Doc ID 58574982	Custodian Manager, Dams & Conveyance, Engineering
Version Date 17/07/2026	Accountabilities Framework Level 1 – Acquire Infrastructure Assets Level 2 – Design Assets
Next Review Date 13/07/2029	

1 Purpose

This work instruction describes the objectives, principles and procedures for considering and mitigating OSH hazards so far as reasonably practicable during the planning and design of Water Corporation assets. It also describes requirements for communicating these considerations and mitigations to the people who will be constructing, commissioning, operating and maintaining the asset.

The resulting Safety in Design Report that is produced helps to ensure that the downstream activities of construction, commissioning, operations, maintenance and decommissioning of a new asset are conducted with a full appreciation of any inherent risks in the design.

These activities are referred to as Safety in Design.

2 Scope

This Work Instruction is applicable to all planners and designers for all design work conducted by or on behalf of the Water Corporation related to assets intended for use in or associated with its water, wastewater and drainage schemes. It is not intended to cover design work associated with buildings and structures managed under the Water Corporation's Corporate Real Estate program.

3 Introduction

Safety in Design, as required by the relevant OSH Act and Regulations, is the integration of hazard identification and risk assessment methods as early as possible in the design process to eliminate or bring the risks of injury "So Far as is Reasonably Practicable" throughout the life of the asset or process being designed. A safe design approach considers the safety of those who plan, design, construct, maintain, clean, repair and demolish an asset as well as those who work in or with it.

4 Statutory and Regulatory Obligations

On 3 January 2008 new regulations relating to the *National Standard for Construction Work* (NOHSC, 2005) were introduced for designers, clients and key contractors within the construction industry. These regulations apply to all buildings and structures and are contained in Division 12 of Part 3 of the Occupational Safety and Health Regulations 1996. WorkSafe WA Occupational Safety and Health Regulations and Code of Practice define a ***building*** or ***structure*** as:

"any erection, edifice, wall, chimney, fence, bridge, dam, reservoir, wharf, jetty or ship or other floating structure, and includes any part of those things."

In accordance with these regulations designers must provide their clients with a written report on the OSH aspects of their designs. This report should set out:

- The hazards –
  - That the designer has identified as part of the design process;
  - That arise from the design of the end product of the construction work; and
  - To which a person at the construction site is likely to be exposed.
- The designer's assessment of the risk of injury or harm to a person resulting from those hazards;
- What things the designer has done to reduce those risks (for example, changes to the design, changes to construction methods); and
- Which of those hazards the designer has not done anything in respect of to reduce those risks.

In addition to the above, the Dangerous Good's Safety (Storage and Handling of Non Explosives) Regulations 2007 impose additional requirements on designers to identify and manage risk. The Water Corporation has integrated these requirements in to the Safety in Design process through the inclusion of appropriate keywords and the required involvement of suitably experienced personnel.

The OSH Act 1984 Section 23 also states that *the designers and suppliers of plant have to ensure that all operational and maintenance hazards have been identified and controlled as far as reasonable practicable and that any information about these hazards should be provided to the operators of the plant.*

5 Objective

The objective of Safety in Design is to identify all OSH hazards associated with the assets being designed and, in turn, mitigate those hazards to ensure, so far as is reasonably practicable using the highest reasonable hierarchy of control, the safety of those who work on, with or use those assets, including the general public.

6 Principles

Principle 1: People with control	**Safe design is the designer's responsibility** – safe design responsibility rests with parties or people having control or influence over the design of products, items or processes no matter when this control is applied (i.e. changes made in the field are the responsibility of those who make them)
Principle 2: Product life cycle	**Safe design employs life cycle concepts** – safe design applies to every phase in the life cycle of an asset, from conception through to redevelopment and disposal, and involves eliminating hazards or minimising risks as early in the life cycle as possible
Principle 3: Systematic risk management	**Safe design incorporates risk management** – through the application of hazard identification, risk assessment and risk control processes, safe design is achieved
Principle 4: Safe design knowledge and capability	**Safe design requires knowledge and capability** – which should be either accessed or demonstrated prior to any person being given control or influence over design. Every designer must know as Technical Designer: • How to assess OSH hazards and risks in the workplace. • How to apply OSH Principles to Design. • Understand **Human interfaces** with the Technology As a Decision Maker**:** • Understand and apply Risk Management • Know how to conduct Risk Assessments • Know how to report the Safety in Design Outputs
Principle 5: Information transfer	**Safe design relies on communication** – effective documentation and communication of design and risk control information between all people involved in phases of the life cycle of an asset is essential for the safe design approach to mitigate risks

7 Safety in Planning

Acknowledging the safe design principles, it is essential that development of concept asset solutions include consideration to safe design through the whole product lifecycle.

