Uisce Éireann

Safety In Design Guidance Document

Revision Number	Description of Change	Author(s)	Approved By	Date of Approval
1.0	First Approval		Mark O'Connell	Nov 2019
2.0	All sections, BIA 25-104	Liam Smith	Alan Morrissey	25/07/2025

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1 INTRODUCTION

Keeping each other safe is a core value for Uisce Éireann.
Proper implementation of Safety in Design stage helps to reduce safety risks and enhance operational efficiency. This document serves as a resource for Uisce Éireann's permanent and temporary works designers, contractors, Project Supervisors for the Design Process (PSDP) and Project Supervisors for the Construction Stage (PSCS), to apply the general principles of prevention (as defined in Schedule 3 of the Safety, Health and Welfare at Work Act 2005), as part of the design risk management process, in consideration of the whole lifecyle of the asset.

2 PURPOSE

As Ireland's national regulated water utility, Uisce Éireann is responsible for the delivery of secure, safe, and sustainable water services for the people of Ireland. Water services projects are inherently complex, involving multiple stakeholders and whole asset lifecycle risks. Uisce Éireann is committed to fostering a world class safety culture with our partners in the delivery of critical water and wastewater projects. Which benefit both people and the environment.
Safety begins at design stage where there is more opportunity to design out hazards or integrate control measures with the original design.
The primary purpose of this guidance document is to increase designer competence and promote positive designer behaviour towards design hazard identification and design risk management across the water industry in Ireland.

3 SCOPE

This document has been prepared to provide guidance on the safe design of water and wastewater facilities being constructed and operated by Uisce Eireann and their contractors. Safety in Design is the process of identifying, assessing, and controlling design hazards and design risks to ensure that the design can be built, used, maintained and eventually decommissioned or demolished without negatively affecting the health and safety of those involved in the construction process, the end user or the environment.
It equips design stakeholders with guidance and tools necessary to achieve the following core objectives:

1. Drive compliance with legal obligations under the Safety Health and Welfare at Work

(Construction) Regulations 2013 to 2021 (i.e. the Regulations).

2. Increase the competence of design hazard identification, evaluation and mitigation for all design stakeholders.
3. Promote a culture of positive designer behaviour towards health, safety and environment (HSE) in design hazard elimination or reduction across the water industry in Ireland.

3.1 Who Should Use This Document:

This guidance document is applicable:

- To all design stakeholders involved in the design, construction, operation, maintenance, decommissioning and demolition of water industry assets in Ireland, including (but not limited to) Uisce Éireann resources, permanent and temporary works designers, contractors, PSDP, PSCS and operation and maintenance personnel.
- For all delivery phases of Uisce Éireann's assets (Refer to *Figure 1*).

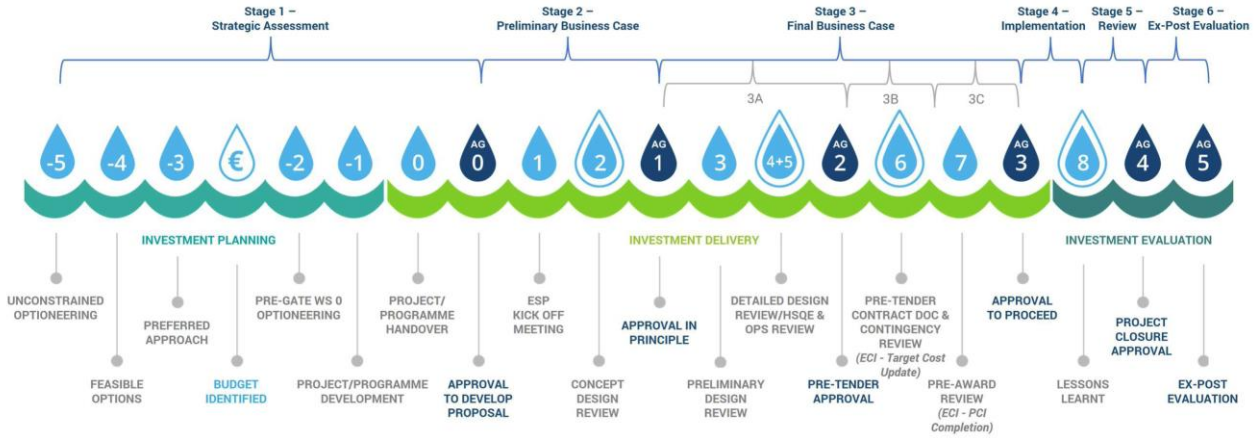


Figure 1 Uisce Éireann Workshop Flow Chart

4 DEFINITIONS

In order to establish the legal requirements of Design Risk Management, the following definitions are interpreted from the Regulations:

