# Lifting

**1 Purpose:**

To manage, control and regulate behaviours, risks and responsibilities concerning lifting operations.

**2 Definitions:**

| | |
|---|---|
| Critical Lift: | Any inherently complex or highly technical lift requiring specialist skills, experience or qualifications.<br>The use of any tower crane.<br>Any 'dual-lift' or 'multiple-machine-lift' scenario.<br>Any lift over a water body (river, lake, sea), residential or commercial building.<br>Any lift over a trafficked roadway.<br>Any lift considered by the PM/LS/OM/CM to require an independent lift study. |
| Gross disproportion | As it relates to Section 4.10.1, when the cost of a crane is 3 times or more greater than the cost of earthmoving machinery. The benchmark taken from the UK HSE Executive "HSE principles for Cost Benefit Analysis (CBA) in support of ALARP decisions." |
| Lift Supervisor: | Competent, qualified and experienced person in charge of the lift. |
| Lift Control Verifier: | Independent technical verifier of the Lift Control Permit |
| PM: | Project Manager |
| PltM: | Plant Manager |
| OM: | Operations Manager |
| CM: | Construction Manager |
| *Exclusions:* | *The following are excluded from this Work Instruction:*<br><br>*Manual handling, forklifts, lifts involving escalators or elevated work platforms,* |

**2 Objective:**

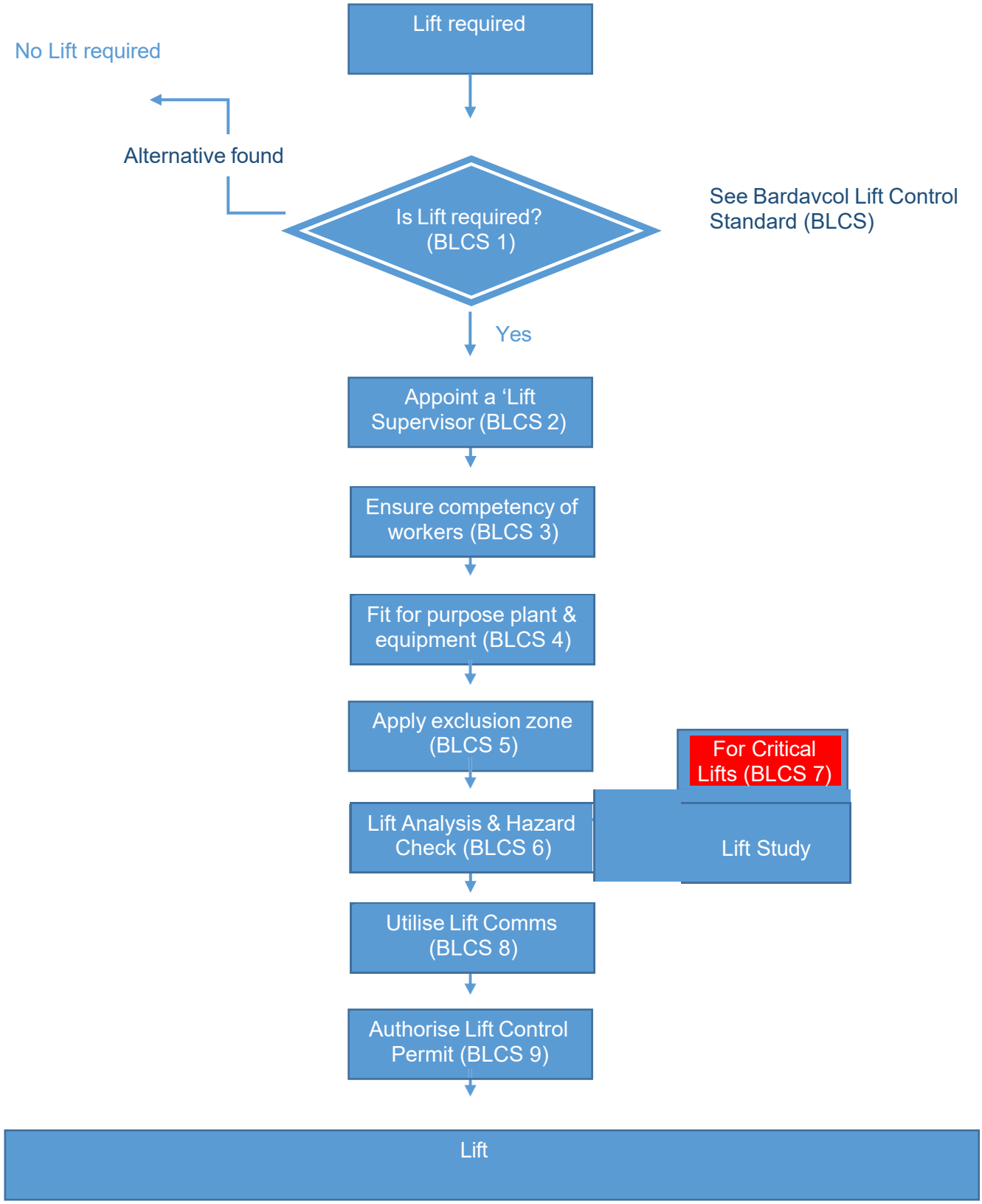
To prevent and minimize the risk of injury, property damage and environmental impact from lifting operations.

