STANDARD
CRANES AND LIFTING

Published:

JUNE 2024

CONTENTS

DOCUMENT INFORMATION

Version history

Document review date is as per the Integrated Management System Standard (HW2013-421/22.002).

Version	Author	Changes	Approved By	Date Approved
1	Lauren Markwell	Changed from Business Rule to Standard	G Pegler	09/08/13
2	Garry Pegler	Amended content	Garry Pegler	11/06/14
3	Lauren Markwell	Reviewed and formatted	WHS Manager	16/09/16
4	Emma Davies	Reviewed and formatted	WHS Manager	01/10/18
5	Elissa Peattie	Reviewed and amended content to reflect legislative requirements	WHS Manager – Megan Brewster	01/01/19
6	Emma Davies	Review and amend content	WHS Manager – Megan Brewster	01/09/21
7	Paul Fray & Peter Payne (Evaluation Pty Ltd)	Review and amend content	Paul Fray – Group Manager SHW	2023
8	David Appleby	New template, position titles and full review	Ian Pike Executive Manager People & Culture	04/06/24

Document control

Document Owner	Group Manager SH&W			
Mandatory Reviewer(s)	SH&W Team			
Approvals	Executive Manager People & Culture			
Key Document Details	☒ Public	☐ System Critical	☒ Legal/Reg Req	☐ Board Approval
Previous Document Rescinded	Standard – FRS Cranes and Lifting (HW2009-2368/2/42.005) Standard – FRS Cranes and Lifting (HW2016-407/3.003)			

Approved By	Executive Manager People and Culture	TRIM No	HW2021-285/10.017
Approved Date	04/06/2024	Version No	8

1 Purpose

This document describes the standards and procedures within Hunter Water Corporation (HWC) to manage risks associated with Cranes and Lifting effectively and describes the HWC Workplace Health and Safety (WHS) Management System's commitment to compliance with the NSW WHS Act and WHS Regulation.

2 Objectives

The objectives of this standard are to ensure that all areas, functions, and work processes that may have Cranes and Lifting risk are effectively managed to ensure the health and safety of Hunter Water people, contractors, and the general public.

3 Scope

This Standard applies to all Hunter Water Business Units. This standard covers the requirements associated with Cranes and Lifting within HWC.

4 Scope

The Hunter Water Lifesavers are a set of minimum behaviours related to high-risk activities.

Lifting Operations

I will only complete lifting operations when people are clear of the line of fire/load shadow.

- // Never position any body part under a suspended load or stand in the load shadow
- // Keep the load in view and maintain a travel path (line of fire) clear of people
- // Complete pre-start check of load shifting machinery and lifting gear
- // Operate load shifting machinery within the Maximum Rated Capacity (MRC) and in accordance with safe lifting procedures / plans
- // Only use trained and competent persons to operate lifting and load shifting machinery
- // A trained and competent Dogger must be used if judgement is required to:
  - SELECT slinging methods and suitable lifting gear
  - INSPECT lifting gear, or
  - DIRECT the load when out of sight of the plant operator

A Dogger is not required (as per SafeWork Australia High Risk Work - Dogging Info Sheet) if:

- A Safe Lifting Procedure is developed by a competent person, which includes load weight range, lifting points, lifting gear selection and slinging methods and a lifting gear inspection / tag system
- The load remains in sight of the plant operator at all times
- Workers are trained and have demonstrated competency in the Safe Lifting Procedure

12 LIFESAVERS POCKET BOOK

5 Definitions, Acronyms and Abbreviations

Term	Definition
Competent person	This means a person who has acquired through training, qualification, or experience the knowledge and skills to carry out the task. A competent person has a more specific meaning in the following circumstances: ▪ For design verification, the person must have the skills, qualifications, competence, and experience to design or verify the lift design. ▪ For inspection of the plant for registration purposes, the person must have educational or vocational qualifications in an engineering discipline relevant to the plant being inspected or knowledge of the technical standards applicable to the plant being inspected.
Bridge or gantry crane	▪ Consists of a bridge beam or beams supported at one or both ends by legs mounted to end carriages ▪ Is capable of traveling on supporting surfaces or deck levels, whether fixed or not ▪ Has a crab with one or more hoisting units arranged to travel across the bridge.
Crane	A crane is a machine generally equipped with a hoist rope, wire ropes or chains, and sheaves that can be used to lift and lower materials and move them horizontally. It is mainly used for lifting and transporting heavy things to other places.
Critical Lift	Critical ▪ Lifts exceeding 80% of the crane's load chart capacity (this does not apply to gantry cranes, which may lift to 100% of the rated capacity) ▪ Multiple crane lifts ▪ Lifts from a suspended or floating structure ▪ Lifts where outriggers cannot be fully extended ▪ Lifts requiring complex crane manoeuvres ▪ Lifting of concrete precast tilt panels ▪ Lifting of personnel using a mobile crane ▪ Lifting of complex loads such as vessels containing more than 1000 litres of liquids or loads with a large sail area in proportion to weigh ▪ Lifts performed in the designated proximity zone of overhead powerlines.
Dogman (or dogger)	A High-Risk Work licensed (DG) person with the qualifications to conduct dogging work. Dogging work includes applying slinging techniques, including selecting and inspecting lifting gear, to sling a load safely. It also includes directing a plant operator in the movement of a load when the load is out of the operator's view.
Job Controller	A Hunter Water employee who directly engages another employee or contractor to perform a service or work activity at a Hunter Water workplace.
Hydraulic Burst Protection	Burst protection devices lock cylinders in the event of a sudden loss of hydraulic fluid pressure (i.e., when a flexible hydraulic hose ruptures).

