LENDLEASE CONSTRUCTION PTY LIMITED | 97 000 098 162

LIVERPOOL HEALTH AND ACADEMIC PRECINCT

CRANE MANAGEMENT SUB PLAN

23/07/2024 | Issue No: 4.0

Document Issue Status				
Date	Document Issue (in numbers)	Purpose and Summary of Amendments	Reviewed by	Approved by
24/05/2016	2.1	New sub plan issued for use	Graeme Mauger	Ross Trethewy
02/10/2018	2.3	Amendment to CASA requirements and company names	Graeme Mauger	Ross Trethewy
02/12/2018	2.4	Amendment to part 2.8 for clarification	Graeme Mauger	Ross Trethewy
18/06/2020	2.5	Document name change to align to other management sub plans	Phill Smith	Ross Trethewy
01/09/2021	3.0	Amendment to incorporate actions arising from LLB and Industry consultation meeting incl. feedback from 2 NSW project teams following the MCSP implementation review and revised Crane related content from 2021 GMRs	Brooke Brittain	Ross Trethewy
23/07/2024	4.0	Updated to Lendlease Construction entity names and current role titles.	Alan Tran	Andrew Hereth

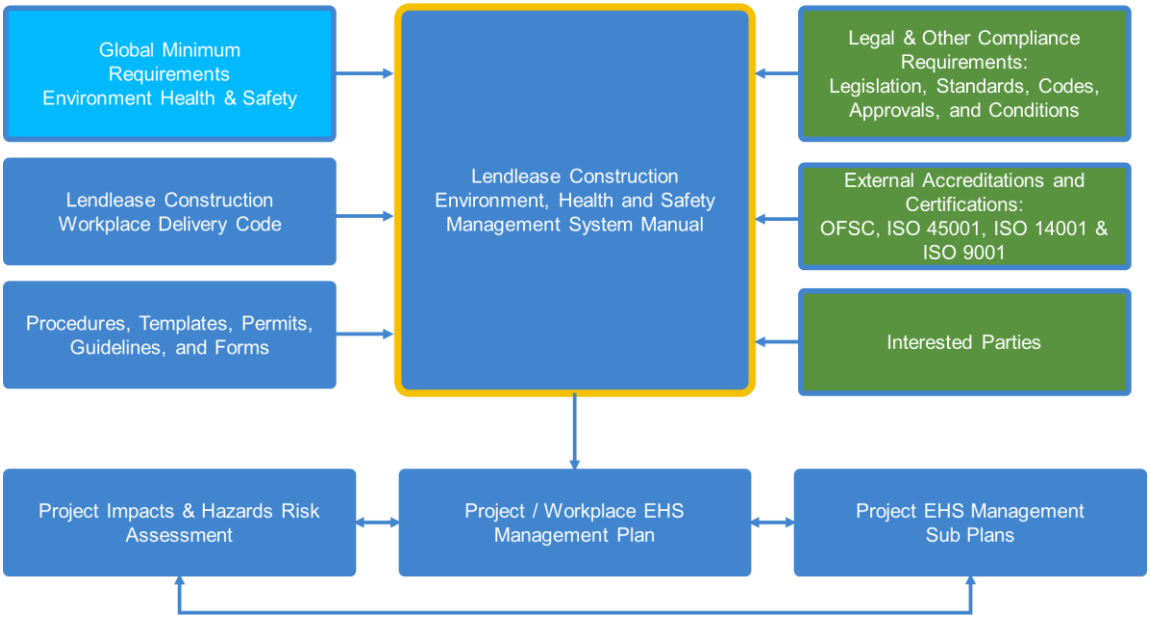
*Note that all printed paper/hard copies of this document remain uncontrolled. The controlled copy of this document is found either in the project collaboration tool, within the Project Management Plan section, or other project specific database/server approved by the Regional EHS Manager / Head of EHS Integrated Project.

Project Revision Status				
Date	Project Revision (in numbers)	Purpose and Summary of Amendments	Reviewed by	Approved by
24/07/2024	13	Template update. Added LHAP specific information. Note: TC dismantled.	Daisy Marks	Lovro Smoljo
02/09/2024	14	Review only, further reviews for stage 2 required. Currently no TC on site, however still use of mobile crane	Daisy Marks	Michael Cain
28/01/2025	15	Review only, no changes. To add new radius diagram for new TC when available.	Daisy Marks	Sebastian Bartholomeusz

WELCOME

Welcome to the project Crane Management Sub Plan for Lendlease Construction Australia.

This Management Sub-Plan forms an integral part of the Lendlease Construction Environment, Health and Safety Management System shown below.



Environment, health and safety (EHS) is our number one priority. Importantly, this Management Sub Plan has been tailored for your project, addressing its specific requirements. It follows a simple and intuitive navigation, please follow the below device to help guide you through the document.

Tips for using this plan

This project Crane Management Sub Plan has been created as a Word Template. In order to customise this template, please follow these instructions:

- Save the template as a Word Document.

- Customise the front cover with the project name, date and revision number. This will automatically update the whole document.
- Do not delete or remove the section breaks as this will affect the document formatting.

