



# PROCEDURE

## Design of activity structures (permanent construction)



Issued with the authority of the Chief Commissioner  
and Chief Executive Officer of Scouts Australia NSW

Chief Commissioner signature		Chief Executive Officer signature	
Sponsor	Head of Risk		
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# Design of activity structures (permanent construction)

## 1 Purpose and scope

This procedure describes the process that Scouts NSW uses for designing new permanent activities structures and for making **modifications** to existing structures.

Examples of activities structures (permanent construction) are climbing and rope structures at State Activity Centres and Scout Camps such as Challenge Valley, flying foxes, high ropes and waterslides. This procedure does not cover temporary activities structures that for example are set up temporarily at major events or camps. (Instead, refer to the relevant adventurous activity Standard Operating Procedure (SOP) or Policy).

The procedure applies to third party designers as well as Scouts NSW management, site managers, activity leaders, maintenance and other workers who are involved in initiating a new design or modification of an existing structure.

When Scouts NSW engages a third party for design, the third party would normally follow their own design procedures that enable compliance with the WHS legislation related to design. Scouts NSW will work with the designer to provide appropriate information and participate in consultation.

## 2 Responsibilities

Scouts Australia NSW has a duty to provide and maintain safe activities structures. Key to fulfilling this responsibility is to invest the time up front to design safe structures. It is easier and economical to consider safety early and draw up a safe design, than it is to physically modify the device after it has been constructed.

The following responsibilities apply to the design of activity structures

**Designers** so far as is reasonably practicable, must ensure that the structure is without risks to health and safety. This duty includes carrying out testing and analysis and providing specific information about the structure. They also are responsible for recognising whether a standard exists that must be applied to the design (or subsequent operation). Through a risk management approach, the designer then generates a final design which appropriately considers legislative responsibilities of designers are described in the Code of Practice for Safe Design of Structures on which this procedure is based.

Where Scouts engages a third party as the designer, Scouts NSW should review the third party's design procedure to make sure the procedure is at least equivalent to this procedure. Alternatively, the designer may use this procedure whilst assuming the role of designer.

**Head of Risk** is responsible for reviewing a third party designer's procedures (as per the above point) to determine if it is suitable to meet the requirements of the WHS Act and WHS Regulations.

Only competent people should attempt to design or modify an activity structure. If any person undertakes to design or modify an activity structure or undertakes to modify a design during the construction phase without communicating this to the designer, they take on the responsibility of **designer**.

**Officers** such as Directors and Board members, are responsible for exercising due diligence to ensure the association complies with the relevant section of the WHS Act and WHS Regulation as well as assigning appropriate resources to do so.

**Persons at Scouts who commissions a design of an activity structure, including modification**, are responsible for ensuring that designs are developed in line with this procedure, or an equivalent procedure. They are required to collect and provide relevant contextual information to the designer. They must also assist the designer in identifying the relevant stakeholders and help to convene consultation opportunities with the designer. They must ensure that residual risks are communicated to the appropriate parties (eg constructors, cleaners and operators) and manage risks assigned to them.

**Builders** are responsible for constructing the structure in accordance with the designs provided. If any variances are required the builder is responsible for consulting with Scouts NSW and the designers to obtain approval on the variance. Builders might also be required to work with designers and certifiers to allow review and inspection of progress at certain stages throughout the construction.

**Certifiers** are required to review the design and construction as per the relevant agreement, to confirm that the design is suitable and that structure has been constructed as per the design.

**Other managers within Scouts NSW** here this includes the relevant managers such as Head of Risk, Commercial Manager, Activity Leader, Site Managers and Region Commissioners and responsible for supporting designers and **persons at Scouts who commissions a design**, to implement this procedure.

### 3 What is meant by safe design?

It is more cost effective to consider safety early in the design process, than it is to physically modify the device after it has been constructed. Foreseeable hazards associated with the specific design will be identified in advance and the risk will either be eliminated or minimised by either modifying the design, or by 'transferring' the risk to be controlled at a later stage by some other means.

Activity structures aim to delight participants by providing them with a physical and mental challenge. Routine risks associated with these types of activities are controlled by the on-going application of techniques such as qualified instruction and supervision, standard operating procedures and personal protective equipment (PPE). However, the specific design plays a critical part in avoiding additional hazards and injuries over the anticipated lifecycle of the structure.