Term	Definition
	Mobile cranes are fitted with burst protection on critical hydraulic cylinders to prevent crane or boom collapse. Burst protection must be fitted on earthmoving equipment used as a crane where the rated capacity exceeds 1 tonne. Information on fitting burst protection should be obtained from the original manufacturer of the plant. Where the plant's rated capacity is 1 tonne or more and burst protection is not fitted, the plant must not be used to lift loads.
Inspections	Activities such as viewing, measuring, examining, testing, gauging, calculating, checking, verifying one or more characteristics of a product design, material, manufacture, product, service, process, plant, or reports and determination of their conformity with specific requirements or, based on professional judgement, with general requirements. NOTES: *1. The above activities may require multiple parties.* *2. For inspection, the 'competent person' should be the 'in-service inspector' or someone with equivalent qualifications and experience.*
Lift	To pick up and move to a different position.
Line Supervisor	A Line Supervisor is a person with day-to-day supervisory responsibilities for workers within a functional area of the business. A Line Supervisor is also considered a worker but has additional responsibilities for implementing the WHS Management System as identified in the WHS Management System and position description.
Manager	A person is responsible for managing a functional area of the business, including the workers within the relevant functional area. A manager is also considered a worker; however, managers may have additional responsibilities for implementing the WHS Management System and any other duties as an officer of the business.
Plant	Includes any machinery, equipment, appliance, container, implement, and tool and consists of any component or anything fitted or connected to any of those things. Plant includes items as diverse as lifts, cranes, machinery, conveyors, forklifts, vehicles, vessels, power tools, playground equipment, and cathodic protection systems. Certain kinds of plant, such as forklifts, cranes and some pressure equipment, require a High-Risk licence from the WHS regulator to operate and some high-risk plant must also be registered with the WHS regulator.
Powered operation	Typical independent powered operations of bridge and gantry cranes include: ▪ Traversing – the movement of the crab from one end of the bridge to the other ▪ Travelling – the movement of the crane along its runway ▪ Hoisting – raising and lowering are considered to be one powered operation, and ▪ Rotating – powered rotation of the hook or attachment by the movement of the crane support structure. If rotation is provided at the hook by the hook or a rotator attachment on the hook, then it is not considered a powered operation. Hook or attachment operations, such as opening and closing a grab or remote hook latch or switching a magnet or vacuum on or off, are also not considered powered operations.
Reeve	To thread a rope or cable through a ring or other opening.

<table>
<tr><th>Term</th><th>Definition</th></tr>
<tr><td>Rigger</td><td>A High-Risk Work licensed (RB, RI, RA) worker who conducts rigging work.
Rigging work involves using mechanical load-shifting equipment and associated gear to move, place, or secure a load, including equipment or members of a structure, to ensure the stability of those members. It also includes the setting up or dismantling of cranes or hoists. There are three levels of competency for a rigger.
The scope of work for basic rigging includes:
Dogging work
Structural steel erection
Particular hoists
Placement of pre-cast concrete members of a structure
Safety nets and static lines
Mast climbers
Perimeter safety screens and shutters
Cantilevered crane loading platforms
The scope of work for intermediate rigging includes:
rigging work in the class Basic Rigging
all hoists
rigging of cranes, conveyors, dredges and excavators
tilt-slabs
demolition of structures or plant
dual lifts</td></tr>
<tr><td>Safe Working Load (SWL)</td><td>Safe Working Load (SWL) is now referred to as the Working Load Limit (WLL)</td></tr>
<tr><td>Sheave</td><td>A wheel with a grooved rim for a rope, cable, or belt, especially one used as a pulley</td></tr>
<tr><td>Slew</td><td>Is the angular movement of a crane boom or crane jib in a horizontal plane</td></tr>
<tr><td>Sling</td><td>A lifting sling consists of cable, chain, rope, or webbing and is used with a lift or crane to facilitate lifting and balancing the load. Slings generally include metal slinging devices in the form of hooks, shackles, links, or rings.</td></tr>
<tr><td>Slinging</td><td>Suspend or arrange (something), especially with a strap or straps, so that it can hang in a particular position.</td></tr>
<tr><td>Qualified Engineer</td><td>Withing the scope of this procedure, a qualified engineer who holds an appropriate engineering qualification working in their area of expertise and has the practical experience to be able to design lifting operations.</td></tr>
<tr><td>Workbox</td><td>Personnel carrying devices are designed to be suspended from a crane to provide a working area for someone elevated by and working from the box. It may also be called a man box.</td></tr>
<tr><td>Worker</td><td>Worker means a person who carries out work in any capacity for Hunter Water, including work as:
an employee
a contractor or subcontractor
an employee of a contractor or subcontractor
an employee of a labour-hire company who has been assigned to work at Hunter Water
an outworker
an apprentice or trainee</td></tr>
</table>

