



**METHODOLOGY FOR THE DEVELOPMENT OF
FLOOD HAZARD MAPS AND FLOOD RISK MAPS
FOR AREAS EXPOSED TO FLOODING
IN THE EVENT OF DAM FAILURE – PART II**

ANNEX no. 2

**DESCRIPTION OF CARTOGRAPHIC VERSION
OF FLOOD HAZARD MAPS AND FLOOD RISK MAPS
FOR THE SCENARIO OF DAM FAILURE**

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1. FLOOD HAZARD MAPS

1.1. MAP ELEMENTS

FLOOD HAZARD MAP WITH WATER DEPTH

Flood hazard maps with water depth show the following elements:

- water depth [m] - in four intervals: 0-0.5 m; 0.5-2 m, 2-4 m, more than 4 m,
- maximum water level,
- top of flood embankment elevation,
- chainage,
- flood hazard area,
- watercourses and canals,
- names of watercourses and canals,
- surface waters,
- flood embankment,
- side dam,
- dam,
- location of dam failure,
- names of towns,
- commune boundary,
- powiat boundary,
- voivodeship boundary,
- country border.

1.2. MAP ELEMENTS OUTSIDE THE FRAME

- name of study (according to the list in chapter 8 of the methodology),
- identification number of map sheet and name of map sheet at a scale of 1:10 000,
- main data frame containing map contents,
- cartographic grid referring to main data frame in map layout,
- kilometer grid referring to main data frame in map layout,
- endings of UTM coordinate system grid,
- explanations of symbols,
- description of dam failure variant (e.g. Damage to the Przeczyce reservoir dam (on the Czarna Przemsza River) as a result of pumping failure during extreme design wave passage with 0.1% probability of occurrence, with simultaneous failure of discharge devices),
- scale and linear scale,
- data frame defined as "sheet layout" with marked area of main data frame:
 - sheet division of topographic maps at a scale of 1:10 000, in PL-1992 rectangular plane coordinate system,
 - fundamental three-stage territorial division of the country,



- area of activity of the organisational units of the State Water Holding Polish Waters - regional water management authorities and catchment authorities,
- information on reference systems,
- information on topographic background (orthophotomap),
- information whether the hydrographic study is up to date,
- information on authorities competent to draw up and approve the maps,
- logotypes: the logo of the European Fund (Infrastructure and Environment), the logo of the State Water Holding Polish Waters, the logo of the European Union (Cohesion Fund),
- information on the contractor engaged to develop the map,
- date and number of revision: 5th Revision 2022.

The area of activity of the organisational units of the State Water Holding Polish Waters - regional water management authorities and catchment authorities, is marked according to the system of codes adopted in the Polish Waters.

Example:

AREA OF ACTIVITY OF THE ORGANISATIONAL UNITS OF
STATE WATER HOLDING POLISH WATERS:

Regional Water Management Authority in Wrocław

Catchment Authority in Zielona Góra (WR.7)

Regional Water Management Authority in Poznań

Catchment Authority in Gorzów Wielkopolski (PO.1)

Catchment Authority in Poznań (PO.4)

1.3. DESCRIPTION OF SYMBOLS

Table 1. Description of symbols - Flood hazard map with water depth

Znak Symbol	Objaśnienie znaku w języku polskim Description of the map symbols in Polish	Objaśnienie znaku w języku angielskim Description of the map symbols in English
Tytuł mapy w języku polskim	MAPA ZAGROŻENIA POWODZIOWEGO Z GŁĘBOKOŚCIĄ WODY OBSZARY NARAŻONE NA ZALANIE W PRZYPADKU USZKODZENIA LUB ZNISZCZENIA BUDOWLI PIĘTRZĄCEJ	
Tytuł mapy w języku angielskim	FLOOD HAZARD MAP WITH WATER DEPTHS AREA EXPOSED TO FLOODING IN THE EVENT OF DAM FAILURE	
	maksymalna rzędna zwierciadła wody	maximum water level
	rzędna korony wału przeciwpowodziowego lub zapory bocznej	top of flood embankment elevation
	kilometr rzeki	chainage
	obszar zagrożenia powodziowego	flood hazard area
	głębokość wody $h \leq 0,5$ [m]	water depth $h \leq 0.5$ [m]
	głębokość wody $0,5 < h \leq 2,0$ [m]	water depth $0.5 < h \leq 2.0$ [m]
	głębokość wody $2,0 < h \leq 4,0$ [m]	water depth $2.0 < h \leq 4.0$ [m]
	głębokość wody $h > 4,0$ [m]	water depth $h > 4.0$ [m]
	cieki naturalne i kanały	watercourses and canals
	wody powierzchniowe	surface water
	wał przeciwpowodziowy	flood embankment
	zapora boczna	side dam
	budowla piętrząca	dam
	miejsce uszkodzenia budowli piętrzącej*	location of dam failure
	granica gminy	commune boundary
	granica powiatu	poviat boundary
	granica województwa	voivodeship boundary
	granica państwa	country border

