

# Gender-Responsive and Socially Inclusive Climate-Resilient Infrastructure

Case Study Booklet

An Extension of the Gender Guide

31 May 2026



GLOBAL  
CENTER ON  
ADAPTATION



**ICSI**  
International Coalition for  
Sustainable Infrastructure

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## Acknowledgements :

This report has widely benefited from the inputs and insights of experts and stakeholders across a wide range of professions, knowledge and practice communities who participated in consultations, meetings, and workshops, while providing the data and information required to achieve this final output.

The project team is particularly grateful to the Planning Commission, Bangladesh, for leading this initiative within the Government of Bangladesh and the Government of Canada for the support to develop this project. The contributions of representatives various government agencies in Bangladesh was also key to the development of this work and so we extend our gratitude to General Economic Division (GED), Local Government Engineering Department (LGED), Bangladesh Railway, Chittagong Port Authority (CPA), and Roads and Highways Department (RHD).



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# GLOSSARY

Term	Definitions
Gender	The socially constructed roles, attributes, and opportunities associated with being male and female <sup>1</sup>
Gender equality	Means that men and women have the opportunity to develop their full potential and make their own choices free from the limitations set by stereotypes, gender roles, or prejudices. It does not mean that men and women must become the same, but that their rights, responsibilities, and opportunities will not depend on whether they are born male or female. It means men and women have equal (i) rights under customary or statutory law; (ii) opportunities and access to resources to enhance their human capabilities, productivity, and earnings; and (iii) a voice to influence and contribute to the decision-making in governing structures, institutions, and the development process in their communities <sup>2</sup>
Gender-responsive	Includes specific action to reduce gender inequalities within communities <sup>3</sup>
Vulnerable groups	Population with specific characteristics that increase their risks compared with others living in the same areas <sup>4</sup>

<sup>1</sup>World Health Organization. Gender and health. <https://www.who.int/health-topics/gender>

<sup>2</sup>Asian Development Bank (ADB). 2021. Guidelines for Gender Mainstreaming Categories of ADB Projects. <https://www.adb.org/documents/guidelines-gender-mainstreaming-categories-adb-projects>.

<sup>3</sup>United Nations Population Fund (UNFPA) and United Nations Children's Fund (UNICEF). 2021. Joint Evaluation of the UNFPA-UNICEF Joint Programme on the Elimination of Female Genital Mutilation: Accelerating Change Phase III (2018–2021). [https://www.unfpa.org/sites/default/files/admin-resource/thematic%20note%201\\_gender\\_final.pdf](https://www.unfpa.org/sites/default/files/admin-resource/thematic%20note%201_gender_final.pdf).

<sup>4</sup>United Nations Economic and Social Commission for Western Asia. Vulnerable groups. <https://archive.unescwa.org/vulnerable-groups>

# THE INFRASTRUCTURE LIFECYCLE

As climate change increases the frequency and severity of climate-related hazards, it intensifies existing gender and inclusion vulnerabilities and introduces new risks. Traditional methods tend to address physical climate risks (such as reinforcing embankments) and gender objectives (like employment quotas) independently. However, climate hazards do not exist in isolation; they interact with and exacerbate social inequalities. Effective resilient infrastructure must therefore integrate gender and climate considerations rather than treating them as separate issues. Adopting an intersectional approach that links gender, climate, and infrastructure is essential. Gender-responsive, socially inclusive, resilient infrastructure focuses on these intersections, ensuring social resilience alongside physical durability. The following two case studies show how this can be done in practice.

The gender interventions utilize the infrastructure lifecycle as a framework (Figure 1) and are grounded in the work of Infrastructure Pathways,<sup>5</sup> which provides extensive guidance on integrating climate resilience throughout the infrastructure lifecycle. The infrastructure lifecycle extends beyond the ‘project lifecycle’, including the crucial stage of identifying infrastructure needs and prioritizing which infrastructure projects to develop.

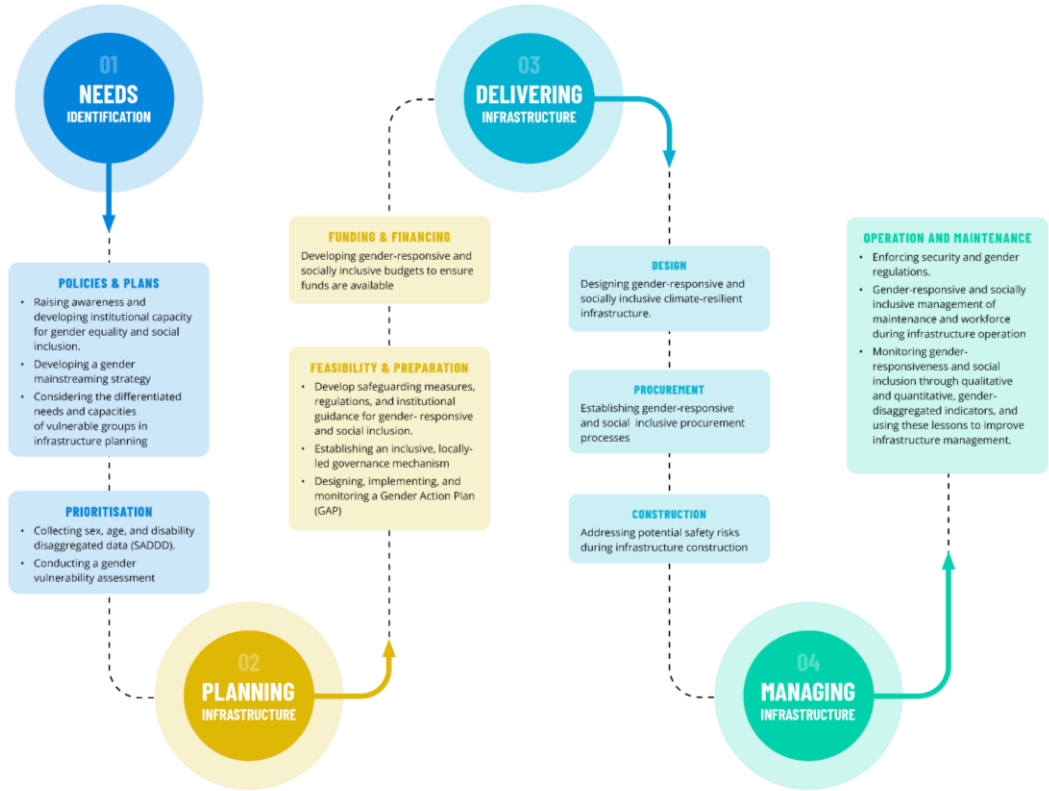


Figure 1: Interventions for gender-responsive, socially inclusive and climate-resilient infrastructure.

<sup>5</sup> [Infrastructure Pathways](#) is a practitioner-oriented resource that provides extensive guidance on integrating climate resilience throughout the infrastructure lifecycle.

# 1. Cyclone Shelters and Institutionalizing Gender Inclusion in the Local Government Engineering Department (LGED)

## CASE STUDY SUMMARY

The Local Government Engineering Department (LGED) of Bangladesh has emerged as a leader in gender-responsive and socially inclusive practices. Targeted interventions throughout the infrastructure lifecycle have transformed once-gender-blind cyclone shelters into more inclusive facilities, reflecting the larger transformation within the LGED.

- **Needs Identification:** LGED's transformation started by creating a supportive environment for inclusion. Over the past three decades, it has shifted from simply employing women in infrastructure projects to mainstreaming gender through institutionalizing a comprehensive Gender Equality Strategy and Action Plan (GESAP). The GESAP promotes practical steps to enhance the supportive environment, such as the Gender Information Management System (GIMS) for collecting sex-disaggregated data, and extensive capacity-building programs, including gender audits and training for staff and partner agencies.
- **Planning Infrastructure:** In the planning phase, LGED shifted to a community-centric model. Historically, cyclone shelters ignored the specific needs of women, the elderly, and persons with disabilities (PWD). Through mandatory community consultations, LGED began systematically identifying and integrating the differentiated needs of these groups into project designs. This led to the inclusion of crucial features in the Gender Action Plans (GAPs), ensuring that project financing was specifically allocated to gender-responsive elements.
- **Delivering Infrastructure:** During the delivery phase, these plans were translated into tangible infrastructure. New and rehabilitated cyclone shelters were constructed with gender-responsive and socially inclusive designs, such as separate and secure washrooms, private rooms for pregnant and lactating women, and universal accessibility ramps. Furthermore, procurement processes began to incorporate labor standards, such as equal pay, to create a safer and more equitable environment for women working in construction.
- **Managing Infrastructure:** LGED's inclusive approach extends to the long-term management of the shelters. Since these facilities often double as community schools, the department has engaged with local committees, such as the Cyclone Shelter Management Committees (CSMCs) and Water Management Committees (WMCs), actively fostering women's participation and leadership to ensure women have a direct voice in the ongoing operation, maintenance, and safety of the infrastructure that is vital to their families' well-being.

Through this comprehensive lifecycle approach, LGED's cyclone shelters have evolved beyond mere protective structures; they serve as catalysts for broader social inclusion. By involving women in every stage – from planning to management – the projects have improved their safety, increased their economic opportunities, and empowered them as leaders in community resilience.

The key lessons from LGED's experience are clear: achieving meaningful and sustainable inclusion requires more than a single action; it depends on systematic and consistent implementation of multiple interventions throughout the entire infrastructure lifecycle. This involves not only mandating gender-responsive policies but also building capacity to implement them effectively. Additionally, reliance on donor funding for project-specific GAPs underscores the importance of embedding these practices and dedicated budgets into institutional operations to ensure that inclusive management persists long after individual projects are finished.

# 1.1 BACKGROUND

## Introduction

In Bangladesh, the Local Government Engineering Department (LGED) is the technical arm of the Ministry of Local Government, Rural Development and Cooperatives (MLGRD&C), which provides technical assistance to local government institutions. Initially, LGED focused on rural infrastructure but has since expanded its operations to rural, urban, and small-scale water resources.

LGED has significantly advanced its approach to gender-responsiveness and social inclusion by institutionalizing a comprehensive Gender Equality Strategy and Action Plan (GESAP). This plan integrates gender considerations throughout all stages of the infrastructure lifecycle, including design, budgeting, management, and maintenance, and serves as a model for other government agencies.

Bangladesh frequently experiences cyclones and tidal surges. As such, one crucial LGED function in rural infrastructure is the construction of multipurpose cyclone shelters to protect coastal communities, which also serve as primary schools. LGED builds connecting roads for safe access during emergencies and equips shelters with essential amenities, including safe drinking water, separate toilets, solar power, dedicated spaces for mothers and newborns, and facilities for livestock.

However, this was not always the case. In the past, cyclone shelters were gender-blind with a lack of dedicated facilities, accessibility issues, safety and security concerns, information gaps, and inadequate maintenance affecting mainly vulnerable populations such as women, older people, and children. This case study will use cyclone shelters to illustrate LGED's progress towards becoming a gender-responsive and socially inclusive infrastructure organization.



## Climate Challenges

Bangladesh is recognized as one of the most disaster-prone countries globally, ranking eleventh in the World Risk Index 2025.<sup>6</sup> Bangladesh faces a wide array of natural hazards, including cyclones, floods, droughts, earthquakes, tidal surges, lightning, storm surge, salinity, river erosion, riverbed siltation, and landslides.<sup>7</sup>

The country's coastal plain stretches around 710 km and is home to nearly 40 million people.<sup>8</sup> Much of this inhabited area is low-lying, with about 50 percent of the country's land at 7 meters or less above sea level.<sup>9</sup> This low elevation and direct exposure to the Bay of Bengal make coastal areas particularly susceptible to cyclones, with major tropical cyclones striking the region almost every year.<sup>10</sup> This results in widespread inundation and substantial damage to infrastructure, services, and dwellings, leading to estimated average annual losses from tropical cyclones of about US\$1 billion.<sup>11</sup> Projections indicate that under a scenario 1.5°C warmer and 4 percent wetter, Bangladesh's sea level could rise over 27 cm by 2050, which, without action, could shrink cropland by more than 6.5 percent nationally and 18 percent in Southern Bangladesh.<sup>12</sup>

## Gender and Inclusion Challenges

Despite progress, gender equality in Bangladesh still faces significant challenges, particularly in disaster-prone coastal regions. At the national level, the women's labor force participation rate has improved from 28.6 percent in 2000 to 44.2 percent in 2024.<sup>13</sup> However, women still typically bear primary responsibility for household tasks, including water collection, sanitation, waste disposal, and childcare. Fulfilling women's needs is especially detrimental to young girls, who often sacrifice their education, and to pregnant women, who face health risks due to fetching water 5 to 6 kilometers away in some southwestern districts.<sup>14</sup> Violence or the threat of violence, including sexual harassment in public and workplaces, remains a concern exacerbated by insufficient lighting and unsafe access roads.

In coastal areas, women and other vulnerable groups have been disproportionately affected by disasters. For instance, in the 1991 cyclone, the death toll for women was more than four times higher than for men.<sup>15</sup> As of 2007, cyclone shelters typically had no access ramps.<sup>16</sup>

Ethnic and religious minorities face marginalization in social and political spheres and are among the poorest in the region. In the southwestern coastal areas, Hindu and Munda people frequently experience discrimination, limiting their access to clean water and employment opportunities. Since indigenous

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<sup>6</sup> Bündnis Entwicklung Hilft / IFHV (2025): WorldRiskReport 2025. Berlin: Bündnis Entwicklung Hilft.

<sup>7</sup> Akon, M. S., & Mia, M. J. (2024). Performance of JICA-funded cyclone shelter in the coastal areas of Bangladesh: An empirical analysis from Pirojpur district. *Progress in Disaster Science*, 23, 100342.

<sup>8</sup> World Bank (2022). The World Bank. Shelter from the storm: protecting Bangladesh's coastal communities from natural disasters.

<sup>9</sup> Akon, M. S., & Mia, M. J. (2024). Performance of JICA-funded cyclone shelter in the coastal areas of Bangladesh: An empirical analysis from Pirojpur district. *Progress in Disaster Science*, 23, 100342.

<sup>10</sup> Recent major cyclones Cyclone Komen (2015), Cyclone Roanu (2016), Cyclone Mora (2017), Cyclone Fani (2019), Cyclone Amphan (2020), Cyclone Yaas (2021), Cyclone Sitrang (2022), and Cyclone Remal (2024) (Akon, M. S., & Mia, M. J. (2024). Performance of JICA-funded cyclone shelter in the coastal areas of Bangladesh: An empirical analysis from Pirojpur district. *Progress in Disaster Science*, 23, 100342)

<sup>11</sup> World Bank (2022). Bangladesh Country Climate and Development Report.

<sup>12</sup> World Bank (2022). Bangladesh Country Climate and Development Report.

<sup>13</sup> International Labour Organization. "ILO Modelled Estimates and Projections database (ILOEST)" ILOSTAT. Accessed January 07, 2025. <https://ilostat.ilo.org/data/>.

<sup>14</sup> Funding proposal of GCF Project "FP069: Enhancing adaptive capacities of coastal communities, especially women, to cope with climate change induced salinity"

<sup>15</sup> UNEP (2005) Mainstreaming Gender in Environmental Assessment and Early Warning, ISBN: 92-807-2487-6.

<sup>16</sup> Akon, M. S., & Mia, M. J. (2024). Performance of JICA-funded cyclone shelter in the coastal areas of Bangladesh: An empirical analysis from Pirojpur district. *Progress in Disaster Science*, 23, 100342.

groups depend more heavily on natural resources and the environment for their livelihood, they are especially susceptible to climate change impacts and water shortages.<sup>17</sup>

Historically, cyclone shelters have increased the vulnerability of women and other groups through the following factors:

- **Lack of dedicated facilities**, such as toilets and separate breastfeeding sections for women.
- **Accessibility issues**, such as poor road conditions, slippery floors, and a lack of ramps.
- **Safety and security concerns**, as women often faced increased threats of sexual harassment in public spaces and shelters post-disaster, and there was a lack of secure storage of belongings and livestock in the shelters.
- **Information gaps**: Cyclone warnings were primarily disseminated to men, leaving many women without the information needed to evacuate promptly and effectively.
- **Inadequate maintenance**, as a significant number of existing cyclone shelters were physically unstable due to inadequate maintenance.

These gender and inclusion gaps get reinforced by climate risks through the different phases of the infrastructure lifecycle (Figure 1).

Infrastructure lifecycle phase	Vulnerabilities
Needs Identification	<ul style="list-style-type: none"> <li>● Rapid-onset events such as floods and cyclones particularly affect people with limited mobility (elders, PWD), limited access to information (children, women), or fewer options for safety (women, people caring for children or livestock).</li> </ul>
Planning Infrastructure	<ul style="list-style-type: none"> <li>● Shelters' location can be hard to access safely and quickly in an emergency for elders, disabled people, and women with children or livestock.</li> <li>● Budgets for gender- and inclusion-related interventions (e.g., partitions, locks, sanitation stations, and sufficient lighting for women's safety) are not always prioritized.</li> </ul>
Delivering Infrastructure	<ul style="list-style-type: none"> <li>● Inadequate design might create safety risks for women or accessibility challenges for PWD.</li> <li>● Jobs created by construction might discriminate or fail to provide safe environments for women or other vulnerable groups to work</li> </ul>
Managing Infrastructure	<ul style="list-style-type: none"> <li>● Poor roads and shelter conditions can drastically decrease their usability and safety for women, children, and disabled individuals, particularly during emergencies.</li> </ul>

Figure 1 - Gender and climate vulnerabilities for each infrastructure lifecycle stage

Source: Documents from projects ADB 45084-001, GCF FP004 and FP069, World Bank P146464

## 1.2 GENDER INTERVENTIONS IN THE INFRASTRUCTURE LIFECYCLE

### Needs Identification

To create an enabling environment for gender-responsive and socially inclusive infrastructure, it is crucial to collect sex, age, and disability-disaggregated data (SADDD), raise awareness of inequalities, and build

<sup>17</sup> Funding proposal of GCF Project “FP069: Enhancing adaptive capacities of coastal communities, especially women, to cope with climate change induced salinity”

capacities for inclusion across institutions and societies. Over the last few decades, LGED has made significant progress across all these domains.

## **Policies & Plans**

**Strengthen institutional capacity by embedding gender and social inclusion specialists, training project teams, engaging communities, and promoting workforce diversity.**

A range of initiatives has been implemented to raise awareness and strengthen gender capacity within LGED and related organizations, including comprehensive gender audits, training for LGED officials and related infrastructure agencies, the development of knowledge products, and hosting knowledge-sharing events with other South Asian countries.

**Elevate gender equality and social inclusion from compliance to a core strategic objective through a gender mainstreaming strategy.**

LGED received Technical Assistance (TA) to develop a GESAP, which set 9 distinct targets for integrating gender considerations at all organizational levels (Box 1) and aligned with Bangladesh's national development priorities. Key mechanisms to implement the GESAP include:

- **Policy adoption and institutional arrangements**, such as the LGED Gender Forum, which oversees and guides gender action plans across sectors.
- **The Gender Information Management System (GIMS)** enables the collection and monitoring of sex-disaggregated data, informing decisions and tracking progress.
- **Capacity building** through training for staff and committee members, utilizing a “training of trainers” approach to promote sustainability.
- **Gender audits** to identify gaps and training needs.
- **Knowledge products**, such as handbooks on gender-responsive infrastructure and planning
- **Innovations in infrastructure**, such as gender-responsive and socially inclusive cyclone shelters with separate facilities and well-lit access roads.
- **Partnerships and lesson sharing** with other agencies and the Ministry of Women and Children Affairs.