**3 Target:**

**a)** No Lifting failures.
**b)** No fatalities or injuries arising from lifting.
**c)** No legal breaches arising from lifting.
**d)** All lifting equipment inspected as required under Australian law.
**e)** No property damage

## 4 Controls:

### *4.0 Lift Process Overview*



## *4.1 Bardavcol Lift Control Standards (BLCS)*

*The following Lift Control Standards (LCS) must be observed for all lifts. These standards are non-negotiable and apply to all Bardavcol workers, contractors and subcontractors.*

*Responsibilities over each LCS is indicated in brackets.*

*All Bardavcol work places must have a copy of the BLCS for prominent display at their allocated Safety Board/s and/or induction room/s.*

| ***STANDARD*** | |
|---|---|
| ***1*** | The Hierarchy of Controls should be applied to the planning of lifts. This includes an assessment of alternatives to the use of mechanical lifting such that hazards can be eliminated or minimised (PM). |
| ***2*** | *An appropriately trained, qualified, experienced and competent worker shall be appointed to the role of 'Lift Supervisor' (LS) to coordinate, verify, implement and manage all aspects of the lift. All lifts shall be subject to a Lift Control Permit.* |
| ***3*** | Only trained, qualified and competent workers shall be involved in lifting operations (LS, PM). |
| ***4*** | *All mechanical aids, plant and equipment, including attachments and associated lifting infrastructure shall be in accordance with Australia Standards (or in their absence a recognised International Standard) and fit for purpose. (PM in conjunction with PltM) Documentation of the verification of compliance shall be maintained.* |
| ***5*** | *Exclusion zones shall be identified, marked (barricaded where of a moderate or higher risk level), and implemented for all lifts. No person shall stand under, or be in the 'drop path' of any suspended load.* |
| ***6*** | *All lifting calculations and safe lift operations shall be analysed, determined and controlled on a Lift Analysis and Hazard Check (part of the Lift Control Permit).* |
| ***7*** | *Any 'Critical Lift' must have an independent lift study prepared by a qualified/competent lifting specialist.* |
| ***8*** | *The LS, Rigger, Dogger and plant operator/s involved in a lift must be trained in the communication methods of Australia Standard AS2550.1* |
| ***9*** | *All lifts shall be subject to a 'Lift Control Permit' satisfactorily completed and authorised in accordance with WI 84.* |

### *4.1 Hiearchy of Control Assessment*

The BLCS (Standard 1) requires an assessment prior to a lift to ascertain if hazards relating to a lift can be eliminated or minimised through alternative means. This requires an analysis to consider:

If the size, shape or weight of the object can be designed, delivered, handled or assembled in a way which eliminates, substitutes or reduces the risk, before making the decision to undertake a lift operation.

