

## Assessing Flood Risk

Complying with the Requirements of 'The COMAH Competent Authorities Operational Delivery Guide: Flood Preparedness Inspection'

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# Flood Risk

- Flooding is considered to be the most widespread and impactful natural hazard affecting the UK.
- **Climate Change** = an increase in both the severity and frequency of flood events in the UK.
- It is essential to plan for and manage flood events to minimise impacts.
- This is a **MUST** for COMAH facilities.
- COMAH Strategic Forum (2016) – designated **Flood Preparedness** as a strategic topic.
- The Operation Delivery Guide – produced to provide a consistent framework for inspecting flood preparedness at COMAH sites.

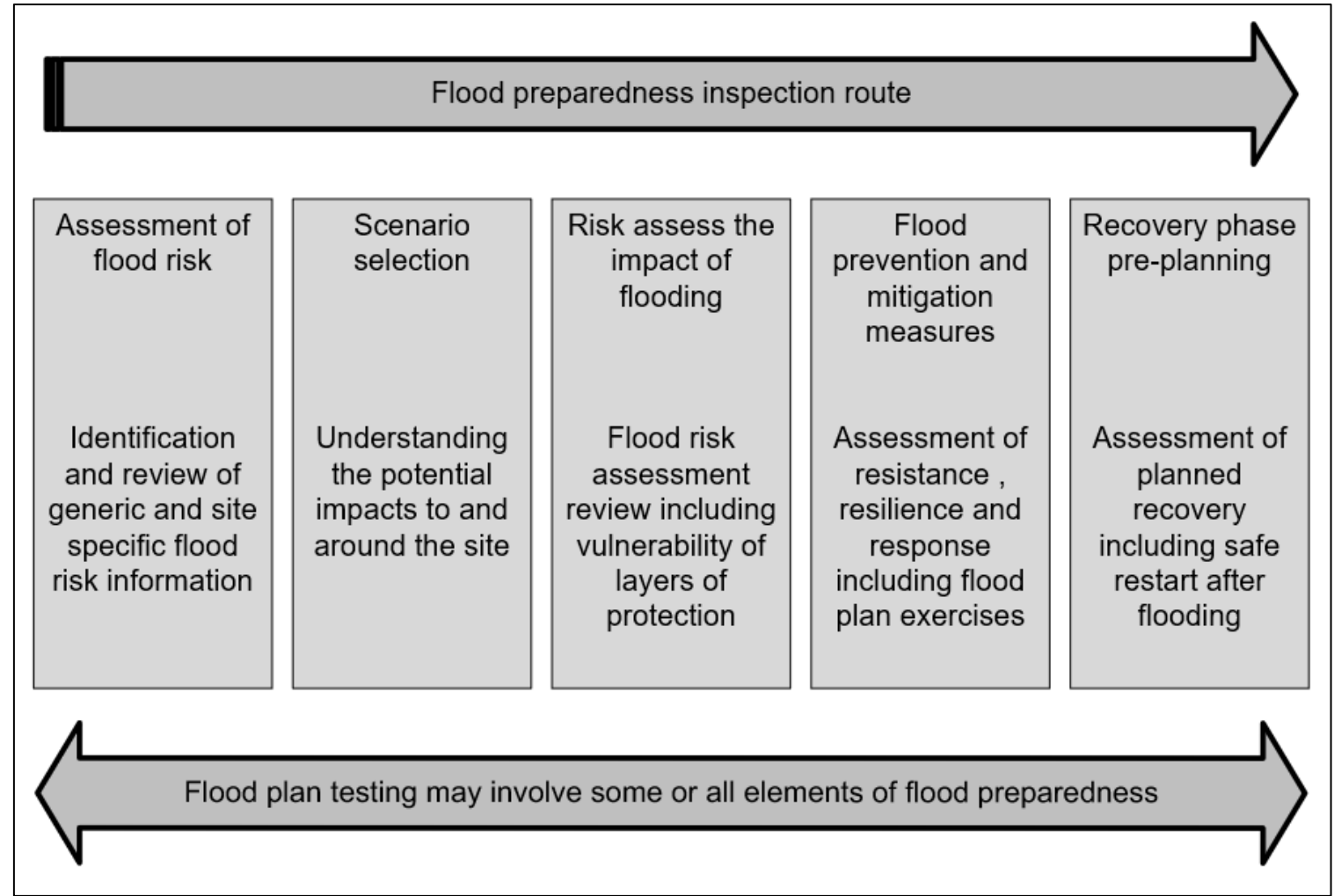
# Operational Delivery Guide

**COMAH** Control of Major Accident Hazards

COMAH Competent Authorities