Box 1. The nine targets of LGED's Gender Equality Strategy and Action Plan (GESAP)

- 1. Policy adoption:** Formulating gender action plans (GAPs) and implementing guidelines for each sector, unit, and project.
- 2. Institutional arrangement:** Establishing the LGED Gender Forum to review and guide GAP implementation across all sectors, units, and projects.
- 3. Data/information collection, monitoring, and evaluation (M&E):** Collecting sex-disaggregated data guided by gender indicators.
- 4. Infrastructure development:** Building women-friendly infrastructures.
- 5. Employment and working conditions:** Training women to acquire necessary skills, increasing the ratio of women in all units and levels, and improving their working environment.
- 6. Training:** Assessing gender sensitivity training needs and providing training for women in additional work areas.
- 7. Participation:** Ensuring women's participation at all levels.
- 8. Empowerment:** Ensuring women's active and effective representation in decision-making bodies and processes within LGED and organizations it assists.
- 9. Financing:** Allocating a gender-responsive budget for the implementation and institutionalization of the LGED strategy.

Source: ADB (2017) People's Republic of Bangladesh: Institutionalizing Gender Equality Practices in Local Government Engineering Department (LGED). Technical Assistance Concept Note Project 51319-001.

Operationalize gender and inclusion commitments by embedding safeguards and clear guidance in regulations, policies, and contracts.

While previously most gender mainstreaming efforts were related to projects supported by development partners, LGED has made explicit efforts to recognize the distinct social roles and vulnerabilities of men and women. LGED has enhanced its guidelines to integrate climate impact and gender considerations into project preparation. Community consultations are also conducted during project planning and design. These efforts were evident in recent projects that built and rehabilitated cyclone shelters, which included consultations to ensure that the voices of women and other marginalized groups were integrated into the location, design, and planning of emergency shelters.

These gender and social inclusion safeguards are included in LGED's GESAP, knowledge products, and handbooks. The implementation is supported by the GIMS and the gender audit methodology, both of which enable monitoring of institutional achievements in gender equality across the central, division, and district levels of LGED. At the project level, these are further operationalized with indicators, timelines, and responsibilities in the GAP and monitoring frameworks.

## **Prioritisation**

**Require systematic collection of sex-, age-, disability-disaggregated data (SADDD), alongside climate data, to identify differentiated risks and needs.**

Data collection, specifically sex-disaggregated data guided by gender indicators, is recognised as one of nine key targets of LGED's GESAP. Although it's unclear if it also includes age and disability status, this already helps gather and monitor data, with a focus on women's access to infrastructure, employment opportunities, training, and participation in committees.

**Apply Gender Vulnerability Assessments at strategic and project levels to prioritize investments based on combined gender, inclusion, and climate considerations.**

LGED conducted a gender audit to assess its institutional capacity, practices, and needs for gender mainstreaming at the central level and across all 64 LGED district offices. For cyclone shelters in particular, consultations with women and vulnerable populations are held to ensure the shelters are well-sited and gender-sensitive.

## **Planning Infrastructure**

### **Feasibility & Preparation**

**Establish locally led governance structures that shift decision-making power to women and vulnerable groups.**

Before building a cyclone shelter, a community consultation is held to foster engagement. Shelters also involve local volunteer groups, such as school management committees, disaster management committees, volunteers for the cyclone preparedness program, and women's groups. These support shelter management and community coordination. Besides the project management unit during construction, these groups act as locally led governance bodies, influencing daily operations and communicating with higher authorities. They include women and key community stakeholders for inclusive participation.

**Develop evidence-based Gender Action Plans supported by dedicated budgets, contractual requirements, and SMART indicators.**

GAPs translate LGED's GESAP into tangible, measurable outcomes within each project. In the context of cyclone shelter construction and rehabilitation, these plans are developed through comprehensive gender

assessments and input from relevant stakeholders, including LGED and international development partners. GAPs specify clear indicators, timelines, responsibilities, and budget allocations to ensure accountability and progress. The plans incorporate participatory mapping and beneficiary selection processes, provide gender-responsiveness training, and emphasize increasing women’s involvement in decision-making and operations and maintenance committees. Additionally, they address gender-specific infrastructure requirements and promote integrating gender considerations into relevant policies and programs.

## Funding & Financing

**Integrate gender equality and climate resilience into public financial management by embedding them in fiscal policies, mandating budget allocations, and ring-fencing funds within the DPP.**

The importance of gender-responsive budgets is reflected in GESAP’s target to allocate funds to implement and institutionalize gender-related initiatives. Despite this, gender-responsive budgeting is not consistently prioritized at LGED. In practice, gender-responsive and socially inclusive efforts, particularly in projects such as cyclone shelter construction and rehabilitation, are often supported by international development funds that include dedicated gender budgets and indicators. However, this is not always the case for government-funded projects.

## Delivering Infrastructure

### Design

**Design infrastructure that is safe, accessible, and climate-resilient by using disaggregated data and targeted inclusive design measures.**

LGED’s GESAP prioritizes the construction of women-friendly facilities across all department projects. Practical features, such as accessible and secure separate toilets for women, well-lit access roads, and dedicated waiting rooms for women in bus terminals, are highlighted as essential interventions. GAPs in recent projects have specified the inclusion of separate rooms, toilets, water, and washing facilities for women in cyclone shelters, public schools, and sanitation projects.

Cyclone shelters include gender-responsive and socially inclusive considerations (Box 2), but not all shelters consistently meet these standards. Overall, while policy frameworks and project designs increasingly reflect gender-responsive principles, the actual construction and consistent implementation of these inclusive features remain a work in progress.

#### Box 2. Interventions to promote inclusion in cyclone shelters

List of illustrative interventions to promote gender-responsive and socially inclusive cyclone shelters.

##### Physical Design and Facilities

- **Segregated and Secure Spaces:** Separate and lockable washrooms and sleeping areas for women/girls, and men/boys to prevent harassment and ensure privacy.
- **Dedicated Rooms for Specific Needs:** Reserved, private rooms for pregnant women, lactating mothers, and women with infants.
- **Universal Accessibility Ramps:** Gently sloped ramps with handrails at all entrances and between levels for people with disabilities, the elderly, and pregnant women.
- **Inclusive WASH Facilities:** Toilets and washing areas accessible for people with disabilities (e.g., grab bars, wider doors) with consistent water supply and bright, reliable lighting (solar-powered) in and around these facilities to enhance safety, especially at night.
- **Functional Kitchen and Storage:** Communal cooking facilities and secure storage spaces.

### Management and Operations

- **Mandatory Women's Participation:** Ensure women participate in Cyclone Shelter Management Committees (CSMCs) to grant them decision-making power over shelter operations, maintenance, and safety protocols.
- **Regular Safety Audits:** Community-led safety audits, with separate focus groups for women and people with disabilities, to identify and address safety concerns.
- **Accessible Early Warning Systems:** Disseminate warnings through multiple channels known to reach women and vulnerable people effectively, in addition to public announcements.

### Accessibility and Connectivity

- **Climate-Resilient Connecting Roads:** Shelter construction must include upgrading connecting roads and pathways to be flood- and cyclone-resilient.
- **Clear and Accessible Signage:** Install clear, simple, and pictorial signage indicating the way to the shelter and the location of different facilities within.

Source: Documents from projects ADB 45084-001, GCF FP004 and FP069, World Bank P146464

## Procurement

Implement inclusive procurement through gender-responsive bidding criteria, inclusive employment targets, and climate-resilient technical specifications.

The GAPS in recent projects require adherence to the Government of Bangladesh's core labor standards, including equal pay for equal work, occupational health and safety, and the provision of water, sanitation, and segregated facilities. However, local contractors are often unfamiliar with these procurement procedures, and language barriers can pose challenges, prompting LGED to include local-language documentation and to hold question-and-answer sessions to support local contractors.

## Construction

Enforce safeguards by mandating inclusive hiring, zero-tolerance policies on gender-based violence, and climate-resilient health and safety standards.

LGED contractors must incorporate gender considerations throughout all phases of project preparation, implementation, and operation, as outlined in the Environmental and Social Management Plans (ESMPs). Additionally, a grievance redress cell (GRC) for cyclone shelters provides a formal mechanism for the community to raise complaints, including those related to safety risks, contractor violations, or environmental impacts.

## Managing Infrastructure

Cyclone shelters are often constructed with international support, leading to insufficient resources for maintenance after the project is completed.

## Operation & Maintenance

Promote an inclusive O&M workforce through hiring targets and safe, equitable employment standards.

The threat of violence and sexual harassment in public places and workplaces is a recognized concern, particularly in remote cyclone shelter locations near small communities where enforcing safety and gender regulations can be challenging. Addressing these risks requires broader cultural changes and efforts to reduce women's vulnerability. Although enforcing security measures does not fall under LGED's mandate, LGED promotes safer environments through advancing gender-responsive infrastructure designs, such as installing streetlights, developing safe access roads, and creating well-lit waiting areas in terminals.

**Secure dedicated, long-term funding for gender-responsive and inclusive maintenance.**

Community-based disaster management groups (with equal representation of women) are tasked with maintaining cyclone shelters. Additionally, some shelters operate a fee-based water supply system, managed by Water Management Committees (WMCs), which are predominantly composed of women (79 percent).

**Ensure maintenance planning explicitly accounts for climate impacts through targeted funding, prioritized safety measures, and extended contractor accountability.**

LGED implements customized maintenance manuals for each facility based on a generic Maintenance Manuals, including budgets for maintenance costs. An Operation & Maintenance (O&M) system is also implemented involving both the community and local governments to address climate-induced wear.

**Enforce zero-tolerance policies and confidential reporting mechanisms to protect vulnerable groups from harassment and climate-related risks.**

Recent cyclone shelters projects established multi-tier Grievance Redress Mechanisms (GRM) that include female focal points to ensure women can report grievances safely and confidentially. Additionally, specific dialogues and trainings, particularly on harassment, are conducted with project staff to enforce protection standards at the field level.

**Institutionalizing gender-responsive monitoring, evaluation, and learning (MEL) systems by setting inclusive performance objectives, collecting SADD, and using qualitative insights to inform operational decisions.**

LGED's GIMS tracks sex-disaggregated data related to women's access to infrastructure, employment opportunities, working conditions, training, and participation in various committees. Staff from LGED's M&E Unit received specialized training to operate GIMS and analyze its data, while upazila officials received guidance on data gathering and reporting procedures.

In cyclone shelter projects, the GAP incorporated monitoring frameworks that generate disaggregated data in the Knowledge Management System (KMS), documented best practices for gender responsiveness and women's involvement in project activities, and maintained a gender balance within working teams. While not exclusive to cyclone shelters, Social Audit Committees (SACs) report climate and gender issues to community groups and implementing partners, who are responsible for taking appropriate action.

## **1.3 INFRASTRUCTURE AS A CATALYST FOR INCLUSION**

**Periodically identifying vulnerable groups and including them in the workforce, ensuring a sense of belonging**

LGED's GESAP sets clear goals to improve jobs and working conditions for women with targeted training, increasing their representation at all levels, and creating better workplace environments for female staff. In infrastructure projects, community consultations actively include women, young people, marginalized

ethnic groups, and PWD, ensuring their voices and perspectives are incorporated into project planning and implementation. Additionally, there is a commitment to empowering vulnerable populations by increasing their involvement as team members and beneficiaries of LGED projects.

### **Promoting how gender-responsive and socially inclusive infrastructure strengthens the role of vulnerable groups in the economy.**

Projects were specifically designed to expand women's economic opportunities and address the disproportionate impact of climate change on their livelihoods. Gender-responsive cyclone shelters go beyond the design to also ensure that women have access to jobs with equitable pay.

## **1.4 KEY LESSONS LEARNED**

- Long-lasting inclusion requires interventions throughout all phases of the infrastructure lifecycle and across all stakeholders at various levels. Gender-responsive designs have been promoted for cyclone shelters for decades with limited impact on the ground. The institutional improvements in LGED provide strong support to ensure these gender-responsive and socially inclusive designs become common practice. However, fully mainstreaming these standards across the country will require strengthening the delivery and management phases to ensure top-level progress reaches the lower levels.
- Mandating gender-responsive elements in policy is not enough; building capacities to implement these policies and raising awareness at all levels is needed to ensure they are properly enforced. The cyclone shelters illustrate this: the policy framework at LGED and project designs are increasingly gender-responsive, but the actual construction and implementation of inclusive features are inconsistent. Limited capacity beyond the capital, especially within smaller communities, remains a barrier for local companies to understand the importance and correctly build inclusion features.
- Gender-responsive interventions, pushed by donors and development funding, are helpful as pilots and to showcase how they can improve infrastructure. However, at least two issues limit their impact. First, gender-responsive specifications might depend on donor requirements and could be inconsistently applied across projects. Second, these funds typically cover only the design and construction phases, leaving a gap in implementing gender-responsive and socially inclusive guidelines during infrastructure operation and management. Including knowledge sharing activities to disseminate the best practices from the gender-responsive and socially inclusive resilient infrastructure constructed with international funds across national stakeholders might help to mainstream these gender standards.

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## 2. Inclusion in Railway Infrastructure: The Akhaura–Laksam Double Track Project

### CASE STUDY SUMMARY

The Akhaura-Laksam Double Track Project, a crucial upgrade to Bangladesh's vital Dhaka-Chittagong railway corridor, provides valuable insights into integrating gender considerations into large-scale resilient transport infrastructure. Part of the South Asia Subregional Economic Cooperation (SASEC) initiative and co-financed by ADB and EIB, the project involved double-tracking 72 km of railway, modernizing signaling, and reconstructing 11 stations. Situated in the flood-prone Meghna River basin, the project incorporated climate resilience primarily through engineering measures, such as adjusted embankment and bridge heights, to mitigate flooding risks. Socially, the region exhibits high poverty rates and traditional norms limiting women's mobility and economic participation, alongside very low female representation within the Bangladesh Railway (BR) itself. The absence of inclusive access facilities also poses challenges for vulnerable groups, including the elderly and people with disabilities, to travel by train. These mobility, access, and comfort challenges are exacerbated by rising temperatures and increased rainfall driven by climate change.

This case study highlights how gender-responsive and socially inclusive interventions were considered through the infrastructure lifecycle.

- **Needs Identification:** Pre-project analysis identified women's limited mobility and the inadequacy of existing station facilities. Consultations, including women-only focus groups, gathered input specifically on station design.
- **Planning Infrastructure:** The GAP mandated specific gender actions. Key interventions focused on incorporating elderly, women, children, and disabled (EWCD)-friendly features in station designs.
- **Delivering Infrastructure:** The most tangible outcome was the design and construction of EWCD-friendly stations, featuring separate and accessible toilets, prayer rooms, illuminated waiting areas, ramps, and designated breastfeeding areas.
- **Managing Infrastructure:** As the project involved upgrading existing infrastructure, it included training for BR staff on EWCD design.

The project's primary contribution to inclusion lies in the lasting physical infrastructure – the EWCD-friendly stations – which aim to facilitate safer, more convenient travel for women and vulnerable groups, potentially enhancing their access to economic and social opportunities. Awareness campaigns conducted during construction may have had a lasting impact on the community's understanding of gender and social issues and safety.

This case study offers important lessons. First, resilient infrastructure that is gender-responsive and socially inclusive should extend beyond physical EWCD-friendly features to address operational barriers and strategic concerns. Second, while donor-funded projects may improve inclusion, the absence of a robust institutional gender strategy could lead to inconsistent application of these practices over time. Third, because infrastructure projects significantly impact local communities, conducting gender assessments during the planning stage is essential to recognize broader needs and opportunities for addressing social issues and promoting inclusion through infrastructure development.

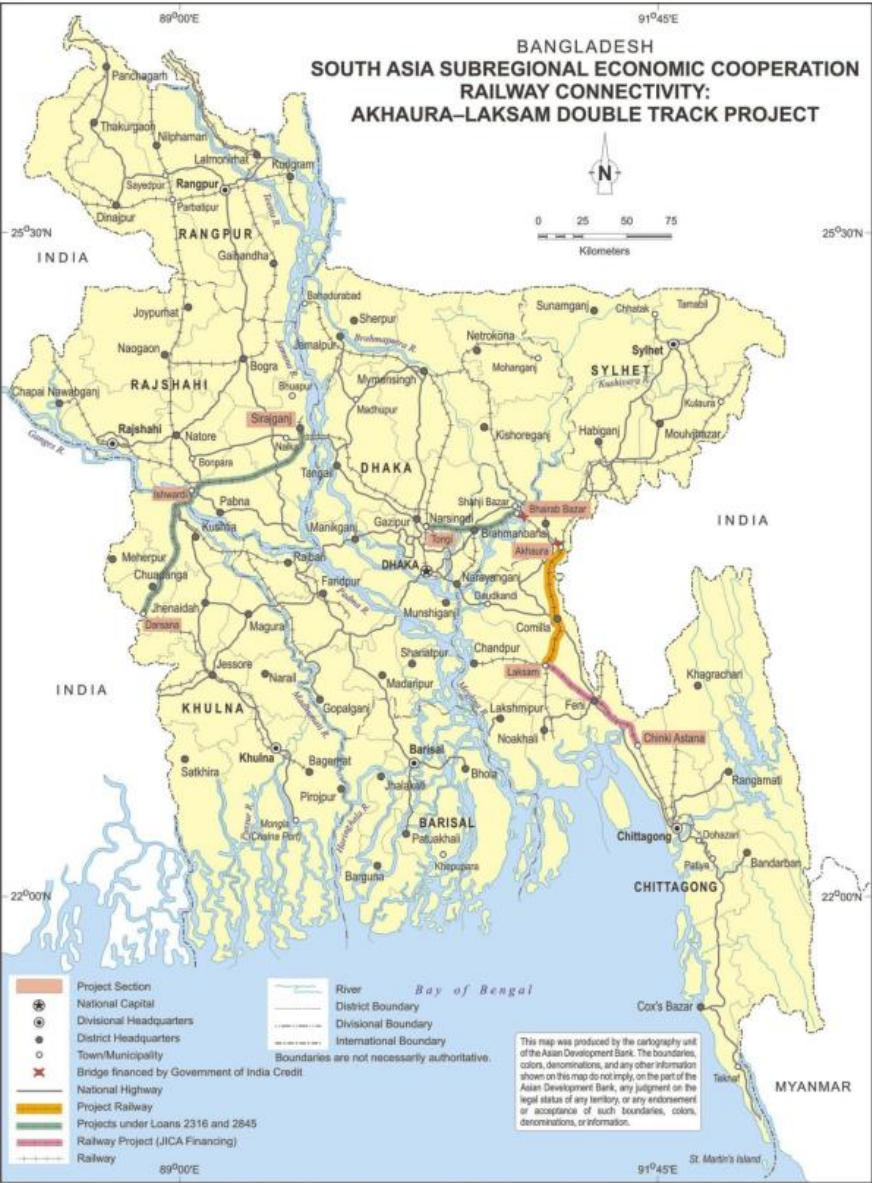
## 2.1 BACKGROUND

### Introduction

The Akhaura-Laksam double-track railway expansion demonstrates how integrating gender-responsive, socially inclusive, and climate-resilient considerations into infrastructure projects enhances their

relevance and robustness. The Dhaka-Chittagong corridor (Figure 1), of which the Akhaura-Laksam section is part, accounts for 40% of all railway passenger journeys in Bangladesh. Furthermore, the Dhaka-Chittagong corridor can facilitate trade between Bangladesh, India, and even Bhutan and Nepal, contributing to major international trade corridors and linking with the Chittagong Port, which handles over 90% of Bangladesh's export-import trade.<sup>18</sup> Given its economic importance, expanding it to double-track was a priority for the Government of Bangladesh, with the Akhaura-Laksam section being the last one to complete the Dhaka-Chittagong corridor.