The planning phase in the life cycle provides opportunity to assess safety in concept designs at scheme level where interface with other assets, location, access, environment and ease of safe operation are just a few of the areas that can be reviewed to ensure best for business decisions on proposed asset solutions.

The 'Safety in Planning' process integrates hazard identification and risk assessment in planning, from scoping (problem identification) through to development, and finally, handover to Engineering.

It is intended that assessments will be supported by ongoing commentary within existing planning milestones, such as Asset Investment Plans (or Technical Advice) and Planning Workshops. Guidewords, based on the nine Safety Essentials, are provided in the Risk Register template to prompt assessments. It is also expected that the Risk and Constraints process will contribute to the assessment.

Final planning hazard identification and risk assessment will be recorded in the Safety in Planning tab of the Safety in Design Report. This report will be an attachment to the Investment business case and will be passed to Engineering. It is intended that subsequent Safety in Design will be completed in the same document, prepopulated with safe planning information.

For further information refer - Safety in Planning Guideline (https://nexus.watercorporation.com.au/otcs/cs.exe/app/nodes/49076364)

8 Safety in Design Procedure

8.1 Design Initiation

8.1.1 Design Hazard Register

At the start of design, review the Safety in Planning Risk Register and then develop the Safety in Design Risk Register. As the design progresses, capture additional hazards identified and record decisions relating to their mitigation in this Register. When sufficient design work has progressed, use this Register as one of the reference documents for the various assessments and workshops undertaken to identify and mitigate OSH hazards. This Register is carried through and updated in each phase of the design and forms an integral part of the final Safety in Design Report.

8.1.2 Preceding Activities

In addition to the Safety in Planning Risk Register mentioned in Section 7, the Project Manager will have initiated a Project Risk Assessment that may have identified OSH Hazards and Risks to be considered in the Safety in Design.

8.2 Hazard Identification

8.2.1 Asbestos

As early as practical in the design process, it must be established, so far as is reasonably practicable, the extent and location of asbestos containing material (ACM) on site through consultation of the asbestos register and desktop analysis of any as constructed drawings. (Note that the Asbestos Register details the location of previously identified ACM; it should not be relied upon to confirm no ACM is present).

Note that it is not sufficient to establish the extent and location of ACM immediately adjacent to or associated with the scope of the works in question. Effort must be placed to investigate the presence of ACM in any and all locations on the site that may be disturbed by the entire scope of the works that are likely to be undertaken on the site. (For example, consider layup areas or where temporary roadways may be built to support the works).

Unless the extent and location of ACM is well defined or the nature of the work is assessed and documented as extremely unlikely to encounter ACM, then a site inspection by a competent person and testing of any suspect material is also required. The Corporation has a panel for Environmental Consultants including asbestos inspections. The panel is managed by Safety, Environment and Aboriginal Affairs (SEAA) Branch and listed under Procurement's webpage. The inspection results must be provided to the custodian of the Corporation's Asbestos Register.

Appendix A of the 'Code of Practice for the Management and Control of Asbestos in Workplaces, NOHSC:2018 (2005)' provides examples of asbestos containing materials. The Corporations Asbestos Asset Register also contains lists of asbestos containing products. This is particularly useful for understanding products used in the water industry as compared to products in general building. Water industry specific materials may include, but is not limited to, AC pipe, fibre cement pits, gaskets, mastic sealant, sealant between concrete slabs, bitumen wrapped pipe and AC sheet as a layer under the welds of steel plate tank floors.

Details of ACM identified via the above investigations should be entered into the Design Hazard Register as a prompt for further action to mitigate the consequential risks.

8.2.2 Coal tar and bituminous (PAH / PCB containing) materials

Most mild steel pipes manufactured prior to 1990 incorporate hazardous substances in the coating material. These coated pipes (bitumen or coal tar wrapped pipe) contain Poly Aromatic Hydrocarbons (PAH) and may contain Polychlorinated Biphenols (PCB) and asbestos. PAHs, PCBs, and asbestos are known carcinogens. Joint sealants in older concrete water retaining structures are also likely to contain PAHs or PCBs and asbestos.

