INSTYTUT BADAWCZY DRÓG I MOSTÓW

Actions of the Road and Bridge Research Institute in assessing the technical condition of public roads and road engineering structures in areas affected by the state of natural disaster

SUMMARY REPORT

Warsaw, December 2024

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1. Introduction

This report presents the results of the activities carried out by the Road and Bridge Research Institute (IBDiM) as part of the task involving field inspections or expert evaluations of the technical condition of public roads and road engineering structures damaged as a result of flood or landslides in September 2024. The task was conducted in areas affected by the state of natural disaster declared by the Regulation of the Council of Ministers of 16 September 2024, covering parts of the Lower Silesian, Lubusz, Opole, and Silesian voivodeships (J. Laws, item 1365, as amended).

The content of the study includes thematically structured chapters referring to the key areas of action undertaken as part of the assessment of the technical condition of roads and bridges reported for inspection by local government units. The report focuses on a detailed description of:

- actions related to the technical assessment of bridge structures and road sections damaged as a result of flood or landslides in September 2024,
- results of analyses of administrative and spatial conditions of the areas affected by the natural disaster,
- promotional and informational activities carried out to communicate ongoing actions,
- conclusions from the workshop entitled “Patterns and standards in road and bridge engineering – infrastructure resilience in flood zones".

An important element of the report is the summary of the results of the technical assessments of bridges and road sections and the assessment of their usability after the flood. The report ends with an annex listing the structures whose technical condition was verified as part of task no. DDP-4.3120.1.2024.

The work was carried out by the Road and Bridge Research Institute for the Ministry of Infrastructure under contract no. DDP-4.3120.1.2024 of November 6, 2024.

2. Decision of the Minister of Infrastructure (reference DDP-4.84.8.2024 from September 20, 2024).

Minister Infrastruktury

Dariusz Klimczak

Znak pisma: DDP-4.84.8.2024
Warszawa, 20 września 2024

DECYZJA

Na podstawie art. 37 ust. 1 pkt 2 ustawy z dnia 30 kwietnia 2010 r. o instytutach badawczych (Dz. U. z 2024 r. poz. 534) w związku z § 1 rozporządzenia Rady Ministrów z dnia 16 września 2024 r. w sprawie wprowadzenia stanu klęski żywiołowej na obszarze części województwa dolnośląskiego, opolskiego oraz śląskiego (Dz. U. poz. 1365, z późn. zm.)

polecam

Instytutowi Badawczemu Dróg i Mostów, dokonanie sprawdzeń lub wykonanie ekspertyz stanu technicznego dróg publicznych i drogowych obiektów inżynierskich, uszkodzonych w wyniku powodzi lub osunięcia ziemi we wrześniu 2024 r.

Zapewnienie finansowania zadania nastąpi w drodze umowy z Instytutem Badawczym Dróg i Mostów, która określi wysokość, sposób i tryb przekazania i rozliczenia środków finansowych w roku 2024.

UZASADNIENIE

Zgodnie z art. 37 ust. 1 pkt 2 *ustawy z dnia 30 kwietnia 2010 r. o instytutach badawczych*, minister nadzorujący może nałożyć na instytut obowiązek wprowadzenia do jego planu działalności zadania albo wyznaczyć zadanie poza tym planem, zgodnie z zakresem działania instytutu określonym w jego statucie w przypadku ogłoszenia stanu klęski żywiołowej lub stanu epidemii. W myśl zaś § 1 ust. 1 ww. *rozporządzenia Rady Ministrów w sprawie wprowadzenia stanu klęski żywiołowej na obszarze części województwa dolnośląskiego, opolskiego oraz śląskiego*, w związku z powodzią we wrześniu 2024 r. w południowo-zachodniej części terytorium Rzeczypospolitej Polskiej, w celu zapobieżenia jej skutkom oraz w celu ich usunięcia, wprowadza się stan klęski żywiołowej na obszarze części województwa dolnośląskiego, opolskiego oraz śląskiego na okres 30 dni od dnia ogłoszenia rozporządzenia. Zgodnie z zakresem działania Instytutu tj. § 3 ust. 3 pkt 5 załącznika do *Zarządzenia nr 28 Ministra Infrastruktury z dnia 7 grudnia 2023 r. w sprawie zatwierdzenia statutu Instytutu Badawczego Dróg i Mostów*, zakres działania Instytutu obejmuje obszar związany z oceną stanu technicznego m.in. nawierzchni dróg jak również drogowych obiektów inżynierskich. Jednocześnie w myśl zaś § 16 załącznika do *Zarządzenia nr 13 Ministra Infrastruktury z dnia 28 maja 2021 r. w sprawie zasad organizacji i funkcjonowania w Ministerstwie Infrastruktury nadzoru nad instytutami badawczymi* w przypadku zlecenia instytutowi przez Ministra zadań, o których mowa w art. 37 ustawy o instytutach badawczych, komórka właściwa w uzgodnieniu z komórką Ministerstwa odpowiadającą za realizację spraw związanych z zarządzaniem kryzysowym, obronnością i bezpieczeństwem państwa przygotowuje projekt stosownej decyzji Ministra.

Mając powyższe na uwadze, celem wsparcia w przywracaniu przerwanych połączeń komunikacyjnych oraz z uwagi na ogromne zniszczenia lub uszkodzenia infrastruktury drogowej w szczególności drogowych obiektów inżynierskich polecam Instytutowi Badawczemu Dróg

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i Mostów, dokonanie sprawdzeń lub wykonanie ekspertyz stanu technicznego dróg publicznych i drogowych obiektów inżynierskich uszkodzonych w wyniku powodzi lub osunięcia ziemi we wrześniu 2024 r.

Niniejsze polecenie zostaje wydane na czas obowiązywania stanu klęski żywiołowej wprowadzonej ww. *rozporządzeniem w sprawie wprowadzenia stanu klęski żywiołowej na obszarze części województwa dolnośląskiego, opolskiego oraz śląskiego* i może zostać, w uzasadnionym przypadku przedłużone, na wniosek Instytutu Badawczego Dróg i Mostów.

Dokument podpisany elektronicznie przez:

W zastępstwie Ministra Infrastruktury

Arkadiusz Marchewka

Sekretarz Stanu

3. Decision of the Minister of Infrastructure (reference DDP-4.84.8.2024 from October 15, 2024)

Minister Infrastruktury

Znak pisma: DDP-4.84.8.2024
Warszawa, 15 października 2024 r.

DECYZJA

Na wniosek Instytutu Badawczego Dróg i Mostów znak IBDiM/DN/4874/2024 z dnia 4 października 2024 r. o przedłużenie polecenia wskazanego w decyzji Ministra Infrastruktury, znak DDP-4.84.8.2024 z dnia 20 września 2024 r. wydanej na podstawie art. 37 ust. 1 pkt 2 ustawy z dnia 30 kwietnia 2010 r. o instytutach badawczych (Dz. U. z 2024 r. poz. 534), w związku z § 1 rozporządzenia Rady Ministrów z dnia 16 września 2024 r. w sprawie wprowadzenia stanu klęski żywiołowej na obszarze części województwa dolnośląskiego, lubuskiego, opolskiego oraz śląskiego (Dz. U. poz. 1395, z późn. zm.),

zmieniam wskazaną powyżej decyzję, określając czas obowiązywania polecenia wydanego Instytutowi Badawczemu Dróg i Mostów ww. decyzją znak DDP-4.84.8.2024, z dnia 20 września 2024 r., na następujący: do dnia 15 grudnia 2024 r.

W pozostałym zakresie ww. decyzja Ministra Infrastruktury pozostaje bez zmian.

Zapewnienie finansowania zadania nastąpi w drodze umowy dotacji celowej z Instytutem Badawczym Dróg i Mostów, która określi wysokość, sposób i tryb przekazania środków finansowych w 2024 r. i ich rozliczenia.

UZASADNIENIE

Zgodnie z art. 37 ust. 1 pkt 2 ustawy z dnia 30 kwietnia 2010 r. o instytutach badawczych, minister nadzorujący może nałożyć na instytut obowiązek wprowadzenia do jego planu działalności zadania albo wyznaczyć zadanie poza tym planem, zgodnie z zakresem działania instytutu określonym w jego statucie w przypadku ogłoszenia stanu klęski żywiołowej lub stanu epidemii.

Z uwagi na wprowadzony przepisami rozporządzenia Rady Ministrów z dnia 16 września 2024 r. w sprawie wprowadzenia stanu klęski żywiołowej na obszarze części województwa dolnośląskiego, lubuskiego, opolskiego oraz śląskiego, w związku z powodzią we wrześniu 2024 r. w południowo-zachodniej części terytorium Rzeczypospolitej Polskiej, w celu zapobieżenia jej skutkom oraz w celu ich usunięcia, stan klęski żywiołowej na obszarze części województwa dolnośląskiego, lubuskiego, opolskiego oraz śląskiego na okres 30 dni od dnia ogłoszenia rozporządzenia, Minister Infrastruktury, decyzją z dnia 20 września 2024 r., nr DDP-4.84.8.2024, polecił Instytutowi Badawczemu Dróg i Mostów „dokonanie sprawdzeń lub wykonanie ekspertyz stanu technicznego dróg publicznych i drogowych obiektów inżynierskich, uszkodzonych w wyniku powodzi lub osunięcia ziemi we wrześniu 2024 r.”.

Decyzja Ministra Infrastruktury znak DDP-4.84.8.2024 z dnia 20 września 2024 r. została wydana na czas obowiązywania stanu klęski żywiołowej wprowadzonej ww. rozporządzeniem w sprawie wprowadzenia stanu klęski żywiołowej na obszarze części województwa dolnośląskiego, lubuskiego, opolskiego oraz śląskiego, tj. do dnia

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16 października 2024 r. Jednakże przewidywała, że może zostać, w uzasadnionym przypadku przedłużona, na wniosek Instytutu Badawczego Dróg i Mostów.

Pismem z dnia 4 października 2024 r., znak IBDiM/DN/4874/2024, Instytut Badawczy Dróg i Mostów zwrócił się do Ministra Infrastruktury z wnioskiem „o przedłużenie Polecenia Pana Ministra dla IBDiM we wcześniej wskazanym zakresie do końca bieżącego roku". Wnioskodawca wskazał, że ze względu na mnogość zadań stojących przed ekspertami Instytutu, przewiduje się, że podejmowane prace (w celu realizacji ww. polecenia) będą trwały dłużej niż okres obowiązywania stanu klęski żywiołowej, czyli dłużej niż do dnia 16 października 2024 r.

Okoliczności powszechnie znane, wskazujące, że na obszarze dotkniętym bezpośrednio przez powódź znajduje się wiele dróg, obejmujących również obiekty inżynierskie, których stan techniczny wymaga sprawdzenia, w szczególności ze względu na bezpieczeństwo ruchu drogowego, przy ograniczonych zasobach ekspertów Instytutu Badawczego Dróg i Mostów, w ocenie Ministra Infrastruktury, uprawdopodabniają to, że wykonanie polecenia określonego w ww. decyzji, w terminie w niej określonym, w pełnym zakresie, nie zostanie wykonane. Biorąc zatem pod uwagę to, że rzetelne wykonanie ekspertyz objętych tym poleceniem jest konieczne, Minister Infrastruktury przychylił się częściowo do ww. wniosku i zmienił ww. decyzję, ustalając nowy termin wykonania polecenia, określonego ww. decyzją z dnia 20 września 2024 r., tj. do 15 grudnia 2024 r. Ograniczenie terminu do dnia 15 grudnia 2024 r., zamiast wnioskowanego przez Instytut 31 grudnia 2024 r., wynika z konieczności zapewnienia możliwości sfinansowania ww. polecenia ze środków budżetowych na 2024 r.

Dokument podpisany elektronicznie przez:

Z upoważnienia Ministra Infrastruktury

Stanisław Bukowiec

Sekretarz Stanu

4. Activities undertaken as part of the implementation of the contract

As part of the implementation of the task under contract no. DDP-4.3120.1.2024, IBDiM undertook a number of activities related to the technical assessment of bridge structures and road sections damaged by flood or landslides in September 2024.

