CONCENTRATING ESSENTIAL FACILITIES AND ACTIVITIES ON UPPER FLOORS

HAZARD

RAINFALL AND FLOODS

COASTAL DYNAMICS

IMPLEMENTATION STEP

CONSTRUCTION

RENOVATION

BUILDING IN OPERATION

AREA OF ACTION

GROUND FLOOR

BASEMENT

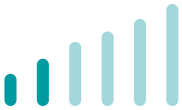
USES

COST

€ € €

low medium high

LEVEL OF SKILL



low

When a building is exposed to the risk of flooding or coastal flooding and is not located out of water's reach, it's advisable to raise the level of sensitive electrical, IT and HVAC equipment and to concentrate essential activities on the upper floors in order to protect against water and salt damage. Bear in mind that the ground floor and basement are the most directly damaged levels in the event of flooding.

IMPACTS

Raising a building's equipment and concentrating its activities on the upper floors is an essential measure, as it **considerably reduces the time needed to return to normal**. After a flood or coastal flooding, getting a building back into operation partly depends on how well **its equipment functions** and whether it is possible to continue everyday activities. The longer it takes to return to normal, the greater the financial losses associated with the stop in activity or the reduction in rental income.

INSTALLATION GUIDE

It is important to implement this action on several levels:

Use the ground floor or basement as a buffer zone: if the ground floor or basement is at risk of flooding, it may be a good idea to relocate essential and costly activities and assets (servers, offices, etc.) on the upper floors. This lower level (basement or ground floor) can then be used as a storage area, or perhaps as a car park. To limit damage if water enters the building, water-resistant materials can be used for flooring, insulation, partitions and joinery on the ground floor or basement.

Protect equipment and networks: it is advisable to install the electric switchboard, meter and heating and hot water equipment on non-floodable levels or to raise them above the potential water level. Ideally, electrical circuits should be wired through the ceiling and sockets should be placed high up. Finally, an electrical network compartmentalisation system can be used to separate circuits located in flood-prone areas from those on upper floors.

This adaptation action has the advantage of being fairly flexible because, although it's advisable to plan ahead for equipment and activities to be taken out of the water, equipment that can be easily transported can in some cases be brought up just before or during a flood.

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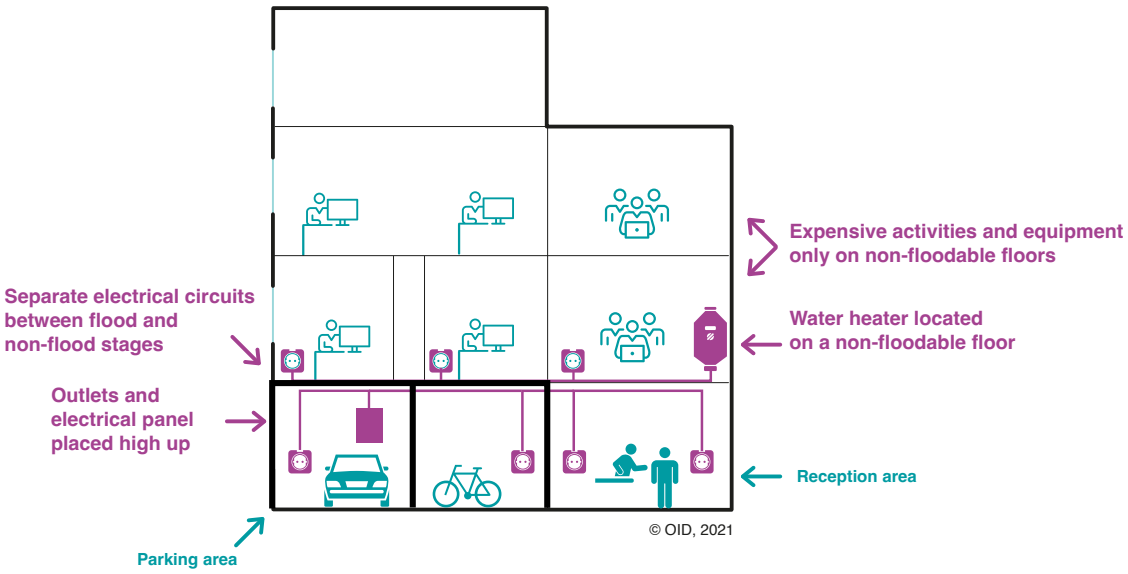
VARIOUS DEVICES FOR WATERPROOFING ESSENTIAL BUILDING ACTIVITIES AND EQUIPMENT



WEAK POINTS AND STRONG POINTS

⊕ Moving essential activities and assets to upper floors is a particularly interesting option because it **doesn't necessarily require additional investment** in terms of renovation and can be implemented in many buildings.