Client	A person for whom a project is carried out.
Project	An activity which includes or is intended to include construction work.
Construction Work	The carrying out of any building, civil engineering or engineering construction work including construction, alterations, converting, fitting-out, commissioning, renovating, repairing, upkeep, decorating, maintaining, de-commissioning, demolishing, dismantling and assembling.
Design	The preparation of drawings, particulars, specifications, calculations and bills of quantities in so far as they contain specifications or other expressions of purpose, according to which a project, or any part or component of a project, is to be executed. Design therefore includes all phases from initial strategic assessment, through to detailed design, construction and final decommissioning/demolition.
Designer	A person engaged in work related to the design of a project. A designer can be from any organisation (i.e. client, consultancy or contractor).
Design Risk Management (DRM)	Increase designer competence and promote positive designer behaviour towards design hazard identification
Contractor	A contractor or an employer whose employees undertake, carry out or manage construction work.
Project Supervisors for the Design Process (PSDP)	An individual or a body corporate, appointed by the Client, before the start of the design process, to coordinate the design process.
Health and Safety Co-Ordinator	Individual person appointed by the PSDP (if considered appropriate by the PSDP) to assist in the undertaking PSDP duties.
Project Supervisors for the Construction Stage (PSCS)	An individual or a body corporate, appointed by the Client, before the commencement of construction work, to coordinate the construction process.
Safety Advisor	Appointed by the PSCS, if there are normally more than 100 persons on a construction site at any one time engaged in construction work, to

	observe and supervise regulatory compliance and the promotion of the safe conduct of work generally.

5 ROLES AND RESPONSIBILITIES

Safety on UÉ projects is the responsibility of everyone in the industry – clients, designers, project supervisors, contractors and construction workers.

It is the responsibility of all duty holders appointed by Uisce Éireann under the Safety, Health & Welfare at Work (Construction) Regulations to ensure the Uisce Éireann minimum requirements for Health and Safety on Infrastructure delivery projects and programmes, as documented in PS-HS-PR-029, are followed.

5.1 Designer

A designer is someone who engages in preparing drawings, particulars, specifications, calculations and bills of quantities to a project. A designer should ensure, so far as is reasonably practicable, that the asset is designed without risks to health and safety throughout the asset's lifecycle. A designer must identify hazards that may present during construction and maintenance stage. Where possible, eliminate or mitigate hazards. Communicate necessary control measures or remaining risks. Co-operate with other designers, the client and other stakeholders. Also take account of existing information, drawings and surveys.
This includes;

5.1.1 Architects and engineers contributing to or having overall responsibility for the design.

5.1.2 Building service engineers designing details of fixed plant.

5.1.3 Surveyors specifying articles or substances or drawing up specifications.

5.1.4 Contractors carrying out design work as part of a design and build project.

5.1.5 Temporary works or specialist suppliers designing formwork & falsework.

5.2 Contractor

While contractors do not create the design, however they play a critical role in identifying, mitigating, and managing risks throughout the construction process. Their expertise ensures that designs are not only feasible but also safe for workers and end-users. Contractors are to

provide feedback to designers on practical construction methods and materials. Contractors must develop RAMS on basis of design for high-risk activities and ensure that risk mitigation measures are integrated into the construction process. The main contractor is primarily responsible for managing safety and implementing site specific safety measures on site.

5.3 Employers Representative & Resident Engineer

The Resident Engineer acts as a critical link between design intent and construction reality, ensuring that risk management strategies are effectively implemented. The Engineer's Representative (ER) ensures that the design aligns with safety, regulatory, and contractual requirements. The ER also acts a crucial link between design and construction teams to ensure design risks are communicated between designers, contractors and the client and identify potential design risks that may affect construction, operation, or maintenance.