If you have any questions about how to use this plan, please contact your Regional EHS Manager / EHS Lead.

CONTENTS

1.0 INTRODUCTION

1.1 Liverpool Health and Academic Precinct Crane Management Sub Plan

All operations with a tower crane or multiple cranes in use are required under Lendlease Global Minimum Requirements for Environment Health & Safety (GMR4.6.4) and the Lendlease Construction EHS Management System to provide a crane management plan that outlines all crane operations on a project including crane locations, operating radius, exclusion zones, loading zones, overhead protection, crane climbs and the appointment of a hoisting or crane lifting coordinator to oversee inspection and maintenance to the requirements of the standards applicable to the region of operation.

The objective of this Crane Management Sub Plan is to comply with the above-mentioned requirements by implementing a comprehensive management regime at this Project to prevent incidents related to high-risk load shifting operations involving the use of a crane(s). This Management Sub-Plan sets out the process for controlling the unique and site specific risks associated with slinging and lifting related to crane load shifting operations by ensuring the integrity and stability of all lifting plant and equipment, the safety of all suspended loads and the provision of effective communication between crane crew team members.

This Management Sub Plan forms part of the Lendlease Construction (LLC) EHS Management System (MS) where the functions and requirements of environmental management and work health and safety or equivalent occupational safety and health or occupational health and safety management are integrated. Management of EHS at this workplace consists of the LLC EHS MS Manual together with the Project EHS Management Plan and related management sub plans, which together hold certification to Australian and international standards for health and safety and for the environment and accreditation with Federal and State authorities.

The structure of the EHS MS framework is outlined on Page 3 and the LLC Environment, Health & Safety Management System (EHS MS) Manual and related procedures, forms and templates is contained within Lendlease Construction Intranet based Management System, Source.

2.0 PLAN

2.1 Outline

This Crane Management Sub Plan sets out the process for controlling the unique and site specific risks associated with Project related crane load shifting operations. The objective of the Management Sub Plan is to ensure that all slinging and lifting operations undertaken by the project tower crane(s) and any mobile cranes (as required from time to time), are managed to prevent injuries and damage to persons and property alike by ensuring the integrity and stability of all lifting plant and equipment, the safety of all suspended loads and the provision of effective communication between crane crew team members.

The development of this Management Sub-plan is to be undertaken in consultation and participation with the projects crane crew and any relevant interested party and is to be implemented on all Lendlease Construction projects with one or more Tower cranes or where Multiple mobile cranes are on the project at the same time (i.e. where there are multiple mobile cranes in operation in close proximity to each other, or where there are mobile cranes and concrete placing booms in operation at the same time).

The Crane Lifting Co-ordinator appointed for the project is TBA for stage 2

in accordance with the Lendlease Global Minimum Requirements for Environment, Health & Safety 4.6.4. Duties of the Crane Lifting Coordinator are provided at Appendix Three.

2.2 Crane Description / Details

CRANE DETAILS				
Owner:	TC dismantled 22.09.23			
Make:				
Type:				
Serial No:				
Mast Height:				
Jib length:				
Safe Working Load:				
Safe Working Load max radius:				
Commenced Operation on Site:				
Location:				
Design Registration number:				

Plant Registration number:				

2.3 Crane Procurement

The crane(s) shall be equipped with those features outlined in GMR4.6.1, GMR 4.6.5 and 4.6.6 and these requirements must be specified in the procurement of the crane, some of which include:

- Diesel tower cranes are not to be used on any Lendlease operations and electric tower cranes must be in use. In exceptional circumstances where diesel tower cranes are required, a GMR exemption is required approved by the Lendlease Construction Chief Executive Officer.
- All crane structural components are to be Original Equipment Manufacturer (OEM) excluding building ties, yokes or collars which must be designed to suit the specific crane by a qualified engineer.
- A Computerised Monitoring Systems must be fitted on all cranes. Real time data must be made available where the crane monitoring system has that capability (e.g., wind speed, overloading, start and end of lift, the weight of the load, angle of the boom, safe working load, radius of the lift).
- An adequate fire suppression system must be fitted to the engine bay (legacy projects and related diesel-powered cranes only); and a serviced fire extinguisher located in the crane cabin and on the crane machine deck, i.e., a minimum of 1 x 2kg CO2 fire extinguisher mounted in the cabin or immediately outside its entry door; and a minimum of 1 x 9kg CO2 fire extinguisher mounted on the machine deck; and tower crane diesel fuel supply hoses and diesel/electric crane hydraulic oil supply hoses shall be fire rated; and
- In the event of an incident, which requires the crane operator (driver) to evacuate the crane and descend the tower mast, the electricity supply to the crane (electric cranes only) shall be capable of being switched off (isolated) by the crane operator, at the crane tower base.
  Refer to GMR4.6.1 for the complete performance standard specification for tower cranes to inform procurement.

