is in the process of developing a GIS repository aimed at simplifying access and management of GIS data. This initiative will streamline data management, establish data standards, and ensure the availability of readily accessible information to support effective decision-making. NHAI has launched extensive public awareness programs on road safety, targeting drivers, pedestrians, and communities to promote safer road behaviour and adherence to traffic rules.

Figure 17: Installation of Safety Reflectors

DIGITAL TRANSFORMATION

NHAI's commitment to leveraging digital technology and promoting environmental sustainability is reflected in its key initiatives like the *Data Lake, Drone Analytics Monitoring System (DAMS),* and the *Green Cover Index (GCI).* These initiatives serve to streamline operations and enhance the environmental footprint of India's road networks.

The *Data Lake initiative* aims to create a centralised, scalable repository for large volumes of structured and unstructured data from across NHAI's operations. This data-driven approach integrates diverse forms of data—such as road infrastructure details, project timelines, traffic patterns, forests and environment related information of road projects, and financial records—into a unified system By utilising advanced analytics, machine learning, and artificial intelligence, the Data Lake enables NHAI to derive valuable insights and support informed decision-making processes, enhancing the efficiency of highway construction and maintenance.

The *Drone Analytics Monitoring System (DAMS)* is another powerful digital platform developed by NHAI to manage and analyse drone image data collected during flight operations. DAMS facilitates the online and remote tracking of National Highways by supporting multiple modules for monitoring the entire lifecycle of road projects. This cutting-edge system ensures accurate and timely surveillance of highway construction, maintenance, and environmental impact assessments, leading to better project management.

On the environmental front, NHAI's *Green Cover Index (GCI)* highlights its dedication to sustainability and biodiversity conservation. Through the Green Highways Policy, NHAI has implemented extensive tree plantation drives along national highways in collaboration with state governments, SHGs, private agencies, and local communities. The GCI measures the success of these efforts by assessing the green cover along roadways. This initiative helps mitigate the environmental impact of road construction, enhance air quality, and support ecological balance, contributing to a more sustainable and environment friendly road infrastructure.

Governance with Integrity

As a government organisation, the NHAI operates under the strict regulatory framework set by the Government of India and fully adheres to all applicable laws and regulations related to competition, anti-trust practices, and anti-corruption. The operations are conducted with a strong emphasis on transparency, fairness, and accountability, ensuring that public contracts and projects are awarded and executed in a manner that promotes healthy competition among bidders and service providers.

In line with the commitment to ethical governance, NHAI does not make any direct or indirect political contributions as part of its organisational policies and operations. As a government body, NHAI adheres to stringent legal frameworks and guidelines set by the Government of India, ensuring that no funds, resources, or support are used for political purposes. This approach reinforces the commitment to transparency, impartiality, and compliance with public governance standards, while upholding the principles of fair competition and anti-corruption and eliminating conflicts of interest in all activities.

ANTI -CORRUPTION MEASURES AT NHAI

NHAI is committed to maintaining the highest standards of integrity, ethics, and transparency in all its operations. NHAI has a robust risk assessment process to identify and mitigate corruption risks across all operations. During the reporting period, all critical functions and high-risk areas were assessed for potential corruption-related risks.

NHAI observed *'Vigilance Awareness Week'* from 30 October to 05 November 2023, under the theme *'Say No to Corruption, Commit to the Nation'.* During this week, NHAI officers and staff took the *'Satyanistha Pratigya'* (Integrity Pledge) to reaffirm their commitment to national unity, integrity, and ethical conduct. The pledge was administered by Shri Vishal Chauhan IAS, Member (Administration) of NHAI, in the presence of senior officials and staff.

As part of the event, NHAI also released its vigilance bulletin, *'Sachetan,'* which is a key initiative led by the CVO aimed at reinforcing the importance of vigilance and integrity across the organisation.

Figure 18: Ethics Workshop, November 2023

A variety of activities, including essay writing, painting competitions, quizzes, debates, and awareness programs, were organised throughout the week to advocate for the importance of transparency and ethical practices. These initiatives foster a sense of responsibility among employees, contractors, and stakeholders to uphold ethical standards.

A workshop on *'Ethics and Values in Governance'* was also held at NHAI Headquarters on 03 November 2023, as part of *Vigilance Awareness Week.* The workshop, facilitated by Smt. Vinod Jindal, Retired Deputy Secretary of the Ministry of Urban Development, highlighted the importance of ethics and integrity in governance and how these values should be maintained in the line of duty.

In alignment with NHAI's vigilance framework, the CVO plays a pivotal role in promoting a culture of transparency and accountability. Vigilance policies are effectively implemented across the organisation, with the CVO providing strategic oversight and leading key anti-corruption initiatives. Employees receive regular training on topics such as bribery prevention, ethical decision-making, and compliance, ensuring they are fully aware of the expectations for ethical conduct.

Figure 19: Vigilance Awareness Week, November 2023

To further bolster its anti-corruption efforts, NHAI conducts regular internal audits and follows stringent reporting mechanisms to flag any suspicious activities. The organisation also maintains a mechanism as per CVC guidelines mechanism that guarantees confidentiality, encouraging employees to report any unethical practices, which are promptly addressed. These efforts demonstrate NHAI's ongoing commitment to upholding integrity, transparency, and accountability in line with the national ethical standards.

Figure 20: Vigilance Awareness Week, November 2023

During the reporting period, there were no confirmed incidents of corruption. The vigilance efforts, proactive risk assessments, and strong internal controls contribute to the organisation's continued commitment to ethical conduct and transparency in business practices.

Figure 21: NHAI Chairman administering the Rashtriya Ekta Diwas Pledge, October 2023

Mitigating Conflicts of Interest

Similar to the efforts to promote anti-corruption, NHAI also strongly upholds a commitment to mitigate all conflicts of interest in its governance as well as in stakeholder relationships. NHAI aligns its efforts with the Government of India guidance and policies, as applicable to the organisation. This is emphasised through the various vigilance initiatives, and rules for dismissal of members of the Board as defined in the National Highways Authority of India Act, 1988. The Act states that members are disqualified if in the opinion of the Central Government, they are deemed to have financial or other interest in NHAI and is likely to prejudice his functioning as a member.

Communication of critical concerns

NHAI has identified various internal and key external stakeholder with whom regular communication channels are established. The key topics of concern, frequency and modes of engagement are detailed in the next section *titled 'Stakeholder Engagement'.* The Member (Admin) handles all the communications related to Coordination, Parliament, VIP Ref., Public Grievances and RTI, thus effectively ensuring involvement of the highest governance body in communication of stakeholder concerns.

Compliance with laws and regulations

National Highway Authority of India was set up by an act of the Parliament, namely the NHAI Act, 1988. The purpose of this was to create *"An Act to provide for the constitution of an Authority for the development, maintenance and management of national highways and for matter connected therewith or incidental thereto".*

As an autonomous organisation of MoRTH, NHAI adheres and complies with the mandates provided by the Government of India.

Figure 22: NHAI Staff taking the 'Satyanistha Pratigya' (Integrity Pledge) during 'Vigilance Awareness Week'

Stakeholder Management

NHAI engages with its stakeholders throughout the entire year to improve the financial as well as operational efficiencies. Crucial sustainability matters are covered by NHAI through communications with internal and external stakeholders, these matters include both sustainable business as well as business as usual practices. These periodic communications help NHAI to identify issues and further communicate critical ESG concerns. The identified concerns are then addressed by relevant committees, authorities, and Key Management Personnel (KMP) in a constructive manner while ensuring communication through appropriate channels. Further details on the stakeholder engagement process have been covered in *'Bridging People & Progress'* section of the report. NHAI operations include interactions with different stakeholders during day-to-day activities as well as at the time of project development.

STAKEHOLDERS OF NHAI

NHAI Internal Stakeholders	NHAI External Stakeholders
Ministry of Road Transport & Highways, Government of India	Concessionaires, Authority/Independent Engineers, Suppliers and Contractors
Central Ministries of Government of India and the State Governments through its Forest, Environment, Revenue, Water Resources Departments etc.	Road Users
Employees: Permanent and Contractual, Subject Matter Experts (SMEs) etc.	Industry and Trade organisations Communities and NGOs
	Regulators

NHAI has been engaging the stakeholders throughout the year with purpose of improving the operational and financial efficiencies. NHAI also covers important sustainability topics through communications with both internal and external stakeholders, which encompass business sustainability and business as usual practices. These are structured, periodic and effective interactions which enables NHAI to identify issues and communicate critical concerns associated with ESG aspects of its operations. All the issues raised are addressed by relevant committees, authorities and key management personnel in time bound manner and communicated through appropriate channels.

STAKEHOLDER COMMUNICATION AND RESPONSES

NHAI regularly interacts with all the stakeholders to maintain enriching dialogue, which in turn helps NHAI to improve is operational and financial efficiencies. During these interactions, NHAI ensures that it addresses, key and context specific concerns of the stakeholders to make sure a holistic project development takes place. Following table illustrates approach to address the stakeholder specific concerns.

Figure 23: Awareness campaign on road safety by Hon'ble Minister, MoRTH

Table 6 Stakeholder engagement mechanism at NHAI

Stakeholders	Key topics of Concern	NHAI`s response
Road Users	• Adequate connectivity through roads • Road infrastructure for all types of weather • Safe road travel • Accessible roads	Holistic long-term planning of roads for greater connectivity. Road safety awareness campaigns. Improving ease of driving.
Communities and NGOs	• Benefits to all strata of society • Boost livelihoods through connectivity. • Connect with underprivileged areas • Conservation of environment	NHAI plans to reach every possible geography to connect most underprivileged ones to mainstream, connect people to market and boost rural businesses. NHAI also take proactive measure to minimise negative impacts on environment while using sustainable strategies during road construction and maintenance.
Concessionaires/ Contractors	• Timely allotment of project • Timely clearances from de-partments • Handholding and support	NHAI maintains a healthy relationship with Concessionaires/Contractors and had laid down thorough procedures to obtain pre -project clearances, during construction, post construction and commercial operation. It also helps in coordinating with respective state and central government departments during project execution.
Employees	• Appropriate employee welfare schemes and benefits • Learning and development	NHAI follows all the statutory norms laid down by government of India to ensure that employees can access all their entitlements and benefits. It has committed to provide skill up gradation trainings to enhance the operational efficiency.
Governments and Regulators	• Compliance with environmen-tal and social laws • Sustainable design with least negative impacts	NHAI strictly adheres to all the compliance requirements which are mandated under regional and central laws. This has been monitored through robust data and document monitoring mechanisms.

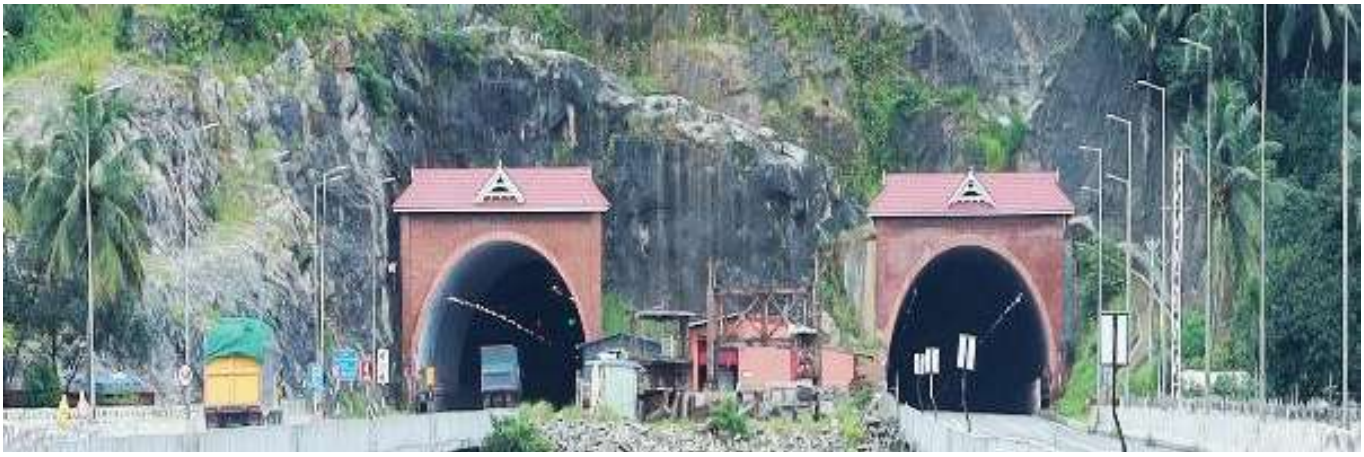


Figure 24: Kuthiran Tunnel, NH-544 Kerala

NHAI's APPROACH TO STAKEHOLDER ENGAGEMENT

Stakeholders are individuals or groups of individuals who are directly or indirectly affected by a program or project, as well as those who may have interests in a program or project and/or the ability to change its outcome, either positively or negatively. NHAI's approach is to identify the key stakeholders, which were further divided into internal and external stakeholder groups. Engagement with these stakeholders has been carried out through multiple channels and at regular intervals.

Table 7 Mode and frequency of Stakeholder Engagement

Stakeholders	Frequency and Mode of engagement		
	Annual	Periodic	Need-based
Road Users	• Road Safety Week • Swachta Pakhwara	• Feedback through online and offline platforms for road infrastructure plans, services, and facilities	• Need based interaction with communities as and when required basis at places. A designated schedule has been kept for such interaction.
Communities		• Health Checkup Camps	• Community engagement programs • Grievance redressal camps
Employees	• Annual Day • Celebration days • Festivals (Holi Milan, Diwali etc.)	• Employee welfare meetings	• Issue specific staff meetings
Concessionaires/ Contractors		• Continuous connect with both qualitative and quantitative data capture mechanism, during all phases of road project life cycle.	• Meetings and Joint site visits
Governments		• Monthly and Quarterly meetings for project updates and other context specific issues on the table	• Project plan documents i.e. DPRs having details of operational and financial details
Regulatory bodies		• Periodic regulatory filings and reporting to compliance bodies	
Industry and trade organisations			• Project design and project management meetings for key high value projects assisting business growth.

ESG THROUGH ENVIRONMENT & GREEN HIGHWAYS DIVISION (ENV. & GHD)

National Highways Authority of India (NHAI) has created Environment and Green Highways Division (Env. & GHD) with a team of environment and forestry experts for planning, implementation and monitoring plantation programmes and other mitigation efforts with the involvement of all stakeholders, Concessionaires/ Contractors, private plantation agencies, NGOs, and State Government agencies. NHAI demonstrates its commitment to inclusive growth and sustainable development by adhering to regulatory requirements, including statutory clearances, such as environmental, forest, wildlife, and Coastal Regulation Zone (CRZ). The Env. & GHD Division undertakes regular compliance reviews and comprehensive monitoring of these initiatives. The division is responsible for planning, implementing, and monitoring plantation programs and other damage reduction measures. They do so by working with Concessionaires/Contractors, private plantation agencies, Non-Government Organisations (NGOs), and state government bodies, among others.

In this regard, project-based collaboration is also envisioned with Corporates, Public Sector Undertakings (PSUs) and other plantation agencies willing to adopt/ fund roadside plantations under their Corporate Social Responsibility Program. NHAI has also collaborated with PSUs and banks in their CSR activities.

The NHAI also has a mechanism for undertaking compliance reviews through its Environment Division with respect to the conditions of all statutory clearances such as Environment Clearance, Forest Clearance, local approvals etc. and is regularly undertaking intensive monitoring. The effort is to strictly adhere to the statutory regulations and proactively implement mitigation plans. NHAI is determined to proactively traverse the path of inclusive growth and sustainable development.

NHAI has signed Memorandums of Understanding (MoUs) with state government agencies, such as urban and forest departments, as well as with the public sector (businesses and corporates) to improve plantation projects along national highways. These collaborations

Figure 25: Constructed Main Carriage Way on Amritsar-Jamnagar Expressway

aim to include a diverse range of stakeholders in the process, fostering extensive involvement in ecological and environmental conservation.

On 29th September 2015, the Ministry of Road Transport and Highways (MoRTH) launched the *Green Highways (Plantation, Transplantation, Beautification, and Maintenance) Policy*[4], a visionary step toward creating sustainable, green corridors along India's vast highway network. This policy promotes the greening of highway corridors through community involvement, including farmers, private sectors, NGOs, and government institutions. The policy emphasises the importance of reducing air pollution and dust, planting trees that act as natural sinks for pollutants, providing much-needed shade, and stopping soil erosion on embankment slopes. This initiative is expected to generate significant employment opportunities, with the potential to provide dignified employment to approximately five lakh people from rural areas. Moreover, the policy aims to reduce road accidents by improving the safety and aesthetics of highway corridors and thus, creating a safer driving environment.

[4] https://morth.gov.in/sites/default/files/circulars_document/GH-Green%20Highways%20Policy%20%E2%80%93%202015_0.pdf

Objectives of the Green Highway Policy

To evolve a policy framework for plantation along National Highways.

To reduce the impact of air pollution and dust as trees and shrubs are known to be natural sink for air pollutants.

To provide much needed shade on glaring hot roads during summer.

To reduce the impact of increasing noise pollution caused due to increase in number of vehicles.

To arrest soil erosion at the embankment slopes.

To prevent glare from the headlight of incoming vehicles.

To moderate the effect of wind and incoming radiation.

To create employment opportunities for local people.

Table 8 Details of plantation activities from 2016-2024

Year of Plantation	No. of Saplings planted in lakh
2016-17	38.00
2017-18	38.26
2018-19	31.36
2019-20	36.20
2020-21	58.87
2021-22	72.05
2022-23	71.52
2023-24	56.08
Total	**402.29**

The Env. & GHD Division has actively updated the Standard Operating Procedures (SOPs) for implementing the Green Highways Policy, empowering Regional Officers to approve plantation projects, and ensuring a high standard of execution. Additionally, the division has finalised its SOP for engaging corporations in Corporate Social Responsibility (CSR)-funded plantation activities. To maintain the integrity of these plantations, the Env. & GHD Division has set clear standards for selecting quality planting materials, further bolstering the sustainability of the initiative.

Since the launch of the Green Highways Policy in 2016, NHAI has made remarkable progress, planting approximately 402.29 lakh saplings by FY 2024. In FY 2023-24 alone, NHAI planted 56.08 lakh saplings along 18,991 kilometres of national highways. The initiative also empowered women and local communities by involving Self-Help Groups (SHGs) through MoUs with state rural livelihood missions, actively engaging them in plantation activities.

Table 9
Plantation activities by ROs (FY 23-24)

S.No.	Regional Office	Fresh Plantation as of March, 2024 (Plantation in Lakhs)		
		Avenue	Median	Total
1	RO-Bengaluru	0.56	1.67	2.23
2	RO-Bhopal	1.57	2.68	4.25
3	RO-Bhubaneswar	1.23	1.45	2.68
4	RO-Chandigarh (HR)	1.13	1.85	2.98
5	RO-Chandigarh (PB)	1.33	1.00	2.33
6	RO-Chennai	0.67	1.02	1.68
7	RO-Dehradun	0.38	0.18	0.56
8	RO-Delhi	2.47	1.13	3.60
9	RO-Gandhinagar	1.61	2.08	3.69
10	RO-Guwahati	0.22	0.63	0.85
11	RO-Hyderabad	0.36	0.39	0.74
12	RO-Jabalpur	1.54	1.25	2.79
13	RO-Jaipur	2.81	5.29	8.10
14	RO-Jammu	0.41	0.36	0.76
15	RO-Kolkata	1.20	0.53	1.72
16	RO-Madurai	0.60	0.33	0.93
17	RO-Mumbai	0.51	0.83	1.34
18	RO-Nagpur	2.20	1.70	3.90
19	RO-Patna	1.15	1.23	2.38
20	RO-Raipur	0.86	0.31	1.17
21	RO-Ranchi	0.57	0.36	0.92
22	RO-Shimla	0.21	0.11	0.32
23	RO-Kerala	0.01	0.18	0.18
24	RO-UP East	1.05	1.09	2.15
25	RO-UP West	1.74	0.92	2.67
26	RO-Vijayawada	0.58	0.55	1.14
Total		**26.96**	**29.12**	**56.08**

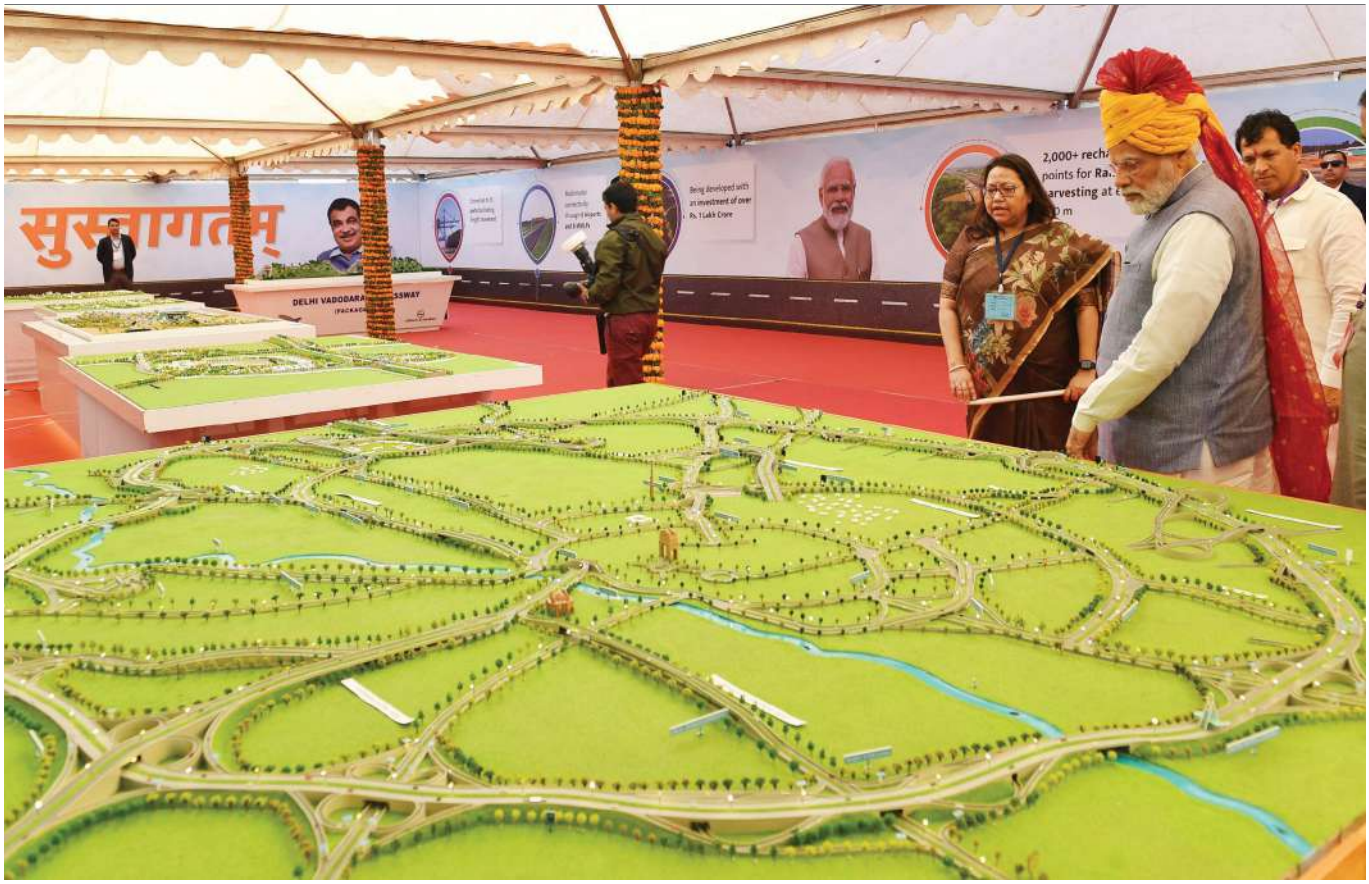


Figure 26: Hon'ble PM Shri Narendra Modi inspecting section of Mumbai-Delhi Expressway

The Env. & GHD Division explores innovative plantation models, such as the *Miyawaki* method and the creation of *Oxygen Parks,* utilising available land parcels to maximise the environmental benefits of plantation activities. Bamboo plantations are being strategically introduced along the extreme rows of avenue plantations, offering additional ecological benefits. They have also afforested 55.55 ha of land under landscaping, beautification and pilot projects of Miyawaki method (a technique renowned for its ability to rapidly create dense, biodiverse forests) and Oxygen Park. This effort is reflective of the NHAI's commitment to enhancing India's green cover and contributing to environmental conservation on a national scale.

Furthermore, the Env. & GHD Division leverages advanced technology to monitor and evaluate the progress of its plantation efforts. The division rigorously tracks the plantation activities through tools like the Data Lake platform for data analytics, drone videography, and field inspections. In partnership with National Remote Sensing Centre (NRSC) Hyderabad, NHAI is also developing a Green Cover Index for National Highways using satellite imagery to enhance the tracking and measurement of environmental factors.

In addition to these significant efforts, the vision of NHAI's Green Highways Program is to develop eco-friendly national highways with the active participation of the community, farmers, NGOs, the private sector, institutions, government agencies, and the Forest Department. This vision aligns with the goal of economic growth and sustainable development. The objectives of the program include evolving a policy framework for plantations along national highways, reducing air pollution, providing shade during the summer, mitigating noise pollution, arresting soil erosion, preventing glare from headlights, moderating the effects of wind and incoming radiation, and creating employment opportunities for local people.

While highway development often leads to the loss of vegetation, the responsibility of highway development agencies is to offset this loss through Corridor

Development. The inclusion of plantation requirements in the Land Acquisition Plans is critical for ensuring the space needed for avenue plantations. Successful highway projects involve collaboration with local communities, NGOs, and government bodies to enhance the aesthetics and environmental value of highway corridors.

This effort also aims to reduce the impact of air pollution and dust, enhance environmental quality, and mitigate the effects of soil erosion, thus improving the overall road environment. The Green Highways Program has not only made the highway network greener, but it has also helped rural communities in big ways, both socially and economically.

Figure 27: Tree Plantation Activity at NHAI

MONITORING

To ensure the successful implementation of plantation activities, a dedicated monitoring mechanism has been established to regularly track the progress of planting and the status of plantations on a continuous basis. Under this, site visits are conducted for field verification, checking the survival, growth, and size of the plantations, as well as their ongoing maintenance. The concerned Env. & GHD Division within NHAI reviews the reports submitted by the field functionaries and take corrective measures as and where required.

COMPLIANCE WITH THE FOREST CONSERVATION ACT, 1980 AND LOCAL LAWS

Before initiating any plantation activities, the local forest department will at times be consulted to ensure compliance with any existing regulations that may affect the raising, maintenance, and harvesting of the plantations. Necessary adjustments to the plantation scheme are made in collaboration with the State Forest Department.

NHAI's Env. & Green Highways Division is committed to creating a greener, safer, and more sustainable highway network across India, promoting environmental conservation, empowering local communities, and contributing to the nation's development goals. Through a combination of strategic partnerships, innovative plantation methods, rigorous monitoring, and compliance with environmental laws, NHAI is playing a crucial role in advancing sustainable infrastructure development while improving the overall health of the environment.

Circularity at NHAI is embedded through the sustainable use of materials and efficient resource management across all stages of highway construction and maintenance. NHAI integrates the principles of circular economy by promoting the reuse of construction waste, utilising recycled materials like fly ash, and adopting environmentally friendly technologies. This approach reduces the demand for virgin materials, minimises waste generation, and lowers the environmental impact of road development projects. The IRC guidelines play a crucial role in driving this circularity by setting standards and best practices for the use of sustainable materials in road construction. For instance, IRC guidelines like IRC: SP:21:2009 and other relevant codes provide technical specifications for the use of recycled and alternative materials in highway projects, ensuring that sustainability is maintained without compromising quality or safety. By adhering to these guidelines, NHAI enhances resource efficiency, promotes waste reduction, and supports the circular economy in the development of India's road infrastructure.

Environmental clearance

As per the 2013 amendments to the Environmental Impact Assessment (EIA) Notification, new national highways and highway expansions exceeding 100 km—where additional right of way surpasses 40m on existing alignments and 60m on realignments or bypasses involving land acquisition and crossing multiple states—require prior environmental clearance.

NHAI ensures full compliance with these EIA Notification requirements by conducting comprehensive EIA studies and developing project-specific Environmental Management Plans (EMPs) for each project.

Plantation

NHAI's projects are distinguished by the incorporation of plantations along the medians and shoulders of the roads. To meet the specific plantation requirements of each state, NHAI consults with Plantation Experts. Additionally, NHAI has enlisted the support of Young Professionals and Horticulture Experts to ensure that the efforts make a meaningful and lasting impact.

Road safety

NHAI has developed and implemented a range of road safety systems to ensure users experience a safe driving environment. Through the involvement of Independent Engineers and Road Safety Consultants, NHAI conducts regular road safety audits to identify accident-prone areas and black spots. Based on these findings, NHAI has introduced safety measures such as rumble strips, traffic lights, and pedestrian crossings to further enhance road safety.

NHAI has also established a fully functional Road Safety Cell. The Road Safety Vision is to make road transport efficient, safe, and sustainable, with a goal to reduce road fatalities by half compared to the 2010 figures. Road safety efforts are aligned with the ***"National Road Safety Policy,"*** while NHAI's specific commitment is reflected in the implementation of the Road Safety Action Plan.

Adoption of LiFE Framework

> This word is LiFE, which means *'Lifestyle for Environment.'* Today, there is a need for all of us to come together and take Lifestyle for Environment forward as a campaign. This can become a mass movement towards an environmentally conscious lifestyle.

HON'BLE PRIME MINISTER SHRI NARENDRA MODI
at COP 26

Figure 28: Hon'ble PM Shri Narendra Modi inspecting Dwarka Expressway

Figure 29: Delhi-Dehradun Economic Corridor

The Mission LiFE is a ground-breaking initiative launched by Government of India to promote sustainable living and environmentally responsible practices at both individual and community levels. Rooted in the principle that small, everyday actions can collectively have a significant positive impact on the environment, the mission encourages people to adopt eco-friendly habits, reduce waste, conserve resources, and minimise their carbon footprints. Launched by Hon'ble Prime Minister Shri Narendra Modi, LiFE aligns with global climate goals and supports India's broader vision of sustainable development, emphasising the importance of mindful consumption, renewable energy, and environmental conservation. The mission is also designed to complement existing national efforts like the *Swachh Bharat Abhiyan* and the *National Clean Energy Policy,* positioning India as a leader in the global fight against climate change.

The framework focused on elements which are being followed by NHAI during project conceptualisation and implementation. The components being:

Creating mass movement to trigger simple actions that everyone across the world can take to protect the environment. NHAI follows similar approach for behaviour change campaigns on environment protection, promotion of circular economy and road safety

Encouragement to ***"Responsible Production and Consumption"*** (SDG12) which is also one of the vital pillars of NHAI road construction activities.


L&T 752
GOODS CARRIER
RAM BHAJO GONS TRUGTION GO

PATHWAYS TO SUSTAINABLE PROGRESS

- Paving the Way
- Partnering for a Greener Tomorrow

Paving the Way

NHAI is in the forefront of developing sustainable road infrastructure that incorporates environmental responsibility into the rapid expansion of the nation's highway network, allowing for interstate travel and cross-country cargo movement. These roads run across the country, connecting national and state capitals, key ports, and rail junctions, as well as extending to the borders and linking to the international routes. The primary objective is to ensure that projects provide safe, accessible, and eco-friendly transportation solutions and promote clean, green mobility across the country.

By adhering to national regulatory frameworks and international best practices, NHAI aims to transform India into a nation where road infrastructure development is aligned with environmental conservation. The organisation implements a range of environmentally conscious practices, including using recycled materials, solar energy, and water harvesting systems in its projects. Additionally, NHAI focuses on biodiversity conservation and the well-being of local communities, ensuring that road development positively impacts both the environment and society. The creation of eco-friendly highways, ropeways, and multimodal logistics parks further demonstrates NHAI's commitment to long-term sustainability while addressing the nation's growing infrastructure needs.

Pathway to Progress

NHAI's journey toward becoming a leader in sustainability took a transformative step in 2015 with the introduction of the Green Highways (Plantations, Transplantations, Beautification, and Maintenance) Policy by the MoRTH. This marked a structured approach to mitigating environmental impacts like deforestation, biodiversity loss, and increased greenhouse gas emissions caused by highway construction. To institutionalise these efforts, the Environment & Green Highways Division (Env. & GHD) was established, tasked with planning, implementing, and monitoring plantation activities along national highways and ensuring a holistic approach to environmental conservation.

The Green Highways Policy framework has driven significant progress in the development of roadside plantations, bringing numerous environmental and socio-economic benefits. These plantations help reduce air and noise pollution while enhancing soil stability by preventing erosion. Moreover, they play a crucial role in carbon sequestration, which significantly reduces greenhouse gas emissions—an essential contribution to India's Nationally Determined Contributions (NDCs) commitments made at COP26, aiming to reduce Emissions Intensity of its GDP by 45 percent by 2030, from 2005 level and to create an additional carbon sink of 2.5 to 3 billion tonnes of CO_2 equivalent through additional forest and tree cover by 2030.

The plantations also support biodiversity, offering habitats for birds and other wildlife, while improving microclimatic conditions along highways. Enhanced air and soil quality, moderated temperatures, and increased biodiversity along the roadways contribute to a healthier environment for ecosystems and local communities. The Green Corridors created under the policy provide shade for travellers, reduce air, and noise pollution, and assist in groundwater recharge, which is critical for regions facing water scarcity. These green belts improve local environmental conditions, purify the air, and mitigate

the adverse effects of vehicular emissions, ultimately improving the health and well-being of citizens living along highways.

Social benefits are also significant. By engaging local communities in the plantation process, the policy creates employment opportunities, fostering socio-economic development. This initiative also promotes sustainable growth by encouraging the use of best practices and green technologies, such as recycled materials and renewable energy in highway construction.

Decongesting Delhi

Ministry of Road Transport and Highways (MoRTH) and National Highways Authority of India (NHAI)has undertaken several key projects to advance its sustainability goals. For example, several initiatives have been taken up which includes comprehensive exercise of widening, upgradation and development of the arterial NH network for decongestion and the reduction of vehicular pollution in the NCR, thus saving fuel, time and reducing carbon-energy footprints. Solar energy plays a significant role, with 8 solar power plants generating a total capacity of 4,000 kilowatts along a 135-kilometre stretch passing through Delhi NCR. To improve green cover, 2.5 lakh trees as Avenue plantations and 87,000 trees as Median plantations have been planted the along the Eastern Peripheral Expressway, supported by drip irrigation systems for efficient water use. Furthermore, rainwater harvesting systems have been installed every 500 metres, and 95,49,212 MT of fly ash has been utilised, further promoting eco-friendly construction practices.

NHAI is committed to balance rapid infrastructure development with environmental responsibility, with the aim of positioning NHAI as a leader in sustainable highway development in India. Through collaboration with farmers, NGOs, the private sector, government agencies, and local communities, NHAI continues to align economic growth with environmental preservation, ensuring that India's infrastructure development is sustainable, eco-friendly, and inclusive.

Partnering for a Greener Tomorrow

NHAI has partnered with several government backed entities to deliver services in a seamless and efficient manner. The current MoUs include:

Digital India Corporation
NHAI Chairman, Shri Santosh Kumar Yadav signed an MoU with Digital India Corporation to develop and maintain Data Lake 3.0 - NHAI's unique Artificial Intelligence-powered BigData Analytics cloud-based platform.

National Remote Sensing Centre (NRSC):
NHAI has signed a three-year Memorandum of Understanding (MoU) with the National Remote Sensing Centre (NRSC), a division of ISRO, to create a *"Green Cover Index"* for India's National Highways network.

Geological Survey of India (GSI)
NHAI has entered an MoU with the Geological Survey of India (GSI) for geotechnical consultancy services for National Highways

Partnering for a Greener Tomorrow

Delhi Metro Rail Corporation (DMRC)
NHAI has partnered with the Delhi Metro Rail Corporation (DMRC) to improve the design and safety of structures on National Highways

Indraprastha Institute of Information Technology (IIIT)
NHAI has partnered with Indraprastha Institute of Information Technology (IIIT) Delhi, a technical university under the Government of NCT, to enhance road safety using Artificial Intelligence (AI).

Delta Bulk Shipping India Pvt Ltd.
NHAI signs an MoU with Delta Bulk Shipping India Pvt. Ltd for developing MMLP in Nagpur. The signing took place in the presence of NHAI Chairman Shri Santosh Kumar Yadav, and other senior officials

NATIONAL REMOTE SENSING CENTRE (NRSC):

NHAI has signed a three-year MoU with the NRSC, a division of ISRO, to create a *"Green Cover Index"* for India's National Highways network. NRSC will use high-resolution satellite imagery to estimate the green cover along highways across India, offering a comprehensive, cost-effective solution that saves time. This initiative enables NHAI to identify regions that lack adequate green cover and take targeted actions to address these gaps. The first cycle of the project will provide region-wise estimates, while subsequent cycles will monitor green cover growth over time using scientific techniques. By estimating green cover for every 1 km of highway, granular metrics can be generated, which will support NHAI in ranking and comparing highways for timely interventions. This project highlights NHAI's commitment to environmental sustainability and the green transformation of India's highways.

Figure 30: MoU with NRSC for Development and Reporting of Green Cover Index

DELHI METRO RAIL CORPORATION (DMRC):

Figure 31: MoU with DMRC to strengthen design & construction of bridges and other structures.

NHAI has partnered with the DMRC to improve the design and safety of structures on National Highways. DMRC will review the designs of bridges and other structures in ongoing projects, as well as randomly selected bridges, tunnels, and reinforced earth (RE) walls. The collaboration also includes reviewing methodologies used in construction, such as pre-stressing, lifting, and launching methods for specialised structures. Additionally, DMRC will assist NHAI in the review of Detailed Project Reports (DPRs) for standalone bridges and special structures. As part of capacity-building efforts, DMRC will conduct customised training programs for NHAI officials, covering various aspects of design, construction, supervision, maintenance, and safety in elevated structures and bridges. This partnership aims to strengthen the quality, safety, and technical expertise in the infrastructure projects.

GEOLOGICAL SURVEY OF INDIA (GSI)

NHAI has entered into an MoU with the GSI for geotechnical consultancy services for National Highways. GSI will provide site-specific geological maps, conduct slope stability studies, and identify geologically weak zones along highway stretches. They will also recommend site-specific remedial measures, perform three-dimensional (3-D) geological logging of tunnels, and suggest stabilisation techniques. In addition, GSI will review and analyse DPRs prepared by NHAI consultants. This collaboration between NHAI and GSI aims to improve the structural integrity and safety of highway projects, ensuring smoother operations, better maintenance, and a more seamless travel experience for highway users.

Figure 32: MoU with the GSI for geotechnical consultancy services for National Highways

INDRAPRASTHA INSTITUTE OF INFORMATION TECHNOLOGY (IIIT)

NHAI has partnered with IIIT Delhi, a technical university under the Government of NCT, to enhance road safety through the use of AI. As part of this agreement, IIIT Delhi will conduct surveys to collect imagery and data on road signs along approximately 25,000 km of National Highways. Using AI technology, the institute will classify and identify gaps between the current state of road signage and the standards required by the approved road signage plan and Codal Provisions for high-speed corridors. This gap analysis will help NHAI address any discrepancies, improving signage quality and contributing to safer highways. By leveraging AI and Geographic Information Systems (GIS), this initiative reflects NHAI's commitment to adopting innovative technologies to enhance road safety across the country.

Figure 33: MoU with IIIT Delhi to enhance road safety with Artificial Intelligence (AI)

M/S DELTABULK SHIPPING INDIA PVT. LTD.

The National Highways Authority of India (NHAI) has signed an agreement with M/S. DC Multi Modal Park (Nagpur) Limited, a special purpose vehicle (SPV) of M/S. DeltaBulk Shipping India Pvt. Ltd., for the development of a MMLP in Nagpur. This project, covering 150 acres and costing an estimated Rs. 673 crores, will be the first MMLP in Maharashtra under the PM Gati Shakti National Master Plan, marking a significant milestone in India's infrastructure development.

The MMLP will be developed in three phases, with Phase-I involving an investment of Rs. 137 crore and expected to be completed within two years. The Park will handle approximately 9.47 million metric tonnes (MMT) of cargo over a 45-year period, significantly boosting industrial zones in Nagpur, Wardha, Chandrapur, and Gondiya, while creating numerous employment opportunities and driving economic growth in the region. Strategically located in Sindi, Wardha district, near a railway station, the site is about 3 km from the Nagpur – Mumbai Maha-Samruddhi Mahamarg and the Howrah – Nagpur – Mumbai rail line, with a 3 km rail siding from Sindi Railway station is nearing completion. The Park will also have access to the four-lane Nagpur – Aurangabad NH 361 and is located 48 km from Nagpur International Airport and 56 km from Nagpur railway station.

A government SPV, Nagpur MMLP Pvt. Ltd., has been formed between National Highways Logistics Management Limited (NHLML), a wholly owned subsidiary of NHAI, and Jawaharlal Nehru Port Authority (JNPA). JNPA has provided the land for the MMLP, while NHLML is responsible for external rail and road connectivity, as well as water and power supply. The MMLP will offer a range of facilities including warehouses, cold storages, intermodal transfer points, container terminal handling, bulk/break-bulk cargo terminals, and value-added services such as sorting, grading, aggregation, bonded warehouses, and customs facilities. It will also support logistics operations with offices for freight forwarders, transporters, and truck terminals. The development of the MMLP is a key initiative by the Government of India to enhance the country's freight logistics sector, aiming to enable efficient inter-modal freight movement, reduce overall freight costs and time, provide efficient warehousing, and improve the tracking and traceability of consignments, thereby boosting the efficiency of the Indian logistics sector.

Figure 34: MoU with M/S. DeltaBulk Shipping India Pvt. Ltd

DIGITAL INDIA CORPORATION (DIC)

NHAI Chairman, Shri Santosh Kumar Yadav, and Shri Akash Tripathi, Chairman and Managing Director of Digital India Corporation, signed a Memorandum of Understanding (MoU) to develop and maintain DataLake 3.0, NHAI's innovative AI-powered Big Data Analytics cloud-based platform. This platform aims to transform NHAI's project management workflow from manual processes to an online portal-based system, enhancing efficiency and transparency. NHAI and Digital India Corporation senior officials were also present at the signing ceremony.

DataLake 3.0 will leverage advanced analytics to forecast delays, predict disputes, and provide timely alerts, thereby expediting decision-making and reducing the likelihood of litigation. The platform will store all project documentation and correspondences in digital format, linked with GIS tagging and unique project IDs, ensuring easy retrieval from any location. This initiative is part of NHAI's broader efforts to become fully digital and improve the efficiency of India's logistics sector.

Figure 35: MoU between NHAI and DIC

ECO-FRIENDLY HIGHWAYS: NHAI's JOURNEY TOWARDS SUSTAINABILITY

CONTRIBUTION TO UN SDGs

- Input Materials
- R&D Projects
- Sustainable Supply Chain

MATERIAL ISSUES

- Recycling and Reuse
- Labour Management
- Corporate Governance
- Training & Capacity Building

HIGHLIGHTS

During FY 2023-24, the construction reached **6,634 km,** which is a **20%** increase from the previous year.

During **FY 2023–24,** NHAI employees participated in the training programmes conducted by the Indian Academy of Highway Engineers (IAHE), including a **16-week** foundation training programme specifically designed for Deputy Managers.

Total **631.92 lakh MT** of recycled materials used in **FY 2023-24.**

IN THIS SECTION:

Construction & projects activities

Input materials

Research & development.

Sustainable supply chain

India's National Highways span 1,46,145 km and serve to link people, communities, and regional economies across the country. Through the NHDP, the Government of India aims to expand and enhance the national highway (NH) network, with considerable progress highlighted in 2024 as compared to a base year of 2014.

NH network increased by 60% to 1,46,145 km, in the year 2024.

During FY 2023-24, the highway construction by NHAI has increased by 20% from the previous year.

During FY 2023-24, the highway construction reached 6,634 km, a 20% increase over the previous year. This is a testament to NHAI's continuous contribution to the national highway construction and alignment with MoRTH's objective of achieving enhanced connectivity and quick mobility.