### *4.2 Bardavcol Lift Supervisor*

The BLCS (Standard 2) requires the appointment of a Lift Supervisor (LS). The LS must:

1. Liaise with all workers involved with the lift, authorise and complete the Lift Control Permit.
2. Halt lift operations if alerted to unsafe conditions.
3. Warrant area preparations are completed before crane/lifting operations commence.
4. Confirm necessary traffic controls are in place.
5. Ensure workers understand their responsibilities and the associated hazards.
6. Allow crane operations near power lines or other energised infrastructure only when applicable requirements are met.
7. Implement precautions and hazard controls for critical lifts.
8. Ensure only appropriately trained and competent workers are used as per 4.3.
9. Be on site during all lift operations.
10. Be of appropriate skill, experience and competency to implement this work instruction (as determined by PM/OM/CM or appropriate delegate). Must have completed training in this work instruction by a Safety Supervisor within the last 24 months.

    A Crane Driver, Dogman, Rigger or Supervisor can act as the 'Lifting Supervisor', providing they have the appropriate level of competency, training and are allocated as per 4.2.10.

### *4.3 Use of trained and competent workers.*

The BLCS (Standard 3) requires: "only trained, qualified and competent workers shall be involved in lifting".

| Activity | Circumstance | Training Required |
|---|---|---|
| Where plant is used | All lifting. I.e. Plant competency standards as per WI 2 | Appropriate license or certificate of competency is required |
| Lifting | Where plant operators cannot see the load throughout the lift | Dogger (or Rigger) (High Risk Work License) |
| | Where plant operators can see the load throughout the lift but:<br>- where there is a hazard pertaining to overhead, underground or other energised infrastructure (e.g. power lines),<br>- where there is plant movement or lifting in vicinity to hazards such as excavations, waterbodies, sensitive infrastructure, people etc. | 1 day 'Spotter Training' Course (e.g. Civil Train, CITB) |
| Slinging the Load | No judgement required because the:<br>- selection of the slinging method is pre-determined by a competent person, and<br>- lifting points are pre-determined by a competent person and marked on the load where appropriate<br>- weight of the load—or load within a weight range—is pre-determined by a competent person e.g. may be marked on the load, and - selection of the lifting gear is pre-determined by a competent person.<br>- The above is detailed in the Lift Control Permit. | Dogger |
| | Judgement is required (i.e. application of slinging techniques for the purposes of lifting a load, including the selection of the method of lifting, nature of the load, its mass, its centre of gravity etc.) | Dogger |
| | Advanced judgement is required:<br>- Erect steel & material hoists;<br>- Install static lines and safety nets;<br>- Erect mast climbing personnel platforms;<br>- Install and maintain perimeter safety screens & shutters & crane loading bay platforms. | Basic Rigger |
| | Advanced judgement is required:<br>- Rig cranes, conveyors, dredges and excavators;<br>- Erect precast concrete panels and tilt up panels;<br>- Demolition work;<br>- Dual crane lifts;<br>- Erect material and man hoists. | Intermediate Rigger |
| | Advanced judgement is required:<br>- Rig: gin poles, shear legs, flying foxes, cable ways, guyed derricks and guyed structures.<br>- Erect suspended scaffolds and fabricated hung scaffolds. | Advanced Rigger |

**TRAINING GUIDE:**

Load Slinging Course:
CPCCST2005A Carry out load slinging of off-site materials (1 day)

Dogman Licence Table:
CPCCLDG3001A Licence to perform dogging (5 day)

Rigger Licence Table:
CPCCLRG3001A Licence to perform rigging basic level (5 day)
CPCCLRG3002A Licence to perform rigging intermediate level (5 day)
CPCCLRG4001A Licence to perform advanced level (4 day)

Spotter:
RIIRTM203D - Work as a safety observer/spotter (1 Day)

Lifting Equipment / Crane Required Licences Table 4.3.1

| Class | Competency Unit |
|---|---|
| Tower crane (CT) | CPCCLTC4001A |
| Self-erecting tower crane (CS) | CPCCLTC4002A |
| Portal boom crane (CP) | TLILIC3007 |
| Bridge and gantry crane (CB) | TLILIC3003 |
| Vehicle loading crane (CV) | TLILIC0012 |
| Non-slewing mobile crane (CN) | TLILIC3006 |
| Slewing mobile crane —with a capacity up to 20 tonnes (C2) | TLILIC3008 |
| Slewing mobile crane —with a capacity up to 60 tonnes (C6) | TLILIC4009 |
| Slewing mobile crane —with a capacity up to 100 tonnes (C1) | TLILIC4010 |
| Slewing mobile crane —with a capacity over 100 tonnes (CO) | TLILIC4011 |

