



**GOVERNMENT OF PAKISTAN
PRIME MINISTER'S OFFICE
NATIONAL DISASTER MANAGEMENT AUTHORITY
ISLAMABAD**



Subject: **Monsoon Infrastructure Advisory – Pre-disaster Phase**

1. **In 2022, Pakistan experienced devastating flood events** that caused widespread destruction across the country, with Khyber Pakhtunkhwa (KPK) also suffering significant damage. The floods submerged vast areas, severely impacting both residential and public infrastructure. In KPK, **91,464 houses were damaged**, displacing thousands of families and leaving many in urgent need of shelter and basic necessities. The province's transportation network was heavily disrupted, **with 1,575 kilometers of roads and 107 bridges either severely disrupted damaged or destroyed**, further complicating relief and recovery operations. Mountainous and hilly regions, especially in areas such as Swat, Dir, Chitral, and Nowshera, were among the most affected due to flash floods and landslides. The 2022 floods exposed the vulnerability of KPK's infrastructure and **highlighted the critical need for proactive disaster preparedness and resilience measures, prior to monsoon season 2025.**
2. **The Infrastructure Risk Atlas (2025), developed by Infrastructure Advisory and Project Development (IA&PD) wing of National Disaster Management Authority (NDMA),** provides a comprehensive mapping of infrastructure vulnerabilities. It classifies residential buildings based on construction types and assesses their flood resilience. **The following map highlights the districts of KP that are most prone to infrastructure losses against floods.** The Infrastructure Risk Atlas supports data-driven decision-making, prioritization of resources and the planning of structural mitigation efforts.

Based on the Infrastructure Risk Atlas, the following districts have been classified as **"Most at Risk"** against flood hazards:

- **KP:** Chitral, Swat, Shangla, Buner, Torghar, Khyber, Peshawar, Charsadda, Nowshera, DI Khan, Tank