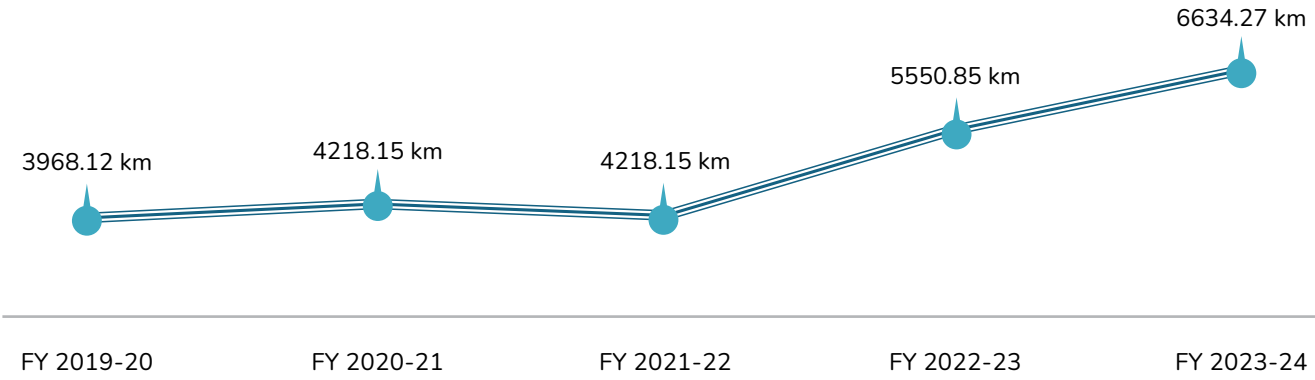


Figure 36: Length of National Highways Constructed across the years.

The MoRTH has prioritised the construction of the NH network, notably in India's north-eastern region, allocating 10% of its budget to this effort. There are 65 projects underway in Assam, 46 in Manipur, 36 in Nagaland, and 32 in Mizoram, followed by projects in Arunachal Pradesh, Meghalaya, Tripura, and Sikkim. Out of this NHAI's jurisdiction is around 1000 Km in which there are 3 ongoing projects.

In addition to the expansion of the NH network, the financial authority for constructing Pedestrian Underpasses (PUPs) and Pedestrian Subways (PSWs) has been delegated to ROs, allowing for funding of up to ₹25 crore. Additionally, they can approve up to ₹1.25 crore for Foot Over Bridges (FOBs) to expedite the process.

Figure 37: Delhi-Katra Expressway

Figure 38: Eight lane bridge over River Narmada

The Eight Lane Extra Dosed Cable Stayed Bridge over the River Narmada is a pioneering structure in India, spanning 2.2 kilometres. This iconic bridge features six spans of 120 metres each, providing both navigational clearance and aesthetic appeal. The construction of this massive structure required over 168,000 cubic metres of concrete, 19,335 metric tonnes of structural steel, 3,032 metric tonnes of high-tensile strands, and 710 metric tonnes of extra-dosed cables, which were imported from Germany.

Training and Development for Engineers

NHAI has ensured trainings of its employees through IAHE and other mechanisms providing training for highway engineers, including new hires, senior and middle-level engineers, and engineers from other nations, as supported by the Ministry of External Affairs. These options include technical and managerial development courses focusing on emerging highway trends and topics such as road safety, planning, design, and construction. During 2023–24, NHAI employees participated in the training programmes conducted by the Indian Academy of Highway Engineers (IAHE), including a 16-week foundation training programme specifically designed for Deputy Managers.

To ensure the continuous expansion and growth of the NH network, standardised practices in design, construction, and maintenance—while taking into account variations in terrain, soil, and climate—are critical for the efficient and cost-effective development of highway facilities, including rural roads. This is supported by the significant contribution from IRC, the apex body of highway engineers in India, responsible for preparing and revising standards, specifications, codes of practice, guidelines, and manuals related to various aspects of road, bridge, and traffic engineering.

Figure 39: Median plantation

Figure 40: Median plantation

USE OF INPUT MATERIALS

NHAI projects adhere to the *'Quality First'* philosophy, which ensures the application of quality assurance and quality control measures in highway construction projects. The MoRTH also places a strong emphasis on the use of innovative and alternative materials during construction, with the release of essential guidelines to promote the use of new technology. This is shown by the use of high-tech materials like *Ultra-High Performance Fibre Reinforced Concrete (UHPFRC)* in long-span bridges and precast concrete parts in bridges and other structures that are still being built. The tables below summarise the various input materials used by NHAI during the previous three reporting years.

Table 10 Usage of Input Materials

Parameter (Solid)	Unit of Measurement	FY 2021-22	FY 2022-23	FY 2023-24
Glass	Metric tonne (MT)	42,241	37,530	1,13,808
Steel	Metric tonne (MT)	10,58,360	19,88,515	26,29,920
Aggregates	Metric tonne (MT)	6,31,87,952	7,90,74,036	10,26,52,211
Sand	Cubic metre (m^3)	45,44,18,887	3,04,55,605	2,08,48,743
Stone dust	Cubic metre (m^3)	3,59,96,236	6,38,80,836	34,69,55,498
Soil	Metric tonne (MT)	17,08,71,889	24,12,30,652	33,35,39,097
Plastic	Metric tonne (MT)	27,567	1,06,192	12,70,826
Procured DCP Powder for firefighting	Kilogram	9,131	18,521	15,070

Parameter (Liquid)	Unit of Measurement	FY 2021-22	FY 2022-23	FY 2023-24
Procured Oil/Lubricant	Litres	5,07,12,390	13,95,13,316	23,67,68,086
Procured-Foam for firefighting	Litres	7,39,365	37,39,483	18,52,718

As an organisation primarily involved in highway construction, the nature of NHAI operations does not involve packaged goods or packaging materials. Thus, the product and packaging reclamation is not applicable to the organisation. However, NHAI remains committed to material efficiency and environmental stewardship by resource optimisation and recycling of construction materials where feasible (e.g., reclaimed asphalt pavement or recycled aggregates).

RESEARCH & DEVELOPMENT (R&D) PROJECTS

NHAI is committed to incorporating the results of significant R&D projects into the standards and specifications used for highway planning, design, construction, operation, and maintenance. The emphasis remains on critical areas such as cost optimisation, timely delivery, increased durability, safety, and sustainability. Several studies are financed through collaborations with academic institutions, and findings are published through IRC journals and incorporated into regulations, guidelines, manuals, and circulars produced by the Ministry.

MoRTH R&D Projects with a focus on Sustainability

- *"Development of Green and Sustainable Bio-Bitumen"* by IIT Roorkee.
- *"Utilisation of Waste Plastic in Bituminous Mixes (Wet Process)"* by Indian Institute of Technology (IIT), BHU, MoRTH Chair Professor.

India's First National Highway NH-66 (Mumbai-Goa) Steel Slag Road Section

(a) Laying of Steel Slag Bituminous Mix

(b) Plate Load Test

(c) Aerial View of Steel Slag Road Section NH-66

(d) Heavy Weight Deflectometer Test

India's first National Highway Steel Slag Road Section is developed on NH-66 (Mumbai Goa National Highway). Around 80,000 tonnes of Conarc Steel Slag have been converted to processed steel slag aggregates at the JSW Steel Dolvi, Raigad plant under the technological guidance of CSIR-CRRI. Processed steel slag aggregates are utilised as 100 % substitutes for natural aggregates in all layers of both roads, i.e., concrete roads and bituminous road sections. This 1 km long steel slag road is subjected to heavy commercial traffic of 75 MSA. These processed steel slag aggregates are found superior to natural aggregates in terms of various mechanical properties and utilised for steel slag road construction in all layers of the road. This road is having a bituminous and cement concrete steel slag road section at the same location in RHS and LHS carriageways. On this road section processed steel slag aggregates and slag cement are utilised for construction of the cement concrete road in all layers. Steel Slag Road is built with 28 % reduced thickness in comparison to conventional bituminous roads under 13 MSA higher traffic conditions.

(e) Solar power plants on Eastern Peripheral Expressway with a capacity of 4000 KW

(f) Use of Fly ash and earth work after water sprinkling to control of dust and air pollution

(g) Construction of embankment using Fly Ash

Eastern Peripheral Expressway utilised about 1.2 cr. cum. of fly-ash generated from nearby thermal plants of Dadri, Badarpur, Pali and Panipat.

Sustainable Supply Chain

NHAI acknowledges the need to create a sustainable supply chain by digitising processes, using recycled materials, and developing connections with responsible suppliers. FASTag fee collection is an excellent example of sustainable highway management, as it reduces wait times and consumption of fuel for cars at toll plazas. As of FY 2023-24, banks issued over 8.81 crore FASTags, resulting in an average daily collection of INR 190.68 crore and a 98.5% penetration in total fee collection.

The NHAI has integrated circularity principles into highway construction by using recycled input materials such as fly ash, recovered glass aggregate, and recycled concrete aggregates. The table below depicts the quantity of recycled input material used during the previous three reporting years:

Table 11 Recycled Input Materials Used (MT)

Input material	FY 21-22	FY 22-23	FY 23-24
Total Ash used	5,57,57,822	4,41,97,857	6,13,49,631
Fly Ash	*1,31,44,490*	*1,11,03,377*	*95,49,212*
Pond Ash	*4,26,13,332*	*3,30,94,480*	*5,18,00,418*
Plastic	13,914	78,972	6,159
Reclaimed Asphalt Pavement (RAP)	3,44,759	10,78,711	8,34,317
Recycled Aggregates (RA)	1,63,360	7,73,931	10,02,162
Total Recycled materials used	**5,62,79,855**	**4,61,29,470**	**6,31,92,269**

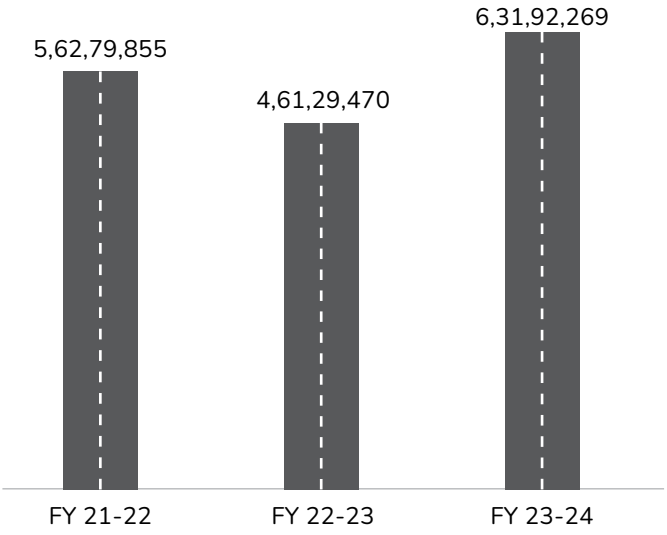


Figure 41: Recycled Input Materials (in MT)

As it can be seen from the table above, NHAI is continually increasing the usage of recycled materials in their operations.

NHAI has collaborated with regional suppliers for the procurement of the materials. Sourcing materials locally lowers transportation costs and delivery times, increases project efficiency, and contributes to overall goals. It also strengthens links with local businesses, which benefits the community's economy and promotes sustainable practices. Furthermore, given the importance of social responsibility and the repercussions of non-compliance across the supply chain, NHAI ensures that suppliers understand these requirements as well. NHAI ensures the safeguarding of human rights in its supply chain with due emphasis on worker health and safety.

SUPPLIER ENVIRONMENTAL AND SOCIAL ASSESSMENT

NHAI onboards all its suppliers (new and existing) following the directions of Government of India, under Public Procurement (Preference to Make in India) Order 2017 with latest amendments and adheres to all the requirements including child labour and minimum wage. NHAI includes contractual clauses that require adherence to national labour standards, occupational health and safety norms, and welfare provisions. All new and existing contractors and concessionaires undergo due diligence as per government bidding norms which include screening for social compliance. These are in line with the requirements of the Ministry of Labour and Employment and relevant state authorities.

NEW TECHNOLOGIES IMPLEMENTED BY NHAI.

Modern highway construction integrates a variety of advanced materials and methods to improve longevity, strength, and sustainability. Several key technologies have been implemented by NHAI in highway construction and maintenance:

Bonded rigid pavements allow for the load distribution is through monolithic behaviour of Pavement Quality Concrete (PQC) & Dry Lean Concrete (DLC) base which are bonded together by mechanical means, thus economise the PQC thickness compared to conventional rigid pavement.

Short panel concrete pavements utilise smaller slabs to enhance load transfer and reduce cracks. The smaller slabs decrease the fatigue damage, thus lower the PQC slab thickness however increases the joint cutting.

Use of **Geogrid** in reinforcing the granular layers increases the load transfer efficiency and structural stability of the **geogrid reinforced pavement,** which leads to optimisation of the overall pavement crust.

Slope stabilisation using geogrids or soil nailing increase structural stability, particularly on weak subgrades or hilly terrains where there is RoW constraint, non-availability of good material. **Soil stabilisation** using lime or cement improves the strength of poor soils.

Precast concrete elements accelerate construction and improve quality, while **GFRP rebars** offer corrosion resistance in concrete, easy handling of the reinforcement (as compared to conventional steel).

Intelligent machine-aided construction uses automation, GPS, and sensors to improve precision, quality, and monitoring across construction stages.

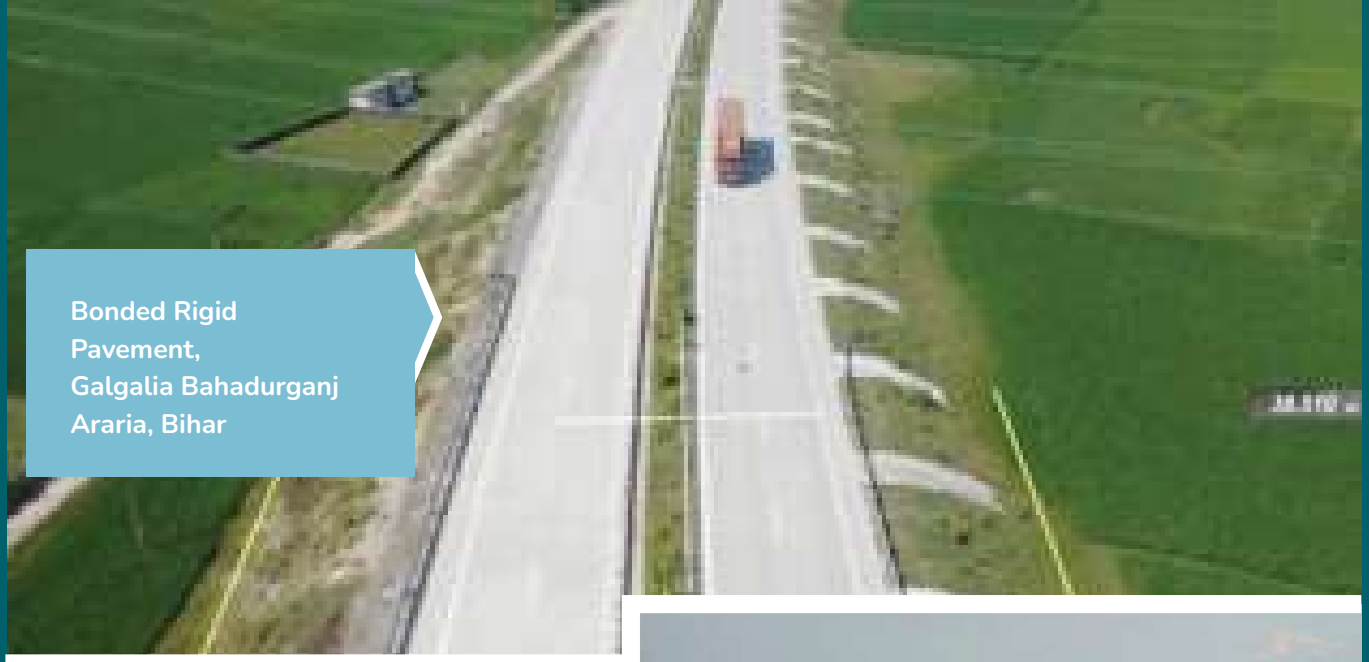
Molasses, as a bio-additive in bituminous concrete (BC), provides the alternative to partially replace dependency on the imported bitumen and utilising the waste material.

Use of **high RAP (Reclaimed Asphalt Pavement) at 60% in hot in-plant recycling** supports cost-effective and eco-friendly method towards sustainability in pavement rehabilitation.

Cement-treated base (CTB) and **sub-base (CTSB)** layers boost structural capacity and reduce deformation thus optimising the pavement crust. **Perpetual pavements** are multi-layered systems designed for long-term durability, needing only surface renewal.

Figure 42: Laying of Bituminous Concrete

Modified bitumen, fiber-reinforced micro surfacing, and **stone matrix asphalt (SMA)** provide enhanced flexibility, durability, and rut resistance in surface layers.

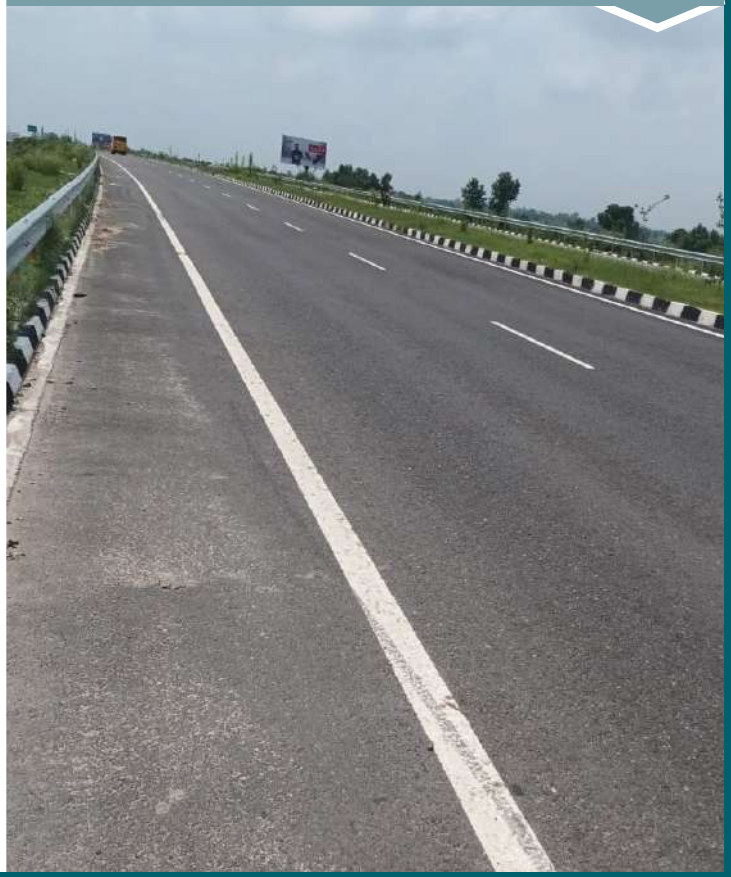


Bonded Rigid Pavement,
Galgalia Bahadurganj
Araria, Bihar

Geogrid Reinforced Pavement, multiple projects in the States of Uttar Pradesh, Maharashtra, Andhra Pradesh, Punjab, Gujarat

Short Panel Concrete Pavement (as trial) in Bilaspur- Urga Package 1, Chhattisgarh

Use of Molasses in BC Layer (as trial) for construction of Shamli to Muzaffarnagar in Uttar Pradesh



Use of Cement Treated Sub-base in multiple projects of Rajasthan, Maharashtra, Punjab, Uttar Pradesh, Bihar

Use of Cement Treated Base in construction of Chhapra to Muzaffarpur in Bihar

Use of GFRP as distribution bar and dowel bar in Projects of Uttar Pradesh, Bihar, Gujarat, Maharashtra,Rajasthan

Slope Stabilisation using Geogrid / Soil Nailing, PAN India

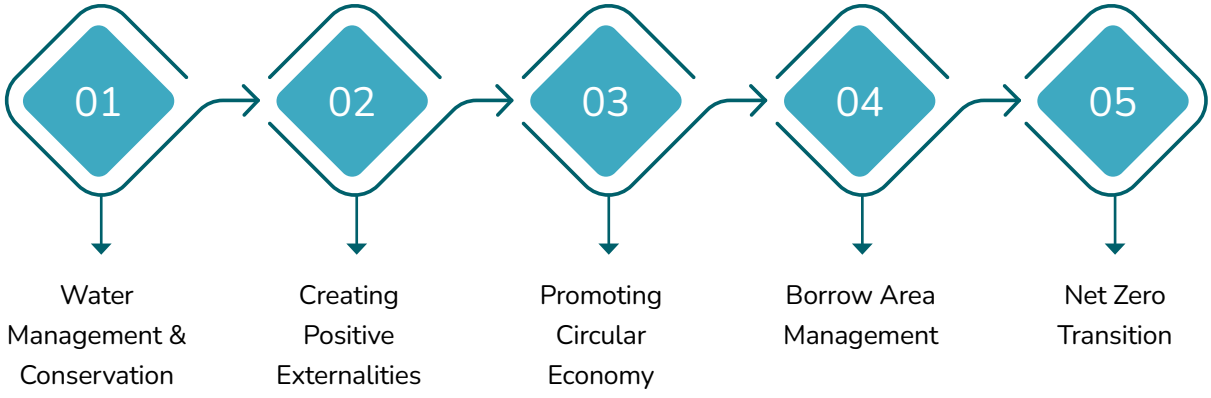
Intelligent Machine Aided Highway Construction of Galgalia Bahadurganj Araria in Bihar

NHAI'S LONGSTANDING COMMITMENT TO SUSTAINABILITY AND CIRCULARITY

- Water Management & Conservation
- Promoting Circular Economy
- Borrow Area Management
- Net Zero Transition

For decades, NHAI has been implementing strategies to lower its environmental footprint and carbon emissions, boost its use of renewable energy, promote circular economy initiatives, and sustainable water management approaches. By investing in environmentally friendly materials and technology, NHAI has established industry standards for green innovation.

NHAI aims at strengthening the commitment to sustainability internally as well as it also inspires consumers, workers, and stakeholders to incorporate sustainability into their own activities. NHAI has continually embedded sustainability in its operations, through its focus on the following key thematic areas:



WATER MANAGEMENT & CONSERVATION

Water Harvesting and Conservation

Rainwater harvesting has been pursued in all NHAI projects as directed in the MoRTH's Standard Operating Procedure dated 03.09.2019, for Rainwater Harvesting and Artificial Recharge along National Highways and IRC: SP:50-2013 Guidelines on Urban Drainage and IRC: SP:42-2014 Guidelines on Road Drainage.

Development of Amrit Sarovar

Mission Amrit Sarovar is based on "Whole of Government" approach with the participation from several ministries including MoRTH and organisations such as NHAI where new water bodies are created and old water bodies are rejuvenated to conserve water for the future. The earth available from the development of such water bodies is to be utilised for road works and plantations as per the suitability of the soil. The state authorities have already been advised not to levy any royalty for burrowing of earth for development of water bodies under the Amrit Sarovar Programme, as such an action would serve as a major milestone in the conservation of water resources and improvement of the microclimate of such areas. It also augments water availability, especially in water-stressed areas of the country, besides improving rural livelihoods and productivity. This pro-poor and environmentally friendly endeavour is aimed toward augmenting the water regime in the country by ensuring the flow of a number of *'ecosystem services'* for society in the course of development.

The development of Amrit Sarovar is aligned with the IRC Guidelines and statutory regulations of the Ministry

of Water Resources by way of its documentation, measurement, verification, and uploading to the NHAI Data Lake portal. Furthermore, NHAI aims to harness the green credits according to Ministry of Environment, Forest & Climate Change (MoEFCC) Notification No. S.O. 4458 (E) dated 12.10.2023, as well as carbon credits from the United Nations Framework Convention on Climate Change (UNFCCC) and the European Protocol.

Figure 43: Amrit Sarovar-Thirupalai Lake, Tamil Nadu

CREATING POSITIVE EXTERNALITY- GREENING OF HIGHWAYS

Roadside Avenue & Median Plantations on Highways:

The Green Highways (Plantation, Transplantation, Beautification and Maintenance) Policy, 2015 and the *IRC-SP: 21-2009* guide NHAI with respect to plantations in avenues and medians of all National Highways. Specific guidance on the selection of species and the spacing between the plants and rows, survival of the plantation and other critical criteria for implementation of green highways is given in IRC-SP:21-2009. The Green Highways Division of NHAI aims to create positive externalities through proper landscaping and horticulture efforts at intersections and near urban areas through such projects.

NHAI ensures the success and survival of its plantation endeavours by way of robust planning with a long-term horizon, effective Monitoring and Evaluation (M&E) Protocol and documentation etc. to harness Green Credits.

The Concessionaires/Contractors are accountable for the success of plantation if it is part of their contract. Plantation in Contract Agreement should be in enforceable schedule with item wise details of cost. NHAI ensures strict adherence to NHAI/Policy Guidelines/Environment/2022 Policy Circular No. 7.4.7/2022 dated 12-07-2022 w.r.t. prescriptions in Schedule-C and Schedule-D of RFP and CA and corrigendum circular number 7.4.8/2022 dated 06-10-2022.

NHAI creates positive externality through proper landscaping/beautification through horticulture efforts especially at junctions/inter-sections/near urban areas. Furthermore, NHAI encourages plantation of species which encourage rural livelihoods, ecological services, and economic usufructs. Bamboo plantations are promoted as per the Policy Circular No. 7.4.11/2023 dated 03-07-2023 for exploring use of Bamboo Crash barriers for reducing carbon footprints.

Figure 44: Use of Bamboo as Crash Barrier

PROMOTING CIRCULAR ECONOMY

NHAI's long-term vision includes building a circular economy by reusing and recycling materials and targeting sustainable resource utilization. NHAI has integrated the 3R Principle—*Reduce, Reuse, and Recycle*—through various initiatives, like the use of alternate materials, inert waste, and recycling methods in the design and construction phases. Some of the key initiatives are highlighted below:

Use of Alternate Materials

Alternate materials, such as modified waste from various development processes, are used in road construction. MoRTH has issued instructions and amended IRC guidelines from time to time so that the alternate materials and technologies are used in road construction for environmental conservation and sustainability. NHAI has issued Policy Circular No. 13.24/2022, dated 02 June 2022, mandating the extensive use of these alternate materials and technologies in road construction to optimise time and cost savings. IRC guidelines are available for the use of alternate materials and technology such as cement-treated base (CTB), cement-treated sub-base (CTSB), geo-synthetics, recycling, modified bitumen (CRMB, polymer-modified, natural rubber), soil stabilisation, etc. in highway construction.

01 Cement Treated Granular Layer

02 Geo-synthetic

03 Recycling of Bituminous Pavements

04 Modified Bitumen

05 Soil stabiliser

06 Stone Matrix Asphalt

07 Fiber Reinforced Concrete Pavements

Table 12 IRC Codes for the use of alternate materials and technology in road construction

S.No.	Material/Technology	IRC Codes
1	Cement Treated Granular Layer	• IRC: SP: 37-2018 Guidelines for Design of Flexible Pavements.
2	Geo synthetic	• IRC: SP: 106-2015 Engineering Guidelines on Landslide Mitigation Measures for India Roads. • IRC: SP:59-2019 Guidelines for Use of Geosynthetics in Road Pavements & Associated Works. • IRC: SP: 48-2023 Hill Road Manual • IRC: SP: 56-2011 Recommended Practices for Treatment of Embankment & Road Slopes for Erosion Control. • IRC: SP: 113-2013 Guidelines for the Design & Construction of Geosynthetic Reinforced Embankments on Soft Subsoils.
3	Recycling	• IRC: SP: 120-2015 Recommended Practice for Recycling of Bituminous Pavements
4	Modified Bitumen	• IRC: SP: 53-2010 Guidelines on Use of Modified Bitumen in Road Construction • IRC: SP: 107-2013 Specification for Bitumen Mastic Wearing Courses
5	Soil Stabilizer	• IRC: SP: 89- (Part II)-2018 Guidelines for the Design of Stabilised Pavements. • IRC: SP: 089-1-2010 Guidelines for Soil & Granular Material Stabilisation Using Cement, Lime & Fly-ash.
6	Stone Matrix Asphalt	• IRC: SP: 79-2023 Specifications for Stone Matrix Asphalt
7	Fiber Reinforced Concrete Pavements	• IRC: SP: 46-2013 Guidelines for Design & Construction of Fibre Reinforced Concrete Pavements

Use of Fly-Ash

NHAI has promoted the use of fly-ash in road laying, road and flyover embankments, shoreline protection measures, low-lying areas of approved projects, backfilling of mines and as an alternative for filling of earthen materials, thus complying to the circular of MoRTH vide date 27 August 2018, and 23 October 2020, on use of Fly-ash in road/flyover embankment construction on NH works. This is also aligned to the Government of India gazette notification on Fly Ash vide dated: 31 December 2021 and subsequent amendment notifications. The principal notification was issued on 14 September 1999, which was subsequently amended vide notifications dated 27 August 2003, 03 November 2009, 25 January 2016, and 31 December 2021. As per these notifications of the MoEFCC, it is mandatory to use fly-ash in the construction of road or flyover embankments within a radius of 300 km of a thermal power plant.

Over time, NHAI has increased the usage of fly ash in its construction projects, demonstrating its commitment to environmental protection through pollution reduction. For this purpose, the organisation has been following the guidelines specified in IRC: SP: 58-2001 *"Guidelines for use of Fly-ash in Road Embankments"* and utilisation as per IRC guidelines IRC SP 44, IRC 58 on the physical and chemical properties of fly-ash and the design methodology to be adopted for embankment construction .

Use of Plastic Waste

Concerns about plastic waste generation and its impact on the environment have been taken seriously by NHAI, which has engineered a strategy to use it as a raw material for road construction following the IRC guidelines for the Use of Waste Plastic in Hot Bituminous Mixes (Dry Process) in Wearing Courses *(IRC: SP:98-2013).*

It is estimated that the construction of 1km of highway using plastic waste would help eliminate 7 tonnes of plastic waste.

Use of Steel Slag

The Central Road Research Institute (CRRI) developed steel slag road technology in collaboration with the Ministry of Steel and major steel manufacturers. The technology involves processing the steel slag to remove impurities and metal content and then using it as an aggregate for road base or sub-base layers. The processed steel slag has high strength, hardness, abrasion resistance, skid resistance, and drainage capacity, making it suitable for road construction as a replacement to earthen shoulders.

Use of Construction & Demolition (C&D) Waste

NHAI uses the C&D waste generated from the construction, renovation, repair, and demolition of houses, large building structures, roads, bridges, piers etc to minimise dependency on virgin aggregate during road construction. This initiative is aligned with *IRC: SP: 121-2017 Guidelines for use of Construction and Demolition Waste* in Road Sector that prescribes for utilisation of C&D wastes. Furthermore, the NHAI complies with the Construction and Demolition Waste Management Rules, 2016 and fulfils all related duties prescribed thereunder.

Use of Material like Stones & Gravels; RBM (Riverbed Material)

NHAI employs locally sourced and sustainably sourced riverbed materials, such as sand, gravel, and rocks, in the construction of roads and associated infrastructure, including crate walls and gabion box structures, as well as flexible support systems for slope stabilization. The use of the dredged material RBM in road construction, thereby has made river basins free from over depositions and made safer from floods.

Cold Recycling Methodology

This approach involves rehabilitating pavements by reusing existing materials without application of heat, thus resulting in minimising fuel dependence and harnessing of carbon credits. The same has been narrated in *IRC: SP: 120-2015 Recommended Practice for Recycling of Bituminous Pavements.*

Use of Geo-synthetics

The use of geosynthetics made from polymeric materials in road pavements and associated works by NHAI is aligned to the *IRC: SP: 59-2019 'Guidelines for Use of Geosynthetics in Road Pavements & Associated Works'.* This document provides detailed design methodology, specifications, construction guidelines, standard testing methods, and

the handling and storage of all the geosynthetics made from polymeric materials for road pavement applications by NHAI.

Use of Jute Geotextiles (JGT)

Geotextiles such as jute geotextiles are used by NHAI on low volume rural roads, to improve engineering performance. These are embedded in soil at the interface of sub-grade and sub-base, increasing the load bearing capacity of the soil through the functions of separation, filtration, drainage, and initial reinforcement up to two season cycles. This is as per the *IRC: SP: 126-2019 'Guidelines for the Design & Construction of Low Volume Rural Roads Using Jute Geotextiles'.*

Natural Geotextiles, are made out of natural fibres like jute, coir, sisal etc. JGT is a natural Textile. The efficacy of JGT has been established through laboratory studies, extensive successful field applications and research in India and in other parts of the world. It has been observed that JGT, when applied at the interface of sub-grade and sub-base, the load bearing capacity of sub-grade soil is enhanced by the concurrent functions of separation, filtration, drainage, and initial reinforcement performed by JGT up-to one or two season cycles.

The Kerala State Government has approved dredging in Ashtamudi and Vembanad lakes to source spoil material for NH 66 development, reflecting a strategic approach to flood mitigation and infrastructure enhancement. Desilting of Basantar River, in District Samba. Union Territory of Jammu and Kashmir was conducted and around 1 lakh metric tonnes (MT) sand was excavated and used in road construction. This has also resulted in significantly reducing flood impact. Similarly, in Kathua District, desilting of the Sehar River was conducted to prevent flooding and reuse of approximately 2 lakh MT of material in highway construction.

BORROW AREA MANAGEMENT

Borrow area management practices can have an impact on the natural environment, biodiversity, and nearby communities within the designated region. The NHAI recognises its obligation to ensure that materials for highway construction are extracted safely, sustainably, and responsibly. Some of the legal or policy requirement, those are directly or indirectly aligned in respect to borrow area management are listed below:

- Clause 305.2.2.2 of MoRTH Specification for Roads and Bridge Works of IRC.
- Guidelines for EIA of Highway Projects, Indian Roads Congress, 1989: (IRC: 104-1988).
- IRC: 10-1961-Recommended Practice for Borrow Pits for Road Embankments Constructed by Manual Operations, as revised in 1989.
- IRC SP: 58-2001 Guideline for Use of Fly-ash in Road Construction.
- IRC SP: 108-2015 Guidelines for Environmental Management Plan for Highways Projects.
- EIA Guidance Manual for Highways of MoEFCC, 2010.
- MoEFCC, Fly-ash Notification dated 31.12.2021.

Documents defining borrow area management include IRC codes, MoRTH requirements and other guidelines circulated from time to time. Some significant highlights from MoRTH specification are described below:

MoRTH Specification:

- The borrow pits shall not be left in a condition likely to cause hazard to human and animal life.
- The Contractor shall seek prior approval from the concerned authorities for operating the borrow pits.
- The arrangement for the source of supply of the material for embankment and sub-grade
- Compliance to the guidelines, and environmental requirements in respect of excavation of borrow areas as stipulated by MoEFCC.
- The maximum depth in any case shall be limited to 1.5 m and pit shall be dug within the offset width of a maximum of 10 m.
- The Contractor shall also submit for approval his proposed method of erosion / sedimentation control on service road and borrow pits and his plan for disposal of waste material.

01 Contractors must ensure that they do not adversely affect stability of excavation or fills.

02 Borrow pits should not be left in conditions that hazard human and animal life.

03 Borrow pits should be dug in regular shape and in a manner to merge these with the natural ground and provided with drainage agreements.

04 Topsoil should be stripped and stacked aside and spread back on land post completion of use.

05 The use of fly-ash is promoted to reduce dependency on natural borrow soil.

06 Borrow pits should not be dug within 800m of any towns or villages.

07 Environmental Impact Assessments (EIA) should be carried out for projects to assess environmental impacts such as air and water quality, biodiversity, land use and socio-economic aspects.

08 Specification in contracts on Borrow Area Rehabilitation Plans covering measures such as community water storage facility, landscape enhancement and rehabilitation by re-vegetation are provided as compliance requirements.

NHAI ensures that following statutory requirements are met for Borrow area management practices to minimise and mitigate any adverse impact on ecology and environment.

a. **The Clause 305.2.2.2 of MoRTH Specification for Roads and Bridge Works of IRC states:** *"The arrangement of the source of supply of the material for embankment and sub-grade and compliance with the guidelines and environmental requirements, in respect of excavation and borrow areas as stipulated, from time to time by the MoEFCC, GoI and local bodies, as applicable shall be the sole responsibility of the Contractor. The contractor shall ensure that he does not adversely affect the stability of excavation or fills by the methods of stockpiling materials, use of plants or sitting of temporary buildings or structures".*

b. **The Clause No. 6.2.8.2 of Guidelines for EIA of Highway Projects, Indian Roads Congress, 1989: (IRC: 104-1988) states:** *"Borrow pits should be dug in regular shape and in a manner to merge these with the natural ground and provided with drainage arrangements."* This IRC Publication focusses on environmental aspects in highway planning and design. It emphasises. the need to consider environmental factors such as ecology, land-use, aesthetics, and social aspects in planning and design of highway projects. It provides recommendations for incorporating environmental considerations into planning and decision-making processes.

c. **IRC:10-1961-Recommended Practice for Borrow Pits for Road Embankments: Constructed by Manual Operations, as revised in 1989:** These rules are recommended for adoption on all types of roads in the country on which earthwork for road embankments is done by manual operation.

- As far as possible no borrow pits should be dug on road land.
- No borrow pits should be dug within the 5 metres of the tow of the final section of the embankment.
- Borrow pits should not be dug continuously. Ridges of not less than 8 metres width should be left at intervals not exceeding 300 metres. Small drains should be cut through the ridges, if necessary, to facilitate drainage.
- To prevent malaria, where other conditions permit, borrow pits should be well-drained. To ensure sufficient drainage, the bed level of the borrow pits

should, as far as possible, slope down progressively towards the nearest cross drain, if any and should not be lower than the bed of the cross drain.

- Borrow pits should not be dug within 0.8 km of towns or villages. If unavoidable they should not exceed 30 cm in depth and should be drained.
- To borrow earth from the temporarily acquired cultivation land, the depth of borrow pits should not exceed 45 cm. After stripping the topsoil, a further 30 cm of excavation may be possible. The topsoil should then be spread back on the land.

d. **IRC SP: 58-2001 Guideline for Use of Fly-ash in Road Construction:** Narrates use of fly ash for construction of road embankment, an environmentally preferable alternative of natural borrow soil.

e. **IRC SP: 36-2008 narrates on the selection of material to be used in construction of sub-grade and embankments** shall be made after necessary surveys and laboratory investigations.
   - The selection of material to be used in construction of sub-grade and embankments shall be made after necessary surveys and laboratory investigations.
   - The structural features and other details regarding the construction work shall be decided by the Engineer-In-charge based on the soil survey results.
   - Only approved material shall be utilised in the embankments.
   - Earth available from the road cutting and excavation, if suitable, should be used in first instance.
   - Borrow pits should be rectangular in shape with one side parallel to the centre line of the road.
   - No borrow pits should be dug within 5 m of the toe of the final section of the road embankment, after making do allowance of future development.
   - The depth of borrow pits should be so rectangular that the borrow pits do not cut an imaginary line having a slope 1V in 4H projected from the edge of the final section of the bank.
   - Borrow pits should not be dug continuously, Ridges of not less than 8m width should be left at intervals not exceeding 300 m, small drains should be cut through the ridge to facilitate drainage.
   - To prevent breeding of mosquitoes, where other conditions permit, borrow pits should be well drained.
   - To borrow earth from the temporarily acquired cultivation land, the depth of borrow pits should not exceed 1 m. The topsoil to a depth of 150 mm should be stripped and stack aside. The topsoil should then be spread back on the land.
   - In waterlogged areas where the water table is near the surface the lowering of the level of the land even by 300 mm, which will result from the practice suggested above, may make cultivation impossible. In such cases, borrow pits should take the form of deep narrow continuous ditches so as to conserve as much land as possible.
   - Borrow pits should not be dug within 800 m of towns or villages. If unavoidable they should not exceed 30 cm in depth and should be drained.

f. **IRC SP 108-2015 Guidelines for EMP for Highways Projects:** This publication provides guidelines for the preparation of EIA and EMP reports for highway projects in India. It outlines the methodology, scope, and contents of the EIA report, including baseline data collection, impact assessment, and mitigation measures. The EMP details the measures to be implemented during construction, operation, and decommissioning phases to minimise adverse environmental impacts. These contain elaborate Guidelines for Siting, Operation, and Re-development of Borrow Areas (Earth and Gravel) including Borrow Area Documentation.

g. **EIA Guidance Manual for Highways of MoEFCC, 2010:** MoEFCC Guidelines on EIA provide overarching principles and procedures for conducting environmental impact assessments for various development projects, including highway projects. These guidelines outline the regulatory framework, procedural requirements, and criteria for evaluating environmental impacts and formulating mitigation measures. Key Components of EIA and EMP Plans: The EIA and EMP plans for highway

projects include comprehensive assessments of potential environmental impacts, such as air and water quality, biodiversity, land use, noise, and socio-economic aspects. Mitigation measures are proposed to minimise adverse impacts, and monitoring and management strategies are outlined to ensure compliance with environmental regulations and standards.

h. **MoEFCC, Fly-ash Notification dated 31.12.2021:** Considering the need to conserve top soil by promoting manufacture and mandating use of ash based products and building materials in the construction sector; to conserve top soil and natural resources by promoting utilisation of ash in road laying, road and flyover embankments, shoreline protection measures, low lying areas of approved projects, backfilling of mines, as an alternative for filling of earthen materials; and to protect the environment and prevent the dumping and disposal of fly ash discharged from coal or lignite based thermal power plants on land; the Government of India introduced a comprehensive framework for ash utilisation in the 2021 notification, which includes a system of environmental compensation based on the *'polluter pays'* principle. MoRTH and NHAI are proactively complying with the provisions contained therein for road construction works.

i. **NHAI Standard Specifications in Contracts RFP, April 2021 Para: 4.11.5. Material Investigations):** Last but not the least, NHAI standard specifications in Contracts Request For Proposal (RFP), which inter-alia contains *'Borrow Area Rehabilitation Plan'* wherein indicative rehabilitation measures such as community water storage facility, pisciculture ponds, recreational spots, landscape enhancement, or rehabilitation by re-vegetation of the borrow area have been provided including 'Reporting and Compliance Requirements' through Authority/Independent Engineers and penal actions on non-compliance.

NET ZERO TRANSITION

To address climate change in road construction and align with international commitments, the 'IRC SP:122 – Guidelines on Reduction of Carbon Footprint in Road Construction Projects' were issued in 2019. NHAI continues to undertake active steps to progress on its journey towards carbon neutrality in order to align with India's national target of reaching net zero by 2070. In particular, it has implemented several initiatives to monitor and reduce the energy usage in its operations .

FASTag Implementation

NHAI, as part of the Digital India campaign, has enabled citizens to adopt FASTag services. FASTag is a device that employs Radio Frequency Identification (RFID) technology for making toll payments directly while the vehicle is in motion. It offers the convenience of cashless payment along with benefits like savings on fuel and time, as the customer does not have to stop at the toll plaza. In addition to a reduction in fuel consumption and waiting time, the convenience to commuters has increased manifold, as it has cashless transactions. It entails reduced revenue leakages and improved transparency and profitability in terms of regular roads.

Harnessing Solar Energy

In efforts to shift to green energy, NHAI signed an MoU with Energy Efficiency Services Ltd. (EESL), Joint Venture (JV) of PSU of the Ministry of Power, to conduct feasibility studies of establishment of solar power projects on:

- Vacant land parcels with NHAI
- Rooftops of NHAI buildings/toll plaza structures/other owned structures.

Data Lake Initiative

Data Lake Portal is the real time and single point of information repository for complete Project Management and Project Monitoring in the NHAI. The information and reports generated from Data Lake are used by management of NHAI, MoRTH and other agencies of Govt. of India. Through this portal, NHAI is able to hugely reduce its paperwork requirement besides increasing its functional efficiency.

Figure 45: Amritsar - Jamnagar Expressway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BLUEPRINT FOR SUSTAINABILITY: MATERIAL TOPICS AND ENVIRONMENTAL STEWARDSHIP

- The ESG Strategy
- Framework for Concessionaire Agreement
- Environmental Management Framework
- Sustainability Governance Mechanisms at NHAI
- Materiality Assessment
- Management of Material Issues
- Impacts, Risks, and Opportunities
- Data Lake
- Key Features of the Data Lake Tool
- eOffice: A Digital Workplace Solution
- Strengthening Internal Capacity at NHAI

The ESG Strategy

The ESG Strategy at NHAI encompasses the entire lifecycle of road construction and management, with a strong emphasis on minimising environmental impacts. The organisation prioritises the reduction of its resource footprint at every stage—from the sourcing and processing of natural materials to their eventual utilisation—ensuring that all practices are environmentally responsible and sustainable. By employing the following approaches during material handling, road construction and management, NHAI reaffirms its commitment to promoting long-term environmental stewardship and mitigating its ecological footprint.

NHAI's **Model Concession Agreement** (MCA) template serves as a crucial framework for ensuring the successful development of highway projects while prioritising stakeholder interests and sustainable practices. This agreement addresses essential elements that are typically important for stakeholders as well as for limited recourse financing of highway projects. This includes:

01

Management and Separation of Risks

MCA helps manage risks by dividing them between the government and the private company in a way that benefits both parties. This is done by assigning responsibilities to those best suited to handle them to ensure the project's success as well as to promote accountability and transparency.