2.4 Crane Operating Locations

Appendix 1 provides the following detail for each operating crane(s) identified in the table above:

- Working radius
- Work areas
- Exclusion zones
- Ambulance pick up points
- First aid cage storage locations
- Ancillary product storage locations
- Fuel cells
- Other specific issues

Note: The crane operating locations (working radius, exclusion zones, crane zoning, work areas) within Appendix 1 must be reviewed and updated as necessary during each review of this Management Sub-Plan.

Cranes will be operated in compliance with:

- Manufacturer’s operating instructions
- Lendlease Global Minimum Requirements for Environment Health & Safety

- Lendlease Construction Workplace Delivery Code
- Lendlease Construction Slinging and Lifting Guidelines
- Applicable Australian legislation, codes of practice or other compliance standards or codes.

Management personnel at the project and the project's Crane Crew will also subscribe to the Lendlease Construction Early Warning Weather Alert to ensure weather conditions are actively monitored for the purposes of planning for significant weather events.

2.5 Crane Height and Location

The maximum height of the crane jib and its operational envelope shall be a considered when planning the location for a static tower crane(s) to be situated. Where this height extends 110 metres above local ground level (note this could be less for helicopter flight paths for hospitals), the crane must be assessed by the Australian Civil Aviation Safety Authority (CASA) to determine whether it is an obstacle to aircraft operations. Common precautions stipulated by CASA where objects have the potential to impact on navigable airspace include navigation warning lighting affixed to the crane jib end and obstacle marking (painted jib butt and jib tip highlights) along the jib's length.

Does the tower crane(s) require CASA approval?	YES ☐	NO ☒

If 'Yes' above, please attach the CASA or equivalent approval to Appendix 5.

If 'No' above evidence of a permit is not required, i.e., attach email correspondence or notes related to any telephone, email or other conversation outlining no requirement for a permit.

Note: Where CASA approvals are required, the approval must be included in Appendix five (5) and updated throughout the project (as appropriate), especially after crane climbing activities.

2.6 Crane Access Security and Stowing

Tower crane access and security must comply with Lendlease GMR 4.6.5 including movement detectors, back to base/text alerts triggered by unauthorised access, and anti-climb mesh. Tower crane access hatches (below the crane cab) and gate or door access to the crane's tower framing must be locked at the end of each shift to prevent the potential for unauthorised access by workers or the public.

The tower access gate or door must also be secured against unauthorised access during work breaks/rest periods. That is, when the Crane Operator leaves the crane cabin unattended.

Access systems for all procured tower cranes must have offset caged ladders (including the A frame) with intermediate landings designed to prevent the fall from height by a person whilst climbing or descending a tower crane.

Note - Where the implementation of this Management Sub Plan is on projects where there are multiple mobile cranes (no tower cranes), mobile cranes must also be secured to prevent unauthorised use, or access when the crane operator is not present at the crane (i.e., during breaks, or outside working hours).

All cranes must be stowed in accordance with Original Equipment Manufacturers (OEMs) shutdown and stowing procedures with requirements outlined within operating Safe Work Method Statements (SWMS).

2.7 Crane Crew Competence

All Crane Crew workers must complete the following before commencing work on this project:

- The project Site Induction.
- At the time of commissioning a documented familiarisation induction by the tower crane owner/supplier in the operating features of the specific crane (crane operators only) including but not limited to;
    - Basic crane operations;
    - Automated anti-collision or zoning systems where fitted,
    - Shutdown protocols i.e., storm bracing, weathervane, hook stow height, jib stow angle, securing components against weather events.
- Any applicable GMR preventative controls must also be outlined within the Crane Lifting SWMS, including special lifts and their requirements; lift plans and load limits.
- A work at heights training certification (including the use of a safety harness). Where a project is to use either a Workbox, First Aid Rescue Cage or loading platforms.
- Provide evidence of a relevant Licence to Perform High Risk Work specific to their particular work activity(s), e.g., crane operation including specific type and capacity, lifting and slinging, crane lifting coordinator, e.g., Dogging/Rigging or other;
- An external independent verification of competency assessment at maximum three yearly intervals.
- Complete Fitness For Work awareness training including fatigue management and alcohol and other drugs.
- Induction in this Management Sub Plan and in Safe Work Method Statement(s) (SWMS) related to slinging and lifting and crane operations (including those SWMS prepared for high risk construction work or any work that requires a high risk work licence) and any other safe working procedures relevant to their work activity.

2.8 Multiple Tower Crane Operations

An automated anti-collision and zoning system must be installed on each tower crane and gantry crane when multiple cranes are planned to be in use; and their planned lifting radius will interface with or overlap with other cranes; or zoning only to prevent encroachment over a protected area such as a rail corridor or a public space.

The Protocol outlined at Appendix 2 shall describe the operation of multiple cranes planned for this project and their potential for interface or overlap of each lifting and operating radius and any area to be protected from encroachment.

This Protocol must include precautionary measures in the event the automated anti-collision or zoning system becomes inactive through technical fault or where close proximity works necessitate deactivation of the system.

The anti-collision frequency must be accordance with Australian Communications and Media Authority and be compliant for use, i.e., a designated frequency must be used.