The design and construction that involves removal or remediation of existing assets that may contain PAHs or PCBs should identify if PAHs or PCBs are present in the material, which may involve testing for PAH/PCBs/asbestos, what controls are required to manage the risk of exposure, and the waste disposal needed. If it contains PAHs or PCBs disposal at a class 5 waste facility is required.

Guidance on identification of hazardous pipe coatings is available (https://nexus.watercorporation.com.au/otcs/cs.exe/app/nodes/163240598)
And for details on disposal requirements refer to HSEAA fact sheet Bitumen and coal tar waste disposal (Asbestos/PAH/PCB)

https://nexus.watercorporation.com.au/otcs/cs.exe/app/nodes/58654270).

8.2.3 Other Onsite Hazards

The presence of other existing on site hazards should be established, so far as is reasonably practicable, through review of drawings, site inspection, dial before you dig, survey and service location. These hazards include but are not limited to:

- Hazards relating to the Water Corporation' S*afety Essentials*:
  - Road safety;
  - Excavation;
  - Fall prevention;
  - Electrical;
  - Lifting operations;
  - Isolation of existing energy sources (electrical, gas, water, sewage, etc.);
  - Mobile plant;
  - Hazardous substances /dangerous goods including water treatment chemicals; and
  - Confined spaces
- Contaminated sites; and
- Unexploded ordinances

8.2.4 Hazard Identification through the Design Process

During the Design Process OSH hazards will be identified through:

- HAZOP Assessments (if required);
- Operability and Constructability Assessments;
- Dangerous Goods Risk Assessments (if DG's are part of the design); and
- Designer consideration of Safety Essentials and the Safety in Design Guideword Checklist – this may be through the design work itself, progress meetings and site visits.

Appropriately experienced personnel should be involved with the above assessments. As a minimum representatives of the operational team intended to operate and maintain the asset should be engaged. The representatives must be empowered by the management of the operational team to make decisions and suggestions on behalf of all operators in that business unit. The attendees should be competent in that they are expected to have relevant expertise which will contribute to the effectiveness of assessments.

The above mentioned assessments can be facilitated via a combined workshop, specific workshops or ongoing engagement through the design process as dictated by the criticality and complexity of the design. Any workshops should be facilitated by a person with the following competencies:

- An Engineer with relevant experience in the asset(s) being reviewed;
- Knowledge and understanding of the procedure for the assessment workshop in question (Refer to the work instruction for relevant assessment workshop);
- Experience as a participant in these workshops;
- Understanding of the Occupational Safety and Health regulations for Safety in Design;
- Understanding of the operational context of the design being addressed at the workshop.

Note the Safety in Design Guideword Checklist, which incorporates the Water Corporation's *Safety Essentials*, provides a set of prompts that have been assembled from past practice to help to identify hazards that will require mitigation.

In addition to utilising the Safety in Design Guideword Checklist the Designer should consider Hazard and Incident data for existing assets of similar design (liaise with Safety and Wellbeing Business Unit) and Engineering's Rich Pictures of good and poor design to help identify additional hazards associated with their design.

8.2.5 Risk Assessment Workshops

Throughout the design process there may be various risk assessment or design review workshops held in order to support the Safety in Design process, as well as to provide critical stakeholder input in to the design. The timing and requirements of the main risk assessment workshops are specified in the Engineering Design Manual and Work Instructions referenced therein.

The HAZOP (if applicable) and Operability and Constructability Workshop, generally held during engineering design, are key inputs to the SID Risk Register. These are then assessed during subsequent design stages for the need to review or redo the workshops.

The SID Risk Register records the risks identified during these workshops along with any mitigation applied during the design process.

8.2.6 Progress Meetings

Design progress meetings, whether internal or with an external consultant, are an important way to identify potential Safety in Design issues for inclusion onto the SID Risk Register. The meeting minutes should record any issues identified which must then be transferred to the SID Risk Register by the Designer.

8.3 Hazard Risk Assessment

All hazards identified and recorded in the Risk Register must be assessed using the Water Corporation's Risk Assessment Criteria (*S389 Risk Assessment Criteria*). Hazards are to be risk assessed prior to mitigation and post the proposed mitigation.

8.4 Hazard Mitigation through Design

Mitigation of all identified hazards must be considered. Figure one illustrates the hierarchy of mitigation controls listed from most to least effective. Note *Administrative* and *PPE* controls are not considered as mitigations associated with the design.