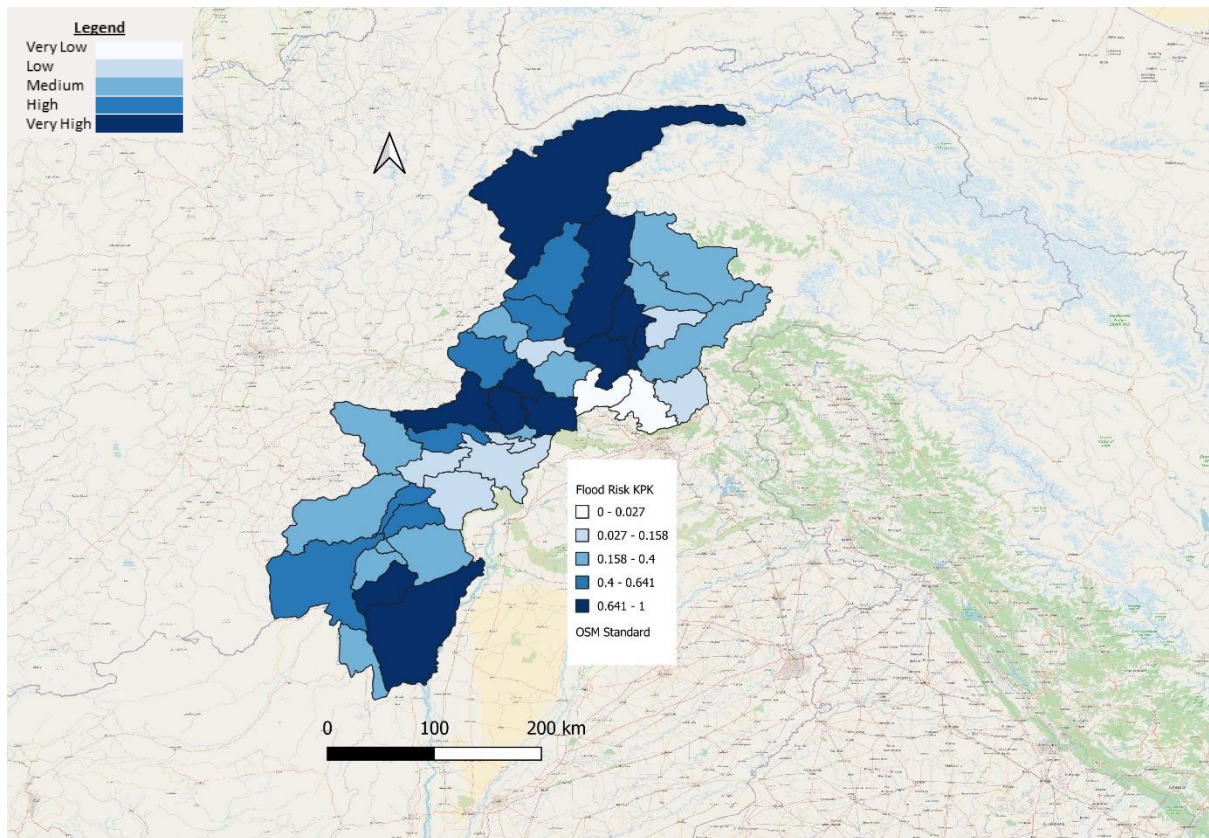


Figure 1: Risk map of Khyber Pakhtunkhwa highlighting districts that are most prone to infrastructure damages against floods

3. According to NDMA's assessment and projections, near-normal monsoon activity is expected in Khyber Pakhtunkhwa (KPK) from July to September 2025, significantly increasing the risk of flood-related hazards across the province. The likelihood of **urban flooding is particularly high in major cities such as Peshawar, Mardan and Nowshera**, where inadequate drainage systems and unplanned urbanization exacerbate waterlogging during intense rainfall. In addition, **flash flooding poses a critical threat in the mountainous and hilly regions of northern and central KPK, including Swat, Dir, Chitral and**

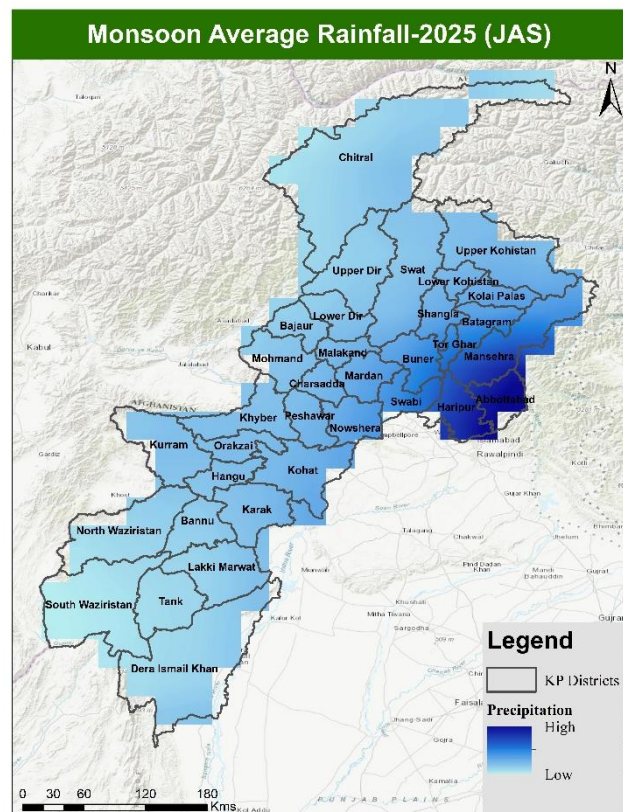


Figure 2: Monsoon 2025 Average Rainfall Projection (Source NEOC, NDMA)

Kohistan, where heavy downpours can trigger sudden surface runoff, landslides and debris flows. **Riverine flooding along rivers such as the Kabul, Swat and Panjkora** may affect low-lying areas and settlements along riverbanks, threatening both infrastructure and human lives. These anticipated conditions call for urgent preparedness and structural resilience measures to protect communities and assets in the province. **Figure 2 shows the vulnerable districts that are expected to be affected during the monsoon season.**

4. To enhance resilience against future flood events, **it is strongly recommended that concerned departments initiate Infrastructure Audits in all districts of KPK which are classified as Most at Risk in the Fig. 1.** These audits should focus on identifying structural deficiencies in public buildings, especially those constructed by using poor quality of materials, unreinforced masonry, or poorly maintained structures. **The findings of these audits will serve as a foundation for retrofitting and reinforcement measures, enabling targeted investments to strengthen key infrastructure ahead of the monsoon season.** By prioritizing retrofitting in schools, hospitals and government offices, the risk of structural collapse and loss of life during flooding events can be significantly reduced.