On September 14, 2024, IBDiM declared readiness to assist the Ministry of Infrastructure, initiating work related to the assessment of the technical condition of bridge and road structures. The first organisational measures, including preparation for inspections, scheduling, and coordination of field activities, began on September 16, 2024. A five-person coordination team was established within IBDiM, responsible for efficient management and oversight of tasks related to technical assessments of bridge and road structures. This team was created to ensure effective communication, integrate activities undertaken by various organizational units, and monitor work progress. The team was supported by additional staff:

- specialists responsible for work-time and cost records, responsible for monitoring and recording project-related costs, including travel, materials, and equipment. Their duties also included preparing financial reports and budget control;
- logistics support specialists, who provided technical support for the field teams, organizing transportation and equipment needed for the inspections. They also handled reservations for accommodation;
- staff responsible for preparing post-inspection reports, including their authorization, as well as persons responsible for office, communication and information services.

IBDiM undertook a spatial analysis of the flood-affected area. The GIS-based data contains key information regarding demographic, hydrological, and topographic conditions, as well as the road network including bridges. The created model enables comprehensive management and analysis of the road network and bridge structures, integrating geometric, topographic, and attribute information. The related results are presented in the chapter entitled *Administrative and Spatial Conditions of the Study Area*. Additionally, a spatial database was created based on information contained in reports completed by experts during inspections. This allows the IBDiM to visualize the spatial distribution of reports on maps and present data according to entered attributes, for example, by presenting bridge structures out of service while simultaneously relating them to a geographic demographic grid, allowing for the estimation of the potential number of users of a given bridge based on population density.

On September 19, 2024, IBDiM requested support from the Institute's Scientific Council in implementing infrastructure reconstruction activities. Simultaneously, initial contacts were established with technical universities, aimed at engaging academic communities in assessing the state of damage to road and bridge infrastructure.

On September 20, 2024, the Minister of Infrastructure issued an order for IBDiM to conduct analyses and expertise on the technical condition of infrastructure damaged during the flood, which, in a letter dated October 15, 2024, extended the validity of the order until December 15, 2024. On the same day, contact was established with the Operation Feniks Command, which allowed for the coordination of cooperation between

IBDiM and the military, which was crucial for effective action in the areas affected by the flood.

From 20–21 September 2024, reconnaissance was carried out in the Kłodzko region to identify the extent of damage and assess the feasibility of field investigations conducted by the IBDiM experts. On September 23, 2024, practical cooperation was initiated with the Polish Chamber of Civil Engineers (PIIB), the Association of Bridge Engineers of the Republic of Poland (ZMRP), and other experts. This made it possible to carry out activities related to the reconstruction of road and bridge infrastructure more effectively. A total of 47 IBDiM staff, 23 ZMRP experts and 15 PIIB experts were involved in the activities related to the assessment of the technical condition of engineering structures and roads.

On September 26, 2024, IBDiM began cooperation with the Polish Air Navigation Services Agency (PAŻP). As part of this cooperation, PAŻP provided two off-road vehicles, which enabled more efficient movement in areas affected by the natural disaster. Additionally, PAŻP supported IBDiM's activities by strengthening its field teams with drone operators responsible for monitoring and assessing the condition of bridge structures.

Figure 1 illustrates the main flowchart of activities related to the assessment of buildings whose technical condition was verified during inspections. Operationally, the flowchart represents the sequence of physical and informational activities performed at each stage of the procedure, enabling the transition to the next phases of the process. The project began with two separate information campaigns: one concerning bridge inspections and the other concerning road inspections. The campaigns were targeted at local government units located in areas affected by the state of natural disaster.

In response to information campaigns, IBDiM received orders to assess the technical condition of 620 bridge structures and 425 road sections, reported by local government units from 45 municipalities.

Figure 2 presents the breakdown of reports by voivodeship. Data analysis showed that 81% of reported bridges and 68% of reported roads originated from the Lower Silesian Voivodeship. The number of reports from the other voivodeships was small and remained at a similar level, with the exception of more pronounced differences in the number of reports concerning road sections in the Lubusz Voivodeship and bridges in the Opole Voivodeship. The spatial distribution of reports is presented in Figure 3.

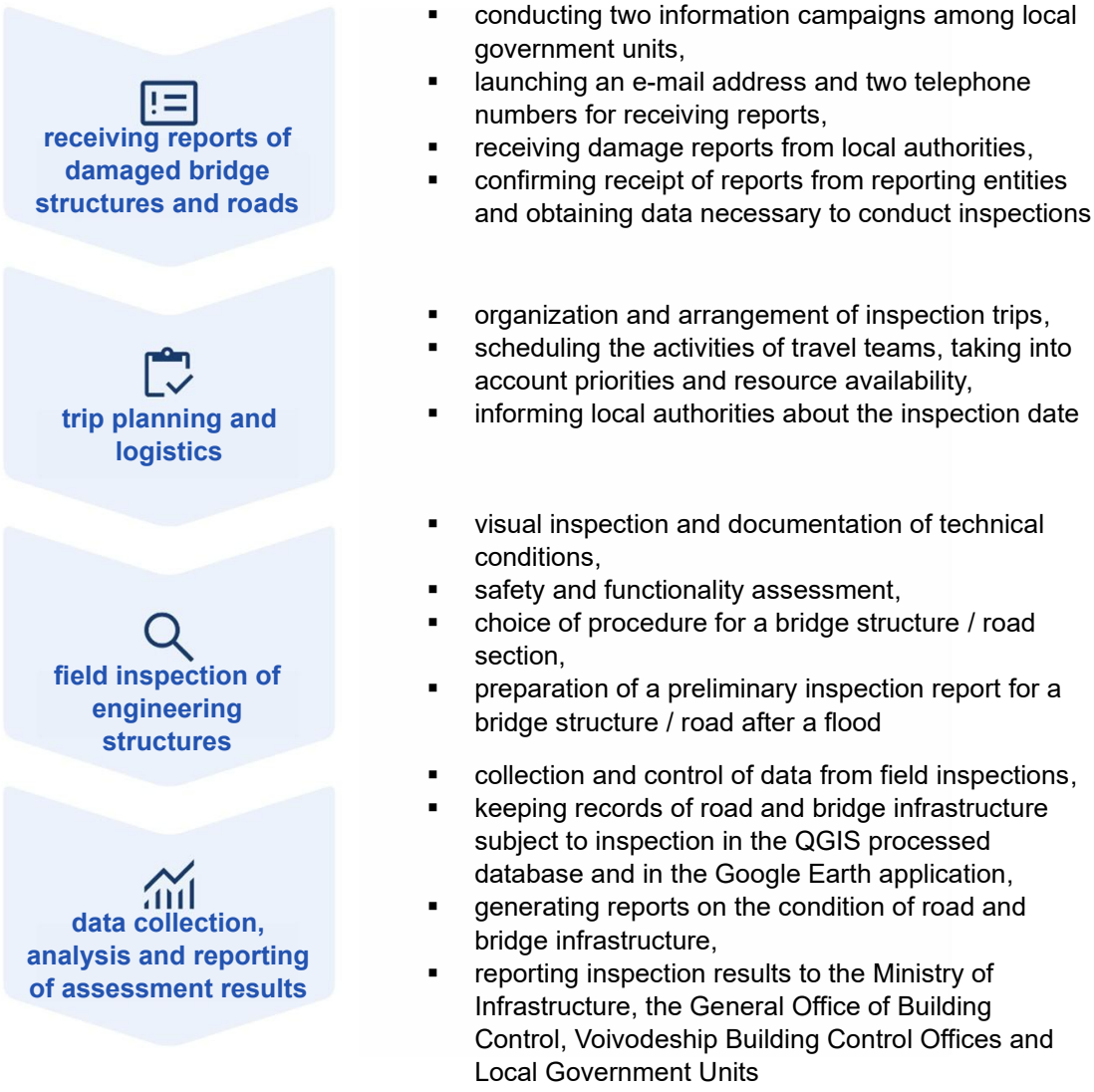


Figure 1. The process of assessing the technical condition of bridge structures and roads

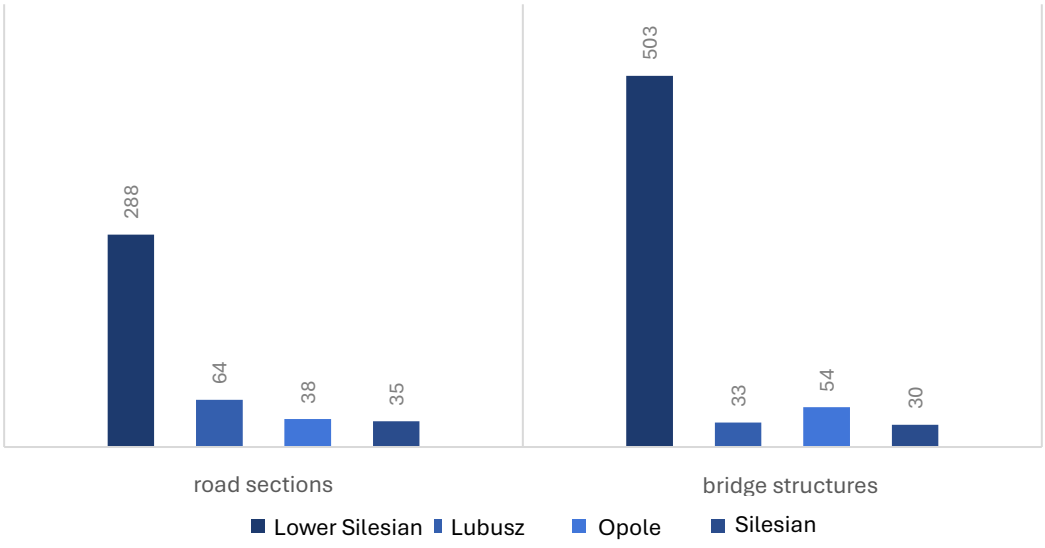


Figure 2. Distribution of reports by voivodeship

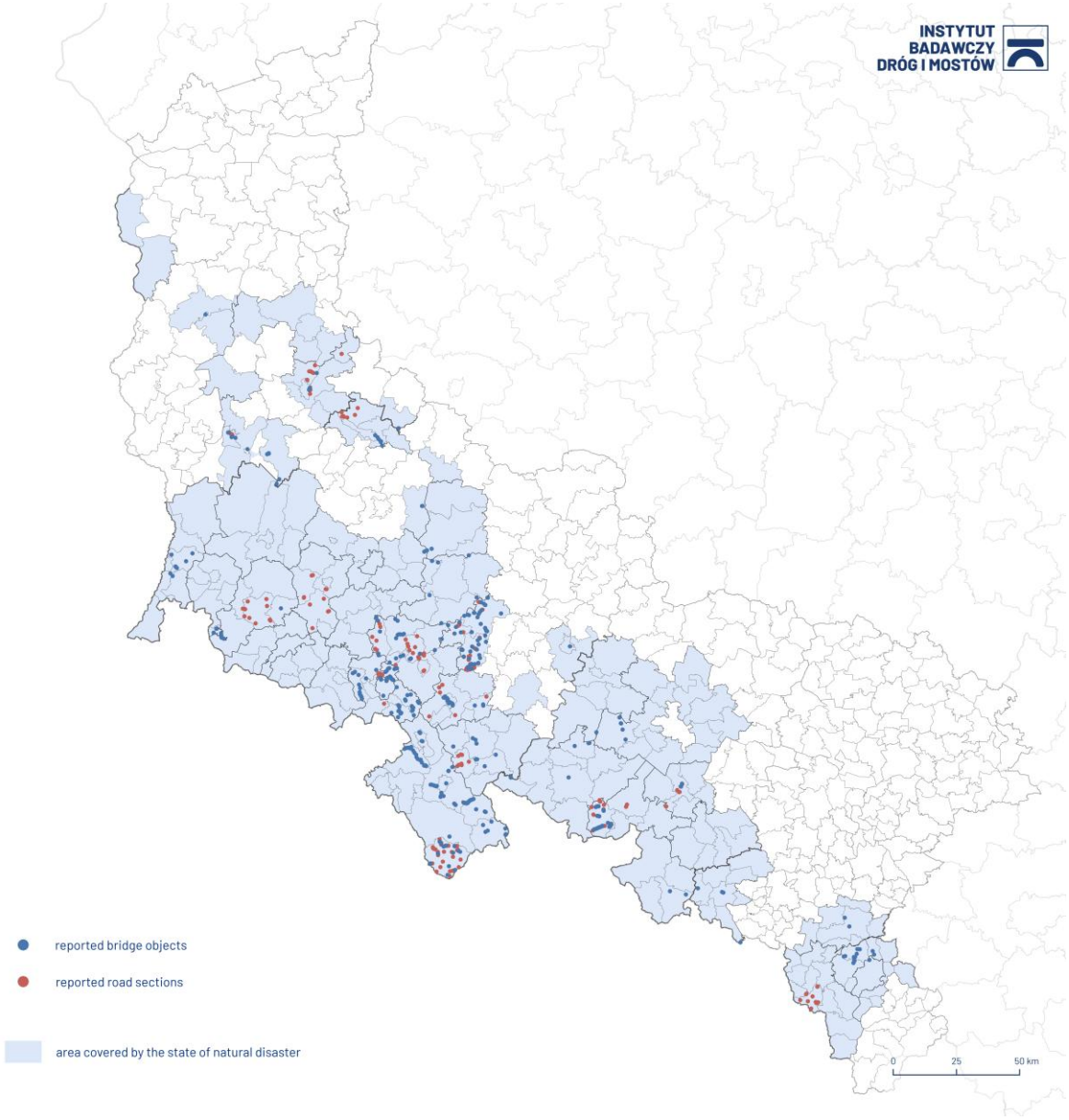


Figure 3. Map showing the spatial distribution of reports

Figure 4 shows the weekly distribution of reports, taking into account reporting entities, i.e., municipalities, indicating structures requiring inspection in their area. The analysis shows that the reporting process began in week 39 and ended seven weeks later. The highest growth rate of reports was recorded in weeks 42 and 43, when nearly 50% of all cases requiring field inspection were reported. In the remaining weeks, the number of reports was more variable, but most often ranged between 100 and 150 reported structures.