02

Clear Distribution of Risks and Rewards

This refers to fairly allocating risks and the benefits that come from the project between the parties involved. For example, if one party takes on more risk, they may also receive a greater share of the rewards.

03

Balanced Responsibility Allocation for Involved Parties

Responsibilities are allocated in a balanced manner between the involved parties to ensure that each party takes on roles suited to their expertise and capabilities, promoting effective collaboration and project success.

04

Clear Definition of Costs and Obligations

MCA clearly outlines the costs and obligations for all parties involved in highway projects, detailing financial commitments and responsibilities. This transparency minimises misunderstandings and disputes, enabling efficient project execution and fostering trust among stakeholders.

05

Minimisation of Transaction Costs

MCA aims to minimise transaction costs by streamlining processes and reducing administrative burdens for all parties involved in highway projects. This efficiency facilitates quicker decision-making and project execution, ultimately leading to cost savings and enhanced overall project viability.

06

Force Majeure (Addressing unforeseen events)

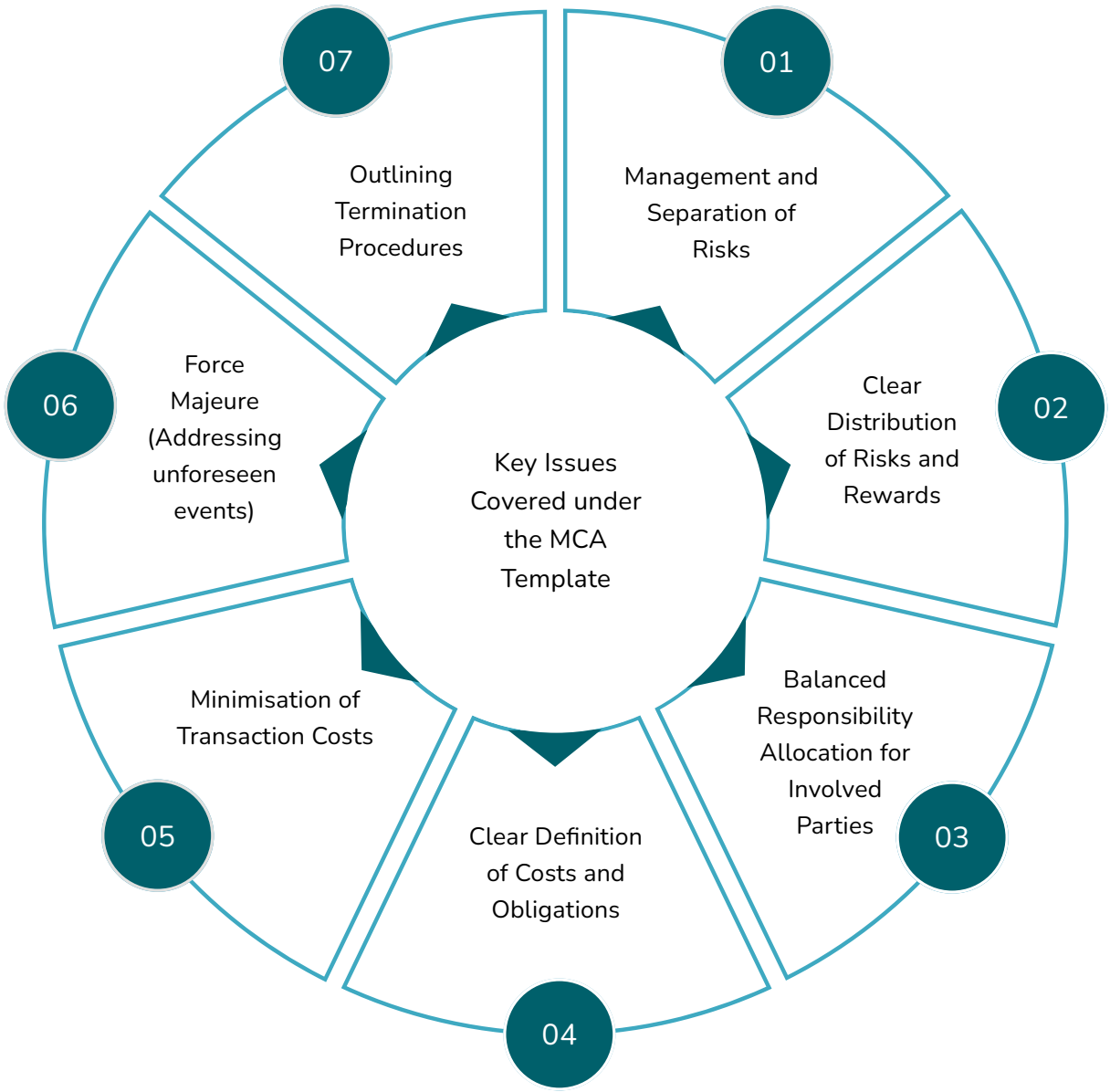
Force majeure outlines how unforeseen events, such as natural disasters or political unrest, will be managed. This ensures that both parties are protected and provides a clear framework for addressing disruptions, allowing for adjustments in timelines and responsibilities without penalty, thereby safeguarding project continuity.

07

Outlining Termination Procedures

It defines the procedures for terminating the agreement, including the conditions under which termination can occur and the steps to be followed. This transparency helps prevent disputes and ensures that both parties understand their rights and responsibilities in the event of early termination, facilitating a smooth transition and minimising disruptions to the project.

FRAMEWORK FOR CONCESSIONAIRE/CONTRACTOR AGREEMENT



The agreement also addresses key concerns, including user protection, independent monitoring, dispute resolution, and financial support from the government. It outlines a strategic approach for commercialising highways in a phased manner, focusing on optimal resource utilisation and adherence to international best practices. The goal is to ensure value for public investments while providing efficient and cost-effective services to users. NHAI prioritise safety and quality service, ensuring all necessary requirements are met before engaging the Concessionaire/Contractor. For example, the government must transfer at least 80% of the required land and secure environmental clearances before Appointed Date can occur.

Additionally, NHAI emphasises cost-effective designs combined with a phased investment strategy to promote efficient and sustainable highway development. Capacity expansion of highways follows the standards set by the IRC, tailored to different traffic volumes, with a focus on gradual development rather than creating high-cost infrastructure for long-term projections.

Furthermore, risks are allocated to the parties best equipped to manage them, with project risks assigned to the private sector as appropriate. This transfer of risks fosters innovation and leads to greater efficiencies in costs and services.

ENVIRONMENTAL MANAGEMENT FRAMEWORK (EMF)

NHAI remains committed to aligning with the guidelines and frameworks established by MoRTH. In accordance, NHAI has adopted MoRTH's Environmental Management Framework (EMF), which serves as a key document to address environmental considerations during the planning, design, and construction of roads.

Environmental management practices are integral to ensuring that the infrastructure projects not only meet regulatory standards but also minimise ecological disruption. The EMF provides a structured approach to incorporating environmental considerations into project design and execution, aiming to:

Define clear procedures and methodologies for environmental planning, review, approval, and implementation of sub-projects under the Green National Highways Corridor Project. This ensures that each project stage is compliant with both national and international environmental standards.

Offer practical guidance for the effective planning, design, and implementation of environmental management measures, which help mitigate risks and enhance positive environmental outcomes.

Establish well-defined roles and responsibilities, ensuring that environmental and related social concerns are managed effectively at all project levels. This includes clearly defining roles and responsibilities and establishing reporting procedures to ensure transparency and accountability.

Outline the institutional arrangements, including the development of training and capacity-building programs, to equip project teams with the necessary knowledge and skills to implement the provisions of the EMF. This ensures that the framework is effectively executed throughout the project lifecycle.

KEY ELEMENTS OF THE EMF

The EMF covers a wide range of environmental management aspects critical to project success, such as:

Compliance with National and International Environmental Standards

The EMF provides comprehensive information on the Government of India's environmental legislations, standards, and policies, as well as World Bank safeguard policies that are relevant to the project context. This ensures that all environmental considerations are addressed and incorporated

Environmental Screening Process

A detailed process for conducting environmental screenings is outlined to guide decision-making for proposed sub-projects. The screening helps identify potential environmental impacts early, allowing for the implementation of mitigation measures from the outset.

EIA and EMP

The framework establishes steps and procedures for conducting EIAs and preparing EMPs for selected sub-projects. These assessments ensure that any potential environmental impacts are thoroughly evaluated and addressed through targeted management plans.

Preliminary Impact Assessment

The EMF provides a preliminary evaluation of potential environmental impacts, tailored to the broader context of anticipated project interventions. This helps in forecasting the potential ecological consequences of the project.

Mitigation Strategies

The framework also outlines generic environmental management measures to avoid, minimise, or mitigate any adverse impacts. These measures are based on best practices and tailored to the specific environmental challenges anticipated in each project.

Institutional Framework for Monitoring and Reporting

The EMF specifies the institutional arrangements for ongoing monitoring and reporting, ensuring that environmental management practices are tracked, reviewed, and adjusted as necessary to meet project goals.

NHAI is committed to integrating these environmental management practices across all its projects to ensure sustainable and responsible infrastructure development.

Sustainability Governance Mechanisms at NHAI

NHAI has implemented a comprehensive framework of Environmental, Social, and Governance (ESG) mechanisms to monitor its activities and those of its Concessionaires/Contractors. These mechanisms are designed to ensure compliance with regulatory standards and promote sustainable development in highway projects

ENVIRONMENTAL AND SOCIAL IMPACT MONITORING

NHAI requires its Concessionaires/Contractors to formulate an EMP in accordance with the EIA Notification of 2006 and its subsequent amendment. MoEFCC mandates environmental clearance, which at times includes specific provisions such as Corporate Environmental Responsibility (CER) costs. NHAI monitors compliance with these EMP requirements, ensuring timely reporting through the MoEFCC portal.

For greenfield projects, Concessionaires/Contractors are required to develop an EMP to mitigate potential environmental impacts in line with MoEFCC guidelines. The EMP typically includes:

EIA

A detailed analysis of potential impacts on air, water, soil, flora, fauna, and human health, along with recommendations for mitigation.

Mitigation Measures

The EMP lists specific steps to lower the effects on the environment based on the EIA's findings. These steps include technologies that lower emissions, better waste management, and stopping pollution.

Monitoring and Reporting

A comprehensive monitoring plan that defines parameters, monitoring frequency, and reporting methods for both construction and operational phases. This also includes reporting mechanisms for any environmental violations.

Capacity Building

A framework for ensuring employees and contractors understand and follow environmental policies through training programs, workshops, and awareness campaigns.

Stakeholder Engagement

NHAI involves local communities by informing and consulting them about potential environmental impacts through public hearings and consultations with NGOs.

The EMP must be approved by NHAI before the project begins, with periodic updates based on monitoring results. NHAI rigorously monitors Concessionaire/Contractor compliance to ensure sustainable project development while minimising adverse impacts on the environment and communities.

SOCIAL IMPACT: FAIR WAGES AND LOCAL EMPLOYMENT

NHAI prioritises not only environmental stewardship but also social responsibility. Concessionaires/Contractors are encouraged to implement fair wage policies and ensure local employment opportunities as part of their commitment to social sustainability. Key measures include:

Fair Wages

NHAI ensures that workers involved in highway construction and maintenance projects are paid fair wages in accordance with labour laws. The wages paid exceed the minimum wage requirement set by each state, depending on the location of the project and where the workers are employed. This commitment extends to both direct employees and subcontracted workers, promoting equitable compensation across the project lifecycle.

Local Employment

Concessionaires/Contractors should prioritise local hiring wherever possible to promote economic growth and community well-being. This includes engaging local labour forces to provide construction, maintenance, and support services, thereby fostering regional economic development and reducing unemployment in project-affected areas.

Skill Development Programs

NHAI encourages Concessionaires/ Contractors to offer training programs that enhance the skills of local workers, equipping them with the expertise required for project-related tasks. Special emphasis is placed on empowering female workers through targeted skill development initiatives, enabling their active participation in infrastructure projects. These initiatives not only improve employment prospects but also empower communities to participate meaningfully in sustainable infrastructure development.

MANDATORY SUSTAINABILIT Y PRACTICES FOR LARGE-SCALE PROJECTS

For road projects exceeding 100 kms. NHAI requires several mandatory pre-implementation activities, integrated into the Detailed Project Report (DPR) and Concessionaire/Contractor agreements. These include:

01 Environmental and social impact assessments, including gender-based assessments.

02 Public disclosure of impact assessment results.

03 Community development programs aligned with local needs.

04 Stakeholder engagement plans informed by stakeholder mapping.

05 Formal grievance mechanisms for local communities.

All ROs managing projects exceeding 100 kilometres have successfully implemented these measures, and in some cases, similar practices have been applied to shorter road stretches to maintain uniform sustainability standards. ROs periodically report results to NHAI headquarters, with project-specific decisions driving assessment efforts.

As part of its dedication to sustainable infrastructure development, NHAI actively engages in the Amrit Sarovar Abhiyan Phase I, a mission to develop and rejuvenate seventy-five water bodies in each district of India, totaling 50,000 water bodies. NHAI places particular emphasis on excavating and restoring these water bodies during road construction projects. This approach not only aids in conserving water resources and recharging groundwater but also supports local biodiversity and meets community water needs.

Under this initiative, MoRTH aims to create over 750 Amrit Sarovars, with NHAI contributing to 510 water bodies, of which 467 have already been completed. By sourcing earth for highway embankments from silted water bodies, NHAI ensures essential construction material while enhancing water storage capacity and groundwater recharge for local communities. To date, this initiative has utilised 2,39,59,802 cubic metres of soil, leading to savings of Rs. 16,690 lakhs for national highway projects. This dual-benefit approach not only fosters community participation but also advances rural development and sustainable infrastructure growth.

CONTINUOUS MONITORING AND COMPLIANCE

NHAI has implemented a robust system for continuous data updates and compliance reporting. As indicated in EC conditions the EMP progress is updated biannually on the MoEFCC portal. Additionally, NHAI's Environment Division oversees compliance with statutory clearances, including environmental, forest, and coastal regulation zone (CRZ) approvals. The authority conducts intensive monitoring to ensure adherence to regulatory requirements, demonstrating its commitment to sustainable development and inclusive growth.

GOVERNANCE-RELATED MONITORING MECHANISMS

NHAI has established robust governance monitoring which adhere to the mandates set by the Government of India on governance aspects and follows the guidelines established by the CVC to uphold integrity and fairness in its operations. These mechanisms enforce compliance with governance standards across all projects, requiring Concessionaires/Contractors to follow strict ethical guidelines. NHAI conducts thorough due diligence, with a focus on ethical compliance, ensuring that all Concessionaires/Contractors adhere to anti-corruption, anti-bribery, and conflict-of-interest policies. Procurement processes are transparent, and safeguards are in place to prevent unethical practices like favouritism or fraud. Concessionaires/Contractors may report anytime on governance practices, ensuring transparency and ethical adherence. Through its well-established governance mechanisms, NHAI remains dedicated to maintaining transparency and sustainability in infrastructure development, ensuring that environmental and social standards are upheld across all projects.

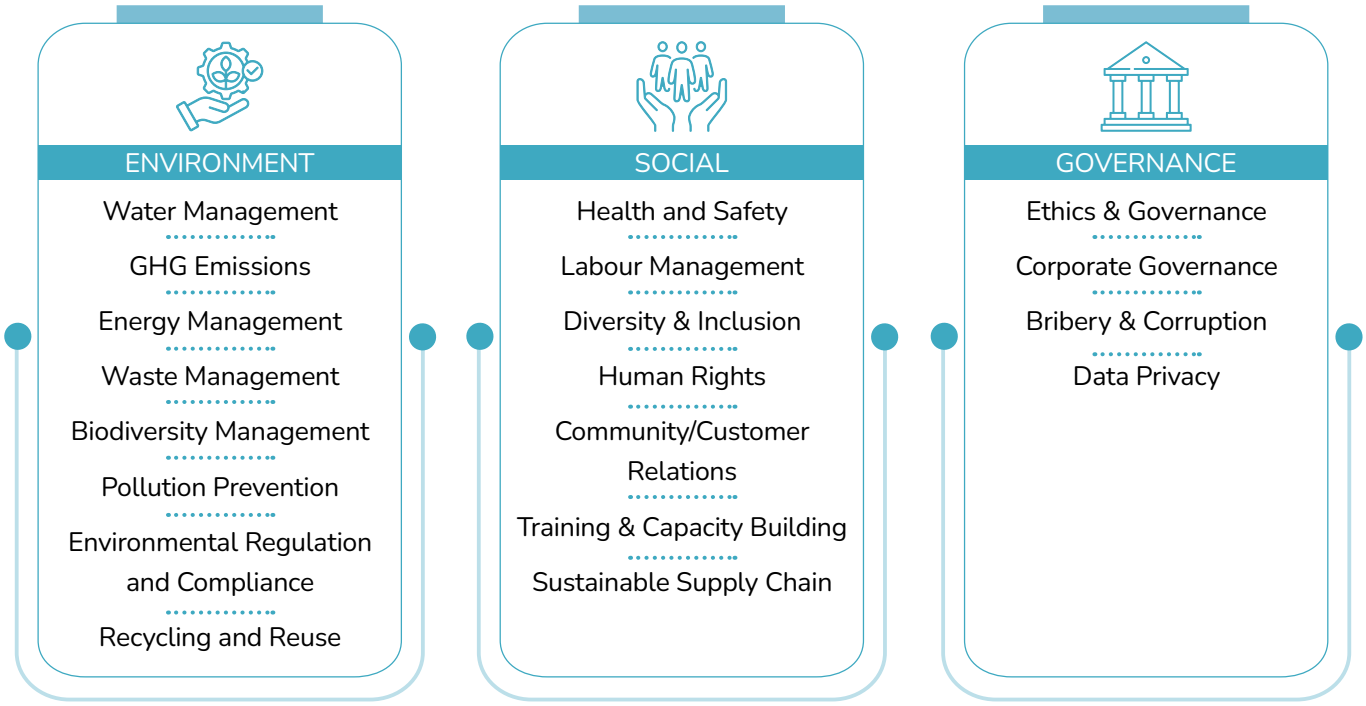
Materiality Assessment

NHAI recognises material ESG topics as those that have the potential to impact its operations and business or are of significant importance to its external stakeholders in the short, medium, or long term. The process for identifying these material topics follows a structured approach, which is as follows:

Table 13 Process of identifying material topics

S.No.	Activity	Explanation
1.	Defining Assessment Parameters	To select material issues, NHAI evaluates each topic based on three key parameters: implication, outcome, and relevance. Each topic is rigorously analysed against these criteria to ensure only relevant issues remain on the list.
2.	Issue Selection	Topics for assessment are identified through a combination of stakeholder engagement and insights from past experiences. This ensures that the selected issues are both relevant to stakeholders and aligned with the operational needs.
3.	Prioritisation	A prioritisation matrix is developed through consultations with internal and external stakeholders. This matrix helps NHAI rank the issues by their importance, providing a comprehensive list of material topics for NHAI.
4.	Impact Assessment	Following prioritisation, the potential impacts of these topics are assessed, resulting in a prioritised list that reflects the key concerns of the stakeholders and their corresponding impact on the operations.
5.	Analysis and Validation	A qualitative analysis is conducted to validate the identified material topics, ensuring they are accurate and relevant before their inclusion in the final report.

These material topics are derived from a structured materiality assessment through a combination of industry analysis, global risk and megatrend reviews, insights from rating frameworks, and internal evaluations, all in accordance with GRI standards. Based on the assessment, NHAI has identified the following ESG topics as material for its operations



MANAGEMENT OF MATERIAL ISSUES

Table 14 Management of material topics

ENVIRONMENT		
Material Topic	GRI Topic	Management Approach
Water Management	GRI 303: Water and Effluents	NHAI recognises the impact of its operations on water as a vital natural resource. It has proactively implemented initiatives to conserve rainwater and facilitate its recharge during its operational period. Furthermore, it has encouraged its Concessionaires/Contractors to adopt water recycling practices.
GHG Emissions, Pollution Prevention	GRI 305: Emissions	NHAI adopts a proactive management approach to GHG emission reduction and pollution prevention through sustainable construction practices, energy-efficient technologies, and stringent environmental monitoring.
Energy Management	GRI 302: Energy	In alignment with objectives for energy efficiency and management, NHAI encourages its Concessionaires/Contractors to implement energy-efficient practices to minimise their energy footprint. Additionally, NHAI actively promotes the use of renewable energy in all its operations wherever feasible.
Waste Management, Recycling and Reuse	GRI 301: Material GRI 306: Effluents and Waste	NHAI is committed to responsible waste management practices, focusing on minimising waste generation and promoting recycling and reuse wherever possible. The organisation implements strategies to manage waste effectively across its operations and encourages Concessionaires/ Contractors to adopt sustainable practices.
Biodiversity Management	GRI 101: Biodiversity, GRI 304: Biodiversity	NHAI is dedicated to conserving biodiversity and minimising its impact on natural ecosystems during its operations. NHAI encourages its Concessionaires/ Contractors to adopt measures that safeguard local ecosystem.
Environmental Regulation and Compliance	GRI 2-27: Compliance with laws and regulations	NHAI ensures that both its concessionaries/contractors and the organisation itself comply with all applicable laws and regulations in their operations. It has implemented various monitoring mechanisms to minimise instances of non-compliance.

SOCIAL		
Material Topic	GRI Topic	Management Approach
Health and Safety	GRI 403: Occupational Health and Safety	NHAI requires its Concessionaires/Contractors to uphold healthy and safe working standards by implementing appropriate adoption and mitigation measures during operations. It has established multiple mechanisms to monitor these conditions throughout the project lifecycle.
Labour Management	GRI 402: Labour Management/ Relations	NHAI is dedicated to maintaining fair and responsible labour management practices across its operations. The organisation adheres to labour laws and standards, ensuring safe working conditions, fair wages, and employee rights. Regular monitoring and feedback mechanisms are in place to support positive labour relations and address any issues promptly, ensuring the well-being and satisfaction of the workforce.

Material Topic	GRI Topic	Management Approach
Diversity and Inclusion	GRI 405: Diversity and Equal Opportunity GRI 406: Non-Discrimination	NHAI is committed to fostering a diverse and inclusive work environment that values the unique contributions of all individuals. NHAI implements policies and initiatives aimed at promoting equal opportunities, supporting underrepresented groups, and encouraging a culture of respect and collaboration, while continuously monitoring progress to ensure an equitable workplace for everyone.
Human Rights	GRI 407: Freedom of Association and Collective Bargaining GRI 408: Child Labor GRI 409: Forced or Compulsory Labor	NHAI is dedicated to respecting and promoting human rights throughout its operations and project implementations. NHAI has established policies and practices to ensure the protection of human rights.
Community/ Customer Relations	GRI 411: Rights of Indigenous People GRI 413: Local Communities	NHAI is committed to minimising its impact on local communities and enhancing their well-being through proactive engagement and consultation. The organisation implements social responsibility initiatives that address community needs and fosters positive relationships, while continuously monitoring the effects of its projects to ensure they contribute positively to the local environment and society.
Training and Capacity Building	GRI 401: Employment GRI 404: Training and Education	NHAI maintains high working standards and views its employees as the most valuable resource for executing projects effectively. The organisation has implemented various policies to ensure the well-being of its employees.
Sustainable Supply Chain	GRI 204: Procurement Practices GRI 301: Materials GRI 308: Supplier Environmental Assessment GRI 408: Child Labour GRI 409: Forced or Compulsory Labor GRI 414: Supplier Social Assessment	NHAI is committed to fostering a sustainable supply chain by ensuring that all materials and products sourced for highway construction adhere to the highest quality standards. Rigorous testing is conducted at the suppliers' and contractors' level, to meet the required criteria. NHAI strictly follows IRC mandates on materials, technologies, and products, which are accredited and aligned with IRC Codes, Guidelines, and Circulars. NHAI prioritises resource efficiency and circularity in its own operations and supply chain through the integration of recycled and alternative materials such as fly ash, plastic waste, construction and demolition waste in various stages of highway construction.

GOVERNANCE

Material Topic	GRI Topic	Management Approach
Ethics and Governance	GRI 206: Anti-Competitive Behaviour	NHAI is dedicated to fostering a culture of ethics and governance, emphasising integrity and accountability in all its actions. The organisation has implemented clear ethical guidelines and conducts regular training for employees to ensure adherence to these standards, along with monitoring mechanisms to promote compliance and address any ethical concerns throughout its operations.
Corporate Governance	GRI 2- General Disclosures	NHAI is committed to upholding high standards of corporate governance, ensuring transparency, accountability, and ethical decision-making in all its operations. The organisation has established comprehensive policies and oversight mechanisms to promote responsible governance practices, which are regularly monitored for compliance throughout the project lifecycle.
Bribery and Corruption	GRI 205: Anti-Corruption	NHAI enforces a zero-tolerance policy towards bribery and corruption, requiring all stakeholders to adhere to ethical standards in their operations. The organisation has implemented robust reporting mechanisms and regular training to promote awareness, alongside ongoing monitoring to ensure compliance with anti-corruption measures.
Data Privacy	GRI 418 Customer Privacy	NHAI prioritises data privacy by ensuring that all operations comply with relevant regulations and best practices

ECONOMIC

Material Topic	GRI Topic	Management Approach
Economic Performance	GRI 204: Economic Performance	NHAI seeks to enhance the organisation's financial stability by boosting operational efficiency while upholding strong sustainability performance.
Economic Compliance	GRI 419: Socio-economic Compliance	NHAI has established comprehensive policies, guidelines, and robust monitoring mechanisms to ensure compliance with local and central laws, facilitating effective adherence.

IMPACTS, RISKS, AND OPPORTUNITIES

The construction of new road and enhanced infrastructure is likely to have a significant impact on the environment and people's livelihoods, particularly when road corridors must be relocated, and bypasses need land that is not in the right of way (RoW). Without effective management and mitigation measures, these effects might cause a variety of concerns.

Through thorough screening processes, EIA, and the development of comprehensive EMP, NHAI gives its greatest emphasis on identifying both the adverse and beneficial impacts of the projects. Targeting specific mitigating strategies helps NHAI to minimise negative impacts and promote sustainable results. Some of the potential risks noticed are listed below

Environmental Impacts

Key environmental risks associated with road expansion include:

- Felling of roadside trees
- Adverse effects on water resources
- Disruption of regional drainage systems
- Debris management and slope cutting issues in hill or mountainous areas.
- Uptake of fertile agricultural land for road development
- Increased traffic leading to safety concerns for road users and roadside residents.
- Diversion of forest land, potentially impacting biodiversity and local ecosystems

Social Impacts

The social implications of road projects may include:

- Impact on material sources and common property resources along the road corridors
- Adverse effects on sensitive receptors such as schools and healthcare facilities, due to increased noise and air pollution during both construction and operation
- Changes in land use patterns and occupational shifts in local communities
- Displacement and disruption of livelihoods for communities dependent on affected land

Governance Impacts

Governance-related impacts and risks associated with NHAI's road expansion and enhancement activities can include:

- Non-compliance with applicable regulations and mandates set by the Government of India.
- Corruption and bribery in the procurement process.
- Favouritism and conflicts of interest in awarding contracts.
- Inadequate monitoring of Concessionaires/Contractors.
- Ineffective internal control mechanisms leading to financial mismanagement.

RISK MITIGATION ASSOCIATED WITH FOREST LAND DIVERSION

In projects that require the diversion of forest land to road construction, NHAI ensures that the impact on natural forests is minimal and that local communities' dependence on forests is considered during planning and construction. For projects located near wildlife sanctuaries, national parks, eco-sensitive areas, or protected habitats, biodiversity assessments are conducted to assess potential impacts on endangered species and wildlife habitats. NHAI obtains forest clearances required under Section 2 of the Forest Clearance Act, 1980 as amended. This includes obtaining prior approval from the Central Government, specifically the Ministry of Environment, Forest and Climate Change (MoEFCC).

RISK MITIGATION WHILE USING AGRICULTURAL LAND

The acquisition of fertile agricultural land for road expansion may exert pressure on agricultural productivity and can lead to environmental degradation. When NHAI acquires such land, it identifies the risks for a site-specific mitigation strategy in reference to community dependence and environmental sensitivity.

RISK MITIGATION WITH REGARD TO PROTECTED AREAS

When road projects are located near protected areas such as national parks, wildlife sanctuaries, and ecological reserves, construction activities may lead to habitat fragmentation, increased human intrusion, and environmental degradation. Potential risks include alterations to natural water flow, soil erosion, and pollution from construction waste, which can negatively impact the ecological balance. Additionally, increased accessibility may contribute to unauthorised activities such as illegal resource extraction and encroachment.

To mitigate these risks, NHAI has the following measures in place:

Wildlife Mitigation Plan: Aligned with the "Best Practice Guidance Document on Eco-Friendly Measures to Mitigate Impacts of Linear Infrastructure on Wildlife" published by the Wildlife Institute of India under MoEFCC. This includes the construction of underpasses, small vehicular/animal underpasses, monkey ladders, land bridges, animal overpasses, and dedicated animal corridors to ensure the safe passage of wildlife and prevent road traffic-related disturbances.

Environmental Management Plan: Focuses on minimising the environmental footprint of construction activities and ensuring compliance with ecological standards.

Soil and Moisture Conservation Plan: Aims at protecting soil quality and maintaining water balance in protected areas.

Compliance with Environmental Regulations: NHAI obtains the requisite environmental clearances as mandated under the EIA Notification, 2006, and subsequent amendments issued by MoEFCC.

These measures collectively ensure the protection and conservation of biodiversity while enabling sustainable infrastructure development.

RISK MITIGATION DURING THE MANAGEMENT OF CONSTRUCTION MATERIALS

The extraction and use of construction materials like sand, aggregates, water, and hazardous chemicals presents a risk to the environment, biodiversity, and nearby communities if not properly managed. Uncontrolled extraction practices and improper disposal of construction waste could lead to long-term environmental damage, including contamination of water sources and land.

A key aspect of managing these risks lies in the effective handling of borrow areas, which are essential for sourcing soil and other materials for highway construction. Improper management of borrow areas can result in soil erosion, loss of agricultural productivity, and damage to local ecosystems. To mitigate these risks, NHAI follows strict guidelines and legal frameworks that ensure safe, sustainable, and responsible borrow area management. This includes adherence to the following legal and policy requirements:

- Clause 305.2.2.2 of MoRTH Specification for Roads and Bridge Works of IRC
- Guidelines for Environmental Impact Assessment of Highway Projects, Indian Roads Congress, 1989 (IRC: 104-1988)
- IRC: 10-1961 - Recommended Practice for Borrow Pits for Road Embankments Constructed by Manual Operations, revised in 1989
- IRC SP: 58-2001 - Guideline for Use of Fly-ash in Road Construction
- IRC SP: 108-2015 - Guidelines for Environmental Management Plan for Highway Projects
- EIA Guidance Manual for Highways of MoEFCC, 2010
- MoEFCC Fly-ash Notification dated 31.12.2021

NHAI ensures that borrow pits are excavated without compromising stability and are shaped to blend with the natural ground, with proper drainage systems in place to avoid hazardous conditions for humans and animals. Topsoil is stripped and stored separately to be reinstated once the extraction is complete, thereby minimising the ecological impact. Additionally, NHAI promotes the use of fly ash to reduce dependency on natural borrow soil and ensures that pits are not dug within 800 metres of towns or villages. Through thorough EIA, NHAI evaluates the impact of borrow area management on air and water quality, biodiversity, land use, and socio-economic aspects. These measures, supported by NHAI's EMP, help mitigate adverse environmental impacts while ensuring compliance with regulatory frameworks and promoting sustainable infrastructure development.

RISKS FROM ROAD TOPOGRAPHY

Roads built through diverse topographies—whether flat plains, rolling terrains, or mountainous areas—pose unique risks. Flat terrains may suffer from poor drainage, while steep slopes increase the potential for landslides and erosion, particularly during the monsoon season. NHAI takes these factors into account to ensure stability and safety across road projects.

Figure 46: Hakunjari to Khonsa section of NH-315A

OTHER RISKS

NHAI recognises that the construction and operation of road infrastructure projects can pose risks to the health and safety of workers involved in construction activities and the safety of road users and nearby communities. This encompasses:

OCCUPATIONAL HEALTH AND SAFETY RISKS

Construction activities pose risks such as exposure to hazardous materials, heavy machinery operation, and the potential for accidents. NHAI mitigates these risks through strict safety protocols in line with national regulations. This includes regular safety training, provision of personal protective equipment (PPE), and adherence to safety procedures on-site. These measures aim to create a secure working environment and protect the health and well-being of construction personnel.

ROAD SAFETY RISKS

The influx of traffic on upgraded roads can lead to increased accidents and hazards for road users and nearby communities. NHAI addresses these risks through improved road design, the installation of traffic management systems, and the development of pedestrian-friendly infrastructure. Safety measures such as appropriate signage, speed control mechanisms, and emergency response systems are implemented to minimise accidents and enhance the safety of both motorists and residents. Additionally, NHAI conducts awareness campaigns to educate communities and drivers on road safety practices.

By integrating these proactive measures, NHAI aims to foster a safer environment for both its workforce and the communities it serves, ultimately ensuring that infrastructure development contributes to the well-being and security of all stakeholders.

ADVANCING SUSTAINABILITY THROUGH INNOVATION AT NHAI

NHAI's commitment to sustainability is evident in its adoption of innovative practices across all aspects of its operations. To advance this objective, the organisation has introduced a range of initiatives aimed at improving the efficiency, transparency, and sustainability of India's highway infrastructure. This section outlines several key initiatives that showcase NHAI's efforts to foster a smarter and more sustainable future for the nation's road network.

Data Lake

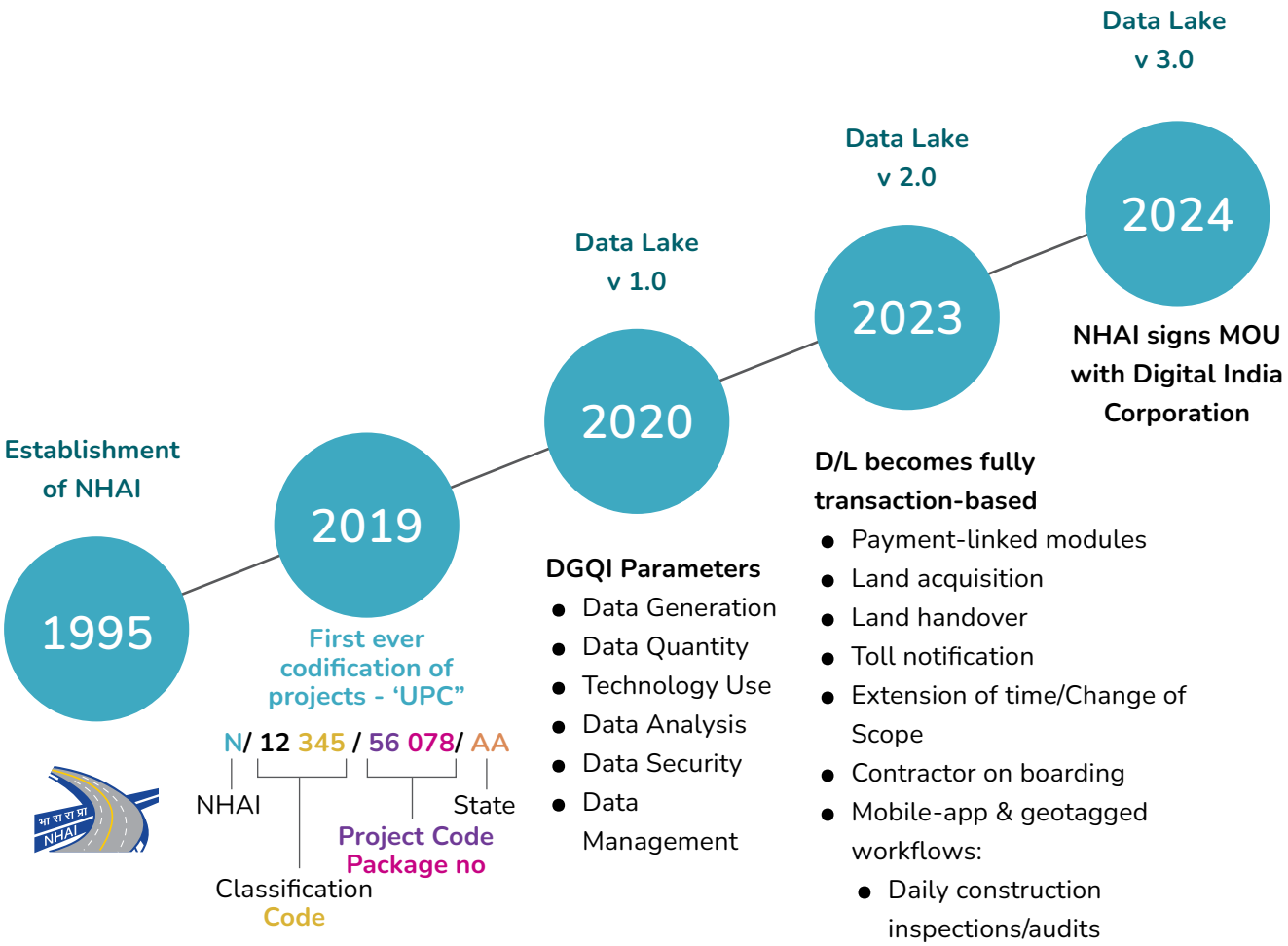
NHAI has developed a comprehensive transaction-based contract and project management system that covers end-to-end activities for national highway projects throughout their lifecycle. Recognising that traditional infrastructure management methods are no longer sufficient to meet the challenges of today's transportation sector, NHAI has adopted technology to improve decision-making, transparency, and productivity. To address the massive amount of information generated during highway projects, NHAI launched the cloud-based Data Lake portal in July 2020, which has since evolved into a fully transactional, workflow-based system. It serves as a central repository for structured and unstructured data from sensors, cameras, toll booths, and other sources with the ability to handle vast volumes of information across the project lifecycle. The platform streamlines repetitive activities for contractors, Concessionaires/ Contractors, engineers, and project directors, providing role-based access and supporting system-generated reports and dashboards.

Additionally, NHAI leverages the DAMS, a platform developed for managing and analysing drone image data collected from periodic flight operations. DAMS facilitates online and remote tracking and monitoring of national highways, with abridged versions of drone videos and annotated data uploaded to the Data Lake software. This data, including before-and-after comparisons, is accessible to the public under the Citizen Charter on NHAI's website. By integrating DAMS with the Data Lake platform, NHAI enhances real-time monitoring, improves project visibility, and ensures transparency.

The Data Lake system encompasses 20 modules and 91 activities, from project inception to completion and tolling, and uses a Unique Project Code (UPC) to link all project-related data, including budgets, expenditures, and milestones. It features integrated transaction and reporting systems, real-time tracking, automated alerts, and escalation provisions to address project issues swiftly. Data Lake also provides a platform for dispute resolution and land acquisition arbitration, which has already helped NHAI resolve 155 conciliation claims, saving approximately INR 25,680 crore. . With features such as centralised data storage, analytics capabilities, real-time monitoring, and predictive maintenance, Data Lake plays a crucial role in improving NHAI's project management, safety, and decision-making across India's vast highway network.

Figure 47: Launch of Grievance Redressal Module in Data lake

NHAL'S DATA LAKE: INCEPTION TO PRESENT



GIS-enabled dashboards help NHAI visualise projects across India, offering detailed insights into road alignments, land acquisition statuses, toll plazas, and project progress. The system supports real-time monitoring, predictive maintenance, and drone-based visual inspections, allowing NHAI to capture data on road conditions, safety concerns, and infrastructure issues.

In addition, NHAI has leveraged emerging technologies such as artificial intelligence and machine learning to enhance decision-making, automate detection of road defects, and monitor assets like toll plazas and project sites. This system also streamlines payments, digitally processed Letters of Award (LOAs) and contracts and facilitates remote visual inspections through drone videography. A mobile app, NHAI One, further enhances field personnel's efficiency by managing attendance, road safety audits, defect reporting, and toilet inspections.

KEY FEATURES OF THE DATA LAKE TOOL

01 Centralised Data Storage

The Data Lake tool is a centralised platform that stores all types of structured and unstructured data, including data from sensors, cameras, and toll booths.

02 Scalability

Designed to handle large volumes of data, the tool is essential for managing the data generated by the extensive highway network in India.

03 Analytics Capabilities

The tool provides analytics features that enable NHAI to derive insights from the data, facilitating informed decision-making and improving overall highway performance.

04 Real-time Monitoring

The tool allows for real-time monitoring of highways and roads, helping NHAI identify issues and take corrective actions promptly.

05 Predictive Maintenance

By analysing the data, the tool predicts maintenance requirements, allowing NHAI to schedule repairs in advance and reduce downtime.

06 Improved Safety

The tool helps NHAI monitor roads for safety concerns, such as accidents, enabling swift preventive measures.

07 Cost-effective

As a comprehensive data management solution, the tool reduces the need for multiple storage systems, making it cost-effective.

08 Collaboration

The tool facilitates collaboration among various departments within NHAI by enabling data and insights sharing, resulting in better decision-making and performance.

09 Reduced Paper Consumption

The tool contributes to environmental sustainability through reduced paper consumption. By digitising project management processes and enabling seamless data sharing across stakeholders, the platform has eliminated the need for extensive paperwork, including physical documentation for approvals, reporting, and monitoring.

eOFFICE: A DIGITAL WORKPLACE SOLUTION

In alignment with Digital India Programme, NHAI has implemented a digital workplace strategy to provide simple, moral, accountable, responsive, and transparent governance throughout its operation. NHAI transitioned to the eOffice platform, a digital workplace solution developed by the National Informatics Centre (NIC) to enhance effective governance by simplifying both inter- and intra-governmental procedures. The tool has aided NHAI's transition to a paperless working environment by streamlining procedures, resulting in more efficient governance.

- NHAI's smart governance includes the eFile Management System (eFile), which allows for electronic diarisation, file generation, digital signature, and faster file flow from receiving to archival.
- The solution serves as a knowledge management system (KMS) and a central repository for documents for NHAI, allowing users to swiftly manage, exchange, and publish electronic documents while maintaining version histories and organising material throughout the organisation.
- The Work from Anywhere (WAW) Portal allows NHAI personnel to access office tasks remotely, enabling smooth operations from any place.
- A web-based system for processing Annual Performance Appraisal Reports (APAR) has been implemented to reduce delays and increase transparency by tracking submission and review progress in real-time .

STRENGTHENING INTERNAL CAPACITY AT NHAI

NHAI places a strong emphasis on enhancing internal capabilities and fostering a culture of continuous learning. As part of this effort, the organisation conducts a weekly capacity-building session, led by the Chairman. These sessions serve as a platform for knowledge sharing, innovation, and collaboration, with active participation from an average of 400-500 employees across various departments.

To ensure the discussions remain relevant and address current challenges, an internal WhatsApp group has been established. This platform allows employees to suggest and collectively decide on the topics to be presented and discussed during each session. This inclusive approach not only fosters engagement but also empowers employees to contribute to shaping the organisation's policies and strategies.

The primary objective of these sessions is to drive policy reforms, identify emerging trends, and explore innovative ideas that can enhance NHAI's efficiency and effectiveness in infrastructure development. By promoting cross-functional collaboration and knowledge exchange, NHAI aims to build a more agile and forward-thinking workforce, capable of addressing the dynamic challenges that arise in its operations.

NHAI'S TOLL INFORMATION SYSTEM (TIS)

Figure 48: Toll Management System

The TIS is a comprehensive, web-based portal designed to provide National Highway users with easy access to detailed toll-related information. This GIS-enabled platform allows users to search for toll plazas across the country by location or along a specific route, offering a transparent and user-friendly way to plan highway journeys. Through the TIS, users can access a wide range of information, such as:

01

Current toll rates for different vehicle categories at each plaza.

02

Concessions and discounts available for local and frequent users.

03

Commercial operation dates, toll notifications, and upcoming toll rate revisions.

04

Details of key personnel at toll plazas, including contact information.

05

Emergency contact numbers for nearby police stations and hospitals.

06

Facilities near toll plazas, such as rest areas and fuel stations.

In addition, TIS provides a clear breakdown of the toll plazas encountered between any two stations on a selected route, including the total toll amount for the journey. By entering a source and destination, along with any via points, users can view the applicable toll fees, estimated travel times, and real-time traffic status at each toll plaza along their route.

The system also allows users to view detailed information for each toll plaza, including the capital cost of the associated project, cumulative toll revenue, traffic statistics, and the names of the Concessionaires/ Contractors operating the plaza. Users can also find a list of vehicles exempted from toll charges and access public notifications, including fee notices published in local newspapers.