The project started in 2014 and was finished in 2023. Before the project, the railway carried 14 daily passenger trains in 2013, and this increased to 17 by 2022, with the journey between Akhaura and Laksam 20% shorter. The central part of the project was the double-tracking of 72 km of railway lines, including the construction of a new second track and the upgrading of the existing track to broad-gauge standards. Along with this, modern signaling and interlocking equipment, 24 new bridges, 90 culverts, and an Engineer's Main Office building were also constructed. This also included reconstructing 11 train stations, which were designed to accommodate the elderly, women, children, and people with disabilities (EWCD). The physical improvements were complemented by training for Bangladesh Railway (BR) staff in EWCD-friendly design strategies, among other topics.



<sup>18</sup> Hossain Chowdhury, Shahadat (06 June 2020). "Import, export through Chittagong Port up in May". The Business Standard. <https://www.tbsnews.net/economy/trade/import-export-through-chittagong-port-may-89659>

Figure 1 – Location of the Akhaura-Laksam double track project, along with two other railway projects that finished in 2015.

Source: ADB (2014). Reports and Recommendations of the President. South Asia Subregional Economic Cooperation Railway Connectivity: Akhaura-Laksam Double Track Project. Project 43168-001.

## Climate Challenges

Bangladesh is recognized as one of the most disaster-prone countries globally, ranking eleventh in the World Risk Index 2025.<sup>19</sup> Bangladesh faces a wide array of natural hazards, including cyclones, floods, droughts, earthquakes, tidal surges, lightning, storm surge, salinity, river erosion, riverbed siltation, and landslides.<sup>20</sup> Additionally, between 1980 and 2023, Bangladesh's temperatures have increased by 1.1 °C, while the 'feels like' temperature has risen by 4.5 °C, causing significant health and economic impacts.<sup>21</sup>

In Bangladesh, railway tracks and most physical infrastructure are typically constructed above flood-prone levels. Nonetheless, BR officials have observed track washouts and failures in drainage infrastructure in recent decades. The signalling systems have also encountered issues due to climate-induced hazards, resulting in trip delays. Additionally, heat stress causes thermal expansion of metal tracks during peak summer temperatures, potentially damaging the railway and increasing the risk of derailments.

The Akhaura-Laksam railway corridor is located within Bangladesh's low-lying Meghna River basin. The Meghna River basin is located between Bangladesh (46% of its surface) and India (54% of its surface), and around 38 million people live in it.<sup>22</sup> Its main climate risk is increased flooding from more intense, erratic monsoon rainfall, as well as potential increases in river discharge. The increased rainfall could lead to riverine and flash floods, as well as prolonged waterlogging. Intense storms contribute damaging winds and heavy rainfall, further exacerbating flood impacts. Beyond the potential physical damage to railway infrastructure, heavy downpours can make boarding trains more dangerous, particularly for people with limited mobility, such as those with disabilities, the elderly, and women with children.

The increase in extreme temperatures due to climate change affects the environment inside the rail-cars. This makes travel more difficult for everyone, but women, children, and persons with disabilities might be particularly vulnerable to it.

## Gender and Inclusion Challenges

Despite progress, gender<sup>23</sup> equality and social inclusion in Bangladesh remain significant challenges. At the national level, the women's labor force participation rate has improved from 28.6 percent in 2000 to 44.2 percent in 2024.<sup>24</sup> Women in the project area primarily focus on household tasks, with limited opportunities for income-generating work and higher education. Consequently, they tend to stay close to home, mainly venturing out for medical visits, visiting relatives, and shopping. Issues like violence or threats of violence, including sexual harassment in public and workplaces, persist as concerns, worsened by poor lighting and unsafe access roads.

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<sup>19</sup> Bündnis Entwicklung Hilft / IFHV (2025): WorldRiskReport 2025. Berlin: Bündnis Entwicklung Hilft.

<sup>20</sup> Akon, M. S., & Mia, M. J. (2024). Performance of JICA-funded cyclone shelter in the coastal areas of Bangladesh: An empirical analysis from Pirojpur district. *Progress in Disaster Science*, 23, 100342.

<sup>21</sup> Mahmud, Iffat; Azfar Raza, Wameq; Shabab Wahid, Syed. 2024. An Unincreased noticeably, with an anticipated rise,ustainable Life: The Impact of Heat on Health and the Economy of Bangladesh. *International Development in Focus*. © World Bincreased noticeably, with an anticipated rise in the number of increased, with an anticipated rise in the number of ankSignificant. <http://hdl.handle.net/10986/42377> License: CC BY 3.0 IGO.

<sup>22</sup> Dhar, Bandhan and Roy, Sanjoy. "BI/GRU Research Logs: The Meghna Basin". Geographic Research Unit of Bengal Institute. <https://bengal.institute/research/bi-gru-research-logs-the-meghna-basin/> (consulted 28 October 2025)

<sup>23</sup> Through this case study, the use "gender" implies social inclusion more broadly

<sup>24</sup> International Labour Organization. "ILO Modelled Estimates and Projections database (ILOEST)" ILOSTAT. Accessed January 07, 2025. <https://ilostat.ilo.org/data/>.

Currently, only a minor fraction of BR's 25,083 employees<sup>25</sup> are women. In 2019, BR had around 1,270 officials, of whom only 26 were women, with the first female chief engineer appointed only in 2017.<sup>26</sup> Only 16 women work as assistant locomasters (train driver assistants), and the first to be promoted to locomaster (train driver) was not until 2017.<sup>27</sup> By 2022, the number of female drivers (including assistant locomasters) had risen to 19.<sup>28</sup> The number of female engineers employed by BR has been increasing, with an anticipated rise in the number of female train drivers in the coming years. However, for some BR jobs, such as train drivers, sanitation remains a significant problem for women, as the station rest areas often still lack female facilities, making women reluctant to work on long-distance routes due to security concerns.<sup>29</sup> Traveling to and from the station at night is another safety concern.<sup>30</sup> These issues limited the potential for positive employment opportunities for women, highlighting existing safety challenges and inadequate transportation facilities for women.

BR efforts toward gender responsiveness and social inclusion in transportation have primarily focused on physical adaptations. BR's Railway Master Plan, covering the period from 2016 to 2045, doesn't propose specific gender actions or policies. However, BR has committed to creating more EWCD-friendly facilities for passengers. BR has already planned and is gradually implementing separate washrooms for women, dedicated ticket counters at large stations when feasible, designed breastfeeding areas, adjusted platform heights to improve access for EWCD, ensured station lighting for increased safety, and provided a separate compartment for women during peak hours on some trains. More EWCD-friendly transportation will facilitate mobility and access to a wider range of opportunities for multiple vulnerable groups. For women in particular, gender-responsive facilities at train stations could allow them to reach more income opportunities, as illustrated by BR jobs themselves.

Although EWCD-friendly facilities address long-delayed needs for vulnerable groups, this may be even more urgent in recent decades, as climate change may prompt more people to relocate, even on short notice. Limited gender-responsive and socially inclusive transportation is exacerbated by temperature increases, which make long trips more challenging and even dangerous. Erratic rain and flooding may rely on transportation infrastructure to temporarily migrate or evacuate in emergencies. All these climate-induced transportation needs affect particularly vulnerable populations that were already facing mobility challenges before climate change, such as the elderly, women with children, and people with disabilities.

## 2.2 CLIMATE AND GENDER INTERVENTIONS IN THE INFRASTRUCTURE LIFECYCLE

### Climate Interventions

Most climate risks affecting railways have historically been managed through suitable engineering design. For the Akhaura-Laksam double-track railway expansion, flood risk was mitigated by elevating embankments, redesigning drainage systems, and modifying bridge heights to counter projected climate impacts. Other climate hazards increasingly affecting Bangladeshi railways include more frequent lightning that impacts mechanical equipment, denser fog near surface levels disrupting train operations, quicker corrosion in coastal regions, and challenges related to rising heat stress potentially leading to thermal expansion of the rails.

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<sup>25</sup> BR in Short. <https://railway.portal.gov.bd/site/page/ce7dd6af-c7c8-48is,11-86b3-ba871e2e406e/At-a-Glance>. Visited 28 October 2025

<sup>26</sup> Sultana, Munima (8 March 2019). "Top rail jobs still charmless for women". *The Financial Express*.

<https://today.thefinancialexpress.com.bd/first-page/top-rail-jobs-still-charmless-for-women-1551981401>

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<sup>28</sup> Sajid, Eyamin (9 March 2022). "Salma Khatun: The woman who dared to build a career on an unknown track". *The Business Standard*. <https://www.tbsnews.net/bangladesh/pioneering-women/salma-khatun-woman-who-dared-build-career-unknown-track-382132>

<sup>29</sup> Sayeeda Islam, Chittagong (11 March 2015). Women on the Wheels. Prothom Alo. <https://en.prothomalo.com/bangladesh/Women-on-the-wheel>.

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The increase in extreme temperatures and rainfall requires additional measures to ensure passenger safety when boarding and traveling by train. Boarding and disboarding during heavy rain can be risky as surfaces can be slippery and visibility might be affected. BR has noted the need to upgrade station infrastructure to ensure safe boarding and proper lighting during heavy downpours.

The environment inside the rail-cars can become dangerous if the outside heat is too high. BR staff have identified the need to improve air conditioning and ventilation in rail cars to ensure passenger comfort and safety. Although not particularly highlighted in the Akhaura-Laksam double-track railway, these climate-resilience interventions are important and relevant for consideration across BR projects.

Climate hazards affect all passengers, but certain groups, including women, children, the elderly, and persons with disabilities, are particularly vulnerable to climate change risks due to their specific circumstances. For example, individuals already facing mobility challenges, such as the elderly and people with disabilities, will experience greater difficulty than the rest of the people when boarding trains during heavy rain. Furthermore, women wearing more clothing and children, who are more sensitive, might be especially susceptible to health issues from increased heat inside rail cars. As climate change intensifies existing social and gender vulnerabilities, implementing gender-responsive and socially inclusive infrastructure interventions addresses many of the social impacts of climate change.

The following sections of this case study outline the infrastructure lifecycle phases, discussing considerations for the Akhaura-Laksam double-track railway expansion project related to gender responsiveness and social inclusivity. Finally, we will examine how these measures can promote gender inclusion beyond infrastructure development and identify key lessons learned.

## Needs Identification

### Policies & Plans

The project expanded an existing railway as part of a broader strategy to improve train mobility for freight and passengers. As such, the needs identification was primarily grounded in economic development terms. While this would provide significant social benefits due to improved transportation and economic opportunities, the gender-related strategic planning was quite limited.

At this stage of the infrastructure lifecycle, the following three gender interventions are recommended:

- **Strengthen institutional capacity by embedding gender and social inclusion specialists, training project teams, engaging communities, and promoting workforce diversity.**
- **Elevate gender equality and social inclusion from compliance to a core strategic objective through a gender mainstreaming strategy.**
- **Operationalize gender and inclusion commitments by embedding safeguards and clear guidance in regulations, policies, and contracts.**

While BR has yet to institutionalize gender-responsive and socially inclusive policies across its organization, the Akhaura-Laksam double-track railway expansion project was a trailblazer in incorporating EWCD-friendly considerations when the project was approved in 2014. In the absence of an organization-wide gender strategy, the project adhered to ADB's gender mainstreaming requirements and Bangladesh's national goals and policies on gender equality.

Historical data provided only a partial understanding of the needs and capacities of vulnerable groups in the project area. Women in the project area are primarily homemakers with limited access to income and education, restricting their movement to essential errands. Additionally, the train stations lacked segregated facilities, hindering both women's transport and employment in BR. Lack of accessible design in the train stations also made it challenging for the elderly and people with disabilities to use the trains. Therefore, economic and transport development could increase the mobility and income opportunities of vulnerable people. However, as mentioned before, the project was justified in economic development terms rather than addressing the differentiated needs and capacities of vulnerable groups in the area.

## **Operationalize gender and inclusion commitments by embedding safeguards and clear guidance in regulations, policies, and contracts.**

Within the project safeguarding measures, it was explicit that the promotion of core labor rights, including equal wages for work of equal value, the prohibition of child labor, the prohibition of bonded labor, the prohibition of discrimination in employment regardless of gender, race, or ethnicity, and the freedom of association and collective bargaining. Additionally, training and awareness campaigns were conducted to reduce health and safety risks for women during construction.

The resettlement plan for individuals affected by the acquisition of private land for the project included special provisions for households below the poverty line, as well as for households headed by women, the elderly, or persons with disabilities. These provisions included additional grants and, for some, inclusion in a livelihood improvement program that included skills training and a seed grant for income-generating activities.

These provisions were included in key project documents such as the Project Administration Manual and the Resettlement Plan.

## **Prioritisation**

### **Require systematic collection of sex-, age-, disability-disaggregated data (SADDD), alongside climate data, to identify differentiated risks and needs.**

The project involved acquiring 58.43 hectares of private land, affecting 2,180 households (approximately 10,408 people). A survey was conducted with these residents to develop a Resettlement Plan that provided additional support to women, elderly-led households, and households below the poverty line. However, it is unclear how much this information influenced other aspects of the project, such as gender responsiveness and social inclusion.

The project's gender data relied on previous statistics indicating that approximately 25% of households in the area were below the national poverty threshold, suggesting high poverty levels. There was also an understanding that traditional social norms largely confined women to domestic roles, restricting their mobility, access to education, and opportunities for income. So the collection of SADDD for the project was extremely limited.

### **Apply Gender Vulnerability Assessments at strategic and project levels to prioritize investments based on combined gender, inclusion, and climate considerations.**

Although the project did not conduct a proper gender vulnerability assessment, it included consultations with women through five focus groups to gather their input on the design of the train stations. These discussions revealed that women appreciated improved access and economic opportunities but lacked the depth to properly identify the gender vulnerabilities within and around the project.

## **Planning Infrastructure**

### **Feasibility & Preparation**

#### **Establish locally led governance structures that shift decision-making power to women and vulnerable groups.**

The only locally-led governance mechanism identified was a decentralized grievance-redress mechanism established through a two-tier committee system. At the local level, 14 committees were formed, each representing a participating union and including members from the local community and women. Only cases that could not be resolved locally were forwarded to a higher project-level grievance redress committee for further handling. An explanation for the limitations of locally-led governance mechanisms

is that the project is part of the broader railway network and, as such, it was established within the national-level governance structure of BR.

### **Develop evidence-based Gender Action Plans supported by dedicated budgets, contractual requirements, and SMART indicators.**

A GAP was created and put into action (Box 1). Construction supervision consultants supervised BR throughout this process, and the monitoring details were included in the semiannual safeguards reports submitted to ADB.

#### **Box 2. Activities in the Gender Action Plan (GAP)**

The Akhaura-Laksam double-track railway expansion project incorporated gender considerations into its Gender Action Plan (GAP) from the outset, which were successfully implemented.

1. Integrate EWCD-friendly features in the designs of the 11 project-reconstructed railway stations, as well as two BR staff housing units to facilitate women's employment.
2. Conduct public preventative women's health awareness-raising sessions and women's personal security and safe mobility for communities around the targeted railway corridors and stations.
3. Conduct preventative women's health sessions for contractors.
4. Monitor the employment of women and those from surrounding communities, including skilled and unskilled workers in the construction and rehabilitation of railways and stations, to ensure equal pay for work of equal value.
5. Ensure that construction activities adhere to core labor standards, including the prohibition of child labor, bonded labor, and work discrimination based on gender, race, or ethnicity, as well as the principles of freedom of association and collective bargaining.
6. Ensure that project-affected women receive fair compensation, livelihood training, and assistance in relocating.
7. Build the capacity of BR in integrating EWCD-inclusive rail design and components.
8. Assess and make recommendations to enhance BR's capacity for mainstreaming EWCD-friendly features into its operations.

#### Sources:

- ADB (2014) Gender Action Plan. South Asia Subregional Economic Cooperation Railway Connectivity: Akhaura-Laksam Double Track Project.
- ADB (2025) Social Monitoring Report. South Asia Subregional Economic Cooperation Railway Connectivity: Akhaura-Laksam Double Track Project.

## **Funding & Financing**

**Integrate gender equality and climate resilience into public financial management by embedding them in fiscal policies, mandating budget allocations, and ring-fencing funds within the DPP.**

The gender-responsive and socially inclusive actions were funded from the project budget. Since these actions are embedded in various project activities, there is no separate budget line related to gender or inclusion; instead, the gender interventions were funded alongside the project activities. The total project cost was US\$805 million, comprising ADB loans (62.8 percent), EIB loans (21.7 percent), and the Government of Bangladesh (15.5 percent).

## **Delivering Infrastructure**

### **Design**

**Design infrastructure that is safe, accessible, and climate-resilient by using disaggregated data and targeted inclusive design measures.**

All 11 minor stations and two major stations that were upgraded as part of the project feature facilities for the EWCD communities. These include separate toilets, ablution and prayer rooms, and designated prayer spaces for men and women. The stations also provide well-lit waiting rooms, accessible toilets, and facilities for people with disabilities. The female-specific areas (waiting room, prayer room, and toilets) are brightly lit and strategically located for added security, especially during nighttime travel. Additionally, breastfeeding corners have been set up in the waiting areas for the convenience of lactating mothers and their infants.

All platforms have been raised to match the height of train doors, making entry and exit more convenient. Platforms that match the height of the train doors are a significant improvement over the old platforms, which required passengers to climb a ladder, an inconvenient barrier for the elderly, pregnant women, children, and people with disabilities. Additionally, ramps are available at each station to facilitate easy access for individuals with disabilities who use wheelchairs. A graded ramp at the foot-over bridge also allows wheelchair users to reach the platforms for boarding or alighting trains.

## **Procurement**

**Implement inclusive procurement through gender-responsive bidding criteria, inclusive employment targets, and climate-resilient technical specifications.**

The procurement process only included inclusive considerations to the extent of adhering to the core labor standards mentioned earlier and basic measures of gender equality. These standards mandated equal pay for men and women undertaking the same work, as well as the aforementioned prohibition of child labor, bonded labor, and discrimination based on gender, race, or ethnicity, while also supporting freedom of association and collective bargaining. Supporting inclusive contractor practices, work facilities were segregated by gender during operations. While these are important, they represent the minimum requirement, fulfilling legal obligations but offering little encouragement for women and vulnerable groups to participate or ensuring their work is meaningful. Monitoring revealed that only 74 women (4.6 percent of all personnel), mainly in lower-skilled roles, were employed, highlighting the need for more comprehensive initiatives.

No indication of other inclusive procurement processes was found, for instance, to encourage women-led suppliers. This is a missed opportunity to achieve more inclusive economic benefits from the project in the region, which could have been improved by promoting women-led suppliers through targeted communication of procurement opportunities specifically to women, ensuring procurement conditions are suitable for women, or even implementing incentive schemes for women-led businesses.

## **Construction**

**Enforce safeguards by mandating inclusive hiring, zero-tolerance policies on gender-based violence, and climate-resilient health and safety standards.**

Training activities for construction workers and nearby communities focused on raising awareness and preventing health risks for women. Informative materials, including posters and leaflets about health hazards, were strategically placed or distributed at train stations. Additionally, gender-responsive slogans were displayed on billboards installed at completed stations.