* Symbol showed in the legend. In the style library, the symbol has no transverse stripes. The stripes come from the dam layer superimposed on the location of dam failure.



1.4. NAMES AND RESOLUTIONS OF PDF AND GEOTIFF FILES

The file name is associated with the breakdown by type and scenario of flood hazard maps, the sheet identification number and file version. The file name is in accordance with the template below:

sheet identification number_type of map_flood scenario_reservoir_version_typ of file.extention

- sheet identification number - in accordance with the division of topographic maps at a scale of 1:10 000, in PL-1992 rectangular plane coordinate system referred to in the legislation on the national spatial reference system;
- type of map - there is only one type of flood hazard map for the scenario of dam failure: ZG for maps with water depth;
- flood scenario: areas exposed to flooding in the event of dam failure - BP;
- reservoir – name of reservoir for which variant of failure is presented on cartographic version of map, name should be compatible with ZBIORNIK field in database;
- version - year and version of the map; the version of the map is defined by adding v1 to the name, v1 being the version of the sheet updated in the given year. In case of several updates in a given year, the version number will be increased accordingly;
- type of file - for georeferenced rasters - GEOTIFF suffix, for pdf rasters without georeference - no suffix;
- extension - *.tif or pdf.

Examples of file names are given below:

N33060Aa1_ZG_BP_Besko_2022v1.pdf

N33060Aa1_ZG_BP_Besko_2022v1_GEOTIFF.tif

Pdf files are prepared at a resolution of 300 dpi in RGB colour system, with JPEG compression parameter equal to 85.

Geotiff rasters are prepared in PL-1992 reference system, at a resolution of 300 dpi in RGB colour system, with LZW lossless compression.

2. FLOOD RISK MAPS

2.1. MAP ELEMENTS

1) FLOOD RISK MAP - POTENTIAL ADVERSE CONSEQUENCES FOR HUMAN HEALTH AND LIFE AND THE VALUE OF POTENTIAL FLOOD LOSSES

Flood risk maps showing potential adverse consequences for human health and life and the value of potential flood losses also show the following elements:

- residential buildings in the flood hazard area [water depth in m] less than and more than 2 m,
- buildings of social importance in the flood hazard area [water depth in m] less than and more than 2 m,
- buildings of social importance are marked as follows:
 - police stations - P,
 - nursery – żłb.,
 - kindergarten – przedszk.,
 - school – szk.,
 - fire stations - rem.,
 - border guard - SG,
 - hospital - szpit.,
 - health resort - san.,
 - social care centre, nursing home, hospice - d.op.,
 - shopping and service centre - c. han.,
 - hotel – H,
 - resort – d.wyp.,
 - educational care facility – d. wych.,
 - penitentiary, correctional or custodial facility – z. kar.,
- values of potential flood losses [PLN/m²],
- chainage,
- flood hazard area,
- watercourses and canals,
- names of watercourses and canals,
- surface waters,
- flood embankment,
- side dam,
- dam,
- location of dam failure,
- names of towns,
- commune boundary,
- powiat boundary,
- voivodeship boundary,
- country border,
- town name and indicative number of inhabitants potentially affected,

- village name and indicative number of inhabitants potentially affected.