Term	Definition
	▪ a student gaining work experience ▪ a volunteer ▪ a worker of a prescribed class
Workplace	A place where Hunter Water carries out work and includes any place where a worker goes, or is likely to be, while at work. This consists of a vehicle, vessel, or other mobile structure.
Working Load Limit (WLL)	The maximum load an item of lifting equipment, lifting device, or attachment is designed to bear. **This was previously referred to as the Safe Load Limit.**

6 Roles and Responsibilities

Roles and Responsibilities can be located in the WHSMA Manual.

Individual guidance booklets are in the Responsibility, Accountability, and Authority Manual HW2021-534.

7 General Requirements

Hunter Water uses various types of cranes across the different workplaces, including, but not limited to, Hiab's, Chain Hoists, gantry cranes, davits, hoists, and lifting frames. Hunter Water may also use mobile cranes for construction or maintenance work.

Hunter Water requires all cranes and hoists used at Hunter Water worksites to be designed and used per the relevant parts of AS1418: Cranes, Hoists, and Winches.

8 Key Elements – Managing the Risks Associated with Cranes and Lifting

8.1 Risk Assessment

Hunter Water uses various types of cranes across multiple workplaces, including, but not limited to, gantry cranes, girder cranes, davits, hoists, and lifting frames. Hunter Water may also use mobile cranes for construction or maintenance work. It is a Hunter Water requirement that all cranes and hoists used at Hunter Water worksites shall be designed and used in accordance with the relevant parts of AS1418: Cranes, Hoists, and Winches.

STEP 1 – Hazard identification Identify the hazards associated with the load to be lifted, the crane or lifting equipment that will be used to lift the load, and the locations where the load is to be raised.

STEP 2 – Risk assessment: inherent risk Assess the intrinsic risks associated with the identified hazards, work location, and activity.

STEP 3 – Control risks Identify and implement risk control measures for all identified hazards.

STEP 4 – Risk assessment with control measures: residual risk Assess the residual risks associated with these hazards following the implementation of the risk control measures.

STEP 5 – Monitor and review control measures. Review risk control measures to ensure they are working as planned.

When undertaking a risk assessment for a crane or lifting-related task, consideration must be given to the following:

Lift data: equipment weight, rigging weight, total weight, height of lift, radius of lift and equipment surface area, centre of gravity.

Equipment data: manufacturer, model, size, boom length, jib length, load block, material size.

Rigging data: sling diameter, length, sling configuration, capacity, hook type, shackle size, and capacity.

Lift computation: boom length, radius of lift, equipment capacity, size of outrigger footplates, and wind speed.

Proximity to overhead electrical lines: including ground stability, underground service, pits, and drains.

Position of the crane:

Local hazards and their controls, including the route for the crane, proximity of people or equipment, and agreed communication method.

8.2 Types of Lifts

8.2.1 Pre-approved routine lifts

Pre-approved routine lifts are covered by an existing pre-approved SWMS signed off by a dogman or rigger and do not require a dogman to sling the load.

A Hunter Water worker who has completed RIIHAN203E – Conduct Lifting Operations can sling a load without holding a dogging (or rigging) high-risk work licence when there is no judgment required for slinging techniques or the suitability of lifting gear because the following factors are predetermined:

- the weight of the load (or within a weight range) to be lifted is predetermined by a competent person (e.g., may be marked on the load)
- a competent person predetermines the selection of the sling and slinging techniques for the load
- the lifting points are predetermined by a competent person and marked on the load
- the load is always lifted within the view of the crane operator.
- Standing lifting procedures have been documented on a SWMS and signed off by a dogman or rigger.

A dogman must review all pre-approved routine lifts annually to validate that there have been no changes to the previously planned and documented lift. Refer to Appendix A for further information on when a certified dogman must be used to sling loads.

8.2.2 Routine lifts

Routine lifts require the lift to be planned and conducted by a suitably qualified dogman (or rigger) but are not critical lifts. The lift must be planned and documented on a SWMS identifying all lift planning requirements specified in section 8.3.

8.2.3 Critical lifts

Hunter Water employees are not permitted to perform a critical lift unless approved by a level 3 manager. The level 3 manager must confirm that:

- a risk assessment for the task has been completed, and there are no other options to either eliminate or reduce the risks associated with the task
- the employees planning the lift, controlling the lift, and operating the crane have appropriate qualifications and competencies as identified in section 5.5, section 5, and appendix A.
- the requirements for a critical lift plan, as detailed below, have been met. When performing a critical lift, as a minimum, the following must be verified by the Job Controller before the lifting commences:
    - A qualified rigger, dogman, or engineer developed a critical lift plan and addressed all the lift planning requirements identified in section 5.3.
    - A qualified engineer has approved the critical lift plan.

