Water Ingress on Construction Sites

Water ingress on construction sites presents a number of risk concerns, ranging from structural damage to delays whilst repairs are undertaken.

This Loss Prevention Standard provides practical guidance on managing the risk associated with water ingress on construction sites.

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Introduction

Water ingress is a common construction risk that can damage weather susceptible materials and affect safety, structural performance, environmental compliance, programme certainty and cost.

Effective mitigation relies on early planning, robust temporary works, proactive monitoring, and strong site discipline. Many water ingress events can be prevented or significantly reduced with the right combination of drainage, protection, and operational controls.

Typical Sources of Water Ingress

- **Heavy Rainfall**. Can overwhelm temporary drainage and cause direct water entry.
- **Surface Run-off**. Water flowing from higher ground into excavations or low areas.
- **Groundwater Tables**. Can cause seepage into excavations and basements.
- **Rivers, Streams and Watercourses**. Breaching banks or temporary barriers.
- **Flooding**. Fluvial, pluvial, or coastal flooding can inundate the site.
- **Sewage Backflow**. Sewage can backup due to drainage systems being overwhelmed.
- **Snow and Ice Melt**. Sudden thaw can overload drainage and cause saturation.

Early identification of water ingress risks during the operational planning phase is essential for ensuring safe, efficient, and resilient construction delivery. By assessing natural water sources such as rainfall, groundwater, and surface run-off at the outset, project teams can anticipate how these hazards may affect each stage of the build and integrate preventative controls into the programme.

Establishing comprehensive mitigation and Emergency Response Plans at an early stage allows for informed design decisions, appropriate temporary works strategies, and advanced preparation of drainage, protection, and monitoring systems. This proactive approach not only reduces the likelihood of damage, disruption, cost increases, and safety incidents but also helps ensure that each construction phase is executed with a clear understanding of the environmental conditions and associated controls required to maintain compliance and protect the integrity of the works.

Understanding the Risks

The risks associated with water ingress include, but are not limited to:

- **Structural and Material Damage**. Including:
  - ✓ Weakening of foundations - High groundwater levels or flooding can saturate soil, reducing bearing capacity. Prolonged exposure may cause settlement, heave, or instability in temporary works.
  - ✓ Damage to building materials - Timber can warp, swell, or degrade whilst steel can corrode if protective measures are compromised. Concrete can suffer reduced strength or spalling if water affects curing or reinforcement. The effects of this are increased as the project enters fit-out and final finishings.
- **Delay and Disruption to Programmes**. Water ingress can halt works, particularly excavations and basement construction, make access routes and workfaces unsafe or unusable and immobilise plant and machinery, often resulting in costly recovery and replacement.
- **Increased Costs**. Water ingress may lead to replacement of materials and costly/lengthy remedial works and overheads as well as extension of preliminaries such as scaffolding, plant, pumps, dewatering systems and potential insurance claims.
- **Increased Health and Safety Risks**.
  - ✓ Site safety hazards – Slips, trips, and falls can increase on wet or waterlogged surfaces. In addition, excavations risk collapse due to weakened ground or hydrostatic pressure and electrical systems exposed to water create electrocution risks.
  - ✓ Contamination risks - Floodwater often carries biological or chemical contaminants that require specialist decontamination.
- **Damage to Temporary Works and Site Infrastructure**. Temporary structures such as scaffolding, hoardings and cabins can be undermined or destabilised. Pumps, drainage systems, and dewatering operations may become overloaded or fail.
- **Long-Term Building Performance Risks**. If water ingress occurs during construction, it can cause defects within envelopes, basements, or roofing systems, mould growth within structural cavities, reduced thermal performance of insulation and waterproofing failures.
- **Environmental and Reputational Risks**. Uncontrolled discharge of contaminated water can breach environmental regulations which may result in an Unlimited Civil Penalties fine (Variable Monetary Penalties – VMPs) and persistent water issues can erode stakeholder confidence and create reputational harm for contractors.
- **Legal and Contractual Risks**. Water ingress events can impact contractual obligations such as completion dates, liquidated damages, insurance coverage for Advance Loss of Profits (AloP), compliance with statutory and local authority requirements.

Managing the Risks

Structural and Material Protection

- Foundation and Excavation Protection:
  - ✓ Carry out pre-construction ground investigations to identify groundwater levels and permeability.
  - ✓ Use wellpoint dewatering, sump pumping, or deep wells where required.
  - ✓ Install temporary cut-off walls such as sheet piles, secant piles, or slurry walls.
  - ✓ Stage excavations so open faces and deep digs are minimised in duration.
  - ✓ Maintain safe benching and battering to reduce collapse risk in wet conditions.
- Material Storage and Protection:
  - ✓ Programme and manage just-in-time deliveries to minimise on-site storage.
  - ✓ Store sensitive materials such as timber, insulation, plasterboard and cement in raised and covered areas.
  - ✓ Use waterproof sheeting and controlled laydown areas with adequate drainage.

    Note: In the United Kingdom temporary coverings should comply with **LPS 1207**: **Requirements for the LPCB approval and listing for fire performance of temporary protective covering materials for use in the interior of buildings**.
  - ✓ Inspect reinforcement before concrete placement to ensure no water-induced corrosion.
  - ✓ Maintain controlled curing environments to avoid wash-out or uncontrolled hydration.