**Operational Delivery Guide**  
Inspection of COMAH Operator Flood Preparedness

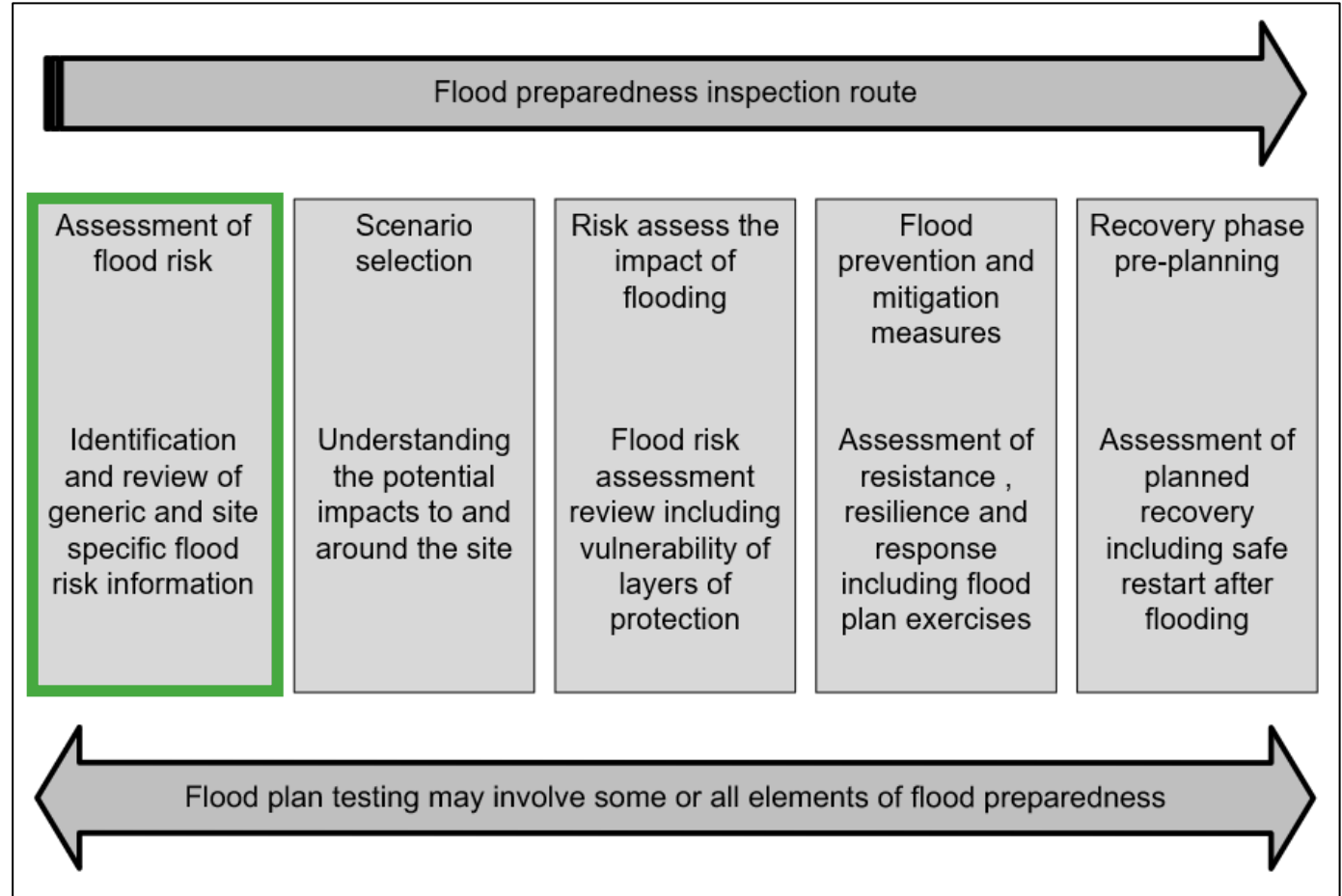
HSE Environment Agency SEPA Cyfoeth Naturiol Cymru Natural Resources Wales ONR Office for Nuclear Regulation



# Assessment of Flood Risk

## Types of Flooding:

- Fluvial Flooding
- Coastal Flooding
- Pluvial Flooding
- Groundwater Flooding
- Reservoir Flooding



# Sources of Information for Flood Hazard

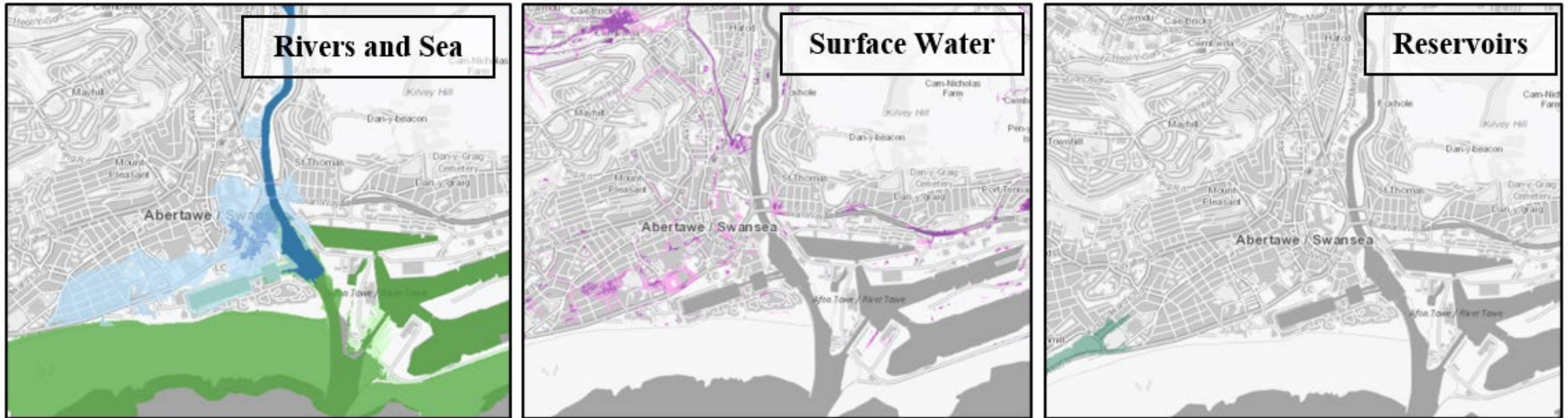
Within the UK there are a number of regional sources available to inform the determination of flood hazard exposure:

- England – Environment Agency (EA)
- Scotland – Scottish Environment Protection Agency (SEPA)
- Wales – Natural Resources Wales (NRW)
- Northern Ireland – Department for Infrastructure (DI)

Each of these sources provide a selection of flood maps for a range of flood sources.