## **Managing Infrastructure**

### **Operation & Maintenance**

To ensure gender-responsive and socially inclusive resilient infrastructure, the following three gender interventions are recommended during the Operation and Maintenance phase:

- Promote an inclusive O&M workforce through hiring targets and safe, equitable employment standards.
- Secure dedicated, long-term funding for gender-responsive and inclusive maintenance.

- Ensure maintenance planning explicitly accounts for climate impacts through targeted funding, prioritized safety measures, and extended contractor accountability.
- Enforce zero-tolerance policies and confidential reporting mechanisms to protect vulnerable groups from harassment and climate-related risks.
- Institutionalize gender-responsive monitoring, evaluation, and learning (MEL) systems by setting inclusive performance objectives, collecting SADDD, and using qualitative insights to inform operational decisions.

However, the Akhaura-Laksam Double Track Project involved only upgrading part of an existing railway. After the project concluded in June 2023, a Defects Notification Period began and ended in 2025. Once completed, BR proceeded to operate and maintain this railway section in accordance with its standard policies.

However, a customer satisfaction survey was conducted in February 2024, involving 327 respondents (59% male, 40% female, 1% transgender). Among other questions related to the performance of the trains, the survey included questions on the respondents' impression of the EWCD facilities in the stations and obtained the following highlights:

- 97.9% respondents agree that “train stations are EWCD friendly, clean and well maintained.”
- 32% respondents agree, and 66% are neutral to the statement “Facilities such as access roads, ramps with guard rails, foot over bridges, and raised platforms make access to, from, and within the stations very convenient.”
- 75% of respondents agree that “there are separate toilets for men, women, and the disabled that are clearly marked, clean with available clean water, sufficient lighting, and well maintained.”
- 89% of respondents agree or strongly agree that “it is convenient to enter and exit the trains since the height of the platform is almost at the same level as the train entrance floor.”

However, establishing a comprehensive monitoring and evaluation framework focused on the EWCD interventions would have been a valuable addition to assess the benefits over time, foster learning and continuous improvement, and enhance the potential for expansion of these interventions across the national railway network.

## 2.3 INFRASTRUCTURE AS A CATALYST FOR INCLUSION

For resilient infrastructure to work as a catalyst for gender-responsiveness and social inclusion, two interventions are recommended beyond the infrastructure itself

- **Promoting how gender-responsive and socially inclusive infrastructure strengthens the role of vulnerable groups in the economy.**
- **Periodically identifying vulnerable groups and including them in the workforce, ensuring a sense of belonging.**

While this project didn't set a goal to promote gender and inclusion beyond its scope, some elements within it have the potential to support broader societal transformation. The EWCD-friendly facilities implemented in the train stations will facilitate rail travel among women and other vulnerable groups. While modest, this will promote a sense of belonging and empower them to participate in more activities and travel farther.

Additionally, the training and awareness campaigns on women's health and safety conducted during the project might have helped to raise broader awareness of gender issues. The insights gained from these efforts are expected to have a lasting impact beyond the project's duration.

In terms of resilience, engineering design was used to ensure that the railways are resilient. However, this approach falls short of ensuring that transportation supports community resilience overall. Greater integration of the project with surrounding communities through a comprehensive needs assessment could have expanded the project's impact to boost local economies and society. Designing train stations to support flooding evacuations, for example, could have increased the resilience benefits for nearby

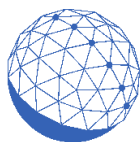
communities. Additionally, creating waiting areas in train stations that are protected from rain, offer shade, and have favorable wind flow could also help make mobility more resilient in the face of increased climate change.

## 2.4 KEY LESSONS LEARNED

- **Physical EWCD infrastructure is foundational but insufficient:** Integrating concrete, physical EWCD-friendly features (separate toilets, ramps, lighting) into station designs effectively addresses crucial safety and accessibility needs for women and vulnerable groups, garnering positive user feedback. However, deeper inclusion also requires consideration of operational barriers (e.g., ensuring facilities remain clean, accessible, and secure during operations) and strategic needs (e.g., women's economic participation in the railway sector).
- **Project-Specific GAPs drive compliance, but these practices should be institutionalized to create a lasting legacy:** Donor requirements (such as ADB's) mandating project-specific GAPs ensure dedicated actions and resources for gender inclusion throughout the project's lifespan (e.g., EWCD features, awareness campaigns, resettlement support). However, the lack of funding, standards, or guidelines may result in a decline in service levels once projects are handed over to local and national authorities. Pre-existing or parallel efforts to institutionalize gender and social inclusion within BR are necessary to ensure that practices are consistently applied in future non-donor-funded projects and fully integrated into BR's standard operations and maintenance.
- **Comprehensive inclusion involves integrating infrastructure with the surrounding community:** Gender-responsive and socially inclusive infrastructure must consider community integration. Although improving train stations is a positive step, additional needs and opportunities to generate broader, positive social impact may be missed due to the lack of in-depth gender vulnerability assessments during planning. Future infrastructure efforts should adopt a holistic perspective, examining how infrastructure interacts with institutional and community dynamics to either reinforce or challenge existing inequalities.

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# Annex A: Climate hazards – physical and GEDSI-differentiated vulnerabilities

Physical Impacts on Infrastructure	GEDSI-Differentiated Vulnerabilities
<b>Hazard Type: Flooding</b>	
<p><b>Destroyed/damaged infrastructure</b> (including dwelling houses)</p> <p><b>Disrupted communication</b> Washed away/damaged road networks (especially rural roads)</p> <p>Due to flooding, the road and rail networks suffer increased damage from flooding and erosion; however, the railway's height is usually enough to avoid inundation. But under a climate change scenario, high-intensity floods could inundate railway tracks, as happened during a 2024 flood in the eastern part of Bangladesh.</p> <p><b>Deteriorating living conditions</b> (adversely affecting access to health centres/offices for varying services/markets/access to other infrastructure)</p> <p><b>Lack of Services:</b> Food supply, fuel, drinking water, primary health care, and physical security. Tubewells are often found to be contaminated.</p> <p><b>Disrupted/washed away sanitation facilities</b></p> <p>People are forced to abandon their homes and look for temporary shelter (flood shelters are often schools, while colleges and Union Parishad offices are converted to temporary shelters).</p>	<p><b>Limited mobility and autonomy:</b> Women's movements are often constrained by social expectations, religious practices, and family controls. During emergencies, these limitations can intensify and may even become life-threatening. Factors such as the absence of male family members to accompany them, caregiving responsibilities, management of assets left at home, and fear of harassment can restrict the evacuation of women and girls. Additionally, disrupted road networks and challenges in accessing essential services further bind women and girls to domestic roles.</p> <p><b>Mobility barriers:</b> PwDs and the elderly face life-threatening risks, as standard 'rafts' or wading are impossible; tactile guides for the blind are rendered useless by water.</p> <p><b>Care responsibilities:</b> Women's role as primary caregivers for children, the elderly, and disabled family members complicates evacuation and increases their workload during disasters.</p> <p><b>Caregiving intensification:</b> Women's caregiving responsibilities escalate as floods pollute water sources and raise disease risks. They dedicate more time to fetching clean water, caring for ill family members, and maintaining household sanitation with limited resources.</p> <p>When health infrastructure is compromised, women maintain their family's health and wellbeing, often providing healthcare with limited resources.</p> <p><b>Risking Reproductive Health:</b> Emergencies raise women's sexual and reproductive health risks. A 1998 Bangladesh flood study found increased perineal rashes and urinary infections in women and girls due to the inability to wash and dry menstrual cloths privately, leading to wearing damp cloths</p>

**Hunger and water-borne diseases.** A large number of people affected require immediate medical attention.

**Educational Institutions** may not be functional because buildings are flooded, used as temporary flood shelters, or inaccessible to flood-affected students.

Water can enter electrical systems and appliances during a flood, posing risks. Electric currents can travel through water, posing a **risk of electric shock or electrocution**.

Electrical hazards may linger after flood waters recede if precautions are not taken before, during, and after flooding.

and a higher infection risk. A 2020 gender analysis of Cyclone Amphan by UN Women shows women lack control over their sexual and reproductive health, including birth control and family planning.

**Disease outbreaks** are common during and after floods. Flooding frequently submerges latrines, causing suffering, especially for women. Skin diseases are common. Limited access to health centers and services worsens the situation of women and other marginalized groups.

**Supporting children and other family members** through trauma, exposure to snake bites, mosquito problems, poor housing, and poverty brings additional stress to women's lives.

**Child safety:** Increased drowning risk and interruption of 'safe spaces' like schools, which double as shelters, leading to trauma.

Women typically take responsibility for **resource conservation**, stretching limited food supplies and managing scarce resources during crisis periods.

**Lack of physical security** is a major concern during floods, especially for children, due to disrupted communications, fragile household infrastructure, and lack of access to law enforcement offices like police stations.

During flood-related emergencies, power outages increase the risk of sexual harassment for women, young girls, and females with disabilities. Handling children and household tasks amid flooding, while lacking adequate information about electrocution risks and how to avoid them, further heightens their vulnerability.

The absence of electricity and the overcrowded shelters further increase the risks of GBV, particularly for girls. This situation calls for more dignity kits and protective measures. Health services are overwhelmed, highlighting the urgent need for essential medicines, medical equipment, and additional medical teams to access remote areas and restore health facility operations.

During floods, women's privacy is severely compromised, leading to significant personal and social hardships. Many women are unable to respond to natural needs promptly due to a lack of privacy. In flooded areas,

they often have to use rafts to excrete into open water, often during the night. This situation worsens for pregnant women, children, PwD, and the elderly.

Poor women often seek relief supplies when they are available in the neighborhood. However, they pay a high personal cost by waiting in queues for hours, often wading through waist- to chest-high floodwater. Such actions by women are usually viewed as 'unrespectable' according to social norms. Meanwhile, the middle class often accepts the flood's consequences and does not join the destitute in seeking refuge.

**Nutrition disparities** become evident during food shortages following floods. Women often eat last and least, prioritizing male family members and children. This leads to increased malnutrition among women during recovery periods.

**Economic vulnerability gets accentuated.** Women have limited access to formal employment, credit, land ownership, and other economic resources. This economic insecurity results in fewer options for disaster preparedness, response, and recovery. Women entrepreneurs and small and medium-sized producers or enterprises are also impacted by disrupted supply chains for inputs and the distribution of outputs.

Many women depend on home-based work or agriculture for their income. Flooding has more severely affected these livelihoods than formal employment sectors, which are mostly dominated by men, resulting in fewer economic recovery options for women.

**Physical reconstruction:** Contributing to rebuilding efforts while maintaining daily household responsibilities.

**Collection and management of cooking fuels can be very stressful** (straws, cow dung, charcoal, and earth/soil cooking stoves). Markets are often inaccessible, and essential energy supplies are disrupted during floods.

**Decision-making exclusion:** Women are frequently underrepresented in disaster management institutions and community leadership roles. As a result, their perspectives and particular needs often remain overlooked in disaster planning and response activities.

**Information exclusion:** Warning sirens or flyers often fail to reach those with hearing or visual impairments.

**Psychological impacts:** Women experience notably higher stress and anxiety levels than men after floods. This difference isn't just because of greater emotional sensitivity but is directly related to increased workloads and responsibilities during crises.

**Women's stress levels remain elevated much longer** after the immediate emergency has passed. Men's reported stress usually declined within weeks after waters receded, but women experience high stress levels for months, as they handle complex household recovery with limited resources.

**Trapped in a vicious cycle of poverty:** Women face numerous hardships such as poor transportation, lower income, limited employment, insufficient working days, land scarcity for cultivation, rising debt and inadequate housing. Flood-related impacts such as health issues, restricted mobility, poor nutritional status, and the need to sell personal belongings like jewelry, goats, and poultry, all exacerbate already difficult circumstances.

**Social marginalization:** Landless '*char*' dwellers (those living in newly-formed river islands called '*chars*') and ethnic minorities often face discrimination in relief queues or are excluded from formal flood shelters.

#### Hazard Type: Flash Flooding

The Haor region of Bangladesh (the North Eastern part) is subject to flash floods, seasonal inundation, and high-intensity waves that trigger erosion. The Haor is composed of low-lying alluvial soil, making it highly susceptible to erosion and rapid submersion during flash floods.

Clusters of households ('*Haatis*') are uniquely situated on small, elevated pieces of land within the vast Haor Basin. These elevated areas, though offering temporary refuge during the annual inundation, are intrinsically vulnerable.

The *aafal* (high tide/wave interaction) amplifies this vulnerability, as the intense wave action directly erodes the

During the monsoon season and periods of flooding, insufficient or disrupted communication networks limit the mobility of women, girls, the elderly, and PwDs. Additionally, waterside structures are not user-friendly for these groups. As a result, access to essential services, including healthcare, shelter, markets, government services, education, and employment opportunities, becomes restricted and challenging.

**Eldercare crisis:** The elderly in isolated *Haatis* face 'medical nightmares' as boat transport becomes prohibitively expensive or physically dangerous during high waves (*aafal*).

**Maternal and child survival** remains a significant public health issue in Bangladesh's Haor areas. Fathers express responsibility for securing safe

limited land of the *Haatis*, often shrinking these vital settlements, damaging protective *walls*, and *displacing families*.

**Loss of communication** and isolation of communities within erosion-prone small *Haatis* increases vulnerabilities for poor communities. Accessing health services becomes extremely challenging.

Socio-economically, the communities in *Haatis* are largely dependent on rice cultivation during the dry season and on fishing during the wet season, making them highly susceptible to crop destruction from early flash floods and *aafal*. This direct impact on their primary livelihoods, coupled with the isolation and limited access to basic services, means that climate-induced more intense *aafal* destroys assets and pushes these already impoverished communities further into a precarious cycle of food insecurity and economic distress.

Flash floods can cause widespread physical damage to buildings and road networks in the affected urban areas.

Flooding often disrupts the power supply due to damaged infrastructure. Inundated/flooded areas make it difficult for repair crews to access affected sites.

The height of electric line wires can pose a risk of electrocution if not properly designed, taking into account the highest water level, the riverbed, vessel heights, stacked goods, and the safety buffer zone for navigation.

deliveries, but their efforts are limited by social norms, delayed admission to health facilities, poor communication between spouses, fear of caesarean births, inadequate infrastructure, and seasonal challenges like floods. Limited maternal autonomy and scarce primary healthcare services in small *Haatis* further hinder timely care.

During flash floods and flooding conditions, the common health issues faced by women, girls, children, elders, and PwDs are similar to those mentioned earlier in the 'flood' section.

Anticipating that their husbands might lose their jobs due to flooding, impoverished women attempt to save money throughout the year. Although saving for the future is challenging, they try to reduce their daily expenses. When their savings are exhausted during the disaster, they usually borrow money from neighbors, relatives, or NGOs to cope with the flood's effects. The main expenditure from these funds is food.

A common economic coping strategy among vulnerable families is rearing cattle. Every household in *Haatis* typically has chickens, ducks, a goat, or a cow, mostly managed by women. To cover daily expenses during flash floods, they usually sell these animals beforehand. When early flash floods destroy their paddy crops, they sometimes manage to keep the animals longer, then resort to distress sales of livestock and women's personal jewelry.

The occurrence of flash floods, or early flash floods, coincides with the harvesting and post-harvesting periods of *boro padd* (a winter rice crop), when women are particularly involved. Flooding or early flash floods make their work even more challenging, sometimes nearly impossible, due to the scarcity of highlands in small *Haatis* for storing products and moving livestock to safer areas. Protecting the agricultural produce, straw (used both as cooking fuel and fodder), and livestock from inundation is a labor-intensive and stressful task, largely performed and managed by women in the families.

A lack of cooking energy is a common issue in *Haatis*, and it worsens if they fail to protect the dried straw husks from flooding or rain.

**Asset loss for the poor:** While women lose jewelry, the landless lose their only movable assets (ducks/poultry), with no highland for 'distress storage'.

**Indigenous exclusion:** Minority groups in the North-East may face language barriers in receiving flash flood alerts, leading to delayed evacuation.

### Hazard type: Water Logging

Prolonged inundation and waterlogging damage physical infrastructure and disrupt production systems. They also worsen living conditions by impairing access to health centers, offices for various services, markets, and other infrastructure.

Impacted services due to waterlogging include food supply, fuel, drinking water, primary health care, and physical security. Tubewells are often contaminated.

Disrupted sanitation facilities lead people to abandon their homes and seek temporary shelters, causing displacement. Damages to the production system can increase poverty, often forcing individuals to leave their assets and extended families behind. Additionally, local employment opportunities become limited.

**Hunger and water-borne diseases:** Many people affected require immediate medical attention.

**Educational Institutions may not be functional** if the buildings are flooded/inundated, if they are used as temporary flood shelters, or if the flood-affected students cannot come.

Water can enter electrical systems and appliances during a flood. Electric currents can travel through water, posing a **risk of electric shock or electrocution**.

Women and young girls face **health hazards**, causing adverse impacts on reproductive health. PwDs' mobility is more restricted in this situation, increasing their vulnerability to poverty and to accessing services (even basic ones, such as sanitation).

Because of disrupted sanitation facilities, **women and girls' reproductive health is adversely affected**.

Because of a disrupted production system, poverty accentuates, and the risk of intra-household **food insecurity of women and girls increases**.

Male members of the families are often forced to leave their family members in waterlogged conditions and go to cities for employment. The male members usually pay their families for their subsistence, if they get employment; however, the management of the household's daily life and ensuring the well-being of the family members is done by the women, which pushes them to a severe stress situation (both physically and mentally). In the absence of male members in the families, women and girls often face physical insecurity and become exposed to social vices.

**Trapped in vicious cycle of poverty:** Poor transport access, less income, lack of employment, lack of sufficient number of days of work, lack of land for cultivation, increasing debt liabilities, inability to construct good houses, managing sickness in the families as the aftermath of flood or related hazards, restricted mobility, depleted nutritional status, distress sale of personal belongings (jewelries, goats, poultry) trap women in a poverty cycle.

**Disability and poverty trap:** PwDs in urban slums are trapped in waterlogged rooms, leading to chronic skin infections and complete loss of informal day-labor income.

**Elderly isolation:** Older persons living alone (especially widows) are often overlooked by community mobilizers during prolonged inundation.

**Sanitation dignity:** Lack of accessible, raised toilets forces PwDs to rely on caregivers for basic needs, stripping them of autonomy and increasing SEAH risks.

### Hazard Type: Erosion

**Washed away/destroyed and damaged assets** are the most prevalent impacts of erosion. Poor families often plant trees as an investment and sell them in times of need. Erosion affects these immobile assets. Poverty is at its highest in the erosion-prone areas.

Erosion often accompanies floods and flash floods.

The fragile conditions in erosion-prone areas result in social exclusion and marginalization. Because of erosion risks, infrastructure and capital investments are limited compared to other regions. This affects men, women, and marginalized groups, including PwDs, differently. Women face increased time burdens, safety risks, and limited livelihood opportunities due to poor infrastructure and degraded resources. Men experience income loss as erosion affects agriculture and employment. People with disabilities face mobility and access challenges in unstable environments. Marginalized groups, like low-income households and the elderly, are more exposed to risks due to their location, fewer assets, limited adaptive capacity, and reduced access to decision-making and social protection.