5. In the light of expected situation, **the following actions are to be ensured for Residential and Public Buildings** by all concerned Federal Ministries / Departments, respective Provincial Governments and their line departments:

- a. All DDMA's and District Administration to undertake proactive monitoring to identify the Kacha houses (Mud Houses) in their districts and the estimated residents. These structures are expected to be damaged during the flooding. Shelter provision will be required for people occupying such structures.
- b. Elevate the plinth of adobe houses with flood-resistant materials (brick or RCC fill) and reinforce roofs with bracing or metal / wooden trusses to prevent damage from rain.
- c. Apply waterproof coatings, such as bituminous or lime-cement plaster, to the external walls and flood-resistant coatings or sealants to the lower portions of the walls up to a height of 1.5 meters.
- d. Place sandbags around the outer boundary of houses to act as a temporary barrier. This helps stop floodwater from reaching the building and protects the foundation and lower walls as well.

- e. Strengthen the riverbanks using protective methods such as retaining walls, ripraps and geotextile reinforcement to stop them from breaching. This helps prevent river water from spilling into nearby low-lying areas, especially in flood-prone areas of KP.
- f. Incorporate rainwater harvesting systems in public and residential buildings, such as rooftop collection with storage tanks, to reduce surface runoff and manage excess rainwater effectively during flood events.
- g. Retrofit public buildings such as schools, hospitals and offices for flood resilience by reinforcing structural elements with steel or concrete. Apply waterproof coatings, elevating critical utilities / equipment and strengthening roof structures.
- h. Incorporate diagonal bracing, shear walls or steel reinforcement for enhancing the structural integrity to prevent collapse under hydrostatic pressure or lateral loads from floodwater.

6. **The following actions are to be ensured for Communication Infrastructure** by all concerned Federal Ministries / Departments, respective Provincial Governments and their line departments:

- a. Conduct thorough inspections of roads, bridges and drainage systems before the monsoon season.
- b. Ensure that drainage systems are free of debris and functioning properly to prevent water accumulation on roads.
- c. Strengthen vulnerable road sections and bridges, particularly those in flood-prone areas.
- d. Establish rapid response teams equipped to handle road and bridge repairs during and after floods.
- e. Construct the emergency access tracks or bypass routes particularly in high-risk areas where the roads have higher probability of being washed away or blocked.
- f. Ensure the development of SOPs and contingency plans for re-routing the traffic in the event of road closures.
- g. Install scour protection (such as gabions, riprap, reinforced concrete aprons) at the vulnerable bridge piers and abutments to reduce erosion during high flows. Moreover, retrofitting piers and abutments with RCC jackets or erosion-resistant materials is recommended.

- h. Retrofit and anchor bridge decks to prevent displacement due to high water velocities.
- i. Protect roads in the vulnerable hilly areas of KPK from landslides, especially in regions like Swat, Dir and Kohistan, it is recommended to implement slope stabilization measures such as constructing retaining walls, rockfall barriers, gabion structures and check dams, along with improving drainage systems through the development of catch drains aimed to mitigate the impact of heavy rainfall.
- j. Install proper slope drainage systems to reduce water infiltration and soil saturation on unstable slopes.
- k. Implement reforestation programs to stabilize slopes and reduce erosion.
- l. All administrative authorities / DDMA's to ensure the cleaning of cross-drainage structures such as culverts, gutters, road drains and manholes to avoid choking and reduce surface runoff.
- m. Construct drainage channels or siphoning systems to reduce the water level in glacial lakes and prevent sudden breaching.
- n. Build check dams, debris flow barriers and diversion channels downstream of glacial lakes to control and redirect floodwaters.

7. **The following actions are to be ensured for Industrial Infrastructure** by all concerned Federal Ministries / Departments, respective Provincial Governments and their line departments:

- a. Establish clear evacuation routes and protocols for all employees.
- b. Ensure that all drainage systems are clear of debris and fully operational to prevent water-logging.
- c. Elevate critical machinery and electrical installations above potential flood levels and waterproof essential equipment.
- d. Set up reliable communication systems to receive real-time flood alerts from NDMA and other meteorological agencies.
- e. Ensure the digitization and backup of critical operational records, drawings, client related data and other important documents off-site or on secure cloud platforms.
- f. Establish direct lines of communication with local disaster management authorities and emergency services.

- g. Secure hazardous waste and chemicals to prevent contamination during floods.
 - h. In case of fire incidents caused by short-circuits during flooding, install automatic circuit breakers and fire extinguishers at key locations and train staff in using firefighting equipment and safe electrical shutdown procedures.
 - i. Conduct a structural integrity assessment of industrial buildings before the monsoon season to identify and retrofit weak points, ensuring the facility can withstand prolonged exposure to floodwaters and heavy rainfall.
 - j. The concerned departments are instructed to follow the flood alert advisories issued from time to time.
8. Forwarded for information / necessary action by all concerned, please.