- The qualifications of all members of the lifting team have been verified.

Hunter Water employees performing an allowable critical lift must use the Critical Lift Plan (FRM-00867) to plan and document the critical lift.

Refer to Appendix A for further information about requirements for critical lifts, including any lifts assessed as not meeting the criteria for being considered a critical lift.

8.3 Lift planning considerations

8.3.1 General requirements

Crane stability

Failure to maintain stability is one of the critical factors associated with serious crane incidents.

Things to consider during planning activities are:

- Crane operation parameters resulting in an overturning moment greater than the stabilising moment.
- The ground conditions and means of supporting the outrigger pads or the crane tyres
- The slope of the ground, including both the side slope and the slope of the ground in the direction of the crane travel if the crane has mobile ratings
- The way loads are lifted or moved e.g. a sudden stop when moving a load may cause the load to swing and destabilise the crane.

If the crane moves unexpectedly while mobile or slewing, the load may swing unexpectedly. Cranes should only be positioned and operated on stable surfaces. Refer to section 5.3.2 for further information on identifying a suitable standing area for mobile cranes.

Wind conditions

Winds impose extra loads on a crane and affect the crane's stability. Where wind speeds are greater than those recommended by the manufacturer, crane operations must be stopped, and if necessary, the crane should be stowed. The design wind speed for the crane should be listed in the manufacturer's instructions and marked on the load chart(s).

Given these variables, crane operators should make their decision to conduct a lift based on the information provided by the crane manufacturer and advice provided by competent people such as engineers, dogmen, or riggers.

Working Load Limit (WLL) and load charts

When selecting a crane and planning a lift, the maximum weight of loads to be moved must be identified. This will enable cranes, hoists, and winches that have an appropriate WLL to be selected.

The WLL must be displayed on the crane. Under no circumstance must a load be lifted that is greater than the WLL.

A crane of variable radius, for example, a tower or mobile crane, will have a crane-specific load chart (also known as a 'rated capacity chart') setting out how the crane lifting capacity varies depending on how the crane is set up, i.e., how far the boom is extended and the angle of the boom. Using the load chart correctly is critical to ensure the crane is used safely.

Collision between the crane and other plant and structures

If there is a possibility of cranes colliding with other plant or structures the person responsible for the lift should position the crane. Hence, the clearance between the crane and its load and other plant, structures and workers minimise the risk of collision.

Where cranes are operating near one another, they may share the same air space. The people in each work area must consult and develop safe work systems to ensure enough space between the cranes and where they work. Each work area should nominate a person to implement a safe system of work.

A dedicated safety spotter must be used where there is a risk that a collision between a crane and other plant or structures may occur.

Working near overhead electric lines

No person, plant, or equipment can enter an overhead electrical exclusion zone. Refer to the WHS Standard - Underground and Overhead Services for further information on electrical exclusions zones for overhead electrical lines.

Falling objects

The risk of falling objects causing injury to workers and other people must be eliminated, or minimised, so far as reasonably practicable including preventing objects from falling freely, or providing a system to arrest the fall of the object. Loads must not be lifted over public access areas, including footpaths, roads, highways, railways, waterways, and buildings. If there is a risk of people being hit by falling objects, control measures like exclusion zones or suitably designed gantries must be used to eliminate the risk of people being hit by falling objects during lifting operations.

Exclusion zones

Exclusion zones must be established around cranes and adjoining areas before lifting occurs to stop people from entering and risking being injured by the crane or falling objects.

The size of the exclusion zone should be based on a risk assessment.

The exclusion zone must ensure that under no circumstance can:

- loads pass over a person or occupied area.
- a person positions themselves (including any body part) under a suspended load.

For a load that a mobile crane is moving, the exclusion zone must extend along the entire route including the line of fire (travel path of the load).

Suspension of person by a crane

By AS2550.1: Cranes, hoists and winches – Safe use – General requirements, a person shall only be suspended from a crane hook when accommodated in a work box designed for the purpose by AS1418.17: Cranes (including hoists and winches) – Design and construction of workboxes.

A workbox must only be used:

- where there are no alternatives to accessing a work area (e.g., scaffolding or elevated work platform)
- where it is necessary to elevate personnel to carry out work where it is not reasonably practicable to use scaffolding or equipment explicitly designed to lift people.

Any cranes used to lift a workbox should:

- where practicable, be equipped with a secondary backup system that will prevent the load from falling if the primary lifting device fails
- have a minimum rated capacity of at least twice the total load of the workbox and its contents at the maximum radius for the task to be performed and not less than 1000 kg
- be fitted with an upper hoist limit – anti-two block – that stops the operation of the hoist, luff, and telescope functions of the crane or be designed so two-blocking cannot damage part of the crane or lifting gear
- have levers and foot pedals fitted with a constant pressure system so crane motion stops immediately after the operator removes pressure from the controls.