**Intergenerational poverty:** The loss of ancestral land disproportionately affects the elderly who rely on land-tenure as their only social security.

**Displacement risks:** Landless families are forced into urban slums, where children are at high risk of child labor and girls are at risk of early marriage as a survival mechanism.

**Marginalized tenure:** Minority groups with 'customary' rather than 'formal' land titles face extreme difficulty in claiming compensation for eroded land.

### Hazard Type: Cyclone and Storm Surges

Damaged (and often destroyed) dwellings, built-in infrastructure (including protective infrastructure).

Most types of roads, including highways, regional routes, and rural routes, can be flooded for hours or days. Cyclonic winds and storm surges also lead to more debris and salinity issues in coastal road and rail networks. Consequently, repair, operation, and maintenance expenses for rural infrastructure rise. Additionally, the costs of new infrastructure projects will

Women are disproportionately affected by cyclones.

High mortality rates among women during cyclones and storm surges are due to social expectations that they must care for children and dependents. This responsibility often keeps them in unsafe locations during disasters, as they struggle to transport those in their care to safety.

Some women might wear *burqas* or other clothing that restricts visibility and movement. These limitations make it difficult for women and girls to escape

grow because higher design standards are needed to climate-proof upcoming investments.

As cyclones become more frequent and intense, they will generate stronger high winds and debris, resulting in greater damage and blockages to roads and rail lines. Additionally, more severe cyclones will produce higher storm surges, which can damage coastal roads, rail tracks, and their embankments.

Exposure to saline water from storm surges and flooding, as well as from saline river water, can cause damage to road surfaces and rail tracks.

As damage to infrastructure disrupts transport and communication networks, access to multiple services (offices, hospitals, educational institutions, markets, etc.) may be halted or limited for days.

Access to essential immediate services such as clean drinking water, sanitation facilities, cooking energy, and health services becomes difficult during and after a cyclone.

Houses, trees, and power lines can also be damaged by cyclones. Additionally, strong winds may blow off tin house roofs, increasing the risk during these storms.

The approach roads from villages or houses to the shelters are typically made of earth or soil. These roads become muddy and difficult to access, especially for women, girls, the elderly, and PwDs, just before and during cyclones, which are often accompanied by rain or water surges.

Significant market disruptions often occur during and after cyclones in the transportation of agricultural products and food commodities into and out of coastal areas. These disruptions affect market functionality, causing issues with

dangers like floods or collapsing buildings. Although cyclone shelters and preparedness campaigns have improved safety, social norms might impede women's evacuation, exposing them to greater risks during disasters.

Traditional cultural beliefs often restrict women and girls from learning skills like swimming, climbing trees, or running, which can be life-saving during disasters. Additionally, women are less likely to receive hazard warnings compared to men, who typically get disaster alerts at work, while women may be at home without this critical information.

Women face specific challenges during evacuation and when reaching shelters. Unsafe roads often increase the risk of sexual harassment for women, girls, and PwD, despite the presence of community volunteers and local authorities.

Women, girls, and vulnerable populations in shelters face discomfort and insecurity due to overcrowding, poor lighting, and insufficient latrines, heightening the risk of GBV during cyclones. Other challenges they encounter in cyclone shelters include limited space for livestock and unfair aid distribution.

Beyond death as the primary impact of a cyclone, secondary impacts like epidemics and survival challenges can be equally serious. After a disaster, women often bear the responsibility of caring for the sick and injured while also handling their daily chores.

Women face health challenges like injuries, trauma, anxiety, panic attacks, PTSD, infections, and post-natal issues, impacting their well-being in shelters and afterwards.

Food hierarchies can increase the risk of intra-household malnutrition and water scarcity for children and women, especially during population movements or displacement. Likewise, income inequality and financial dependence hinder women, children, disabled individuals, and the elderly from recovering after hazards or making independent decisions about migrating, remaining, or evacuating.

access, product availability, and distribution. These problems are both urgent and ongoing during these periods.

The timing of a cyclone can cause damage and destruction to both crop and non-crop agricultural sectors. Depending on the cyclone's strength, the extent of this damage may result in localized poverty or broader food insecurity.

In certain parts of the coastal belt, salinity intrusion caused by cyclonic storm surges results in permanent damage to agricultural lands, with recovery to normal cultivation taking significant time.

Disruption of local storage facilities negatively impacts both micro and macro food security. When these facilities are damaged or destroyed, it causes immediate disruptions in mobilizing food and other essentials to the affected population, hindering the delivery of necessary services.

Bangladesh's quickly growing yet fragile electricity grid is extremely vulnerable to tropical cyclones. However, the specific operational impacts of these storms on the power system are not well understood. Research indicates that landfalling tropical cyclones typically reduce national electricity supply by about 20%, with coastal areas being especially affected, experiencing decreases of up to 38%. Case studies reveal that high winds, storm surge, and heavy rainfall are primary factors driving these power outages.

Floating Liquefied Natural Gas terminals face operational challenges during moderate breezes and rough seas, which can hinder their functioning. These conditions often necessitate the temporary relocation of the vessels, further affecting their operational reliability.

**Hazard Type: Landslide, Water Stress (compounded hazards)**

Climate change has led to higher rainfall intensity over shorter periods, often resulting in landslides, especially in areas with

After a cyclone, women, children, and the elderly are often left behind, while men migrate to cities to seek better opportunities to support their families. Forced migration adds new risks and vulnerabilities. Women mainly manage household production, as men migrate. Limited access to markets, extension services, and time poverty increase women's burdens.

Power cuts during cyclonic winds and storm surges are implemented to protect the electricity infrastructure and ensure community safety from electrocution. However, these outages can last for hours or even days, leading to significant disruptions in accessing essential services such as drinking water, sanitation, the internet, and health care. This situation can increase insecurity, particularly for women, young girls, and PWD, adding further stress on women.

Indigenous communities face exclusion in cyclone shelters. They usually avoid shelters and instead take refuge in hills to protect themselves from cyclonic winds and storm surges.

**Physical accessibility:** Many cyclone shelters lack ramps or wide doors for wheelchairs; overcrowding pushes PwDs to the periphery or results in their being left behind in unsafe homes.

**EWS gaps:** Warning systems that rely solely on radio/voice communication overlook deaf people; those with cognitive disabilities may find complex warning flags confusing.

**Minority exclusion:** Indigenous/ethnic groups often avoid formal shelters due to fear of harassment, instead taking refuge in unsafe hillsides.

**Elderly frailty:** High winds and slippery approach roads make the "last mile" to the shelter a high-risk area for falls among the elderly.

Indigenous communities often reside in climate-sensitive regions and are heavily reliant on natural resources, making them more vulnerable to extreme weather events.

steeper slopes and unconsolidated rock in Southeast Bangladesh.

Additionally, anthropogenic stresses (fast urbanization, unsustainable land use, mining, hill cutting, foothill settlement development, rapid deforestation, traditional shifting farming practices, enormous population pressure from plain land, and other human-induced factors) are making landslides more intense, unpredictable, and deadly. Massive landslides damage multiple structures and roadways, sometimes causing human and economic casualties.

Deforestation leads to the destruction of watersheds in hilly regions, resulting in drying streams and springs. Traditional farming practices are changing, partly because of water scarcity caused by the drying of traditional sources called '*choras*'. As many streams and springs in Rangamati, Khagrachhari, and Bandarban districts have dried up, local residents are losing access to clean water.

Landslides damage infrastructure, disrupt communication, crop sales, healthcare, and education, impacting the economy. Displacement makes indigenous families more vulnerable and socially excluded, eroding or blocking access to assets.

These unfavorable circumstances worsen socioeconomic challenges, threaten livelihoods, health, and cultural practices. Remote areas often lack grid connection and face frequent power disruptions, depriving communities of many services.

#### Hazard Type: Sea Level Rise and Salinity (as a slow onset event)

Salinity damages roads, bridges, irrigation canals, and even concrete structures by accelerating corrosion. This drives up maintenance costs and shortens the lifespan of public infrastructure, putting an additional financial burden on local and national authorities.

Saline water can penetrate concrete, leading to corrosion of steel reinforcement and weakening structural integrity. Corrosion of metal parts, such as in bridges and pipelines, occurs rapidly in saline environments, increasing maintenance costs and safety risks. Salinity can damage road surfaces, leading to cracks and potholes, which require frequent repairs.

**Inadequate and poor drainage systems** can trap saline water around structures, increasing exposure.

Increased salinity in drinking water sources leads to health problems such as hypertension and kidney disease. In saline-prone areas, women face health hazards, especially related to reproductive health. A study by the International Centre for Diarrheal Disease Research, Bangladesh (ICDDR, B) found that women in saline-affected areas are more likely to develop high blood pressure during pregnancy, increasing maternal risks.

In many coastal villages, women and children walk kilometers daily to fetch drinkable water. Traditional ponds and tubewells are unsafe as the water is too salty. This scarcity of clean water causes physical and economic hardships for struggling families.

Economic stress from reduced agricultural output and displacement due to environmental changes can lead to mental health issues.

Loss of mangroves and wetlands reduces natural barriers against storms and flooding, increasing vulnerability to health hazards.

Salinity affects daily life significantly, causing a lack of safe drinking water, damaging agriculture, and threatening livelihoods. Waterlogging from sea-level rise and salinity intrusion can lead to nearly irreversible ecological damage.

**Health disparities:** While women face reproductive health issues, the elderly and PwDs face increased hypertension and kidney disease, with fewer resources to access saline-free specialized diets.

**Economic displacement:** Small-scale farmers with disabilities cannot easily pivot to shrimp farming (which requires significant capital), leading to total livelihood collapse.

**Child nutrition:** Salinity-driven crop failure leads to stunted growth in children from the poorest households who cannot afford imported 'sweet water' or food.

### Hazard Type: Drought, Heatwaves, and Water Stress

Drought harms crop production, worsens food insecurity, and makes household vegetable cultivation and livestock rearing difficult.

Increased usage of groundwater, due to a lack of surface water in the dry season, can lead to localized subsidence that can damage roads and railways.

Groundwater depletion leads to a lack of safe drinking water, especially in dry seasons, as tubewells become ineffective when water levels drop.

Sanitary hygiene is compromised, and common waterborne diseases (diarrhea, cholera, dysentery, skin infections) increase due to water shortages.

Bangladesh's flood-prone areas have embankments for protection, but breaches occur during floods in unprotected regions. People outside the embankment experience deliberate breaches intended to help the water recede and reduce flooding, often damaging infrastructure and increasing social cohesion issues.

Under current climate change scenarios, more days of extreme temperatures are expected, which will accelerate

Lack of safe drinking water and sanitation disrupts women's reproductive health.

Extreme daytime heat reduces open-air work hours, especially in agriculture. It increases women's time poverty, affecting household chores and outside work, whether unpaid family labor or paid day labor.

Water stress can cause conflicts within communities and families, often disfavoring women and girls during food shortages or social disputes.

**Physiological vulnerability:** The elderly and young children face higher risks of heatstroke; those with certain physical disabilities may have compromised thermoregulation.

**Education continuity:** Heat stress in poorly ventilated, tin-roofed schools leads to high absenteeism among children and adolescents.

**Water conflict:** Marginalized 'lower-caste' or ethnic minority groups are often the last to access community deep-set tube wells during periods of extreme water stress.

wear on road surfaces and railway materials (tracks, signals, etc.).

Urban areas in regions prone to drought face greater pressure on water supply systems, leading to shortages.

### Hazard type: Heat Island Effect and Waterlogging in Urban Settings

Climate change poses a risk to urban services due to population pressure. As climate displacement sends people to cities, unplanned densification strains available services.

Urban migration and poor squatters expand into urban fringes, especially into low-lying areas within natural drainage systems. Urban densification reduces natural water pathways, worsening drainage congestion.

Rising forced migration of the poor increases encroachment into the drainage system, worsening existing drainage issues.

Urban heat island effects pose health risks to city dwellers.

Both children and adolescents sometimes miss school due to heat stress.

Women are especially vulnerable to heavy rain and rely on male assistance to remain functional. Their mobility, and that of young girls, is further limited by rising transport costs in cities.

Lack of or inadequate access to safe drinking water and inaccessible sanitation facilities in urban slums, along with insufficient public sanitation options, pose significant health risks, especially to women, young girls and PwDs.

**Slum-dwellers' burden:** The urban poor, particularly PwDs and the elderly living in temporary houses, have no cooling options, leading to chronic respiratory and heat-related illness.

**Safety in the dark:** During power cuts, the lack of lighting in urban slums creates a 'no-go zone' for children and PwDs, increasing the risk of accidents and crime.

**Mobility costs:** Increased transport costs during waterlogging prevent PwDs from reaching vocational training or specialized healthcare centers in the city.

# Annex B: Making Social Infrastructure in Bangladesh Gender-Responsive, Socially-Inclusive and Climate-Resilient

Annex B presents impacts on different types of social and ancillary infrastructure, as determined in consultation with local communities. It presents climate adaptation measures either currently being implemented or recommended for implementation, alongside measures for the integration of GEDSI considerations throughout infrastructure planning and operations. These range from minimum compliance measures to those that enable the empowerment of marginalized groups and the transformation of social infrastructure to be more inclusive and resilient.

Reported Impacts on Infrastructure	Climate-adaptive Responses	Minimum compliance measures to integrate GEDSI considerations	Empowerment measures to integrate GEDSI considerations	Transformation measures to integrate GEDSI considerations
<b>Approach Roads</b>				
Infrastructure gets inundated Faces rain-cuts Damage to the top material/bitumen	Height adjustment of the plinth level (earth filling)  Use low-cost sensors for monitoring rain-cuts; post-monitoring refurbishment.  Invest in all-weather approach roads (transformative)	Well-lit.  Islands and sidewalks must be designated, accessible, and maintained without constrictions (for example, small shops, hawkers, auto rickshaws, cycle parking, etc., create constrictions).  Quiet spaces and critical turns on the approach roads can be marked.  The roads, especially the marked areas, should be provided with basic lighting (solar is preferred because in cyclone-prone areas, grid electricity disruption is quite common).	Roadside plantations have to be maintained so that they do not create any safety threat to women (especially young girls and girls with disabilities).	The local volunteers must be vigilant in these areas so that no sexual harassment occurs on the way to (and back from) the multipurpose cyclone shelter/any other hazard-avoidance centre.
<b>School Buildings</b>				
Compound gets/remains inundated	<i>Old structures:</i> adjust plinth height	Ensure school infrastructure supports the needs of all the users (including females).  Building design must ensure an abundance of natural light and gentle wind.	Design the building and its spaces so students can mingle during their free time. There should be enough space to sit and	Planning (site selection, design) begins with consultation with potential users, local

<p>WASH facilities get inundated</p> <p>Some are turned into flood/cyclone shelters;</p> <p>High-intensity wind blows away roofs or sidewalls</p> <p>Physical damage due to storm surge</p> <p>The entire structure is lost due to erosion</p>	<p><i>New structure:</i> adjust design criteria</p> <p>In the coastal zones and flood-susceptible upazilas, all primary-level schools should be built as multipurpose hurricane shelters, including a wash facility to avoid erosion-prone areas.</p>	<p>The entire complex must be well-lit (open spaces and adequate sunlight can serve this purpose).</p> <p>Prioritize access to safe water and sanitation. Installation of water filters to provide safe drinking water.</p> <p>Ensure that toilet facilities are safe and appropriate for all students, teachers, and staff.</p> <p>Separate toilets (sex-segregated sanitation facilities).</p> <p>In co-education schools, provide separate toilet blocks for male and female students. These should be set up on opposite sides of a building.</p> <p>Toilets must be well-lit and have running water.</p> <p>Cultural sensitivity and local customs must also be considered, e.g., toilets that are intended for use by Muslims should not face Mecca.</p> <p>Toilets should be close to classrooms, cubicle doors should open inwards, toilets should have covers, and facilities should have an appropriate ventilation system and regular maintenance.</p> <p>Open playgrounds and indoor play spaces must be available.</p>	<p>chat. There must be waste disposal systems in these spaces.</p> <p>Ensure adequate toilet facilities for every student.</p> <p>Ensure private baskets in the toilets so that women can dispose of sanitary napkins. Also include hooks on the toilet walls for students to hang their personal belongings.</p> <p>Sanitary napkin vending machines can be made available adjacent to the female toilets.</p> <p>There must be changing rooms, adjacent or within the toilet blocks.</p> <p>Install communications and electrical infrastructure, including solar power and internet connectivity.</p> <p>There must be adequate space and seating arrangements in the library and seminar rooms. All the rooms should be well-lit and accessible.</p> <p>Good to have an individual locker system.</p>	<p>communities, and parents.</p> <p>Separate arrangements for girls' and boys' play must be in place. They can play in a team. However, sometimes, separation is needed. Designated time slots (equally distributed among boys and girls) can be made available.</p>
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		<p>Availability of braille system education for persons with visual impairment. Utilize apps and software designed for communication with the deaf and hard of hearing. Explore assistive devices, such as hearing aids or cochlear implants, when appropriate.</p> <p>Regularly monitoring the suitability of the infrastructure (building, parking, furniture, energy, and other associated amenities related to infrastructure).</p>		
College & University Campus				
Compound gets/remains inundated	Adjust the height of the low-elevation compound.	All buildings and infrastructure within the college/university campus must be accessible to PwDs and elderly persons. There must be ramps and elevators for multi-storied infrastructure.	Toilets should have private baskets for sanitary napkins and hooks on the walls for personal belongings.	In a gymnasium, designated women's spaces for practice, washrooms, changing rooms, and lockers must be provided. The floor materials in the gymnasium's playing spaces must be non-slip.
WASH facilities get inundated	Adjust design criteria for new WASH facilities in hazard-susceptible areas.	Availability of Braille education for persons with visual impairments. Utilize apps and software designed for communication with the deaf and hard of hearing. Explore assistive devices, such as hearing aids or cochlear implants, when appropriate.	Sanitary napkin vending machines can be installed near the women's toilets.	Install electricity generators to provide power during power cuts, with a significant portion of energy sourced from solar power.
Some are turned into flood/cyclone shelters	In coastal zones, all new facilities must comply with the new design criteria to avoid storm surges and erosion hazards.	Provide separate toilet blocks for male and female students. These should be set up on opposite sides of a building. Ensure adequate toilet facilities for every student.	There must be changing rooms, adjacent or within the toilet blocks.	All entry, exit points, and common spaces must be well-lit. CCTV should be installed at all entry and exit points of all
Physical damage due to storm surge		Toilets must be well-lit and have running water.	For female teachers, designated toilets must include changing rooms and diaper-changing facilities.	
The entire structure is lost due to erosion		Installation of water filters to provide safe drinking water.	The playground should have changing room facilities with running water and light availability. Personal lockers for storing	