5.4 Infrastructure Delivery Project or Programme Manager

Project and Programme Managers shall be responsible for ensuring health and safety compliance and promoting Uisce Éireann's safety value and behaviours throughout delivery on UÉ projects and programmes.

6 GUIDELINE

Influencing Safety is most effective when applied at the earliest stage of the design process. There is a direct link to cost and difficulty of implementing controls the further we move along asset lifecycle. The most cost effective and enduring controls with regard to safety are usually applied between the concept and the detailed design. As the project progresses towards construction and operation, these controls get more difficult to introduce along with a potential increase in costs.

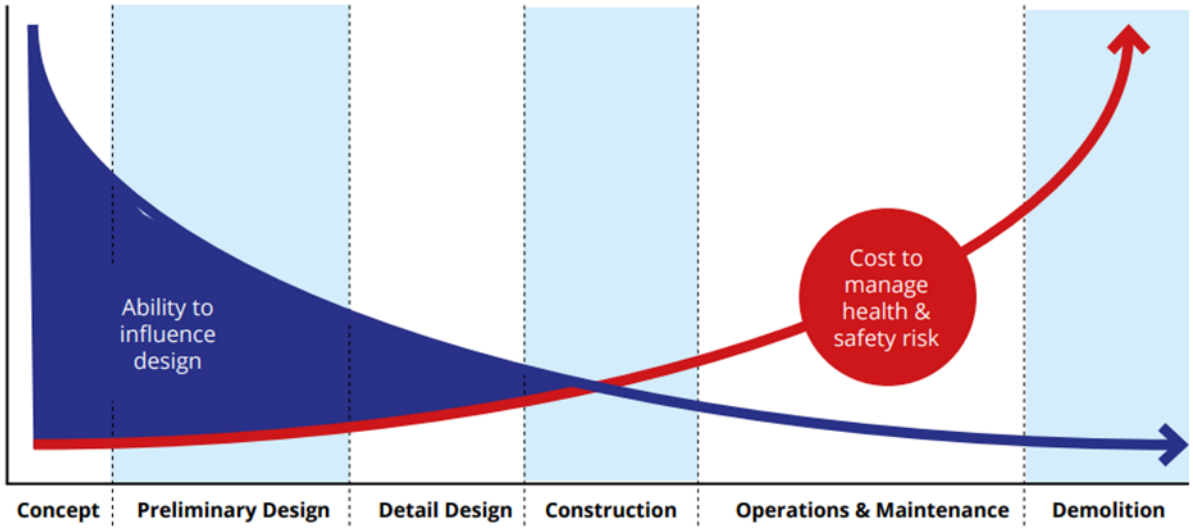


Figure 2 Influence of Safety vs Cost

6.1 Understanding Hazards and Risks

Design hazards represent potential sources of harm or danger to people or the environment that can arise from the design of Uisce Éireann's projects. Understanding these hazards and how to identify them, is fundamental to effectively managing design risks.

6.1.1 Difference Between Hazards and Risks

It is important to understand the difference between hazards and risks:

Hazard	Risk
A potential source of harm or damage that directly arises from the design of a structure, system, or process	The combination of the probability and the severity of a hazard occurring

6.1.2 Design Hazards vs Construction Hazards

Designers must understand the differences between design hazards and construction hazards. The focus of design hazard identification should be on what the designer can do to eliminate or mitigate the following:

- Existing site or asset hazards

and/or

- Hazards introduced by the design process that may affect the asset's whole lifecycle.

Design Hazards	Construction Hazards
Conditions, situations, or factors identified during the design of a project, that have the potential to cause harm to people or the environment.	Dangers, circumstances, or activities of construction work that have the potential to cause harm people or the environment

6.2 How to Identify Design Hazards

Design hazard identification involves a systematic approach of data gathering, design stakeholder collaboration, peer reviews and the closing of knowledge gaps across the design interface.
The following Uisce Éireann Design Hazard Wheel has been devised to aid design stakeholder collaboration in identifying whole lifecycle design hazards which may impact people and the environment.