# Sources of Information for Flood Hazard

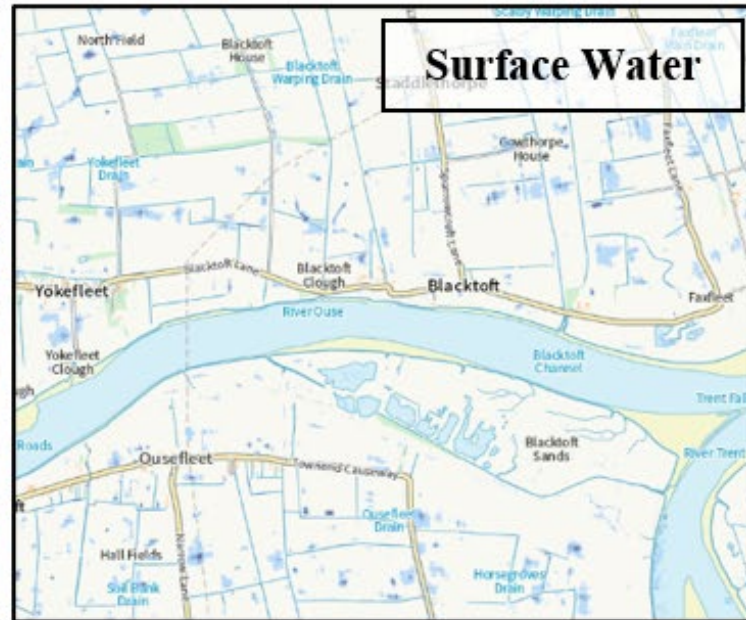
Natural Resources Wales Flood Map Examples:



Flood Hazard Maps for Wales showing Rivers and Sea, Surface Water and Reservoir Flood Hazard, Source: NRW

# Sources of Information for Flood Hazard

Environment Agency Flood Map Examples:

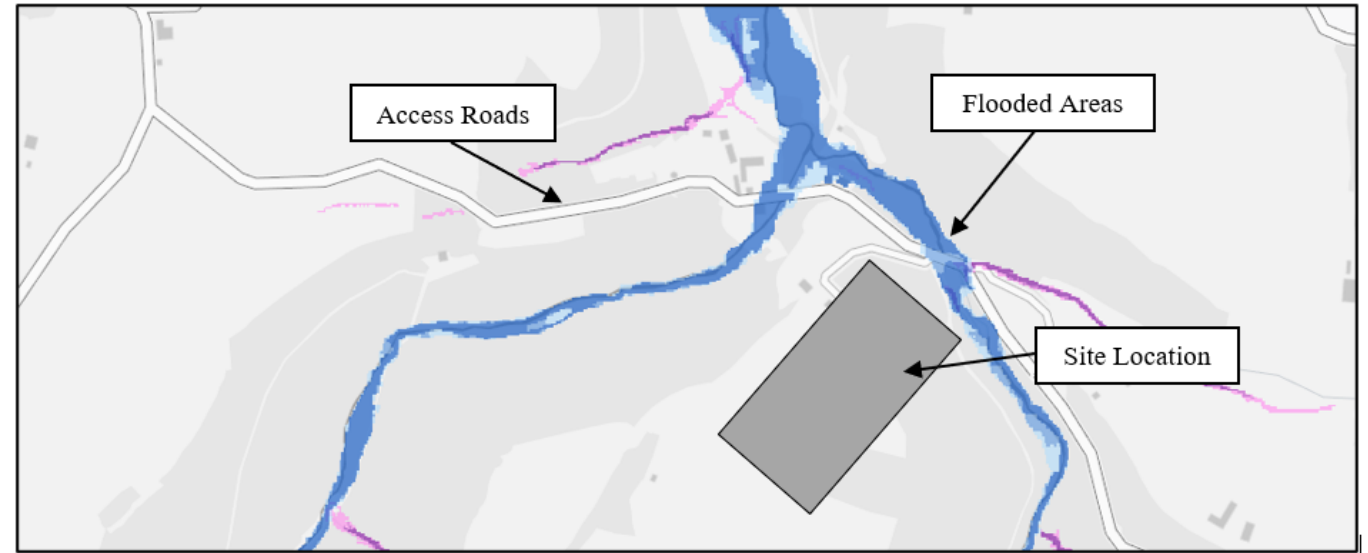


Flood Hazard Maps for England showing Rivers and Sea, Surface Water and Reservoir Flood Hazard, Source: EA