2) FLOOD RISK MAP - POTENTIAL ADVERSE CONSEQUENCES FOR ENVIRONMENT, CULTURAL HERITAGE AND ECONOMIC ACTIVITY

Flood risk maps showing potential adverse consequences for environment, cultural heritage and economic activity, also show the following elements:

- land use types:
 - residential areas,
 - industrial areas,
 - transportation areas,
 - forests,
 - recreational areas,
 - arable land,
 - grassland,
 - other areas,
 - surface waters;
- groundwater abstraction;
- surface water abstraction;
- abstraction protection areas;
- bathing waters;
- zoos;
- areas and objects of cultural heritage:
 - area, object of cultural heritage,
 - UNESCO World Heritage Site,
 - extermination monument,
 - open-air museum, museum,
 - library, archives;
- forms of nature conservation:
 - national park,
 - nature reserve,
 - Natura2000 site:
 - Special Protection Area (birds),
 - Special Area of Conservation (habitats);
- potential sources of pollution:
 - industrial plants:
 - installations which may, in the event of flood, cause significant pollution to some parts of the environment or the environment as a whole (IED), for the operation of which it is required to obtain an integrated IPPC permit referred to in Article 181, item 1, point 1 of the Environmental Protection Law, in the following categories of industrial activity:
 - energy industry,
 - production and processing of metals,
 - mineral industry,



- chemical industry,
- waste management,
- other activities,
- industrial plants with installations that do not require the permit referred to in item 1 and which may cause hazards, including plants with high risk of accidents or increased risk of accidents within the meaning of Article 248, item 1 of the Environmental Protection Law;
 - (municipal, industrial, mixed) landfills;
 - wastewater treatment plants;
 - wastewater pumping stations;
 - cemeteries;
- chainage;
- flood hazard area;
- watercourses and canals;
- names of watercourses and canals;
- flood embankment;
- side dam;
- dam;
- location of dam failure;
- names of towns;
- commune boundary;
- powiat boundary;
- voivodeship boundary;
- country border.








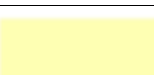
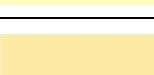

2.2. ELEMENTS OUTSIDE THE FRAME ON FLOOD RISK MAPS

- name of study (according to the list in chapter 8 of the methodology),
- identification number of map sheet and name of map sheet at a scale of 1:10 000,
- main data frame containing map contents,
- cartographic grid referring to main data frame in map layout,
- kilometer grid referring to main data frame in map layout,
- endings of UTM coordinate system grid,
- explanations of symbols,
- description of dam failure variant (e.g. Damage to the Przeczyce reservoir dam (on the Czarna Przemsza River) as a result of pumping failure during extreme design wave passage with 0.1% probability of occurrence, with simultaneous failure of discharge devices),
- scale and linear scale,
- data frame defined as "sheet layout" with marked area of main data frame,
 - sheet division of topographic maps at a scale of 1:10 000, in PL-1992 rectangular plane coordinate system,
 - fundamental three-stage territorial division of the country,
 - area of activity of the organisational units of the State Water Holding Polish Waters: regional water management authorities and catchment authorities,
- information on reference systems,
- information on topographic background (orthophotomap),
- information whether the hydrographic study is up to date,
- information on authorities competent to draw up and approve the maps,
- logotypes: the logo of the European Fund (Infrastructure and Environment), the logo of the State Water Holding Polish Waters, the logo of the European Union (Cohesion Fund),
- information on the contractor engaged to develop the map,
- date and number of revision: 5th Revision 2022.