All tower cranes in procurement across Lendlease Construction projects that will be fitted with anti-collision and zoning must also be fitted with a visible signal device to alert personnel on the ground that the anti-collision or zoning system has been deactivated. The signal device must be a flashing white strobe light that is easily visible from ground level, e.g., mounted below the operator's cabin.

Tower cranes procured or erected after 11/02/2020, which by the nature of their positioning on the site are required to have anti-collision and zoning fitted and operational on each crane; must have the signal device fitted as a visual alert to ground personnel in the event that anti-collision or zoning is required to be deactivated.

For tower cranes in operation (erected prior to 11/02/2020) across Lendlease Construction projects that have anti-collision and zoning fitted and operational; note that Jaso cranes are generally fitted with a flashing white strobe light positioned below the operator's cabin; which activates when the anti-collision or zoning is deactivated. If this light is not fitted or operational, please inform the Regional EHS Manager to discuss a suitable time frame for its fitment

2.9 Special Lifts

Special Lifts as defined by the Lendlease GMRs must be planned and require a Lift Plan to be developed which must be approved by a third party independent engineer and where determined necessary to supervise the execution of the lift to confirm the adequacy of the lifting methodology.

This includes the following lift types:

(i) Any lifts that require the crane to operate between 90% and 100% of the original manufacturer's rated capacity.
(ii) Any abnormal loads that due to their centre of gravity, unusual shape or density may be adversely affected by wind during a lift.
(iii) Any lifting operation that requires the load to slew or travel over public or private properties or infrastructure that requires closure or evacuation of these areas.
(iv) Any load that requires more than one crane (e.g., dual or tandem lifts, but not tailing).
(v) Multiple lifting of steel members (i.e., multiple structural steel members lifted during a single lift)
(vi) Any crane that operates on a floating vessel or barge
(vii) Any lift requiring the use of a Workbox to carry a person(s) (excluding the routine use of a Workbox for crane maintenance, inspection or other activities as part of a tower crane or hoists installation, alteration or dismantling and the use of a workbox in an emergency).
(viii) Roof sheets over 20m in length are categorised as a Special Lift and require a lift study (approved by an Independent Qualified Engineer) with the method of lifting to include a spreader bar.

Notes

- No operational lifting is permitted above 100% of the original manufacturer's crane and hoisting equipment lifting capacity.
- Where a test lift (usually over 100% of the original crane/ hoist manufacturer's lifting capacity) is to be undertaken as part of the commissioning process of a crane, it must be reviewed by an independent third-party engineer as part of the commissioning process.
- For a Special Lift (i.e., operational lifting) outlined above and numbered (i) to (iv) the third party Independent Qualified Engineer review and related documents must be provided for additional review to the Regional EHS Manager; General Manager EHS, Construction, or the National EHS Operations Manager before the lift can proceed.

  GMR 4.6.2(ii) provides further information.

2.10 Loading Platforms

The proposed installation of a Loading Platform(s) (temporary structure) must be planned and include independent verification by a qualified and registered structural engineer, before installation can be undertaken to ensure structural integrity of the structure to which the platform will be fixed and its method of fixing.

Where retractable loading platforms cannot be used, loading platforms should be staggered to prevent lifting gear or loads from contacting any adjacent platforms above.

The location of a Loading Platform(s) is determined during the construction design and planning stages of a Construction Project and must consider risk related to building structure limitations, optimising line of sight for the tower crane operator, minimising the interaction of tower crane jibs where multiple cranes are in use on the project and minimisation of crane movement from planned construction zone locations.

When installing a loading platform, a Safe Work Method Statement shall be developed in consultation with and participation by those workers undertaking the work. Workers shall hold high risk work tickets of competency relevant to the work activity and the work shall be overseen by the assigned Crane Lifting Coordinator.

The proposed use of a Safety Harness as a 'primary' means of fall prevention during installation shall be implemented under the Lendlease Construction Permit To Work System and the Safety Harness system shall be rigged to fall restraint mode, not fall arrest mode.

When using a Loading Platform, activity planning and implementation shall ensure that the load is within the platform's safe working load limit. If the platform is fitted with gates, these shall remain locked in the closed position and only unlocked and opened after i) prior approval from the Crane Lifting Coordinator or nominated Crane Crew representative; ii) immediately prior to the load shifting operation, and iii) under the supervision of Crane Crew representative's and iv) only if the load cannot be landed onto the platform whilst the gates remain in the closed and locked position. .

Note: Where gates are required to be opened to land or remove loads all loading/unloading personnel positioned on the Loading Platform must wear a Safety Harness configured in fall restraint to prevent the potential for a fall off the edge of the platform. A Permit To Work must be implemented for the use of a Safety Harness as a primary means of fall restraint.

In addition, the padlock securing the landing platform gates must be tethered to the gate using a proprietary tether to prevent the padlock falling from height.