# Flood Risk Considerations

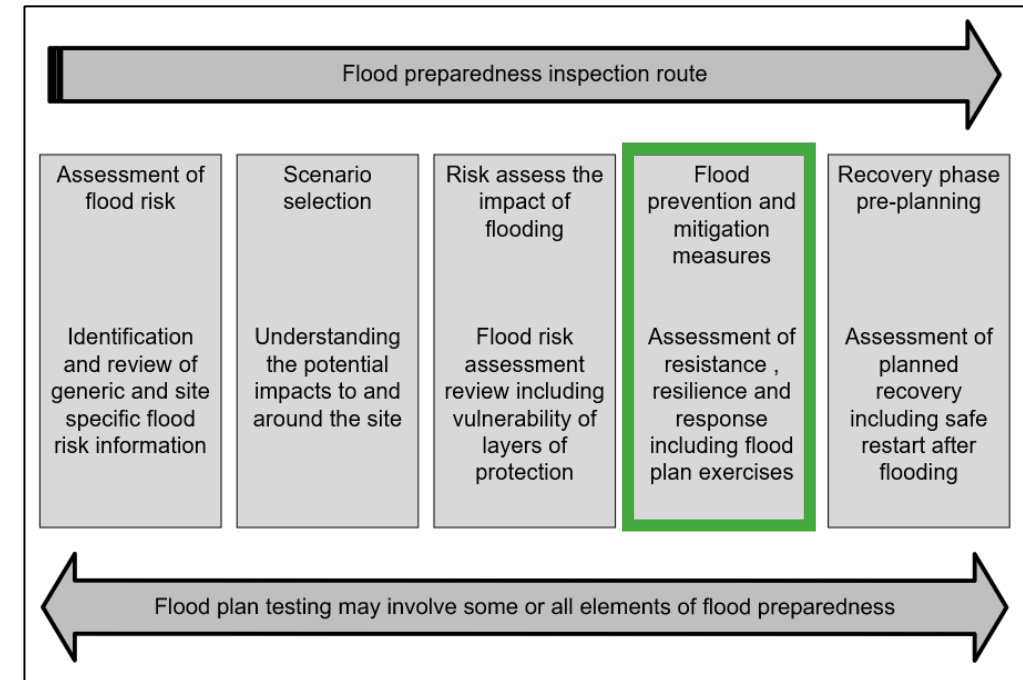
- Flood Extent and Sources of Flooding
- Vulnerability Review
- Hazard and Operability (HAZOP) study
- Flood data should include;
  - Flood Probability (Return Periods),
  - Flood Depth, Flood Velocity,
  - Rate of Onset of Flooding,
  - Flood Duration, etc.
- Scenarios – for example, water entry into electrical systems from roof drainage can result in loss of power, etc.
- Off-Site considerations – site access, power etc.



# Flood Mitigation and Management

Options for mitigation should consider:

- Protection levels to be considered, Return Period.
- Extent of protection:
  - Facility-wide perimeter flood walls or key areas only.
  - Facility-wide entry point options.
  - Individual building waterproofing.
  - Equipment location optimization.
  - Equipment elevation changes.