		<p>Design the building and its spaces so students can mingle during off/break times, with enough seating. There must be waste disposal systems in these spaces.</p> <p>There must be adequate space and seating arrangements in the library and seminar rooms. All rooms should be well-lit and accessible.</p> <p>There must be a designated, separate playground for female students with lighting facilities so they can play at night.</p> <p>There must be separate male and female student halls and dormitories, and they must be accessible to students with disabilities. Elevators are a must. The female students' dormitories must be close to teachers' quarters and some distance from the male dormitories. These sites must be away from highways; they must be designed so that female students can enjoy the openness, while still maintaining separation from the crowds outside.</p> <p>Cafeterias, cafes, and small food courts should be easily accessible. The wash blocks should be safe and accessible.</p> <p>The staircases must have strong handles and be of such height to prevent children from falling.</p> <p>Walking and bicycling must be encouraged. The roads, streets, and lanes just outside the campus must have islands and walkways.</p>	<p>private belongings must be there.</p> <p>There must be female doctors available in the university or college medical centers. The medical centers must be accessible. There should be separate waiting and resting rooms for male and female students and teachers. A vending machine for sanitary napkins should be available.</p> <p>Islands and walkways on streets must be well-lit. If there are dense trees along the streets, ensure the lighting is sufficient for safe mobility in the dark.</p> <p>Designated parking lot for bicycles and cars, with a separate or designated space for vehicles owned by the teachers. There should be a designated parking space for females in the bicycle parking lot. The parking lot must be well-lit, and this space must have CCTV installed.</p> <p>There must be an adequate number of mobile phone</p>	<p>infrastructure buildings.</p> <p>The Teachers Students' Centre must have a designated room for the University's Anti Sexual Harassment Committee (as the guideline provided by the High Court of Bangladesh), psychologist(s), students' advisors, and rehearsal rooms for different cultural groups. This center should be centrally located and close to the auditorium and other recreational infrastructure. This building must have notices on the walls and boards listing the hotline numbers for medical emergencies and sexual harassment complaints.</p> <p>Daycare centers can be located centrally or within faculties. All the features described under the 'day care' infrastructure type in</p>
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		<p>Banks and ATMs should be available on campus.</p> <p>The swimming pool must have separate designated time slots for male and female students, teachers, staff, and other users. There should be separate changing rooms, locker rooms, and washrooms. These rooms must be well-lit and accessible.</p>	charging stations across all campus infrastructure.	this section are relevant here.
<b>Open Space/Playground/Killa</b>				
<p>Playgrounds get inundated due to their low elevation.</p> <p>They remain waterlogged due to poor drainage.</p> <p>In coastal areas, salinity build-up prevents grass from surviving on playgrounds.</p>	<p>Height adjustment (earth filling).</p> <p>Re-define drainage (design criteria).</p> <p>[Very high co-benefit potential if turned into livestock relocation centres, known as <i>killas</i>, during hazards]</p>	<p>The process for prioritizing and selecting a public open space includes a comparative assessment based on four criteria:</p> <ol style="list-style-type: none"> <li>1. community benefit;</li> <li>2. gender and social inclusion;</li> <li>3. environment, climate vulnerability, and adaptation; and</li> <li>4. landownership.</li> </ol> <p>It is recommended that the local governments prepare a map of at least three public open spaces.</p> <p>Multidisciplinary, short-term experts in urban design, landscape, gender, universal access, sustainable infrastructure, and biodiversity are recommended to support the local governments.</p> <p>Useful to conduct a user survey and a non-user survey by age and income to understand the gendered experiences of abuse and harassment, and make assessments on the following:</p>	<p>Design streets to prioritize and provide safe and accessible pedestrian and cycling facilities, as well as mid-block and intersection crossings.</p> <p>Improve public transport connectivity and frequency (where feasible), open spaces, gender-responsive bus stops, and accessibility.</p> <p>Provide shaded pickup and drop-off points for public transport vehicles and cycle parking.</p> <p>Consider non-motorized transport-only streets for weekly markets and retail streets with high pedestrian footfall.</p> <p><i>For emergencies:</i> As part of first aid, an emergency kit</p>	<p>A comprehensive quality assessment of connectivity, walkability, safety, amenities and furniture, environment and heritage, and lighting should be conducted. It includes stakeholder engagement, assessments on connectivity and access, spatial context and mapping, existing climate change adaptation interventions, safety &amp; security, street furniture and amenities, universal gender responsive design, information and communications.</p>

		<ul style="list-style-type: none"> <li>• How active, secluded, or crowded is the public open space during the day and night?</li> <li>• Do men and boys dominate areas?</li> <li>• Are there any blind spots that make the public open space unsafe?</li> <li>• Is the public open space well-lit, or are there dark, hard-to-see corners in the evening and at night?</li> <li>• How safe is the access to public toilets and amenities?</li> </ul> <p>Include access ramps, anti-skid surfaces, maintain levelled footpaths, and ensure consistency of color and texture.</p>	<p>(including sanitary napkins and other first aid supplies) should be available. Information about the kit's location and the designated contact person should be displayed clearly so that every user can easily see and read it. For persons with visual impairment, this information should be provided in Braille at the park entrances.</p>	<p>The local governments should select a ward with the lowest public open space per capita in the city. If the ward does not have planned parks, gardens, or playgrounds, consider (a network of) underutilized or underdeveloped (public) land adjacent to public facilities and amenities, community pocket parks, streets (with a right-of-way less than 18 meters), non-motorized transport pathways, road junctions, lakefronts, waterfronts, historical places, and monuments.</p> <p>A well-developed communications strategy can lead to effective engagement with targeted stakeholders based on their tier, role, and contribution in different stages.</p>
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**Multipurpose Cyclone Shelters/Hazard Avoidance Centre**

<p>Cyclonic winds damage the structure.</p> <p>The entire structure is sometimes lost due to erosion.</p> <p>Sea level rise threatens long-term slow inundation.</p>	<p>Already incorporated a better design to suit the purposes.</p> <p>Local flood reference levels may be considered in the design criteria.</p>	<p>Approach roads must be paved (all-weather roads).</p> <p>The quiet places on the approach roads can be marked; the roads, and especially the marked places, should be provided with light connectivity (solar is preferred because in cyclone-prone areas, grid electricity disruption is common).</p> <p>Local volunteers must be vigilant in these areas to prevent sexual harassment on the way to and from the cyclone shelter or any other hazard-avoidance center.</p> <p>The cyclone shelters must be accessible to all. Ramps must be available to reach the first floor. The approach to the ramps must be paved, and the slope must be carefully designed to provide easy access.</p> <p>There must be separate toilets for men and women, preferably in two opposite directions. The toilets must be adequate in number for the people expected to use the shelter during an event. Toilets must be well-lit. Water availability and other cleanliness features must be present (liquid soap, tissue paper, hand wash, sanitary napkins, waste baskets, etc.).</p> <p>Toilets in cyclone shelters must be built on the first floor or above ground level. Toilets on the ground floor can become inoperable during cyclones and post-cyclones. At least one toilet must be accessible to people who use wheelchairs.</p>	<p>Islands must be designated and maintained without restrictions (for example: small shops/hawkers, auto rickshaws, cycle parking, etc.).</p> <p>Roadside plantations should be maintained so that they do not create any safety threat to women (especially young girls and girls with disabilities). Many plantations are located in remote areas, increasing vulnerability to crime and accidents.</p>	
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		<p>Designated 'women only' space must be facilitated with emergency health medicines and breastfeeding corners.</p> <p>Availability of lights and fans is fundamental, ideally with solar energy availability.</p> <p>Drinking water outlets must be located close to the designated women's area. Also, there should be more than one drinking water outlet so that at least one can be set up in areas where mostly men take shelter.</p> <p>An announcement with specific directions and information about the event's management and situation is very important. There must be designated spaces or kiosks for information. Announcement arrangements must be built in.</p> <p>Avoid glass fittings at the windows.</p> <p>The electrical switchboards must meet safety standards to prevent electrocution in shelters during floods or cyclones.</p>		
<b>Embankment/Protective Infrastructures</b>				
<p>They erode as they face higher-intensity wave energy.</p> <p>Sometimes they get inundated due to rising water levels.</p>	<p>Extremely important life, livelihoods, and asset-saving infrastructure.</p> <p><i>Long-term:</i> Both design and material selection should be done scientifically.</p>	<p>Women must participate in the planning phase.</p> <p>Employment creation during construction (locally recruited women as unskilled labour).</p> <p>The construction plan must ensure suitable equipment and facilities for women workers (for example, appropriate welding jackets and glasses, safety jackets, carts to replace head</p>		<p>Embankment width is vital for community mobility. Local government, with BWDB or LGED when suitable, may also develop riverside</p>

<p>The earthen infrastructure gets washed off due to the cyclonic surge.</p>	<p><i>Short/medium term:</i> Crest height adjustment and slope protection to be initiated (even to go back to a 1-in-20-year flood frequency level, considering climate change).</p> <p>[<i>Enabling:</i> The prevailing governance failure must be addressed. Increased contingency allocations are required and need to be mobilised by the authority.]</p>	<p>loads, separate shades, and separate sanitary facilities).</p> <p>Women's representation in the management and monitoring committees of infrastructure.</p> <p>To get on a boat from the embankment side, the slopes must be gentle, and the stairs must be suited to women, children, the elderly, and PwDs.</p>		<p>recreational areas with seating.</p>
<b>Community Latrines/Sanitation</b>				
<p>Gets inundated by floodwater.</p> <p>High-intensity wind may damage the roof and blow it away.</p> <p>Water supply gets disrupted following the hazard.</p>	<p>Height adjustment.</p> <p>Ramp with slope adjustment.</p> <p>Choices of building materials.</p> <p>Linking supply with the current ongoing piped water supply programme of DPHE.</p>	<p>Every public toilet must have a separate space and arrangements for women and girls. These spaces must be accessible to PwDs.</p> <p>The entry points for males and females can be placed in opposite directions. The toilets must face in a direction that aligns with cultural practices and religious beliefs.</p> <p>The sites of the public toilets must not be far away from the crowd's area. The privacy issues must be carefully designed; however, safety comes first.</p>	<p>The approach road(s) should be well-connected and incorporate universal accessibility features.</p> <p>For children, sanitation facilities must be suited to their height (e.g., commodes and washing facilities). There must be diaper-changing facilities in the WASH block.</p>	<p>Braille signage.</p> <p>Some facilities have audio instructions or alarms to assist users. Asking for help from staff or other patrons.</p> <p>There are mobile applications designed to help locate accessible restrooms and provide navigation assistance.</p>

		<p>Visual signs should clearly indicate the separation of the toilets.</p> <p>At least one toilet within the complex must have accessibility features. Many public restrooms are equipped with accessibility features, such as ramps for wheelchair users and tactile door indicators.</p> <p>Availability of running water, push showers, tissues, liquid soap, mirrors, hooks on the wall, and a waste-dumping basket will help maintain hygiene and cleanliness.</p> <p>Public toilets must be well-lit.</p> <p>The supplies required for the toilets (as mentioned above, but not limited to) must be included in the maintenance contracts.</p> <p>Employ women workers to clean and maintain the public toilet infrastructure.</p> <p>Notices for users describing the directives for using the toilets must be included.</p>		
Stadia				
<p>Only minor damage.</p> <p>The approach roads are generally inundated or waterlogged.</p>	<p>New design criteria should be set to make the structure adaptive.</p>	<p>Ensure every entry and exit point is accessible to women, children, the elderly, and PwDs. Each of these points must be well-lit.</p> <p>Provide separate toilet blocks for males and females. These should be set up on opposite sides of a building.</p> <p>Visual signs should indicate the separation of the toilets. Vending machines for sanitary napkins can be made available adjacent to</p>	<p>There should be cafeterias or food courts adjacent to or within stadium complexes.</p> <p>Emergency kits, including sanitary napkins and other first-aid supplies, must be readily available for immediate assistance. Their location and emergency contact points</p>	<p>Many public restrooms are equipped with accessibility features, such as ramps for wheelchair users, tactile door indicators, and Braille signage. Some facilities have audio instructions or alarms to assist users.</p>

		<p>the female toilets, along with other standard sanitary features.</p> <p>There must be changing rooms, adjacent or within the toilet blocks. Male and female players' changing rooms and locker rooms must have separate, designated spaces.</p> <p>The seating arrangements for spectators should provide adequate legroom. In addition to the general spaces accessible to men and women, there should be designated seating for women.</p>	<p>should be displayed, easily accessible, and visible to all users. This vital information must also be made available in Braille at all entry points for individuals with visual impairments.</p>	<p>There are mobile applications designed to help locate accessible restrooms and provide navigation assistance.</p>
<b>Community Centres/Auditorium/Theaters</b>				
<p>Compound gets or remains inundated.</p> <p>WASH facilities get inundated.</p> <p>Physical damage due to storm surge.</p> <p>The entire structure is lost due to erosion (low probability).</p>	<p>Municipalities and LGED should develop, based on urban centre categories, design criteria that guide automatic selection, including flood-avoiding plinth height, WASH facilities, building materials, locational direction, etc.</p>	<p>All entry points must have accessibility features and CCTV (installed and functional).</p> <p>All entry and exit points must be well-lit.</p> <p>Separate green room for male and female artists.</p> <p>If the theater hall needs to be darkened for the performance, there must be an allowable lumens limit to ensure the safety of women and girls.</p> <p>When available, separate prayer spaces.</p> <p>AC can be installed; otherwise, adequate wind flow must be present.</p> <p>Separate wash blocks must have all the safety, accessibility, and service features as described in other sections.</p> <p>The auditorium must be well-connected to public transportation.</p>	<p>Food courts with lighting and safety can be provided outside or within the theater premises.</p> <p>Emergency kits, including sanitary napkins and other first-aid supplies, must be readily available for immediate assistance. Their location and emergency contact points should be displayed, easily accessible, and visible to all users. This vital information must also be made available in Braille at all entry points for individuals with visual impairments.</p>	<p>Accessibility features are multi-layered and respond to needs assessments for different types of PwDs, and the construction designs are made accordingly.</p>

		If parking facilities are available, see the features described in the parking section.		
<b>Food Grain Silo</b>				
Occasionally gets inundated or remains underwater.	The plinth height needs to be adjusted to avoid inundation.	The approach roads to the silos must be paved. The charging rates for the space must be clearly stated on notice boards in large fonts so they can be easily read outside the silo.	Clear instructions for priority access for women, the elderly, and PwDs at cash counters should be prominently displayed.	Digitization of the stored products and their traceability.
Physical damage occurs during storm surges.	The floor must be dry and damp-proof.	The silo must be well-lit and must have a system with designated areas that include the names and identification of the stored products and the producers. Product specifications are important for traceability.	Easy-to-use carts to carry products must be available.	
Slow-onset hazards damage the infrastructure (very low frequency).	Dehumidifiers are installed and functional (where appropriate).	The color of the product bags and sacks of the women growers can be a designated color to help identify the product easily, and the waiting time for women producers to release their products will be shorter.		
		The weighing machine must be set in an open place where transparency can be ensured.		
		Separate washroom facilities outside the silo, with cleanliness, accessibility, and safety features.		
<b>Mosque/Temple/Churches</b>				
The compound and the approach roads generally remain underwater during high floods.	As these are religious infrastructures, design criteria might be imposed to ensure quality service. A minimum set of guidelines	A certain percentage of the religious infrastructure can be designed to serve as a protective shelter during hazards and extreme weather events. In these cases, the spaces for women and men must be designated in accordance with religious guidelines.	Availability of a breastfeeding corner.	Place the sanitary facilities so that passersby, men and women (including those with varying religious beliefs), can use them.
Cyclonic wind blows away the			Availability of seating arrangements or chairs for the elderly, sick, pregnant women, and PwDs	

structure (particularly for kutcha mosques).

Surges cause physical damage to infrastructure.

may be developed with the appropriate authority.

Entry points should be separate for women. Ensure easy, barrier-free access at entry points for women, children, the elderly, and PwDs.

The privacy of users of the infrastructure must be maintained. All entry points and seating areas must be well-lit (in accordance with the sanctity of religious norms).

Drinking water availability and sanitation facilities for women, PwDs, and the elderly must be carefully designed in a separate, designated area. Directions for using the toilet and washroom facilities must be posted in the areas to maintain hygiene and cleanliness. The font of the directives should be easily readable. Photo cards also work.

Separate 'Ozu Khana' facilities (space for maintaining cleanliness before prayers) for both men and women should be available.

A designated space for prayers for women.

The stairs of the mosques must be suitable for the elderly, children, and PwDs.

**Office buildings/City Halls/Local Government Office (Parishad) Buildings**

Occasionally gets inundated and remains underwater.	In highly hazard-prone areas, inundation-avoiding design may be developed for new infrastructure, while the plinth height of existing buildings and their WASH	Ensure safety, barrier-free access, and facilities for women, the elderly, children, and PwDs across all infrastructure types.  Installation of CCTV in every entry and exit point. The privacy of users of the infrastructure must be maintained.	Washrooms must have a 24/7 water supply, be clean, have soap, private waste disposal baskets, and hooks for keeping bags and mobile phones.  Sanitation facilities for children should be	The daycare center's toilet facilities must cater to children's needs, including toilet heights, changing rooms, a breastfeeding area, diaper-changing spaces, and
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<p>Slow-onset hazards damage the infrastructure (very low frequency).</p> <p>The entire structure may be eroded (low probability).</p>	<p>facilities may be adjusted.</p> <p>When choosing building materials for new buildings, consider climate hazards.</p>	<p>All entry points and seating areas must be well-lit.</p> <p>Designated waiting rooms are needed, with potential separate spaces for men and women based on usage. These rooms must include fans and lights.</p> <p>Day care centres, as per the Day Care Centre Act 2021, must be designed safely within government offices, equipped with proper facilities, and include child-friendly toilet facilities. Room lighting should be attractive to children, and charges must be clearly displayed on notice boards at entry points.</p> <p>Drinking water and sanitation facilities for women, PwDs, and the elderly should be well-designed, possibly in separate areas, with distinct toilets and washrooms for men and women.</p> <p>Fire safety measures must be in place. The stairs must be designed in accordance with the house building code.</p>	<p>appropriate for their height, including commodes and washing areas. Diaper changing facilities must also be included in the WASH block.</p> <p>To ensure the safety of kids in day care centres, CCTV must be installed and operational, covering entry points, archways, key areas, and adjacent areas of the centre.</p> <p>Separate prayer spaces for women must be designated in large buildings.</p> <p>Emergency management spaces for medical and fire accidents must be included. If the building is above the first floor, a lift should be installed.</p>	<p>bathrooms. Window locks and handles should be secure. Electrical switchboards should be out of children's reach and of high quality to prevent electrocution. Sturdy handrails on nearby staircases are necessary to prevent falls.</p> <p>A metal detector can be installed in entry points and archways.</p> <p>An emergency kit, including sanitary napkins and first aid supplies, should be easily accessible, with clear information on its location and emergency contact details. For visually impaired individuals, this information should be available in Braille at entry points.</p> <p>Separate changing room facilities for both men and women should be available.</p>
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				<p>Washroom usage instructions for hygiene must be displayed inside the facilities in an easily readable font. Photo cards can also be effective.</p> <p>Availability of the breastfeeding corner.</p> <p>All service areas, including wash blocks, must be accessible to PwDs.</p> <p>A designated space for prayers (and a designated separate space for women) should be provided.</p>
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Health Care Centres (HCC)/Hospital/Clinics

<p>Occasionally gets inundated and remains underwater.</p> <p>Physical damage occurs during storm surges.</p> <p>Cyclonic winds may blow away smaller units in coastal zones.</p> <p>Slow-onset hazards damage the infrastructure (very low frequency).</p> <p>The entire structure may be eroded (low probability).</p>	<p>In highly hazard-prone areas, inundation-avoiding design may be developed for new infrastructure, while the plinth height of existing buildings and their WASH facilities may be adjusted.</p> <p>When choosing building materials for new buildings, consider climate hazards.</p> <p>Avoidance of erosion-prone locations.</p>	<p><b>Primary Health Care Centres (PHCs)</b>  In Bangladesh, these are mostly in rented houses or spaces. The house must be centrally located in a community. If a house does not originally have accessibility features, enter into a contract with the homeowner to have accessibility features added at the government's expense.</p> <p>The PHCs must have waiting rooms for mothers with children, with fans and lights. Designated washrooms, changing rooms, and breastfeeding corners must be posted on a notice board or poster at the center's entry.</p> <p>The center must have posters with awareness messages on primary health care, vaccination, pregnancy, and reproductive health.</p> <p>Regular on-shelf medicines must be available with a clear price list.</p> <p>At least two beds must be available for any emergency.</p> <p><b>Hospitals with fewer than 50 beds</b>  Entry and exit points must be accessible and well-lit.</p> <p>The emergency service area is at the entry point. The ticket counter is very close to the emergency area.</p> <p>The emergency area must have curtains or dividers for female patients during examinations.</p>	<p><b>Primary Health Care Centres</b>  The PHCs must have links with local midwifery services, and associated logistics must be available and maintained.</p> <p>An emergency kit containing sanitary napkins and first-aid supplies should be readily accessible. Information about its location and emergency contacts must be clearly visible. For visually impaired individuals, the information should be provided in Braille at entry points.</p> <p><b>Hospitals with fewer than 50 beds</b>  All the features of under 50-bed hospitals, plus the additional features recommended below:</p> <p>Sanitation facilities for children should be child-height, including commodes and washing areas. Diaper changing facilities should also be included in the WASH block.</p> <p>Post clear, readable instructions for toilet or</p>	
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The admission ticket must have a queue number, which will be displayed electronically on a screen while the patient waits in the designated area.