If the crane is fitted with a free fall facility, this function should be positively locked out to prevent inadvertent activation when lifting a workbox.

Where a crane has a brake acting directly on the drum, the braking efficiency of the hoisting drive train should be tested by hoisting and holding a load:

- equivalent to the line pull of the hoist winch or
- not less than twice the maximum hoisted load

If the crane is used to lift other loads, the test should be repeated before re-lifting the workbox. During the crane operation with a workbox, the line pull of the hoist winch should not exceed that used in the test.

To help make sure people in a crane-lifted workbox are safe:

- a Work at Height Permit and supporting Rescue Plan must be completed. The rescue plan must include emergency retrieval arrangements should workers need to safely exit the work box in the event of crane failure
- the workbox must be securely attached to the crane
- full body fall-arrest harnesses should be worn at all times
- harnesses should be attached to fall-arrest anchorage points in the workbox or the main sling ring above the heads of the workers
- directions to the crane operator should only be provided from the workbox by a person holding a dogging or rigging licence
- mobile cranes must not travel while suspending a workbox
- workers remain substantially inside the work box while lifted or suspended.

Tage Lines

Tag lines should be used where the worker is required to conduct the lift to steady or control the load. This prevents workers from standing under the load as it is lifted.

8.3.2 Additional requirements for mobile cranes

Positioning the crane

The responsible dogman (or rigger) should choose where to position a crane during the planning phase after considering relevant factors, including the following:

- risk of the crane overturning or collapsing
- foundations or supporting structures failing
- crane and foundations/supporting structure combination not being able to withstand the forces likely to be imposed on it
- risk of the crane colliding with other plant, structures, or objects at the workplace
- risk of the crane entering any electrical exclusion zones
- loads and lift paths, including the load pickup and drop off or installation locations.

Crane standing area

The crane standing design must conform to the manufacturer's instructions or an engineer's recommendation. The crane standing area should be designed to withstand the forces likely imposed on it by the crane during in-service, out-of-service, and during erecting and dismantling.

These forces include:

- the dead weight of the crane
- the dead weight of the load and lifting attachments
- dynamic forces caused by the crane moving
- bearing pressure being applied by the crane's outriggers and tyres/tracks
- wind loadings
- The designer of the crane standing area identified other loads.

Additional precautions may also need to be taken to ensure the stability of the crane when the crane is positioned on unstable ground near underground services, excavations, or embankments.

Where the ground condition is identified as a risk, an engineer may need to be engaged to assess and confirm that the ground conditions are suitable for the crane. This is particularly recommended where a crane will be positioned near steep embankments, open excavations, or river and creek banks (where there is a risk of undermining).

Pick and carry activities

Pick-and-carry activities occur when a mobile crane carrying a suspended load travels with the load. Pick-and-carry activities are only carried out with cranes designed for this purpose and by the manufacturer’s instructions.

The rated lifting capacity of pick and carry cranes is de-rated by design to consider the reduced stability when the crane moves across various terrain types. Pick-and-carry crane manufacturers may also provide a de-rating chart to help determine a crane’s rated lifting capacity when working on specified side slopes.

Operational risks such as ground conditions, intended travel pathways, exclusion zones for mobile plants, and wind speeds also need to be considered as part of the PTRA.

Unless otherwise specified by the manufacturer, cranes designed to remain in one location during the lift, for example, vehicle loading cranes, are not to be used in a pick-and-carry mode.

When plant such as earthmoving equipment or telescopic handlers are used for pick and carry activities, the manufacturer’s instructions or those of a qualified dogman (or rigger) must be followed.

8.3.3 Additional Requirements for Vehicle mounted cranes

Isolating the vehicle

Controls must be implemented when using a vehicle-mounted crane to ensure the vehicle cannot be operated while the crane is in use (e.g., PTO). Any outriggers must be fully extended and crane operated within the intended lift envelope.

8.4 Conducting a lift

8.4.1 Planning and Lift Preparation

Developing the SWMS as a minimum, a SWMS must be prepared for all work tasks that involve lifting operations. A SWMS for a pre-approved or routine lifting activity must be approved by a dogman (or rigger) and, as a minimum, must address the lift planning requirements outlined in Section 5.3 when being developed.

Site preparation

Site preparation will depend on the lifting activity and type of crane. Site preparation activities must be documented in the SWMS and may include:

- selection of a suitable crane
- identification of appropriate location for positioning a mobile crane (including obtaining required engineer approvals)

Exclusion Zones

Set up the exclusion zones, including exclusions around:

- the crane and lifting area
- overhead electrical lines
- other structures and items of plant

Communication method

Before the lift proceeds, a method of direct communication between the crane operator and the person in control of the lift must be developed.

8.4.2 Pre-start requirements

Crane pre-start inspection checklist

Before the commencement of work in which a crane or hoist is to be used, the crane or hoist must be given a visual inspection and functional test documented on a pre-start checklist.