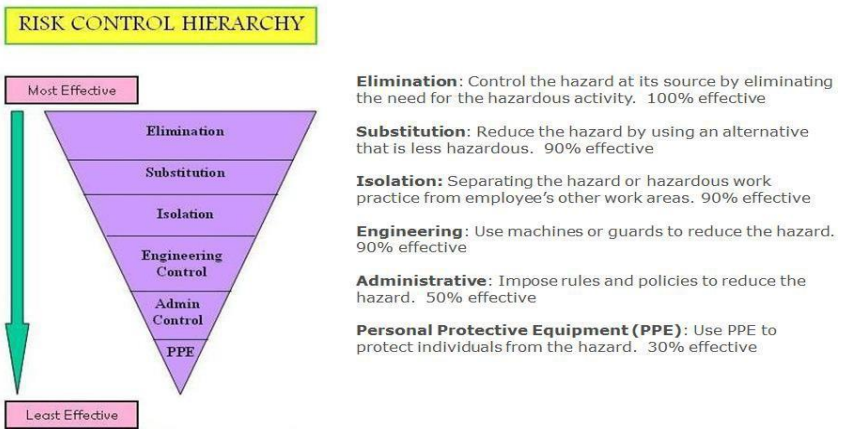

Figure one: Risk Control Hierarchy

The selected mitigation should be the highest in the risk control hierarchy and reduce the post mitigation risk so far as is reasonably practicable. The proposed mitigation and its post mitigation risk rating should be entered into the Design Hazard Register.

Further assessment of the mitigation that would achieve the next lowest level of risk should also be considered and the reason for not adopting this mitigation should be recorded in the Design Hazard Register. Reasons for not adopting the mitigation that would achieve the next lowest level of risk might include:

- The mitigation creates other hazards with higher levels of risk later in the assets life (i.e. construction of a pipeline in a roadway away from overhead power transmission wires creates a traffic hazard during operations that can only be mitigated by administrative procedures), or;
- This level of risk reduction is beyond what is reasonably practical to implement. (Safe Work Australia has a guide for determining what is reasonably practicable. (guide_reasonably_practicable.pdf (safeworkaustralia.gov.au).

Where the identified hazard cannot be designed out (through Elimination, Substitution, Isolation or an Engineering Control) a construction or operational administrative mitigation should be proposed, risk assessed and recorded in the Design Hazard Register in the same manner as design mitigation detailed above. However the residual risk in the Design Hazard Register should be recorded "Open" in the Risk Status column indicating those responsible for later phases must assess the residual risk. A suggested residual risk, along with the suggested mitigation, should be entered by the designer in the *Reasoning or Risk Treatment / Mitigation Plan* column of the register.

8.5 Reporting

8.5.3 Report Preparation

At the conclusion of the design phase complete the Safety in Design Report using the *Safety in Design Report Template*.

8.5.4 Drawings

It is good practice for Safety in Design information to be included on the design drawings to signify and communicate important safety information such as Work Authority Procedure to Works locations, high voltage power transmission cables, high pressure natural gas pipelines, and so on.

8.5.5 Sign off of Safety in Design Report

The Designer must sign off the Safety in Design Report but only after all hazards identified during the design phase have a documented proposed mitigation that has reduced the residual risk of the hazard so far as reasonably practicable. The reasons for not adopting the mitigation with the next lowest risk rating should also be documented.

Engineering shall check all externally sourced SID reports to confirm they are fit for purpose and relevant to the asset class. This check is to be evidenced on the SID report.

Note: The Safety in Planning assessment is provided to the Designer for information only and is not considered as part of the Safety in Design Report sign off.

8.5.6 Treatment action management

Once the Safety in Design Report is complete, and before the bid is prepared, all Design Hazards not eliminated (those with residual risk level greater than low which require mitigation) must be transferred as residual risks to the Project Manager so they can manage these risks. Where appropriate the Project Manager will transfer these risks to the Project Risk Assessment, ensure they are identified in the Contract Risk Register and recommended treatments are actioned by the responsible party. The Safety in Design Report should also be provided as an appendix in the bid documents.

8.6 Safety in Design Presentation

At the start of construction, at the start –up meeting, the Designer will present relevant points from the Safety in Design Report to the Contractor. A Safety in Design presentation should be prepared to explain the context for preparing the Safety in Design Report, the benefits of the report for constructors, the high or extreme risks that have been mitigated or not through the design and what actions are suggested for the constructor to manage these risks. The Project Manager and Superintendents Representative will work with the Contractor to action the proposed controls during the life of the project.