The Scouts NSW WHS Procedure Safe Design of activities structures (permanent structures) is based upon the principles of Safe Work NSW Safe-design-of-structures-Code-of-practice, which provides recommended

practices for organisations to comply with the relevant section of the WHS Act and WHS Regulation. The remainder of this section is an excerpt from the-Code-of-practice.

Safe design means the integration of control measures early in the design process to eliminate or, where this is not reasonably practicable, minimise risks to health and safety throughout the life of the structure being designed.

The safe design of a structure will always be part of a wider set of design objectives, including practicability, aesthetics, cost and functionality. These sometimes competing objectives need to be balanced in a manner that does not compromise the health and safety of those who work on or use the structure over its life.

Safe design begins at the concept development phase of a structure when making decisions about:

- the design and its intended purpose
- materials to be used
- possible methods of construction, maintenance, operation, demolition or dismantling and disposal
- what legislation, codes of practice and standards need to be considered and complied with.

## 4 Lifecycle of a structure

The “lifecycle” of an activity structure refers to the following phases: **construction, commissioning, maintenance, operation, modification and even demolition and disposal.**

The designer is required to consider health and safety aspects of their specific design, projected over its anticipated lifecycle. Designers are also required to consider the context in which their design is expected to exist; such as conditions like exposure to weather, remoteness, expected volume of usage and level of financial resources available to maintain it. Therefore, Scouts must provide the designer with relevant information to enable the designer to understand the context, or conditions, in which the design will exist.

Naturally, conditions can change over time in ways that were not foreseen when the design was drawn up. An example would include a structure that was originally designed and constructed solely for adult participants, now is instead planned for use by young children. When conditions change at any time after the design is completed (either prior to or after construction) it is the responsibility of Scouts NSW to consider whether these change could impact the safety of the design and take appropriate steps to mitigate any new risks. This might include contacting the designer to modify the design of the structure to minimise the hazards presented by the changed conditions.

## 5 The design process

### *Design Step 1 - Determine the requirements and risk context*

Before the design is even drafted, you need to clearly define the requirements of the structure and establish the risk context. This information will be provided to the designer, as well as being used to align stakeholders on what you are wanting to achieve.

Involve all relevant stakeholders and document the risk context on Part A of [H-S 61.1 – Activity Structure Design Review Checklist \(Permanent Construction\)](#). The requirements and risk context

include aspects such as: (this is not a complete list and other aspects will depend on the item being designed).

**Intended users** eg age ranges, typical physical ability, usage volume, physical and intellectual disability.

**Objectives of activity** – eg what is the general nature of the activity and how mentally and physically challenging do you want it to be for the participants? Will this be a supervised activity eg led by an activity leader or is it self-guided? i.e. these aspects will help determine the acceptable risk. Consider whether your intended structure will be required to be registered.

**Site location** – where will the structure be built? Are there existing features to be considered in any of the lifecycle phases? eg existing nearby structures, large trees, powerlines, drains, climate (eg extreme heat or cold, snow, frost etc) ground stability, sloping ground, cliff edges, natural flood zones, accessibility for construction and maintenance workers, ability to bring materials to the site, accessibility for users with physical and intellectual disability.

**Available maintenance resources** – be realistic about the human labour and financial resources that will be available to maintain the structure in future. This will impact design aspects such as materials selection.

**Supervision requirements** - be realistic about the availability of activity leaders to instruct and supervise the and financial resources that will be available to maintain the structure in future.

**PPE limitations** – is there an impediment such as cost, storage etc to providing PPE eg helmets, harnesses? If so, this might limit the types of activities you can perform on the structure. Research the applicable standards to see if any recommended or mandated PPE requirements apply.

**Identify the stakeholders** - typically the stakeholder might include other designers with knowledge of specific components and representatives of the people who will use, operate, construct and maintain and pay for the structure.

### *Design Step 2 – Select the designer and agree the expectations*

The next step to success is to select a designer who is competent for the task understands their responsibilities in regard to generating a design which is safe throughout its anticipated lifecycle.

Competent designers must be engaged. The level of competency required will vary with the complexity and level of innovation (i.e. amount of variance from standardised or known structures).

