



Flood Resilient Redevelopment of the Zollhafen Mainz

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Redevelopment of the Zollhafen Mainz as Flood Resilient Development
of a new City Quarter at the River Rhine

Zollhafen Mainz is one of the largest container ports on the Upper Rhine. The harbor logistics are being moved and expanded on the site of the Industriehafen, directly adjoining the Zollhafen to the North. In the Zollhafen area, the development of a new city quarter with 4,000 future jobs and 2,500 future inhabitants is planned. The project site is situated in the flood plain of the River Rhine where no active flood defence measures are allowed (EU floods directive 2007). The Rhine exposes 40,000 inhabitants of the city of Mainz to flood risk. The project is part of the INTERREG IV B NWE project FloodResilienCity.

The “Project Developers’ Guide”:

This abstract introduces the “Project Developer’s Guide” (PDG) for the Zollhafen development. This provides the future developers with the framework for flood-resilient development. It also explains the obligations that have to be fulfilled in order to build and the potential for innovative development that building in a flood-prone area provides. The Zollhafen quarter lies outside of the city’s existing flood defence line, however continuity of the historic defence line will be ensured by incorporating several of the building plots into the extended defence line. Due to this position in the floodplain, the site development has to be retention-neutral. The Zollhafen area will be flooded if the Rhine levels rise above the 1/100 flood level; accordingly the redevelopment of the harbor area must be flood resilient and the construction has to be flood-adapted. For the Project Developer’s Guide a legend of spatial demands and possible solutions has been developed, such as defensive / as part of a mound+canal system / with retention capacities on site / capable of withstanding the current and possible obstructions. The preferred solutions are external flood defence / integrated flood defence / stilted, reduced footprint / floodable. For each site, the PDG gives relevant excerpts from the development plan, a detailed description of requirements and specifications due to its position in the Zollhafen. Furthermore, a quantitative visualization of the requirements and possible solutions illustrated in sections (always based on the design of the masterplan; buildings could also end up looking quite different) are provided. Building development in the flood plain was generally prohibited in Germany by federal law in 2005. Only a very few exceptions are possible, one of them being inner city harbor conversions. For this reason a special request has to be filed with the regional agency of the State Ministry of the Environment to obtain a building permit. Further, reference projects are shown, organized according to the different possible solutions.

The “Flood Risk Management Guide”:

This abstract also introduces the Flood Risk Management Guide (FRMG); a brochure for the people who will live or work in the new Zollhafen quarter. It answers 10 central questions about the flood risk and its management. The FRMG closely follows the requirements of the EU Floods Directive, 2007.

- Question 1: How high is the risk of being flooded? The Zollhafen has been designed to manage the risks should the development be threatened by flooding; the following scenarios for escalating flows in the River Rhine have been addressed: HQ 100, HQ 200 and HQ 200 plus 50 cm freeboard.

- Question 2: To what extent is my house protected? On the street level new shops, bars and business will be unaffected below the 1/100 year event; protection against higher floods will be provided by means of integrally designed temporary systems. Existing street level buildings (art gallery, wine museum) will achieve similar protection by the means of retro-fitted temporary systems. Floor Levels for new housing and dwellings are to be constructed 1.20 m to 1.50 m higher than the 1/100 flood level which is above the extreme flood. The infrastructural supply remains operational up to the HQ 200 level at a minimum.

- Question 3: How can I protect my technical installations? Shut off points and electrical plant, telecommunications technology and heating systems as well as other technical installations will be positioned higher than the highest flood level. The water supply system will be protected against germ and bacteria contamination. Sewerage systems must be flood adapted.
- Question 4: How can I protect my cars and movable equipment and help protect the river against substance discharge? In the Zollhafen quarter there are some parts of buildings that can be flooded: for example subterranean garages or cellars. The guiding principle is to keep the damage potential low!
- Question 5: Can I insure myself against flood damage? We have found that if the buildings are flood resilient and resistant, then the residual flood risk can be insured against. In Germany the so called "elementary insurances" cover flood damage.
- Question 6: When a flood is approaching: Where do I get information from? The Flood Risk Management Guide gives advice on how to get information.
- Question 7: How will I be warned in case of a probable emergency? The streets in the Zollhafen quarter will not be flooded until the flood level in the River Rhine rises higher than the 1/100 year flood. Long before, the City of Mainz closes gaps in the flood defenses with temporary systems. This action alerts inhabitants that a bigger flood is expected. The City of Mainz initiates the municipal disaster management plan. When the flood reaches determined levels the Civil Defence gives warning by loudspeaker or flyers. If the flood rises very quickly the Authority will sound the warning siren.
- Question 8: What does the local authority do to protect me? If the flood rises higher than the 1/100 level the rescue routes are progressively affected. The main emergency access routes are free up to the 1/200 level to give more safety to the inhabitants and the services. If the streets are flooded (higher than 1/200 level) the rescue service may not be aware of hazards such as obstacles and voids within the highway, so safe evacuation routes will be identified by the City of Mainz. If the flood level exceeds the flood protection level 1/200 plus 50 cm freeboard the flood defences (flood walls) will be overtapped. Wide areas of the City of Mainz will be flooded. Even under these conditions the dwellings in the Zollhafen still could be inhabited. However, rescue vehicles will not be able to move and then the City of Mainz will decide whether evacuations have to be initiated and how. This decision (to evacuate) will be influenced by the actual forecasted height and duration of the flood.
- Question 9: How do I have to prepare myself for an approaching flood? The FRMG contains advice gathered from the best national and international practice and tailored for the specific requirements of the Zollhafen about the personal flood plans of the inhabitants; how to prepare the property protection and deal with flooded rooms; what to do if they need to be evacuated and other related issues.
- Question 10: What do I have to do after the flood has arrived? The Flood Risk Management Guide explains that the main function of the Fire Brigade and the Civil Defence is to avert and minimize physical danger to people. Protection of private property (whether the flooding of cellars or the deployment of sand bags or other temporary defences) is the responsibility of the inhabitants themselves (self protection). The FRMG provides a number of check lists to assist people to prepare for and manage their residual flood risks.

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