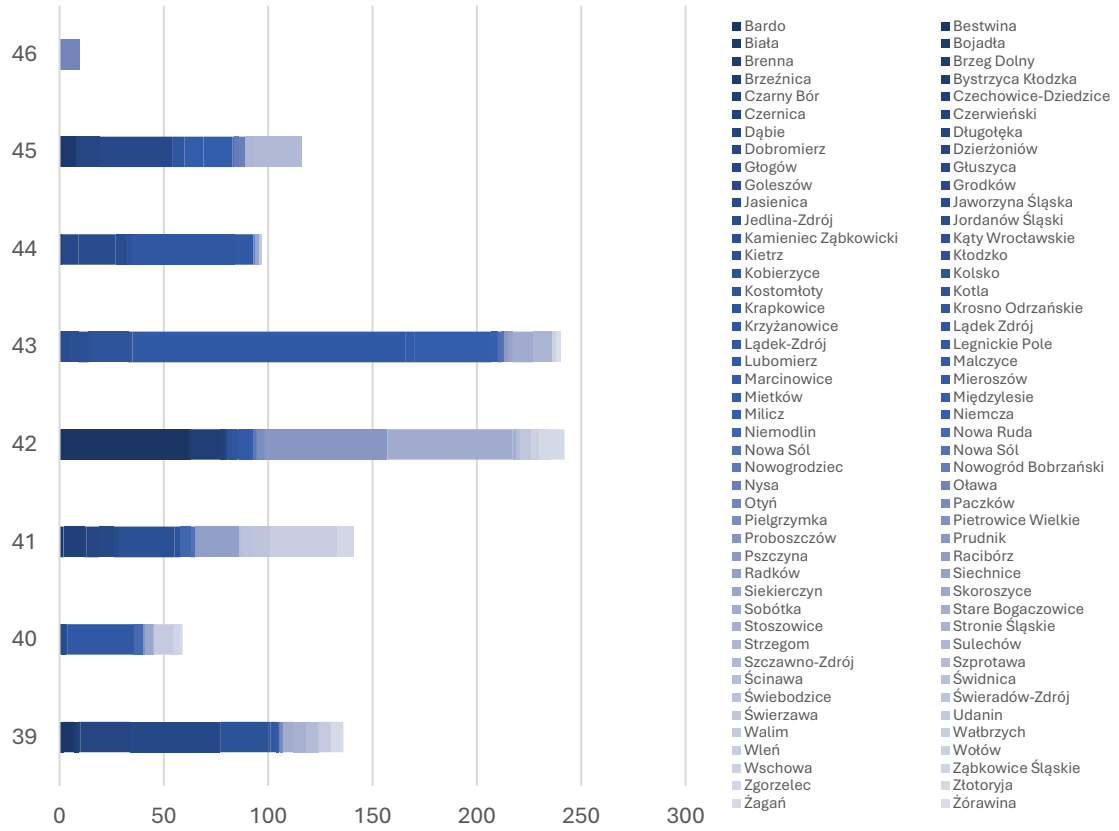


Figure 4. Distribution of reports by week and sender

Figure 5 shows the weekly distribution of reports by report type. Data analysis indicates that the highest number of reports related to bridges was recorded in weeks 39 and 43. Week 42, in turn, had the highest number of road reports, when local government units submitted 156 road sections for technical condition assessment.

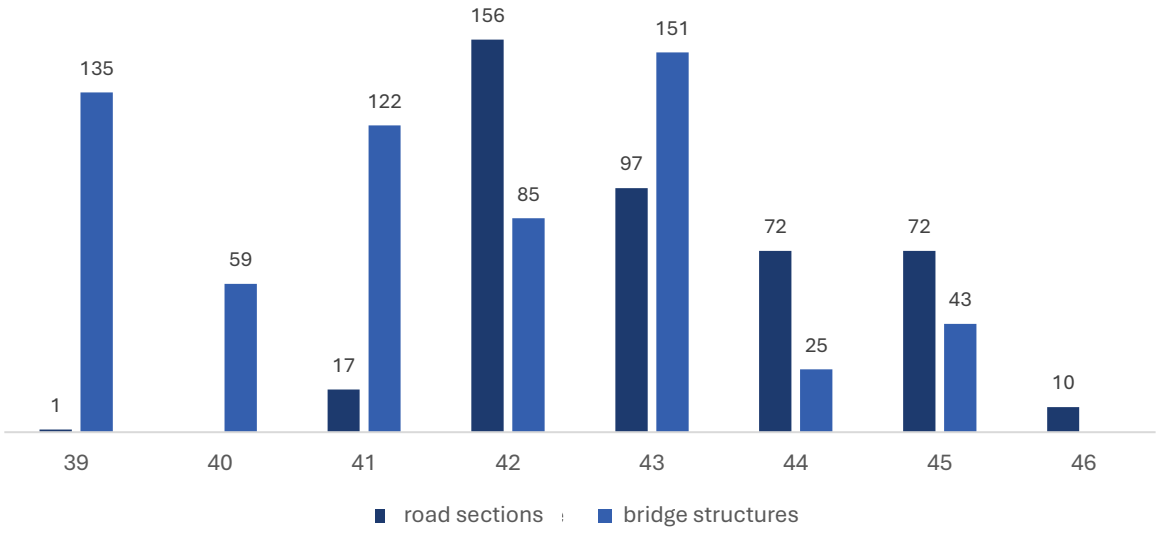


Figure 5. Distribution of reports by week and report type

The next stage involved entering reports into the system and conducting verification activities to ensure that the information contained in the reports was complete, accurate, and pertaining to public roads and engineering structures in areas affected by the state of natural disaster. Next, transportation for the inspection was organized, taking into account the priorities regarding the urgency of the reports and the availability of the teams.

The field inspection of the facilities was carried out by two-, three-, or four-person teams consisting of engineers and technicians. Their main tasks included: (i) technical condition assessment – verifying the structure of the facilities for damage, deformation, and other signs of degradation; (ii) technical documentation – preparing detailed descriptions and photographic documentation; and (iii) identifying intervention priorities – identifying areas requiring immediate remedial action or further detailed diagnostic testing. These activities formed the basis for decision-making as part of the subsequent process, which included data collection and analysis, and reporting results to various stakeholder groups.

Figure 6 presents the percentage distribution of completed inspections involving IBDiM experts and representatives of the ZMRP and PIIB. The data indicates that over 70% of all reports were handled by IBDiM inspectors. Some reports were completed as part of joint inspections between IBDiM and PIIB, and IBDiM and ZMRP.

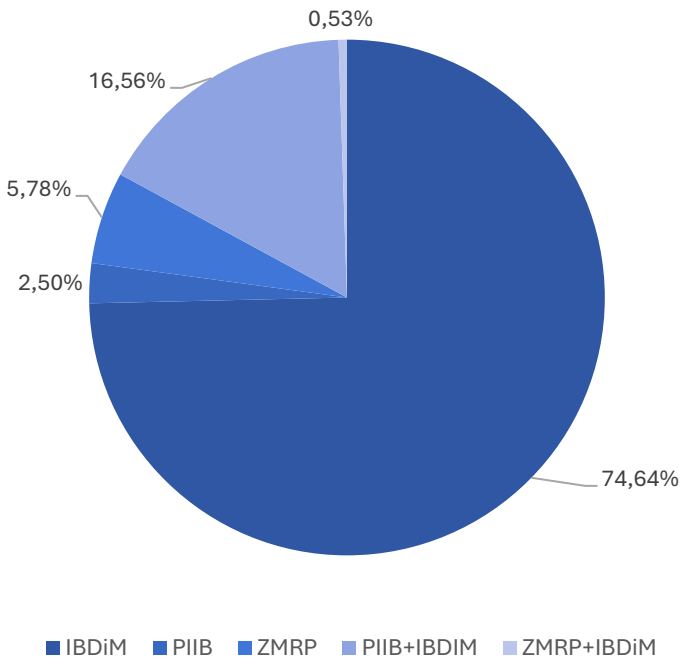


Figure 6. Level of involvement of evaluation units

5. Administrative and spatial conditions of the study area

State of natural disaster and administrative map of the areas affected by it

The flooding in Central Europe that occurred in September 2024 also left its mark on Poland. The flood affected four voivodeships: Silesia, Opole, Lower Silesia, and Lubusz. Due to the dramatic nature of the flood, which caused widespread destruction, on September 16, 2024, the Council of Ministers, pursuant to the Regulation of the Council of Ministers of September 16, 2024, declared a state of natural disaster in the areas affected by the flooding. The number of these areas increased daily until October 9, 2024, when the final regulation was announced, declaring one municipality to be under a state of natural disaster. The regulations were repealed a week later, on October 16, 2024, pursuant to the Regulation of the Council of Ministers of October 15, 2024.

The state of natural disaster affected a total of 310 municipalities, including the following areas:

a) in the Lower Silesian Voivodeship:
   - all municipalities located within the Bolesławiec, Dzierżoniów, Jawor, Kamienna Góra, Karkonosze, Kłodzko, Legnica, Lubań, Lwówek, Środa, Świdnica, Wałbrzych, Wołów, Ząbkowice, Zgorzelec, and Złotoryja counties, as well as the cities with county rights: Jelenia Góra, Legnica, and Wałbrzych,
   - in Głogów County: the urban municipality of Głogów, the rural municipality of Głogów, the municipality of Kotla, the municipality of Pęcław, and the municipality of Żukowice,
   - in Górów County: the municipality of Jemielno,
   - in Lubin County: the town and municipality of Ścinawa,
   - in Oława County: the urban municipality of Oława and the rural municipality of Oława,
   - in Strzelin County – Strzelin Municipality,
   - in Wrocław County – Kąty Wrocławskie Municipality, Mietków Municipality, and Sobótka Municipality;
b) in the Lubusz Voivodeship:
   - in Krosno County – Dąbie Municipality and Krosno Odrzańskie Municipality,
   - in Nowa Sól County – Bytom Odrzański Municipality, Kolsko Municipality, Nowa Sól Urban Municipality, Nowa Sól Rural Municipality, Otyń Municipality and Siedlisko Municipality,
   - in Słubice County – Cybinka Municipality and Słubice Municipality,
   - in Wschowa County – Szlichtyngowa Municipality,
   - in Zielona Góra County – Bojadła Municipality, Czerwieńsk Municipality, Nowogród Bobrzański Municipality, Sulechów Municipality, Trzebiechów Municipality and Zabór Municipality,
   - in Żagań County – Szprotawa Urban-Rural Municipality and Żagań Rural Municipality, as well as the city of Małomice and the city of Żagań;
c) in the Opole Voivodeship:

- all municipalities located within the Brzesko, Głubczyce, Krapkowice, Kędzierzyn-Koźle, Nysa, Opole, and Prudnik counties;

d) in the Silesian Voivodeship:
   - all municipalities located within the Bielsko-Biała, Cieszyn, Pszczyna, and Racibórz counties, as well as the city with county rights of Bielsko-Biała.