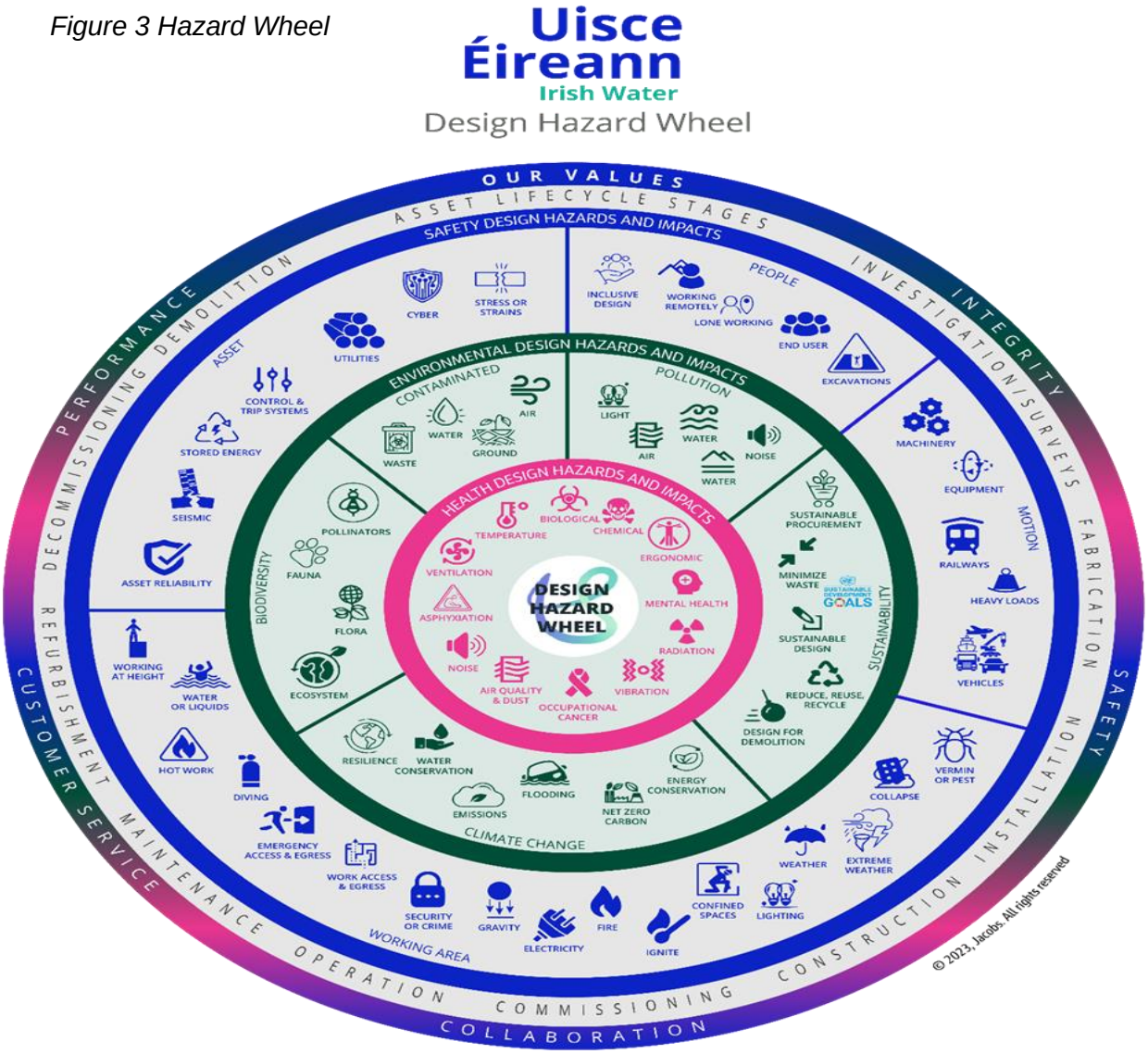
6.3 Design Hazard Wheel

The Design hazard wheels is a structured diagrams that help designers incorporate safety, environmental, and health considerations into their design decisions. By visually mapping out different categories of hazards—such as physical safety risks, environmental impacts, and health concerns—the wheel helps guide teams to proactively address risks throughout the entire lifecycle of an asset, from construction to decommissioning. See figure 3.