Programme and Operational Mitigation

- During the pre-construction phase, it may be necessary to carry out a flood risk assessment (FRA) for your proposed development site. A Flood Risk Assessment should be completed in accordance with guidance from the Environment Agency (EA), Local Authority and any other applicable body.
- Develop an Emergency Response Plan that outlines the steps to take in the event of flood warnings and unexpected water intrusion. Subscribe to national weather alert initiatives, such as UK weather warnings - Met Office in the United Kingdom.
- Build weather-related delay capacity into construction programmes, especially for groundwork and envelope construction.
- Use temporary roofs or scaffold sheeting to protect structures during critical phases.

  Note: Sheeting/wrap must conform to **LPS 1215**: **Requirements for the LPCB Approval and Listing for Fire Performance of Containment Net and Sheet Materials for External Use on Construction Sites**.
- Install temporary drainage channels, swales, or bunds to divert water away from the working area.
- Maintain controlled site levels so water flows away from key operational zones.
- Schedule high-risk activities outside seasonal peaks where feasible.

Cost Management and Efficiency

- Implement preventative maintenance for pumps, drainage systems, and temporary power with suitable backup and redundancy.
- Keep emergency materials onsite such as sandbags, bunding and flame-retardant plastic sheeting.
- Establish trigger levels for implementation of the Emergency Response Plan, including activation of emergency workforce.

Health and Safety Controls

- Site safety:
  - ✓ Ensure that people are safely evacuated in a timely manner and cooperate with the Emergency Services in accordance with the prepared emergency response plan.
  - ✓ Maintain slip-resistant walkways and regular housekeeping to clear standing water.
  - ✓ Regularly inspect excavations for signs of bulging, slumping, or hydrostatic pressure build-up. In the UK, excavations must be inspected by a competent person at least daily, before the start of every shift, and before anyone enters.
  - ✓ Ensure electrical equipment is weatherproofed, raised off the ground and protected by Residual Current Devices (RCDs).
  - ✓ Use non-slip mats, trench covers, and barriers around wet or waterlogged areas.
- Contamination control:
  - ✓ Use barriers to keep floodwater and debris from entering clean areas.
  - ✓ Provide PPE suitable for contaminated water handling.
  - ✓ Establish safe disposal and decontamination protocols for flood-damaged materials.

Protection of Temporary Works and Site Infrastructure

- Design temporary works with allowances for increased hydrostatic pressure, uplift, or the erosive removal of soil, sediment, or sand from around the foundation of a structure.
- Anchor or ballast lightweight structures such as cabins or welfare units.
- Install high-capacity pumps with automatic floats and backup generators.
- Maintain redundancy: dual-pump systems and alternative access routes.
- Inspect hoardings, scaffolds, and falsework after heavy rainfall or flood alerts, in addition to statutory checks.

Long-Term Building Performance Protection

- Install robust waterproofing systems for basements, podium decks, and roofs.
- Use cavity drainage membranes and dual waterproofing for high-risk structures in accordance with local standards and codes.
- Seal temporary penetrations and interfaces and install permanent solutions as early as possible to help prevent rainwater ingress into the building envelope.
- Carry out regular integrity inspections of temporary and permanent protections during construction to avoid ingress and trapped moisture.
- Ensure insulation is protected from saturation and the moisture content matches the suppliers recommendations before final closure.

Environmental and Reputational Mitigation

- Provide clear pollution prevention plans in line with Local Authority guidance.
- Use silt fences, settlement tanks, or filtration systems before discharging any pumped water.
- Communicate early with neighbours and stakeholders if flooding affects access or operations.

Legal and Contractual Mitigations

- Maintain and review the Emergency Response Plan as the works progress.
- Embed weather-related risk into contract terms and insurance provisions.
- Ensure compliance with the National Standards for Sustainable Drainage Systems (SuDS) and Environment Agency flood maps.
- Document all inspections and responses to adverse weather.

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Aviva Risk Management Solutions can offer access to a wide range of risk management products and services at preferential rates via our network of Specialist Partners.

For more information please visit: Aviva Risk Management Solutions – Specialist Partners

Sources and Useful Links

- National standards for sustainable drainage systems (SuDS): National standards for sustainable drainage systems (SuDS) - GOV.UK
- Gov.UK Preparing a flood risk assessment - standing advice: Preparing a flood risk assessment: standing advice - GOV.UK
- CIRIA Code of practice: The SuDS Manual C753F
- Environment Agency flood mapping: Get flood risk information for planning in England - Flood map for planning - GOV.UK
- MET Office Weather Warnings: UK weather warnings - Met Office
- Environmental Civil Sanctions: Extending civil sanction variable monetary penalty powers: response document - GOV.UK

Note: Whilst UK standards and legislation are referenced in this document, other international standards and legislation should be referenced where applicable.

Additional Information

Relevant Aviva Loss Prevention Standards include:

- **Flood Guidance & Mitigation (UK)**
- **Flood Guidance & Mitigation (Global)**
- **Flood - Emergency Response Plan**

To find out more, please visit Aviva Risk Management Solutions **or speak to one of our advisors.**

Email us at riskadvice@aviva.com or call 0345 366 6666.*

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