The crane operator must carry out the pre-start. The inspection and test must include the following:

- operating and emergency controls
- brakes
- any safety/warning devices, including safety switches and interlocks
- structure
- wire ropes

Lifting equipment inspection

The lifting equipment must be inspected to identify that:

- the current inspection tags are present
- the Working Load Limit (WLL) is identified
- the equipment is appropriate for the load to be lifted
- there is no visible damage

Refer to section 8.6 for further information on lifting equipment.

Pre-lift meeting

A pre-lift meeting must be conducted with the lifting team to review the SWMS (and lift plan for critical lifts) and make any amendments due to changes to the job or environment. Any changes that affect the lifting operation must be approved by a dogman (or rigger). All workers involved in the activity must sign onto the SWMS.

Communication method testing

The chosen communication method should be tested before the lift commences to confirm direct communication between the crane operator and the person directing the lift.

8.4.3 Performing the lift

If applicable, follow the SWMS (and lift plan) to sling the load correctly using the identified lifting equipment.

Lift the load enough so the crane takes the weight to ensure the load is stable before performing the lift.

Once it has been confirmed that the load is stable, transfer it to the new location per the SWMS, ensuring it doesn't pass over other workers or occupied buildings.

8.4.4 Close Out

Following the completion of the lift, confirm that the load has been secured in the final position. Once the crane has ceased operation, the exclusion zone associated with the mobile plant can be removed.

Once all planned lifting operations have ceased, and the crane has been demobilised:

- any equipment used, such as slings and chains, should be checked for damage and be returned to the storage location

- if using a mobile crane, this should be moved to a safe location or removed from the site where applicable
- the remaining exclusion zones can be removed (where appropriate).

8.5 Licencing requirements for operating specific cranes

Details of licenses required for operating specific cranes are available from the Safe Work NSW website at the following location:

https://www.safework.nsw.gov.au/licences-and-registrations/licences/high-risk-work-licences

The following is a summary of the licensing requirements commonly applicable to Hunter Water workers:

<table>
<tr><th>Crane type</th><th>Typical use and requirements</th><th>Licensing requirement</th></tr>
<tr><td>1. Workshop bridge or gantry cranes remotely controlled with three or less powered operations. There are only Three movements: north/south, east/west, and hoist up/down.</td><td rowspan="2">Moving equipment around a workshop or lifting dam wall infrastructure.</td><td>Nil</td></tr>
<tr><td>2. Workshop bridge or gantry cranes that are:
• Controlled from a permanent cabin or control station; or
• Remotely controlled with more than three Powered Operations (e.g. a single hoist with four powered operations – traversing, travelling, hoisting, and rotating)</td><td>Bridge and gantry crane license (Class CB)</td></tr>
<tr><td>3. Mobile crane (slewing & non-slewing)</td><td>Typically, routine or critical lifts are required for construction or maintenance activities.
Worksafe QLD registration of plant where the safe working load is> 10t.
• Rating capacity chart is fixed in a position visible to the crane operator or available in the cabin. Slew pins must be secured in place in mobile cranes while traveling.
• Slewing to test the integrity of outriggers on mobile cranes must be conducted before commencing lifts.</td><td>There are four classes of slewing mobile cranes, each with a different capacity:
• up to 20 t (C2) - incorporating CN and CV classes
• up to 60 t (C6) - incorporating C2, CN and CV classes
• up to 100 t (C1) - incorporating C6, C2, CN and CV classes
• over 100 t (C0) - incorporating C1, C6, C2, CN and CV classes
Non-slewing mobile cranes greater than 3 t capacity (CN) and which incorporate a boom or jib that cannot be slewed.</td></tr>
<tr><td>4. Vehicle loading cranes (<10MT)</td><td rowspan="2">Typical used for the delivery of equipment and supplies.
Operator control stations for vehicle-mounted cranes must be located in an area protected from swinging loads and the crane jib.</td><td>Nil</td></tr>
<tr><td>5. Vehicle loading cranes (>10MT)</td><td>Vehicle Loading Crane License (Class CV) *
*Persons who hold a slewing mobile crane license are also licensed to operate a vehicle loading crane with a capacity of 10 tonnes or more</td></tr>
</table>

Crane type	Typical use and requirements	Licensing requirement
6. Using other powered mobile plant as a crane	Powered mobile plant used in this way includes forklifts and earthmoving machinery like backhoes, front-end loaders and excavators. The mobile plant used as a crane must be fitted with Hydraulic Burst Protection where the rated capacity exceeds 1 tonne. Loads must only be suspended from the manufacturer's designated lift point or quick-hitch if fitted unless another designated lifting point has been designed and fitted. Using a powered mobile plant as a crane for construction work is classified as high-risk construction work and a safe work method statement must be prepared before the work starts. Suppose additional attachments are used, for example, a jib attachment on a forklift. In that case, the operator must have completed additional training, such as Standard Operating Procedure (SOP) training, in the attachments used.	Power-powered mobile plant operators must be trained and competent to operate the plant safely.