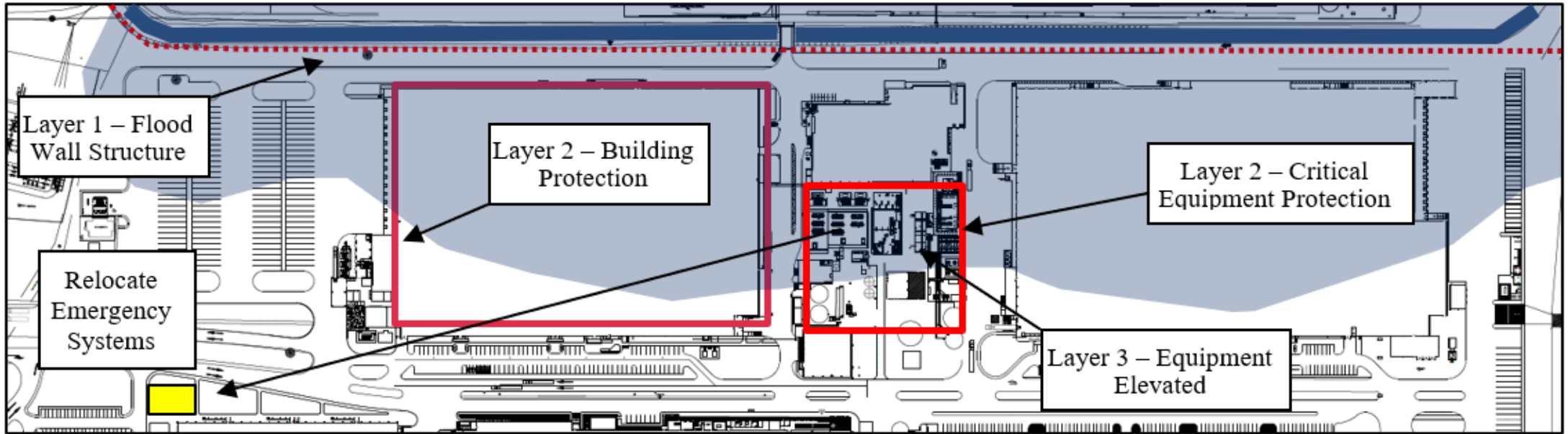


# Flood Mitigation and Management

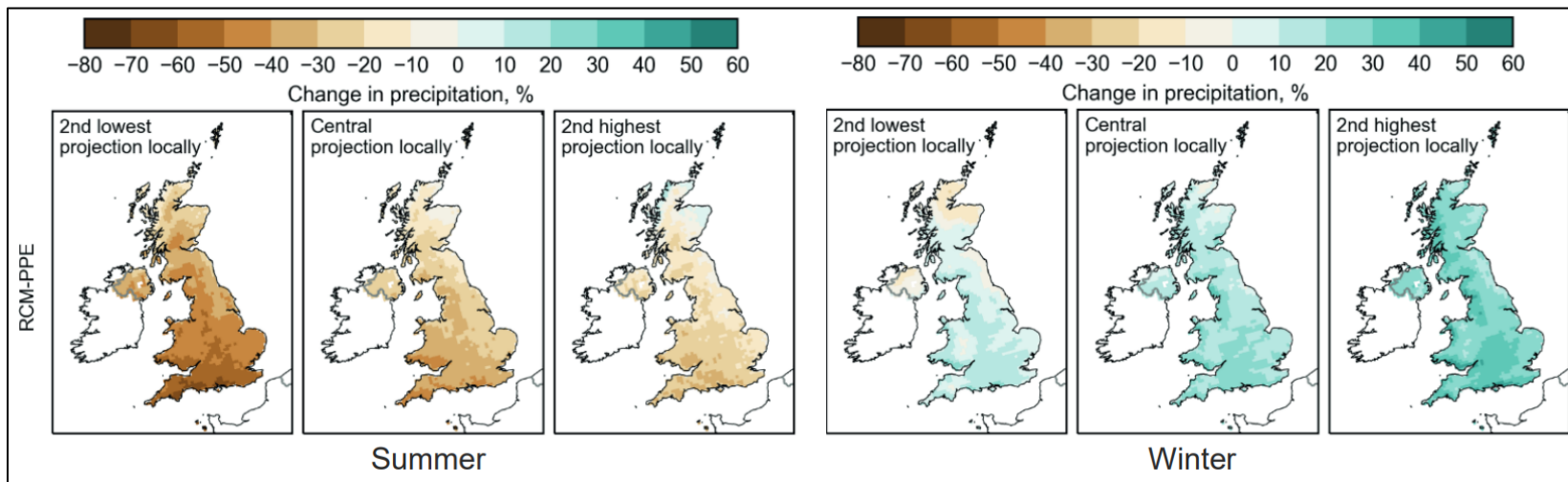
Flood Management Plans should include:

- Organisational chart for plan ownership
- Partner and Stakeholders identification
- Document flooding sources
- Flood assessment study results
- Historic and current flood history
- Discuss influences around future conditions (climate change and land use)
- Document current laws and regulations that do or could influence plans
- Process is continuous (Prevent, Before, During, and After)
- Warning system to define level of action needed