Moreover, TIS serves as a platform for user engagement and grievance redressal, providing a mechanism for feedback on toll plaza operations and the overall user experience. This integrated system helps ensure transparency, improve decision-making for road users, and enhance the overall convenience of traveling on India's National Highways.

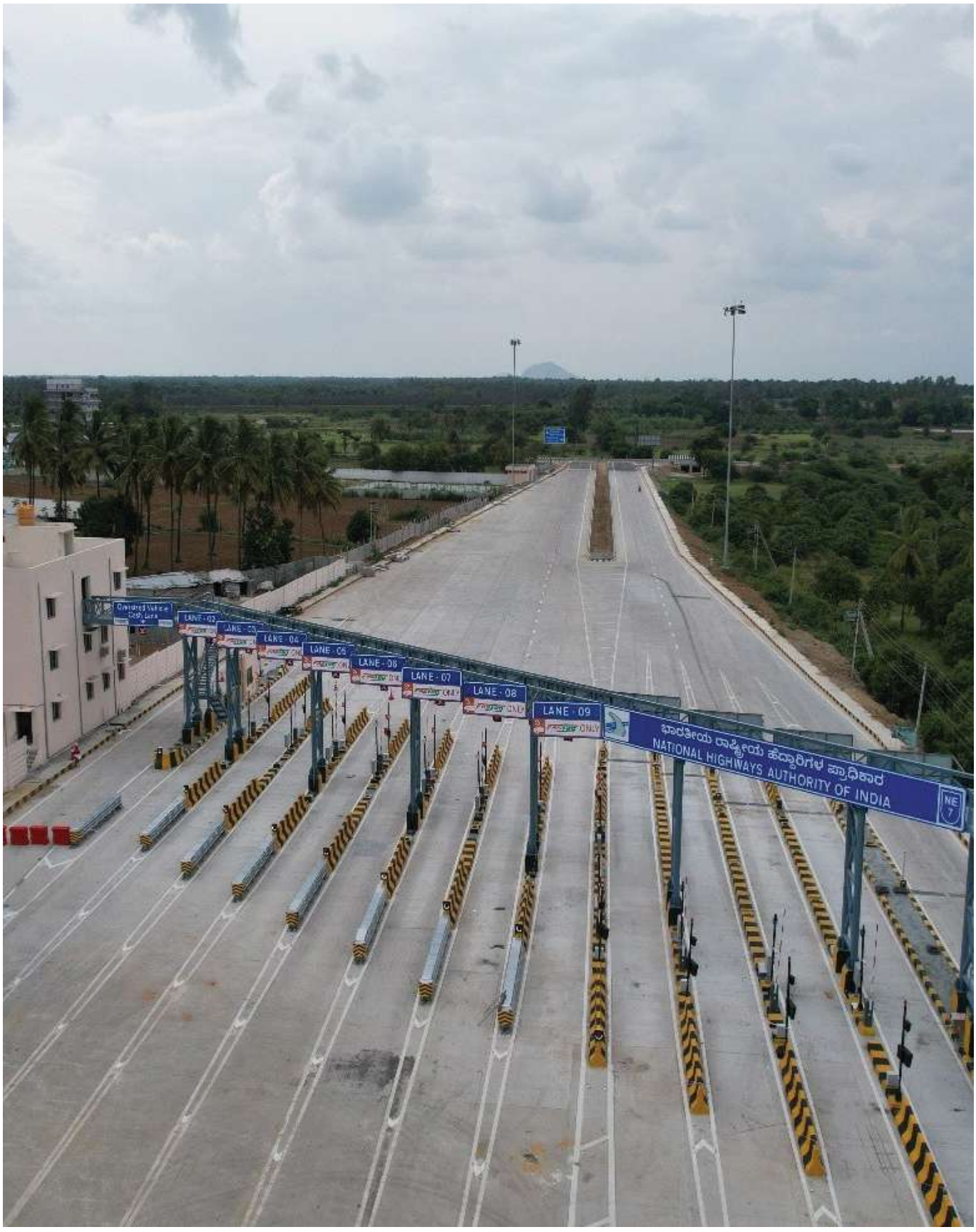


Figure 49: Toll Plaza at Bangalore-Chennai Expressway

MANTHAN – IDEAS TO ACTION

Manthan at NHAI is a platform that was launched to encourage innovative thinking and promote best practices in road infrastructure and highway development. This initiative includes regular brainstorming sessions, typically held on Monday mornings where new initiatives, techniques, and updates are discussed. For instance, the introduction of bamboo crash barriers, plantation success stories, and bridge success stories have emerged from these discussions. The attendees range from Deputy Managers (DMs) to top management, including the chairman, and sometimes field officers are also included, ensuring a collaborative and inclusive environment.

The initiative facilitates knowledge-sharing sessions, idea generation, and policy discussions aimed at improving road safety, operational efficiency, and the environmental sustainability of national highways. Manthan acts as a bridge for implementing cutting-edge technologies, innovations, and reforms that contribute to the nation's infrastructure development, while keeping a strong focus on quality, cost-efficiency, and time management.

It often involves discussions on diverse topics such as the use of new materials, the adoption of smart technologies and data management systems. Overall, the initiative is part of NHAI's vision to enhance road infrastructure while aligning with national development goals.

SUSTAINABILITY DISCLOSURES

The preparation of a sustainability report for the National Highways Authority of India (NHAI) is crucial for demonstrating the organisation's commitment to environmental and social responsibility. This report highlights NHAI's efforts in reducing greenhouse gas emissions, promoting the use of recycled materials, and enhancing biodiversity through initiatives like wildlife crossings and extensive plantation drives.

The major process of preparing this report involved several key steps: identifying and engaging stakeholders, collecting, and analysing data on environmental and social impacts, and adhering to the Global Reporting Initiative (GRI) guidelines to ensure transparency and accountability.

Similar to the last interactions made during sustainability reporting exercise for FY21-22, the approach followed for FY23-24 report was extensive. It involved robust capacity building, data collection, data collation, query resolution, narrative preparation, and relevant narrative disclosure.

01

Definition of Boundaries, Scope of Disclosure, Timelines

Reporting for FY 2023-24 for all Regional Offices and Head Office, all ongoing and completed projects.

02

Creation of Data Templates and Stakeholder Orientation

Data templates for all relevant GRI topics and indicators capturing FY 2023-24 data.

03

Sensitisation and capacity building workshops

Workshops with Regional Office (RO) stakeholders for data template familiarisation and clarity of understanding.

04

Data Collection and Collation

Appropriate data collection and collation at RO where it should be checked and verified for errors and gaps, subsequent compilation at HO level and compilation of narratives at RO level.

Capacity building and data collection to be taken up from contractors too for complete representation of NHAI operations specifically scope 3 emissions

05

Data compilation and report preparation

Data and narrative compilation at HO level.
Addition of Case Studies and Photos.
Leadership guidance.
Review and Approval.

06

Public Disclosure

Publishing and release of the report in public domain.

Definition of boundaries, scope of disclosure, timelines

Reporting for FY 2023-24 for all Regional Offices and Head Office, all ongoing and completed projects.

Creation of Data templates and stakeholder orientation

Data templates for all relevant GRI topics and indicators capturing FY 23-24 data.

SIGNIFICANCE OF SENSITISATION WORKSHOPS FOR REGIONAL OFFICES

Capacity building sessions for regional offices of the National Highways Authority of India (NHAI) on sustainability reporting were essential for several reasons:

01

Enhanced Understanding
These sessions helped regional offices understand the importance of sustainability reporting, including its role in promoting transparency, accountability, and environmental stewardship.

02

Skill Development
Training programs equipped staff with the necessary skills to collect, analyse, and report data accurately. This included understanding global reporting standards like the GRI guidelines.

03

Consistency and Quality
By standardising the reporting process across all regional offices, NHAI ensured consistency and high-quality data, which was crucial for credible sustainability reports.

04

Stakeholder Engagement
Capacity building fostered better engagement with local stakeholders, ensuring their concerns and expectations were reflected in the sustainability report.

05

Continuous Improvement
These sessions promoted a culture of continuous learning and improvement, enabling regional offices to stay updated with the latest sustainability practices and reporting techniques.

06

Compliance and Risk Management
Training helped regional offices comply with national and international regulations, reducing the risk of non-compliance and enhancing the organisation's reputation.

Overall, capacity building sessions were vital for empowering regional offices to contribute effectively to NHAI's sustainability goals, ensuring comprehensive and reliable reporting.

NHAI's PARIVESH

CONTRIBUTION TO UN SDGS

- Environmental Stewardship and Management at NHAI
- Environmental Management Plan
- Efficient use of energy in Road Construction
- Advancing towards a Low-Carbon Emissions Road Infrastructure
- GHG Emissions from NHAI
- GHG Emissions from Concessionaires/Contractors Business Operations
- Air Quality
- Water Management
- Surface Water Management
- Groundwater Management at NHAI
- Water Consumption at NHAI
- Waste Management
- Waste Generation Across NHAI's Value Chain
- Biodiversity
- Green Highway Policy
- Greening India's Highways for Environmental Sustainability
- Green Highway Initiative

MATERIAL ISSUES

- GHG Emissions Management
- Energy Management
- Energy transition
- Water Management
- Waste Management

HIGHLIGHTS

Community Participation: NHAI aligns with Mission LiFE by fostering large-scale community involvement in green initiatives.

Cleaner Energy Growth: Biogas usage by the Concessionaires/ Contractors increased from 21,907 GJ in FY21-22 to 1,70,398 GJ in FY23-24, showing promising growth.

Renewable Electricity: First recorded usage of 1 GJ in FY23-24, at NHAI marking a significant step in sustainable energy.

NHAI has maintained its GHG Emission Intensity: at ≤1 $MTCO_2e/km$

Water Conservation: NHAI aims to create around 510 ponds across India and has already created 467 Amrit Sarovars. Water use intensity of NHAI has reduced by 74% in water stress regions as compared to FY 2021-22.

Recycling Efforts: Used 6,31,92,269 MT of recycled materials in FY 2023-24 for road construction activities, including 6,13,49,631 MT of ash.

Massive Plantation Drive: Planted 3.46 crore saplings from FY 2016-17 to FY 2022-23.Nationwide plantation drive on 12 July 2023, with successfully planting over 4,13,000 saplings in a single day.

Drone Analytics: Implemented Drone Analytics Monitoring System (DAMS) for enhanced oversight of highways and plantations.

Big Data Analytics: NHAI's Data Lake consolidates plantation data for effective analysis and monitoring

Regulatory Compliance: Strict adherence to environmental, forest, and wildlife regulations during highway construction.

IN THIS SECTION:

Energy & Emissions | Water | Waste | Biodiversity | Air quality

In the second edition of Sustainability Report, NHAI has aimed to streamline the processes and system of collection and management of data as well as the scope of disclosure of providing suitable representation for all its material topics.

In the current reporting structure, NHAI has expanded the reporting boundary beyond its direct operations. For FY 2023-24, the scope of the report comprises NHAI's head office (HO), 25 regional offices (ROs), and the activities and processes of Concessionaires/ Contractors engaged by NHAI for construction, operation, and maintenance of the road infrastructure.

NHAI has reviewed the reported GRI indicators for FY21-22 and has updated the related indicators in the current sustainability report that conform to new reporting boundaries for NHAI and Concessionaires/Contractors, as deemed appropriate.

Environmental Stewardship and Management

The Environment Division at NHAI, has established an elaborate procedure for collecting and reviewing the environmental data, including energy usage, carbon emissions, water consumption, waste generation, and material utilisation for the purpose of this report. NHAI integrates stringent environmental management requirements into its contractual agreements with Concessionaires/Contractors. Every project mandates the development and approval of Environmental Management Plan across various phases. These plans, formulated as a continuation of Environmental Impact Assessment studies, strengthen risk management processes, and ensure compliance with environmental safeguards. Adherence to environmental compliance and standards is a vital aspect of NHAI's operations, and the operational processes are periodically updated by NHAI to ensure compliance with new rules and context-specific requirements to ensure on sustainable road construction approaches.

The contractual framework outlines specific guidelines and procedures addressing environmental considerations during project execution. Many of the partner Concessionaires/Contractors have secured ISO 14001:2015 certification, demonstrating alignment with Indian environmental laws, regulations, and directives from regulatory bodies.

The NHAI plays a pivotal role in shaping the nation's infrastructure while balancing the need for sustainable development. As the custodian of India's extensive highway network, NHAI recognises the critical importance of integrating environmental stewardship into its projects. Highways not only connect regions and foster economic growth but also traverse diverse ecosystems, making it imperative to minimise environmental impacts. NHAI is committed to adopting eco-conscious practices, addressing challenges such as biodiversity preservation, resource efficiency, and climate resilience.

To strengthen its sustainable practices, NHAI has engaged in collaborative partnerships and organised national workshops aimed at integrating environmental best practices in infrastructure projects. During the year workshops were hosted by NHAI that brought together government officials, environmental experts, and

industry leaders to discuss critical issues in sustainable road infrastructure. Topics of focus included eco-friendly mitigation measures for wildlife, effective environmental impact assessments (EIAs), forest clearances, and adherence to coastal regulation guidelines. These panel discussions highlighted the need for a unified approach in sustainable project execution, emphasising collaboration among all stakeholders from the early stages of project design to post-construction maintenance. Senior officials advocated for embedding eco-friendly practices within the project's lifecycle, ensuring the highways' long-term environmental resilience and adaptability. This collective commitment aims to reduce environmental disruptions, safeguard biodiversity, and support local ecosystems along the nation's highways.

ENSURING THE MITIGATION OF ENVIRONMENTAL IMPACT

Before initiating any project, NHAI conducts preliminary impact assessments and secures requisite clearances from relevant authorities, such as the Forest Department, Central Ground Water Board (CGWB), and Revenue Department. Proactive implementation of recommended measures helps mitigate pollution, contamination, and environmental risks throughout the project lifecycle.

ENVIRONMENTAL CLEARANCE FOR BROWNFIELD AND GREENFIELD PROJECTS

As per the Gazette notification S.O. 2559 (E) dated 22 August 2013, the national highways and expansion of highways greater than 100 km, involving additional right of way greater than 40 m on existing alignments and 60 m on realignments or bypasses involving land acquisition and passing through more than one state, require a prior environmental clearance.

NHAI ensures that all its projects are aligned to the requirements of the EIA Notification, NHAI conducts detailed Environment Impact Assessment studies and prepare project specific Environmental Management Plans.

NHAI is determined to proactively traverse the path of inclusive growth and sustainable development. The Environment Division at NHAI ensures that all its projects are aligned to the requirements of the EIA Notification, 2006, and subsequent amendments. Detailed Environmental Impact Assessment studies are conducted for both Brownfield and Greenfield projects, in accordance with the EIA notification. The project-specific Environmental Management Plans are prepared for both the construction and operation phases. The Expert Appraisal Committee of MoEFCC conducts a thorough examination of EIA and EMP reports, public consultation proceedings and detailed project report to accord required environmental clearance, as appliable. In addition, compliance reports on environmental aspects are submitted to MoEFCC on a regular basis, which are made available on the web portal of MoEFCC. The ongoing monitoring conducted by State Pollution Control Boards and State Forest Departments further underlines NHAI's commitment to environmental accountability.

NHAI has established comprehensive procedures for Concessionaires/Contractors to address key environmental challenges, including land degradation mitigation, water pollution control and abatement, water conservation and resource management, and sustainable waste management practices. Through the Environment Division, it ensures that all the conditions of all statutory clearances are being met. This includes the conditions of Environment Clearance, Forest Clearance, Coastal Regulation Zone (CRZ) clearance, local approvals, and more. This is done regularly as part of intensive monitoring. The effort is to strictly adhere to the statutory regulations. Further, the Environment Division conducts regular monitoring and evaluations of the Concessionaires/Contractors' compliance with the provision of EMP.

Besides meeting its statutory obligations, which have been indicated and budgeted under the Environmental Management Plan (EMP) in terms of contributions to or for schools, hospitals, dispensaries, or public facilities in the green field or brownfield projects, NHAI is directly or indirectly addressing its societal and humanitarian commitments, either directly or through its Concessionaires/Contractors. NHAI mandates its Concessionaires/Contractors to create a holistic Environment Management Plan (EMP), which is part of the overall road approval procedure. Under the EIA notification of 2006 and its further amendments, the environment clearance given by MoEFCC has a component of the environment management plan wherein there is a specific provision about different components. NHAI undertakes the compliance with the said activities and timely uploading on the MoEFCC portal.

ENVIRONMENTAL CLEARANCE FOR GREENFIELD PROJECTS

When it comes to greenfield projects, which involve the construction of new roadways or significant to existing highways, the NHAI requires developers to acquire environmental approval from the Ministry of Environment, Forest and Climate Change. The requirements for obtaining environmental clearance may vary depending on the project and its environmental impact. However, some common conditions that developers may need to comply with include:

01 Conducting an Environmental Impact Assessment (EIA) study to identify potential environmental impacts of the project.

02 Developing a detailed Environmental Management Plan (EMP) to mitigate adverse impacts on the environment.

03 Obtaining all necessary permits and clearances from relevant authorities

04 Implementing measures to prevent pollution, such as wastewater treatment and waste management.

05 Compensating for any loss of biodiversity or ecological services resulting from the project

06 Undertaking measures to conserve and enhance the environment, such as afforestation and soil conservation.

07 Monitoring the environmental impacts of the project during construction and operation phases

08 Undertaking a Social Impact Assessment (SIA) to identify potential social impacts of the project and developing a plan to address them.

09 Establishing a grievance redressal mechanism to address complaints from affected communities.

These conditions are designed to ensure that green field projects are developed in a sustainable manner, with minimum adverse impact on the environment and the local community. NHAI/Developers/Concessionaires/ Contractors comply with these conditions and obtain clearance from the Ministry of Environment, Forest, and Climate Change before proceeding with the project.

ENVIRONMENTAL MANAGEMENT PLAN

The EMP is prepared with the objective to implement the project in an environmentally sustainable manner, where contractor/concessionaire understand the potential environmental impacts arising from the sub-project and take appropriate actions/mitigation measures to properly mitigate/manage such environmental impacts. The Concessionaires/Contractors commit to identifying the environmental and social impacts on the project road as part of the EMP.

The EMP ensures that the road construction activities are undertaken in a responsible, non-detrimental manner with the objectives of (i) providing a proactive, feasible, and practical working tool to enable the measurement and monitoring of environmental performance on site; (ii) guiding and controlling the implementation of the findings and recommendations of the environmental assessment conducted for the sub-project; (iii) detailing specific actions deemed necessary to assist in mitigating the environmental impacts of the project road; and (iv) ensuring that safety recommendations are complied with.

The Authority Engineer/Independent Engineer ensures that the Concessionaire/Contractor implements the EMP, with the PIU bearing the overall accountability. The PIU ensures that the engineer receives regular quality checks and advice by training them and monitoring activities to guarantee that all EMP rules and requirements translate into "contract documents" and are followed precisely. The Concessionaire/Contractor is responsible for implementing the EMP and follows all mitigation measures in conjunction with their activities. The Concessionaire/Contractor complies with the provisions of the EMP.

The budget for putting the EMP into action is part of the bid or construction contract and comes in the form of technical specifications and environmental performance requirements. The costs incurred on the implementation of EMP are incidental to the civil works, and therefore, no separate environment budget/cost is provided to the Concessionaire/Contractor for the implementation of EMP. The Concessionaire/Contractor ensures the effective implementation of the EMP during the preconstruction, construction, and demobilisation stages. PIU implements the EMP for the operation stage.

ENVIRONMENTAL MANAGEMENT MEASURES DURING EMP

The Environmental Management Plan (EMP) guides the environmentally sound construction of the project road and ensures efficient lines of communication and coordination between the PIU/Authority Engineer, Concessionaire/ Contractor. The EMP is prepared for three stages of project road construction activities: (i) Pre-construction Stage; (ii) Construction Stage; and (iii) Demobilisation Stage. The PIU/PMU implements the EMP during the operation stage.

The EMP assigns responsibility to the Concessionaire/ Contractor to implement necessary mitigation measures. Any lapse in implementing the same attracts the damage clause specified in the EMP. Any complaints from the public, within the scope of the concessionaire/contractor, are to be formally registered with the PIU and communicated to the Concessionaire/Contractor. If these complaints are not properly addressed within the time intimated by the PIU, they are also treated as major lapses, and appropriate corrective actions are ensured.

FOREST CLEARANCE PROTOCOL

The areas where forest land is diverted for non-forestry purposes for the purpose of highway construction under The Forest (Conservation) Act, 1980 and amendment carried out from time to time the protocol as prescribed by the Ministry of Environment, Forests and Climate Change (MoEFCC) is followed in letter and spirit. Herein, the NHAI follows the Consolidated Guidelines and Clarifications issued under Van *(Sanrakshan Evam Samvardhan)* Adhiniyam, 1980 and Van *(Sanrakshan Evam Samvardhan)* Rules, 2023 and submits its Forest Clearance proposals to MoEFCC accordingly.

Table 15 Environmental management measures during EMP

A.	**Planning stage**	
	Responsibility: Planning and Execution - PIU	
	Diversion of Reserve Forest	
	Tree Cutting Permission	
	Preservation of Trees	
	Utility Shifting	
	Orientation of Implementing Agencies	
B.	**Pre-construction Activities by the Contractor/ concessionaires**	
	Planning and Execution – Contractor/concessionaires & Supervision & Monitoring - Engineer /PIU	
	Appointment and Mobilisation of Environment Officer	
	Regulatory Approvals	
	Common Property Resources (CPR's)/ Cultural/Religious Sites	
	Procurement of Machinery, Crushers, Batching Plants, etc and establishment of Plants/crusher.	
	Construction Camp Locations Selection, Design & Lay-out	
	Arrangement for Construction Water	
	Labour Requirement and compliance of labour regulations	
	Labour Requirement and compliance of labour regulations	
	Stockyard/Storage of Construction Material and Establishing Equipment Lay- down Area	
	Contractor/ concessionaires' Environmental & Social Management Plan	
C.	**Construction Stage**	
	Planning and Execution – Contractor/ concessionaires Supervision & Monitoring - Authority Engineer /PIU	
	Procurement of Construction Materials	**Protection of Drainage and Surface Water Bodies**
	Quarry operations & crushers for procurement for aggregate and other construction materials	Drainage and Control of Accumulation of Water
	Transporting Construction Materials	Siltation of Water Bodies and Degradation of Water Quality
	Work/Construction Zone Safety	**Mitigation Measures for Flora & Fauna**
	Work/Construction on Zone Safety	Occasional Presence of Leopards
	Site Clearance (Clearing and Grubbing)	Aquatic Fauna in the river near and crossed by the subproject
	Clearing, grubbing and levelling	**Slope Protection and Control of Soil Erosion**
	Stripping, stocking and preservation of top soil	Slope Protection and Control of Soil Erosion
	Controlled Blasting for Cuttings of Rocks/Hills	**Longitudinal Drains Along Road Sections**
	Controlled Blasting for Hill Cutting	Construction of longitudinal drains along the road
	Dismantling of Construction & Demolition Wastes	**Longitudinal Drains Along Road Sections**
	Dismantling of old culverts/ bridges	Construction of longitudinal drains along the road
	Generation & disposal of debris from dismantling of existing road	**Sensitive Receptors- Impact Management**
	Utilisation of Hill's cutting Materials	Sensitive Receptors- Impact Management
	Disposal of construction debris	
	Pollution Control	**Personal Safety and Health**

	Control of Water Pollution	Personal Safety Measures for Labours and Staff
	Control of Water Pollution from Fuel and Lubricants	Emergency Management
	Waste Water from Labour Camp	Risk Force Measure
	Air Pollution	First Aid Facility
	Control of Dust Pollution	Occupational Health and Safety of Workers
	Emissions from Construction Vehicles, Equipment and Machineries	**Labour/Construction Camp and Project Site Management**
	Noise Pollution	Labour Camp
	Noise Levels from Construction Vehicles and Equipment's	Accommodation for Laborers
	Environmental Monitoring	HIV/AIDS Prevention Measures
	Environmental Monitoring- Construction Stage	Potable Water for Workers
	Sites Clean-up and Restoration (On Contractor/ concessionaires' Demobilization)	Sanitation and Sewage System at Labour Camp
	Clean-up Operations, Restoration and Rehabilitation	Solid Waste Collection and Disposal
	Land Rehabilitation	**Archaeological Resources and Cultural Properties**
	Borrow Area Rehabilitation	Chance Found Archaeological Property
		Impacts Cultural Properties
D.	**Post Construction Stage**	
	Planning and Execution - PIU Supervision & Monitoring - PMU	
	Environmental Monitoring- Post Construction Stage	
	Monitoring of Bio- Engineering and Landscaping	
	Soil Erosion and Monitoring of Borrow Areas	

The performance indicators, identified as significant in affecting the environment critically, are evaluated for (a) efficacy of environmental mitigation measures for controlling air, noise, and water pollution, (b) compliance with the suggested environmental management measures, and (c) determining efficacy and usefulness of the proposed mitigation measures including the Wildlife Mitigation & Management Plan and Soil & Moisture Conservation Plan (if needed) for the project road.

ENSURE CIRCULARITY AND RESOURCE EFFICIENCY IN EMP.

The EMP encourages the efficient use of resources and includes steps to do so, such as reusing cut materials, using local aggregates, recycling bituminous materials from the existing crust, and reducing the use of high-grade cement in concrete construction by using locally available low-grade cement that does not produce as much heat. This lowers carbon emissions and heat emissions.

Rainwater harvesting, the creation of artificial storage ponds, the use of energy dissipation techniques such as gabion walls in steps, and the channelisation of EMP all contribute to water conservation and mitigate the environmental impact of the project. These measures not only improve the highway's sustainability, but also safeguard and preserve local ecosystems over time.

The implementation of these strategies aims to mitigate adverse environmental impacts while promoting biodiversity and sustaining local ecosystems. Furthermore, community involvement in these initiatives ensures greater awareness and stewardship towards the preservation of natural resources.

PROMOTING ENVIRONMENTAL AWARENESS

NHAI recognises environmental awareness as a fundamental pillar of sustainable development. To promote compliance and proactive environmental protection, all new inductees receive environmental awareness training. Additionally, Concessionaires/ Contractors are encouraged to conduct awareness campaigns for employees and stakeholders throughout project implementation.

Through initiatives like the Green Highways Programme, NHAI is committed to resource conservation, energy efficiency, and biodiversity enhancement. The plantation drives and transition towards clean energy and sustainable waste management practices reinforce NHAI's dedication to becoming an environmentally responsible and conscious organisation.

As a key enabler of **Mission LiFE,** NHAI is actively integrating sustainable practices into its infrastructure development. By fostering large-scale community participation in green initiatives, NHAI aligns with Mission LiFE's vision of mobilising individuals and institutions toward environmental conservation. The organisation is also exploring innovative approaches such as carbon sequestration through afforestation, sustainable road construction techniques, and energy-efficient highway infrastructure. Additionally, capacity-building programs and awareness campaigns are being conducted to encourage responsible environmental actions among stakeholders, reinforcing NHAI's role in driving measurable impact for a greener and more sustainable future.

EFFICIENT USE OF ENERGY IN ROAD CONSTRUCTION

Being an energy intensive sector, NHAI acknowledges significance of sustainable energy management of the everyday operations from planning, construction, and management. Over the decade, NHAI has undertaken a variety of initiatives focused on enhancing energy efficiency and promoting energy conservation throughout its multifaceted operations across different geographical regions. This has resulted in a reduction of emissions from both direct and indirect energy sources. NHAI is committed to encourage Concessionaires/Contractors in enhancing energy efficiency while steadily incorporating renewable energy sources into their operations. Continuous monitoring and active engagement with stakeholders are conducted for refining and optimising sustainable energy practices, which will ultimately result in a substantial decrease in NHAI's energy footprint in near future. NHAI's energy consumption pattern reflects a diverse mix of fuel sources, with a notable reliance on conventional fossil fuels such as diesel, petrol, and kerosene. Conventional fuels remain the primary energy source for NHAI's operations, largely due to the nature of its projects, which often span remote and challenging terrains. Ensuring reliable fuel availability in these areas has been essential for seamless infrastructure development and connectivity, with combined diesel consumption recorded at NHAI and its Concessionaires/Contractors being 4,99,17,993 GJ in FY 22-23 and 5,10,60,213 GJ in FY 23-24. The adoption of cleaner energy sources is showing promising growth. Biogas usage by Concessionaires and Contractors increased significantly—from 21,907 GJ in FY 2021–22 to 170,398 GJ in FY 2023–24—indicating substantial progress toward sustainable energy integration. Similarly, although still in its early stages, renewable electricity usage was recorded for the first time at NHAI in FY 2023–24, with a usage of 1 GJ. Additionally, its adoption among Concessionaires and Contractors has seen a slight increase. These developments highlight NHAI's gradual transition toward greener energy alternatives while meeting the rising energy demands of its operations.

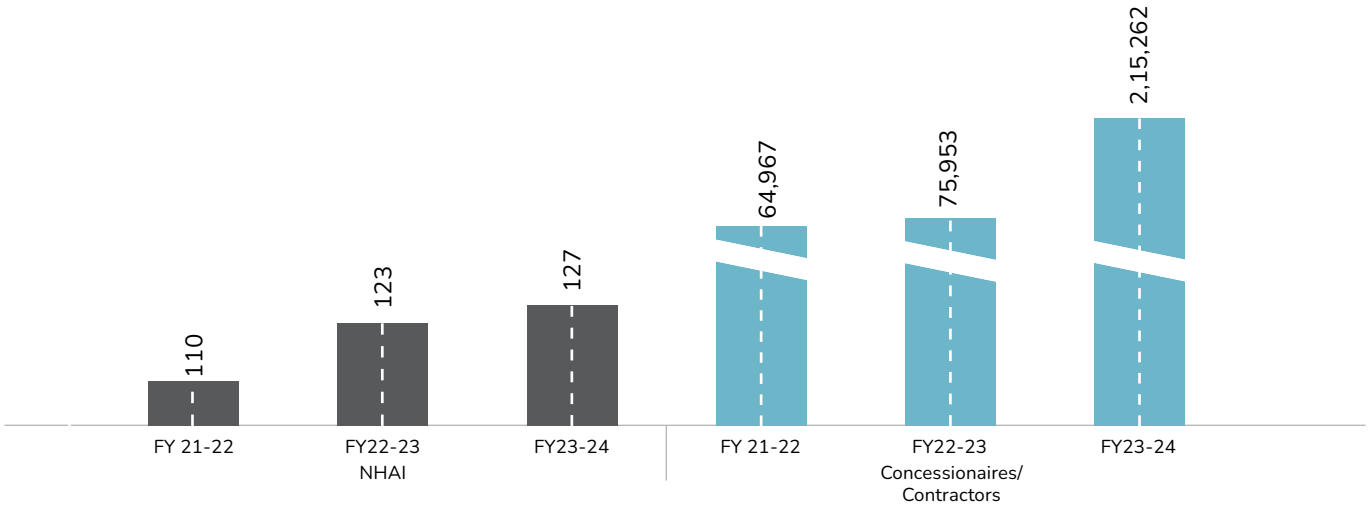


Figure 50: Energy Consumption (GJ) from renewable fuel* (biogas and biodiesel) by NHAI and its Concessionaires/Contractors.
***NHAI consumes Biodiesel as a Renewable Fuel. Whereas, the *Concessionaires/Contractors* use both Biofuel and Biogas**

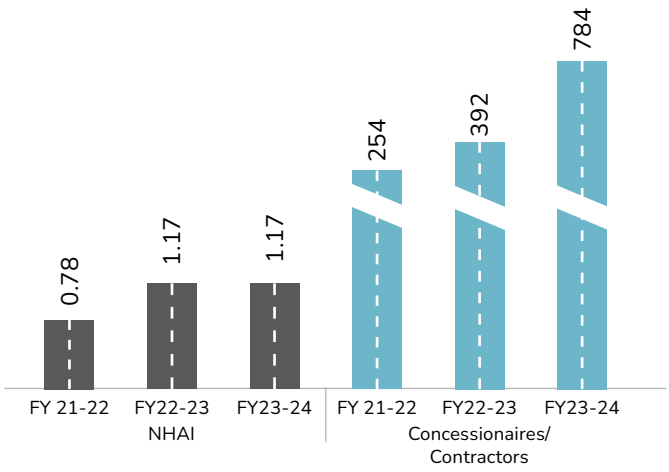


Figure 51: Renewable electricity consumption (GJ) by NHAI and its Concessionaires/Contractors

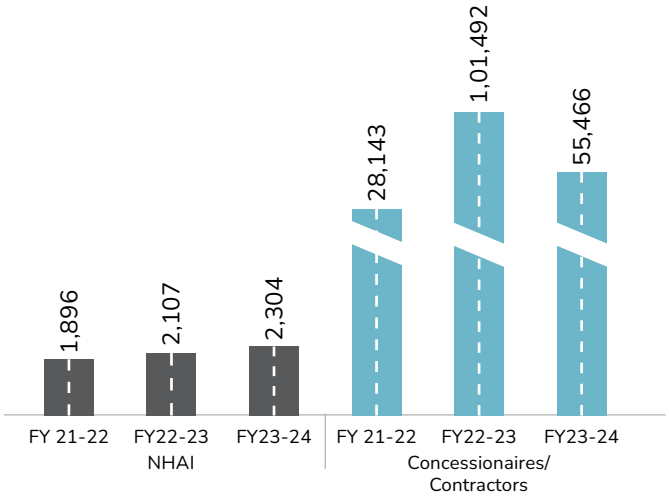


Figure 52: Energy consumption (GJ) from use of grid electricity by NHAI and its Concessionaires/ Contractors.

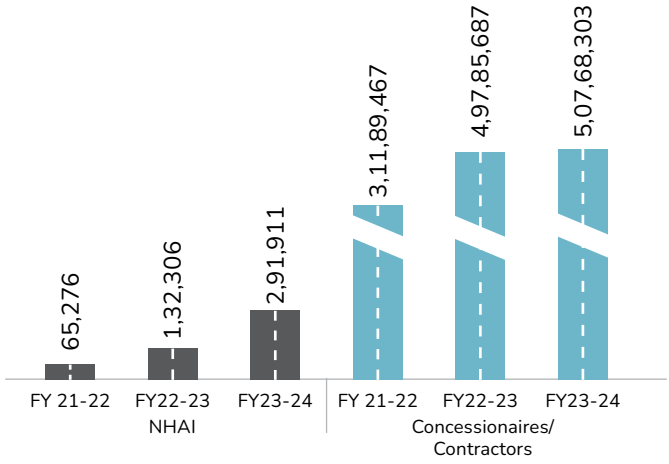


Figure 53: Energy Consumption (GJ) from use of diesel by NHAI and its Concessionaires/Contractors within the organisation.

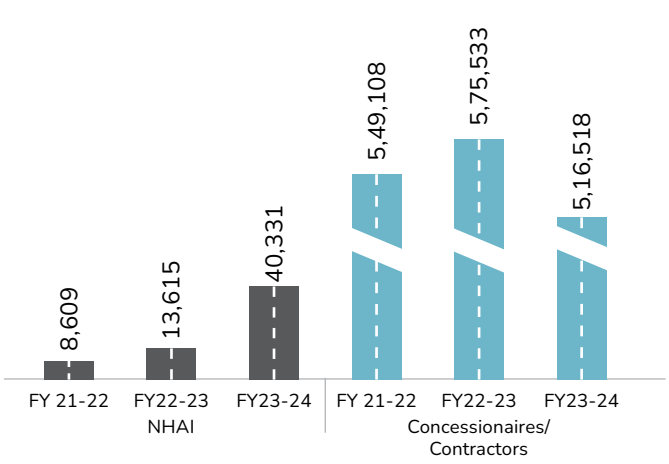


Figure 54: Energy consumption (GJ) from use of other fossil fuels (petrol, kerosene, CNG and LPG) by NHAI and its Concessionaires/Contractors within the organisation.

*NHAI consumes Biodiesel as a Renewable Fuel. Whereas, the Concessionaires/Contractors use both Biofuel and Biogas

Table 16 Cumulative Energy Consumption within and outside NHAI (TJ)

Energy Sources	FY21-22	FY22-23	FY23-24
Diesel	128.14	189.88	365.33
Petrol	12.75	21.83	25.24
CNG	2.27	5.44	7.03
LPG	0.72	1.26	16.84
Kerosene	0.12	0.13	1.31
Biodiesel	0.11	0.12	0.13
Biogas	0.00	0.00	0.00
Electricity	1.90	2.11	2.30
Renewable electricity	0.0008	0.0012	0.0012

SOLAR POWER SYSTEMS FOR SUSTAINABLE HIGHWAY OPERATIONS

In line with its commitment to sustainability and renewable energy, the National Highways Authority of India (NHAI), RO-Bengaluru, has successfully implemented solar power systems at toll plazas along the Bijapur-Hungund Section of NH-13. These initiatives not only showcase NHAI's leadership in sustainable infrastructure development but also demonstrate the tangible environmental and economic benefits of adopting renewable energy solutions.

Project Overview

The solar power systems were INSTALLED at two key toll plazas: Bijapur Plaza and Nagarhalla Plaza. Each plaza is equipped with a 50 KW on-grid solar power system designed to reduce greenhouse gas emissions, improve air quality, and mitigate climate change impacts. The projects exemplify NHAI's efforts to transition to cleaner energy sources and enhance the sustainability of highway operations.

Performance Highlights

99,564 kWh
combined generation from two toll plazas

72,383 $MTCO_2e$
avoided in GHG Emissions

₹ 9,15,350 combined savings from the two toll plazas

The solar power installations at Bijapur and Nagarhalla Plazas are testament to NHAI's dedication to environmental stewardship and operational efficiency. Both projects have played a critical role in lowering carbon emissions, protecting ecosystems, and contributing to India's climate goals. By leveraging renewable energy, NHAI has not only managed to reduce its carbon footprint but also set a benchmark for sustainable infrastructure development in the transportation sector. These projects will pave the way for broader adoption of solar energy across India's national highways as these projects are aligned with India's renewable energy targets under the National Action Plan on Climate Change (NAPCC).

Advancing towards a Low-Carbon Emissions Road Infrastructure

In the current reporting structure, NHAI has expanded the reporting boundary outside its direct operations. For FY2023-24, the scope of the report comprises NHAI's head office (HO), 25 regional offices (ROs), and the activities and processes of Concessionaires/ Contractors engaged by NHAI for construction, operation, and maintenance of the road infrastructure. NHAI has calculated and reported the Scope 1, Scope 2, and Scope 3 GHG emission for its operations covering the reporting boundary. The Concessionaires/ Contractors reported on only Scope 1 and 2 GHG emission data.

Figure 55: Nanguneri Kanyakumari Highway

GHG EMISSIONS NHAI

The fuel consumption by NHAI (for its own assets) was included in the Scope 1 calculation whereas for Scope 2 Emission, the same is electricity sourced from State and National Grids for its direct operational activities was included. Scope 3 included emissions from supply chain. NHAI has reviewed reported emission values for FY 21-22 to conform to new reporting boundaries for NHAI and Concessionaires/Contractors, as deemed appropriate.

NHAI's emissions profile reflects the operational scale and energy demands of large-scale infrastructure development, particularly in road construction and maintenance. Over the past three fiscal years, total emissions from NHAI's own activities have increased from 15,491 $MTCO_2e$ in FY21-22 to 36,260 $MTCO_2e$ in FY23-24, in line with the organisation's growing footprint and infrastructure expansion.

Although Scope 1 emissions, which represent direct emissions from fuel consumption, have risen from 5,386 $MTCO_2e$ in FY21-22 to 24,113 $MTCO_2e$ in FY23-24, this increase corresponds with the expanding scale of NHAI's projects, particularly in remote and challenging terrains where diesel-powered equipment is essential for seamless execution. As NHAI continues to enhance its infrastructure network, it remains focused on improving fuel efficiency and exploring alternative

energy solutions. Scope 2 emissions, associated with purchased electricity, have remained stable, increasing moderately from 4,962 $MTCO_2e$ in FY21-22 to 6,031 $MTCO_2e$ in FY23-24. This trend highlights NHAI's ongoing efforts to optimise energy consumption and progressively incorporate renewable electricity into its operations. While Scope 3 emissions, which account for indirect emissions from the value chain, have also increased, this growth reflects the natural expansion of infrastructure activities. NHAI continues to strengthen its collaboration with stakeholders to drive efficiencies across the supply chain.

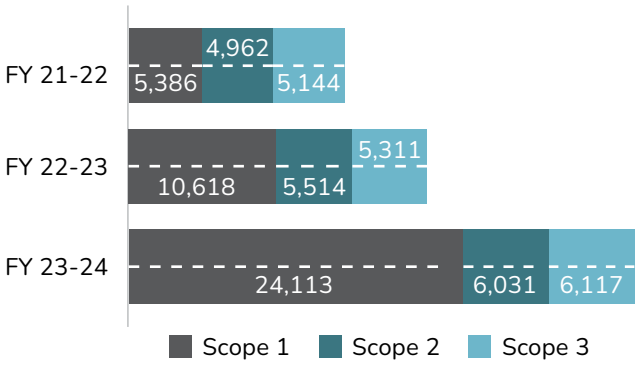


Figure 56: Scope 1, 2 and 3 GHG Emissions (in $MTCO_2e$), due to NHAI business operations

NHAI measures the GHG emission Intensity in metric tonnes of CO_2 equivalent per kilometre of road constructed, it has remained ≤1 $MTCO_2e$ /km. This reflects NHAI 's commitment to maintain and further reduce its emission intensity despite increasing project footprints with operations in extremely energy intensive terrain.

GHG EMISSIONS FROM CONCESSIONAIRES/ CONTRACTORS' BUSINESS OPERATIONS

The Concessionaires/Contractors emissions profile reflects the operational realities of large-scale infrastructure development, where fuel consumption plays a critical role in project execution, particularly in remote and challenging terrains. Scope 1 emissions, primarily from diesel usage, have increased in line with the expansion of road infrastructure projects, rising from 23,39,343 $MTCO_2e$ in FY21-22 to 37,86,328 $MTCO_2e$ in FY23-24. This underscores the sector's dependence on reliable conventional energy sources for construction and maintenance activities.

Scope 2 emissions, resulting from purchased electricity, have fluctuated over the years, peaking at 2,65,624 $MTCO_2e$ in FY22-23 before declining to 1,45,166 $MTCO_2e$ in FY23-24. This reduction highlights NHAI's progress in enhancing energy efficiency and incorporating renewable electricity into its operations. Notably, avoided emissions through renewable electricity adoption have grown substantially, from 4,55,084 $MTCO_2e$ in FY21-22 to 15,21,180 $MTCO_2e$ in FY23-24, demonstrating NHAI's commitment to advancing its clean energy transition. Meanwhile, Scope 3 emissions, which stem from indirect sources within the value chain, have remained minimal and stable, reflecting effective controls over outsourced activities and a commitment to optimising environmental performance across all aspects of infrastructure development.

Recognising the importance of emissions reduction, NHAI is actively exploring low-carbon construction technologies, alternative fuels, and renewable energy adoption to minimise its carbon footprint while maintaining efficiency in infrastructure development. These efforts align with NHAI's broader sustainability goals, ensuring that road construction and management evolve toward a more environmentally responsible future.

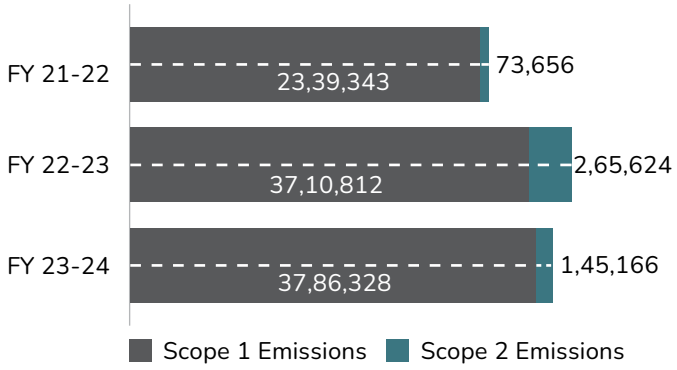


Figure 57: GHG emissions (Scope 1 and 2) in $MTCO_2e$ due to Concessionaires/Contractors' business operations.

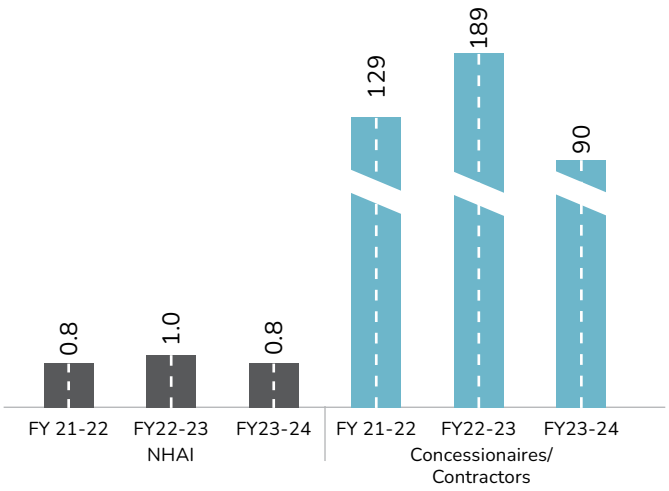


Figure 58: GHG emissions intensity ($MTCO_2e$ /km) for NHAI and Concessionaires/Contractors' business operations

The NHAI is currently at the planning stage with regard to attending embodied carbon in its road infrastructure and brain storming on issues to decarbonise its highways and to prepare futuristic net zero road map.