Before a Loading Platform can be used after installation, the following must be checked as a minimum:

- All bolts or connectors are secured and tightened in position.
- The size and capacity of all connections are in accordance with engineer's installation documentation.
- All props are plumb and positively secured in position.
- The maximum Safe Workload (Working Load Limit) is clearly displayed to those positioned on the platform.
- Rear guardrails are in position.
- Side panels and gates are positively fixed in position.
- Any gaps where the loading platform impacts with existing edge protection and containment systems must be protected with an equivalent containment system to prevent the fall of materials.

- A competent person should verify that the platform has been installed in accordance with the design drawings.

Only crane crew or persons associated with landing and launching of a load(s) (under the direction of the crane crew) are to access a loading platform (i.e., sight-seeing from the platform by unauthorised workers is not permitted).

Minimal work activities are to be undertaken on loading platforms and where reasonably practicable preparation for the slinging and rigging of a load should be undertaken within the envelope of building.

A robust exclusion zone shall be implemented below loading platforms before load shifting operations and landing of a load onto the platform can commence. Where reasonably practicable this shall consist of interlocked 1.8m high barricade fencing with a locked entry gate and where determined necessary a Spotter shall oversee the exclusion zone to prevent unauthorised entry.

2.11 Workbox Use

Where a workbox is proposed for use to elevate people using a crane, a risk assessment must be undertaken to review reasonably practicable alternatives that would eliminate elevating people in a Workbox. Where the use of a Workbox is determined as the only suitable means of access, the activity must be controlled by a Permit to Work - Workbox Use.

As outlined in section 9 of this Management Sub Plan (Special Lifts) and required by the Lendlease GMR 4.6.2, any lift requiring the use of a Workbox to carry a person(s); (excluding the routine use of a Workbox for crane maintenance, inspection or other activities as part of a tower crane or hoists installation, alteration or dismantling and the use of a workbox in an emergency) is classed as a ‘Special Lift’ and requires an Independent Qualified Engineer to review the Lift Plan (refer to GMR 4.6.2 (ii) for additional information).

Any crane that uses a Workbox to elevate people must be fitted with a secondary independent brake to all winches and must be inspected by a qualified person prior to use. Where a mobile crane cannot be procured with a secondary independent brake a mobile crane with a single brake acting directly on the drum can be used subject to the following:

- Approval by the Regional EHS Manager / EHS Lead
- The lift of the Workbox to elevate people must be controlled by a Permit to Work;
- The proposed lift must be treated as a Special Lift and reviewed by an Independent Engineer that includes confirmation of the braking efficiency of the hoisting drive train. Confirmation of the braking efficiency shall as a minimum incorporate the following requirements.
    - Before commencing the lift of personnel, the mobile crane shall hoist and hold a load without exceeding the cranes maximum SWL:
        - equivalent to the line pull of the hoist winch, or
        - at least 200% of the maximum load to be hoisted;
    - In either case the mobile crane shall hoist and hold a load that is not less than 200% of the maximum load to be hoisted without exceeding the cranes maximum SWL.

With the load stationary all power and hydraulic/pneumatic power shall be released and the brake 'backed-off' or isolated to the extent it no longer applies a restraining force. The load shall then be monitored for movement or creep. The drive train shall be considered to be a satisfactory braking system if no movement or creep is detected over a 5-minute testing period.

Note: Where the mobile crane is used to lift loads other than the workbox, the above test shall be repeated prior to re-lifting the workbox.

During operation of the crane with a Workbox, the line pull of the hoist winch shall not exceed that used in the above test

2.12 Fire and Emergency Response

Credible emergency scenarios are considered in the project Impacts & Hazards Risk Assessment and are specifically outlined in the Project Emergency Response Management Sub Plan that includes emergency response arrangements for crane related incidents.

The following minimum requirements apply:

- Each Crane Crew worker shall be briefed in the operation and use of the First Aid Cage / Workbox. The briefing shall include reference to and the requirements of AS 1418:17.
- Each crane crew worker shall hold a nationally recognised work safely at heights training certificate for the use of a safety harness, e.g., when required to use a Workbox or opening the gates on a loading platform.
- Emergency response team members (from the Tower Crane, or during the use of a Workbox) must be trained in the height rescue equipment in place for the project (this can include: Gotcha, Davit Arm, or other rope rescue kits) in addition to being familiar with the content of the task specific SWMS, and the emergency scenario controls and methods prior the work activity commencing.
- The First Aid Cage remains on standby within the lifting radius of the crane with clear access maintained to the cage at all times.
- All crane operators shall be formally trained in the use of a fire extinguisher (i.e., Demonstrate first attack fire or equivalent).
- Diesel engine tower cranes must be equipped with a first response engine fire suppression capability and this requirement shall be outlined in the procurement of the crane and include:
    - an adequate fire suppression system within the diesel engine compartment, and;
    - fuel supply hoses and hydraulic oil supply hoses shall be fire rated.
- All crane types shall have a fire extinguisher located within the tower crane cabin and on the tower crane machine deck, i.e., minimum of 1 x 2kg CO2 fire extinguisher mounted in the cabin or immediately outside its entry door; and a minimum of 1 x 9kg CO2 fire extinguisher mounted on the machine deck.
- In the event of an incident which requires the tower crane operator (driver) to evacuate the crane and descend the tower mast the electricity supply to the crane shall be capable of being safely isolated at the base of the crane's tower.