8.7 Management of Change

Once the project moves into the Deliver Phase the Project Manager (and or Contract Manager) must communicate any changes that could impact on the risk identified in the Safety in Design report, to the Designer.

The Designer must then consider whether the design risks have changed and whether they need to revisit the Safety in Design process.

For example, if any Request for Information (or technical query) is received from a contractor or a change occurs to the scope, design or proposed construction methodology, the Designer should consider the Safety in Design report and manage all risks to determine whether the changes alter any existing risks or create any new risks.

Depending on the nature or significance of a proposed change it may be necessary to consult with the Principal Engineer, subject matter experts (including the Asset Delivery Representative or operators), or undertake the HAZOP or operability assessment again.

If the Designer determines that the RFI or change will alter the risk profile they must consult with the Project Manager to update the risks, risk level and risk treatment plan in the Project Risk Assessment, action the treatment plan and communicate the changes to the contractor such that all risks are brought to a level considered to be SFAIRP.

8.8 Handover of Safety in Design Report

During Asset handover stage, the Project Manager shall transfer the residual risks from the Project Risk Assessment to the asset owner through the OSH Handover Report. Whenever any modifications are made to the built asset, the asset owner is required to consider the amendments based on alterations to existing risks. These risks are then required to be communicated to the operator to avoid operational hazards and damage to the existing asset.

9 Records

Any original electronic and hardcopy documents produced whilst undertaking the design, including those associated with Safety in Design must be retained in corresponding corporate files.

It is mandatory to file all documents in Nexus under the project file number. Where documents require signatures, scan the signature page into the document and file in Nexus.

10 Supporting Documents

Operability and Constructability Study Work Instruction
HAZOP Study Work Instruction
Dangerous Goods Risk Assessment Guideline
S389 Risk Assessment Criteria
Safety in Design Report Template
Safety in Design Guideword Checklist
Project Risk Management Work Instruction

Document Revision History	
16/02/11	New document
06/03/12	Major Revision
08/03/12	Risks Accepted change to Risks Treated, Risks not Accepted change to Risks not Treated
05/02/14	Section 4 – Reference to OSH Act added; Section 7.2.1 – Added requirement for an OSH representative to attend Design Risk Assessment Workshop, References to Dangerous Goods added to section 4, section 7.1.1, section 7.2, section 7.3 and section 9
19/11/15	Section 3 – Risks to be treated “So far as is reasonably practicable”; Section 7.2: New; Section 7.4 – Report sections updated: Custodian title changed.
11/01/16	Section 7.2.1 – Investigation for ACM to be extended to whole site; Section 7.3.2 – Clarify SiD Report and Risk Register requirements
05/04/16	Section 7.3 – Requirement to document meeting minutes and attendee list; Section 7.3.1 – clarified responsibility for determining attendees and requirement for OSH Advisor attendance.
04/05/16	Section 7.3.2 and Section 8: Remove reference to SID3, SID4 and SID5 checklists which have been combined into the Guideword Checklist
05/10/16	Major revision to all sections
16/12/16	Reviewed as part of Engineering Design Process review. Removed reference to specific Safety in Design workshops
28/06/17	Sec 6: Principle 4 updated; Sec 7.2.3: Competent attendees required at the workshop.
28/07/17	Sec 7.2.3: Requirements for operational team members in the workshop added
18/09/17	Sec 7.5.4 New; Sec 7.6 Infrastructure Design Branch change to Engineering, PM and Superintendent’s rep requirement to work with the constructor added; Sec 7.7 and 7.8 new
22/11/18	Sec 7.2.3: removed paragraph relating to Records of how the assessments were undertaken, updated business terminology; Sec 7.4 minor update; Sec 7.5 updated link for the Safety in Design Report

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Document Revision History	
	Template; Sec 7.54, Sec 7.6, Sec 7.7: minor updates; Sec 7.9 removed section Monitoring & Improvement
22/01/20	Sec 7.6 updated – reference to Template for Presentation to Construction Contractor removed. Aqua links updated to Nexus
18/07/20	Sec 7.6 updated - updated to reference Designer at Start-Up meeting instead of CRAW
04/09/2020	Sec 7 added and section 8 renamed
28/02/2022	Update to Sec 7, 8.1.1 and 8.1.2
03/04/2024	Update to section 8.4 page 8, link added to Safe Work Australia document.
17/07/2026	**Section 8.2.2 added**