Air Quality

As a leading organisation in infrastructure development, the National Highways Authority of India (NHAI) has intensified its commitment to environmental sustainability through multiple strategic initiatives. With a focus on green infrastructure, NHAI is embracing innovative afforestation techniques, engaging with stakeholders on eco-friendly construction practices, and prioritising biodiversity. These efforts are not only transforming India's highways but are also playing a crucial role in enhancing the air quality. NHAI ensures that all the activities are in compliance with the provisions of Air (Prevention and Control of Pollution) Act, 1981 and the ambient air quality during the construction and maintenance phase meets National Ambient Air Quality Standards, 2009.

NHAI's multi-faceted sustainability strategy demonstrates a comprehensive approach to environmentally conscious infrastructure development. By combining green cover expansion, technical partnerships for geotechnical assessments, and active engagement with stakeholders, NHAI ensure that the air quality standards and conditions indicated in EMPs are

In response to air quality concerns and as directed by the Commission of Air Quality Management (CAQM), NHAI has established a Dust and Control Management Centre to monitor dust control measures at National Highway construction sites across Delhi-NCR. This initiative aims to improve air quality around major projects like the Dwarka Expressway, UER II, Delhi-Amritsar-Katra Expressway, and Delhi-Dehradun Expressway. NHAI mandates Concessionaires/Contractors to comply with dust control protocols from CAQM and pollution control boards, implementing measures such as:

- Use of mechanical sweeping machines on completed projects.
- Regular water sprinkling at all construction sites.
- Deployment of anti-smog guns at construction sites and batching plants
- Covering construction and demolition materials with green nets or cloth

These actions align with the Graded Response Action Plan (GRAP), which NHAI enforces rigorously to help control dust and maintain air quality standards in the NCR region.

complied during construction and management of road highways. This approach not only addresses environmental concerns such as carbon sequestration, biodiversity conservation, and soil quality but also contributes to improved public health, enhanced air quality, and aesthetic value for commuters and communities alike.

Table 17 Cumulative values of air quality indicators from the business operation of Concessionaires/Contractors

	Measure	FY 21-22	FY 22-23	FY 23-24
Oxides of Nitrogen (NOx)	kg	70,574.29	64,303.14	38,364.27
Oxides of Sulphur (SOx)	kg	2,020.63	2,063.02	2,665.82
Persistent organic pollutants	µg /m^3	145.00	122.90	112.72
Volatile organic compounds	µg /m^3	75.16	198.86	276.01
Particulate matter (PM2.5)	µg /m^3	1,027.75	1,418.35	1,655.24
Particulate matter (PM10)	µg /m^3	1,947.54	2,657.22	4,172.93
Suspended Particulate Matter (SPM)	kg	4,156.30	5,271.24	3,028.23

Note: The Table does not capture air quality data from Chandigarh and Jabalpur.

NHAI ensures that the measures indicated in an EMP to mitigate air pollution, if any, are implemented adequately by Concessionaires/Contractors. Some measures which usually form a part on an EMP are highlighted below:

- Road construction works specially earth work and movement of construction vehicles plying on the road during construction phase may add to dust and gaseous air pollution along the project road. Frequent dust suppression like water sprinkling on the road will be ensured by the use of water tankers.
- The Concessionaires/Contractors will procure the construction machineries, which conforms to the pollution control norms specified by the MoEFCC/CPCB/SPCB.
- Regular maintenance of vehicles to be used for materials transportation and equipment will be carried and vehicular pollution check will be mandatory.
- The excavated earth /construction materials will be stored properly so that it does not generate fugitive emissions.
- Cement bags will be stored and emptied in covered area to control fugitive dust emissions.
- While handling and emptying cement bags, workers will wear masks, hand gloves and protective goggles.
- Mask and other PPE shall be provided as a mandatory effort to the construction workers in dust prone areas.
- The Concessionaires/Contractors will ensure that all vehicles, equipment and machineries used for construction works will regularly be maintained and conform that pollution emission levels and comply with the requirements of CPCB and/ Motor Vehicles Rules. Pollution under control certificate (PUC) will be obtained for all vehicles engaged in the construction,
- DG sets will be provided with chimney of adequate height as per CPCB guidelines.
- Environmental monitoring will be carried out as per the monitoring plan.

Water Management

NHAI is committed to safeguarding and appropriate management of water since it acknowledges its significance as a resource that is vital to the growth of communities, the economy, and even biodiversity. To address water conservation, the NHAI has put best practices and measures into place. Concessionaires/ Contractors are encouraged to use surface water resources rather than drawing groundwater for building. In order to meet the water demands during road construction and maintenance, NHAI projects have used grey water, artificial surface reservoirs, and natural surface reservoirs. However, by creating a recharge plan at least as large as the amount of water being extracted, groundwater is sustainably obtained in areas lacking sufficient surface water.

National Highways Authority of India (NHAI) recognises the essential role of water for economic development, community welfare, and ecological health. With significant portions of India facing water stress, climate change has only amplified challenges due to shifting rainfall patterns and altered weather conditions. In response, NHAI has adopted a comprehensive approach to water management aimed at both conserving and efficiently utilising water resources across its projects.

EMBRACING BEST PRACTICES IN WATER CONSERVATION

To mitigate water scarcity, NHAI emphasises the use of surface water resources in construction, directing its Concessionaires/Contractors to prioritise rivers, lakes, and other available surface water sources. In addition to this, NHAI actively discourages groundwater extraction for construction to alleviate stress on aquifers and sustain local water tables. Projects under NHAI employ surface reservoirs—both man-made and natural—and make use of greywater recycling where feasible, addressing water needs for both construction and maintenance of highways.

Sustainable Groundwater Practices in Scarce Regions

In areas with limited surface water availability, NHAI implements controlled groundwater extraction with a dedicated recharge plan. This approach ensures that any water extracted is counterbalanced by an equivalent or greater recharge volume. This practice aligns with India's sustainable groundwater management efforts, aiming to replenish aquifers and maintain ecological balance in water-scarce regions.

Advanced Water Conservation Initiatives and Innovations

Beyond conventional methods, NHAI is exploring advanced water conservation measures. For instance, rainwater harvesting structures are being established along national highways to collect and store rainwater, contributing to groundwater recharge. These initiatives not only support NHAI's water management goals but also foster sustainable water practices within the communities adjacent to highways.

This dedication to sustainable water use exemplifies the broader vision of building resilient infrastructure that not only enhances connectivity but also respects and preserves natural resources for future generations.

SURFACE WATER MANAGEMENT

Innovative Soil Management for Water Conservation in Highway Construction

In an effort to integrate environmental stewardship into highway development, NHAI has adopted an innovative approach to soil excavation that promotes the creation of new water bodies. By strategically sourcing soil for road construction, NHAI aims to transform these excavation sites into sustainable surface water bodies, especially in rural areas where water resources are often scarce. This initiative not only meets the construction material requirements but also addresses water scarcity, bringing long-term benefits to local communities and enhancing the landscape around national highways.

Celebrating *'Azadi ka Amrit Mahotsav'* through Regional Collaboration

As part of its commitment to sustainable infrastructure development, NHAI organised a regional conference in Srinagar, bringing together representatives from Jammu & Kashmir, Himachal Pradesh, Punjab, Haryana, and Delhi. The conference served as a collaborative platform for NHAI officials and regional stakeholders to discuss achievements, challenges, and strategies in water management, with a focus on sustainable practices that support both infrastructure development and resource conservation.

Nationwide Water Rejuvenation Mission: Utilising Excavated Soil for Pond Restoration

In alignment with the national water conservation initiative launched by the central government, encouraging NHAI to use soil excavated from ponds and tanks across the country. This directive aligns with a broader mission to rejuvenate 75 water bodies in each district across all states as part of the ***'Azadi ka Amrit Mahotsav'*** initiative, contributing to large-scale water conservation and ecosystem restoration efforts. This initiative underscores a commitment to replenishing water resources and enhancing rural water infrastructure, ensuring sustainable access to water for agricultural and community use.

The Amrit Sarovar Initiative: Building Ecologically Sustainable Water Bodies

Furthering its dedication to ecological balance, NHAI has introduced the Amrit Sarovar initiative, to establish and rejuvenate ponds or ***"Amrit Sarovars"*** alongside National Highways. These ponds will serve as water conservation sites, facilitating both surface water rejuvenation and groundwater recharge. The construction of these ponds will contribute to the nationwide effort to develop sustainable infrastructure while addressing critical water needs in communities across India.

Through innovative soil management practices and a strong commitment to water conservation, NHAI demonstrates a clear dedication to sustainable resource management and ecological resilience. By integrating water management into every stage of infrastructure development, NHAI not only supports the advancement of the National Highway network but also enhances the environmental resilience and well-being of the communities it serves. This approach embodies NHAI's vision of building highways that support both progress and sustainability, setting a standard for environmentally conscious infrastructure development.

GROUNDWATER MANAGEMENT AT NHAI

NHAI has adopted an integrated approach to water management, prioritising conservation, sustainable use, and recharge across its highway projects. Recognising water as a critical resource for economic growth, ecosystems, and communities, NHAI actively implements responsible water management practices, particularly in water-stressed regions of India where climate change has impacted rainfall patterns and local water availability.

In alignment with the MoRTH guidelines and the Standard Operating Procedure for Rainwater Harvesting and Artificial Recharge along National Highways (MoRTH Circular, September 2019), NHAI mandates water conservation measures across all projects. Concessionaires/Contractors are encouraged to source water from surface reservoirs or reuse grey water rather than extracting groundwater. Where groundwater is essential, NHAI ensures a sustainable balance by implementing equivalent or greater recharge systems, offsetting the amount extracted.

NHAI's water conservation approach includes several measures:

01

Rainwater Harvesting

Detailed Project Reports (DPRs) for highways now include dedicated provisions for rainwater harvesting and artificial recharge structures, customised based on local rainfall data and geological conditions. Each rest stop, toll plaza, and way-side amenity incorporate rainwater harvesting systems, ensuring efficient water capture, and reducing demand on local resources.

02

Tunnel Water Harvesting

NHAI launched a first-of-its-kind initiative to capture and store seepage water within highway tunnels. In the Nela tunnel on the Kiratpur-Manali Highway, this pilot project successfully collected water seepage, preventing structural damage while offering a supplementary source of clean water. This harvested water is redirected to support local communities, providing a reliable resource for both drinking and agricultural use.

03

Creation of 'Amrit Sarovar' Ponds

As part of India's "*Azadi ka Amrit Mahotsav",* NHAI aims to create around 510 ponds across India and has already created 467 Amrit Sarovars. These ponds serve as water reservoirs and ground recharge systems, contributing to rural water security and offering a dependable source of surface water for local communities.

Figure 59: Amrit Sarovar on the Nagpur-Umred NH

Additionally, as part of the nationwide water conservation mission led by Prime Minister Narendra Modi, NHAI is utilising soil excavated from highway construction to develop or restore over 50,000 ponds and water bodies across India, significantly enhancing rural water storage. This initiative not only supports water availability but also contributes to groundwater recharge and local biodiversity, exemplifying NHAI's dedication to environmental stewardship. Through such strategic, multifaceted water management efforts, NHAI advances sustainable highway infrastructure, creating value for both the environment and the communities it serves.

WATER CONSUMPTION AT NHAI

NHAI is committed to minimising groundwater usage during the construction and operation phases of its projects, especially in water-stressed regions of India. Recognising the critical importance of responsible water management, NHAI leverages comprehensive Environmental Impact Assessments (EIA) and data from the Central Groundwater Authority (CGWA) to assess water availability and stress levels in specific areas. This ensures that projects are informed by up-to-date insights on local water resources, allowing for targeted conservation strategies. NHAI emphasises alternative water sources like rainwater harvesting and surface reservoirs to reduce groundwater dependence. The organisation has also adopted water storage practices, enabling the recycling and reuse of water wherever possible, thereby reducing dependency on existing water sources and mitigating water stress. This strategy not only conserves essential water resources but also aligns with NHAI's commitment to sustainable infrastructure and supports regional water resilience efforts for long-term ecological balance.

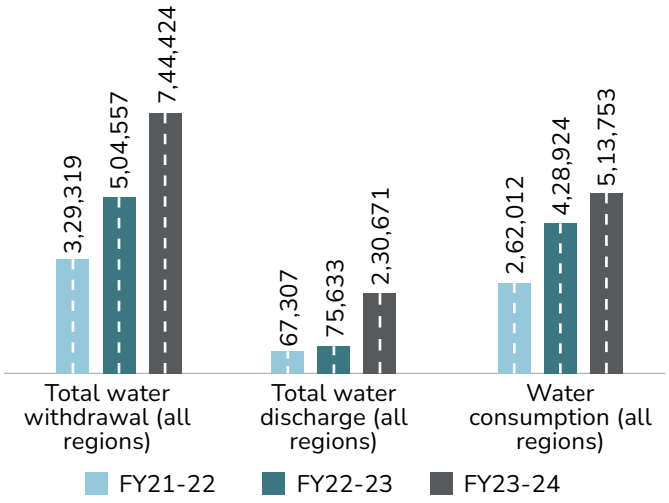


Figure 60: Water Consumption by NHAI (in kL)

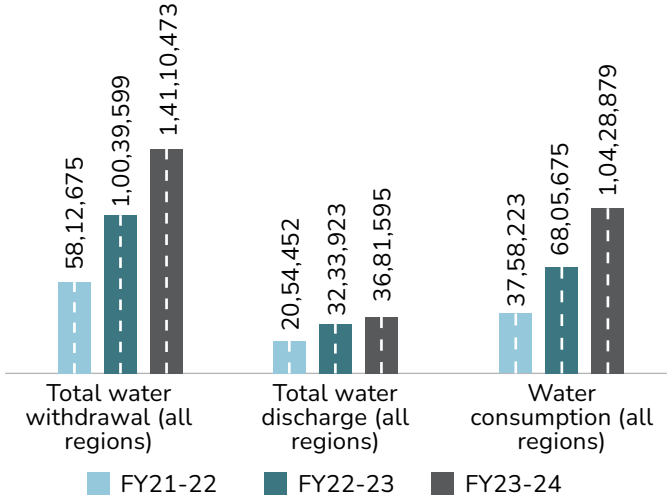


Figure 61: Water Consumption by Concessionaires/ Contractors (in kL)

Table 18 Water Consumption during FY 23-24

	NHAI's Operations	Concessionaire/ Contractor
Total Water Consumption from all regions in kL	5,13,753	1,04,28,879
Total Water Consumption from all regions with water stress in kL	3,908	24,62,689

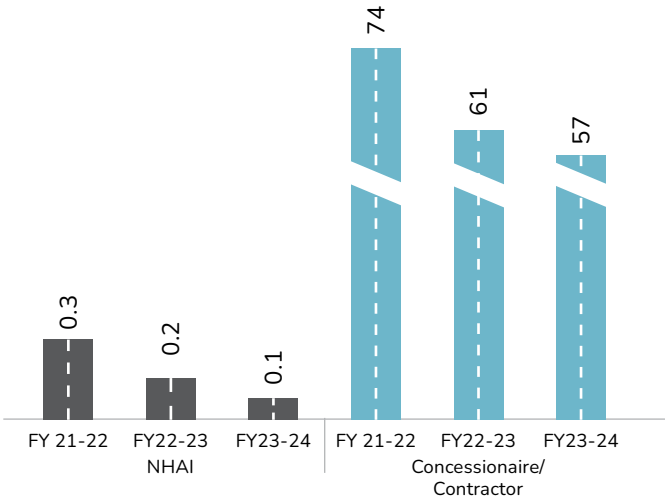


Figure 62: Water use intensity (kL/km) for NHAI and Concessionaires/Contractor business operations in water stressed areas.

Waste Management

NHAI's large-scale infrastructure projects involve extensive material utilisation, including road construction, maintenance, and operational activities. Key inputs such as aggregates, asphalt, concrete, steel, and bitumen play a crucial role in infrastructure development. Through various activities, including excavation, earthwork, and construction, a mix of materials is generated, requiring strategic management. The outputs of these processes include valuable opportunities for recycling, reuse, and responsible disposal, enabling NHAI to enhance resource efficiency and environmental stewardship.

WASTE GENERATION ACROSS NHAI'S VALUE CHAIN

NHAI takes a comprehensive approach to managing waste at all stages of its value chain:

01

Own Activities (Direct Management)
On-site processes such as construction and maintenance generate materials that are actively managed through sustainable techniques, including waste segregation, material reuse, and responsible disposal practices.

02

Upstream Considerations
Sustainable sourcing and material optimisation play a key role in ensuring that resources are efficiently utilised before reaching project sites, minimising potential waste generation at the procurement stage.

03

Downstream Initiatives
Post-construction and operational phases involve ongoing efforts to manage roadway maintenance materials, signage updates, and public waste collection along highways, reinforcing NHAI's commitment to cleanliness and sustainability under the Swachh Bharat Mission.

NHAI is committed to minimising its environmental impact through effective waste management and resource optimisation strategies. By prioritising the reduction, recycling, and responsible disposal of waste, NHAI aims to go beyond regulatory compliance and act as a responsible corporate entity. A significant initiative includes the use of plastic waste in highway construction, particularly in urban areas generating high volumes of plastic waste. Pilot projects in Tamil Nadu, Kerala, and a stretch of NH-48 near Dhaula Kuan in Delhi have successfully incorporated plastic waste into surface courses. The Delhi-Meerut Expressway and Gurugram-Sohna Highway also feature sections constructed using this innovative approach.

NHAI uses plastic waste through Concessionaires/ Contractors. Additionally, the combined use of fly ash and pond ash in construction has increased over the past three years, further demonstrating NHAI's commitment to sustainable practices. Through these initiatives, NHAI has successfully diverted **3,300 tonnes of non-hazardous waste** from disposal within its own operations, reinforcing its dedication to circular economy principles. By adhering to the Indian Road Congress guidelines, these efforts have significantly contributed to reducing environmental disruptions, with approximately seven tonnes of plastic waste eliminated for every kilometre of a four-lane highway constructed.

Table 19 Non-hazardous waste generated by NHAI.

Composition of Waste in MT	FY 21-22	FY 22-23	FY 23-24
Demolition waste (Non-Hazardous)	7,030.00	0.50	549.80
Organic Waste	20.42	21.09	45.52
Dismantling of existing road	12,958.00	150.00	450.00
RAP & Aggregate	0	260.00	350.00
Electrical Street Light poles	0	50.65	81.35
Metal Waste	0.01	71.01	127.01
Plastic	2.56	2.57	2.55
Concrete	13,500.00	89.38	90.00
DBM BC Scrap	0	40.00	60.00
Steel Scrap	22.00	47.50	185.52
Scarified Bituminous	0	25.00	0
Crusher Wastage	0	10.00	310.00
Used Tyres as Rubber	0	0	1.50
Admixture	0	7.50	16.30
WMM (Wet Mix Macadam)	0	10.00	10.00
Morrum	0	0	0

Table 20 Hazardous waste generated by NHAI

Composition of Waste in MT	FY 21-22	FY 22-23	FY 23-24
E-Waste (Hazardous)	0.01	0.05	0.08
Drums/Tins (Hazardous):	0.60	91.80	290.00
Chemical waste (Hazardous) if any	0	0	0
Used Batteries (Hazardous)	0.14	46.97	69.02
Waste Oil (Hazardous)	0	2,000.00	0
Bio-Medical Waste	0.01	25.00	35.00

Table 21 Waste Management by NHAI

	Hazardous Waste		
	FY 21-22	FY 22-23	FY 23-24
Waste generated (in MT)	0.76	2,163.82	394.10
Waste diverted from disposal (in MT)	0	0	0
	Non-Hazardous Waste		
Waste generated (in MT)	0.76	2,163.82	394.10
Waste diverted from disposal (in MT)*	0	0	0

*External procured waste (recycled for internal operations)

Table 22 Waste Management by Concessionaires/Contractors

	Hazardous Waste		
	FY 21-22	FY 22-23	FY 23-24
Waste generated (in MT)	1,50,318	8,46,339	8,22,491
Waste diverted from disposal (in MT)*	22,43,006	26,52,445	18,31,090
	Non-Hazardous Waste		
Waste generated (in MT)	18,60,871	68,41,548	1,01,81,995
Waste diverted from disposal (in MT)	2,39,628	13,84,934	7,22,115

*External procured waste (recycled for internal operations)

The data on hazardous and non-hazardous waste management by NHAI Concessionaires/Contractors over the past three fiscal years reflects significant progress in waste diversion efforts, alongside evolving challenges that present opportunities for further improvement. For non-hazardous waste, while there was a slight reduction in overall generation, the volume of waste diverted from disposal remained significant. However, a decline in diversion compared to the previous year highlights the need to strengthen recycling infrastructure and resource recovery initiatives to sustain high diversion rates and improve waste management efficiency. While hazardous waste generation has increased, it also reflects the growing scale and complexity of infrastructure projects. NHAI's efforts to divert hazardous waste from disposal remain ongoing but there is a need to enhance treatment mechanisms and adopt innovative solutions for safer disposal and minimisation of hazardous materials.

Recognising the unique waste management challenges in civil and road construction, NHAI is proactively refining its strategies to drive sustainable infrastructure development. The sector's large-scale material uses, and complex project sites demand innovative solutions to minimise environmental impact. By aligning with principles of circular economy and regulatory best practices, NHAI is strengthening Concessionaire/ Contractor compliance, optimising resource recovery, and integrating advanced waste treatment technologies to ensure more sustainable construction and road management practices.

NHAI has installed dedicated bins at its headquarters for the disposal of sanitary pads, which are considered biohazardous waste. The collected waste is sent to Padcare Labs for recycling, thereby contributing to the reduction of harmful environmental impacts and promoting sustainable waste management. This initiative helps decrease the burden on landfills while supporting environmental protection and public health.

Fly Ash in Road Construction

The National Highways Authority of India (NHAI) has actively endorsed the incorporation of fly-ash in various infrastructure projects, including road laying, embankments for roads and flyovers, shoreline protection initiatives, and the enhancement of low-lying areas within approved projects. This practice also extends to the backfilling of mines and serves as a sustainable alternative to traditional earthen materials. These efforts align with the directives issued by MoRTH and is also in accordance with the Government of India Gazette Notification regarding Fly Ash, dated 31 December 2021, along with subsequent amendment notifications.

NHAI has mandated the use of fly ash and pond ash in road and highway projects located within a 300-kilometre radius of coal-based thermal power plants, ensuring efficient utilisation of this by-product. By incorporating fly ash into its projects in accordance with IRC:SP:58-2001 Guidelines for the Use of Fly Ash in Road Embankments, and following the utilisation practices and design methodology outlined in IRC:SP:44, NHAI ensures sustainable embankment construction. By incorporating fly ash into its projects, following the guidelines specified in IRC: SP: 58-2001 *"Guidelines for use of Fly-ash in Road Embankments"* and utilisation as per IRC guidelines IRC SP 44, IRC 58 on the physical and chemical properties of fly-ash and the design methodology to be adopted for embankment construction.

The National Highways Authority of India (NHAI) has taken a leading role in promoting sustainable construction strategies, especially by integrating fly ash into highway construction initiatives. Fly ash, a by-product of coal combustion in thermal power plants, represents a sustainable alternative to conventional construction materials. Through the incorporation of fly ash, NHAI effectively mitigates the environmental consequences associated with waste disposal while simultaneously improving the quality and longevity of infrastructure.

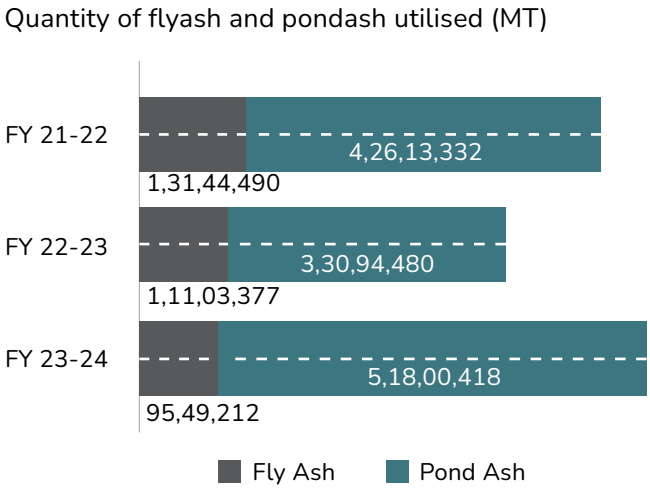


Figure 63: Use of flyash and pond ash in road construction activities.

The utilisation of fly ash in construction presents significant advantages, particularly in enhancing the strength and durability of concrete and embankments. The incorporation of fly ash into cement formulations enhances the density and durability of concrete, resulting in a material that exhibits increased resistance to cracking and improved load-bearing capabilities. Furthermore, incorporating fly ash in embankments presents an economically viable approach, minimising dependence on natural resources such as soil and aggregates, while enhancing compaction and stabilisation outcomes.

This has led to a decreased demand for virgin raw materials and has significantly reduced landfill usage for the disposal of fly ash. This proactive approach aligns seamlessly with the nation's sustainability objectives and promotes a circular economy by transforming waste into a valuable resource. It exemplifies NHAI's dedication to environmentally responsible construction practices while ensuring the delivery of resilient and enduring road networks that bolster the country's economic development.

Biodiversity

Biodiversity conservation is recognised for its critical importance in achieving sustainability at NHAI. As a responsible authority, NHAI ensures that all its projects undergo a comprehensive Environmental Impact Assessment (EIA) to identify potential risks, implement measures to minimise or avoid them, and define effective mitigation strategies against adverse impacts. Site-specific management plans are also developed and implemented to avoid net loss of biodiversity, with particular attention to preventing human-wildlife conflict.

NHAI maintains strict compliance with environmental, forest, and wildlife regulations during the construction of National Highways across the country. All statutory clearances for National Highway and Expressway projects are obtained under key legal frameworks such as the Environment (Protection) Act, 1986, Indian Forest Act, 1927, Forest (Conservation) Act, 1980 and amendments issued from time to time, Wildlife Protection Act, 1972, Coastal Regulation Zone (CRZ) Notification, 2019, and Biological Diversity Act, 2002. In addition, NHAI aligns with the applicable international conventions such as Ramsar Convention on Wetlands of International Importance, 1971 and different schedules of the Wild Life (Protection) Act, 1972. NHAI is also mindful of provisions of the International Union for Conservation of Nature (IUCN).

Forest and Environmental Clearances under the Forest (Conservation) Act, 1980 and Environment (Protection) Act, 1986:

Forest clearances are required under Section 2 of the Forest (Conservation) Act, 1980 whenever forest lands are involved in highway or expressway construction. The MoEFCC grants prior approval from the Central Government in two stages: Stage-I (in-principle approval) and Stage-II (final approval). Environmental clearance is necessary under the Environment (Protection) Act, 1986 and Environment Impact Assessment (EIA) Notification, 2006, and its subsequent amendments issued by MoEFCC.

Wildlife Conservation and Mitigation Measures for Wildlife Protection:

In some instances, National Highways and Expressways pass through protected areas to meet connectivity requirements. These protected areas are designated as National Parks, Wildlife Sanctuaries, Wildlife Corridors, Eco-Sensitive Zones, Conservation Reserves, and more, under laws such as the Wildlife (Protection) Act, 1972 and the Environment (Protection) Act, 1986.

To minimise the impact on wildlife, NHAI follows the *"Best Practice Guidance Document"* published by the Wildlife Institute of India under MoEFCC, which recommends eco-friendly measures for mitigating the effects of linear infrastructure on wildlife. These measures include constructing underpasses, small vehicular/ animal underpasses, monkey ladders, land bridges, animal overpasses, and dedicated wildlife corridors to ensure the safe passage of animals and reduce road traffic impacts. NHAI integrates these guidelines into its Wildlife Conservation and Mitigation Plans, which are being actively implemented to protect wildlife and their habitats.

NHAI continuously evaluates the ecological impact of

Figure 64: India's First Dedicated Wildlife Corridor on Nagpur-Jabalpur Section

its projects, especially concerning flora and fauna. In the past year, the operations did not affect any areas of high biodiversity value, protected zones, or critical habitats. The activities remain limited to areas without significant biodiversity concerns, ensuring minimal ecological disturbance and a commitment to sustainable infrastructure development.

During the reporting period, NHAI conducted a thorough assessment of its operations and their potential impact on biodiversity, particularly focusing on species listed in the six schedules of Wildlife Protection Act, (1972). Based on the evaluation, NHAI confirms that the activities have not affected any Schedules I or II list[5] species or habitats critical to their survival.

As part of the commitment to environmental stewardship, NHAI continues to monitor and assess biodiversity risks, ensuring that the operations remain aligned with the highest standards of conservation and protection of ecosystems. NHAI also maintains regular engagement with relevant stakeholders to ensure ongoing compliance with protected area regulations and initiatives aimed at protecting threatened and endangered species. This proactive approach helps NHAI to ensure that its operations do not negatively impact vulnerable or endangered species in the regions where it operates.

Figure 65: Monkey Canopy in the jurisdiction of PIU Nabarangpur

(a) Combined Structure for Elephant at Chila Motichur in RNP, NH-58, Haridwar-Dehradun-Section

(b) Elevated Corridor around Pench National Park, Madhya Pradesh

(c) Elevated Corridor in Pench National Park, Madhya Pradesh

(d) Underpass in Pench National Park, Madhya Pradesh

(e) Mumbai: Satara-Kagal Sec of NH-48 (old NH-4), Median

(f) Gujarat, National Expressway 1

(g) Vijayawada: Ranasthalam, km 634 to Anandapuram km 681 of NH-16 in Andhra Pradesh

Figure 66: Biodiversity Conservation

GREEN HIGHWAYS POLICY

The Green Highways (Plantation, Transplantation, Beautification & Maintenance) Policy, introduced by the MoRTH in 2015, marks a significant milestone in India's sustainability journey. Recognising the environmental challenges associated with highway development, such as biodiversity loss, carbon emissions, and vehicular pollution, the policy aims to mitigate these impacts through scientific and systematic roadside plantation efforts. It establishes an institutional framework to ensure the effective implementation and monitoring of plantations, addressing earlier unscientific management practices.

The policy prescribes the development of green corridors along highways to support carbon sequestration, reduce air and noise pollution, enhance groundwater recharge, and provide habitats for birds. It also incorporates practical objectives such as preventing soil erosion, reducing glare from headlights, and offering shade on hot roads, all of which contribute to safer and more comfortable travel. By promoting plantation activities and emphasising community participation, the policy not only promotes environmental preservation but also creates employment opportunities for local populations.

To institutionalise these efforts, the National Highways Authority of India (NHAI) established the Environment & Green Highways Division (Env. & GHD) to fulfil the policy objectives to undertake plantations, transplantation, beautification and maintenance activities so as to develop green aesthetic corridors along national highways by planting trees and shrubs along the highways and median, and is tasked with planning, implementing, and monitoring roadside plantations.

The Green Highways Policy, 2015, also provides for the transplantation of fully grown trees instead of felling them during highway development after conducting a feasibility study by technical and experienced professionals where the transplantation of trees is to be done. However, with the commitment to save even a single tree, the NHAI is proactively developing and standardising the transplantation of grown-up trees, as this is a complex activity considering the skill set required, cost involved, equipment needed, and the survival of the transplanted trees.

Figure 67: Miyawaki Plantation - Loop Areas at Lucknow-Ayodhya Road and Lucknow Outer Ring Road Intersection Junction.

[5] https://tribal.nic.in/downloads/FRA/Concerned%20Laws%20and%20Policies/Wildlife%20Protection%20Act,%201972.pdf

Env. & GHD also seek to adopt innovative technologies and global best practices to enhance the sustainability of India's highway network. The collaborative efforts of the local government, corporations, and local communities under this policy aim to keep highways green and beautiful, counteracting the adverse effects of vehicular pollution and deforestation while fostering a balance between development and ecological preservation.

Greening India's Highways for Environmental Sustainability

Under the *"Azadi Ka Amrit Mahotsav"* initiative, NHAI undertook a large-scale plantation drive, across 300+ locations nationwide, including along National Highways, NHAI land parcels, toll plazas, and Amrit Sarovars. This drive aligns with the Green India Mission, aiming to transform National Highways into sustainable Green Highways. It involved diverse stakeholders, including government representatives, NGOs, civil society, and students, amplifying the message of environmental sustainability.

Aligned with the Green Highway Policy-2015, NHAI has planted 3.46 crore saplings from FY 2016-17 to FY 2022-23. In FY 2023-24 alone, over 56 lakh saplings were targeted for planting, initiated in the monsoon season. Plantation and tree transplantation have become integral to National Highway projects, with a focus on compensating for felled trees by planting double the number and relocating large trees where feasible. Geotagging is also employed to track the growth and progress of these saplings.

Supporting Mission LiFE, NHAI's initiatives aim to promote eco-friendly behaviours and reduce carbon emissions. The goal is to establish continuous green cover along National Highways, with ongoing collaboration with Concessionaires/Contractors, state agencies, plantation organisations, and community groups. Through these sustainable actions, NHAI strives to create a robust ecosystem that supports long-term environmental health and resilience against climate change.

ENHANCING GREEN COVER THROUGH MIYAWAKI PLANTATIONS

NHAI's latest green initiative involves adopting the Miyawaki plantation method to significantly increase vegetation cover along national highways. The Miyawaki method, a Japanese afforestation technique, is renowned for creating dense, native forests that grow quickly and support rich biodiversity. These mini forests not only create visually appealing landscapes but also provide essential environmental benefits, acting as natural sound and dust barriers and improving micro-climatic conditions. Additionally, Miyawaki forests retain groundwater and enhance soil quality, thus contributing to ecosystem stability.

In Delhi-NCR, over 53 acres of land adjacent to major highways has been designated for Miyawaki plantations, which includes sites along the Dwarka Expressway, Delhi-Vadodara section, and the Eastern Peripheral Expressway. These plantations are expected to have a transformative impact on surrounding areas, enriching biodiversity, and creating a healthier environment for communities along these busy transport corridors. Ground preparations have commenced in early 2024, with planting scheduled during the monsoon season, ensuring optimal growth conditions. The project has the potential to serve as a model for expanding similar initiatives across India, enhancing green cover on a national scale.

ITARSI TO BETUL SECTION OF NH-69 (MADHYA PRADESH)

One of NHAI's major projects under supervision involves the four-laning of the Itarsi to Betul section of NH-69, covering a distance of approximately 73.955 km. This project spans the Satpura Melghat Tiger Corridor—a region of ecological importance known for tiger movement, though it is not classified as a Protected Forest (PF), Reserved Forest (RF), or wildlife sanctuary.

- **Land Use:** The project covers 107.075 hectares of forest land. While located within a tiger corridor, the area is not part of any designated sanctuary or formally protected forest area.
- **Biodiversity Precautions:** Given its proximity to a tiger corridor, the project team and consultants are implementing careful monitoring to minimise disruption to wildlife movement and biodiversity. These efforts reflect NHAI's commitment to aligning infrastructure development with environmental stewardship.

Environmental Impact on Ecosystems

NHAI's operations do not intersect with freshwater, marine, or terrestrial environments that are classified as protected or sensitive biodiversity zones. As such, NHAI's projects in the reporting year required no specific biodiversity rehabilitation or protection efforts. However, the organisation remains vigilant, with a commitment to addressing biodiversity considerations in future constructions or renovations, particularly in ecologically sensitive areas.

Forward-Looking Approach

While NHAI's current activities have not impacted high-biodiversity regions, future infrastructure projects will continue to integrate environmental evaluations, ensuring sustainable development practices that align with biodiversity preservation goals. This approach showcases NHAI's long-term vision in infrastructure planning and construction.

THORAPALLI AGRAHARAM - JITTANDAHALLI SECTION OF NH-844

NHAI is undertaking a project in the Thorapalli Agraharam - Jittandahalli Section of NH-844, situated in the Eastern Ghats of the Dharmapuri Forest Circle. This location is adjacent to the Sanamavu Reserved Forest (RF) and the Gummanur Reserved Forest (RF), both of which are terrestrial ecosystems characteristic of the Eastern Ghats. Although these areas are designated as reserved forests, they are not classified as protected areas under national or international biodiversity frameworks, such as the Ramsar Convention.

Project Details and Biodiversity Positioning

- **Subsurface Land Management:** The project involves reserved forest land, managed by NHAI, situated within these reserved forest boundaries.
- **Position Relative to Biodiversity Value Areas:** The construction area lies inside the reserved forests of Sanamavu and Gummanur, which possess significant biodiversity as part of the Eastern Ghats' terrestrial ecosystems.
- **Type and Scale of Operation:** The activity in this area is construction work related to NH-844, specifically within:
  - Sanamavu RF covering 0.049 km².
  - Gummanur RF covering 0.00389 km².

Biodiversity Characteristics and Conservation Status
These areas, being part of the Eastern Ghats' Forest ecosystem, support a diverse range of flora and fauna typical of terrestrial habitats. NHAI remains mindful of the need to preserve these biodiversity values during construction, given the ecological significance of reserved forests.

Green Highways Initiative

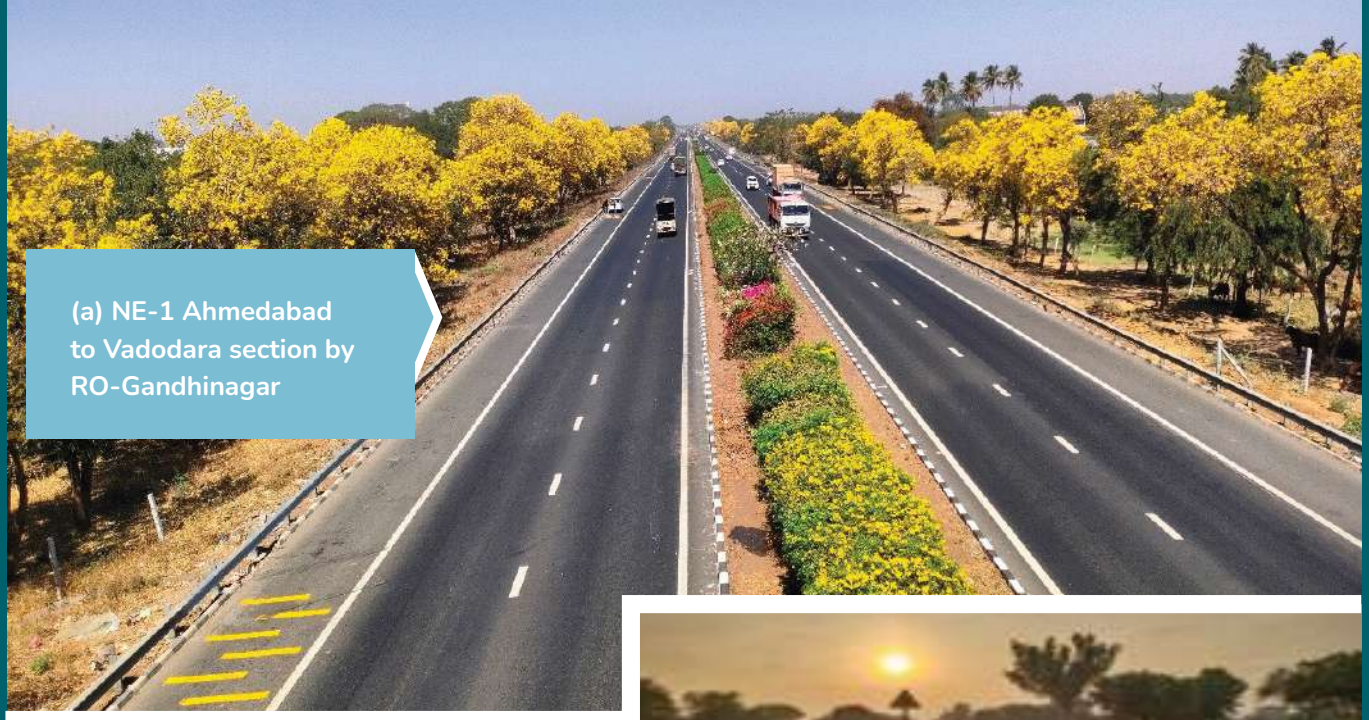
The Green Highways Policy-2015 entrusts NHAI to achieve its goals through plantations. Transplanting, enhancing beauty, and upkeep tasks to create a green aesthetic corridor beside the National Highways by cultivating decorative and blooming trees and bushes on the median and land available at the roadside in RoW. The activities related to plantation and landscape development are being executed via Annual Plantation Action Plans in accordance with IRC: SP: 21-2009 (Guidelines on Landscaping and Tree Plantation).

As part of the *'Azadi Ka Amrit Mahotsav'* celebrations, NHAI organised a nationwide plantation drive on 12 July 2023, successfully planting over 4,13,000 saplings in a single day. This extensive effort was conducted simultaneously across 485 designated locations along the National Highways, including NHAI land parcels, toll plazas, and Amrit Sarovars. The drive, aimed at promoting environmental sustainability, saw enthusiastic participation from public representatives, civil society members, NGOs, and students.

The initiative was launched in Tirupati, Andhra Pradesh, by Shri Nitin Gadkari, the Hon'ble Minister for Road Transport & Highways. During his address, the Hon'ble Minister emphasised that, in line with the Hon. Prime Minister's vision, the creation of a viable and sustainable ecosystem is a key priority, and this plantation drive plays a significant role in enhancing the environment. The Hon'ble Minister of State for Road Transport & Highways and Civil Aviation, Gen. (Retd) Dr. V.K. Singh, along with NHAI Chairman Shri Santosh Kumar Yadav, also participated in the event by planting saplings in Dasna, Ghaziabad.

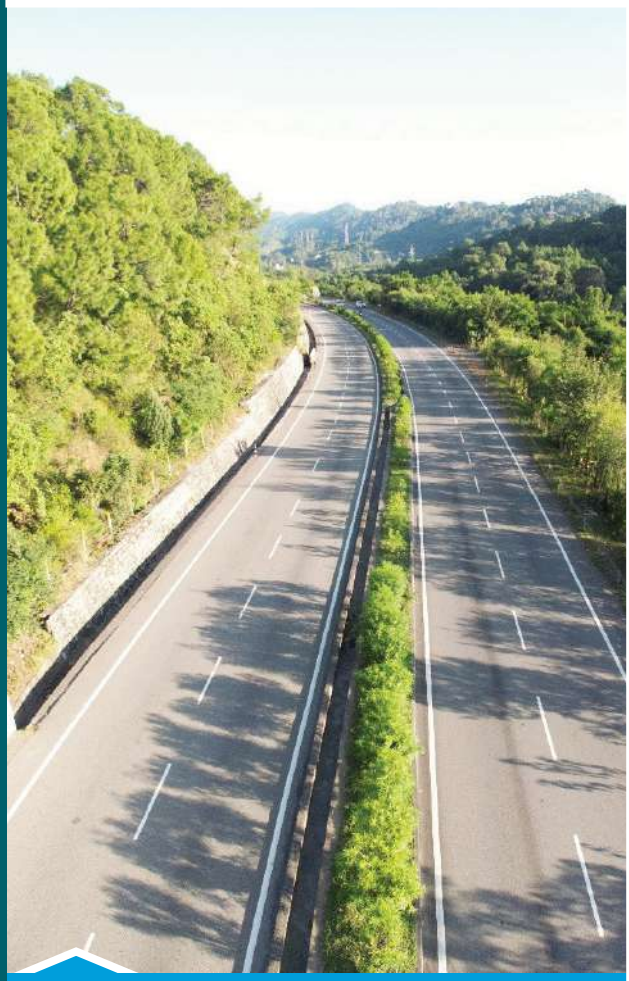
This initiative focuses on planting local indigenous shrubs and trees on surplus roadside land and median spaces. For the financial year 2023-24, NHAI set a target to plant over 5.6 million saplings, with the plantation activities commencing alongside the monsoon season. The plantation action plan is a core component of the National Highway Development Program and aligns with the Hon'ble Prime Minister's *"Mission LiFE" (Lifestyle for Environment)* initiative. This mission aims to put individual human behaviour at the forefront of global climate action by fostering environmentally friendly habits. Through this ongoing sustainable effort, NHAI is committed to contributing to the creation of a self-sustaining ecosystem that promotes environmental consciousness and reinforces sustainable practices.