For up to date licence requirements for 'High Risk Work Licences' see SafeWorkSA website www.safeworksa.sa.gov.au

### *4.4 Fit for purpose plant and equipment*

The BLCS (Standard 4) requires plant and equipment used in lifts to be fit for purpose. This requires the LS to ensure that each item of plant and equipment:

- Is suitable, safe and effective for the designated lift.
- Is designed for the lift.
- Includes the assessment of accessory, such as lifting gear, is appropriately inspected, marked and tagged.
- Has had a plant pre-start inspection completed and recorded (and any areas of deficiency addressed).
- Checked, visually inspected and tested (in accordance with relevant lifting standards)
- Is maintained under a system/certification (e.g. ISO45001) which ensures appropriate processes and records are in place to verify its safe design and safe condition.

***4.5 No person shall stand or be in the 'drop path' of any suspended load.***

The BLCS (Standard 5) requires that:

- No person shall stand under, or be in the 'drop path' of any suspended load.
- Exclusion zones shall be identified, marked (barricaded where of a moderate or higher risk level), and implemented for all lifts.
- For complex lift scenario's, the potential fall/drop path of objects (should the lift fail), including bounce, roll and deflection potentials, must be calculated and the fall/drop path must then form part of the exclusion zone.
- Exclusion zones shall at a minimum, be one and a half times the length of the load.
- Exclusion zones must always be greater than and inclusive of, the lift radius and potential drop zone.

***4.6 Bardavcol Lift Analysis and Hazard Check (Part of the Lift Control Permit)***

The BLCS (Standard 6) requires: As part of the Lift Control Permit, all lifting calculations and safe lift operations shall be analysed, determined and controlled. All lifting operations must also undergo a general safety inspection, to mitigate common and foreseeable lifting hazards.

All Lift Control Permits contain a 'Lift Analysis and Hazard Check' which include consideration of:

- *Lift calculation analysis*
- *overhead and underground services*
- *uneven/unsuitable/sloped ground conditions to support outriggers, tyres, tracks*
- *working near trenches and excavations*
- *risk of overturning*
- *crane and lifting equipment stability, indicating devices, safety devices*
- *sloping ground, including side slope and slope in direction of travel*
- *wind and other weather conditions (eg. lightning, thunderstorms)*
- *operating near the maximum rated capacity*
- *falling objects*
- *collision with other plant, structures or objects*
- *access routes for pick and carry operations or tramming*
- *other workers, public*

*Note: The applicable SWMS or Job Task Card may be referenced in the Lift Analysis and Hazard Check.*

***4.7 Lift Studies***

The BLCS (Standard 7): For Critical Lifts, the Lift Control Permit requires a Lift Study to determine appropriate plant, load calculations, crane selection, reach calculations, exclusion zones, designs, loadings and other aspects of lift safety. Lift studies are generally undertaken by specialist lifting experts with specific experience and qualifications. The PM shall, in consultation with the LS, procure an appropriate lift study where required.

Attributes to consider when choosing an Independent Lift Experts for Lift Studies:

Are they a member of the Crane Industry Council of Australia?

Do they offer NATA accredited facility offering in-house and on-site mechanical testing (ISO/IEC 17205) and visual inspections (ISO/IEC 17020) in compliance with ISO 17205 standards and repair services?

### *4.8 Bardavcol Lift Communication Protocols*

The BLCS (Standard 8) requires that the LS, Rigger, Dogger and plant operator/s involved in a lift must be trained in the communication methods of Australia Standard AS2550.1

**COMMUNICATION**

**4.8.1 General**

Where communication is required between the operator and other personnel, a reliable and efficient method of communication shall be established.

**4.8.2 Hand signals**

Hand signals should be as shown in Figure 1.

**4.8.3 Bell, buzzer and whistle signals**

If used, bell, buzzer and whistle signals used should be as shown in Figure 1.

The bell or buzzer shall be located in a position where it can be readily heard by the crane operator while at the control position.

If two or more cranes are operating in close proximity, the tones of each bell, buzzer or whistle employed for the cranes shall be clearly distinguishable.