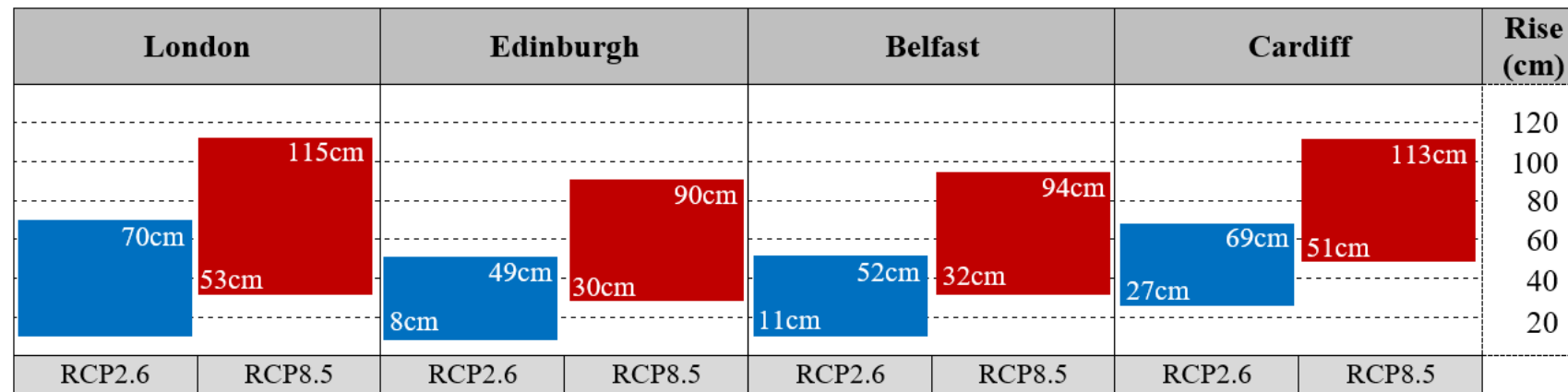
# Layers of Protection



# Climate Change



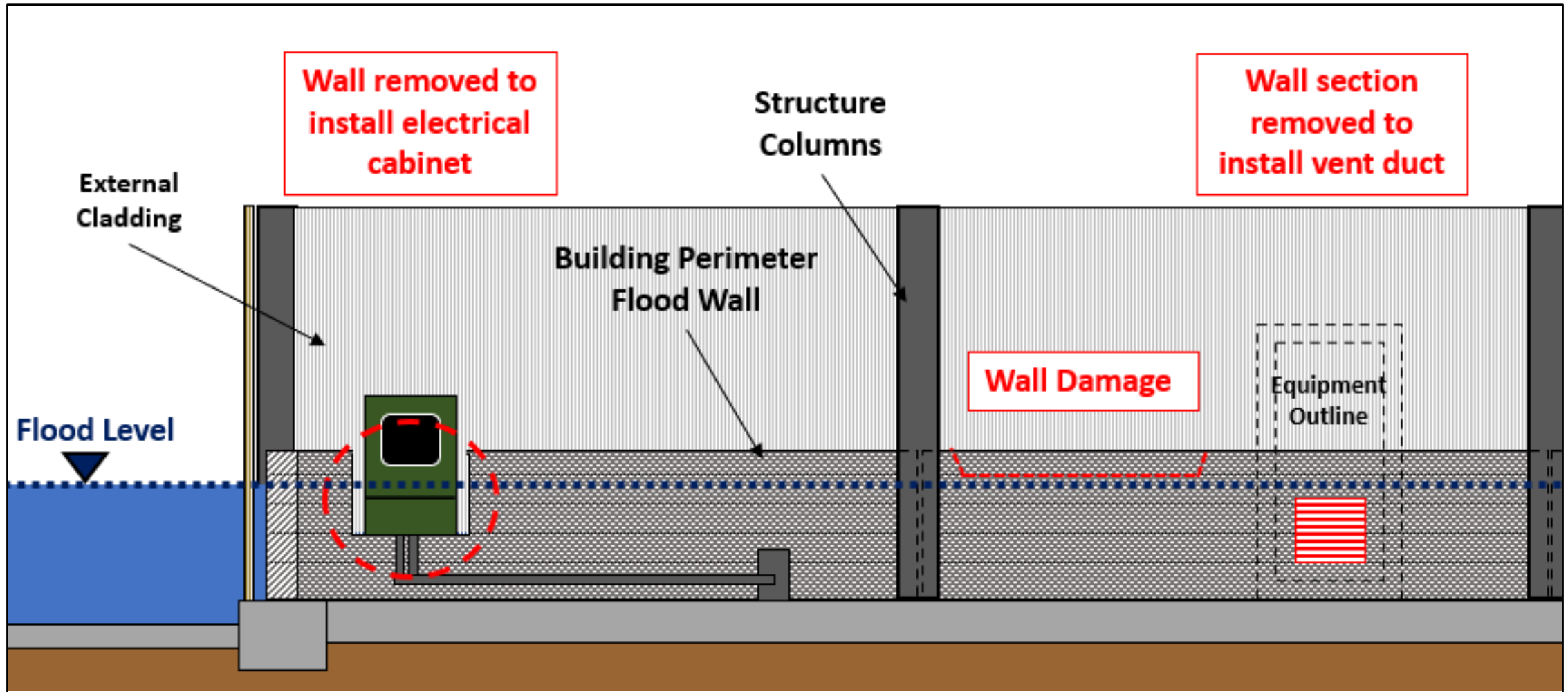
Patterns of Precipitation Change to 