2.12.1 Emergency Response Planning

Emergency response planning related to work activities on or within a tower crane must be considered in emergency scenario planning detailed in the Project Emergency Response Management Sub Plan. The Table below outlines activities and persons that may require rescue from height on a tower crane and any need for rescue must be planned.

Consistent with the information outlined in the Table below, a procedure for fall arrest retrieval must be outlined in the Project Emergency Response Management Sub Plan and any relevant subcontractor's Safe Work Method Statement (e.g., a subcontractor undertaking crane erection, alteration or dismantling). The SWMS shall include emergency response actions to facilitate timely response to this credible emergency scenario for tower crane operations.

Emergency Services response shall not be relied upon as the sole means of managing any fall arrest suspension incident related to tower crane operations due to the risk of suspension trauma beyond 15 minutes, therefore appropriate height rescue equipment (e.g., first aid or rescue cages, or height rescue kits such as 'Gotcha' kits or Davit Arm) as determined by the Emergency Response Management Sub- Plan

Medical emergencies shall be assessed on a case by case basis and unless diagnosed as suspected life threatening shall await Emergency Services arrival, advice and assistance.

Emergency Response team members must be trained in height rescue equipment in place for the project (e.g., Gotcha, Davit Arms, other rope rescue kits) in addition to being familiar with the content of the task specific SWMS, and the emergency scenario controls and method prior to the activity commencing.

Activity	Person Requiring Rescue					Emergency Scenario			
	Erector	Crane Operator	Maintenance Person	Competent Persons	Authorised Visitors	Suspension from Fall Arrest System	Equipment Failure	Medical Emergency/ Injury	Partial failure/ collapse of Tower Crane
Erection	X	-	-	-	-	X	X	X	X
Use (Operator)	-	X	-	-	-		X	X	X
Alteration	X	-	-	-	-	X	X	X	X
Servicing/ Inspection/ Maintenance Machine Deck	-	-	X	X	-	-	-	X	X
Servicing/ Inspection/ Maintenance Jib	-	-	X	X	-	X	X	X	X
Dismantling	X	-	-	-	-	X	X	X	X
Other	-	-	-	-	X		X	X	X

2.13 Crane and Helicopter Operations

The LHAP development is located to the west and northwest of the Liverpool Hospital helicopter landing site (HLS) complex.

The cranes used for the construction will impact the approach / departure paths to the primary HLS flight path. The final structures Stage 1 and Stage 2 will not impact flight operations however care must be exercised with any equipment or obstructions that may be placed on the roof space and must ensure that no loose material remains in the vicinity of the HLS flight paths.

Given the impact the cranes will have, it will be necessary to ensure:

- The cranes are illuminated at night
- Construction staff / personnel are aware of the potential for helicopter operations in an east / west direction.

Liverpool hospital has two operating helicopter Landing Sites (HLS). Figure 5 illustrates the locations of the HLS, and they are labelled primary and secondary.

Figure 5: Liverpool Hospital HLS locations

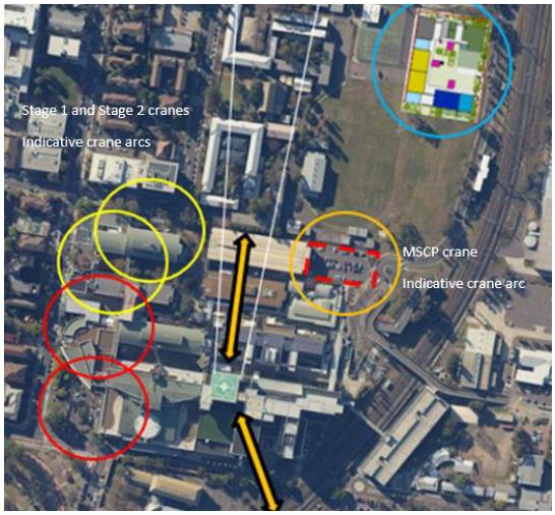
Flight Path

See below a new flight path that has been considered for the project by Avipro.

As the western flight paths are expected to be unusable, a new northern flight path has been considered. The figure below illustrates the planned northern flight path that will keep the helicopters clear of the Stage 1 and Stage 2 tower cranes.

The northern flight path will also keep the helicopters clear of the MSCP crane.

Even with the realigned northern flight path, it will be necessary to ensure that the above points in section 2.1 of this plan are followed.



3.0 IMPLEMENT

3.1 Crane Maintenance

The Crane Operator (driver) shall undertake a daily pre-start inspection of the crane and complete the Daily Plant Inspection Logbook (or its electronic equivalent) to formally record each pre-start inspection. Any defects/faults shall be immediately reported to the Site Manager as soon as possible and also listed in the notes section of the Daily Plant Inspection Logbook (or its electronic equivalent) on the day that the defect/fault was identified.