The areas affected by the state of natural disaster in southwestern Poland are shown on Figure 7.

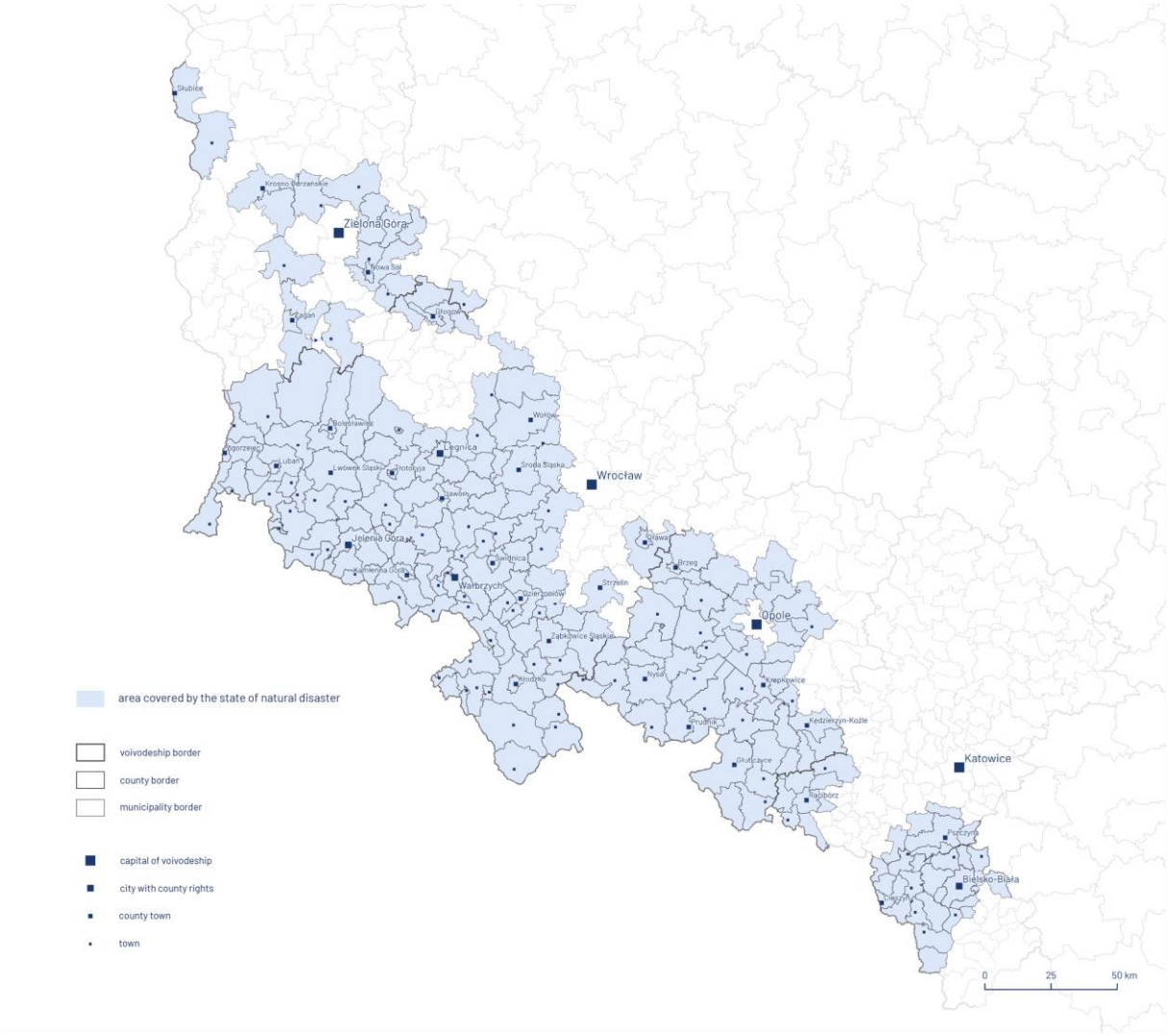


Figure 7. Administrative map of southwestern Poland with areas affected by a state of natural disaster

Demographic analysis of areas affected by a state of natural disaster

The demographic structure of the study area is relatively uniform and standard – higher population density is visible in cities with county rights and surrounding areas as well as in county towns, and lower population density is in municipalities. The exception is the area located in the Silesian Voivodeship, where the entire region is characterized by a very high percentage of inhabitants – these are the counties of Bielsk (including the city of Bielsko-Biała), Cieszyn, Pszczyna, and Racibórz. Generally, high population density within

the municipalities themselves is noticeable in mountainous and tourist regions – primarily in cities.

The cities with the largest populations in the natural disaster zone were:

- the city with county rights of Bielsko-Biała (Silesian Voivodeship): 165,127 people,
- the city with county rights of Wałbrzych (Lower Silesian Voivodeship): 99,463 people,
- the city with county rights of Legnica (Lower Silesian Voivodeship): 91,335 people[1].

The map below (Figure 8) shows the population in a kilometer grid obtained from the National Public Procurement Office (NPS) geo.stat.gus.pl (number of people per square kilometer) in Poland, with the area affected by the state of natural disaster highlighted. This area was inhabited by a total of 3,104,571 people.

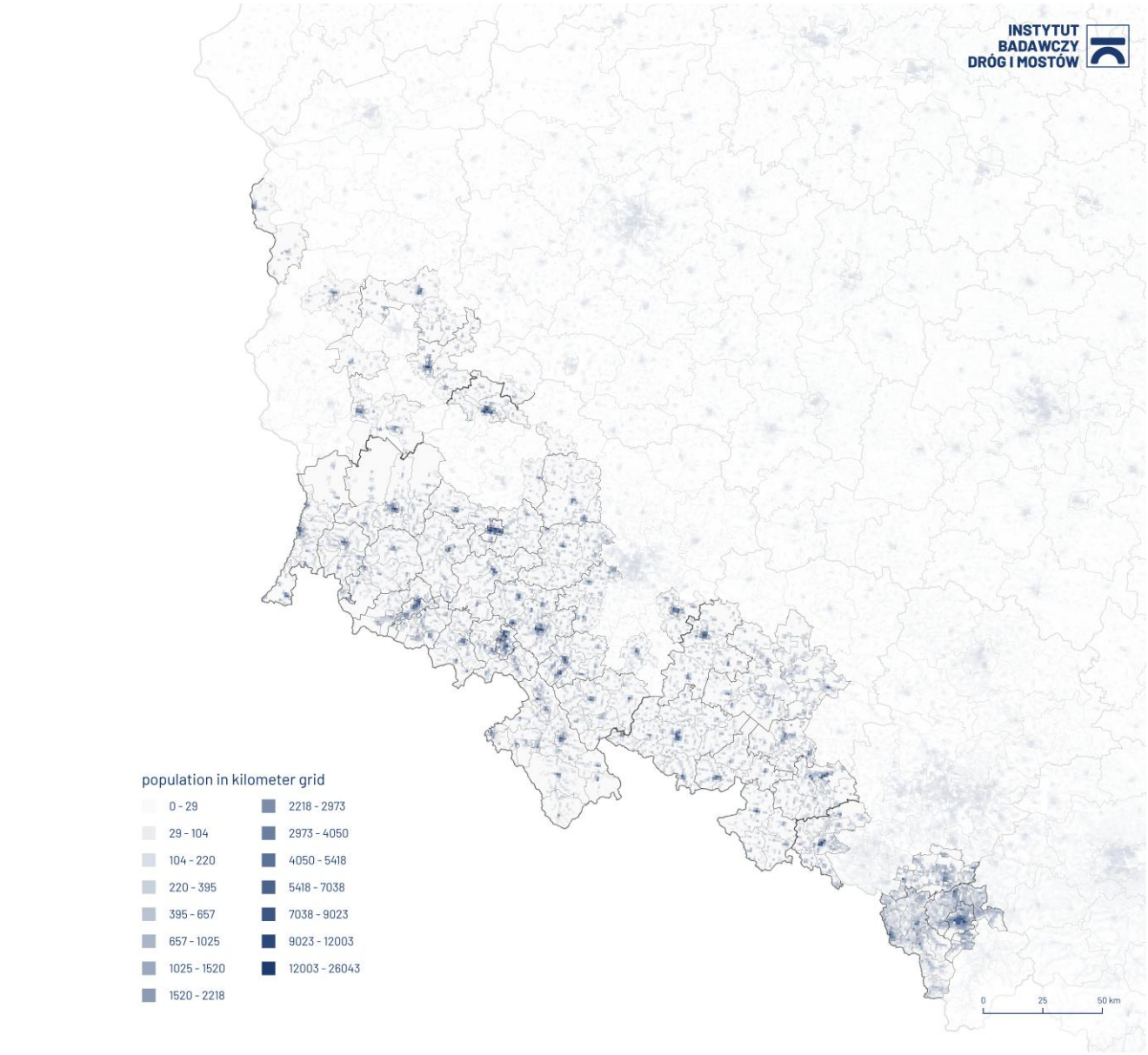


Figure 8. Demographic map showing the population in a kilometer grid

[1] according to Central Statistical Office data from June 30, 2024

Surface waters

The southwestern region of Poland is characterized by upland and mountainous terrain, which means it is home to numerous watercourses and other forms of surface water. The largest rivers in the analyzed area are the Oder, Vistula, Neisse, and Lusatian Neisse. These rivers, with the exception of the Vistula (which has its own river basin), lie within the Oder River basin and are part of the Baltic Sea drainage basin. Based on the analyses, the area affected by the natural disaster includes 134 rivers with a total length of 4,110 km and streams with a total length of 36,296 km.

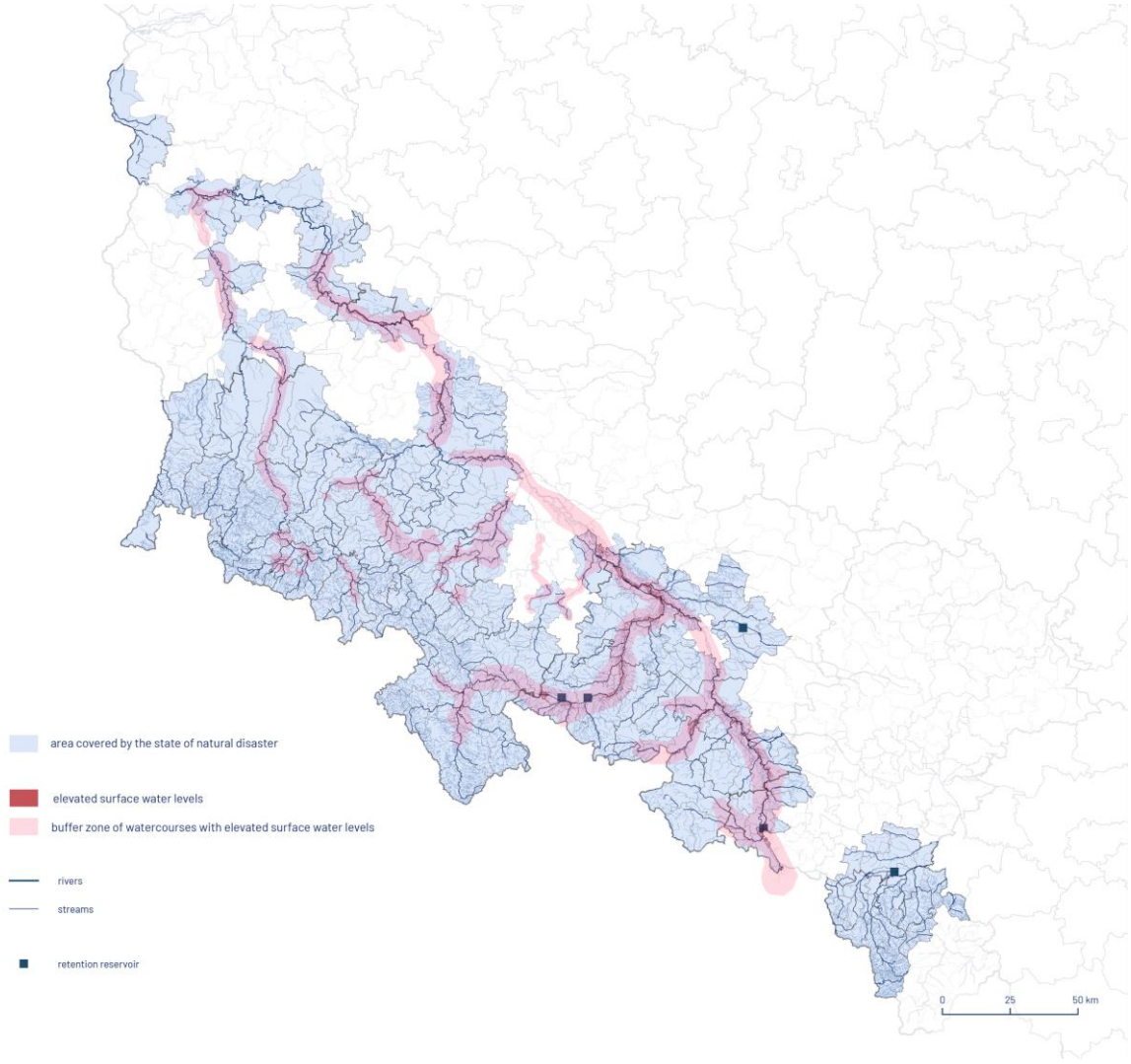


Figure 9. Map of hydrological conditions

The map above (Figure 9) shows the water network of the study area, as well as the elevated surface water levels resulting from this year's flood. Additionally, a buffer area has been designated on the map to identify areas most affected by flooding and structures vulnerable to flooding.