2.3. DESCRIPTION OF SYMBOLS


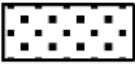







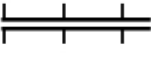




Table 2. Description of symbols – Flood risk maps

Znak Symbol	Objaśnienie znaku w języku polskim Description of the map symbols in Polish	Objaśnienie znaku w języku angielskim Description of the map symbols in English
Tytuł mapy w języku polskim	MAPA RYZYKA POWODZIOWEGO – POTENCJALNE NEGATYWNE SKUTKI DLA ŻYCIA I ZDROWIA LUDZI ORAZ WARTOŚCI POTENCJALNYCH STRAT POWODZIOWYCH	FLOOD RISK MAPS - POTENTIAL ADVERSE CONSEQUENCES FOR HUMAN HEALTH AND LIFE AND VALUES OF POTENTIAL FLOOD LOSSES
Tytuł mapy w języku angielskim	AREA EXPOSED TO FLOODING IN THE EVENT OF DAM FAILURE	
	budynek mieszkalny w obszarze zagrożenia powodziowego, głębokość wody ≤ 2,0 [m]	residential building in the flood hazard area, water depth ≤ 2.0 [m]
	budynek mieszkalny w obszarze zagrożenia powodziowego głębokość wody > 2,0 [m]	residential building in the flood hazard area, water depth > 2.0 [m]
	budynek o znaczeniu społecznym w obszarze zagrożenia powodziowego, głębokość wody ≤ 2,0 [m]	building of social importance in the flood hazard area, water depth ≤ 2.0 [m]
	budynek o znaczeniu społecznym w obszarze zagrożenia powodziowego, głębokość wody > 2,0 [m]	building of social importance in the flood hazard area, water depth > 2.0 [m]
<p>żłb. przedszk. szk. P rem. SG szpit. san. d. op.</p> <p>c. han. H d. wyp. d. wych. z. kar.</p>	<p>oznaczenie budynku o znaczeniu społecznym:</p> <ul style="list-style-type: none"> - żłobek, - przedszkole, - szkoła, - jednostki Policji, - jednostki ochrony przeciwpożarowej, - jednostki Straży Granicznej, - szpital, - sanatorium, - dom pomocy społecznej, dom opieki, hospicjum, - centrum handlowo-usługowe, - hotel, - dom wypoczynkowy, - dom wychowawczy, - zakład karny, zakład poprawczy, aresztśledczy 	<p>building of social importance:</p> <ul style="list-style-type: none"> - nursery - kindergarten - school - police station - fire station - border guard - hospital - health resort - social care centre, nursing home, hospice - shopping and service centre - hotel - resort - educational care facility - penitentiary, correctional or custodial facility
	wartości potencjalnych strat powodziowych:	value of potential flood losses:
	obszary, dla których nie oblicza się strat	areas with no estimation of losses
	≤ 1 [zł/m ²]	≤ 1 [zł/m ²]
	2-50 [zł/m ²]	2-50 [zł/m ²]
	51-150 [zł/m ²]	51-150 [zł/m ²]

	151-300 [zł/m ²]	151-300 [zł/m ²]
	301-600 [zł/m ²]	301-600 [zł/m ²]
	> 600 [zł/m ²]	> 600 [zł/m ²]
	obszar zagrożenia powodziowego	flood hazard area
	cieki naturalne i kanały	watercourses and canals
	wody powierzchniowe	surface water
	wał przeciwpowodziowy	flood embankment
	zapora boczna	side dam
	granica części miejscowości znajdującej się w obszarze zagrożenia powodziowego	boundary of a town or village part within a flood hazard area
	granica miejscowości znajdującej się w obszarze zagrożenia powodziowego	boundary of a town within a flood hazard area
	granica gminy	commune boundary
	granica powiatu	poviat boundary
	granica województwa	voivodeship boundary
	granica państwa	country border
KALISZ 1380	nazwa miasta i szacunkowa liczba mieszkańców zagrożonych powodzią	town name and indicative number of inhabitants potentially affected
Chotów 52	nazwa wsi i szacunkowa liczba mieszkańców zagrożonych powodzią	village name and indicative number of inhabitants potentially affected
<i>Rypinek</i> 15	nazwa części miasta lub wsi i szacunkowa liczba mieszkańców zagrożonych powodzią	town or village part name and indicative number of inhabitants potentially affected
Tytuł mapy w języku polskim	MAPA RYZYKA POWODZIOWEGO – POTENCJALNE NEGATYWNE SKUTKI DLA ŚRODOWISKA, DZIEDZICTWA KULTUROWEGO I DZIAŁALNOŚCI GOSPODARCZEJ OBSZARY NARAŻONE NA ZALANIE W PRZYPADKU USZKODZENIA LUB ZNISZCZENIA BUDOWLI PIĘTRZĄCEJ	
Tytuł mapy w języku angielskim	FLOOD RISK MAPS - POTENTIAL ADVERSE CONSEQUENCES FOR ENVIRONMENT, CULTURAL HERITAGE AND ECONOMIC ACTIVITY AREA EXPOSED TO FLOODING IN THE EVENT OF DAM FAILURE	
klasy użytkowania terenu:		land use types:
	tereny zabudowy mieszkaniowej	residential areas
	tereny przemysłowe	industrial areas
	tereny komunikacyjne	transportation areas
	lasy	forests