Figure 68: Bangalore Satellite Town Ring Road (STRR) , NH-648



(a) NE-1 Ahmedabad to Vadodara section by RO-Gandhinagar

(b) Jaipur Agra Section, RO-Jaipur



(c) Median Plantation along NH-163, PIU Warangal, RO-Hyderabad

(d) Jammu Udhampur Section of NH-44, PIU Udhampur, RO-Jammu

(e) Plantation along Lucknow Ring Road, RO- UP West

(f) SHG Women planting at NH-27, Pkg-AS-07, Assam

(g) Union Minister of Road Transport and Highways inaugurated Oxygen Bird Park along the Nagpur-Hyderabad National Highway-44 in Nagpur, Maharashtra

(h) Oxygen Bird Park at NH 44, RO Nagpur

(i) Four Lanning of Bijpur - Hungund section of NH 50, PIU- Bagalkot, RO-Bengaluru

Figure 69: Plantation Drive by NHAI

Monitoring of Plantations

To effectively monitor the plantations along the highways, NHAI has implemented several key programs to ensure that the Green Highways mission is progressing as planned:

- **Drone Videography:** NHAI has adopted and implemented the DAMS to enhance the oversight management of National Highways (NHs) and associated plantation stretches by using drone technology. This approach enhances transparency and ensures consistent coverage of all Avenue and Median Plantations along NH stretches with minimal human intervention. Concessionaires/Contractors are required to conduct mandatory monthly drone video recordings and upload them to the Data Lake, capturing various stages of project development.

Key Features of DAMS:

  - **Comprehensive Monitoring:** DAMS facilitates drone-based recording of high-resolution imagery across various project stages, including Detailed Project Report (DPR) preparation, construction, and Operation & Maintenance (O&M) phases. This approach ensures consistent and accurate tracking of project progress from inception to completion.
  - **Advanced Data Analysis:** The system employs Artificial Intelligence (AI) and Machine Learning (ML) algorithms to process drone-captured imagery. This analysis aids in detecting changes and assessing key parameters, which are then presented on a centralised dashboard. The dashboard encompasses four primary areas: under-construction projects, O&M activities, plantation monitoring, and road safety measures.
  - **Empanelment of Service Providers:** To operationalise DAMS, NHAI has engaged multiple service providers specialising in drone analytics. These partnerships, initially established for a three-year term with the possibility of a two-year extension, ensure the consistent collection and analysis of drone data across various regions.
  - **Standardisation and Compliance:** NHAI aims to standardise drone imagery outcomes to facilitate uniform monitoring across all projects. The drones utilised comply with the Directorate General of Civil Aviation (DGCA) guidelines, and operators are required to possess valid drone pilot licenses, ensuring adherence to regulatory standards.

- **Data Lake:** NHAI's Data Lake is a Big Data Analytics platform that consolidates plantation data for analysis and monitoring. Each Project Implementation Unit (PIU) enters plantation data monthly, which is then verified at the Regional Office (RO) level to ensure accuracy and reliability. The platform provides detailed project information, including plantation details by chainage, species planted, Indian Roads Congress (IRC) targets, and progress. Joint Advisors (Environment & Plantation) and Young Professionals use this data to generate insights that enhance plantation activities along National Highways.
- NHAI leverages digital tools and data-driven approaches to monitor plantation projects along National Highways. These technologies help track plantation progress, assess plant health, and enhance greening initiatives, ensuring effective maintenance and long-term sustainability of roadside vegetation.
- Field Inspections by Joint Advisors (Environment & Plantation) and Young Professionals: NHAI has engaged Joint Advisors (Plantation) and Young Professionals (Plantation Managers) in all Regional Offices. Their primary role is to monitor plantation activities and natural resource management (NRM) within their jurisdictions. These professionals conduct regular field inspections, providing guidance to frontline teams and ensuring that plantations established by Concessionaires/Plantation Agencies are maintained to the highest standard. Necessary corrective measures are taken to improve plantation outcomes based on their findings.

Figure 70: Nelamangala - Devihalli section on NH-75


श्री अजय टम्टा
माननीय राज्य मंत्री
सड़क परिवहन और राजमार्ग
श्री अनुराग जैन
परिवहन एवं राजमार्ग मंत्र

BRIDGING PEOPLE AND PROGRESS

CONTRIBUTION TO UN SDGS

- NHAI's Workforce
- Employee Recruitment and Turnover
- Remuneration
- Reimbursement For Essential Amenities
- Employee engagement and well-being Initiatives
- Group Life Insurance
- Supporting Workforce Health Through Regular Check-ups
- Parental Leave
- Employee Engagement Initiatives
- Post-Retirement Benefits
- Investing in Workforce Development
- Career Transitions
- Annual Performance and Career Development Reviews
- Respecting Human Values
- Diversity and Equal Opportunity
- Addressing Employees' Concerns and Grievances
- External Grievance Mechanism
- Health and Safety
- NHAI's Occupational Health and Safety Management System
- Hazard Identification and Risk Assessment (HIRA) for Ensuring Safety and Wellbeing
- Enhancing Road Safety
- NHAI's Occupational Health Services
- Workforce Engagement and Communication on Occupational Health and Safety
- Community Development at NHAI
- Community Engagement and Services
- Corporate Social Responsibility

HIGHLIGHTS

0% of operations and suppliers identified to be at a significant risk for incidents of Child Labour

No instances of discrimination in the workplace in FY 2023-24.

60% decrease in workplace fatalities as compared to FY 2022-23.

100% of direct employees, as well as workers engaged through contractors managing work or workplaces on behalf of NHAI, covered under Occupational Health and Safety (OHS) Management Framework.

IN THIS SECTION:

Employee Well-Being Initiatives at NHAI.

Upholding of Human Values.

Occupational Health and Safety Management.

Initiatives towards Road Safety.

Contribution to Local Communities.

Stakeholder Engagement Efforts.

NHAI considers its workforce as its greatest asset, it can continue to provide excellence in all facets of its operations by cultivating the ability to think critically, solve complicated problems, and carry out solutions successfully. NHAI prioritises developing a culture of disciplined discussion in its workforce, strategic planning, and flawless execution in addition to improving technical proficiency.

NHAI strives to seek, nurture, and enhance the skills and capabilities needed to continually excel and unlock its full potential. Through a deliberate process of growth and improvement, NHAI aims to surpass boundaries and achieve what matters most to the organisation.

NHAI has a strong commitment to continuously seeking, acquiring, and nurturing the skills and capabilities required to operate at the best possible standard. This approach is a continuous, deliberate process of improvement, and every step increases the capacity to get past obstacles, propel advancement, and provide stakeholders with value that is not just significant but also transformative for the communities it serves. With a comprehensive approach,

the capacity-building programs ensure that every worker and employee is equipped with the tools, knowledge, and support necessary to excel. The training programs are designed to foster not only technical skills but also the mindset and adaptability needed to advance, and NHAI provides a wide range of advantages that improve their well-being. In order to foster an innovative and resilient culture, the objective is to establish a learning environment where people are inspired to consistently achieve their highest potential.

For long-term success, the workforce's health and well-being are essential. By funding initiatives that support mental health, physical fitness, and general well-being, NHAI makes sure that teams not only function at their peak but also prosper on a personal and professional level. By empowering them to bring their best selves to work, NHAI helps create a dynamic and lively organisational culture that can handle any situation.

NHAI's workforce

NHAI is committed to fostering an inclusive workplace that champions diversity and empowerment for all. To promote women's empowerment, NHAI has made significant strides in hiring women across all levels of the organisation and ensuring gender representation in both leadership and operational roles. The commitment to diversity also extends to actively recruiting minorities, both for permanent positions and temporary roles, enhancing the workforce's cultural and social representation. The table below depicts the progress and performance of Diversity and Inclusion at NHAI over the past three years, underscoring its commitment to creating a workforce that truly reflects the communities it serves.

STRUCTURE OF NHAI'S GOVERNANCE BODIES AND WORKFORCE (AS ON 15 MAY 2025)

Table 23 Overview of governance bodies and workforce

Designation	Number of Members
Full-time Members (Chairman, Member-Admin, Project, Finance, PPP, and Technical)	7
Part-time Members (CEO, Niti Aayog; Secretary, Dept. of Expenditure; Secretary, MoRTH; DG, RD & SS; IIM-Mumbai Director; Former SBI Chairman)	6
Total	**13**

At NHAI HO

Designation	Number of Members
Chief Vigilance Officer	1
Chief General Manager	27
General Manager	43
Deputy General Manager	51
Manager	58
Deputy Manager	61
Total	**241**

*The number of individuals for each designation are as of 15th May 2025.

Table 24 Employee breakdown for FY 23-24

Designation	Female	Male	Total
Number of Permanent Employees	47	2,263	2,310
Number of Temporary Employees	349	2,814	3,163
Number of non-guaranteed hours employees	8	1	9
Number of full-time employees	342	4,977	5,319
Number of part-time employees	53	97	150

Table 25 Region-wise employee breakdown

Region	Gender	Permanent Employees	Temporary Employees	Non-Guaranteed Hours Employees	Full-Time Employees	Part-Time Employees	Total Number of Employees
North India*	Male	1,166	767	1	1,885	45	2,083
	Female	13	82	0	78	16	107
East India*	Male	129	647	0	742	34	776
	Female	6	32	1	29	9	38
West India*	Male	65	288	0	345	8	353
	Female	5	20	0	22	3	25
South India*	Male	147	672	0	813	6	819
	Female	18	183	7	177	24	201
Central India*	Male	756	440	0	1,192	4	1,196
	Female	5	32	0	36	1	37
Total	**Male**	**2,263**	**2,814**	**1**	**4,977**	**97**	**5,227**
	Female	**47**	**349**	**8**	**342**	**53**	**408**

*- Breakup of ROs provided in Annexure 2.

Table 26 Number of workers (not on NHAI's payroll)

New employee hires	FY 23-24
a. Total number of workers who are NOT employees and whose work is controlled by the organisation	16,234

The NHAI workforce structure aligns with general employment practices, encompassing permanent, temporary, full-time, and part-time employees. The data presented in the above tables primarily reflects individuals directly employed by NHAI, excluding contracted or Concessionaire/Contractor employees for certain indicators. Fluctuations in employee numbers can be influenced by various factors, including project demands, seasonal work patterns, specific hiring needs aligned with ongoing projects, and broader labour market conditions. These dynamics shape the employment trends and reflect the evolving nature of infrastructure development.

NHAI places paramount importance on diversity and inclusion (D&I), fostering a workplace where individuals from diverse backgrounds can thrive. D&I initiatives at NHAI aim to create a culture where every employee feels valued, respected, and empowered to contribute fully to the organisation's goals. The organisation adheres to guidelines from the National Commission for Scheduled Castes and the Ministry of Social Justice & Empowerment to ensure that the interests of Scheduled Castes are well integrated into its functions. NHAI's diversity efforts encompass a broad range of human differences, including race, ethnicity, gender, sexual orientation, age, physical abilities, religious beliefs,

*-Breakup of ROs provided in Annexure 2.

socio-economic status, and cultural background. To promote inclusion, NHAI makes deliberate efforts to ensure that all employees, regardless of their background, are welcomed, supported, and integrated into every aspect of the organisation.

Notably, in the table presented above, the increase in permanent female employees signifies meaningful progress toward fostering a more diverse and inclusive workplace. This upward trend reflects NHAI's ongoing efforts to create equitable opportunities and encourage the greater participation of women in the infrastructure sector. By actively hiring and retaining female professionals, NHAI is not only enhancing workforce diversity but also reinforcing the commitment to gender-balanced growth.

Additionally, the rise in both male and female full-time employees highlight NHAI's strategic approach to workforce expansion. As NHAI continues to strengthen the operations and take on ambitious infrastructure projects, investing in a skilled and dedicated workforce remains a priority. This steady increase demonstrates the dedication to attracting top talent, providing stable employment opportunities, and ensuring a resilient, future-ready workforce that supports the nation's infrastructure development goals.

NHAI is focused on providing equal opportunities to all and it strictly adheres to guidelines from the Department of Personnel and Training (DoPT), Ministry of Personnel, and Public Grievances and Pensions, ensuring the implementation of reservation and relaxation policies for Scheduled Caste (SC), Scheduled Tribe (ST), and Other Backward Classes (OBC) candidates in direct recruitment.

Recognising that diversity is both a moral imperative and a strategic advantage, NHAI actively cultivates an environment conducive to innovation, creativity, and collaboration. The organisation is also dedicated to removing barriers for individuals with disabilities, ensuring their full participation and career advancement. In alignment with the Rights of Persons with Disabilities Act, 2016, NHAI prioritises accessible work environments, reasonable accommodations, and a culture of respect and empathy. The organisation has implemented measures such as reservation and relaxation in recruitment and promotions, as per guidelines from the DoPT and the Ministry of Social Justice & Empowerment, to ensure the well-being and equal opportunities of employees with disabilities.

Through its steadfast commitment to diversity and inclusion, NHAI fosters a dynamic and socially responsible work environment, positioning itself as a forward-thinking organisation that upholds equity, accessibility, and workforce development as core principles.

EMPLOYEE RECRUITMENT AND TURNOVER

NHAI is committed to maintaining a dynamic and skilled workforce by regularly recruiting new talent, which brings fresh perspectives to the projects and strengthens the ability to deliver top-quality services. The approach to hiring not only supports innovation but also ensures that NHAI consistently meet and exceed quality standards in all the initiatives.

The organisation adheres strictly to the recruitment norms and regulations laid out by the Government of India in all hiring processes, including for senior management roles. Appointments are made based on merit, qualifications, and eligibility criteria as defined by relevant authorities, ensuring a transparent and equitable process. While the organisation does not prioritise local hiring for senior positions as a policy, it ensures compliance with reservation policies, regional eligibility, and cadre-based postings wherever applicable under government guidelines.

Detailed data on the employee recruitment and turnover rates can be found in the following table, illustrating the ongoing efforts to foster a balanced and capable team.

Table 27 Workforce recruitment at NHAI

New employee hires	FY 21-22		FY 22-23		FY 23-24	
	Number of new employees hired by RO					
	Male	Female	Male	Female	Male	Female
Number of new employees hired <30 years of age	329	40	296	40	296	33
Number of new employees hired between 30-50 years of age	202	25	209	24	205	24
Number of new employees hired >50 years of age	36	2	35	1	38	3
Total number of new employee hire	567	67	540	65	539	60
Rate of new employee hire	9.75%	16.42%	9.62%	17.02%	10.31%	14.71%

Over the past three years, NHAI has demonstrated a consistent commitment to workforce growth and rejuvenation, aligning with its broader strategic vision. A notable aspect of NHAI's hiring trends is its strong emphasis on attracting young talent, which reflects the organisation's dedication to fostering a dynamic and future-ready workforce.

Between FY 2021–22 and FY 2023–24, the number of new hires under 30 years of age has remained robust, with nearly 300 young professionals joining the organisation each year. This infusion of fresh perspectives not only energises NHAI's workforce, but it also ensures the cultivation of innovative ideas and approaches essential for the evolving infrastructure landscape.

Furthermore, NHAI's recruitment strategy demonstrates a balanced approach towards mid-career professionals, consistently onboarding over 200 experienced individuals aged between 30 and 50 years annually. This blend of youth and experience underscores NHAI's strategy to maintain a well-rounded team capable of addressing both present challenges and future opportunities.

Gender diversity remains a focus area, with female hires making a meaningful contribution to the workforce each year. While the total number of female recruits has remained steady, the proportion of women hired relative to their applicant pool has been consistently strong. This reflects NHAI's ongoing commitment to fostering an inclusive work environment and expanding opportunities for women in infrastructure development.

In addition, NHAI has shown a slight but promising increase in hiring individuals over 50 years of age, bringing invaluable expertise and mentorship into the workforce. This age-diverse approach highlights NHAI's commitment to inclusive growth and knowledge sharing across different age profiles.

Table 28 Employee turnover rate at NHAI

	FY 2021-22		FY 2022-23		FY 2023-24	
	Male	Female	Male	Female	Male	Female
Number of employees left <30 years of age	36	9	49	19	49	16
Number of employees left between 30-50 years of age	38	8	58	8	74	15
Number of employees left >50 years of age	12	1	13	1	20	2
Total number of employees left	86	18	120	28	143	33
Employee turnover rate	2.83%	8.49%	1.39%	4.67%	1.74%	5.63%

Note: Over the past few years, NHAI has refined the data capturing procedures, leading to improved accuracy. As a result, there may be variations when compared to the data presented in the SR 2021-22.

As observed from the table above, NHAI continues to maintain a low and stable employee turnover rate, reflecting the organisation's ability to retain talent and provide a supportive work environment. Over the past three years, turnover rates have remained relatively low, particularly among male employees, with figures ranging between 1.39% and 2.83%, demonstrating strong workforce stability.

An encouraging trend is the gradual increase in female retention, as seen in the turnover rate for female employees. While the absolute number of female exits has slightly risen, the female turnover rate has remained below 6%, indicating that a majority of women hired at NHAI choose to stay and grow within the organisation, reflecting NHAI's commitment to fostering an inclusive and supportive workplace that encourages long-term career development. The turnover rate for employees under 30 years remains relatively low, ensuring that the influx of young talent is retained, allowing for a skilled and experienced workforce to develop within the organisation. By maintaining low overall turnover rates and ensuring strong retention across diverse employee groups, NHAI continues to strengthen its human capital, reinforcing its commitment to workforce stability, inclusivity, and professional growth.

REMUNERATION

National Highways Authority of India (the Term of Office and Other Conditions of Service of Members) Rule, 2003 as amended vide Notification No. 128 dated 5 March 2015 defines the renumeration for the board members whereas employees are governed by the Central Pay Commission of Government of India.[6]

As a government organisation, employment terms and conditions—including those related to wages, working hours, and other benefits—are governed by central or state government rules, as applicable. These are typically outlined in service rules and standing orders and apply uniformly across employee categories.

The workforce encompasses a diverse range of personnel, including Management, Advisors, Joint Advisors, Young Professionals, and Senior Staff, each receiving compensation commensurate with their responsibilities and contributions to NHAI's objectives.

For contractual employees, the consolidated emoluments paid to contract employees are based on agreements with the outsourcing and placement agencies. These payments are structured to meet or exceed the minimum wage levels established by the Central Government or respective State Governments.

When soliciting bids or quotations from outsourcing and placement agencies, the field offices are required to clearly specify this condition in order to uphold fair labour standards across the workforce.

The consolidated emoluments, which include Employee Provident Fund (EPF), Employees' State Insurance (ESI), and bonuses for contract workers hired through outsourcing or placement agencies, are set by policy guidelines released by NHAI Headquarters. The designated agencies handle the deduction of EPF and ESI contributions from the consolidated emoluments, and NHAI matches these contributions. The combined funds are then deposited by the agencies with the relevant authorities, ensuring regulatory compliance and continuous benefits coverage for all contract staff.

This approach reflects NHAI's commitment to responsible employment practices and regulatory compliance.

[6]https://morth.nic.in/sites/default/files/NHAI_Rules.pdf

REIMBURSEMENT FOR ESSENTIAL AMENITIES

NHAI provides employees reimbursement for essential amenities tailored to their specific designations and corresponding pay scales. This initiative recognises that employees have diverse needs based on their roles within the organisation, and it aims to ensure they have access to the necessary resources that facilitate their professional responsibilities and personal well-being. By offering these reimbursements, NHAI not only supports its employees in managing their work-related expenses but also contributes to their overall job satisfaction and productivity. The reimbursement program includes the following amenities:

01
Lease Accommodation Facility

02
Reimbursement of Cost of Mobile Instrument

03
Reimbursement of Mobile/ Telephone Charges

04
Reimbursement of Cost of Laptop/Notebook

05
Reimbursement for Purchase of Newspapers and Magazines

06
Reimbursement of the Amount for Purchase of Briefcase/Ladies' Bags

EMPLOYEE ENGAGEMENT AND WELL-BEING INITIATIVES

The success of NHAI's operations and initiatives in many regions is largely due to its workforce. Recognising their important contributions, NHAI is committed to creating a safe, empowering, and supportive work environment that meets their fundamental needs.

In complete accordance with regulatory requirements, NHAI offers a broad range of benefits to its employees, such as the Employee Provident Fund (EPF) and Employee Insurance. All full-time employees are eligible for the standard benefits package, which includes retirement plans, healthcare, disability and invalidity insurance, life insurance, and parental leave. To further ensure that the workforce is well-supported and protected, NHAI strictly adheres to every regulation and rule that applies, such as the Employees' Provident Funds Act of 1952, the Maternity Benefit Act of 1961, the Income Tax Act, and other pertinent legislation.

NHAI has put in place a number of stress-reduction and well-being initiatives as an effort to establish a work environment that encourages sustained employee engagement and satisfaction. NHAI also provides flexible work arrangements, including flexible scheduling and work-from-home options. These actions encourage a better work-life balance by supporting employees as they balance their personal and professional obligations. Additionally, NHAI ensures that its workforce stays engaged, motivated, and productive by proactively addressing concerns that can cause employee burnout.

In addition to flexible work schedules and legal requirements, NHAI offers a comprehensive benefits package to new hires, making sure they feel supported in all facets of their lives.

BENEFITS FOR EMPLOYEES INCLUDE:

Housing Support
NHAI offers housing provisions to ensure employees have access to safe and comfortable living accommodations near their work locations.

Accomodation Assistance
For employees who require it, NHAI provides additional support to cover the cost of temporary accommodations during relocations or project assignments.

Reimbursements
Employees are reimbursed for various work-related expenses, ensuring they are not burdened by out-of-pocket costs while performing their duties.

Advances
NHAI offers financial advances to employees, helping them manage unexpected expenses or emergencies.

Healthcare Services
NHAI's healthcare benefits ensure that employees have access to essential medical services, safeguarding their physical well-being.

Medical Benefits
In addition to general healthcare, NHAI provides a range of medical benefits that cover preventive care, treatments, and emergency medical services, ensuring its workforce remains healthy and secure.

GROUP LIFE INSURANCE

In line with the decision made during the 97th Meeting of the Authority on 22 October 2013, the NHAI implemented the Group Insurance Scheme (GIS) for its employees, with funding sourced from the Annual Budget of NHAI beginning in January 2014. This initiative reflects the authority's commitment to ensuring the well-being and security of its workforce.

The GIS provides comprehensive insurance coverage of Rs. 20.00 lakhs to a wide range of employees, including all regular officers and employees of NHAI, officers on deputation to the Authority, and long-term contract employees who are actively engaged in service. This extensive coverage is designed to offer financial protection to employees and their families in the event of unforeseen circumstances. The risks covered under the GIS include death resulting from illness, accidents, and natural causes, highlighting NHAI's commitment to fostering a safe and supportive working environment.

For employees on deputation, the insurance coverage corresponds to the amount they are already insured for within their parent organisation. This arrangement ensures that these employees continue to receive adequate protection while contributing their skills and expertise to NHAI. The Group Life Insurance Policy does not cover certain categories of personnel. These include officers and employees who are on deputation to other organisations; short-term contract

employees appointed through placement agencies or directly by the project directors; and those who are on medical leave for 180 days or more. It is important for employees on medical leave to return to duty for at least one day before the expiration of the 180-day period to maintain their eligibility for coverage under the scheme. This provision helps keep the membership intact and ensures that employees remain connected to NHAI.

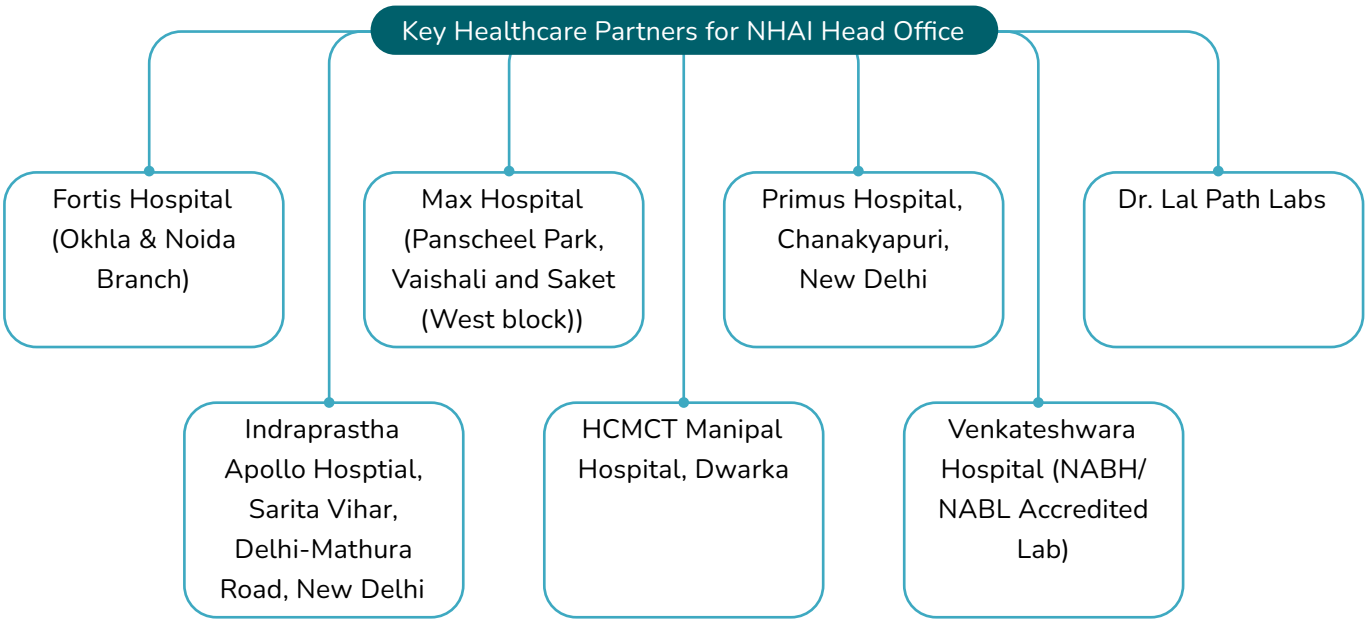
New employees joining NHAI are automatically enrolled in the Group Insurance Scheme effective from their date of joining. Similarly, those returning from a leave period that exceeds 180 days are re-enrolled as members of the policy, provided they furnish a certificate of excellent health and are deemed fit by a doctor from the insurance company. This process ensures that all employees, regardless of when they join or return from leave, have access to essential insurance coverage.

SUPPORTING WORKFORCE HEALTH THROUGH REGULAR CHECK-UPS

NHAI prioritises the health and well-being of employees through proactive medical care, which includes providing both regular health check-ups and on-demand medical services tailored exclusively for regular employees and those on deputation.

NHAI has established partnerships with leading hospitals and diagnostic centres, granting seamless access to a range of essential health services to its employees. These trusted healthcare providers offer comprehensive medical check-ups, preventive screenings, and diagnostic services, enabling NHAI to support the employees' health proactively and with the highest standards of care. This initiative reflects the belief that a healthy workforce is essential to achieving organisational excellence and increasing productivity.

NHAI is committed to providing comprehensive healthcare support for its workforce. While the graphic highlights key healthcare partners for the Head Office, employees in this region have access to over 120 hospitals. Additionally, *NHAI has partnered with 129 healthcare providers for its Regional Offices,* ensuring access to leading hospitals in their respective locations. This extensive network ensures quality medical care across all operational areas.



PARENTAL LEAVE

NHAI is committed to supporting the employees during significant life events, including parenthood. To this end, NHAI provide parental leave benefits, specifically maternity leave, to all eligible employees. The maternity leave policy is fully compliant with the Maternity Benefit Act of 1961, which ensures that expectant mothers receive paid leave and job security during their time away from work. This benefit aims to create a supportive and inclusive work environment, allowing employees to care for their new-borns and recover, while securing their position within the organisation.

Additionally, in line with the Government of India's mandate, NHAI employees are entitled to Childcare Leave (CCL), which allows eligible employees to take up to 730 days of leave during their entire service tenure to care for their minor children (below 18 years of age). This benefit is available to female employees and single male employees (unmarried, widowed, or divorced) and can be availed in up to three spells per calendar year. CCL can be used for various child-related needs, such as illness, education, or other essential caregiving responsibilities. By providing this flexibility, NHAI supports employees in balancing their professional commitments with parental responsibilities, fostering an inclusive and supportive work environment. The following table provides a breakdown of parental leave data for the past three financial years, highlighting the ongoing commitment to employee well-being and work-life balance. The reported return-to-work and retention rates indicate how many employees took parental leave and subsequently returned to work—and remained employed—for a specified period within the same reporting year.

Table 29 Provisions for parental leave at NHAI

Employee turnover	FY 21-22			FY 22-23			FY 23-24		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
a. Total number of employees entitled for parental leave	721	58	779	786	55	841	812	61	873
b. Total number of employees that took parental leave	34	3	37	35	4	39	33	2	35
c. Total number of employees that returned to work in the reporting period after parental leave ended	19	3	22	25	3	28	22	1	23
d. Total number of employees that returned to work after parental leave ended that were still employed 12 months after their return to work	6	2	8	6	3	9	12	1	13
I. Return to work rates of employees that took parental leave	56%	100%	59%	71%	75%	72%	67%	50%	66%
ii. Retention rates of employees that took parental leave	46.15%	100.00%	53.33%	31.58%	100.00%	40.91%	48.00%	33.33%	46.43%

Note 1. Over the past few years, NHAI has refined the data capturing procedures, leading to improved accuracy. As a result, there may be variations when compared to the data presented in the SR 2021-22.
2. The return to work and retention rates have been calculated only for the Regional Offices of NHAI for FY23-24.
3. Return to work rate refers to the total number of employees that did return to work in the reporting year after parental leave as a percentage of employees due to return to work after taking parental leave.

A consistent return-to-work rates after parental leave has remained above 65% over the past two years, demonstrating that employees feel encouraged and supported to resume their roles after taking leave. The return-to-work rate for female employees has been particularly strong, indicating a positive work culture that enables work-life balance and career continuity for women. Furthermore, employee retention after returning from parental leave has remained stable, reinforcing NHAI's efforts in providing a conducive work environment for employees managing both professional and personal responsibilities. Notably, the female retention rate has been consistently high, reaching 100% in some years, highlighting NHAI's commitment to supporting long-term career growth for women.

Figure 71: Creche facility at NHAI

By maintaining strong parental leave provisions, ensuring smooth reintegration for returning employees, and fostering an inclusive and family-friendly workplace, NHAI continues to uphold its dedication to employee well-being and workplace sustainability.

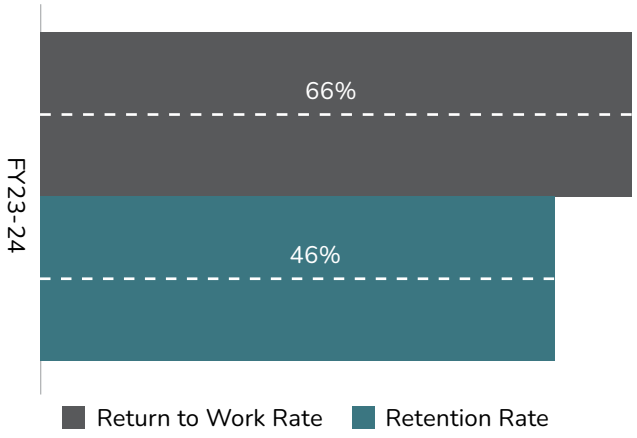


Figure 72: Return to Work and Retention Rates for employees that took parental leaves.

EMPLOYEE ENGAGEMENT INITIATIVES

Figure 73: Yoga Day at NHAI HO

Figure 74: PIU Ratlam- Yoga Day

NHAI is dedicated to fostering a positive and engaging work environment through a variety of initiatives that focus on employee well-being and recognition. The organisation promotes overall well-being with programs like the Yoga Sessions, encouraging employees to stay physically and mentally healthy. Celebrations such as the Aam Festival, Holi Fest, New Year get together help create a sense of community and cultural connection among employees. Additionally, NHAI organises Cultural Activities and celebrates NHAI Day to honour achievements and strengthen team bonds. Employee recognition is also an integral part of NHAI's engagement efforts, with personalised Birthday Wishes ensuring that employees feel valued and appreciated. These initiatives contribute to building a supportive, inclusive, and motivating work culture at NHAI. To foster health and wellness, the National Highway Authority of India marked the International Yoga Day with a special event at its New Delhi Headquarters as well as at ROs and PIUs. Held on 21 June 2023, International Yoga Day encourages individuals to prioritise their wellbeing amidst the demands of modern life. NHAI officials enthusiastically participated in a yoga session, emphasising its crucial role in holistic development.

Figure 75: NHAI Chairman at Diwali Celebrations, 2023

Figure 76: Holi Celebrations at NHAI, 2023

Figure 77: Flag Hoisting at NHAI HQ

Figure 78: New Year Get-together at NHAI HQ

Figure 79: Annual Day-2023 Celebration at NHAI

POST-RETIREMENT BENEFITS

NHAI extends a range of benefits to retired NHAI officers and employees, reflecting the commitment to supporting them even after their service has concluded. These benefits are designed to provide financial security and enhance the quality of life for the retirees. This structured contribution plan allows retired personnel to access the benefits they are entitled to, ensuring that they continue to receive support as they transition into this new phase of life.

The allowances to employees, including details of pensions, are regulated by the Central Pay Commission and Central Civil Services (Pension) Rules, 2021, of Government of India. NHAI ensures compliance with these recommendations in providing pension to retired employees.

INVESTING IN WORKFORCE DEVELOPMENT

NHAI regularly updates employees about the full range of benefits available to them and ensures their active awareness of the engagement and welfare initiatives. The training programs are designed not only to inform but also to strengthen employees' skills, empowering them to enhance productivity, achieve personal growth, and advance within NHAI. This approach plays a critical role in reducing turnover rates and enhancing overall employee engagement.

NHAI's Regional Offices also contribute to skill-building efforts by training highway workers through certified providers under the Recognition of Prior Learning (RPL) Scheme, overseen by the MoRTH. These programs are monitored at the ministry level and executed through the ROs and PIUs.

The training initiatives have yielded positive results, with employee training hours for both male and female employees steadily increasing over the past three years. Junior and mid-management staff, in particular, receive regular annual training to ensure they are equipped with the necessary skills to excel in their roles. The training programs cover a wide array of topics essential for aligning employees with NHAI's safety and HR standards.

Key training areas include:

01 Core Job Roles & Responsibilities

02 Employee Benefits and Entitlements

03 Internal Policies & Procedures

04 Reporting & Accountability Structures

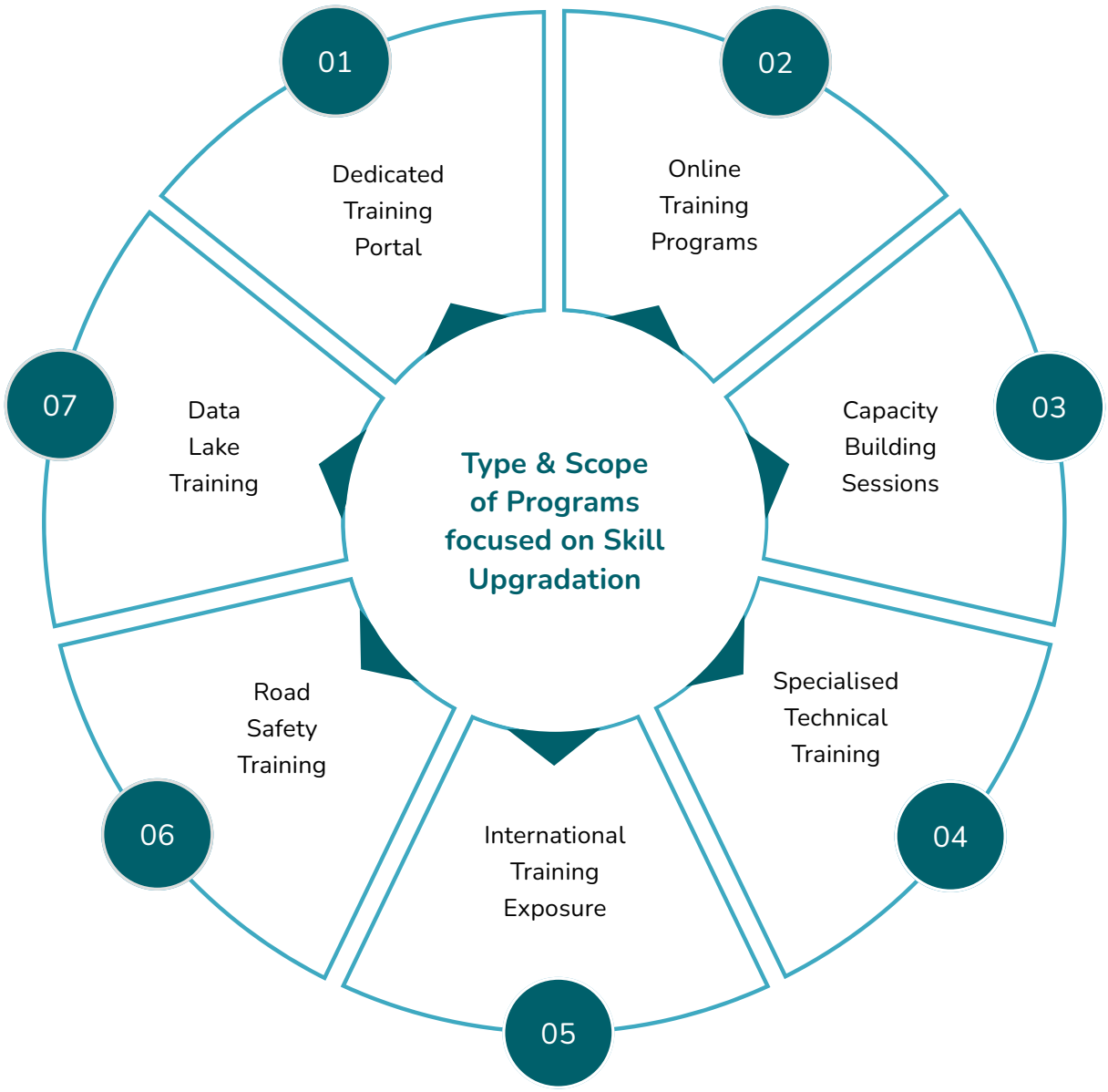
05 Grievance Resolution Mechanisms

06 Compliance Protocols

07 Vigilance Mechanism

08 Health and Safety Standards

NHAI ensures continuous learning and skill enhancement of the employees so that they are equipped with the latest knowledge and tools needed to excel in their roles. NHAI has implemented a robust framework for employee skill development, leveraging modern training technologies and subject matter expertise to facilitate both technical and professional growth. The training programs cater to the diverse needs of employees across various cadres, ensuring that they remain competitive and future ready.



01

Dedicated Training Portal

NHAI has developed a specialised Training Portal that enables employees to plan and schedule their training activities throughout the year. Through the comprehensive Training Need Identification (TNI) exercise, NHAI assess skill requirements and host various training programs and workshops on the portal. Employees are nominated for courses based on their roles and areas of expertise.

02

Online Training Programs

NHAI has migrated to the Integrated Government Online Training (iGOT) Portal, allowing employees to undergo continuous training without disrupting their routine work. This platform enables self-paced learning, encouraging employees to upgrade their skills at their convenience.

03

Capacity Building Sessions

NHAI conducts frequent capacity-building sessions on domain-specific topics every saturday. Delivered through online video conferences, these sessions feature industry experts covering topics such as road safety, construction techniques, financial management, and environmental standards. These sessions enhance employee knowledge while promoting the adoption of best practices.

Figure 80: Snippets of Capacity Building on Project Management at NHAI

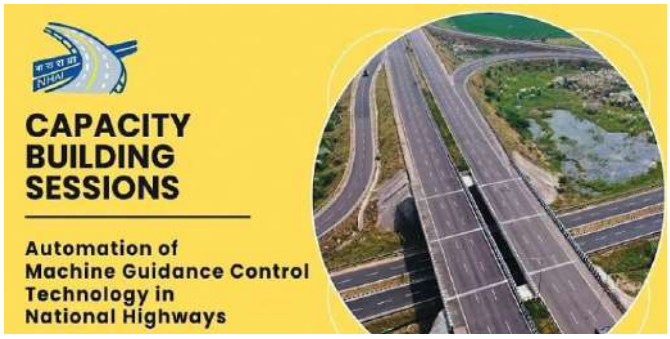


Figure 81 Snippets of Capacity Building on Automation of Machine Guidance Control

The above pictures capture snippets of the weekly capacity building sessions conducted by NHAI. These sessions are recorded and are available to the public through the official YouTube channel which can be accessed on https://www.youtube.com/@NHAI_Official

04

Specialised Technical Training

NHAI provides tailored training programs for different cadres, including technical training in construction, highway engineering, geospatial technologies, and tunnelling. These programs ensure that employees stay updated on cutting-edge techniques and technologies in infrastructure development.

05

International Training Exposure

Recognising the importance of global best practices, NHAI provides opportunities for employees to train abroad, allowing them to learn from international experiences and apply these insights to domestic projects.

06

Road Safety Training Programs

Road safety is a priority at NHAI. Regular training sessions focus on road safety engineering and auditing, emphasising safe driving techniques, hazard identification, and preventive measures for both workers and road users.

07

Data Lake Training

With the implementation of the Data Lake System, NHAI provides specialised training to enhance employees' understanding of data collection, management, and analysis, ensuring improved decision-making across operations.

NHAI meticulously tracks and monitors training participation and compliance across all employees, ensuring they remain up to date with required training. The structured training programs are developed catering the need of employees across all levels. Over the past three years, junior employees have consistently received increasing training hours, demonstrating a strong focus on skill-building for early-career professionals. Senior management has also maintained significant engagement in training, ensuring leadership remains well-equipped with evolving industry insights. While middle management training hours have been optimised over time, employees continue to receive substantial professional development opportunities. These trends highlight NHAI's dedication to fostering a knowledgeable and future-ready workforce through targeted training initiatives.

Table 30 Average training hours by employee category

Employee Category	Measure	FY 21-22	FY 22-23	FY 23-24
Junior Employees (Below Deputy Manager)	Avg. Hours	53	61	71
Middle Management (Deputy Manager and Manager)	Avg. Hours	295	225	195
Senior Management (DGM and Above)	Avg. Hours	89	129	109

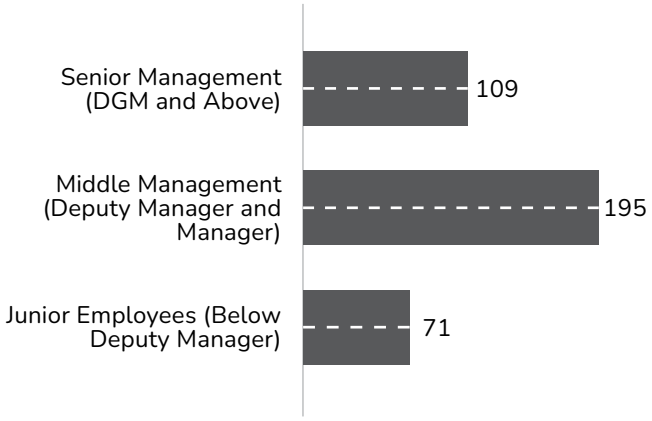


Figure 82: Average Training Hours by Employee Category FY 23-24

NHAI invests in the professional development of its workforce, ensuring both male and female employees have access to training opportunities. While male employees have consistently engaged in significant training hours, female employees have seen a steady increase in training participation over the past three years. This upward trend reflects NHAI's commitment to fostering an inclusive learning environment and enhancing skill development for all employees, equipping them with the necessary expertise to excel in their roles.

NHAI's Regional Offices play a vital role in enhancing the skills of highway labourers by providing training through providers enlisted by MoRTH under the **Recognition of Prior Learning (RPL) Scheme.** This program is executed by the Regional Offices and Project Implementation Units (PIUs) of NHAI, with monitoring at the Ministry level.

NHAI ensures that its employees receive comprehensive training and development programs to align with our internal safety and HR requirements. These training programs cover:

- Employee roles and functions—New technology, project management, contract management, dispute resolution.
- Benefits.
- Internal requirements and procedures.
- Reporting structure.
- Grievance redressal.
- Vigilance.
- Health and safety, among other areas.

NHAI closely tracks all employee training sessions and monitor their compliance status to ensure continuous professional development and adherence to organisational standards.