6.4 How to use a Design Hazard Wheel

- Risk Identification: During brainstorming or design reviews, teams use the wheel to systematically identify potential hazards.
- Design Decision Support: Helps prioritize design choices that reduce or eliminate risks.
- Communication Tool: Facilitates discussions between multidisciplinary teams (e.g., engineers, architects, environmental consultants).
- Compliance & Documentation: Ensures alignment with legal, ethical, and sustainability standards

Figure 3 Hazard Wheel



Project Awareness	Thoroughly understand the project scope. Gather all available project documentation, including plans, specifications, and any relevant site surveys.
Design Interface	Thoroughly understand the design interface, including the interdependencies of design stakeholders and how (and when) other design outputs may impact the design.
Plan	Plan ahead for successful design delivery. Identify all designers, their responsibilities, scope, key design interfaces, design change control and planned design stakeholder coordination activities before design work commences.
Site Assessment	Gain an understanding of local surroundings, topography, existing infrastructure, nearby buildings, roads, utilities, local environmental and end user factors.
Historical Data Analysis	Research past incidents or issues related to similar infrastructure projects, or the surrounding area, if available. These can provide valuable insights into potential design hazards that might not be immediately obvious.
Simulation or Modelling	Use computer simulations, modelling or virtual reality tools (where appropriate) to visualise the project and simulate various scenarios. This can help collaborate on potential hazards that might be overlooked in traditional design processes.
Design Stakeholder Collaboration	Engage in continual collaboration with all design stakeholders to ensure that there are no gaps in design knowledge exchange. Identify and schedule regular engagement between all design stakeholders, including (but not limited to) clients, engineers, architects, permanent and temporary works designers, environmental specialists, ecologists, operations and maintenance, construction experts, relevant third parties etc.
Design hazard wheel	Use the Uisce Éireann Design Hazard Wheel to identify whole lifecycle HSE in Design hazards in project team meetings, workshops etc. Identify any knowledge gaps which may require additional collaboration with expert resources.
Design Risk	Maintain a design risk register of design hazards for all design

Assessment	disciplines to guide the design process. Evaluate the identified design hazards in terms of their probability of occurrence and severity. Use the General Principles of Prevention to eliminate or reduce design risks to as low as reasonably practicable.
Reviews	Organise regular, scheduled reviews with peer reviewers, design discipline leads, design stakeholder (as appropriate) to discuss identified hazards and emerging mitigation measures. Encourage collaboration between all design stakeholders across the design interface.
Learning and training	Encourage ongoing knowledge sharing and training for the project team to stay updated on the latest safety standards, methodologies, technologies, design hazards and best practices for design hazard identification and mitigation.

6.5 Design Risk Assessment Process

Stage	Description
Identify	Each design discipline to continuously identify whole lifecycle design hazards which may impact people or the environment, throughout the entire design process.
Record	Use a design risk assessment form to continuously record each design hazard as they occur throughout the design process, as a permanent record.
Evaluate	Assess each design hazard and evaluate its initial design risk rating in terms of the probability of occurrence against its severity.
Collaborate	Discuss emerging design hazards with design disciplines (as appropriate) to collaborate on potential risks which may impact the wider design process and the asset's whole lifecycle, to benefit people and the environment.
Mitigate	Designers use the general principles of prevention to Eliminate, Reduce, Isolate or Control (ERIC) design risks to as low as reasonably practicable (refer to - General Principles of Prevention). Detail what the

	designer has done to mitigate the design risk on the design risk assessment form. Track design changes, mitigation actions and owners for adoption within the design.
Residual	Re-evaluate the probability and severity of the design risk post adoption of the design mitigation measure(s). Record the residual design risks on the design risk assessment form.
Review	Conduct regular scheduled reviews of design risk assessments, throughout the design phase, to ensure continuous communication, coordination and collaboration between all design stakeholders and peer reviewers.
Transfer	Collate all residual design risks and communicate design mitigation measures to follow on designers, contractors and end users (where appropriate) for adoption in later project phases.

6.6 Design Risk Rating

A design risk assessment is a process used to evaluate and prioritise the potential risk associated with a design hazard. It involves assigning a risk rating based on an assessment of probability of occurrence and potential severity. Design risk assessments are subjective and not an absolute or precise determination of a design risk.