**4.8.4 Radio communication**

Where radio communication is used, the transmitting frequencies of the radio equipment shall be selected to prevent interference to or from other radio equipment being used in the vicinity of the crane.

Figure 1 of AS2550.1

| MOTION | HAND SIGNAL | WHISTLE, BELL OR BUZZER SIGNAL | | MOTION | HAND SIGNAL | WHISTLE, BELL OR BUZZER SIGNAL |
|---|---|---|---|---|---|---|
| Hoisting raise |  | 2 short •• | | Hoisting lower |  | 1 long — |
| Luffing boom up |  | 3 short ••• | | Luffing boom down |  | 4 short •••• |
| Slewing right |  | 1 long, 2 short — •• | | Slewing left |  | 1 long, 1 short — • |
| Jib-trolley out: telescoping boom extend |  | 1 long, 3 short — ••• | | Jib-trolley in: telescoping boom retract |  | 1 long, 4 short — •••• |
| Travel and traverse |  | Not applicable | | STOP |  | 1 short • |
| CREEP SPEED: APPROPRIATE HAND SIGNAL FOR MOTION WITH HAND OPENING AND CLOSING | | | | | | |

### *4.9 Lift Control Permit Authority to Lift*

The BLCS (Standard 9) requires the completion of the Lift Control Permit. This has a 'Lift Control Permit Authority to Lift' section which:

- *Must be completed in full prior to any lift being undertaken.*
- *Must be signed by the independent verifier (author of the Lift Study) for any critical lift.*
- *Must be signed by the Lift Supervisor and any deputy. There is only one Lift Supervisor responsible for the Lift, hence a deputy only signs when 'acting' as the designated Lift Supervisor in circumstances where the primary Lift Supervisor is unable to be present.*
- *Must only be signed by the above, once all checks, inspections and verification documents have been attached.*

The Lift Control Permit also ensures that all lifts undergo a process-based risk management approach to consider:

- *Approved Training*
- *Scope calculations*
- *Equipment Calculations*
- *Stakeholder management*
- *Environmental Conditions*
- *Equipment suitability and condition*

Lift Control permits are valid for a conditional time frame. The validity of the permit must not exceed 7 days (unless governed by Section 4.11 MTLTS), or when there has been a change in any aspect of the lift or lift conditions which could reasonably impact on the safety of the lift. The obligation to continually assess any variable conditions (such as weather, wind etc.) remains with the LS.

All Lift Control Permits must be issued by a Bardavcol Safety Supervisor, or in his/her absence, a Bardavcol Supervisor, Project Manager, Project Engineer or Construction Engineer to ensure that Bardavcol is aware of the lifting operation.

### *4.10 The use of Earthmoving Equipment / Plant for lifting*

A person with management or control of plant must ensure, so far as is reasonably practicable, that any plant used to lift or transport a freely suspended load is specifically designed for that purpose (Sec 219 of WHS Regs). Unlike cranes, earthmoving equipment such as excavators, front-end loaders and backhoes are not designed for the primary purpose of lifting loads.

Earthmoving equipment should only be used to lift loads where it is not reasonably practicable to use a crane, where non-precision lifting is required and where such use, does not cause a greater risk to health and safety than if specifically designed plant were used. In that circumstance, *Earthmoving equipment shall only be used as a crane when:*

- *The plant is assessed and approved for lifting by the LS.*
- *The plant operator has successfully completed a VOC for that item of plant.*
- *All requirements under Appendix I of AS2550.1 have been complied with.*
- *Plant is in accordance with applicable safety and maintenance requirements.*

#### *4.10.1 Assessability for 'reasonably practicable'*

*Bardavcol's position of when it is 'reasonable' to use earthmoving equipment is:*

A. *Where an additional safety factor of 20% has been calculated on top of the Safe Working Load, Rated Capacity or Working Load Limit (taking into account all attachments, reach etc., OR*
B. *In circumstances when the requirement to lift has arisen either unexpectedly, as a result of an emergency event or other unforeseeable event AND earthmoving equipment is already available and accessible on site AND a crane is not readily accessible and available on site, OR*
C. *In circumstances where, in addition to the above, the lift is one where non-precision lifting and placement is required, OR*
D. *When a risk assessment is shown to indicate a 'low' risk for the lifting activity, following the consideration of all hazards, exposures, likelihoods and control measures, OR*
E. *When the cost of a crane is grossly disproportionate to the risk and the use of earthmoving equipment for the lift is undertaken following Appendix I of AS2550.1 and this work instruction.*

## APPENDIX I

## USE OF EARTHMOVING EQUIMENT AS A CRANE

(Normative)

Where earthmoving equipment is used as a crane, the following requirements apply:

(a) The earthmoving equipment shall be travelled only with arm and boom retracted to minimum practicable radius.