Table 31 Average training hours by gender

Gender	Measure	FY 21-22	FY 22-23	FY 23-24
Male	Avg. Hours	307	266	219
Female	Avg. Hours	25	43	42

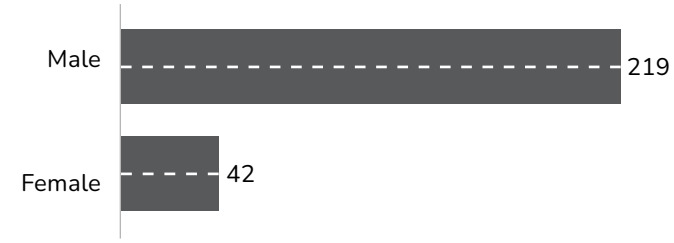


Figure 83: Average Hours of Training by Gender (FY 23-24)

Figure 84: Capacity building of Toll Plaza staff

CAREER TRANSITIONS

The career transitions—whether due to retirement or changes in employment—can be significant milestones in an employee's professional journey. To ensure that the workforce remains equipped for the future, NHAI provides a range of training and development programs designed to enhance both current job performance and long-term career prospects. These initiatives focus on skill enhancement, exposure to industry best practices, and adaptability to evolving technologies, ensuring that employees remain valuable contributors even beyond their tenure at NHAI. The structured approach to career transition support includes:

01

Career Transition Readiness
Employees benefit from a blend of technical training, hands-on experience, and industry exposure, equipping them with a strong skill set that enhances their employability after retirement or career shifts.

02

Adapting New Technologies:
As NHAI continues to integrate advanced systems such as the RFI system on the Data Lake Portal, employees receive dedicated training to ensure they can seamlessly adopt and leverage these innovations, keeping their skills relevant in a rapidly evolving industry.

03

Retirement Preparation Programs
Employees nearing retirement are offered specialised training modules focused on financial planning, post-retirement employment opportunities, and essential life skills, helping them navigate the transition with confidence.

04

Continuous Skill Enhancement
Weekly capacity-building sessions cover critical topics like SAP training, fiscal management, and road safety audits, ensuring that employees have access to continuous learning opportunities to strengthen their professional capabilities.

By fostering continuous learning and career preparedness, NHAI empowers employees to successfully transition into new opportunities, contribute to the industry beyond their tenure, and maintain long-term professional growth.

ANNUAL PERFORMANCE AND CAREER DEVELOPMENT REVIEWS

In addition to technical and role-based training, NHAI conduct Annual Performance and Career Development Reviews for all employees, ensuring they have a clear understanding of functional requirements and an opportunity to reflect on their performance from the past year. This structured review process, which applies to junior staff, middle management (Deputy Managers and Managers), and senior leadership (DGMs and above), underlines the commitment to career development for all employees, including those in technical and non-technical roles.

Table 32 Employees receiving regular performance and career development review by gender

	FY 21-22	FY 22-23	FY 23-24
Percentage of Male employees receiving performance development review	100	100	100
Percentage of Female employees receiving performance development review	100	100	100

Note- The percentages provided above reflect data for NHAI's Regional Offices.

Table 33 Employee receiving regular performance and career development review by employee category

Employees receiving Regular Performance and Career Development Review by Employee Category ((Also Referred to as Annual Performance Appraisal Report as per Government of India Mandate) (APAR))			
Management Level	FY 21-22	FY 22-23	FY 23-24
Percentage of Junior level employees (Below Dy. Manager) receiving performance review	100	100	100
Percentage of Middle management (Dy. Manager and Manager) receiving performance review	100	100	100
Percentage of Senior management (DGM & above) receiving performance review	100	100	100

Management Level	FY 21-22	FY 22-23	FY 23-24
Percentage of Technical employees receiving performance review	100	100	100
Percentage of non-technical employees receiving performance review	100	100	100

Figure 85: Mission Karmayogi Capacity Building Plan

Respecting Human Values

NHAI is fully committed to upholding the Central Civil Services (Conduct) Rules of 1964[7], which set forth a comprehensive framework for the ethical conduct and integrity of government employees. According to these rules, any government employee whose services have been placed at the disposal of an external entity—such as a company, corporation, organisation, or local authority—will still be regarded as a government servant serving under the government's authority. This applies even when their salary is drawn from non-governmental sources, such as the budget of their partner organisation or other funds outside the Consolidated Fund of India. In all situations, there are consistent ethical standards for all government workers. These rules ensure that the principles of honesty, integrity, impartiality, and accountability are followed, no matter what their job is. This continuity reinforces public trust and upholds the dignity of the public service, as government servants are expected to maintain the highest standards of behaviour and professionalism while safeguarding the values that NHAI and the government stand for.

None of the operations and suppliers were identified to be at a significant risk for incidents of Child Labour

The specific ethical principles and professional standards expected of such government servants during their tenure with any external organisation are outlined below:

01
Maintain absolute integrity.

02
Maintain devotion to duty.

03
Do nothing which is unbecoming of a government servant.

04
Commit themselves to and uphold the supremacy of the Constitution and democratic values.

05
Defend and uphold the sovereignty and integrity of India, the security of the State, public order, decency, and morality.

06
Maintain high ethical standards and honesty.

07
Maintain political neutrality.

08
Promote the principles of merit, fairness, and impartiality in the discharge of duties.

09
Maintain accountability and transparency.

10
Maintain responsiveness to the public, particularly to the weaker section.

11
Maintain courtesy and good behaviour with the public.

12
Take decisions solely in public interest and use or cause to use public resources efficiently, effectively, and economically.

[7]https://dopt.gov.in/sites/default/files/CCS_Conduct_Rules_1964_Updated_27Feb15_0.pdf

13

Declare any private interests relating to his public duties and take steps to resolve any conflicts in a way that protects the public interest.

14

Not place themselves under any ¬financial or other obligations to any individual or organisation which may influence him in the performance of his Official duties.

15

Not misuse their position as civil servants and not take decisions in order to derive ¬financial or material benefits for themselves their family, or their friends.

16

Make choices, take decisions, and make recommendations on merit alone

17

Act with fairness and impartiality and not discriminate against anyone, particularly the poor and the under-privileged sections of society.

18

Refrain from doing anything which is or may be contrary to any law, rules, regulations, and established practices.

19

Maintain discipline in the discharge of their duties and be liable to implement the lawful orders duly communicated to them.

20

Maintain confidentiality in the performance of their official duties as required by any laws for the time being in force, particularly with regard to information, disclosure.

21

Perform and discharge their duties with the highest level of professionalism and dedication, to the best of their abilities.

Figure 86: International Women's Day celebration at NHAI

Figure 87: Workshop on Prevention of Sexual Harassment, December 2023

In addition, all individuals employed by NHAI are mandated to strictly follow the Central Civil Services (Conduct) Rules of 1964, which outline clear expectations and standards for employee conduct. These rules include:

- **Prohibition of Sexual Harassment:** NHAI enforces a zero-tolerance policy against sexual harassment of women in the workplace, in alignment with these rules, ensuring a safe, respectful, and inclusive environment for all employees.
- **Restrictions on Political Involvement:** Employees are prohibited from engaging in political activities or participating in elections in an official capacity, thereby maintaining their impartiality and dedication to public service without conflicts of interest.
- **Prohibition of Child Labour:** No government servant shall employ any child below the age of 14 years for any form of work, underscoring the commitment to ethical practices and adherence to child labour laws.
- **Prohibition of Forced Labour:** Employees are also prohibited from engaging in or supporting any form of forced or coerced labour, which aligns with the dedication to upholding the principles of fairness, human rights, and voluntary employment.

These regulations reinforce NHAI's dedication to maintaining high ethical standards and a professional, respectful workplace culture.

In FY 2023-24, NHAI assessed the operations and supply chain for potential risks related to child labour and forced labour, finding no significant concerns. Through regular monitoring and human rights due diligence, NHAI remain committed to upholding ethical practices and maintaining a responsible and sustainable organisation.

DIVERSITY AND EQUAL OPPORTUNITY

NHAI takes pride in fostering a diverse and inclusive workforce. NHAI are deeply committed to ensuring equal opportunities for individuals from Scheduled Caste (SC), Scheduled Tribe (ST), and Other Backward Classes (OBC) categories. The efforts reflect the belief in creating a workplace where everyone, regardless of their background, gender, or caste, feels respected and valued.

To further this commitment, NHAI has established a dedicated Reservation Cell to address grievances of employees belonging to SC, ST, and OBC categories. Originally constituted in November 2020 under the directives of the National Commission for Scheduled Castes, the Reservation Cell was reconstituted in June 2022 to enhance its functioning. This cell ensures that grievances are addressed efficiently and effectively.

No instances of discrimination was reported in the workplace in FY 2023-24

As part of the accountability measures, NHAI submit quarterly grievance reports to the Commission through the MoRTH. These reports provide detailed information on:

The total number of cases received,

The number of cases successfully resolved,

The number of unresolved cases, and

Actions taken against wilful defaulting officers.

Through these measures, NHAI strive to uphold justice, transparency, and inclusivity, reinforcing the commitment to a diverse and equitable workplace. Discrimination of any kind is not tolerated at NHAI. NHAI uphold the principles of fairness and inclusivity across all levels of the organisation.

ADDRESSING EMPLOYEES' CONCERNS AND GRIEVANCES

To ensure an effective and transparent process for addressing employee grievances, the HR Division at NHAI has established an internal Grievance Redressal Committee (GRC) specifically tasked with resolving service-related issues raised by NHAI employees. This initiative is rooted in the provisions of the GRC Office Memorandum dated 16 July 2021, which outlines the committee's structure and mandate. The GRC comprises six members, including a Presiding Officer, a Member Secretary, and four additional members, reflecting a balanced representation of roles to ensure fairness and impartiality in decision-making.

Employees with grievances are required to report their concerns directly to the GRC, ensuring that all submissions are accompanied by relevant supporting documents. To maintain accountability and proper documentation, the cadre-controlling divisions are responsible for keeping records of these submissions. During the reporting period, the GRC demonstrated its efficacy by addressing and resolving all of the grievances brought before it in a series of structured meetings, highlighting NHAI's commitment to prompt resolution of employee concerns.

Beyond service-related grievances, NHAI has also taken proactive measures to address workplace harassment. A dedicated Complaints Committee has been constituted to investigate and resolve complaints of sexual harassment in accordance with the guidelines laid down under the Prevention of Sexual Harassment (POSH) Act. To

maintain relevance and operational continuity, this committee is periodically reconstituted based on the availability and posting of its members. This approach ensures that the committee remains effective and aligned with the evolving organisational framework.

For grievances extending beyond internal service matters—such as those raised by employees, contractors, or consultants—NHAI has introduced a comprehensive Complaint Policy. This policy enables individuals to voice their concerns through multiple channels, ensuring accessibility and responsiveness:

Written Submissions

- Complaints related to corruption can be directly addressed to the Chief Vigilance Officer (CVO).
- Non-corruption-related complaints are directed to the General Manager (HR/Admin), ensuring specialised handling based on the nature of the grievance.

Online Submissions

- Individuals can file complaints electronically through the "Complaints" portal available on the NHAI website (https://nhai.gov.in) or via email.
- The portal categorises complaints into two types:
  - Corruption-related complaints, which are routed to the CVO for investigation.
  - Other matters, managed by the Administration team for resolution.

To safeguard confidentiality and encourage employees to raise concerns, NHAI provides a mechanism for submitting corruption-related grievances under the Public Interest Disclosure and Protection of Informers (PIDPI) framework. Complaints filed under this mechanism are handled by designated authorities, including the Central Vigilance Commission (CVC) and the CVO of the MoRTH. Crucially, the identity of the complainant is protected throughout the process, fostering a culture of trust and accountability.

These grievance redressal mechanisms reflect NHAI's unwavering commitment to ethical governance, employee welfare, and stakeholder engagement. By instituting clear, accessible, and effective resolution frameworks, NHAI not only ensures compliance with legal and regulatory requirements but also reinforces its dedication to creating a fair, transparent, and secure environment for all its stakeholders.

EXTERNAL GRIEVANCE MECHANISM

NHAI has established a robust Grievance Redressal Mechanism to address concerns and complaints from the public related to its services and projects. A dedicated Grievance Redressal Cell (GRC) operates at NHAI's headquarters in New Delhi, serving as the central hub for receiving, processing, and resolving externally received grievances.

The GRC functions as the nodal agency, actively coordinating with relevant authorities to ensure grievances are addressed efficiently and within a stipulated timeframe. This proactive approach underscores NHAI's commitment to accountability and public service excellence. In order to make the system work better, NHAI has added modern feedback systems that let a lot of different groups, like road users, Concessionaires/Contractors, local communities, and others, give direct, digital, and virtual feedback. These improvements ensure a more inclusive, responsive, and transparent grievance redressal process.

How NHAI's Public Grievance Redressal Mechanism Works.

01 **Grievance Redressal Portal**
NHAI operates a dedicated online Grievance Redressal Portal (https://pgportal.gov.in/) where the public can register complaints regarding its services or projects. The portal enables citizens to monitor the status of their grievances and facilitates direct communication between the complainant and the relevant NHAI official, ensuring transparency and accountability.

02 **Toll-free Helpline**
NHAI has established a toll-free helpline number (1033) to address road users' grievances, including concerns related to its services and projects. This helpline is operational 24/7 and can be accessed from any location across India, providing uninterrupted support to the public.

03 **Grievance Redressal Officers**
NHAI operates a dedicated online Grievance Redressal Portal (https://pgportal.gov.in/) where the public can register complaints regarding its services or projects. The portal enables citizens to monitor the status of their grievances and facilitates direct communication between the complainant and the relevant NHAI official, ensuring transparency and accountability.

04 **Public Meetings**
NHAI regularly organises public meetings to actively seek feedback and address grievances related to its services and projects. These meetings serve as an open platform for citizens to interact directly with NHAI officials, express their concerns, and provide insights. By fostering transparent communication and community engagement, NHAI aims to build trust and ensure that public concerns are effectively addressed.

05 **Mobile Application**
General road users and citizens can utilise the mobile application "MyGrievance," available on both Android and iOS platforms, to register, monitor, and resolve their grievances related to highways and associated services. Additionally, the Rajmarg Yatra mobile application, developed by NHAI, provides users with real-time traffic updates, toll plaza information, emergency assistance, and lodging of complaints, ensuring a smoother and safer travel experience on national highways and NHAI One App for internal use.

06 **Social media**
NHAI actively engages with citizens on social media platforms like Twitter and Facebook, allowing the public to raise grievances related to its services or projects. These platforms are regularly monitored by NHAI officials, who promptly address and respond to complaints and concerns.

There are two approaches to filing a complaint: they can either write directly to the Grievance Redressal Cell (GRC) at the NHAI headquarters or submit an online complaint form available on the official NHAI website. The online form requires the complainant to provide essential details, including their name, address, contact number, email address, and a brief description of the grievance.

Upon receiving the complaint, the GRC promptly initiates an investigation and coordinates with the relevant authorities to address and resolve the issue effectively. Regular updates and feedback keep the complainant informed of the progress throughout the process, ensuring transparency and accountability in grievance resolution.

Figure 88: Awareness session on Ethics at NHAI

PRIORITY GRIEVANCE REDRESSAL MECHANISM FOR VIPs AND PUBLIC REPRESENTATIVES

The VIP Reference System of grievance redressal at NHAI is a specialised mechanism developed to ensure that grievances and complaints raised by high-profile individuals are handled with urgency, efficiency, and sensitivity. This system prioritises concerns brought forth by VIPs, such as Members of Parliament (MPs), Members of Legislative Assemblies (MLAs), and other senior officials or dignitaries, ensuring their issues receive prompt attention and resolution.

When a complaint is lodged under the VIP Reference System, it is first acknowledged by the Grievance Redressal Cell (GRC) at NHAI. The GRC then forwards the complaint to the relevant Project Director or Regional Officer, who is tasked with addressing the matter without delay. These officers are required to take swift, decisive action and provide a resolution within the shortest possible timeframe to uphold the integrity and efficiency of the system.

To maintain transparency and accountability, the progress of each VIP complaint is meticulously tracked by the GRC. Regular updates and feedback are provided to the VIP concerned, ensuring they remain informed about the status of their grievance at every stage of the resolution process.

Additionally, NHAI has established a dedicated VIP Grievance Redressal Cell to oversee and manage these complaints with the highest level of priority. This specialised unit ensures that all concerns raised by prominent individuals are addressed with care and diligence.

Health and Safety

The health and safety of all individuals involved in the projects is the highest priority, as NHAI ensures that all the initiatives are in strict compliance with Indian regulatory standards and align with internationally recognised good industry practices. To facilitate this, the Model Concession Agreement clearly defines the health and safety requirements that must be followed by Concessionaires/Contractors and their contractors. It outlines specific guidelines and responsibilities to ensure that all personnel, including staff and workers, are adequately trained to safely carry out their roles on-site.

The appointed Authority Engineers and Independent Engineers play a critical role in overseeing the enforcement of safety protocols at each project location. They guarantee the proper implementation of all safety measures and provide NHAI with regular reports, including monthly updates on compliance and potential concerns. This oversight guarantees that the necessary precautions are continuously in place to protect the workforce.

The Concessionaire/Contractor is tasked with taking all essential steps to safeguard the health and safety of staff and labour engaged in NHAI projects. In partnership with local health authorities, the Concessionaire/Contractor must ensure the availability of essential services, such as paramedical staff, first aid facilities, and ambulance services, at all times on site. Furthermore, it is required that proper provisions be made for the welfare of workers, including access to hygiene facilities and measures to prevent the spread of diseases or epidemics.

In addition, both NHAI and the Concessionaire/Contractor appoint a dedicated safety officer for each project. These safety officers are highly qualified and have the full authority to enforce safety protocols on-site. They are responsible for ensuring that all personnel comply with safety regulations, taking necessary steps

Figure 89: Eye Check-up & Medical Camp- Hyderabad & Bangalore Project

to prevent accidents, and issuing any safety-related instructions as required. The safety officers' role is essential in maintaining a safe working environment and addressing potential hazards proactively.

To ensure accountability and transparency, the Concessionaire/Contractor is required to maintain comprehensive records of health, safety, and welfare activities. These records should document all relevant aspects of personnel safety, welfare measures, and any incidents or property damage. NHAI monitors and reviews the ongoing commitment to safety on the projects, based on the submitted reports.

NHAI's Health and Safety Commitments

01 Operating a robust health and safety management system that clearly defines policies and standards necessary to ensure safe service delivery.

02 Complying with all relevant legislative requirements and, where possible, striving to exceed these standards by promoting higher levels of health and safety across its operations.

03 Identifying and eliminating hazards wherever possible, and in cases where elimination is not feasible, minimising risks to the greatest extent practicable.

04 Providing all colleagues with the appropriate safety and wellbeing information, training, instruction, and supervision, tailored to their specific roles and responsibilities.

NHAI's OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEM

NHAI is committed to safeguarding the health, safety, and well-being of everyone involved in the highway projects, including employees, contractors, and local communities. The Occupational Health and Safety Management System (OHSMS) is aligned with ISO 45001:2018, a globally recognised standard, ensuring a proactive, structured approach to workplace safety across all project phases.

NHAI strictly adheres to the guidelines set by the MoRTH, embedding robust safety protocols into the planning, construction, and maintenance of highways. Additionally, NHAI follow Indian Roads Congress (IRC) standards, which provide industry-specific frameworks for road safety, construction best practices, and worker protection. These guidelines ensure that the safety measures are tailored to the unique demands of India's road infrastructure.

The safety framework is further reinforced through compliance with the National Building Code (NBC) and relevant standards from the Bureau of Indian Standards (BIS), ensuring alignment with both national regulations and industry best practices. To foster a culture of safety, NHAI conduct regular safety audits, risk assessments, and comprehensive training programs for employees and contractors, proactively mitigating risks and enhancing on-site safety.

Over the past three years, **100% of direct employees,** as well as **workers engaged through contractors managing work or workplaces on behalf of NHAI,**

have been fully covered under the comprehensive **Occupational Health and Safety (OHS) management framework.** Hired **contractors and their workforce strictly adhere to these safety protocols,** reinforcing the commitment to workplace safety at every level.

By integrating these global and national standards, NHAI remains dedicated to building a safer and healthier work environment, reinforcing its commitment to national priorities and international best practices in occupational health and safety management.

Table 34: Work-related injuries for employees and workers

	FY 19-20	FY 20-21	FY 21-22	FY 22-23	FY 23-24
For employees:					
The number of fatalities as a result of work-related injury;	3	0	6	19	8
The number of high-consequence work-related injuries (excluding fatalities);	0	1	0	7	18
The number of recordable work-related injuries;	3	9	8	44	50
The number of hours worked	2,20,67,379	2,68,27,145	2,80,66,501	4,96,03,104	5,55,77,304

	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24
For all workers who are not employees but whose work and/or workplace is controlled by the organisation:					
The number of fatalities as a result of work-related injury;	0	0	25	36	52
The number of high-consequence work-related injuries (excluding fatalities);	0	0	5	2	6
The number of recordable work-related injuries;	25	32	38	99	85
The number of hours worked.	5,01,41,295	5,81,06,819	6,53,55,15	7,53,42,744	7,89,85,300

NHAI has made commendable efforts in enhancing workplace safety over the years, with promising improvements in key areas. A particularly noteworthy achievement is the consistent decline in the fatality rate among employees, underscoring the effectiveness of strengthened safety protocols, proactive monitoring, and continuous on-site interventions. Another positive development is the stabilisation of recordable work-related injuries. Although there was an increase in the previous year, recent trends indicate successful containment. This progress reflects the impact of proactive measures such as structured risk assessments, targeted training programs, and improved adherence to safety standards, which are proving effective in curbing further escalation. While there is still work to be done in addressing severe injuries (excluding fatalities), these instances serve as a valuable reminder of the importance of ongoing efforts to identify and mitigate high-risk hazards. NHAI remains fully committed to advancing workplace safety through robust measures and responsive mechanisms.

A major accomplishment for NHAI is its ability to manage a growing workload while maintaining a strong safety focus. With the expansion of highway construction and maintenance activities, the number of hours worked has steadily increased. Encouragingly, injury rates have not risen proportionally, demonstrating that NHAI's evolving safety frameworks are successfully adapting to the demands of large-scale infrastructure development.

HAZARD IDENTIFICATION AND RISK ASSESSMENT (HIRA) FOR ENSURING SAFETY AND WELLBEING

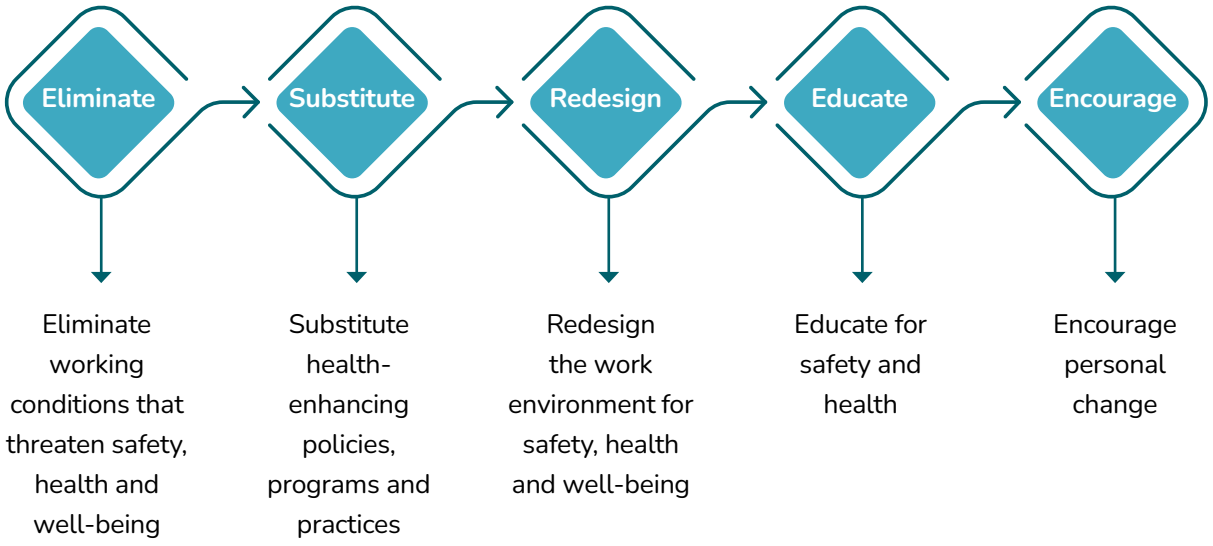
At NHAI, ensuring the safety and well-being of all stakeholders involved in the highway projects is a top priority. NHAI adopts a systematic approach to hazard identification, risk assessment, and incident investigation, integrating these principles into every stage of project planning, design, and execution.

The Occupational Health and Safety(OHS) management framework is aligned with ISO 45001:2018, a globally recognised standard that provides structured methodologies for identifying workplace hazards, evaluating risks, and implementing effective control measures. Indian Roads Congress (IRC) guidelines and MoRTH directives strengthen this framework even more. These make sure that the safety measures are tailored to India's complicated road infrastructure.

Beyond hazard identification, NHAI has established rigorous incident investigation protocols. Every workplace incident or near miss is meticulously analysed using best practices outlined in the National Building Code (NBC) of India and the Bureau of Indian Standards (BIS) safety codes. The approach goes beyond identifying root causes—NHAI implements corrective and preventive measures and ensures that lessons learnt are shared across projects to drive continuous improvement in safety practices.

To further embed a culture of safety, NHAI conducts regular safety audits, facilitates ongoing safety training for employees and contractors, and has established safety committees to actively engage all stakeholders in risk assessment and mitigation. These proactive measures ensure that safety remains a shared responsibility across all levels of the organisation.

By integrating national and international best practices, NHAI remains committed to fostering a safe and resilient work environment, preventing workplace injuries, and ensuring incidents are effectively managed to enhance overall safety performance.



ENHANCING ROAD SAFETY

NHAI recognises road safety as one of its most material issues, focusing on the well-being of citizens who use the roads it builds. The organisation aims to address infrastructure, policy, and knowledge gaps to protect human lives and promote safety. As part of this effort, NHAI is committed to raising awareness about road safety issues, the social and economic implications of road accidents, and the steps needed to curb the rising occurrence of accidents.

Acknowledging that road accidents stem from multiple factors, NHAI has developed a comprehensive, multi-pronged strategy to enhance road safety and reduce accident rates. This approach is built on the foundation of the 4 Es:

Education

NHAI works to raise awareness among citizens using national highways about road safety practices and available services, aiming to ensure safer travel with fewer accidents. The organisation has launched various initiatives to address the root causes of accidents and educate road users about these issues. A key focus has been on education programs for heavy vehicle drivers, as they are responsible for approximately 80% of accidents, with 60% occurring on highways. NHAI has been conducting Road Safety Education (RSE) programs in collaboration with NGOs, local authorities, schools, and community institutions.

Engineering

Road safety is a key component of engineering design at the project planning stage. The Indian Roads Congress (IRC) develops, updates, and distributes various guidelines on road construction and maintenance, including those related to road safety. These safety specifications and designs are integrated into the planning and execution of NHAI projects. Highway designs are carried out by consultants, ensuring they meet all relevant geometric and safety standards. This includes provisions for flyovers, grade separators, bypasses, railway overpasses/underpasses, bus/truck lay-bys, service roads, junction improvements, overhead signs, cautionary/regulatory/informative retro-reflective signboards, crash barriers, medians, thermoplastic road markings, traffic lights, and delineators. NHAI ensures these engineering measures are properly implemented to minimise accidents and fatalities.

Emergency Care

NHAI has implemented an Incident Management System across national highways, designed to initiate a coordinated response when an accident or emergency occurs. In such situations, assistance is readily available through the **1033** helpline, a vital emergency support system under NHAI's initiative. This helpline plays a crucial role in ensuring rapid response, minimising delays, and providing immediate aid to those in distress.

The primary objective of this system is to enhance road safety, reduce incident impact, and swiftly restore normal traffic flow on affected highways. The incident response operator is responsible for identifying emergencies and coordinating with relevant agencies, including rescue teams, fire services, hazardous materials handlers, traffic police, medical responders, hospitals, and road maintenance teams. Additionally, the system ensures 24/7 route patrols, strategically placed cranes, and ambulances along designated highway stretches, enabling a prompt and effective response to emergencies.

Enforcement

Enforcing existing safety laws and regulations is a critical aspect of realising road safety initiatives. NHAI has identified several challenges in this regard, such as commercial vehicle overloading, limited use of safety devices like seat belts, drunk driving, overcrowded passenger vehicles, and animal-related disturbances. To address these issues, NHAI has developed effective strategies, including rigorous monitoring of road safety standards in engineering, and providing support to local traffic authorities to address traffic violations effectively.

Figure 90: NHAI's Ambulance Services

In line with the 4Es framework, NHAI, under the guidance of MoRTH, has implemented several concrete measures to enhance road safety, including

Accident Blackspot Identification and Rectification

To mitigate accident-prone locations, MoRTH has prioritised the identification and rectification of blackspots on national highways. Based on accident and fatality data from 2016-2018, 5,352 blackspots were identified, out of which 4,005 have been permanently rectified, with work in progress for the remaining locations. Additional blackspots have been identified in subsequent years, with rectifications ongoing.

To address blackspots, MoRTH and NHAI implement both short-term and long-term solutions:

01

Short-term measures
Cautionary Road signs, transverse bar markings, rumble strips, and solar blinkers.

02

Long-term solutions
Construction of flyovers, underpasses, foot overbridges, and service roads.

03

Traffic calming strategies
Deployment of warning signs, road studs, bar markings, and speed humps at critical locations to prevent accidents.

04

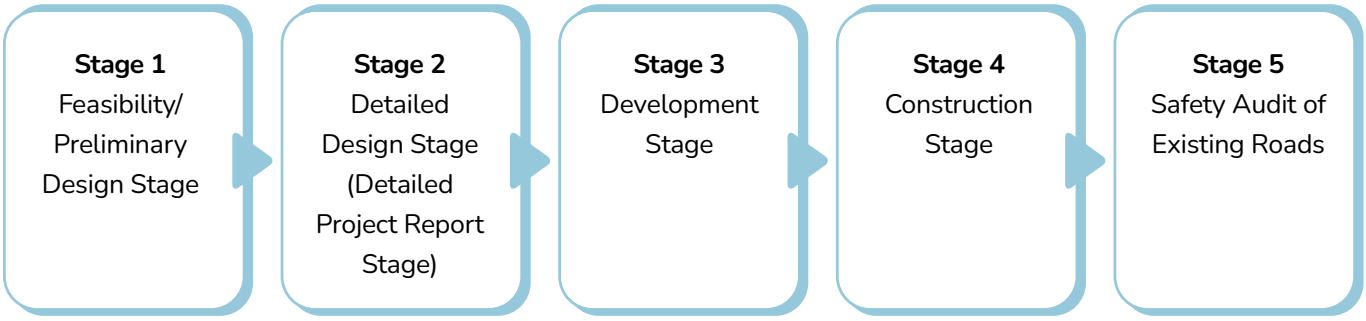
Emergency medical
facilities: As per contract agreements, provisions for emergency medical services and accident response are included to ensure prompt assistance to road accident victims.

Road Safety Audits and Compliance

As part of its ongoing initiatives to promote awareness, the MoRTH observed Road Safety Month from 15 January to 14 February 2024. This campaign focused on educating citizens and road users about the critical challenges associated with road safety

Road safety is a priority for NHAI. To enhance safety across India's national highways, NHAI conducts comprehensive Road Safety Audits to identify potential hazards and implement corrective measures at all stages of highway projects—design, construction, and operation & maintenance. These audits are conducted in accordance with IRC: SP: 88 standards set by the Indian Road Congress (IRC) to ensure adherence to best practices in road safety.

These audits follow a structured five-stage process:



Enhancing Pedestrian Safety

To enhance pedestrian safety and expedite infrastructure development, the MoRTH has delegated financial authority to NHAI's Regional Officers, allowing them to approve up to INR 25 crore for the construction of Pedestrian Underpasses (PUP) and Pedestrian Subways (PSW) and up to INR 1.25 crore for the development of Foot Over Bridges (FOBs).

Standardised Road Signages for Enhanced Safety

In July 2023, MoRTH issued new guidelines[8] for uniform road signages across expressways and national highways to improve visibility and communication. Key enhancements include:

- Pictorial depictions for intuitive understanding.
- Multilingual signage to aid diverse road users.
- Lane discipline-focused signages for better traffic management.
- Priority implementation on highways with PCU (Passenger Car Unit) above 20,000 and all new expressways, greenfield corridors, and upcoming highway projects.

Through these measures, NHAI, in collaboration with MoRTH, is strengthening road safety infrastructure, enhancing accident response, and ensuring a safer and more efficient transportation network across India. By integrating engineering advancements, stringent enforcement, and public awareness, NHAI remains committed to making national highways safer for all road users.

OCCUPATIONAL HEALTH SERVICES

NHAI conducted Industrial Health and Hygiene audits across various regions. The audit methodology encompasses the following key aspects:

- Review of policies related to Health and Safety
- Assessment of SOPs related to industrial hygiene.
- Review of HIRA, Material Safety, and Data Safety
- Review of exposure assessment
- Assessment of roles and responsibilities on OHS.
- Review of overall PPE management plan
- Review of industrial hygiene related accidents/ incidents/first aid cases reported at the site (if any)
- Inspection of food safety/canteen safety assessment records
- Review of training and medical records
- Review of incident and training register
- Review of vehicular movement
- Conducting project site walkthrough
- Examining site specific working conditions
- Interview with internal and external stakeholders.
- Review onsite usage of PPE by employees and workers.
- Visual observation of existing exposure and ergonomics assessment
- Review of handling and storage of waste materials
- On-site observation of working conditions like high temperature, noise, illumination, vibration, etc.

[8]https://morth.nic.in/sites/default/files/circulars_document/Guidelines%20for%20provision%20of%20signages%20on%20Expressway%20and%20NHs%2020%20Jul%202023.pdf

NHAI'S OCCUPATIONAL HEALTH SERVICES AT NHAI's

01 Employee Health Checkup

02 Diagnosis Record Keeping

03 Case-wise History

04 Fitness Search

Workforce Engagement and Communication on Occupational Health and Safety

Worker participation at NHAI is a key element in creating a robust and effective safety and health program. It involves active engagement from all workers, whether stationed at regional sites, the Head Office, or those employed by contractors, subcontractors, and temporary staffing agencies. NHAI ensures worker involvement by encouraging participation in the establishment, operation, evaluation, and continuous improvement of its Occupational Health and Safety (OHS) initiatives.

To promote a safety-conscious culture, NHAI has implemented a rigorous process for the induction of new workers. This process includes a thorough screening, followed by an introduction to essential safety measures they must follow while working on-site, in accordance with the OHS Management System. Before any work begins, risk assessments are conducted, and appropriate safety precautions are put in place to ensure that each task is executed with the goal of zero harm.

In addition to these practices, NHAI conducts thorough workplace inspections to ensure that all environments are safe, minimise risks, and provide a secure setting for the workforce.

As part of its commitment to safety and quality, NHAI is an Integrated Management Systems (IMS) Certified organisation, adhering to the following internationally recognised standards:

01 **ISO 9001:2015** (Quality Management System)

02 **ISO 14001:2015** (Environmental Management System)

03 **ISO 45001:2018** (Occupational Health & Safety Management System)

These certifications reflect NHAI's commitment to maintaining the highest standards of safety, quality, and environmental responsibility across its operations.

Building Safe Systems for Enhanced Mobility

01 **System Planners & Policy Makers**
Accountable for prioritising safety in design and policy development

02 **Individual Road Users**
Accountable for adhering to traffic rules and regulations

03 **If road users make mistakes**
Designs and policies are evaluated for potential safety enhancements

NHAI has implemented comprehensive practices aimed at fostering worker participation and open communication, which play a vital role in cultivating a positive Safety and Health culture throughout the organisation. These practices ensure that workers feel valued and empowered to contribute actively to safety initiatives and improvements. The key initiatives include:

01

Open Door Policy
NHAI encourages a transparent communication environment where workers can approach managers with concerns or suggestions related to safety and health. This open-door policy ensures that workers' voices are heard, creating a supportive space for dialogue and proactive problem-solving.

02

Empowerment for Safety Action
Workers are empowered to take immediate action when they perceive any work activity or operation to be unsafe. This includes the authority to request or initiate a temporary suspension or shutdown of operations, ensuring that safety is always prioritised.

03

Collaborative Problem-Solving
Workers are actively involved in identifying and addressing safety issues. By engaging them in finding practical solutions to reported concerns, NHAI promotes a collaborative approach that encourages responsibility and accountability at all levels.

04

Hazard Identification and Risk Mitigation
Workers are trained to identify potential hazards in the workplace, enhancing their understanding of the safety program and fostering a sense of ownership. This not only improves the program's effectiveness but also helps sustain its long-term success by continuously addressing emerging risks.

05

Creating Local Employment Opportunities
NHAI is committed to creating job opportunities for local communities, which contributes to economic development and strengthens the relationship between NHAI and the regions in which it operates.

COMMUNITY DEVELOPMENT AT NHAI

NHAI recognises the vital role that community development plays in building strong, resilient communities. NHAI is committed to not only improving infrastructure but also to creating environments that empower local populations, provide meaningful employment opportunities, and foster sustainable economic growth. The community development initiatives aim to enhance the standard of living for local communities by offering access to resources, training, and opportunities for growth.

NHAI believes that community development is significant as it helps create resilient communities able to attract and nurture talent, while ensuring optimal business growth.

NHAI is focused on creating stronger, more connected communities by addressing both the immediate and long-term needs of the people. The initiatives are designed to foster self-sufficiency and provide avenues for local populations to thrive by facilitating the establishment of industries and improving livelihoods, leading to sustainable community development.

COMMUNITY ENGAGEMENT AND SERVICES

NHAI's community engagement efforts are centred around the implementation of programs that address the needs of both the customers and the broader community. Some of the key initiatives include:

- **Wayside Amenities**
  To enhance the comfort and convenience of highway users, MoRTH has planned the development of state-of-the-art wayside amenities (WSAs) approximately every 40–60 kilometres along the National Highways, operating under a PPP model. These amenities are designed to offer a range of rest and refreshment options for commuters on their journeys. Key facilities being developed at each WSA include fuel stations, EV charging stations, food courts/restaurants, dhabas, convenience stores, clean and hygienic toilet facilities,

drinking water, first aid/medical rooms (including childcare rooms), designated areas to support local artisans, car/bus/truck parking, and trucker facilities like dormitories and dhabas, along with drone landing/ helipad facilities.

NHAI aims to develop over 700 WSAs along National Highways by FY2025-26, with 322 already awarded, including 162 in FY 2023-24. Of these 322 WSAs, 83 sites are operational. These WSAs present significant opportunities for investors, developers, operators, and retailers. Additionally, all upcoming greenfield access-controlled highway projects are mandated to include WSAs, which will not only contribute to local economic growth by creating employment opportunities but also support local communities in showcasing and selling their unique products and crafts at village halls established at these locations.

- **National Road Safety Month**

  To raise awareness about road safety, NHAI organises workshops, seminars, bike rallies, walkathons, and health and eye check-up camps across the country during National Road Safety Month 15 January to 14 February 2024. The event is aimed at educating the public on road safety practices, conducting road safety audits, identifying accident-prone areas, and implementing remedial measures to reduce accidents. NHAI's continued focus on road safety strengthens its commitment to ensuring safer roads for all users.

- **Multi-Modal Logistics Parks (MMLPs)**

  An efficient transportation and logistics sector is essential for economic growth. NHAI, through the National Highways Logistics Management Limited (NHLML), is developing Multi-Modal Logistics Parks (MMLPs) across the country to improve the logistics infrastructure. These parks are designed to enhance intermodal freight movement by integrating various modes of transportation, including road, rail, and air, while also offering essential storage and terminal facilities.

  Multi Modal Logistics Parks (MMLPs) are planned to be developed across the Country as approved by Cabinet Committee on Economic Affairs (CCEA). National Highways Logistics Management Limited (NHLML), a 100% owned Company of National Highways Authority of India (NHAI) has been mandated by Ministry of Road Transport & Highways (GoI) to develop MMLPs. With the development of MMLPs, the overall logistics cost of India which is currently 13%-14% of the country's GDP will be reduced to less than 10%.

  Benefits of MMLP

  i. Hub and spoke model of transport network compared to point-to-point network.
  ii. Lowers transportation cost by enabling a seamless modal shift to rail & vice versa
  iii. Lower handling costs due to presence of best in class modern and mechanised handling infrastructure
  iv. Reduces secondary freight costs by co-location of large warehouses and value-added services
  v. MMLPs benefit from economies of scale, by creating shared infrastructure and due to availability of more options for selection of competitive and reliable logistics providers

  As part of the Bharatmala Pariyoa, a network of 35 Multimodal Logistics Parks (MMLPs) is planned for development, with a total investment of approximately INR 46,000 crore. These MMLPs will be developed in 35 strategic locations, such as the Mumbai Metropolitan Region, Pune, Aurangabad, Nashik, Dighi Port Industrial Estate, Chennai, Bengaluru, Hyderabad, and Indore. Once operational, these MMLPs will be capable of handling around 700 million metric tonnes of cargo. Among them, MMLPs at 15 prioritised locations will be developed with an investment of about ₹22,000 crore.

  As part of the Sagarmala Pariyoa, these MMLPs will be built along with Inland Waterway Terminals. These MMLPs will be important regional hubs for collecting and distributing cargo. They will connect different agricultural and industrial areas, consumer hubs, and EXIM gateways like seaports through multiple modes of transportation. The goal is to make inland cargo transportation much cheaper by making it easier for large quantities of goods to move instead of using old-fashioned road-based methods.

User-Centric Initiatives

At NHAI, user satisfaction is a top priority. NHAI ensures that it remains accessible to all highway users, including commuters and roadside residents, by offering a variety of services designed to address their concerns and provide high-quality experiences. Some of the user-centric initiatives NHAI has in place include:

01	02	03	04	05	06
Medical Aid Centres	Washroom/Toilet Facilities	Emergency Phone Booths (SOS)- Save Our Soul	Roadside Assistance	Wayside Amenities	Complaint Offices (at toll plazas)

NHAI ensures that all user complaints are recorded and addressed in a timely manner, providing a seamless and responsive service experience. Additionally, NHAI has set up customer care numbers to ensure that feedback and concerns are resolved quickly.

To further enhance the safety of road users, Toll Plazas are strategically located at designated points along the National Highways for fee collection. As part of the commitment to road safety and the well-being of highway users, NHAI has implemented a compensation scheme that provides insurance coverage for third parties, including workers, road users, and roadside residents, in the event of accidents. This insurance covers fatalities, injuries, and property damage regardless of fault. Emergency helpline numbers and contact details are available at regular intervals across all projects, ensuring quick access to assistance when needed.

Digital Innovation for Convenience

In the reporting period, NHAI also launched a new mobile application, NHAI One, designed to streamline onsite requirements in the execution of National Highway projects. This app is a part of the ongoing efforts to enhance operational efficiency and ensure ease of commuting on National Highways. By integrating technology into project execution, the app aims to simplify processes and improve the overall user experience for commuters and stakeholders alike.

Rajmarg Yatra App

The Rajmargyatra App launched in August 2023 has improved the highway user experience. The app serves as a repository of all necessary information for highway users. The users can get real-time weather updates along with broadcast notifications. Further details on accessibility to nearest toll plazas, fuel stations, hospitals, as well as hotels can also be availed through the app. The app has been equipped with mechanism for complaint redressal and resolution, giving the users ability to report highway-related concerns, attach photos and videos. The users also have the ability to track grievance status for complete transparency. The app has a seamless integration with different bank portals, allowing the users to process FASTag recharges, avail monthly passes from a common platform.

Through these community development and customer-centric initiatives, NHAI is not only improving the infrastructure but also creating positive impacts on the lives of local communities, road users, and businesses across the country.

Figure 91: Snippet of the Rajmarg Yatra App

Figure 92: Snippet of the NHAI One App

CORPORATE SOCIAL RESPONSIBILITY

NHAI recognises the significance of corporate responsibility in shaping positive impacts on society, the environment, and the broader ecological system. As part of its commitment to sustainable development, NHAI actively contributes to a wide range of initiatives that align with its responsibility towards good governance, economic growth, social welfare, labour welfare, and environmental stewardship. Through these focused efforts, NHAI is not only enhancing infrastructure but also ensuring that its operations benefit communities, create lasting value, and promote sustainability in line with national and global development goals. Over the past year, NHAI has launched initiatives to support the welfare of the communities around us, including:

Figure 93: Annual Winter Collection Drive

Odha Do Zindagi: The Annual Winter Collection Drive

Building on the success of the previous campaign, where the workforce contributed 2,80,000 blankets and 13,00,000 woollens to those in need during the cold months, NHAI has organised the "Odha Do Zindagi" donation campaign in FY 2023-24. This initiative encouraged the employees and workers to donate blankets, quilts, sarees, shawls, mufflers, socks, caps, gloves, coats, mattresses, and more.