**For designs of new activity structures, or complex modifications to existing structures** a professional designer must be engaged. Their knowledge and experience in challenge ropes courses, abseiling etc is critical to success. They also should have knowledge of, or access to, information about engineering, construction standards and materials. Engaging a professional under a commercial arrangement will enable both parties access to the protection of the designer's professional indemnity insurance (to be confirmed at the time of the completion of the [WHS 26.1 FORM – Contractor WHS Questionnaire](#). Professional indemnity insurance is designed to covers financial loss, personal injury and property damage resulting from a negligent act, error or omission associated with the designer's work.

Prior to engaging an external designer, the **Person at Scouts who commissions a design** should request the designer to complete [WHS 26.1 FORM – Contractor WHS Questionnaire](#), which includes a section on safe design of structures.

The exact design process will depend on the structure and the risk management practices used by the designer. For example, a professional designer engaged by Scouts NSW might use the design and risk management processes implemented by their organisation. The **Person at Scouts who commissions a design** shall, in consultation with the Head of Risk, discuss the designer's intended process to confirm that it is in line with and at least equivalent to this procedure.

**For minor modifications of existing structures. Examples include** the addition of new safety equipment to an existing structure. These types of changes may not require a design drawing, however the person leading this change must consider the health and safety impact of the and changes and take appropriate steps to mitigate these the risk.

For modifications, it is important to consider the potential impact of the modification to ensure it does not unexpectedly introduce a new hazard.

### *Design Step 3 - Develop the concept design, identify hazards*

The concept designs are the initial designs which are used to consult with stakeholders during the safe design process. Consult with stakeholders and identify hazards associated with the specific design, considering the projected LIFECYCLE of the structure. Do not dwell on assessing specific risk levels- this is not an exact science - as long as all stakeholders have an opportunity to voice opinions and concerns.

Involve all relevant stakeholders and document the review on Part B of *H-S 61.1 – Activity Structure Design Review Checklist (Permanent Construction)*.

Focus on identifying safety hazards that are specific to the design, where the level of risk can be influenced by the design. Do not confuse design-related hazards with 'routine hazards'; which are associated with any activity structure of this type regardless of their design. For example, routine operational hazards (such as fear of heights, use of a belay), routine construction hazards (such as using hammer or a circular saw) or other routine hazards that are adequately addressed solely by the application of recognised standards. Routine hazards are not influenced by the specific design so they must be treated separately by the appropriate person at the appropriate time.

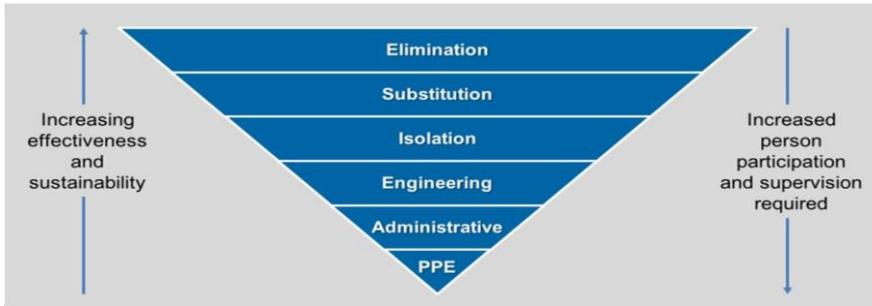
### *Step 4 – Assess options for mitigating risk, adjust the design*

Refine the concept design based on information gathered in previous steps. Ideally develop multiple design options and consult with stakeholders assess each one on its merit. For each design option, brainstorm the potential control measures for each hazard (or combination of controls if no single measure is sufficient). Attempt to eliminate the hazards that are associated with the specific design. Where it is not feasible to eliminate the hazard, consult with your stakeholders to determine options for controlling the hazards, either by modifying the design or by some other means. Compare these options with reference to the hierarchy of controls, of the risks by modifying the design. Where this is not feasible, consider what other ways there are to minimize risk once the structure is constructed – are these risks acceptable?

The hierarchy of controls must be considered in the selection of risk mitigation solutions. The available risk treatment options are listed below. You may need to apply multiple options.

- eliminate the risk
- apply Standards and /or Codes of Practice
- reduce the likelihood of occurrence
- reduce the consequences

- refer to the hierarchy of controls (shown below)



For details of each of the above points, refer to [Scouts NSW WHS Procedure 18 WHS Risk Management](#).