Road infrastructure

The state of natural disaster area is characterized by a dense road network, consisting primarily of national roads (including motorways and expressways), voivodeship roads, county roads, and municipal roads. The most important road sections running through the study area include: the A1 motorway, the A2 motorway, the A4 motorway, the A18 motorway, the S1 expressway, the S3 expressway, and the S8 expressway.

Below is a detailed road network diagram (Figure 10) by road category, based on BDOT10k data provided by the Head Office of Geodesy and Cartography, focused on the study area.

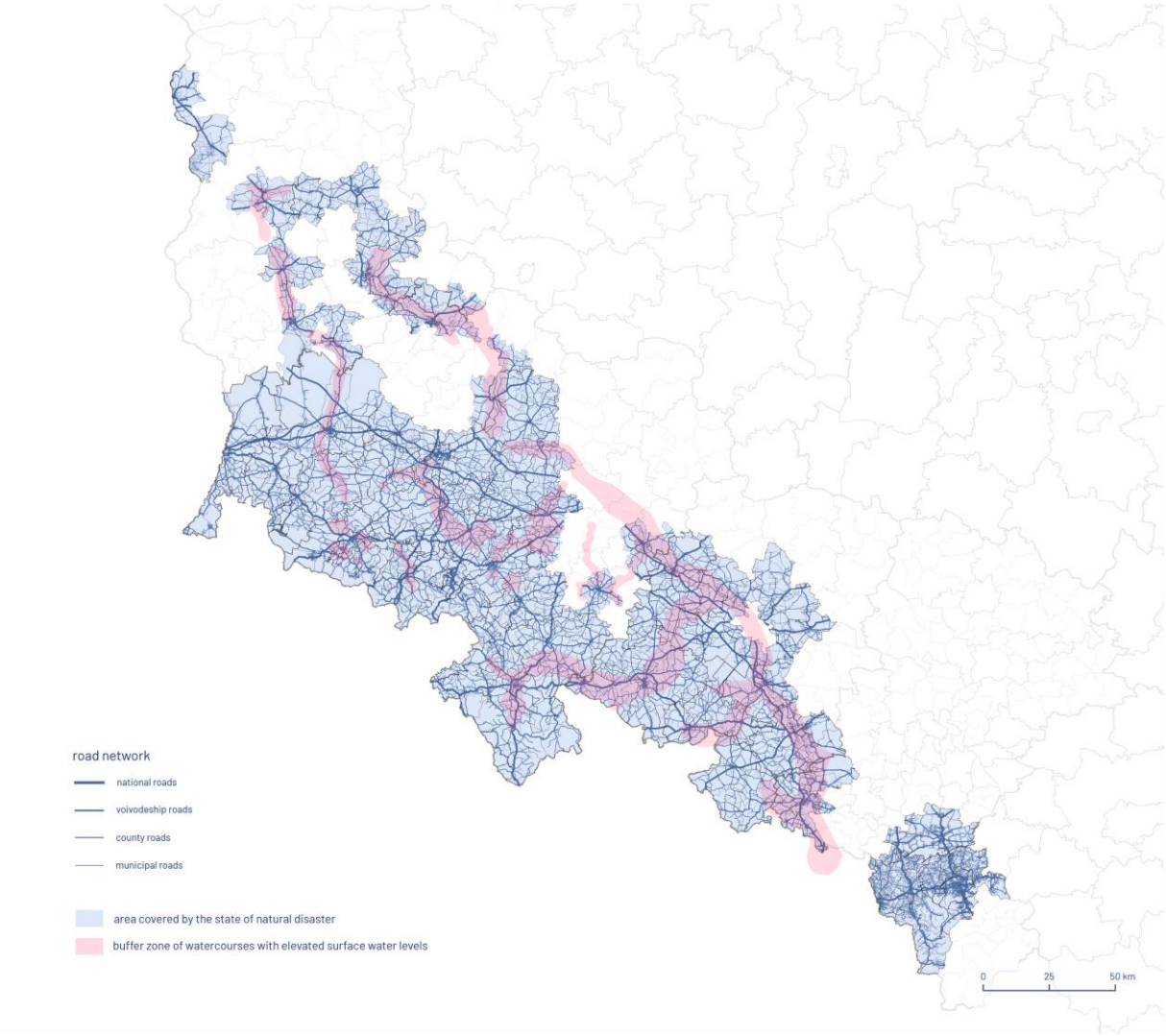


Figure 10. Road network map

The analysis of the database of topographic objects allowed us to determine the distance of roads located in the area of the natural disaster, divided into four categories of public roads presented in Table 1.

Table 1. Road network mileage

No.	Road Category	Mileage
1.	National road	1 824 km
2.	Voivodeship road	3 175 km
3.	County road	10 095 km
4.	Municipal road	14 654 km

Bridge structures

Due to the large number of rivers, streams, and creeks, the flood-affected area is characterized by a very large number of bridge structures. Using the BDOT10k database, bridges located along national, voivodeship, county, and municipal roads, as well as footbridges, were identified. Figure 11 shows these structures in the area of the natural disaster.

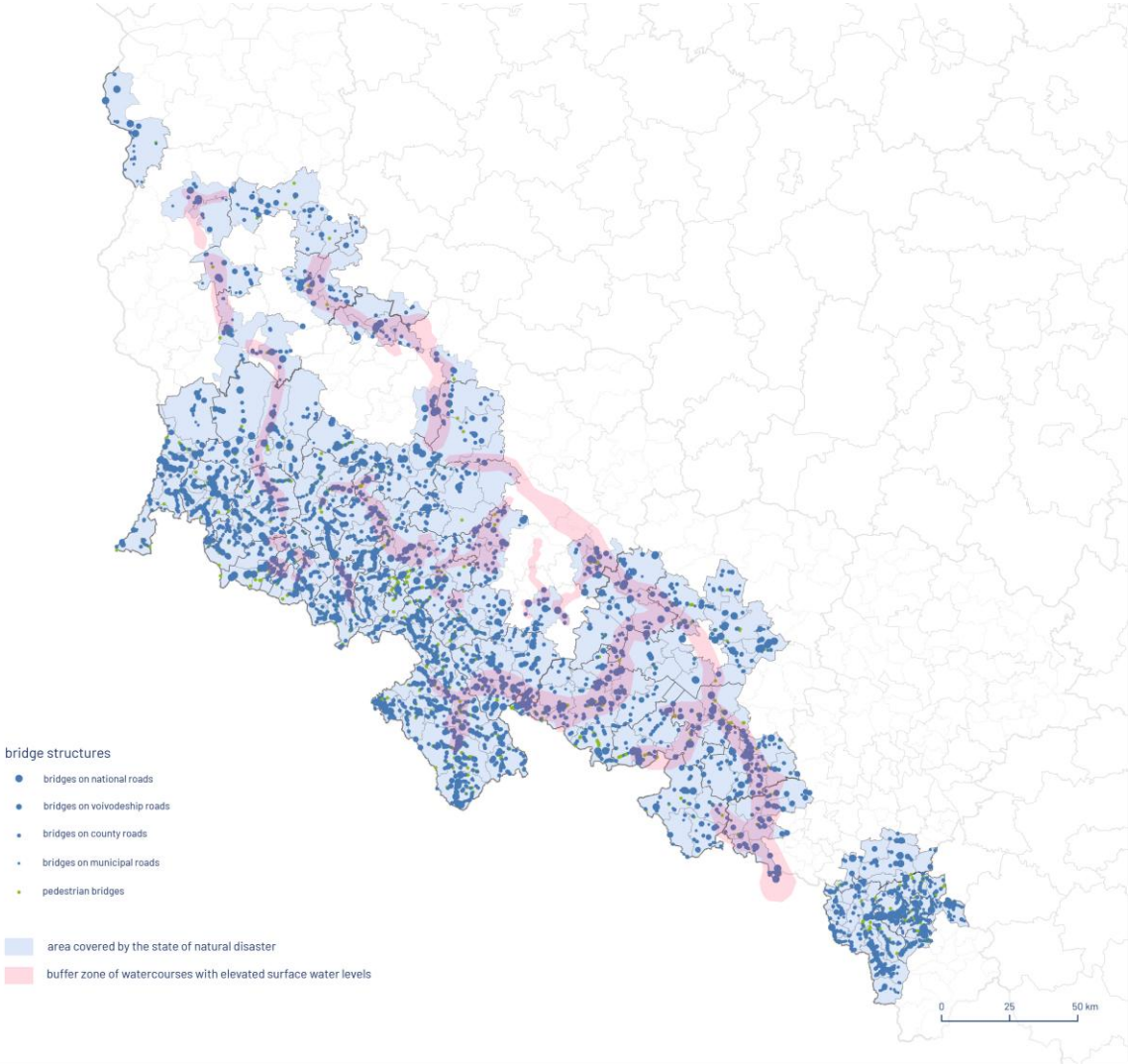


Figure 11. Map of bridge structures

Based on spatial analyses, a table was developed that presents the number and length of bridge structures, divided into previously defined categories.

Table 2. Bridge structures on public roads

No.	Bridge Structure	Amount	Total Length
1.	National road	327	14,6 km
2.	Voivodeship road	546	11,3 km
3.	County road	1934	22,6 km
4.	Municipal road	1780	18 km

6. Promotional activities carried out in connection with the implementation of the contract

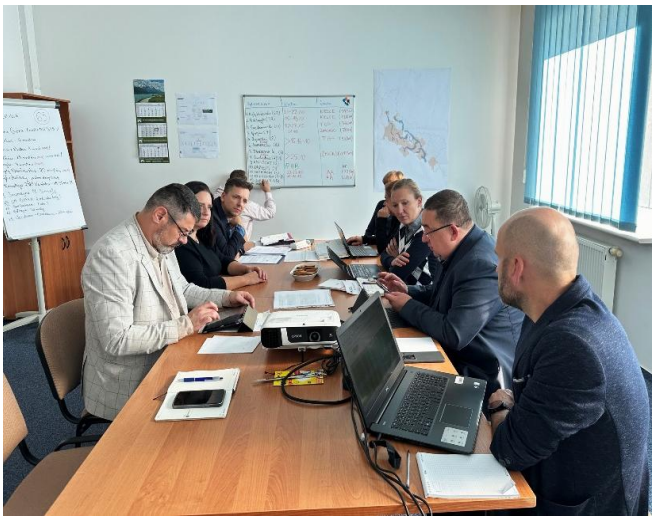
Promotional activities focused on widely disseminating information about the actions undertaken by IBDiM in response to the damage to road and bridge infrastructure caused by the September flood. This was achieved primarily through electronic communication channels, such as the IBDiM website, newsletter, and social media profiles: Facebook, LinkedIn, and X.