⊖ There may be an opportunity cost, however, as this adaptive action may involve **a loss of space** and therefore potentially a loss of income. Concentrating essential facilities and activities on the upper floors may therefore be more difficult to implement in assets located in sought-after areas.

⊕ To ensure the safety of occupants, it's important to create exits to the upper floors, and inform occupants about the climate risks, the correct behaviour to adopt, and the existing emergency services.

MALADAPTATION

Maladaptation can result from the following:

Danger for occupants

Encouraging occupants to remain in the building during a flood rather than directing them to a refuge area can present considerable risks to their safety. By remaining in the building, occupants expose themselves to an increased risk of drowning, as water can quickly rise and submerge lower levels. Even if essential equipment and activities have been moved to upper floors, water can still infiltrate the building and pose a serious threat. Occupants who are encouraged to stay put may find themselves stranded with no means of leaving the building if they need to.

Neglect of uncertainties associated with climate change

If the measure has been implemented and calibrated to current levels of flood risk or coastal flooding, but these risks increase due to climate change, equipment and activities on upper floors may not be sufficiently protected. Water levels could exceed initial forecasts, putting property and operations at risk. This highlights the need to factor climate change projections into initial planning to ensure that adaptation measures remain effective in the face of changing environmental risks.

MONITORING INDICATORS

ESSENTIAL RECOMMENDATIONS WORTH THINKING ABOUT

- USE AN ELECTRICAL NETWORK COMPARTMENTALISATION SYSTEM TO SEPARATE CIRCUITS LOCATED IN FLOOD-PRONE AND NON-FLOOD-PRONE AREAS
- CREATE EXITS ON THE UPPER FLOORS TO ALLOW OCCUPANTS TO EVACUATE

MONITOR MY ACTIONS FOR CLIMATE CHANGE ADAPTATION

+/− : Quantitative indicator ★ : Qualitative indicator

INDICATORS OF MEANS		INTERPRETATION
+/−	Percentage of people whose main activity is located above flood-prone levels (%)	To be maximised
+/−	Percentage of equipment (electric switchboard, sockets, meters, heating installations, water heater, etc.) above flood-prone or raised levels (%)	To be maximised
+/−	Percentage of networks (overhead cabling, etc.) above flood-prone or raised levels (%)	To be maximised

INDICATORS OF RESULTS		INTERPRETATION
+/−	Comparison between the time required to bring the building back into operation, with equipment/activities concentrated on the upper floors, and a control situation* (hours)	Time required to bring the building back into operation with equipment/ activities concentrated on the upper floors < control situation
+/−	Comparison between the financial, material and human repercussions of implementing the adaptation action with those of a control situation*	Minimise the financial, material and human repercussions
+/−	Financial, material and/or human damage caused by the mechanical action of water in the event of flooding or coastal flooding	To be minimised

** The control situation is defined by the parameters established to isolate the influence of the adaptation action (similar conditions: weather, time of measurement, space, etc.).*

CONCEPT / DEFINITION

● **Sensitive equipment** is equipment that is necessary for the **building to function** properly or for users to be able to carry out **their activities**. Examples include: control, production and distribution stations for fluids (HVAC equipment), electrical stations on which the building depends, data centres, etc. This includes all **equipment that is absolutely necessary for the occupation of the building**.

FIND OUT MORE

Centre européen de prévention des risques d'inondation (CEPRI) (2010), *Le bâtiment face à l'inondation.*

Centre européen de prévention des risques d'inondation (CEPRI) (2009), *Un logement "zéro dommage" face au risque d'inondation est-il possible ?*

Guide bâtiment durable (2017), *Concevoir les techniques en cas d'inondation*

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