2061-2080 for UK (RCP8.5) – Source: Met Office



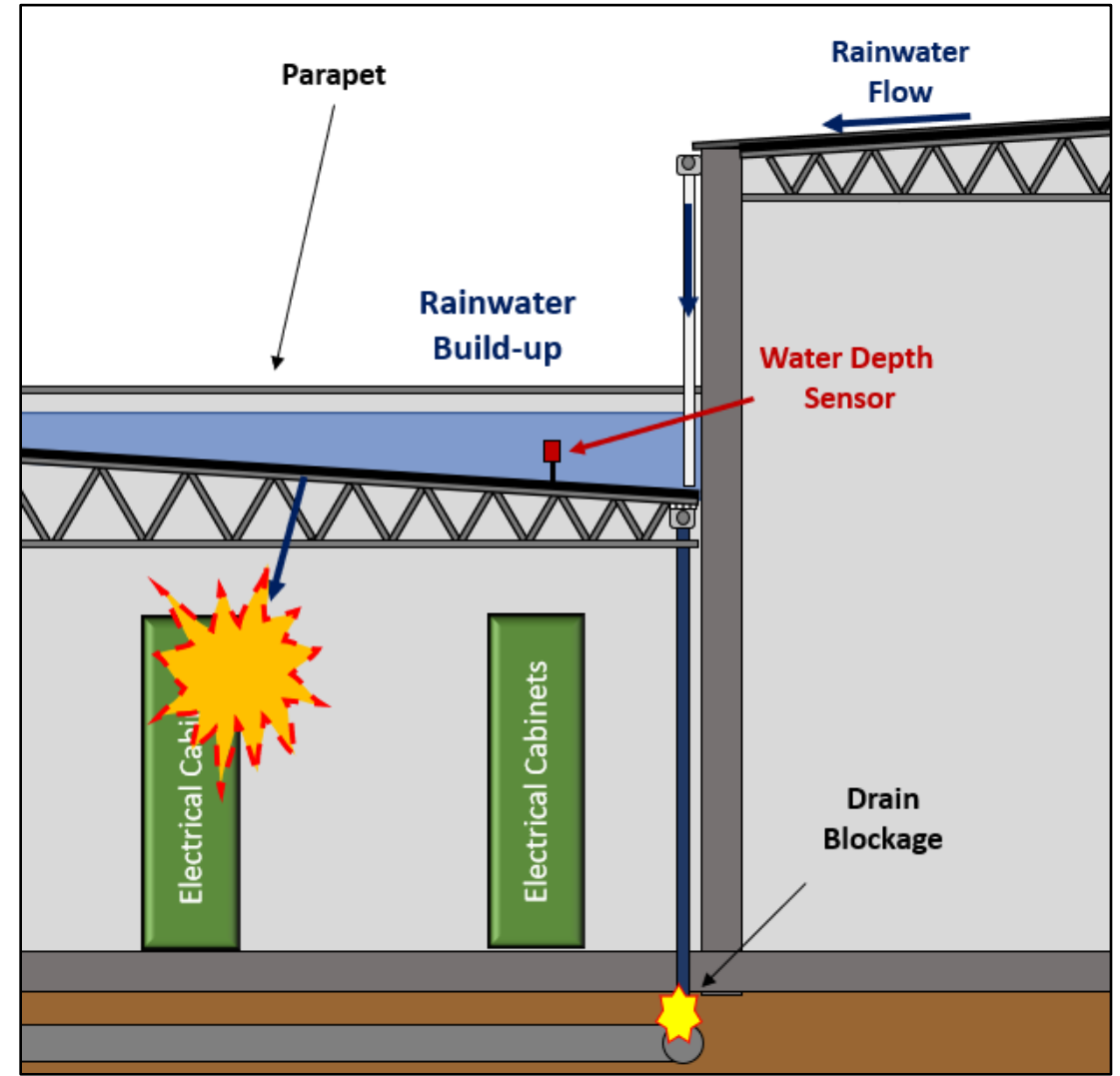
Projected Sea Level Rises by 2100 relative to 1981-2000, Source: Met Office