8.6 Lifting equipment

A register of cranes, hoists, and lifting gear must be maintained. For Hunter Water, this is kept in ELLIPSE. In addition, the following general requirements apply to all lifting equipment.

- Lifting or rigging equipment is not to be used in lifting operations if such equipment has been previously used for towing.
- Lifting equipment must be inspected before use to verify the equipment can function to its design specifications.
- Only lifting and rigging equipment compliant with the relevant Australian Standards shall be used at Hunter Water worksites.

8.6.1 Working load limit (WLL)

Lifting equipment must have a WLL to provide adequate safe working loads for the intended uses.

The WLL must be suited to the mode of connection and use and the nature of the load to be lifted.

The WLL must be displayed on the equipment or the equipment tag.

8.6.2 Identification and marking

Where reasonably practicable, each lifting device shall be clearly and permanently marked in accordance with AS 4991: Lifting Devices. As a minimum, the equipment must be marked with the following information as appropriate:

- identification of manufacturer (or authorised representative or importer)

- model, where applicable
- identification number
- tare mass of equipment when it exceeds 50kg
- WLL in kilograms was less than one tonne, and in tonnes, it was greater than one tonne. When the equipment can be used in several configurations, WLL/rated capacities for each configuration shall be indicated
- the group classification, as defined in AS 1418.1, when greater than Class C3. Refer to the Australian standard for more detail on this requirement.

Tare mass and WLL/rated capacity must be marked in the same unit of measurement.

8.6.3 Sling material

Lifting sling material (chain, cable, rope, or webbing) shall be chosen to resist any degrading effects from the environment, such as moisture, chemicals, microbiological attack, ultraviolet light, sunlight, heat, and surface abrasion. When selecting a sling, consideration must be given to the range of work environments likely to be encountered when using lifting slings.

8.6.4 End connections

The eyes or end fittings of slings must be compatible with any hooks or other lifting devices to which they are connected; for example, metallic end fittings that are susceptible to attack from acids or alkalis must not be selected for use on slings that are intended for use in acidic or alkaline environments.

Where attached to components such as links, pins, and shackles, slings must be terminated by thimble-reinforced eyes.

All lifting hooks (except for grab and chain shortening hooks) must be fitted with a safety latch to prevent the load from accidentally detaching unless otherwise specified in a risk assessment.

8.6.5 Use of Lifting slings

Unless given adequate care during use, the service life of slings may be considerably shortened.

The following precautions must be taken when using lifting slings:

Lifting slings must only be used by personnel trained in the correct method of use.

Contact with hot surfaces and exposure to hot gases, such as those from blowlamps or welding torches, must be avoided.

Exposure to damaging conditions, such as biological attack or prolonged exposure to sunlight, dust, or chemicals (such as spray, mist, or fume), must be avoided.

If it is suspected that a lifting sling has come into contact with acids or alkalis, the sling should be discarded.

Slings that have become wet in use or as a result of cleaning should be hung up and allowed to dry naturally. Under no circumstances should slings be heated or otherwise force-dried. Slings must never be dried near a heat source (such as in front of a fire) or stored near a stove or other heat source. Depending on the material of the lifting sling and the chemicals, it may be necessary in some cases to request additional recommendations from the supplier on the cleaning procedure to be followed after the sling has been used in the presence of chemicals.

8.6.6 Inspection

Scheduled

A competent external provider is responsible for undertaking scheduled inspections of any slings owned by Hunter Water as per regulatory requirements relating to timing.

Before Use

Every time a sling is used, the operator must be satisfied that it does not show any signs of damage that could affect its safe use. Particular attention should be given to circumstances, locations, and atmospheres that are likely to result in accelerated damage.

Slings exhibiting any signs of damage must be tagged out of service and withdrawn immediately.

When inspecting lifting slings, the following signs of damage should be looked for on all surfaces along the entire length of the sling. The next are potential causes of damage to slings, including how to identify this potential damage:

Severe overloading – Damage caused to natural fibre slings due to overloading is evidenced by powdering and fracture of the central yarns in the strands. Damage caused to synthetic slings due to severe overloading is evidenced by hardening, loss of extensibility, or opening of the lay. Inconsistent or deformed chain rings can identify chain slings. Slings showing such faults must be discarded.

Eternal wear – External wear caused by dragging over rough surfaces causes an opening out of surface fibres (with a furry appearance). This is the most noticeable cause of weakness, particularly when a sling is being compared with a new sling. The outer faces of the strands may become so worn that they are flattened, and the outer yarns are severed. Also, the tag may become damaged.

Local abrasion – Any substantial local abrasion has to be viewed critically. Local abrasion will be caused by movement over sharp edges while the sling is under tension, resulting in a loss of strength.

Cuts and contusions – Cuts and bruises can be internal or external and may be indicated by local rupturing or loosening of the yarns or strands.

Internal wear – Internal wear will be caused by repeated flexing, particularly when wet and by particles of grit that may have penetrated the fibres. Internal wear may be indicated by thickening of the sling, the presence of grit or dirt, excessive looseness of strands or yarns, and powdered fibre.