Ref	Probability of Occurrence	Severity
1	Exceptionally unlikely to occur, minimal chance.	Negligible impact, minor consequences.
2	Low likelihood, uncommon occurrence.	Insignificant impact, minimal impact.
3	Moderate probability, notable to occur.	Notable impact, moderate consequences.
4	Highly possible, significant chance.	Substantial impact, requires high attention.
5	Almost certain to regularly occur.	Catastrophic consequences, immediate and comprehensive action required.

Residual Risk Rating	Actions Designers Should Take
High	Residual risk resulting from design mitigation is unacceptably high. Revise design to reduce residual risk to an acceptable and manageable level. In exceptional circumstances, consult with the Client, PSDP, designers, contractors and PSCS (where appropriate) to confirm if the residual design risk and identified design mitigation measures must be accepted due to other factors. Document all decisions.
Medium / High	Following consultation between designers, PSDP and the Client, residual design risk may be permitted with appropriate design mitigation measures adopted, which shall be communicated to follow on designers, contractors and end users (where appropriate).
Low / Medium	Residual design risk permitted with appropriate design mitigation measures adopted, which shall be communicated to follow on designers, contractors and end users (where appropriate).
Low	Residual design risk is permitted, subject to the adoption and communication of identified design mitigation measures, to follow on designers, contractors and end users (where appropriate).

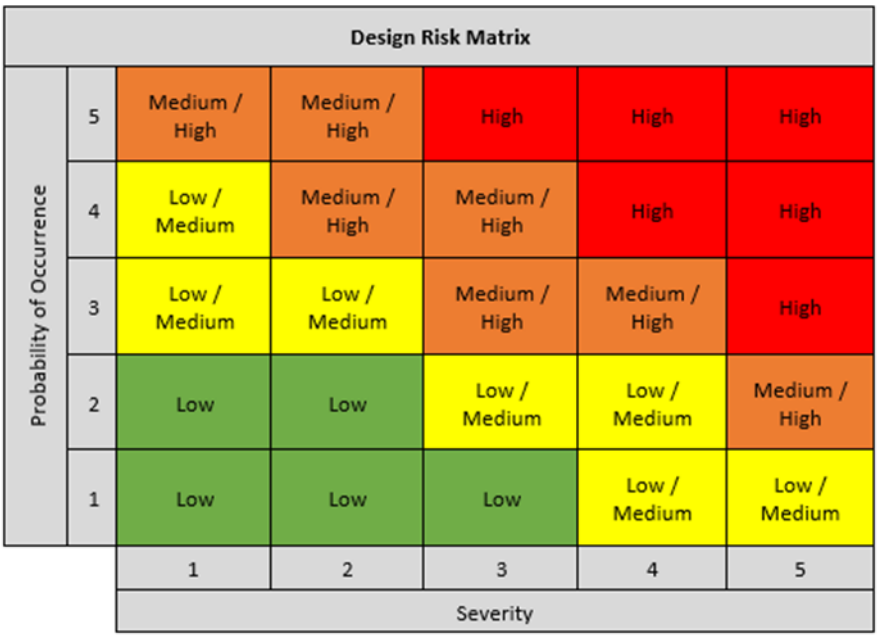


Figure 4 Risk Matrix

6.5 Design safe to construct?

Designers must take account of the general principles of prevention as set out in Schedule 3 of Safety, Health & Welfare at work Act 2005 when preparing designs.

The General Principles of Prevention (GPoP) are:

- Avoidance of risks.
- Evaluation of unavoidable risks.
- Combatting of risks at source.
- Adaptation of work to the individual, especially regarding the design of places of work, the choice of work equipment and the choice of systems of work, with a view, in particular, to alleviating monotonous work and work at a predetermined work rate and to reducing the effect of this work on health.
- Adaptation of the place of work to technical progress.
- Replacement of dangerous articles, substances or systems of work by safe or less dangerous articles, substances or systems of work.
- Giving of priority to collective protective measures over individual protective measures.
- Giving of appropriate training and instructions to employees.

When design risks cannot be eliminated. The risks must be mitigated as per figure 5 mitigation triangle below. Below are examples of Design Mitigation measures relating to the construction of a structure:

- Re-routing existing utilities cables before construction begins.
- Consider the use of site construction (prefabrication) to reduce the risks such as fall from height during construction.