The table below provides a detailed description of the activities carried out by IBDiM to inform various stakeholder groups about the initiatives undertaken.

Table 3. Description of promotional and informational activities

No.	Task	Activity
1.	Informing on conducted expertise and damage assessments	▪ IBDiM website – 4 posts published, ▪ IBDiM social media – 30 posts published, ▪ IBDiM information newsletter – mentioned in 2 issues.
2.	Informing about cooperation with other scientific units and associations	▪ IBDiM website – 4 posts published, ▪ IBDiM social media – 30 posts published, ▪ IBDiM information newsletter – mentioned in 2 issues.
3.	Informing about the participation of the IBDiM director in meetings regarding post-flood activities	▪ IBDiM website – 2 posts published, ▪ IBDiM social media – 6 posts published.
4.	Participation in workshops and presentations	▪ On September 25, 2024, IBDiM participated in a workshop on the use of the JAŚMIN Crisis Management System in the Polish Armed Forces and state administration. The IBDiM Director presented the topic of road and bridge construction in flood-affected areas and discussed the potential use of the SZK Jaśmin system in tasks carried out by the Institute.
5.	Supervision of IBDiM experts over bridge load tests	▪ IBDiM website – 1 post published, ▪ IBDiM social media – 6 posts published, ▪ IBDiM information newsletter – mentioned in 1 issue.
6.	Reporting flood-damaged properties	▪ IBDiM website – a dedicated "Flood" tab was created, ▪ IBDiM social media – 3 posts published, ▪ IBDiM information newsletter – mentioned in 2 issues.
7.	Media	▪ Substantive input to news articles in Gazeta Wyborcza and RMF FM, ▪ Reports and interviews on TVP INFO - bridge load in Głuchołazy.

The photographs below show selected activities undertaken by IBDiM as part of promotional and information activities related to the implementation of the task.



7. Participation in the workshop entitled *Norms and standards in road and bridge engineering – infrastructure resilience in flood zones*

The Road and Bridge Research Institute provided substantive support for the workshop „Norms and standards in road and bridge engineering – infrastructure resilience in flood zones", which took place on November 27-28, 2024, in Wrocław. The workshop was organized by the Polish Road Congress Association and the Ministry of Infrastructure. Representatives of public road managers, scientists, road contractors, the military, and representatives of the Ministry of Infrastructure participated in the event. Three workshop sessions were held, during which participants jointly discussed the need to amend road and bridge guidelines and technical regulations. Information on this topic was published on the website and on social media profiles: Facebook, LinkedIn, and X. The photos below depict the workshop and discussions within each workshop group.

Conclusions from the workshop

Participants of the two-day workshop entitled: „Norms and standards in road and bridge engineering – infrastructure resilience in flood zones", carried out work related to identifying typical and unusual damage to roads and bridges in areas affected by the state of natural disaster during the flood in September 2024.

The aim of the workshop was to identify the need for changes and additions to the Recommended Road Guidelines (WR-D) and Bridge Guidelines (WR-M) and to identify the need for coordination between civil and military services involved in crisis situations.

The following material also provides a collection of conclusions and recommendations for flood-prone areas. Implementing these conclusions and recommendations will minimize future losses to road and bridge infrastructure and increase its resilience to flooding. In the case of civil-military operations, the conclusions and recommendations point to increased effectiveness of joint operations in crisis situations.

I. ROAD INFRASTRUCTURE

Typical damage to roads and their elements

Below are the results of identifying typical road damages that occurred during flood:

- washout, undermining, and erosion of embankment slopes and road structures,
- destruction of the upper part of the pavement structure due to the loss of interlayer adhesion between asphalt layers,
- loosening of subgrade layers made of unbound limestone aggregates,
- damage to external installations and infrastructure located within the road structure due to their location on the side of the hazard source, i.e., the river side,
- potential heave due to dampness in embankments after flooding,
- structural deformations (rutting) due to the premature opening of heavily damp road structures,
- silting, clogging of drainage elements with sludge deposited during the flood,
- destruction or disappearance of drainage ditches,
- destruction of small retention facilities,
- uplift of drainage pipes caused by water displacement due to lack of proper venting,
- washout of joints in concrete or stone paving after the passage of a flood wave,
- more frequent erosion of road structures in surfaces without curbs or retaining walls,
- greater risk of destruction of the entire road structure in surfaces without a hard shoulder,
- secondary road damage due to damaged riverbank protection, e.g., erosion of retaining structures.

Need for changes in regulations and Recommended Road Guidelines

The following are the needs for changes in the Recommended Road Guidelines (WR-D) and other regulations that will shape road infrastructure solutions in flood areas:

1) Risk analysis and planning

- Floodplain mapping – using hydrological models to identify areas at risk of flooding. The guidelines for the use of these models should be updated and made available, identifying the current version. Based on the mapping, road sections at risk of flooding should be identified.
- Spatial planning – avoiding road construction in high-risk flood zones or designing such sections with flood protection in mind. Building roads with hydraulic structures resistant to floodwaters, scouring pavement structures, embankments, and counterslopes. Developing standard design solutions for these roads.
- Road administration at all levels should introduce a classification of roads based on their significance during a flood event:
  - a road that is passable throughout its operational life – designed for the design risk of overtopping specified in the guidelines,
  - a road that is flooded but water-resistant and can be used immediately after the water level recedes,
  - other roads.

In the case of the above roads, temporary traffic management arrangements should be developed to be implemented in the event of a flood hazard or occurrence.

2) Drainage systems

- The need to update input data and calculation methodology for drainage systems. A detailed review of the adopted solutions should be conducted at the design stage due to the anticipated flood risk.
- Improved drainage – installing efficient drainage systems, such as drainage ditches, storm sewers, and culverts, based on the calculated flows as described in point 1. Adapting the geometry and design of drainage systems to the specific characteristics of floodplains and streamlining existing facilities, both technically and in terms of ownership.
- Retention systems – constructing retention reservoirs and floodplains that capture excess water within the existing area. Reservoirs and their location should be determined by hydrological calculations. The construction of regulating facilities in the retention/detention system should be based on computational models and water management in designated areas. Efforts should be made to restore areas that naturally function as marshes, wetlands, or forest retention facilities.

3) Durable materials and construction

- Water-resistant material – using concrete with low permeability and a low coefficient of thermal expansion and structures resistant to scouring, e.g. slope reinforcement, difficult-to-wash materials, sheet piles and retaining structures or, if it is better for the structure, introducing structures susceptible to flow – using culverts to relieve high water, permeable or easily release water materials, using drainage structures.

- Increased use of modified and highly modified asphalts and modifier-based emulsions, and improved road subgrade technologies for scours, which are crucial to road stability. Strict verification of the quality of completed work (including interlayer joints, binder content, compaction, etc.).
- The use of curbs with a stop, hardened shoulders and structures made of stone material enclosed, for example, with geotextile or similar after assessing the suitability of this technology for the given needs in the case of constructing embankments in order to prevent the structure from being washed away.

4) Maintenance and modernization

- Regular inspection and cleaning of drainage systems by all required owners and managers – improving the identification of responsibilities and ownership of the equipment and ensuring its proper identification.
- Introducing sanctions and enforcement tools for entities responsible for maintaining drainage infrastructure, such as maintaining culverts under access roads.
- Introducing regulations/procedures for preventive cleaning of flood-prone areas immediately before the expected flooding (loose elements/objects that may pose a threat during a flood wave).
- Regular inspections of road surfaces (especially before the season with increased rainfall) and their repair.

5) Green infrastructure

- Tree planting and renaturalization of areas outside riverbeds.
- Utilizing the restoration of natural riverbeds to reduce flood risk, taking into account specific local conditions.
- Green areas along roads – creating a green belt around infrastructure that absorbs excess water after technical, environmental, social, and economic analysis, including the necessary land occupation, both for greenery to compensate for the sealing of the area under the roads and for safety reasons for the use of the road itself. It is important to consider whether the greenery will restrict access to the road for both the public and emergency services. It is recommended to seek joint investments with managers of forests, wetlands, and other areas already serving similar functions.

6) Early warning systems

- Installing water level sensors and real-time monitoring systems to warn of threats.
- Developing procedures for rapid response and information provision to road users.
- In areas at risk, a systematic and uniform system for monitoring the condition of infrastructure before, during, and immediately after the threat subsides is required (this must be added to WR-D-83). This task may be part of a permanent monitoring system conducted by the Road and Bridge Research Institute as a National Research Institute.

7) Cross-sectoral cooperation

- Involving hydrologists, urban planners, and road engineers in the infrastructure design and modernization process.
- Collaboration with local communities to monitor and respond to threats.

8) Actions during a flood

- The need for visual or automated monitoring of flooded infrastructure (aerial monitoring is also recommended).
- The need to create a catalog of best practices – elements related to the actions of road managers in WR-D-83 should be included.

9) Education and awareness

- Conducting information campaigns on safe road use during a flood.
- raining services responsible for infrastructure management.

10) Legal, formal and administrative matters

- Similarly to mining damage, the regulation on technical conditions should be amended to include the requirement to consider the risks and threats associated with high water levels.
- Introduce a provision in the regulation on technical conditions requiring the consideration of flood risk for roads in at-risk areas.
- Introduce a program for securing road infrastructure against disasters for all road managers.
- Include provisions in the Reconstruction Acts that address the possibility of implementing temporary solutions.

II. BRIDGE INFRASTRUCTURE

Typical damage to bridges and their components

Below are the results of identifying typical bridge damages that occurred during a flood:

- erosion of the cone foundations, resulting in their landslide, which initiated the erosion process, and scouring/breaking the continuity of the road structure at the junction with the abutment, resulting in scouring/collapse of the transition slab,
- scouring of the abutment and pier foundations,
- displacement/subsidence of abutments and retaining structures,
- scouring/displacement/subsidence of retaining structures at the inlet and outlet of engineering objects,
- sliding of a span off its bearings,
- scouring of the riverbed,
- damage to riverbed reinforcements within the structures,
- sediment deposits within the piers, the subgrade, and the span,
- damage to bridge equipment (railings, barriers, lighting, etc.),
- damage to external equipment on the structure,
- damage to individual object components caused by unexpected impacts by elements carried by water (logs, boulders, building elements, vehicles, etc.).

Most of the damage was caused by insufficient foundation of engineering structures. With a deeper foundation or intermediate foundation, the extent of the damage would have been less severe.

Need for changes in regulations and Recommended Bridge Guidelines

The following are the needs for changes in the Recommended Bridge Guidelines (WR-M) and other regulations that will shape road infrastructure solutions in flood areas:

1) Implementation of new formulas/models for calculating water flows in rivers, taking into account current climatic conditions (atmospheric, hydrological) and local weather phenomena characteristic for a given area.
2) Development of comprehensive hydrological models (natural and extreme states) for the entire river system, defining flow parameters, taking into account the river's characteristics (mountain, foothill, and lowland) and the technical parameters of hydraulic structures (including retention reservoirs). These models should be developed by a team of hydrologists supported by specialists in other fields. Continuous data updates based on current measurements are essential.