The doctors' chambers must be marked with directions, and this must be displayed on a large TV screen along with other information (specialization, availability, room number, visiting hours, fees, etc.). The TV screen must be centrally located on each floor.

Escalators and elevators (stretcher lift and passenger lift).

An emergency kit containing sanitary napkins and first-aid supplies should be readily accessible. Information about its location and emergency contacts must be clearly visible. For visually impaired individuals, the information should be provided in Braille at entry points.

Good hospital pharmacy; consider handing over to private investors to improve efficiency, under the oversight of the hospital authority.

Designated test and diagnostic areas with adequate seating and lighting facilities. Each floor must have a drinking water dispenser.

Emergency numbers, such as police hotlines, should be hung up at regular intervals.

Adequate parking space (see the parking section for details).

<b>Parks/Recreational Space/Zoos</b>				
<p>Inundation and waterlogging occurs due to flooding and storm surges.</p> <p>Slow-onset hazards threaten infrastructure (low frequency).</p>	<p>Design of parks should take into account local inundation reference levels. Natural drainage paths should be kept open (not obstructed) to facilitate drainage.</p>	<p>Ensure barrier-free access at all entry points. Install CCTV at all entrances while maintaining data privacy. All entry and exit points, rides, and seating areas must be well-lit.</p> <p>Drinking water and sanitation facilities should be designed with women, PwDs, and the elderly in mind, and should include clear signage.</p>	<p>An emergency kit containing sanitary napkins and first-aid supplies should be readily accessible. Information about its location and emergency contacts must be clearly visible. For visually impaired individuals, the information</p>	<p>Facilities for PwDs must be tailored to their specific needs, requiring knowledge, investment, and appropriate norms.</p> <p>Changing room facilities should be</p>

		<p>To maintain hygiene, keep toilet directions inside the facilities. Use easily readable fonts or photo cards.</p> <p>All service areas, including wash blocks, must be accessible to PWDs.</p> <p>The planning of parks and open spaces should focus on selecting and placing trees to provide shade, fragrance, and aesthetic appeal while ensuring they do not pose any safety risks.</p>	<p>should be provided in Braille at entry points.</p> <p>Billboards, notices, and announcements should be placed with messages to protect women and children from trafficking, harassment, mugging, extortion, drug usage, and other violence.</p> <p>Parks should have a designated area specifically for girls' and women's recreational activities.</p>	<p>available separately for men and women.</p> <p>Availability of a breastfeeding corner.</p> <p>Based on usage patterns, open spaces and parks should have designated areas for community-led freehand exercises. The timing and locations for these sessions can be communicated via hanging notices.</p>
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**Common Market Places/Kitchen Markets**

<p>Compound gets and remains inundated.</p> <p>WASH facilities get inundated.</p> <p>Physical damage due to storm surge.</p> <p>The entire structure is lost due to erosion (moderate frequency).</p>	<p>In hazard-prone areas, new infrastructure should be designed to avoid inundation, and existing buildings may need adjustments to plinth height and WASH facilities.</p> <p>The choice of building materials for new constructions must consider climate hazards.</p>	<p>Designated seating areas for women producers/sellers in kitchen markets should be centrally located to ensure easy access for buyers. These spots must include shade to protect against heat and rain.</p> <p>The designated space for women sellers must have a concrete base (with an elevation to avoid rainfall and flood-induced waterlogging).</p> <p>For markets that are open at night, all entry and exit points are provided with lights and CCTV. Energy supply may come, at least partially, from solar energy to ensure uninterrupted lighting.</p> <p>Supply water in the markets to ensure drinking water availability.</p>	<p>The chilling center for dairy should be conveniently located for women, ensuring safety and accessibility. As the number of women employed in this sector increases, the centers must include a payment counter. Also, the quality-control instruments should be visible to women producers and clients. Additionally, there should be a seating area outside the counter for women, the elderly, and PwDs.</p> <p>For children, sanitation facilities must be suited to</p>	<p>An emergency kit containing sanitary napkins and first-aid supplies should be readily accessible. Information about its location and emergency contacts must be clearly visible. For visually impaired individuals, the information should be provided in Braille at entry points.</p> <p>Separate changing room facilities should be provided for both men and women.</p>
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	<p>Avoidance of erosion-prone locations.</p>	<p>Sanitation facilities for women, PwDs, and the elderly must be carefully designed in a separate designated area. The facade of these facilities must follow the religious and cultural practices.</p> <p>To maintain hygiene, keep toilet directions inside the facilities. Use easily readable fonts or photo cards.</p> <p>Washrooms must have a 24/7 water supply, be clean, include soap, have private waste disposal bins, and provide hooks for personal items.</p> <p>A designated space for prayers (and a designated separate space for women) should be provided.</p> <p>Billboards feature messages encouraging women producers and entrepreneurs to become members of local business associations and to contact safety and security officials.</p>	<p>their height (e.g., commodes and washing facilities). There must be diaper-changing facilities in that WASH block.</p> <p>Availability of a breastfeeding corner.</p> <p>For inclusion in the Lease Contract (who will be managing the market): Ensure regular operation and maintenance, and maintain safety and hygiene.</p> <p>Ensure the availability of drinking and running water, as well as other facilities (soap, bucket, basket, and other amenities mentioned above).</p> <p>Employ women to manage and maintain women's toilets.</p> <p>Billboards and posters must display emergency helplines (999/109) and raise awareness about theft, trafficking, and sexual harassment.</p>	<p>There should be a designated kiosk where women entrepreneurs will have priority access to information and available services on tax, fees, VAT, and other financial rules.</p>
<b>Mall/Structured (pucca) Markets</b>				
Occasionally gets inundated and	As these are private infrastructures, the municipality may	All entry and exit points must have accessibility features (ramps, escalators, elevators, etc.), and CCTV must be	Billboards feature messages encouraging women producers and	

<p>remains underwater.</p> <p>Physical damage occurs during storm surges.</p> <p>Slow-onset hazards damage the infrastructure (very low frequency).</p> <p>The entire structure may be eroded (low probability).</p>	<p>circulate a generic guideline on the plinth height for inundation avoidance. Guidance on construction material to make the structure robust, locations to avoid erosion, etc.</p>	<p>operational, covering the entire market, except inside the toilets.</p> <p>Separate toilet blocks for women and men (preferably on different floors, depending on the market's size). The facade of these facilities must follow the religious and cultural practices.</p> <p>For children, sanitation facilities must be suited to their height (e.g., commodes and washing facilities). There must be diaper-changing facilities in the WASH block.</p> <p>Washrooms must have a 24/7 water supply, be clean, include soap, have private waste disposal bins, and provide hooks for personal items.</p> <p>An emergency kit containing sanitary napkins and first-aid supplies should be readily accessible. Information about its location and emergency contacts must be clearly visible. For visually impaired individuals, the information should be provided in Braille at entry points.</p> <p>Availability of the breastfeeding corner.</p> <p>Adequate seating and open spaces.</p> <p>A designated space for prayers (and a designated separate space for women) should be provided.</p>	<p>entrepreneurs to become members of local business associations and to contact safety and security officials.</p> <p>There should be a designated kiosk where women entrepreneurs will have priority access to information and available services on taxes, fees, VAT, and other financial rules.</p> <p>For inclusion in the Lease Contract (who will be managing the market): Ensure regular operation and maintenance, and maintain safety and hygiene. Ensure the availability of drinking and running water, as well as other facilities (soap, bucket, basket, and other amenities mentioned above).</p> <p>Employ women to manage and maintain women's toilets.</p> <p>Posters (with visual cues) are placed in common areas with instructions on how to use the toilets. Billboards and posters must display emergency</p>	
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			helplines (999/109) and raise awareness about theft, trafficking, and sexual harassment.	
<b>Drainage structures (sluice gates/regulators)</b>				
Silt deposits following a storm surge make the infrastructure inoperable.  Sometimes eroded.  Salinity in water leads to corrosion.	Metal treatment to reduce corrosivity against salinity.  Contingency mobilization for silt removal.		Maintenance and regulation of the sluice gates are critical for proper functioning. Local women (individual or groups) can be employed to maintain this infrastructure.	
<b>Community water assets</b>				
Low flow and dry periods reduce water volume.  Floods and storm surges bring contaminated water, which degrades water quality.  The storm brings in silt, raising the bed level.  Salinity is a cause of concern for water quality.	Desilting to increase the water draft.  When possible, lift the bank height so that floodwater does not penetrate.  Promote the integrated use of groundwater and surface water for irrigation.  Water conservation investments (i.e., buried pipelines for distribution).  Conjunctive use of both groundwater	The planning must begin with consultation at the local level. Women in the communities must be involved in site selection, design (if any structure is suggested), construction, and maintenance. Any effort to re-excavate ponds or canals must consult the local communities (men and women, marginalized groups) before initiating the work. Local women and men can be employed in re-excavation.  Local Water Management Groups (WMGs) set by the Bangladesh Water Development Board must be active.  Bank protection and vegetation around the pond or canal can be planned and done by women in the community.  The use of the pond and canal should be determined in consultation with local		

<p>Water stress makes irrigation difficult.</p> <p>Larger deep tubewells (DTW) become inoperable.</p> <p>The groundwater level goes below the DTW suction head during peak dry periods.</p>	<p>and surface water (where possible).</p> <p>Further investment towards Department of Public Health Engineering-led micro-scale piped water supply schemes.</p>	<p>communities. Specific activities, such as fish cultivation, irrigation, drinking, and washing, require tailored maintenance and infrastructure. For instance, bathing necessitates concrete stairs and platforms. When water bodies are public property, the community, especially women, should play a key role in deciding their usage.</p>		
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**Pond Sand Filters, Rainwater harvesters**

<p>Water stress reduces water availability from the pond, making the PSFs inoperable.</p> <p>Storm surge increases salinity in pond water.</p>	<p>Enabling: water governance, community-based O&amp;M.</p>	<p>Planning should start with local consultations that involve women in site selection, design, construction, and maintenance. Discuss the benefits and challenges of community-led drinking water systems before construction, and find ways to address these challenges throughout the infrastructure lifecycle.</p> <p>The site must be within a 10-minute walk of the households.</p> <p>The base of the filters must be concrete-based. If the tubewell is set on a higher platform, the stairs to reach that platform must have a gentle slope.</p>	<p>The revenue-generating plan must be approved by the users, especially the local women. A management committee (with a majority of members being women, including women members of the Union Parishad) must be set up at an early stage of the project. Accordingly, the revenue can be collected by a community women's group (as part of the management committee). The Union Parishad's women members will be responsible for looking after this.</p>	
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**Green space/parks**

<p>Generally remains underwater during high floods.</p>	<p>Landscaping above local reference flood levels.</p>	<p>Provide shaded pickup and drop-off points for paratransit vehicles and cycle parking.</p> <p>Ensure barrier-free access to all the entry points. There can be designated entry points for women, PwDs, and the elderly.</p> <p>Drinking water availability and sanitation facilities for women, PwDs, and the elderly must be carefully designed, maybe in a separate designated area.</p> <p>Washrooms must have a 24/7 water supply, be clean, include soap, have private waste disposal bins, and provide hooks for personal items.</p> <p>To maintain hygiene, keep toilet directions inside the facilities. Use easily readable fonts or photo cards.</p> <p>Billboards, notices, and announcements should be placed and functional with messages against women and children trafficking, harassment, mugging, extortion, drug usage, and other violence.</p> <p>Parks must have a designated space for girls'/women's play.</p>	<p>Include access ramps, anti-skid surfaces, maintain levelled footpaths, and ensure consistency of color and texture.</p> <p>CCTV should be installed at all entry points, and the privacy of the data must be maintained.</p> <p>Each entry and exit point, and seating area, must be well-lit.</p> <p>For children, sanitation facilities must be suited to their height (e.g., commodes and washing facilities). There must be diaper-changing facilities in the WASH block.</p> <p>Based on usage patterns, open spaces and parks should have designated areas for community-led freehand exercises. The timing and locations for these sessions can be communicated via hanging notices.</p>	<p>An emergency kit containing sanitary napkins and first-aid supplies should be readily accessible. Information about its location and emergency contacts must be clearly visible. For visually impaired individuals, the information should be provided in Braille at entry points.</p> <p>Separate changing room facilities should be provided for both men and women.</p> <p>Availability of a breastfeeding corner.</p> <p>All the service areas, including wash blocks, must be accessible to PwDs.</p> <p>The planning of parks and open spaces should focus on selecting and placing trees to provide shade, fragrance, and aesthetic appeal while ensuring they do not pose any safety risks.</p>
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**Graveyards**

<p>Generally remains underwater during high floods.</p>	<p>Landscaping, approach roads above local reference flood levels.</p>	<p>There must be separate prayer rooms or spaces for women and men.</p> <p>Ensure barrier-free access to all the entry points. There can be designated entry points for women, PwDs, and the elderly.</p> <p>Drinking water availability and sanitation facilities for women, PwDs, and the elderly must be carefully designed, and may be in a separate designated area.</p> <p>'Ozu Khana' (a place to wash before prayers) must be available in separately designated spaces.</p>	<p>For children, sanitation facilities must be suited to their height (e.g., commodes and washing facilities). There must be diaper-changing facilities in the WASH block.</p> <p>Washrooms must have a 24/7 water supply, be clean, include soap, have private waste disposal bins, and provide hooks for personal items.</p> <p>To maintain hygiene, keep toilet directions inside the facilities. Use easily readable fonts or photo cards.</p> <p>All the service areas, including wash blocks, must be accessible to PwDs.</p>	<p>The planning of parks and open spaces should focus on selecting and placing trees to provide shade, fragrance, and aesthetic appeal while ensuring they do not pose any safety risks.</p> <p>Seating arrangements for prayers or waiting should be available for women, children, the elderly, and PwDs.</p>
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**Solid waste dumping stations**

<p>The compound and the approach roads generally remain underwater during high floods.</p>	<p>Landscaping, approach roads above local reference flood levels.</p>	<p>Increased awareness among homemakers and children regarding waste segregation and the proper procedures for waste disposal.</p> <p>Women's involvement is essential in waste management decision-making, planning, execution, and monitoring.</p>		<p>The disposal outlets must be closer to households (in rural areas). In cities, waste is collected by municipal workers.</p> <p>The waste disposal points must be clean and maintained in accordance with</p>
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environmental  
standards.

# Annex C: Making Transport Infrastructure in Bangladesh Gender-Responsive, Socially-Inclusive and Climate-Resilient

Reported Impacts on Infrastructure	Climate-adaptive Responses	Minimum compliance measures to integrate GEDSI considerations	Empowerment measures to integrate GEDSI considerations	Transformation measures to integrate GEDSI considerations
<b>Roads</b>				
<p>Rain-cut, overflow &amp; physical damage.</p> <p>Sideways erosion.</p>	<p>Higher elevation (design).</p> <p>Management, services, and maintenance (regular and post-hazard), and repair and protection.</p> <p>Drainage (design).</p> <p>Crest height adjustment (design).</p> <p>All weather roads (where possible).</p> <p>Contingency budget for immediate maintenance works.</p>	<p>Proper design of accessible foot paths (most regional and approach roads in cities outside Dhaka lack footpaths, even near social infrastructure) and footbridges (accessible for the elderly and PWDs).</p> <p>Proper lighting along streets, major roads, footpaths, and bus stops. Properly lit roads with appropriate markings, maps, and display of names and directions.</p> <p>Proper lighting and CCTV surveillance in subways and public transport stops.</p> <p>Availability of public washrooms for women at bus stops and at regular intervals on the highway.</p> <p>Barrier-free, accessible toilets for women, senior citizens, and PwDs.</p> <p>Signboards are posted every 2-3 km indicating the location of public toilets. Ensure proper planning and implementation for the cleanliness and maintenance of the washroom.</p>	<p>Rejuvenation of isolated areas often used by women and young girls.</p> <p>Provision of emergency buttons or public telephone booths, rest areas, and public transport.</p> <p>Start a 24-hour helpline as a critical step toward women's safety.</p> <p>Special washrooms and essential facilities for physically disabled women, senior citizens, and child- and baby-friendly toilet seats.</p> <p>Provision of amenities like water, a bucket, a washbasin, soap, and a dustbin.</p>	<p>The slope of the foot landing over bridges must be carefully designed.</p> <p>Land is scarce in Bangladesh, with around 60% of the Roads and Highways Department (RHD) project costs going to land acquisition, making it challenging to build restrooms at intervals. Inviting private investors to invest in restrooms and food courts, in linewith RHD guidelines, could be beneficial. The Government of Bangladesh could offer tax incentives for these private investments.</p>

		Engagement of the Labor Contracting Society, the model by LGED to maintain the rural roads by local women's groups.		
Bus Bays				
<p>Overflow and damage; erosion.</p> <p>Approach road inundated.</p> <p>Cyclonic wind damages a corrugated iron sheet-based roof.</p>	<p>Higher elevation (design).</p> <p>Site selection for new infrastructure (design).</p> <p>Management, services, and maintenance (regular and post-hazard), and repair and protection.</p> <p>Strengthening.</p> <p>Structural adjustment (design).</p> <p>Selection of building material (discouraging corrugated iron sheets on the rooftop).</p>	<p><i>Design</i></p> <p>Separate bays for local and regional routes streamline operations and minimize delays. Careful design of the bay arrangements is optimized to facilitate smoother bus movements and quicker turnarounds. Clearly defined bays help drivers and passengers navigate the terminal without confusion.</p> <p>Clear directional signage enhances passenger movement and reduces congestion.</p> <p><i>Terminal Amenities</i></p> <p>Providing seating and waiting areas enhances passenger comfort.</p> <p>Provide shades, fans, and lights in the seating areas.</p> <p>Clean, accessible restroom facilities (with proper lighting and other amenities) are fundamental.</p> <p><i>Safety Measures</i></p> <p>Strategic lighting enhances visibility and deters criminal activity.</p> <p>CCTV systems increase safety by monitoring activities within the terminal.</p>	<p>Electronic schedules and route maps on the information display boards help passengers plan their journeys.</p> <p><i>Accessibility Features</i></p> <p>Installing ramps ensures wheelchair access throughout the terminal.</p> <p>Guidance paths (tactile paths) help visually impaired passengers navigate independently.</p> <p>Providing information in Braille assists persons with vision impairments.</p> <p>Properly placed emergency facilities and services can handle unexpected incidents effectively.</p>	<p>Adequate space is essential for queues without obstructing passenger flow.</p> <p>Thoughtful bay design helps handle peak passenger volumes effectively.</p>