(b) Where the earthmoving equipment requires the use of stabilizers in order to achieve stability, the equipment shall be supported by such stabilizers.

(c) No person shall be permitted under the boom or suspended load.

(d) All persons operating the earth moving equipment, slinging or directing the load shall have the appropriate license, certificate or training, in accordance with the National Standard for Licensing Persons Performing High Risk Work (April 2006).

(e) No person shall be lifted by earth moving equipment being used as a crane.

(f) Where a quick hitch is used, loads shall only be suspended from a lift point on the quick hitch that complies with AS 1418.8, with the bucket and other attachments removed.

(g) Lift points shall be arranged such that accidental unhooking of the load cannot occur.

(h) Operational speed shall be reduced from high-speed mode.

(i) Where the sling or tackle is wrapped over the back of the bucket, due care shall be taken to ensure that it does not come into contact with any sharp projection or sharp edge.

(j) Loads shall not be suspended from bucket teeth or adaptors.

(k) The rated capacity at each lifting point shall be prominently marked at the lifting point. This shall not be exceeded under any configuration, that is, the lifted load plus any attachments (bucket, etc.) shall not exceed the rated capacity.

(l) Deductions from the rated capacity for larger than standard buckets or quick hitch devices shall be considered to determine the maximum allowable mass of the item that may be lifted.

(m) Reference shall be made to the manufacturer's manual for correct operation.

(n) Quick hitches shall be used only to support items of equipment specifically designed to fit, and specifically designed for the duty to be undertaken.

(o) Quick hitches shall be maintained in proper working order at all times.

(p) A crane service record (logbook) shall be used to record servicing, maintenance and repair work, and details of any malfunction that may occur with the machine.

### *4.11 Medium to Long Term Scenarios (MTLTS)*

Certain sites/projects may undertake medium to long-term lift setups, such as sites with lifting equipment placed in-situ for extended periods (months or years). MTLTS setups require a Lift Control Permit, however, the permit can be issued to cover an extended timeframe as long as the permit is adequately maintained.

MTLTS require:

A. The maintenance of worker training and competency (BLC3) at all times. Where multiple workers may be used throughout the period, the Lift Control Permit can 'refer' to an appropriate appendix listing the relevant workers and level of training and competency.
B. Any new or change in Lift Supervisor (BLCS 2) requires the new LS to review and sign the Lift Control Permit, which for MTLTS can be undertaken by reference to an appendix listing the Permit Number and list of successive Lift Control and/or Lift Control Officers.
C. BLCS 4, pertaining to 'fit for purpose' plant and equipment, to be maintained throughout the period, which can be undertaken by reference to an appendix indicating the sequential testing and maintenance regime undertaken on relevant plant and equipment for the period.
D. BLCS 5 exclusion zones to be maintained at all times. To ensure the exclusions zones are adequate and maintained, the Lift Control Permit should, for MTLTS, reference an exclusion zone inspection schedule.
E. Unique and documented lift studies for high risk lifts (referenced via sequential appendix) and independent verifiers.
F. No Lift Analysis and Hazard Check to be completed for each individual lift, where a Lift Analysis and Hazard Check has been completed for the working day to cover all planned lifts and there is no change in conditions which could affect the lift risk.

The intent of MTLTS is to demonstrate full control over the lifting risks in line with the BLCS under a single Lift Control Permit.

**5 Permits/Licences:**

See section 4.3

**6 Emergency Response:**

As per Project Management Plan Emergency Response Plan.

**7 Program Inspection:** Refer internal audit schedule for each project.

**8 References:**

AS 2550 Cranes Hoists and Winches – General Requirements.
IP 15.5 Incident Investigation, Corrective Action & Reporting
FO 46 Lift Control Permit