3) Include devices for real-time measurement of water flow parameters in the Guidelines, install these devices on structures, and continuously transmit data to the Institute of Meteorology and Water Management (IMiGW) to update flow models. Warning data should be forwarded to the road manager so that appropriate action can be taken (traffic restrictions or complete closure of the structure).
4) Development of Guidelines for the design of engineering structures in areas at risk of high water levels, taking into account the time and duration of high water levels and flow rates (areas with flash floods, areas with flood surges).
5) Development of Guidelines for auxiliary services specifying the maximum level of lifting temporary embankments during a flood, which will minimize the risk of water accumulation by bridge structures.
6) Implementation of solutions ensuring the unity of assumptions for calculating the area of the reduced catchment area (local spatial development plan, development decisions, biologically active area, small retention, etc.)
7) Development of Guidelines for the design of engineering structures for emergency situations (including additional dynamic loads from elements carried by flood waters, backflow from the mouth to another stream, and plugs from sediments).
8) Development of Guidelines for the ongoing maintenance and upkeep of engineering structures.
9) Implementation of regulations specifying the extent of tree cover within watercourses, particularly mountain streams.
10) There is a need to create and manage a database of civic temporary bridges (foldable structures). This task could be carried out by individual divisions of the General Directorate for National Roads and Motorways (GDDKiA), which would increase the ability to respond to crisis situations.
11) In areas prone to flooding, especially in mountainous regions, it is recommended to use frame bridges (integrated bridges), founded so that any possible undermining of the supports does not cause them to subside or rotate. Regulations related to submersible bridges in these areas are also necessary.
12) In flood areas or areas exposed to long-term water impact, design road embankments at the junction with engineering structures as hydrotechnical structures.
13) When designing abutments, it is necessary to increase the depth of foundation erosion, especially on mountain and foothill rivers.
14) Indirect foundation of all abutments and, in particularly justified cases, block abutments (definition and description should be included in the Guidelines) - direct foundation on rocks or rubble.
15) Securing the foundations with a permanent sheet pile wall.
16) Use of massive abutments (taking into account the buoyancy force).
17) Use of massive foundations under river pillars and in mountainous areas enclosed with palisades or sheet pile walls.
18) Limiting the use of columnar pillars.

19) Limiting the number of river abutments (on mountain rivers only single-span structures, in exceptional cases multi-span ones).
20) Abandonment of suspended wings in favour of retaining structures incorporated into the road body (reaching at least 7-10 m from the abutment wall).
21) Water jetting at the inlet and outlet.
22) Designing bridge elements up to the level of reliable water as hydrotechnical structures in terms of durability and resistance to high water levels.
23) Designing submersible structures, especially on lower class roads (if lifting is not possible).
24) Designing facilities with flow reserve (e.g. application of safety factors depending on the road class and the nature of the watercourse).
25) Use of "reserve" dry culverts behind abutments, in the road body.
26) Strengthening the cones and the area under the engineering structure with heavy hydrotechnical stone rip-rap or gabion reinforcement on concrete and geotextile.
27) Prompt sealing and repairs of concrete bridge elements are essential during their operation. Cracks and gaps in these elements can lead to accelerated deterioration, and in the event of a flood, the complete "washout" of structural elements – especially abutments.
28) In mountainous areas, designing abutments as hydrotechnical structures enabling quick reconstruction of the bridge using temporary structures and marking the axis of the temporary bridge as a spare crossing.
29) Use of water wells/covers for stream abutments.
30) Use of quickly dismantled equipment elements of engineering structure.
31) Ongoing maintenance of the riverbed.

Most of the above recommendations can be applied to railway engineering structures.

III. BRIDGE IN GŁUCHOŁAZY – ASSUMPTIONS FOR RECONSTRUCTION

The bridge workshops included an attempt to develop guidelines for the construction of a permanent bridge in Głuchołazy, at the request of the General Directorate for National Roads and Motorways (GDDKiA). Below are the guidelines for the bridge reconstruction project:

- the use of massive abutments behind the strengthening of the riverbed embankments,
- intermediate foundation of abutments,
- use of a single-span structure with a supporting structure above the bridge deck,
- design of a submersible structure
- use of quickly removable structure elements,
- streamlining of the river bed,
- reconstruction of the weir below the bridge into a flap-type one,

- taking into account exceptional situations in the design, including impacts from objects carried by flood waters and sediments,
- adopting a greater washout depth for design.

IV. ACTIVITY OF CIVIL-MILITARY SERVICES DURING FLOODS

1) Identification of technical, organizational and legal problems related to the natural disaster of September this year and previous years:

Preparation for flood action

Key issues related to the preparation of civilian and military services for flood response were identified, focusing on:

- increasing the effectiveness of preparatory activities,
- improving coordination of activities,
- better acquisition of equipment and personnel resources,
- improving cooperation at various levels of crisis management.

Particular attention was paid to issues related to the organizational preparedness of local government units, particularly in terms of knowledge of procedures and operational plans for crisis management. The important role of civil-military training and exercises in improving preparedness at the local level was also emphasized. It was pointed out that flood operations had omitted the need to engage experts to assess the condition of engineering structures. Research conducted prior to a crisis, as well as expert opinions conducted after the flood, could significantly contribute to a more comprehensive verification of the technical condition of these facilities and better preparation for future threats.

Conclusions:

- *It was found that local government units are insufficiently prepared for crisis management, mainly due to a lack of appropriate training, underfunding, and staffing shortages among those responsible for crisis management at the municipal level. There is also a lack of clear lines of responsibility and designated leaders within local government units.*
- *A lack of guidelines/regulations for local governments regarding the preparation of areas before and during flood threats was identified. An example could be the actions of local governments in the Czech Republic during floods, where they removed elements and objects that, if carried away by water, could pose a threat to buildings, road and bridge infrastructure.*

Technical challenges

Key technical issues encountered at various stages of flood response were discussed, focusing on the need to improve resource availability and utilize modern technologies for information exchange. Difficulties related to coordinating the use of equipment and resources during crisis response were highlighted, as was the need for effective management of technical infrastructure using IT systems. A significant part of the discussion focused on issues related to receiving damage reports (imprecise reports) for the purpose of assessing the technical condition of bridge and road infrastructure.

Conclusions**:**

- *A need was identified for a central database containing comprehensive information about equipment, including its location, technical parameters, condition, and usage history. A significant improvement would be the ability to track equipment in real time, significantly increasing transparency and enabling better control over the management of resources used in flood relief operations.*
- *The national strategic reserves should be analyzed with a view to acquiring additional heavy equipment, for example by concluding framework agreements with owners and, additionally, introducing a system of insurance policies for equipment that will be destroyed during operations.*
- *Actions should be taken to create a telecommunications shield by building a stationary and mobile radio communication system implemented with external systems and implementing satellite communication (independent of mobile telephony, which is overloaded or does not work at all in crisis situations).*

Organizational challenges

Key organizational issues related to resource management and interorganizational cooperation were discussed. Difficulties in information exchange and communication were highlighted, resulting in a lack of full knowledge of the actions undertaken by other entities involved in flood relief operations. As a result, coordination of operations was hampered, and various services duplicated their responsibilities. Particular attention was paid to the problem of cooperation with private entities that possessed equipment that could be used during rescue operations. An additional organizational challenge was the limited availability of crisis management experts and individuals capable of coordinating local operations, which negatively impacted the effectiveness and efficiency of crisis management tasks.

Conclusions:

- *There is an urgent need to implement an integrated IT system for crisis management that will significantly improve coordination of operations and information flow. This system should encompass all entities involved in flood operations, including emergency services, central and local government administration, research institutes, and organizations such as PGW Wody Polskie. The proposed system should have a modular architecture, with a key communication and coordination module. This module should offer a unified information exchange platform, a central database, and real-time activity tracking functionality, enabling more effective*

resource management and better response to dynamically changing crisis situations.

Legal challenges

Difficulties arising from legal regulations regarding cooperation, administrative barriers, and legal liability were discussed. Attention was drawn to the lack of regulations regarding access to private land and the possibility of utilizing the resources of other entities. The need for a clearer division of responsibilities and competencies was emphasized.

Conclusions:

- *A directory of individuals and organizations should be created as a database of entities involved in crisis management activities. This system should include mechanisms for civilian involvement, with appropriate regulations for formal issues such as leave, remuneration, tax aspects (e.g., in the context of providing pro publico bono services, in cooperation with the Ministry of Finance), and rules for deployment to specific crisis situations. Such a directory will streamline the process of mobilizing human and organizational resources, ensuring greater efficiency and clarity in managing support during crisis situations.*
- *A system of training and knowledge development for local governments and entities involved in crisis management activities should be created.*
- *It is necessary to eliminate gaps in awareness of the regulations at the municipal level and prevent their misinterpretation.*
- *Spatial planning should take into account flood areas to minimize flood risk.*
- *It is recommended to introduce the possibility of using direct procurement in crisis situations, which will speed up decision-making processes and the implementation of actions.*

2) Technical, organizational and legal solutions before, during and after a natural disaster – assumptions for joint civil-military guidelines

The table below (Hadonna matrix) presents a comprehensive overview of technical, organizational, and legal solutions at various stages of flood management, identifying key areas requiring improvement. The presented solutions provide a general framework for future interventions and remedial actions.

Implementation of the proposed directions should begin with the establishment of working teams composed of experts in the relevant fields. These teams will be responsible for a thorough analysis of existing solutions, identifying existing gaps based on experience, and developing improvements. Their work will result in the development of detailed action plans that will take into account specific local, technical, and organizational conditions, increasing the effectiveness of implemented solutions.

Table 4. Technical, organizational and legal solutions before, during and after a flood

Specification	Technical Solutions	Organizational Solutions	Legal Solutions
Before the Flood	▪ Improvement of the early warning system for hazards. ▪ Digitization of data and creation of a platform for real-time information exchange with individual access levels tailored to assigned tasks.	▪ Training and exercises for civil and military services on crisis cooperation. ▪ Establishing procedures for cooperation between civil and military units. ▪ Developing evacuation and supply plans. ▪ Creating strategic reserves. ▪ Prioritizing facilities based on safety, mobility, and social importance (at the municipal level).	▪ Drafting legal acts regulating the allocation of financial resources for disaster recovery. ▪ Framework agreements with entities possessing heavy equipment necessary for rescue operations. ▪ Defining the responsibilities of public institutions and other entities in disaster situations. ▪ Spatial planning that considers flood risk.
During the Flood	▪ Activation of monitoring systems and assessment of the threat scale. ▪ Use of drones and satellite technology for real-time monitoring of affected areas.	▪ Establishing a crisis management team with representatives from military and civil units. ▪ Defining a clear command chain. ▪ Coordinating rescue and evacuation efforts at the regional and local levels. ▪ Ensuring rapid communication between emergency services and residents (e.g., via SMS alerts, social media). ▪ Securing shelters and providing essential resources.	▪ Activation of emergency regulations allowing faster decision-making (including temporary acquisition of private land and technical resources for rescue operations). ▪ Developing regulations to protect the rights of disaster victims. ▪ Establishing laws to facilitate quick access to private resources for rescue purposes.
After the Flood	▪ Assessment of damage extent and prioritization of recovery actions. ▪ Data collection and analysis to improve early warning systems.	▪ Compiling reports on rescue operations and infrastructure reconstruction. ▪ Reorganizing procedures based on lessons learned from completed actions. ▪ Providing social and psychological support for affected individuals.	▪ Enabling the rapid disbursement of compensation for affected individuals and entities. ▪ Modifying legal regulations based on conclusions from conducted actions (e.g., clarifying responsibilities of different services, improving spatial planning). ▪ Creating regulations supporting reconstruction.

8. Assessment of the technical condition of bridge structures and possibilities of their use after the flood

The task related to the assessment of the technical condition of road engineering structures damaged as a result of flooding or landslides in September 2024 was carried out from September 23, 2024 to December 15, 2024. As part of this task, 483 bridge structures were inspected[2].

The technical condition of the bridge structures was assessed using the protocol template presented below. A key element of the protocol was determining the further course of action for the bridge structure, based on the observed damage. The analysis included an assessment of the condition of the abutments and piers, the load-bearing elements of the spans, the roadway surface, access roads, the surrounding area, and other identified damage.

The assessment categories, in accordance with the prepared protocols for bridge structures, are as follows:

- **A**: Approved for use under the existing conditions – 326.
- **B**: Approved for use to a limited extent – 36.
- **C**: No approval for use - renovation or reconstruction required – 52.
- **D**: Demolition of the structure/construction of a temporary crossing – 37.

Among the above assessments, 57 facilities were classified as category **E**, which indicates the need to conduct a detailed expertise.

The spatial distribution of bridge structures along with the assigned assessment categories is presented in Figure 12. The data analysis shows that the largest number of structures assessed in categories C and D are located in the Lower Silesian Voivodeship, the area most affected by the effects of the September flood.

[2] 32 protocols were submitted to local government units by ZMRP, bypassing IBDiM.