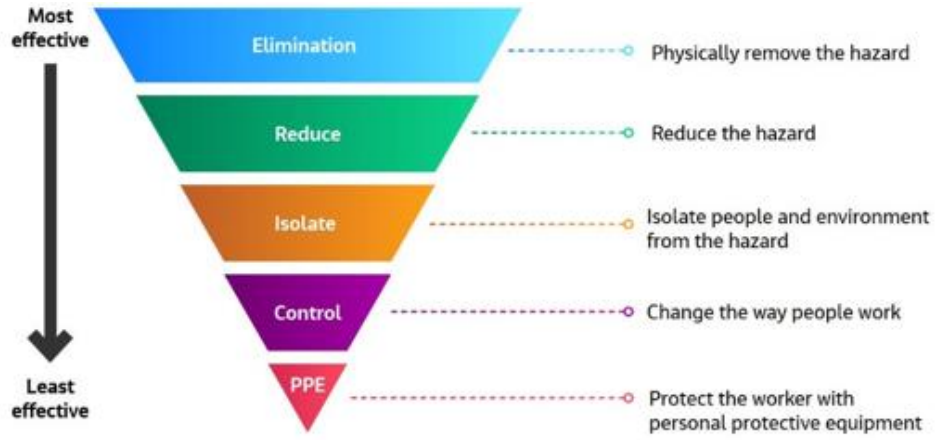


Figure 5 Mitigation Triangle

6.6 Design safe to use?

Consider that the asset is safe to construct, operate, maintain and decommission of the asset, including the likely systems of use, and the type of machinery and equipment that may be used.

Below are some examples of how risks relating to operations of assets can be addressed by:

• Designing in access for maintenance purposes (e.g. fixed stairs to a machine room)

• Using non-slip materials on for surfaces in areas exposed to the weather or dedicated wet areas

• Providing sufficient space within the facility to safely install, operate and maintain plant

6.7 Designer Competency

6.7.1 Overview

Competence is a combination of skills, knowledge and experience that enables an individual to perform a task or an activity successfully within a given context.

In addition to design discipline knowledge, it is important that designers have an understanding of:

a) Any applicable legislation, codes of practice/guidance and other regulatory requirements applicable to that design discipline.

b) Design hazard identification and design risk assessment for the design.

c) How the asset being designed can be safely constructed, operated, maintained, refurbished, decommissioned and demolished.

d) The potential impact of the design on other designers.

e) The potential impact of other designer outputs on the design.

f) The potential environmental impacts of the design over the asset's whole lifecycle including construction, operation, maintenance, decommissioning and demolition.

6.7.2 Designer Competency

Demonstrating competency may include sample evidence such as curriculum vitae, proof of membership of a professional institution, appropriate training records or examples of working on similar projects.

The following table provides an example matrix to assess designer competency for the assigned design scope and, importantly, any competency gaps requiring either additional

training or sourcing of other expert resources.

Name:	Proposed Role:	Professional Accreditation & Qualifications:	Design scope for intended Project Role:	Previous Relevant Technical Project Experience:	Relevant Training Role:	CV Received: Yes/No	Identified Competency Gaps:

6.7.3 Knowledge Enhancement

Uisce Éireann encourages the continuous development of design professionals and engagement in lifelong learning to stay updated on the latest health, safety and environmental in design practices. The following are encouraged to be adopted by all partners:

a) Industry-specific training: Seek out training programs (internal or external) that address the unique challenges of the water industry.

b) Interdisciplinary knowledge: Encourage cross-training between different disciplines within design teams to enhance understanding and collaboration.

c) Knowledge sharing: Foster an environment where design professionals share their expertise, experiences and lessons learned to promote a holistic understanding of design risks.

7 REFERENCED DOCUMENTS

Document Name	*Document Number*	*Location*
PS-HS-PR-029	*Minimum Health, Safety, Quality & Environment Requirements for Uisce Éireann Capital Projects*	Alfresco » Document Details
PS-HS-FM-037	*Design Risk Assessment Form*	Alfresco » Document Details
ID-PO-PR-02	*Project/ Programme Workshop Procedure (i20)*	Alfresco » Document Details
AMS-SI-POL-002	*L1 - Sustainability Policy*	*Alfresco » Document Details*
AMS-SI-POL-010	*L2 - Climate Change Policy*	*Alfresco » Document Details*