The supplier/owner of the crane(s) (included within the application of this Management Sub-Plan) shall provide Lendlease with an Inspection and Test Plan (ITP) and inspect, service and maintain the crane in accordance with the manufacturer's recommendations, applicable Australian standards, Lendlease Global Minimum Requirements and as required to maintain the crane's operation. Any repairs related to any defect/fault shall also be recorded in the logbook (or its electronic equivalent) along with service information.

Included with the ITP shall be an extract of the manufacturer's specifications detailing the ongoing service requirements for the crane, e.g., monthly, every 250 hours or other including jib component inspections. Servicing of the crane shall be formally scheduled by the nominated Crane Lifting Coordinator in advance of the scheduled service intervals. Adequate planning shall be provided consistent with the operational hours of the crane to ensure that the crane servicing and maintenance does not exceed the maximum hours between servicing recommended by the manufacturer.

To facilitate consultation and planning by the crane supplier/owner for servicing or other maintenance the completed Plant Daily Inspection Logbook shall be forwarded to the supplier/owner via the project collaboration tool following the end of each working week. Alternatively, an electronic monitoring system shall be implemented with alerts to the Site Management Team and the crane supplier/owner of servicing, fault or other requirements.

Crane maintenance must be scheduled in accordance with the manufacturer's required intervals and works performed only by those personnel that meet the required competency requirements, e.g., Fitter.

Note: Enough time (as designated by the supplier/owner) must be allowed in the construction project program for scheduled crane maintenance. Crane maintenance must be undertaken in day light hours only where it is reasonably practicable to do so, and the crane crew must be present at all times.

Copies of service or repair documents must be submitted to Lendlease no later than 3 working days after the day that the service/repair was undertaken. Defects/faults noted by the Crane Operator in the notes section of the Daily Plant Inspection Logbook and reported to the Site Manager shall be sent to the crane owner/supplier by the Crane Lifting Coordinator or other appointed representative; shall be formally noted as rectified in any service/repair documents and also listed as repaired in the notes section of the Daily Plant Inspection Logbook on the day that the repair was undertaken.

3.2 Communications:

Separate horizontal and vertical communication protocols shall be established; the Crane Crew(s) shall communicate as follows:

- Each crane shall operate a dedicated radio frequency for vertical communication between the Crane Operator and Dogger(s) working with that crane, i.e., three cranes require three dedicated radio frequencies;
- The Project shall have a dedicated radio frequency for horizontal communication between crane operators. Additional radios, programmed to the horizontal frequency should be made available for mobiles cranes where their operation encroaches on the working radius and RL's of the Tower cranes
- The Project shall have a dedicated agreed radio frequency for emergency horizontal communication between crane operators;
- As a backup, Doggers shall have a secondary communication system, e.g., a two-way radio
- Where other constructors/builders or interested parties are using tower cranes within a zone of influence, the LLC Site Manager and Crane Lifting Coordinator will consult with the other constructors/ builders or interested parties to document the agreed protocols and consultation to prevent collision or entanglement.

All crane lifts will be coordinated by a designated Crane Lifting Coordinator nominated in this Plan.

3.3 SWMS

In addition to the requirements for Safe Work Method Statements in the Project EHS Management Plan, the SWMS for the crane(s) included within the scope of this Crane Management Sub Plan must also outline specific preventative (and mitigation) controls (or better) as outlined by the Lendlease Global Minimum Requirements for Environment, Health & Safety. It is not sufficient to simply make reference to the GMR clauses or numbering.

3.4 Register of SWMS

The following Safe Work Method Statement(s) or safe work procedure(s) apply to crane and load shifting operations at this Project:

Reference No.	Title	Date of Last Review (monthly)
1	Erection of a Tower Crane	
2	Base Install	
3	Operating a Tower Crane	
4	Service and Repair of a Tower Crane	
5	Materials Handling and Dogging	
6	Use of a Man box	

3.5 Lifting Equipment / Gear

All lifting gear/equipment must be fit for purpose and marked with a means of identification, i.e., serial/equipment number, and the Working Load Limit (WLL) and shall be itemised in a Plant & Equipment Register or equivalent.

The use, storage, inspection and testing of Lifting gear, must be undertaken in accordance with the relevant legal requirements, codes of practice, compliance codes and applicable standards and the Lendlease Construction Slinging and Lifting Guidelines.

In addition, all lifting gear/equipment shall be:

- Visually inspected prior to use by a competent person; and
- Formally inspected (visual) at intervals not exceeding one (1) month and documented by an appropriately qualified and competent person; and
- Annually inspected by a third party NATA (or LEEA) accredited organisation for all lifting gear/equipment.

Note: refer to LLC Slinging and Lifting Guidelines for additional information regarding inspection or testing requirements.

Any damaged/faulty or out of service equipment shall be removed from service immediately to prevent inadvertent use and where practicable shall be located within a locked container or cabinet to prevent unauthorised or inadvertent use.

A Danger Tag and Out of Service Tag must be applied to damaged/faulty equipment to further warn against inadvertent use.