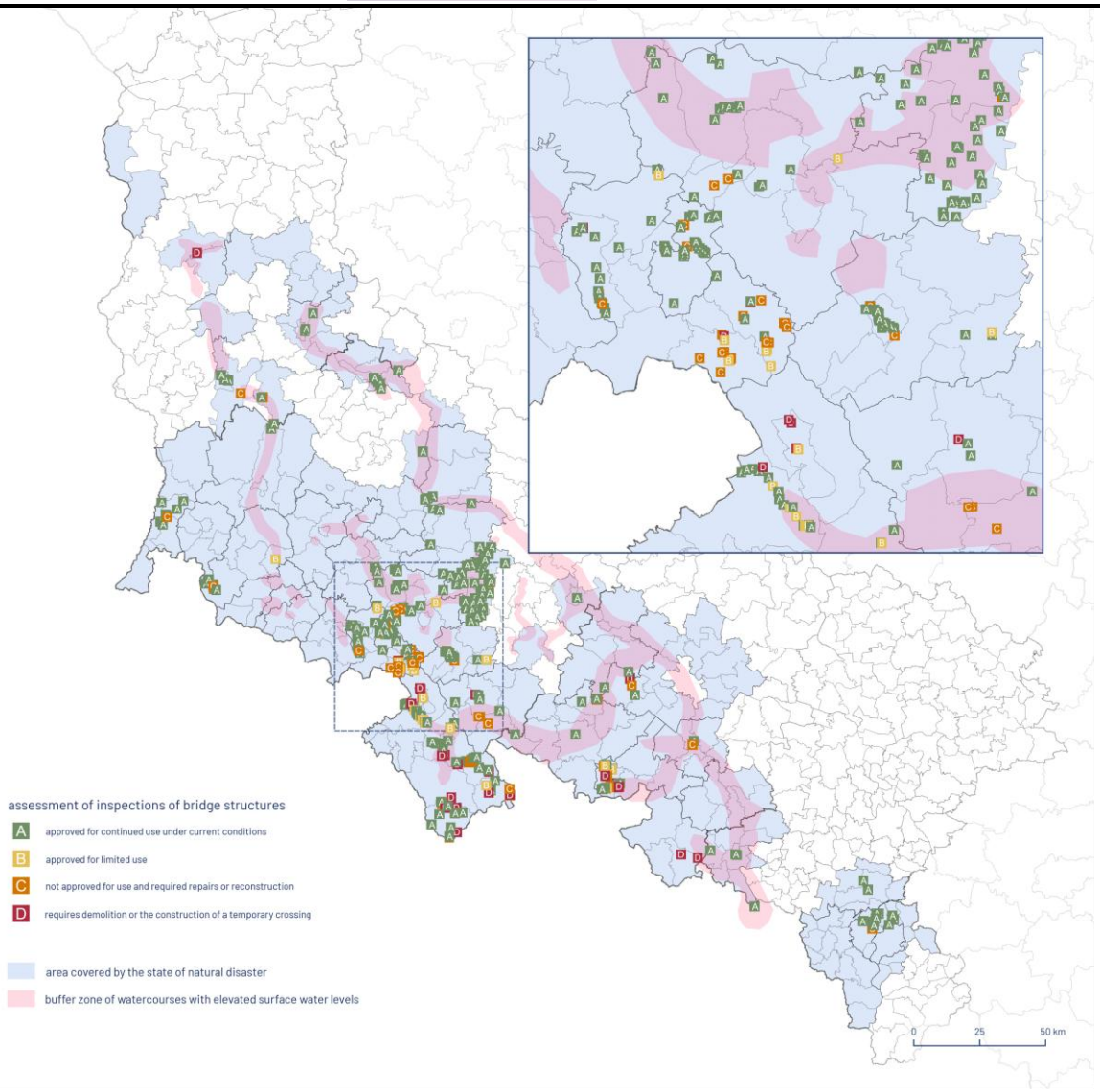


Figure 12. Spatial arrangement of bridge structures with assigned assessment categories

PROTOCOL OF THE PRELIMINARY INSPECTION OF THE BRIDGE STRUCTURE AFTER THE FLOOD			
Assessment of the technical condition of the structure and its usability after the flood			
GENERAL INFORMATION ABOUT THE STRUCTURE			
UNI		**Administrative unit, municipality**	
Road no		**Name and type of the obstacle**	
Mileage		**Structure width**	
GPS coordinates		**Structure length**	
Structure manager	Name		
	Address		
	Phone number		
Photo of the structure (side view)			

CHOICE OF PROCEDURE FOR THE BRIDGE STRUCTURE	YES/ NO
A. Approved for use under the existing conditions	
B. Approved for use to a limited extent Approved: weight……speed…… number of traffic lanes…….	
C. No approval for use - renovation or reconstruction is required	
D. Demolition of the structure/construction of a temporary crossing	
E. Additional expert assessment required	

BRIEF DESCRIPTION OF DAMAGE
No damage YES/NO **Small damage** YES/NO **Multiple damage** YES/NO

PERSON CARRYING OUT THE ASSESSMENT	
First and Last Name	
Name of the unit company/university/institute	
Construction license number	
PIIB membership number	
Phone number	
Consent to the processing of personal data contained in the form	

DAMAGE DESCRIPTION AND PHOTOGRAPHIC DOCUMENTATION
Condition of abutments and pillars – photo no
Condition of the span-bearing unit - photo no
Condition of the road pavement on the structure - photo no
Condition of the access roads - photo no
Damage of structure surroundings or other damage - photo no
ADDITIONAL NOTES

9. Assessment of the technical condition of road sections and possibilities of their use after the flood

The task of assessing the technical condition of public roads damaged by floods or landslides in September 2024 was carried out from October 1, 2024 to December 15, 2024. As part of this task, 278 road sections were inspected.

The technical condition of road sections was assessed using the protocol template presented below. A key element of the protocol was determining the next course of action for the road section, based on the observed damage. The analysis included an assessment of: the condition of the road surface, the condition of the shoulders, the condition of culverts, the condition of equipment, including road safety devices, and other damage within the roadway.

The assessment categories, in accordance with the prepared protocols for road sections, are as follows:

- **A**: Approved for use under the existing conditions – 213.
- **B**: Approved for use under the existing conditions, with the section to be observed indicated – 51.
- **C**: Approved for use to a limited extent – 5.
- **D**: No approval for use - renovation or reconstruction required – 4.
- **E**: Road demolition/construction of a temporary road – 5.

Among the above assessments, 48 road sections were classified as category **F**, which indicates the need to carry out a detailed expertise.

The spatial distribution of road sections, along with the assigned rating categories, is presented in Figure 13. The analysis shows that the largest number of road sections in categories D and E are located in the Lower Silesian Voivodeship, the area most affected by the September flood.

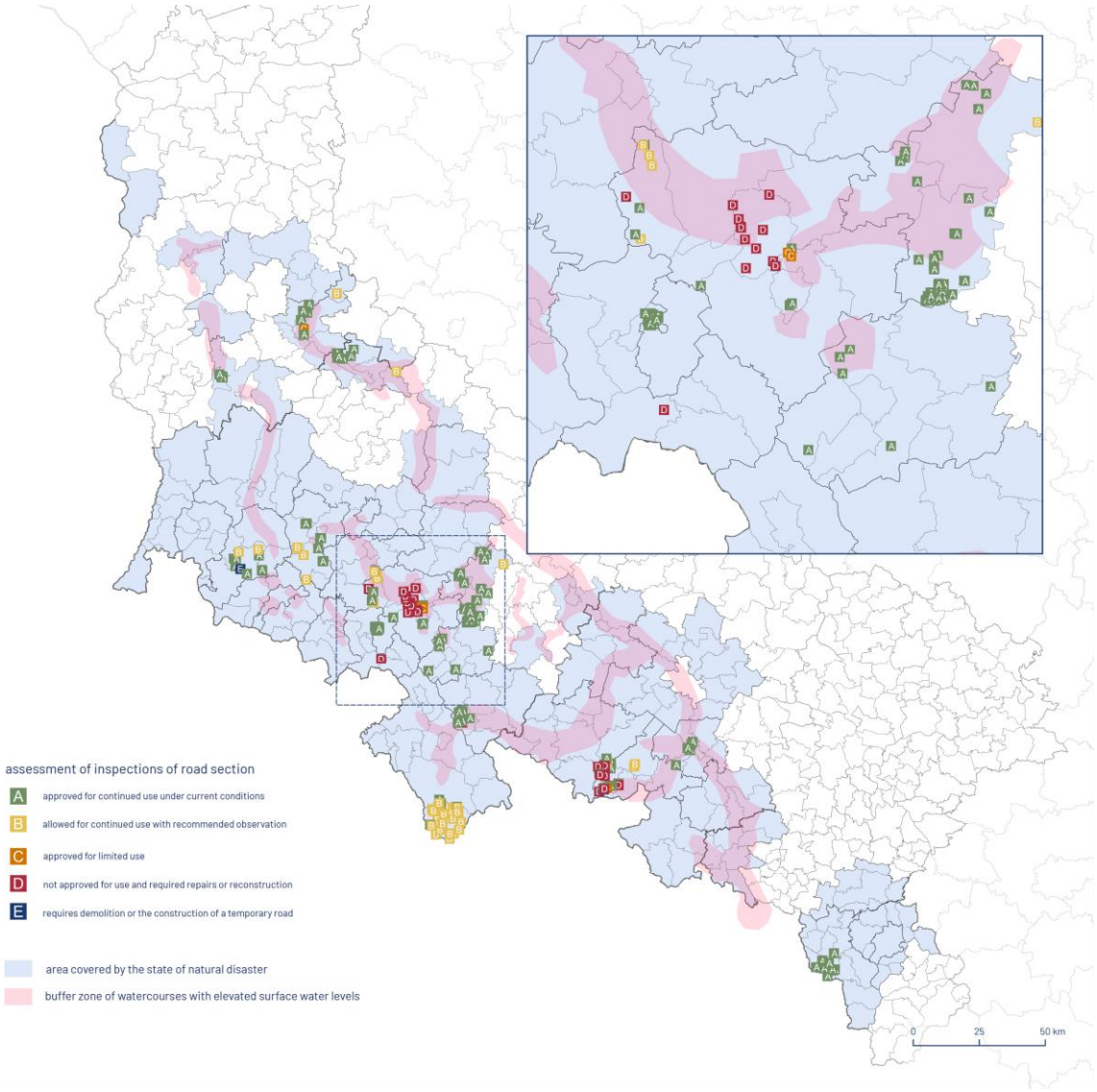


Figure 13. Spatial distribution of road sections with assigned assessment categories

INSTYTUT BADAWCZY DRÓG I MOSTÓW

POLSKA IZBA INŻYNIERÓW BUDOWNICTWA

ZMRP

PROTOCOL/EXPERTISE OF THE PRELIMINARY ROAD INSPECTION AFTER THE FLOOD

Assessment of the technical condition of the road section and its usability after the flood

GENERAL INFORMATION ABOUT THE ROAD SECTION

Road no		**Administrative unit, municipality**				
Road technical class	A, S, GP, G, Z, L, D	**Road category**	National	Voivodeship	County	Municipal
Mileage (from / to)		**Road length** [km]				
GPS coordinates (../..)		**Road width** [m]				
Road pavement type		**Shoulder width** [m]				
Road manager	Name					
	Address					
	Phone number					

Photo of the road section being assessed (general view)

CHOICE OF PROCEDURE FOR THE ROAD SECTION	YES / NO
A. Approved for use under the existing conditions	
B. Approved for use under the existing conditions, with the section to be observed indicated	
C. Approved for use to a limited extent Approved: weight…… axle load……speed…… number of traffic lanes……	
D. No approval for use - renovation or reconstruction required	
E. Road demolition/construction of a temporary road	
F. Additional expert assessment required	

BRIEF DESCRIPTION OF DAMAGE

No damage YES / NO **Small damage** YES / NO **Multiple damage** YES / NO
Partial road destruction YES / NO **Total road destruction** YES / NO

PERSON CARRYING OUT THE ASSESSMENT		CHECKING PERSON	
First and Last Name		First and Last Name	
Name of the unit		Name of the unit	
Phone number		Phone number	
Other information		License number	
Consent to the processing of personal data contained in the form		Consent to the processing of personal data contained in the form	

DAMAGE DESCRIPTION AND PHOTOGRAPHIC DOCUMENTATION

Condition of road pavement - photo no/location

Condition of road shoulders - photo no/location

Condition of culverts with an internal diameter of up to 150 cm - photo no/location

Condition of equipment, including road safety devices - photo no/location

Other damage in the roadway - photo no/location

ADDITIONAL NOTES