Ideally, document your risk assessments on a template such as H-S 18.2 Risk Assessment Template (for leaders of adults). You may need to modify some of the columns to suit. Always perform risk assessments in consultation with others and capture on the risk assessment:

1. The hazards you identify associated with the intended design
2. Suggestions made by stakeholders to eliminate or mitigate the risk (this will include both changes to the design, or future actions after the device is constructed eg on-going maintenance or operational risk controls)
3. The options agreed and the subsequent steps

When refining the design, be sure to consider whether the design refinements which are aimed to reduce one hazard, do not introduce a new and possibly greater hazard. Keep repeating the process for all subsequent version of the design until all hazards are eliminated or controlled to an acceptable level and the final design is agreed.

#### *Step 5 – Agree final design, communicate the residual risks*

The final design drawings resulting from this consultation and risk assessment process is released to Scouts NSW along with other information. Designers should provide to Scouts a **safety report** describing; a) the relevant health & safety information that was used in the design process and b) a description of the residual risks for managing later in the asset's lifecycle (the designer should have by now discussed and agreed the residual risks with Scouts NSW).

Although the goal is to eliminate or 'design out' hazards, some remaining risk is permissible, as long as it has been minimised so far as is reasonably practicable. This remaining risk is called the residual risk.

Pay particular attention to the 'high consequence, low probability' risks to examine any reasonably practicable ways to further reduce the risk. This is particularly important for complex structures that have a lengthy life cycle. Where hazards remain in your specific design, make sure the agreed risk control methods are communicated or 'transferred' to the relevant person to manage at a later phase eg during construction, or later during operation and maintenance. This might be via the risk assessment, through meeting or by notes provided along with the design.

Any changes made after the final design is provided to Scouts eg during construction of afterwards, must be treated as a modification. The person who initiates the change is responsible for assessing the impact of these changes and of 'designer' unless they delegate the role of designer to someone else, risk assessed

and controlled accordingly. Note that if changes are made to the design during construction, the impact of these changes must be assessed using this procedure.

Where a constructor makes a change to the final design without consulting with the designer, the client /constructor essentially take on the role of designer for the change and subsequently are responsible for considering safe design.

From the information provided, the respective stakeholders will use this information to develop subsequent actions such as construction instructions, operating instructions, activity leaders' inductions, S.O.P's, maintenance schedules and Personal Protective equipment (PPE) requirements.

## 6 Plant and plant design registration

Some activity structures and designs must be registered with SafeWork NSW. There are a number of exclusions however the designer is responsible for making the necessary enquires to find out if the structure or its design must be registered. From this point, Scouts NSW will be responsible for maintaining compliance to registration requirements.

## 7 Records & References

- Safe Work NSW Safe-design-of-structures-Code-of-practice
- Scouts NSW WHS Procedure 26 Contractor Safety
- Scouts NSW WHS Procedure 18 WHS Risk Management
- Information on Safe Design from Safe Work Australia's web site
- Scouts NSW Adventurous Activities SOP's
- WHS Act Section 22
- WHS Regulation 294 and 295

## 8 Associated Forms

- H-S 61.1 – Activity Structure Design Review Checklist (Permanent Construction)

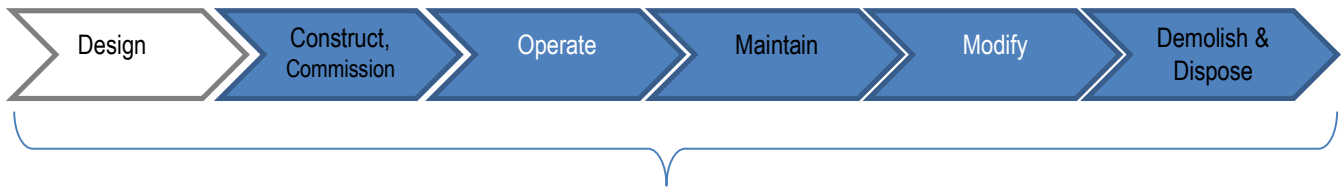
## 9 Appendices

- Appendix 1 – Overview of design process for activity structures



## Appendix 1 – Overview of design process for activity structures

The designer must consider safety for the anticipated **Lifecycle of Structure** i.e.



*Identify future hazards in the design phase.*

*Need to 'Design out' the hazard or agree how the risks can be controlled adequately in the future, and by whom*