		Properly positioning emergency facilities and services can effectively manage unexpected incidents.		
<b>Minibus/Tempo Station/Stand</b>				
Overflow and damage.	Higher elevation (design).	Careful design of the stand arrangements is optimized to facilitate smoother movement of minibuses and small vans and to enable quicker turnarounds.	Adequate space is essential for queues without obstructing passenger flow.	Electronic schedules and route maps on the information display boards help passengers plan their journeys.
Erosion.	Site selection for new infrastructure (design).			
Approach road inundated.	Management, services, and maintenance (regular and post-hazard), and repair and protection.	Clearly defined spaces in and around the stand help drivers and passengers navigate the terminal without confusion.	Clear directional signage enhances passenger movement and reduces congestion.	Adequate placement of emergency facilities/ services can handle unexpected incidents
	Strengthening.	Providing seating and waiting areas with shades, fans, and lights enhances passenger comfort.	Provide separate ticket counters for women, the elderly, and PwDs.	
	Structural adjustment (design).	Clean, accessible restroom facilities (with proper lighting and other amenities) are fundamental.	Guidance paths (tactile paths) help visually impaired passengers navigate independently.	
	Selection of building material (discouraging corrugated iron sheets on the rooftop).	Strategic lighting enhances visibility and deters criminal activity.	Providing information in Braille assists persons with vision impairments.	
		CCTV systems increase safety by monitoring activities within the terminal.		
		Installing ramps ensures wheelchair access throughout the terminal.		
<b>Truck/Smaller Van Stands</b>				
Overflow and damage.	Higher elevation (design).	Women's lounges and dedicated parking areas for female drivers.		
Erosion.	Site selection for new infrastructure (design).	Enhanced lighting, security features, and well-maintained facilities.		
Approach road inundated.	Management, services, and maintenance (regular			

	<p>and post-hazard), and repair and protection.</p> <p>Strengthening.</p> <p>Structural adjustment (design).</p> <p>Selection of building material (discouraging corrugated iron sheets on the rooftop).</p>	<p>Separate toilets and bathrooms for women and men drivers, employees, entrepreneurs, and users.</p> <p>Easy access to restrooms, showers, and dining options for women, the elderly, and PwDs.</p>		
<b>Railway assets (stations and tracks)</b>				
<p>Approach road &amp; parking lot inundated or waterlogged.</p> <p>Skirt of the protective layer eroded.</p> <p>Ambient temperature rise of tracks during heat stress.</p> <p>Derailment of a rail coach.</p> <p>Erosion to the track.</p> <p>Inundation of the station, approach road, or parking lot.</p>	<p>Enhancement of drainage capacity of approach roads.</p> <p>Crest height adjustment (design).</p> <p>Management, services, and maintenance (regular and post-hazard), and repair and protection.</p> <p>Selection of building material (discouraging corrugated iron sheets on the rooftop).</p> <p>Reducing the temperature of tracks during heat stress.</p> <p>Track adjustments.</p>	<p>A holistic approach targeting the end-to-end journey works better for women.</p> <p><i>Station access</i> Waiting areas and adequate signage and direction markers.</p> <p>Display board with clear information on routes, fares, and interchangeability.</p> <p>Concourse areas.</p> <p>Provide a step-free access route and avoid long, convoluted ones.</p> <p>Offer well-equipped women's toilets, separate ticketing counters, baby feeding rooms, proper lighting, and CCTV in the areas where ladies' coaches halt.</p> <p>Display stickers or boards with emergency numbers for reporting crimes against women at the stations.</p> <p>Design to be child-friendly</p>	<p>Accessibility (escalators, stairs, and elevators), level and underpass, and convenient crossing facilities.</p> <p>Escalators and stairs should be placed and designed so that women with children, the elderly, and PwDs can access the train without barriers.</p> <p>Safe location of bike storage facilities and implementation of surveillance.</p> <p>Display stickers or boards for reporting crimes against women at the station's platform.</p>	<p><i>Station access</i> Multi-modal interchange connectivity: presence of bus stop facilities.</p> <p>Provide adequate access gates through an assessment of expected traffic (a few wide aisle gates located at either side of the gate line tend to experience longer queues).</p> <p>Seated capacity can be prioritized over inclusive seating. Stanchion placement might prevent an even distribution of passengers along the train. It might work for the commuter peak.</p>

		<p>Adequate spaces for queuing, as queuing areas tend to be crowded.</p> <p>Make navigation and wayfinding easier by installing information display boards. The placement of the boards must be visible to all waiting passengers.</p> <p>Establish and develop an information and help desk at the stations.</p> <p>There must be clarity about which areas of the platform are covered by CCTV and are safer; displaying this with boards or stickers at frequent intervals can help build confidence.</p> <p>The gap between the train and the platform must be minimized to make it easier for everyone to get on the train.</p> <p>Limited dwell times might be more difficult to access for women with children, the elderly, and PwDs.</p> <p>Mechanical coordination between train platforms and train bogies must allow people to board the train with ease and without hurry or crowding, to alleviate risks around attire and luggage getting stuck in the doors.</p> <p>Feeding rooms will be equipped with comfortable seating, a nappy-changing table, and a place to store baby bags. Similarly, all ladies' washrooms would have</p>	<p>Design the waiting areas at and around the platform entrance and exit so that people (especially women, girls, and PwDs) do not feel uncomfortable, and ensure there are enough spaces.</p> <p>The location of the step-free platform entrance and exit should not be at the far end.</p> <p>More options for door opening services. Selective door-opening arrangements mean having to walk from carriage to carriage.</p> <p>Onboard visual travel information is more important for women.</p>	
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		hangers, sanitary pad vending machines, and lady attendants.	
<b>Inland Water Transportation Hub (Ghat/Jetty)</b>			
Approach roads are inundated.	Adjustable elevation (design).	<i>Ferry Ghats/Jetty</i> Make the approach road paved so that accessing the jetty is not slippery.	
Floating jetties drift away.	Dismantleable approach road (design).	Jetties must have protective walls.	
	Improved anchoring (design).	Waiting facilities for the passengers.	
	Height adjustment (design).	Clear signboard for the walkway.	
	Selection of construction material for the approach road.	Well-lit.	
		Separate toilets with running water/and other facilities.	
		Install CCTV camera.	
		<i>Small Ghats or jetties for boats</i> Make the approach road paved.	
		Provide stairs and sturdy platforms with handles so that women with children, pregnant women, the elderly, and PwCs can easily access the boat.	
<b>Waiting Sheds (Jatri Chauni)</b>			
Overflow and damage.	Higher elevation (design).	Must have shades with fans and lights. The shades must be designed to protect the passengers from rain.	Emergency button to seek help from police/security services.
Erosion.	Site selection for new infrastructure (design).	Accessible to women with children, pregnant, the elderly, and PwDs	
The approach road is inundated.	Management, services, and maintenance (regular and post-hazard), and repair and protection.	Seating areas.	
Cyclonic wind damages a	Strengthening.	Display board with timing, routes, fares, and CCTV camera.	

corrugated iron sheet-based roof.

Structural adjustment (design).

Selection of building material (discouraging corrugated iron sheets on the rooftop).

### Bridge/Culvert

Overtopping, approach road waterlogged.

Higher elevation (design).

Bridges must have sidewalks.

Slope erosion.

Strengthening (robustness through design).

Well-lit.

Approach roads are paved.

Completely washed off (in extreme cases).

Structural adjustment (design).

The slope of bridges, especially rural bridges (typically 3% in practice), must be carefully designed. Where people commute by autorickshaws or vans, the bridges should be designed with a gentle slope so that pregnant women, the elderly, sick people, and PwDs can have easy access.

The draft height underneath may block water transport.

Management, services, and maintenance for strengthening and protection.

### Parking Lot (Open Space)

Overflow and damage.

Higher elevation (design).

Women's parking spaces will be located in well-lit areas of parking lots and underground garages, close to escape routes, exits, and elevators. They are also clearly visible through the surveillance camera. It should be adjacent to family parking zones (all zones must be marked with separate colors and signs).

Erosion.

Site selection for new infrastructure (design).

Approach road inundated.

Management, services, and maintenance (regular and post-hazard), and repair and protection.

Separate toilet facilities are available in the open parking spaces and food courts.

Strengthening.

Structural adjustment (design).

Clear direction of routes.

	<p>Selection of building material (discouraging corrugated iron sheets on the rooftop).</p> <p>Edge reinforcement.</p>	<p>Easy system for payment (if any).</p> <p>Emergency button at a designated space near the women's parking space (it should be well circulated through media).</p>		
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# Annex D: Making Energy Infrastructure in Bangladesh Gender-Responsive, Socially-Inclusive and Climate-Resilient

Annex D presents impacts on different types of energy infrastructure, as determined in consultation with local communities. It presents climate adaptation measures either currently being implemented or recommended for implementation.

Reported Impacts on Infrastructure	Climate-adaptive Responses
<p>The most common impacts of extreme weather events and climate change on people and livelihoods are as follows:</p> <ul style="list-style-type: none"> <li>• Loss of connectivity</li> <li>• Fuel supply disruption</li> <li>• Inundation from flooding and storm surge</li> <li>• Electrocution</li> <li>• Managing and adapting to disaster risks in the energy system</li> </ul>	<p>It is critical that energy-related institutions are resilient to these risks. The following approaches were adopted:</p> <ol style="list-style-type: none"> <li>1. Review of equipment specification, network design, and planning approaches;</li> <li>2. Wind risk analysis and simulations for high-risk infrastructure zones; and</li> <li>3. Assessment of the impact of the implementation of conventional network solutions and distributed generation sources (solar rooftop and energy storage) on mitigating climate risks.</li> </ol>
Electric grid transition from traditional design to the design of the future	
<p>The traditional electric grid has provided highly reliable electricity for more than a century. However, much of the current electric grid was designed and built decades ago using system design models and organizational principles that must be restructured to meet the needs of a low-carbon, digital economy. The traditional architecture was based on large-scale generation, remote from consumers, hierarchical control structures with minimal feedback, limited energy storage, and passive loads.</p>	<p>A modern grid must be more flexible, robust, and agile. It must have the ability to optimize grid operations and resources dynamically, rapidly detect and mitigate disturbances, integrate diverse generation sources (on both the supply and demand sides), integrate demand response and energy-efficiency resources, enable consumers to manage their electricity use and participate in markets, and provide strong protection against physical and cyber risks. These features must be incorporated as the electric grid transitions from the traditional design to the design of the future.</p>
Lightning-resistant design	
<p>Bangladesh has a high incidence of lightning. The average annual lightning strike rate is approximately 10 strikes per km<sup>2</sup> over most of the country. Most of the lightning activity in Bangladesh occurs from March</p>	<p>The ability of a power line to withstand lightning strikes without flashing over depends on the insulation level of the pole-top assembly and the presence of surge protection devices on the line.</p>

to May, just after the end of the dry season, with an average intensity of 40 strikes per km<sup>2</sup> over the three months.

The resistance of the 11 kV Bangladesh Rural Electrification Board (BREB) system to lightning, as originally designed, followed standard practice and maintained a pole top insulation level of 300 kV, sufficient to minimize outages from indirect lightning strikes.

The substitution of concrete poles and steel crossarms for wood components was made without considering the need to maintain a high pole top insulation level, resulting in the 11 kV line currently under construction being extremely vulnerable to lightning and very likely to experience frequent lightning outages.

The 33 kV lines, with their inherently higher insulation level, overhead ground wire, and different structural layout, did not suffer a significant loss of insulation level during the transition to concrete poles. The transition to steel cross-arms on 33 kV lines substantially reduces the insulation level and increases vulnerability to both direct and indirect lightning strikes.

### Structural design for high winds

Bangladesh is intermittently exposed to very high wind loads from cyclonic storms originating in the Bay of Bengal, with generally higher wind speeds south of Dhaka. Wind speeds along the coast of the Bay rival those of the worst typhoons of the western Pacific.

Wind is a factor in line design because it exerts pressure on the poles themselves, on the wires supported by the poles, and on any equipment attached to the pole. Transmission lines are supported by braced towers, in which any single element is supported by other elements, much like a truss-type bridge. However, with distribution lines, only the pole supports the loads.

The wind loading for the design of 11 kV and 33 kV networks is not consistent with the wind speeds specified in the Bangladesh Building Code. The system requires an assessment of energy networks to withstand the highest level of wind speed (as expected/ experienced in the past).

Pole sizing and span lengths on 11 kV lines are inadequate to ensure the survival of the line structures under high wind conditions. Only the presence of trees and buildings shielding the lines reduces wind loadings to tolerable levels in some areas.

Reinforcing the poles with concrete piling and cross arms is being practiced in some coastal areas.

The number of substations is increased in the south west coastal region, in a bid to shorten the catchment/feeder area, to easily locate the fault area during high winds.

### Tree trimming to avoid line failure

Falling trees can cause damage to 11 kV power lines. The process of cleanup is significant when a large tree knocks down a three-phase span of distribution line, especially during high wind/cyclone & storm surges.

Trees must be kept clear of power lines, and the maintenance crew must trim trees that could fall on the line. It is not always necessary to remove the tree, as there are techniques that can alter its growth trajectory such that if it does fall, it will fall away from the line. Achieving this result requires training, proper tools, and a commitment to line maintenance that goes beyond simple corrective measures.

To address the vulnerabilities to climate and extreme weather events:

1. Use of a composite approach consisting of underground cabling, alternate feeding arrangements, and feeder augmentation in high-risk areas
2. Maintenance of a pole top insulation level of 300 kV
3. Integration of distributed solar and Battery Energy Storage System (BESS) solution
4. Use of wind load specifications for network equipment that are consistent with the Bangladesh Building Code
5. Establishment of a vegetation management program to manage the impact on network lines
6. Elevated substations and drainage to reduce the risk of flooding.

### Increased readiness to integrate Distributed Energy Resources/Diversify Energy Sources

Distributed solar and BESS can help increase the share of renewable energy in the generation mix, circumvent land availability constraints faced by utility-scale developments, and present an alternative to expensive diesel generators used in energy-intensive manufacturing, such as ready-made garments, and also the diesel-dependent Ground Water Irrigation.

Bangladesh has significant solar resources, averaging slightly less than 1,400 kWh per kWp per year over most of the country.

The solar resource is distributed evenly over the country, with a concentration in the Chittagong Hill Tracts and Cox's Bazar area.

Distributed energy resources such as rooftop solar, BESS, electric mobility, and demand response can make the electricity system more efficient, reliable, and resilient while also supporting the decarbonization of the sector.

There is significant distributed solar potential across different areas, and integrating distributed solar with BESS can help reduce distribution losses, improve reliability, and make distribution networks more efficient. Depending on the location, they could also help defer distribution investments.

Accelerating solar development, particularly for rural power supply, will benefit from exploring distributed options.

Rooftop solar potential analysis must be carried out.

1. The integration of solar rooftop generation can result in a significant amount of generation being made available
2. Solar rooftop generation has the potential for a substantial reduction in feeder losses due to its distributed nature
3. Solar generation does not offset investment in voltage correction in the feeder, so it is not likely to have a significant impact on reducing capital investment requirements at 11 kV
4. Distributed solar generation at 33 kV is an effective method for reducing losses in the 33 kV network.

### Battery Energy Storage Systems (BESS)

During disasters and extreme weather events, faltering electricity connections or lack of electricity transmission and distribution are quite common, especially in cyclone and flood-prone areas.

As the electricity demand in Bangladesh increases rapidly and the grid integrates a growing amount of variable renewable energy and demand side management, BESS can serve an important function in the grid by:

1. Increasing system flexibility for integrating variable renewable energy, particularly grid-connected solar rooftops
2. Managing peak demand to optimize use of system power capacity and reduce the need for new generation capacity
3. Deferring capital investment in the expansion of distribution and transmission networks
4. Improving frequency control and power quality, particularly for special economic zones and customers such as hospitals
5. Improving resilience of the power system from disasters, by using BESS to service outages and displace captive diesel generators.

The ancillary services provided by BESS are not limited to overcoming the fluctuating nature of variable renewable energy but can also be applied to voltage regulation, enhancement of power quality, smoothing, scheduling of optimal power generation dispatch, and operational flexibility for variable renewable energy.

## GEDSI-Responsive Energy Infrastructure

Women's representation in the energy sector has historically been low.

This absence of women professionals or other specialists to give a voice to the needs and priorities of women and girls - especially in the planning and design of infrastructure - can contribute to the development of energy infrastructure that does not consider the specific needs and circumstances of women, girls, and diverse people.

When a new large-scale energy infrastructure project arrives in a community, employment opportunities may be limited, especially for women. Barriers to women's employment in energy infrastructure include legal restrictions on women's employment in the sector as well as a lack of technical, construction, and professional engineering skills. An additional factor that may discourage energy infrastructure employment for women is a gender-insensitive work environment.

Women and men are differentially affected by land use changes that stem from large-scale energy infrastructure projects, including reduced access to agricultural land resources. Women are also more likely than men to be excluded from compensation schemes due to a lack of understanding of local gender issues. There are also differences in men's and women's needs and preferences for compensation forms.

Men and women are differently affected by displacement and resettlement, and women often suffer disproportionately due to existing gender inequalities.

Beyond compensating displaced communities for their immediate losses, energy infrastructure projects can offer ancillary infrastructure and benefit-sharing schemes that, if designed to address gender gaps, can advance gender equality in the community.

Several health risks and related gender impacts are associated with large energy infrastructure projects.

A gender impact assessment must be carried out before the initiation of any energy infrastructure. The objective of the assessment is to better understand the gender gaps and barriers at the institutional level.

The assessment will

1. Establish a baseline to monitor progress on the gender and diversity goals of the project or program
2. Identify opportunities to mainstream gender considerations in the key areas covered in the technical assessments
3. Inform the project and framework to monitor the impacts.

It is important to communicate the results via a variety of channels.

Use the results of the gender analysis to form the basis for mainstreaming gender equality into the project or programme results framework, including:

- Situation Analysis
- Theory of Change and Theory of Action
- Risk Assessment Framework
- Results Framework
- Budget
- M&E, including indicators and targets

### Gender-sensitive M&E indicators for energy infrastructure

The following provides a sample list of gender targets and indicators to monitor outputs of projects in the energy sector, including:

1. Number of jobs (person-days) generated for women by the project (compared to the number of total jobs generated).
2. Number of women receiving technical and skills development training (compared to the total number).
3. Percentage of women represented in electricity user groups, committees, cooperatives, utility management level jobs, on energy boards, and other decision-making bodies.

Ethnic minority and indigenous groups can be particularly affected by energy infrastructure projects, where communities may experience involuntary appropriation of their lands, waterways, and other resources. Additionally, indigenous women experience multiple forms of discrimination, oppression, and marginalization.

4. Percentage of women who participated in policy formulation during public consultation meetings.
5. Number of projects, energy agencies, and utilities staff receiving gender awareness training.
6. Improved gender equality performance by energy sector agencies or utilities (e.g., human resources strategy).
7. Sector policy or strategy explicitly highlighting gender equality interventions that have been adopted.