Damage from high temperatures – High temperatures can result from a hot environment, radiation, or friction. High enough temperatures will cause fusing or shrinkage of synthetic fibres. Fusion can occur at temperatures approximately equal to the polymer's melting point from which the fibres have been made. The melting point of polypropylene is 165°C. The melting points of nylon or polyester range from 260°C to 265°C. Aramid polyamide does not melt.

Sunlight degradation - Prolonged exposure to ultraviolet radiation (including sunlight) of any textile fibres will weaken the fibres. Degradation may be indicated by a hairy appearance of fibres, which can be plucked or rubbed off (in extreme cases as a powder).

Mildew – and the growth of other microorganisms can occur on manila and sisal fibres under damp or humid conditions. Storage of fibres under excessively humid conditions should be avoided and, if a sling becomes wet, it should be carefully dried out under natural atmospheric conditions, cleaned if necessary and stored again correctly.

Chemical attack – usually indicated by local weakening or softening of the fibres, allowing surface fibres to be plucked or rubbed off. In some cases, the sling may have stiffened. In extreme cases, surface fibres are reduced to powder.

Label/tag damage – The sling's label is missing or illegible, and the sling cannot be positively identified.

Damage to eyes – Any coupling components or fittings are distorted, cracked, fractured, or excessively worn or corroded.

Damage at the connection to any terminal attachment – Any load-bearing fibres are damaged. Any damage to a cover indicates potential damage to the load-bearing core. Any cuts in the cover should raise serious doubts about the integrity of the load-bearing core.

Damage to any end fittings

8.7 Inspection and repair of cranes

8.7.1 Inspections and Maintenance

All cranes and hoists at Hunter Water worksites shall be subject to inspections carried out at sufficient frequency to ensure the crane is kept in a safe and satisfactory condition. This includes the following inspections:

Inspection Type	Frequency
Pre-operational inspection	Before each use (crane log book)
Periodic third-party inspection – scheduled in ELLIPSE	Every three months (unless otherwise specified)

8.7.2 Major inspections to assess a crane for continued safe operation

Cranes and hoists shall be subjected to a significant inspection by a competent third party to assess their suitability for continued safe operation as follows:

- after two-thirds of the design life specified by the manufacturer (typically, the design life is 25 years for the structure and ten years for the mechanical components), or where this is unknown, after seven years of use
- where cranes are to be re-commissioned or imported and do not have previous operating records or were designed or built to unknown Standards
- following the upgrade or modification to a crane
- where a major inspection is required as a result of a periodic third-party inspection
- where maintenance records indicate repeated failures of any critical component
- where damage has occurred as the result of an overload.

All repair work must be conducted by a competent person by relevant standards. Following repairs, the crane is to undergo load and operational tests by a qualified third party in line with the type of repair and as specified.

9 Training

All Hunter Water employees and contractors required to use personal fall protection equipment will be trained in selecting, assembling, inspecting and using all equipment associated with working at heights.

9.1 Crane Operators

Personnel who operate cranes must hold the appropriate license and be competent in using the crane. Refer to Section 8.5 for further details on license requirements.

9.2 Dogman

A dogman must hold the appropriate Vocational Educational Training (VET) qualification to apply for a High-Risk Work license for dogging.

Any Hunter Water worker responsible for planning or conducting routine lifts must hold a dogging high-risk work license.

9.3 Rigger

There is no requirement for Hunter Water workers to hold a rigging high-risk work license.

9.4 Other workers who conduct lifting

All workers who conduct pre-approved routine lifts must complete RIIHAN203E – Conduct Lifting Operations. This provides workers with competency in basic rigging and slinging techniques, but it does not certify them as a rigger or dogman.

10 Monitoring and Review

Monitoring processes for this topic include:

- High Risk Audits
- Critical Element Focussed Observations
- Safe Behaviour Observations
- Field Inspections

Review processes for this topic include:

- Review of applicable injury and incident reports
- Review of hazard reports in Protecht
- Review of this standard and associated documents, Risk Register, Bow Tie diagrams following a high potential incident.
- Engagement with the Field Safety Committee and any relevant sub-committees.

11 Related Documents

Document ID	Document Title
Assessment	Pre-Task Risk Assessment PTRA
Standard	Consultation, Cooperation, Participation and Coordination
Booklet	Hunter Water Lifesavers – Mobile Equipment
SWMS	Hunter Water SWMS – Working with Mobile Plant
Work Instruction (WI)	Hunter Water Work Instruction WI060 – Working with Cranes and Lifting Equipment

12 Associated Regulations and Standards

Document ID	Document Title
Act	NSW WHS Act 2011
Regulation	WHS Regulation 2017
Code of Practice	Code of Practice – Work Health and Safety Consultation, Cooperation and Coordination
Standard	AS 2550.1 – Cranes, Hoists and Winches – Safe Use
Code of Practice	Code of Practice – How to manage work health and safety risks