	tereny rekreacyjno-wypoczynkowe	recreational areas
	grunty orne i pola uprawne	arable land
	użytki zielone	grassland
	tereny pozostałe	other areas
	wody powierzchniowe	surface water
	kąpielisko	bathing waters
	ujęcie wody podziemnej	groundwater abstraction
	ujęcie wody powierzchniowej	surface water abstraction
	strefa ochronna ujęcia wody	abstraction protection area
	ogród zoologiczny	zoo
	obszar, obiekt zabytkowy – obiekt wpisany na listę światowego dziedzictwa UNESCO	area, object of cultural heritage –UNESCO World Heritage Site
	pomnik zagłady	extermination monument
	skansen, muzeum	open-air museum, museum
	biblioteka, archiwum	library, archives
	park narodowy	national park
	rezerwat przyrody	nature reserve
	obszar Natura 2000 – obszar specjalnej ochrony ptaków	Natura2000 site – Special Protection Area (birds)
	obszar Natura 2000 – specjalny obszar ochrony siedlisk	Natura2000 site – Special Area of Conservation (habitats)
zakłady przemysłowe:		industrial plants:
	instalacje mogące powodować znaczne zanieczyszczenie poszczególnych elementów przyrodniczych albo środowiska jako całości	installations which may cause significant pollution to some parts of the environment or the environment as a whole (IED)
	zakłady stwarzające zagrożenie wystąpienia poważnej awarii przemysłowej	plants which may cause major industrial accident hazards (Seveso)
	przemysł energetyczny	energy industry
	produkcja i obróbka metali	production and processing of metals
	przemysł mineralny	mineral industry
	przemysł chemiczny	chemical industry
	gospodarka odpadami	waste management
	inne rodzaje działalności	other activities
	składowisko odpadów komunalnych	municipal landfill



	składowisko odpadów przemysłowych	industrial landfill
	składowisko odpadów mieszanych	mixed landfill
	cmentarz	cemetery
	oczyszczalnia ścieków	wastewater treatment plant
	przepompownia ścieków	wastewater pumping station
	obszar zagrożenia powodziowego	flood hazard area
	kilometr rzeki	chainage
	cieki naturalne i kanały	watercourses and canals
	wał przeciwpowodziowy	flood embankment
	zapora boczna	side dam
	granica gminy	commune boundary
	granica powiatu	poviat boundary
	granica województwa	voivodeship boundary
	granica państwa	country border



2.4. NAMES AND RESOLUTIONS OF PDF AND GEOTIFF FILES

The file name is associated with the breakdown by type and scenario of flood risk maps, the sheet identification number and file version. The file name is in accordance with the template below:

sheet identification number_type of map_flood scenario_reservoir_version_typ of file.extention

- sheet identification number - in accordance with the division of topographic maps at a scale of 1:10 000, in rectangular plane coordinate system referred to in the legislation on the national spatial reference system;
- type of map - depending on the type of flood hazard map, it takes the following form:
 - RL for maps showing potential adverse consequences for human health and life and the values of potential flood losses;
 - RS for maps showing potential adverse consequences for environment, cultural heritage and economic activity;
- flood scenario: areas exposed to flooding in the event of dam failure - BP;
- reservoir – name of reservoir for which variant of failure is presented on cartographic version of map, name should be compatible with ZBIORNIK field in database;
- version - year and version; the version of the map is defined by adding v1 to the name, v1 being the version of the sheet updated in the given year. In case of several updates in a given year, the version number will be increased accordingly;
- type of file - for georeferenced rasters - GEOTIFF suffix, for pdf rasters without georeference - no suffix;
- extension - *.tif or pdf.

Examples of file names are given below:

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Geotiff rasters are prepared in PL-1992 reference system, at a resolution of 300 dpi in RGB colour system, with LZW lossless compression.