## Case Studies

# Case Study 1: Controlling Facility Alterations

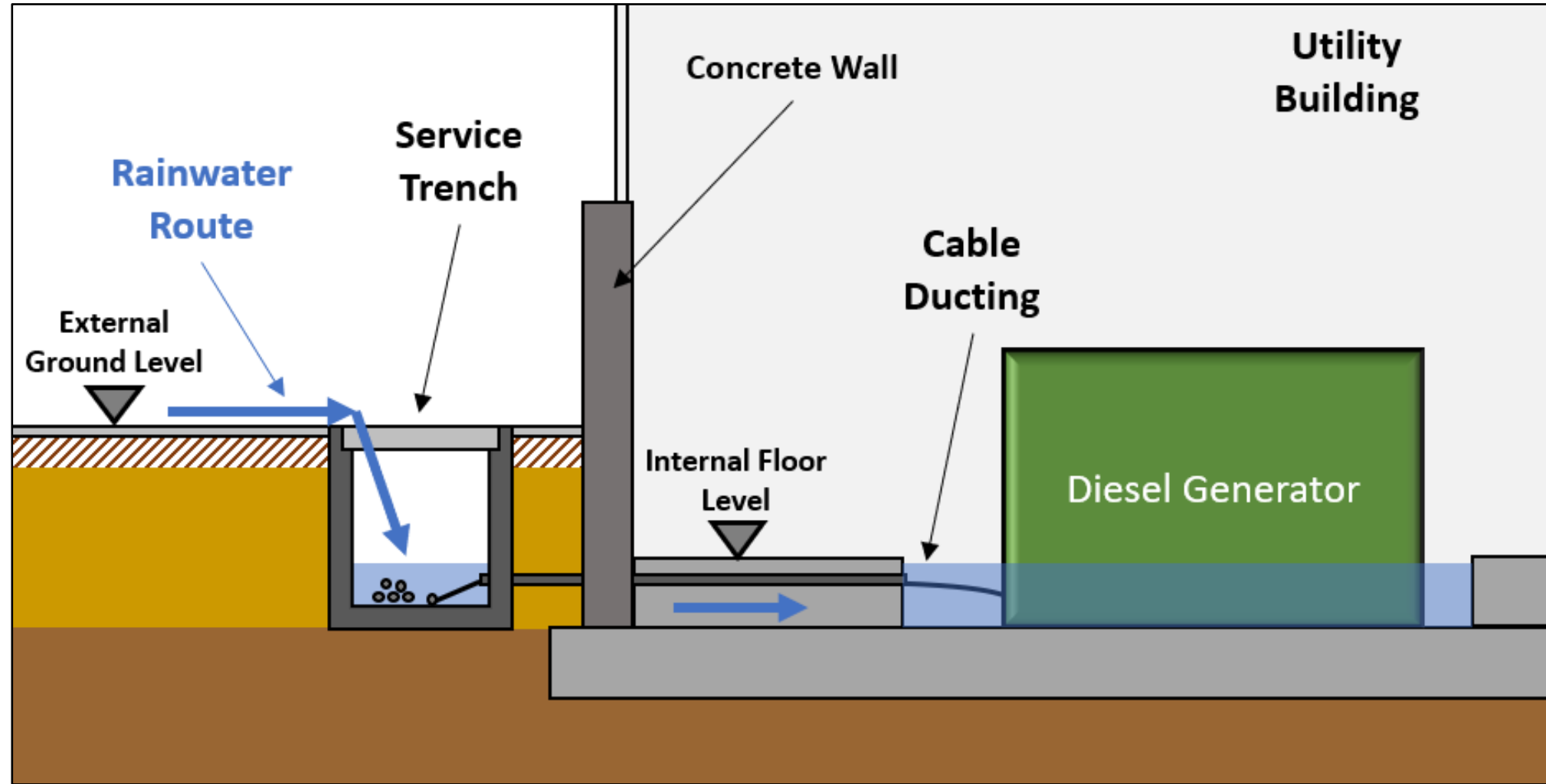


# Case Study 2: Maintaining Monitoring Equipment

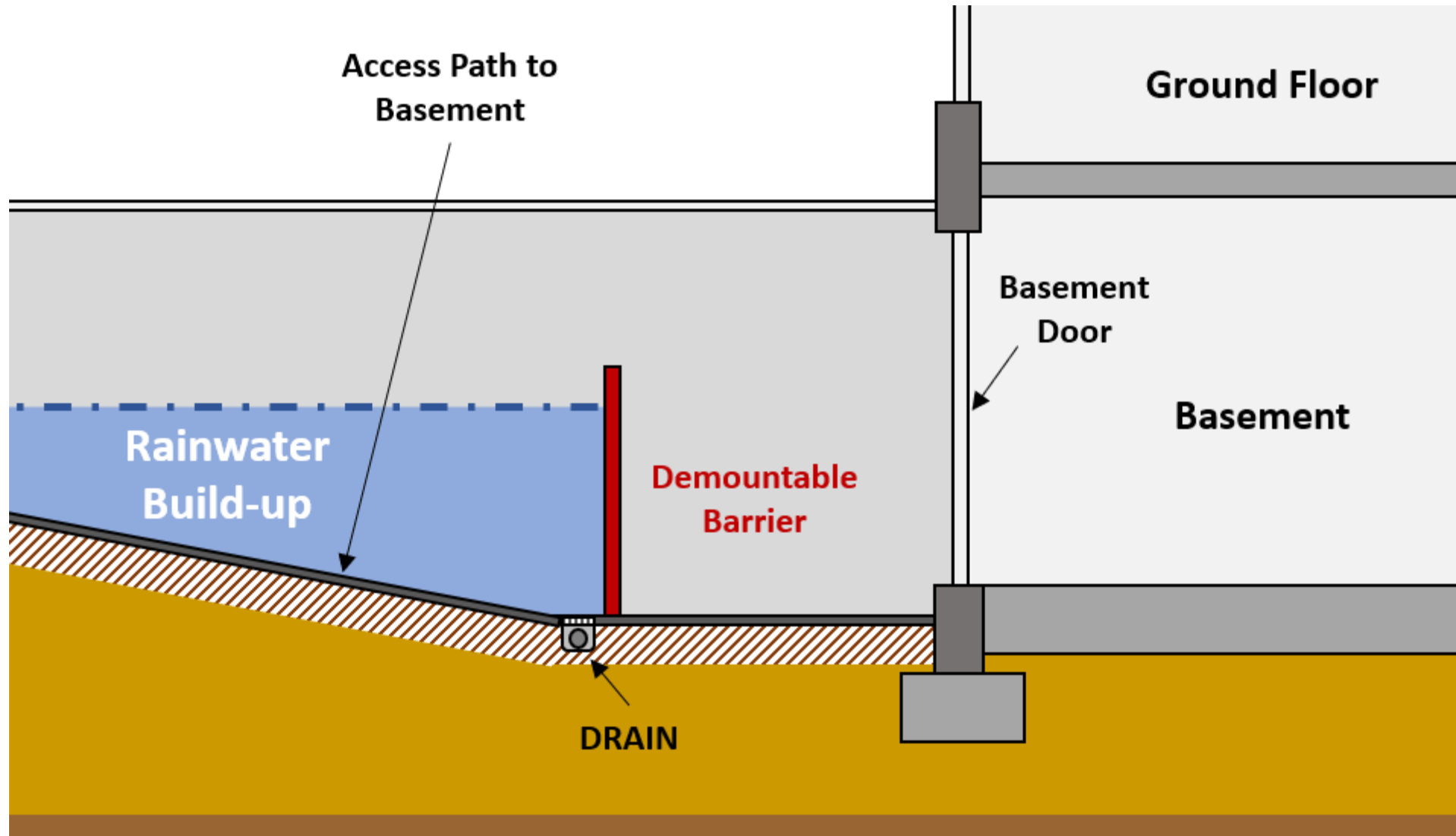




# Case Study 3: Not Considering All Ingress Routes



# Case Study 4: FMP and Management of Change



# Summary

- Flooding is considered the most frequent and expansive natural hazard in the UK.
- Effects of Climate Change look set to exacerbate the flood risk within the UK.
- Identifying the present-day flood risk and future flood risk is essential for Flood Risk Management.
- Need to understand all aspects of flood risk management to successfully manage the risk.
- Our experience has shown that what looks like a small unimportant issue can often undermine a site's flood management and response resulting in major property damage and business interruption.
- With climate change, the flood defence systems in place today may not be fit for purpose in 20- or 30-years time; thus, periodic reviews are essential to maintain levels of protection.



Thank You !