NHAI is committed to fostering inclusive and sustainable development by actively engaging with local communities, conducting impact assessments, and implementing development programs tailored to community needs. Over the past three years, NHAI has consistently strengthened the approach to stakeholder engagement, environmental and social responsibility, and transparency in project execution. the efforts are reflected in the steady increase in the percentage of operations incorporating key community engagement and impact assessment measures. The table below highlights the percentage of operations with implemented local community engagement, impact assessments, and/or development programs.

Table 35 Percentage of operations with implemented local community engagement, impact assessments, and/or development programs

		FY 21-22	FY 22-23	FY 23-24
1	Social impact assessments, including gender impact assessments, based on participatory processes;	59.37	61.24	64.18
2	Environmental impact assessments and ongoing monitoring;	59.38	62.03	65.70
3	Public disclosure of results of environmental and social impact assessments;	57.10	63.02	65.16
4	Local community development programs based on local communities' needs;	48.64	50.57	60.11
5	Stakeholder engagement plans based on stakeholder mapping;	44.92	45.28	58.72
6	Broad based local community consultation committees and processes that include vulnerable groups;	47.62	50.12	57.43
7	Works councils, occupational health and safety committees and other worker representation bodies to deal with impacts;	50.32	55.11	61.68
8	Formal local community grievance processes.	46.36	50.29	55.02

Steps taken for keeping environment clean for workers and locals

- Personnel protective equipment provided like Helmets, Nose mask etc.
- Transport facilities provided to the workers at site.
- Inside tunnels, ambient air quality provided via ventilation fan to make the tunnel environment workable.
- Drinking water quality is being monitored on a regular basis.
- Restroom provided to the workers.
- The plantation drive is being carried out in the project stretch to improve the environmental quality.
- Sprinkling of water via water tankers is being done to control the dust.

During the reporting period, the organisation did not identify or record any incidents of violations involving the rights of Indigenous peoples in any of its operations or activities. The organisation remains committed to respecting the rights of Indigenous communities. The NHAI ensures that local communities are not adversely affected by its operations and continues to focus on inclusive development and stakeholder well-being. There were no significant actual or potential negative impacts on local communities arising from its activities.

Cleanliness is next to Godliness

The NHAI observed Swachhta Pakhwada from 02 October to 31 October 2023, in alignment with the #SwachhataHiSeva campaign. As part of this initiative, NHAI organised the 'Shramdaan for Swachhata' cleanliness drive at its headquarters in New Delhi. Reflecting the vision of a Clean India, the event saw active participation from NHAI officials and staff from the headquarters, as well as Regional Offices across the country, who stepped forward to pledge their commitment to maintaining cleanliness.

The drive was led by Shri Anurag Jain IAS, Secretary of the Ministry of Road Transport and Highways, alongside NHAI Chairman Shri Santosh Kumar Yadav IAS and other senior officials. These efforts exemplify NHAI's dedication to promoting cleanliness and ensuring a healthy environment, which is in line with the long-term goals of the Swachh Bharat Mission.

Figure 94: Swachhata Hi Seva Campaign at NHAI

FUELING GROWTH THROUGH SUSTAINABLE INVESTMENTS

CONTRIBUTION TO UN SDGS

- Economic Performance

MATERIAL ISSUES

- Corporate Governance
- Economic Performance

HIGHLIGHTS

₹ 41,153.98 crore under Asset Monetisation mode during 2023-24 (highest ever).

IN THIS SECTION:

Economic Performance

Asset Monetization

Economic Performance

The National Highways Authority of India (NHAI) was established under the National Highways Authority of India Act, 1988, enacted by Parliament. NHAI is responsible for the development, maintenance, and management of the National Highways assigned to it. In addition to receiving budgetary support from the Government of India, NHAI finances its highway development programs through various funding sources. These include toll revenues from completed highway stretches, monetisation of future toll collections, and borrowing from financial institutions and capital markets.

Figure 95: Cloverleaf Interchange at Bengaluru-Chennai Express

In line with the Vision 2047, NHAI is committed to improving connectivity, equity, and efficiency of its highways, which stand at a total of 146,145 km as of FY 2023-24. This continual growth objective at a national scale is funded partly by Government Budgetary Support (GBS) and partly by Internal Extra Budgetary Resources (IEBR). A summary of the total funding received by NHAI from its various sources over the last three years can be seen in the table below:

Table 36 Total Funding Received By NHAI

Item (In INR Crore)*	FY 21-22	FY 22-23	FY 23-24
Opening Balance	5,235	3,971	3,757
CESS	36,210	1,10,674	1,27,727
Toll Plough Back	12,670	18,006	25,000
InVIT	7,350	2,850	15,700
Borrowings	65,149	798	0
DME	14,006	9,824	6,666
NH (o) and Others	30,653	31,066	56,050

*FY 2024 figures are unaudited

According to the NHAI Act, 1988, the Central Government provides grants and support to NHAI through institution of a fund that should be utilised for the following purposes:

01

Expenses of the Authority in the discharge of its functions having regard to the purposes for which such grants, loans or borrowings are received and for matters connected therewith or incidental thereto.

02

Salary, allowances, other remuneration and facilities provided to the members, officers and other employees.

03

Expenses on objects and for purposes authorised by the Act.

During FY 2023-24, the total budgetary allocation increased by 27.33% to INR 2,76,351 from INR 2,17,027 crore in FY 2022-23.

Table 37 Schemes with their allocation and expenditure

S.No.	Scheme	Allocation (INR Crore)	Expenditure (INR Crore)
1	Capital	2,63,895	2,63,738
2	Revenue	2,656	2,589
3	Total (Central Sector Road)	2,66,552	2,66,327
4	CRF (State Roads)	8,836	8,646
5	EI&ISC for State roads – Capital	260	259
6	Ropeway	250	250
7	Road Transport	279	276
8	Secretariat Expenditure	175	157
9	Total (Budget)	2,76,351	2,75,915
	Other Resources		
10	Project Based Financing		8,646*
11	InvIT		15,700**
12	Pvt. Sector Investment		34,805

* Provisional
** Actual raise

For NHAI, effective asset monetisation is aimed at improved operational efficiency, reduced maintenance costs, and sustainable growth, significantly boosting its financial performance. Over the last three years, NHAI has continued to expand its highway network while simultaneously increasing asset monetization, as seen in the graphs below:

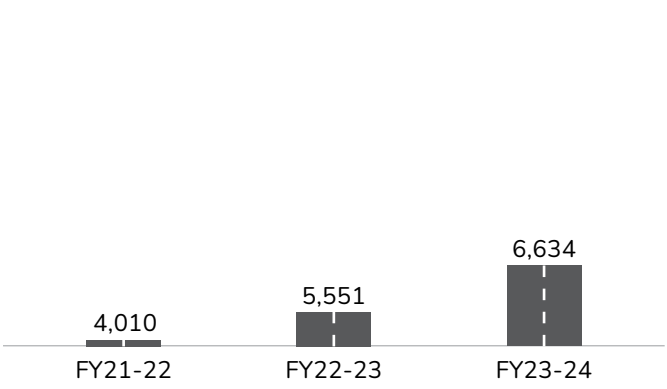


Figure 96: Highways Construction (in kms)

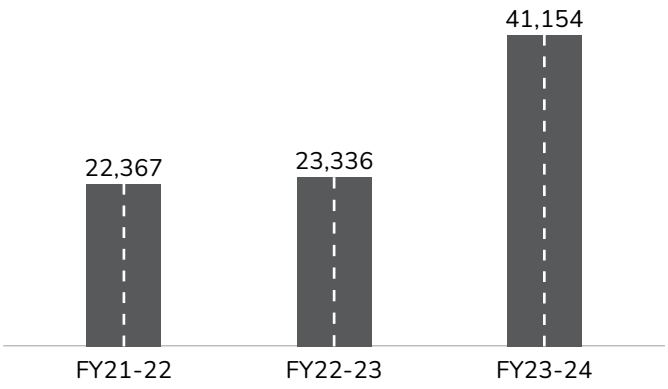


Figure 97: Asset Monetisation (in INR crores)

These trends are a testament to NHAI's dedication to the growth and expansion of its operations, supported by the adequate financial instruments.

₹ 15,968.1 crore has been raised through monetisation via Toll Operate Transfer mode (TOT) during 2023-24 against the target of ₹ 10,000 crore

₹ 15,699.88 crore has been raised through monetisation via InvIT during 2023-24 against the target of ₹ 15,000 crore

₹ 42,207 crore has been raised via Project-based financing of Delhi Mumbai Expressway (DME), out of which ₹ 8,646 crore has been raised during 2023-24.

NHAI has raised ₹ 41,153.98 crore under Asset Monetisation mode during 2023-24 (highest ever) against the target of ₹ 34,000 crore.

- In the Toll-Operate-Transfer (TOT) model, the right to collect user fees (tolls) for certain operational highways built with public funding is assigned to a Concessionaire/Contractor through a bidding process and a Concession Agreement. This arrangement lasts for a specific duration of 15 to 30 years in exchange for an upfront lump-sum payment to the Government/NHAI. Throughout the concession period, the Concessionaire/Contractor is responsible for the operation and maintenance of the road assets.
- In compliance with the SEBI InVIT Regulations, 2014, the InVIT model is a pooled investment that issues units to investors and consists of three entities for its management namely the Trustee, Investment Manager, and Project Manager, with their respective roles and responsibilities outlined by SEBI.
- The establishment of a Special Purpose Vehicle (SPV), fully owned by NHAI, has been enabled by bundling together specific road assets and securitising future user fees from these assets. NHAI will collect tolls, maintain the road infrastructure, and regularly transfer payments to the SPV to meet its debt servicing obligations. This approach led to the project-based financing raised with regard to the DME.

Figure 98: Hon'ble PM Shri Narendra Modi inaugurates 6-lane Amritsar-Jamnagar Greenfield Economic Corridor

INDIRECT ECONOMIC IMPACTS

NHAI has been assigned the National Highways Development Project, which involves the development, maintenance, and administration of 50,329 km of national highways, in addition to other minor projects. This has provided substantial direct and indirect benefits, including the enhancement of transport access for underserved communities, which has contributed to the reduction of inequalities in mobility and access to services.

NHAI'S APPROACH TO TAXATION

NHAI's approach to taxation is aligned with the mandate of Government of India and the organisation aims to ensure absolute compliance with the same. As a statutory body, under MoRTH NHAI adheres to tax governance as mandated under the Income Tax Act, 1961 and other regulations of Government of India. Any tax-related control and risk matters are handled by authorised government auditors and the Comptroller and Auditor General of India (CAG), ensuring transparency and compliance. NHAI's tax compliance and related disclosures are subject to review by authorised statutory and regulatory bodies. Stakeholder concerns regarding taxes, if any, are addressed through established grievance redressal mechanisms and government-led audits.


2024
संवेदना का सफ़र
सड़क सुरक्षा अभियान 2024
संवेदना का सफ़र

AWARDS AND RECOGNITION

- National Highways Excellence Awards, 2022
- Recognition for Undertaking Advanced Technology Initiatives
- National Highways Excellence Award, 2023

NATIONAL HIGHWAYS EXCELLENCE AWARDS, 2022

On 06 February 2024, in Yashobhoomi, Dwarka, the National Highways Excellence Awards, 2022 ceremony was held with the theme "Excellence in Project Management and Road Safety." The awards were bestowed in the presence of Hon'ble Minister for Road Transport & Highways Shri Nitin Gadkari. Prizes were given out during the ceremony to concessionaire/ contractors who had excelled in project management, operation and maintenance, green highways, highway safety, and remarkable performance in difficult conditions and innovation.

Figure 99: Hon'ble Minister, MoRTH at National Highways Excellence Awards, 2022

Figure 100: National Highways Excellence Awards, 2022

This report highlights NHAI's significant efforts in reducing environmental impact, enhancing social welfare, and driving economic progress. The organisation has made notable strides in implementing eco-friendly and sustainable practices, such as the use of renewable energy, promoting green highways, and advancing waste management techniques. NHAI remains committed to delivering projects that are not only economically sound but also socially responsible and environmentally sustainable. NHAI has achieved numerous construction records due to the use of effective planning and incorporation of cutting-edge practices in highway construction.

Figure 101: Awardees at the National Highways Excellence Awards

The National Highway Excellence Awards 2022, highlights the organisation's commitment to sustainable development, inclusive growth, and responsible practices. The sustainability report demonstrates the efforts made by NHAI towards reducing its environmental impact, improving social welfare, and promoting economic growth and steps towards adopting sustainable and eco-friendly practices, including the use of renewable energy sources, promoting green highways, and adopting waste management practices.

Going forward, the NHAI plans to continue its efforts towards sustainability, considering the changing social, economic, and environmental conditions. The organisation remains committed to ensuring that its projects are not only economically viable but also socially responsible and environmentally sustainable.

RECOGNITION FOR UNDERTAKING ADVANCED TECHNOLOGY INITIATIVES

Figure 102: Shri. Deepak Saxena CGM (i/c) receiving the award, August 2023

The GeoSmart Infrastructure Awards India celebrate excellence in the application of geospatial technologies in infrastructure development. These awards recognise innovative projects, organisations, and individuals who have significantly contributed to the field of digital construction and engineering. The awards aim to highlight the best-in-class applications and leadership in transport infrastructure development and asset management.

The awards held in 2023 conferred NHAI with 'Recognition for Undertaking Advanced Technology Initiatives' in New Delhi. Hon'ble Minister, MoRTH Shri Nitin Gadkari virtually addressed the conference and unveiled the Digital Twin Strategy for Indian Infrastructure report. This report was developed under the guidance of the Non-Executive Think Tank on Digital Twin Strategy for Indian Infrastructure, established by Geospatial World.

The Hon'ble Minister underscored the vital role of embracing cutting-edge technology, fostering research and innovation, and integrating successful practices from both global and domestic sources to drive progress and excellence. He highlighted the need to use alternative materials to reduce costs without compromising quality. "Time is the most critical factor in construction; it is our greatest asset," he stated.

NHAI was bestowed with the prestigious award for its outstanding steadfastness to embrace advanced technology initiatives in highway construction. NHAI has demonstrated a laudable standard for sustainability, efficiency, and enhanced connectivity across India's highways. This award is a celebration of NHAI's forward-looking approach and serves as an appreciation for the organisation's pivotal role in modern infrastructure development in India.

NATIONAL HIGHWAYS EXCELLENCE AWARDS 2023

The sixth edition of the National Highways Excellence Awards 2023 (NHEA 2023) was held at Bharat Mandapam, New Delhi to acknowledge professionals demonstrating exceptional contributions to the development of National Highways. The event was graced by the presence of the Hon'ble Minister for Road Transport and Highways, Shri Nitin Gadkari, alongside Shri Harsh Malhotra, Hon'ble Minister of State, and Dr V.K. Saraswat, Member of NITI Aayog alongwith senior officials from MoRTH and NHAI. The following projects of NHAI received awards in the various categories:

National Highways Excellence Awards 2023

Award	Name of the Project	Name of the State	Name of the Company
Excellence in Operation & Maintenance (Flexible)			
	Madurai to Kanyakumari Package 4 of NH-7	Tamil Nadu	Nanguneri Kanyakumari Tollway Pvt. Ltd.
Green Highways			
	Kandi to Ramsanpalle Section of NH-161	Telangana	Ashoka Buildcon Ltd.
	MH-KT Border to Sangareddy Section of NH-65	Karnataka & Andhra Pradesh	Deccan Tollways Ltd.
Excellence in Project Management (PPP)			
	Ateli Mandi to Narnaul Section of NH-11	Haryana	H.G. Infra Engineering Ltd.

NHAI recognises the sustainability efforts by Concessionaires/Contractors and confers awards on the excellence in project management as well as operation and maintenance.

NHAI has made remarkable strides in embracing sustainable and eco-friendly initiatives. These include the integration of renewable energy sources, the promotion of green highways, and the implementation of effective waste management practices. These initiatives have earned well-deserved recognition, notably through the prestigious National Highway Excellence Awards 2023, affirming NHAI's leadership in sustainable infrastructure development.

(a) Hon'ble Minister Shri Nitin Gadkari-MoRTH India.

(b) Shri Harsh Malhotra (Hon'ble Minister of State, Corporate Affairs & MoRTH India).

(c) Shri V. Umashankar, IAS (Secretary, MoRTH).

(d) Shri Santosh Kumar Yadav, IAS (Chairman, NHAI).

(e) Shri V. Umashankar, IAS (Secretary, MoRTH).

(f) Hon'ble Minister Shri Nitin Gadkari, Hon'ble Minister Shri Harsh Malhotra, Shri V. Umashankar, Dr. V.K. Saraswat, Member, NITI Aayog.

(g) Hon'ble Minister Shri Nitin Gadkari presenting The Best Engineer Award to Shri Navratan, DGM & PD, NHAI

(h) Valedictory Session

(i) NHEA 2023 Awardees with Hon'ble Minister Shri Nitin Gadkari

Figure 103: NHAI Highways Excellence Awards, 2023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Annexure 1: Alignment with GRI Standards

GRI STANDARD	DISCLOSURE	Section in SR	Reason for Omission/ Remarks
GRI 2: General Disclosures 2021	2-1 Organisational details	About NHAI	
	2-2 Entities included in the organisation's sustainability reporting	About the Report	
	2-3 Reporting period, frequency and contact point	About the Report, NHAI's Parivesh	
	2-4 Restatements of information	About the Report	
	2-5 External assurance	About the Report	
	2-6 Activities, value chain and other business relationships	About NHAI	
	2-7 Employees	Bridging People and Progress	
	2-8 Workers who are not employees	Bridging People and Progress	
	2-9 Governance structure and composition	About NHAI	
	2-10 Nomination and selection of the highest governance body	About NHAI	
	2-11 Chair of the highest governance body	About NHAI	
	2-12 Role of the highest governance body in overseeing the management of impacts	About NHAI	
	2-13 Delegation of responsibility for managing impacts	Environment & Green Highway Division	
	2-14 Role of the highest governance body in sustainability reporting	Sustainability reporting at NHAI	
	2-15 Conflicts of interest	About NHAI	
	2-16 Communication of critical concerns	About NHAI	
	2-17 Collective knowledge of the highest governance body	About NHAI	
	2-18 Evaluation of the performance of the highest governance body	About NHAI	
	2-19 Remuneration policies	Bridging People and Progress	
	2-20 Process to determine remuneration	Bridging People and Progress	

	2-21 Annual total compensation ratio	Not applicable	As a statutory body under the Ministry of Road Transport and Highways, NHAI adheres to government-mandated pay scales and service rules. Compensation structures, including the highest and median employee pay, are determined by central pay commission guidelines and not independently set by NHAI.
	2-22 Statement on sustainable development strategy	Sustainability at NHAI	
	2-23 Policy commitments	About NHAI	
	2-24 Embedding policy commitments	NHAI Policies	
	2-25 Processes to remediate negative impacts	Bridging People and Progress	
	2-26 Mechanisms for seeking advice and raising concerns	Bridging People and Progress	
	2-27 Compliance with laws and regulations	About NHAI	
	2-28 Membership associations	Pathways to Sustainable Progress	
	2-29 Approach to stakeholder engagement	Bridging People and Progress	
	2-30 Collective bargaining agreements	Bridging People and Progress	
GRI 3: Material Topics 2021	3-1 Process to determine material topics	Blueprint for Sustainability: Material Topics and Environmental Stewardship	
	3-2 List of material topics	Blueprint for Sustainability: Material Topics and Environmental Stewardship	
	3-3 Management of material topics	Blueprint for Sustainability: Material Topics and Environmental Stewardship	
GRI 201: Economic Performance 2016	201-1 Direct economic value generated and distributed	Fuelling growth through sustainable investments	
	201-2 Financial implications and other risks and opportunities due to climate change	Creating Positive Externality- Greening Of Highways Net Zero Transition	
	201-3 Defined benefit plan obligations and other retirement plans	Bridging People and Progress	
	201-4 Financial assistance received from the government	Fuelling growth through sustainable investments	

GRI 202: Market Presence 2016	202-1 Ratios of standard entry level wage by gender compared to local minimum wage		The entry level wages at NHAI are governed by the guidelines of Government of India.
	202-2 Proportion of senior management hired from the local community	Bridging People and Progress	The operational boundary for NHAI is India
GRI 203: Indirect Economic Impacts 2016	203-1 Infrastructure investments and services supported	Programmes at the NHAI	
	203-2 Significant indirect economic impacts	Fuelling growth through sustainable investments	
GRI 204: Procurement Practices 2016	204-1 Proportion of spending on local suppliers	Eco-Friendly Highways: NHAI's journey towards sustainability	
GRI 205: Anti-corruption 2016	205-1 Operations assessed for risks related to corruption	About NHAI	
	205-2 Communication and training about anti-corruption policies and procedures	About NHAI	
	205-3 Confirmed incidents of corruption and actions taken	About NHAI	
GRI 206: Anti-competitive Behavior 2016	206-1 Legal actions for anti-competitive behavior, anti-trust, and monopoly practices	About NHAI	
GRI 207: Tax 2019	207-1 Approach to tax	Fuelling growth through sustainable investments	
	207-2 Tax governance, control, and risk management	Nhai's Approach To Taxation	
	207-3 Stakeholder engagement and management of concerns related to tax	Nhai's Approach To Taxation	
	207-4 Country-by-country reporting	Not applicable	NHAI is an autonomous organisation under MoRTH, Government of India. Country-by-country tax reporting does not apply to NHAI, as it operates solely within India and under government budgetary provisions rather than through multi-jurisdictional commercial operations.
GRI 301: Materials 2016	301-1 Materials used by weight or volume	Eco-Friendly Highways: NHAI's journey towards sustainability	
	301-2 Recycled input materials used	Eco-Friendly Highways: NHAI's journey towards sustainability	
	301-3 Reclaimed products and their packaging materials	Eco-Friendly Highways: NHAI's journey towards sustainability	

GRI 302: Energy 2016	302-1 Energy consumption within the organisation	NHAI's Parivesh
	302-2 Energy consumption outside of the organisation	NHAI's Parivesh
	302-3 Energy Intensity	NHAI's Parivesh
	302-4 Reduction of energy consumption	NHAI's Parivesh
	302-5 Reductions in energy requirements of products and services	NHAI's Parivesh Efficient use of energy in Road Construction Advancing towards a Low-Carbon Emissions Road Infrastructure
GRI 303: Water and Effluents 2018	303-1 Interactions with water as a shared resource	NHAI's Parivesh
	303-2 Management of water discharge-related impacts	NHAI's Parivesh
	303-3 Water withdrawal	NHAI's Parivesh
	303-4 Water discharge	NHAI's Parivesh
	303-5 Water consumption	NHAI's Parivesh
GRI 304: Biodiversity 2016	304-1 Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas	NHAI's Parivesh
	304-2 Significant impacts of activities, products and services on biodiversity	NHAI's Parivesh
	304-3 Habitats protected or restored	NHAI's Parivesh
	304-4 IUCN Red List species and national conservation list species with habitats in areas affected by operations	NHAI's Parivesh
GRI 305: Emissions 2016	305-1 Direct (Scope 1) GHG emissions	NHAI's Parivesh
	305-2 Energy indirect (Scope 2) GHG emissions	NHAI's Parivesh
	305-3 Other indirect (Scope 3) GHG emissions	NHAI's Parivesh
	305-4 GHG emissions intensity	NHAI's Parivesh
	305-5 Reduction of GHG emissions	NHAI's Parivesh
	305-6 Emissions of ozone-depleting substances (ODS)	NHAI's Parivesh
	305-7 Nitrogen oxides (NOx), sulfur oxides (SOx), and other significant air emissions	NHAI's Parivesh
GRI 306: Waste 2020	306-1 Waste generation and significant waste-related impacts	NHAI's Parivesh
	306-2 Management of significant waste-related impacts	NHAI's Parivesh
	306-3 Waste generated	NHAI's Parivesh

	306-4 Waste diverted from disposal	NHAI's Parivesh	
	306-5 Waste directed to disposal	Waste Management NHAI's Parivesh	
GRI 308: Supplier Environmental Assessment 2016	308-1 New suppliers that were screened using environmental criteria	Environmental Stewardship and Management at NHAI	
	308-2 Negative environmental impacts in the supply chain and actions taken	NHAI's Parivesh Environmental Management Measures During Emp	
GRI 401: Employment 2016	401-1 New employee hires and employee turnover	Bridging People and Progress	
	401-2 Benefits provided to full-time employees that are not provided to temporary or part-time employees	Bridging People and Progress	
	401-3 Parental leave	Bridging People and Progress	
GRI 402: Labor/ Management Relations 2016	402-1 Minimum notice periods regarding operational changes	Not applicable	As a government authority, any operational changes affecting employees or contractors are communicated through formal notifications, circulars, or directives as per prescribed service rules. Notice periods comply with standard central government regulations.
GRI 403: Occupational Health and Safety 2018	403-1 Occupational health and safety management system	Bridging People and Progress	
	403-2 Hazard identification, risk assessment, and incident investigation	Bridging People and Progress	
	403-3 Occupational health services	Bridging People and Progress	
	403-4 Worker participation, consultation, and communication on occupational health and safety	Health and Safety	
	403-5 Worker training on occupational health and safety	Investing In Workforce Development	
	403-6 Promotion of worker health	Workforce Engagement and Communication on Occupational Health and Safety	
	403-7 Prevention and mitigation of occupational health and safety impacts directly linked by business relationships	Bridging People and Progress	
	403-8 Workers covered by an occupational health and safety management system	Bridging People and Progress	
	403-9 Work-related injuries	Bridging People and Progress	
	403-10 Work-related ill health	Bridging People and Progress	

GRI 404: Training and Education 2016	404-1 Average hours of training per year per employee	Bridging People and Progress	
	404-2 Programs for upgrading employee skills and transition assistance programs	Bridging People and Progress	
	404-3 Percentage of employees receiving regular performance and career development reviews	Bridging People and Progress	
GRI 405: Diversity and Equal Opportunity 2016	405-1 Diversity of governance bodies and employees	Bridging People and Progress	
	405-2 Ratio of basic salary and remuneration of women to men	Bridging People and Progress	
GRI 406: Non-discrimination 2016	406-1 Incidents of discrimination and corrective actions taken	Bridging People and Progress	
GRI 407: Freedom of Association and Collective Bargaining 2016	407-1 Operations and suppliers in which the right to freedom of association and collective bargaining may be at risk	Not applicable	NHAI operates under the purview of the Government of India and complies with all national labor laws that uphold the right to freedom of association and collective bargaining. Concessionaires/ Contractors engaged by NHAI are required to follow applicable labour laws including the Industrial Disputes Act, 1947 and the Trade Unions (Amendment) Act, 2019. As a result, NHAI's operations do not involve any identified risks related to violations of these rights.
GRI 408: Child Labour 2016	408-1 Operations and suppliers at significant risk for incidents of child labor	Bridging People and Progress	
GRI 409: Forced or Compulsory Labour 2016	409-1 Operations and suppliers at significant risk for incidents of forced or compulsory labor	Bridging People and Progress	
GRI 410: Security Practices 2016	410-1 Security personnel trained in human rights policies or procedures	Not applicable	Security personnel deployed across NHAI-operated toll plazas or project sites are appointed by third-party service providers. These agencies are mandated to comply with applicable labour and human rights laws. While NHAI does not directly train security personnel, it ensures that all service providers comply with government norms which includes provisions for basic conduct and legal compliance.
GRI 411: Rights of Indigenous Peoples 2016	411-1 Incidents of violations involving rights of indigenous peoples	Bridging People and Progress	

GRI 413: Local Communities 2016	413-1 Operations with local community engagement, impact assessments, and development programs	Bridging People and Progress	
	413-2 Operations with significant actual and potential negative impacts on local communities	Bridging People and Progress	
GRI 414: Supplier Social Assessment 2016	414-1 New suppliers that were screened using social criteria	Sustainable Supply Chain	
	414-2 Negative social impacts in the supply chain and actions taken	Eco-Friendly Highways: NHAI's journey towards sustainability	
GRI 415: Public Policy 2016	415-1 Political contributions	About NHAI	
GRI 416: Customer Health and Safety 2016	416-1 Assessment of the health and safety impacts of product and service categories	Enhancing Road Safety	
	416-2 Incidents of non-compliance concerning the health and safety impacts of products and services	Not applicable	Any reported incidents of non-compliance related to health and safety are addressed through structured grievance mechanisms, regular audits, and compliance monitoring conducted by independent engineers. Based on available records, there were no reported instances of non-compliance during the reporting period that resulted in penalties, sanctions, or legal actions.

GRI 417: Marketing and Labeling 2016	417-1 Requirements for product and service information and labelling	Not applicable	NHAI projects do not fall under typical product labeling requirements. However, information related to project features, safety signage, and public instructions are displayed as per the Indian Roads Congress (IRC) standards. These include road signs, lane markings, and emergency information, thereby ensuring user awareness and safety.
	417-2 Incidents of non-compliance concerning product and service information and labelling	Not applicable	There were no recorded incidents of non-compliance concerning product and service information or public signage across NHAI-managed projects during the reporting period. Therefore, this disclosure is not applicable. Any signage issues identified during audits are promptly addressed as part of standard corrective action procedures.
	417-3 Incidents of non-compliance concerning marketing communications	Not applicable	As a statutory body, NHAI does not engage in commercial marketing activities. All public communications, including awareness campaigns and project-related updates, are carried out in accordance with government communication protocols. There were no recorded incidents of non-compliance with regulations or voluntary codes concerning marketing communications during the reporting period.
GRI 418: Customer Privacy 2016	418-1 Substantiated complaints concerning breaches of customer privacy and losses of customer data	Not applicable	NHAI handles personal data (e.g., FASTag vehicle details, toll user data) through National Electronic Toll Collection (NETC) systems managed by authorized banking partners and the National Payments Corporation of India (NPCI). There have been no substantiated complaints of data breaches or privacy violations during the reporting period. All digital systems operate in compliance with relevant government data protection guidelines.

Annexure 2:
External Assurance Statement

ASSURANCE STATEMENT ON SUSTAINABILITY REPORTING FOR NATIONAL HIGHWAY AUTHORITY OF INDIA

for
Reporting Period:

April 01, 2023 – March 31, 2024

Bureau Veritas (India) Private Limited

4th Floor ServeSpaces Business Park D-5 & 6 Sector 3, Noida 201301

Independent Assurance Statement

Introduction and Objective of Work

BUREAU VERITAS has been engaged by the National Highway Authority of India (hereinafter referred to as "NHAI") to provide an independent and limited assurance of its Sustainability Report (hereinafter abbreviated as "Report") for the reporting period from 01.04.2023 to 31.03.2024, based on Global Reporting Initiative (GRI) Standards.

The verification of the sustainability practices adopted by NHAI Project Implementation Units under respective Regional Offices, Head Quarter and the review of documents and disclosures were conducted at NHAI head office as a part of the sustainability assurance. The current reporting cycle covers 25 Regional Offices out of a total 25 functional Regional Offices (ROs).

The selection of reporting criteria, reporting period, reporting boundary, monitoring and measurement of data, preparation, and presentation of information for the report are the sole responsibility of the management of NHAI. Bureau Veritas was not involved in the drafting or preparation of the back-up data of the said sustainability report. The responsibility of BV was to provide independent assurance, as described in the scope of assurance.

Intended User

The assurance statement is made solely for "National Highway Authority of India (NHAI)" as per the governing contractual terms and conditions of the assurance engagement contract between "NHAI" and "Bureau Veritas". To the extent that the law permits, we owe no responsibility and do not accept any liability to any other party other than "NHAI" for the work we have performed for this assurance report or for the conclusions stated in the paragraph below.

Assurance Type and Scope

Bureau Veritas conducted sustainability assurance in accordance with the International Federation of Accountants (IFAC) requirements and the International Standard on Assurance Engagements (ISAE) 3000 (Revised) (Limited Assurance), and ISAE 3410 (Greenhouse Gas Emission Statements), which applies to assurance engagements other than audits or reviews of historical financial information. Additionally, the assurance was carried out following Account Ability's Assurance Standard (AA1000 AS v3, Type I, Moderate Assurance), ensuring that the information in the report meets key principles of relevance, completeness, materiality, reliability, neutrality, and understandability.

The scope of the engagement, as agreed with NHAI, included the review and verification of sustainability policies, practices, initiatives, and performance presented in the report. It also involved assessing the underlying management and reporting processes in line with the GRI Standards and evaluating the report's adherence to the "in accordance" criteria of these standards. Furthermore, the verification covered standard disclosures listed in the GRI Content Index to ensure transparency and accountability in sustainability reporting.

Scope, Boundary, And Limitations of Assurance

Assurance has been provided for selected sustainability performance disclosures presented in the Sustainability Report. The reporting boundary covers data and information for the period 01 April 2023 to 31 March 2024 across NHAI's 25 regional offices, in alignment with the Global Reporting Initiative (GRI) Standards. The assurance process included the verification of sample data and information on selected material topics from seven randomly selected and representative regional offices, namely RO Bangalore, RO Hyderabad, RO Gandhinagar, RO Dehradun, RO Mumbai, RO Madurai, and RO Uttar Pradesh (East).

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Independent Assurance Statement

Scope of Sustainability Assurance

The scope of assurance involves evaluating the sustainability performance of non-financial disclosures for the period from April 1, 2023, to March 31, 2024, based on the GRI Standard.

The Scope of Assurance for Sustainability Indicators based on GRI Standard includes:

- An assessment of the procedures or approaches followed for data compilation and reporting of the sustainability performance of non-financial disclosures for specific operations.
- Testing, on a sample basis, of evidence supporting the data disclosed.
- Verification of the sample data evidence and information on selected material topics reported at the above-mentioned operations for the defined reporting period.
- Assessment of the suitability between the backup data for the selected sustainability performance of non-financial disclosures and the information presented in Sustainability Report.
- Completion of assurance statement for inclusion in the report reflecting the verification, findings, and conclusion of the disclosure's assurance.

List of GRI disclosure assured at a limited level:

GRI Standard	Disclosure Number	Disclosure Title
GRI 2: General Disclosures 2021	2-1	Organizational details
	2-2	Entities included in the organization's sustainability reporting
	2-3	Reporting period, frequency and contact point
	2-7	Employees
	2-27	Compliance with laws and regulations
	2-29	Approach to stakeholder engagement
GRI 205: Anti-corruption 2016	205-1	Operations assessed for risks related to corruption
	205-2	Communication and training about anti-corruption policies and procedures
	205-3	Confirmed incidents of corruption and actions taken
GRI 206: Anti-competitive Behaviour 2016	206-1	Legal actions for anti-competitive behaviour, anti-trust, and monopoly practices
GRI 301: Materials 2016	301-1	Materials used by weight or volume
	301-2	Recycled input materials used
GRI 302: Energy 2016	302-1	Energy consumption within the organization
	302-2	Energy consumption outside of the organization
	302-3	Energy intensity
GRI 303: Water and Effluents 2018	303-1	Interactions with water as a shared resource
	303-3	Water withdrawal
	303-5	Water consumption
GRI 304: Biodiversity 2016	304-1	Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas
	304-2	Significant impacts of activities, products and services on biodiversity
GRI 305: Emissions 2016	305-1	Direct (Scope 1) GHG emissions
	305-2	Energy indirect (Scope 2) GHG emissions

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Independent Assurance Statement

	305-3	Other indirect (Scope 3) GHG emissions
	305-4	GHG emissions intensity
	305-6	Emissions of ozone-depleting substances (ODS)
GRI 306: Waste 2020	306-1	Waste generation and significant waste-related impacts
	306-3	Waste generated
	306-4	Waste diverted from disposal
GRI 401: Employment 2016	401-1	New employee hires and employee turnover
	401-2	Benefits provided to full-time employees that are not provided to temporary or part-time employees
	401-3	Parental leave
GRI 402: Labor/Management Relations 2016	402-1	Minimum notice periods regarding operational changes
GRI 403: Occupational Health and Safety 2018	403-1	Occupational health and safety management system
	403-2	Hazard identification, risk assessment, and incident investigation
GRI 404: Training and Education 2016	404-1	Average hours of training per year per employee
	404-2	Programs for upgrading employee skills and transition assistance programs
	404-3	Percentage of employees receiving regular performance and career development reviews
GRI 405: Diversity and Equal Opportunity 2016	405-1	Diversity of governance bodies and employees
GRI 406: Non-discrimination 2016	406-1	Incidents of discrimination and corrective actions taken
GRI 408: Child Labor 2016	408-1	Operations and suppliers at significant risk for incidents of child labour
GRI 409: Forced or Compulsory Labor 2016	409-1	Operations and suppliers at significant risk for incidents of forced or compulsory labour
GRI 413: Local Communities 2016	413-1	Operations with local community engagement, impact assessments, and development programs
GRI 415: Public Policy 2016	415-1	Political contributions

The Methodology Adopted for Assurance

The Bureau Veritas sustainability assurance process involves specified procedures to obtain evidence regarding the reliability of the data provided by the entity. The nature, timing, and extent of these procedures depend on the data and evidence presented, including the verification of risks associated with material topics in the selected sustainability disclosures and their relevance. While assessing these risks, the internal strategy is considered during report preparation to design the assurance procedures and validate their appropriateness to the fullest extent possible.

As per the scope of assurance, sample evidence, information, and explanations necessary for the assurance process were reviewed. Based on this, the following assessments were conducted:

Independent Assurance Statement

- Ensuring that the report is prepared in accordance with the Sustainability Reporting Standards, based on the Global Reporting Initiative (GRI Standards), applicable to the operations of NHAI.
- Evaluating the appropriateness of various assumptions applied by NHAI for data estimation.
- Reviewing the report to ensure there is no misrepresentation of disclosures within the defined assurance scope.
- Assessing the systems used for data compilation and reporting based on Universal Disclosures and Topic-Specific Disclosures of material topics outlined in the assurance scope.
- Verifying the systems and procedures for quantification, collation, and analysis of sustainability performance disclosures included in the report.
- Examining month-wise data for consistency, reliability, and accuracy.
- Validating selects key performance data based on information from regional offices, including head quarter:
    - Testing data reliability and accuracy on a sample basis.
    - Assessing the stakeholder engagement process and approach to addressing key topics and concerns as defined in the report.
    - Conducting a limited review of the materiality assessment process based on the information provided for the respective regional offices.
    - Reviewing processes for data collection, compilation, and reporting of sustainability performance disclosures.
    - Performing a gap assessment of the current Sustainability Report against the GRI Standards framework.
    - Classifying observations and findings, followed by the issuance of the Assurance Statement.

Sample data were collected to support Bureau Veritas' conclusions regarding the verified information and data. The assurance process was conducted based on the details available during the review of the regional offices and head quarter.

Limitations and Exclusions

The assurance is limited to the above-mentioned scope of work and excludes the information relating to:

- Data related to the NHAI's financial performance disclosures.
- Activities and practices followed outside the defined assurance period stated hereinabove.
- Positional statements, expressions of opinion, belief, aim, or future intention by "NHAI" and statements of future commitment and any of the statements related to organizational aspects or reputation.
- The assurance does not extend to the activities and operations of "NHAI" outside of the scope and geographical boundaries mentioned in the report as well as the operations undertaken by any other entity that may be associated with or have a business relationship with "NHAI".
- Compliance with any Environmental, Social, and legal issues related to the regulatory authority.

Independent Assurance Statement

Our Findings

- Nothing has come to our attention to indicate that the sustainability disclosure in the Sustainability Report based on GRI standard are inaccurate or that the information included therein is not fairly stated.
- It is our opinion that NHAI has established appropriate systems for the collection, aggregation, and analysis of data on Sustainability/Non-Financial performance disclosures.
- The sustainability disclosure in the Sustainability Report provides a fair representation of the NHAI's activities as included therein.
- The information is presented in a clear, understandable, and accessible manner, and allows readers to form a balanced opinion over the NHAI and status during the reporting period.

Based on our findings from the assurance process, the Bureau Veritas assurance team concludes that NHAI adheres to the AA1000 Principles. To further illustrate NHAI's commitment to sustainable development, the table below outlines key sustainability principles—Inclusivity, Materiality, Responsiveness, and Impact:

Principle	Observation
Inclusivity: Stakeholders participate in shaping a strategic, accountable sustainability response.	NHAI actively involves socially responsible investors, infrastructure partners, Government officials, and local communities in its sustainability framework, ensuring diverse input is valued. It fosters inclusivity by integrating stakeholder perspectives into highway projects, balancing economic growth with social welfare effectively.
Materiality: Assessing an issue's relevance and significance to the organization and stakeholders.	NHAI targets critical environmental and social issues through extensive stakeholder engagement, ensuring a balanced sustainability focus. Its Sustainability Report integrates internal risk and opportunity assessments with external stakeholder priorities, addressing material topics aligned with its highway development objectives responsibly.
Responsiveness: Addressing stakeholder sustainability concerns through decisions, actions, and communication.	NHAI addresses material issues with clear policies, measurable targets, and proactive initiatives, promoting environmental sustainability and safety. It implements robust emergency response, risk management, and health measures across highway operations, maintaining transparent communication with stakeholders to resolve concerns equitably and effectively.
Impact: Monitoring, measuring, and ensuring accountability for actions affecting broader ecosystems.	NHAI prioritizes monitoring and measuring its operational impacts on ecosystems, ensuring accountability via transparent reporting and thorough evaluations. No assessment findings suggest lapses in tracking sustainability outcomes, reflecting a balanced commitment to minimizing harm while maximizing infrastructure benefits responsibly.

Management Responsibilities

NHAI is completely responsible for the report contents, identification of material topics, and data reporting structure. The selection of reporting criteria, reporting period, reporting boundary, monitoring, and measurement of data, preparation, and presentation of information for the report are the sole responsibility of the management of "NHAI". Bureau Veritas (BV) was not involved in the drafting or preparation of the report and any other backup data for the reporting period. The responsibility of BV was to provide independent assurance for the sustainability performance of non-financial disclosures as described in the scope of assurance.

Independent Assurance Statement

The said assessment is properly based on the assumption that the data and information provided in the report are proper and without any discrepancy. Bureau Veritas shall not be held liable or responsible for any type of decision a person or entity would make based on this assurance statement. While reading the assurance statement, stakeholders shall recognize and accept the limitations and scope as mentioned above.

Uncertainty

The reliability of assurance is subject to uncertainty(ies) that is inherent in the assurance process. Uncertainties stem from limitations in quantification models used, assumptions, or data conversion factors used or may be present in the estimation of data used to arrive at results. Our conclusions with respect to this assurance are naturally subject to any inherent uncertainty(ies) involved in the assurance process.

Statement of Independence, Impartiality, and Competence

Bureau Veritas is an independent professional services company that specializes in Quality, Health, Safety, Social, and Environmental Management with almost 196 years of history in providing independent assurance services. Bureau Veritas has implemented a Code of Ethics across the business to maintain high ethical standards among staff in their day-to-day business activities. We are particularly vigilant in the prevention of conflicts of interest.

No member of the assurance team has a business relationship with "NHAI", its Directors, Managers, or officials beyond that required of this assignment. We have conducted this verification independently and there has been no conflict of interest.

Competence

The assurance team has extensive experience in conducting assurance over environmental, social, ethical, and health & safety information, systems and processes an excellent understanding of Bureau Veritas standard methodology for the Assurance of Sustainability Reports.

Restriction on use of Our Report

Our assurance report has been prepared and addressed to the Board of Directors of the NHAI at the request of the NHAI solely to assist the NHAI in reporting on the NHAI's Sustainability performance and activities. Accordingly, we accept no liability to anyone, other than the NHAI. Our deliverables should not be used for any other purpose or by any person other than the addressees of our deliverables. The Firm neither accepts nor assumes any duty of care or liability for any other purpose or to any other party to whom our Deliverables are shown or into whose hands it may come without our prior consent in writing.

AA1000
Licensed Report
000-137/V3-YNU5G

Amit Kumar
Senior Lead Assurer

Date: 05/04/2025
Place: Delhi, India

Munji Rama Mohan Rao
Technical Reviewer

Date: 05/04/2025
Place: Hyderabad, India

Ref: BV_NHAI_SR_ 24935136

Acknowledgement

Shri SH. VISHAL CHAUHAN,
IAS Member Administration

The efforts of all nodal officers nominated from the NHAI Head Office, Regional Offices, and Project Implementation Units are recognised for their proactive approach in submitting data to the Environment Division for the development of the Sustainability Report for FY 2023-24. The following NHAI personnel have actively contributed to highlighting the organisation's best practices, which have been incorporated into this Sustainability Report. Their contributions are duly appreciated.

Shri Alok Kumar
I/c Chief General Manager
(Technical) & Coordinator for
Sustainability Report

Shri Manoj Kumar Bansal,
General Manager
(Technical)

Dr. Nagin Nanda IFS Retd.
Advisor (Environment &
Clearances), NHAI

Shri Vidit Jain
Deputy General Manager
(Technical)

Shri Hemant Chandola
Manager
(Technical)

Sushma Dakey
Deputy Manager
(Technical)

Note

National Highways Authority of India
Ministry of Road Transport & Highways
www.nhai.gov.in