3.6 Schedule of Common Lifts

Description of Common Lift	Approx. weight	Method of Lifting
Structural Steel Elements	TBA	Chains double wrapped around steel
Metal Rubbish Bins	230kg (Empty) to 1000kg (Full)	Certified Lifting points
Ductwork	400kg	Certified Lifting Cage
Pallet of Brick / Blocks	1000kg	In certified lifting cage
Gyprock	1200kg	As per requirements of Slinging & Lifting Guidelines
Reinforcing steel	1000kg	Double Choked minimum 2 legs
Bags of Sand	900kg	In a certified lifting cage
Stressing coils	Approx. 3000kg	In certified lifting cage or chained through coil
MEWP's	750kg to 6000kg	Certified Lifting Points
Kibble	750kg to 2500kg	Certified Lifting Point
Lift Shutters	1200kg	Certified Lifting Point

CLT Panels	500 – 1000kg	Certified Lifting Point
Formwork Packs	1100kg	Synthetic Slings – Minimum 2 legs

Note: A Lift Plan is required for any lift that requires a crane to operate at 90% or greater of the original manufacturer's rated capacity. GMR 4.6.2 provides further information.

3.7 Multiple Crane Operations Implementation

In addition to the planning requirements outlined in section 2.8 of this Plan where multiple crane operations (multiple tower or multiple mobile cranes) are implemented and the operating radius of each crane is within 5 metres (i.e., close proximity) of other cranes, a specific SWMS must be developed and utilised, which includes the requirements for:

- an additional competent Crane Lifting Coordinator for the duration of the close proximity works; and
- a formalised process for Tower Crane Operators to follow in the event of a failure of the automated anti-collision and zoning system or the requirement to deactivate the system.

The Multiple Crane Operations Protocol is contained in Appendix Two.

3.8 Loading and Unloading vehicles

When loading/unloading bays are in use, they must be barricaded to prevent unauthorised personnel including the public from entering the area. This includes truck drivers once they have unshackled the load.

Pedestrian detours (if required) must be in place preventing unauthorised personnel being within the truck loading/unloading zone. Loading/unloading bays are to remain clean and tidy and general parking or storage is not permitted within the bay unless approved by the Crane Lifting Coordinator.

Before loads are unshackled in readiness for slinging and lifting the stability of the load and other environmental factors such as prevailing wind; wind gusts and the camber of the unloading area or road surface (and related truck tray angle) must all be considered.

Loading and unloading of vehicles must be undertaken to the requirements of the Project Specific Chain of Responsibility Management Sub Plan, in addition to additional controls as determined and by the respective subcontractor or heavy vehicle service provider to comply with their legal obligations under the National Heavy Vehicle Legislation (or COR Provisions in Road Safety Law in WA and the NT).

The Restraint of loads must be in accordance with the requirements of the NTC Load Restraint Guide(s) for Heavy and Light Vehicles.

3.9 Heavy Lifts

A Lift Plan is required for all lifts greater than 20 tonnes and for any lift that requires a crane to operate at greater than 90% of the original manufacturer's rated capacity. GMR 4.6.2 provides further information.

Structural work above the existing Radiology Bunkers requires large structural steel or precast members to be installed to span the bunkers. These members will span approximately 21m and weigh approximately 45 Tonnes. Careful consideration and planning will be required for these lifts with a specific Lift Plan developed for the works.

A lift plan will be provided from the appointed crane company for any lifts greater than 20 tonnes and for any lift that requires a crane to operate greater than 90%.

A high-risk review will be completed, and the subcontractor will include a methodology and safe work method statement on how the works are to be completed with approval from Lendlease prior to works commencing.

Exclusion zones and spotters will be in place at the time of any heavy lifts.

4.0 IMPROVE

4.1 Monitoring of the Workplace

Workplace monitoring (observations and Inspections) of the load shifting operations by the crane(s) included within the scope of this Management Sub-Plan shall be undertaken in line with Section 5.1 of the Project Environment, Health & Safety Management Plan.

4.2 Monitoring of Plant

Plant and equipment shall be inspected and maintained in line with Appendix 3 Plant, Equipment And Processes Inspection And Testing Schedule and Appendix 4 Applicable Australian standards, codes and standards, within the Environment, Health & Safety Management Plan Part 2.

APPENDIX

APPENDIX 1 CRANE OPERATING LOCATIONS

Stage 2 Radius Diagram TBA

APPENDIX 2 MULTIPLE CRANE OPERATIONS PROTOCOL

Multiple Tower Crane Operational Zones & Anti Collision

Where more than one tower crane is on site and the working radius of each crane overlaps or when encroachment must be prevented over a protected area such as a rail corridor, or public interface, or zoned out areas of the site, an automated anti-collision or zoning system consistent with the requirement of the Lendlease GMR shall be fitted as a Crane Operator assist feature. Crane operators and Crane Crew are to be assessed as competent through routine VOC (Section crane crew competence this Plan) and should not drive to the limits of an automated anti-collision and zoning system as the system is a backup only to competent crane operation.

Crane crews are to be specifically familiarised in the operating features of the specific tower crane type including the use and maintenance of the anti-collision or zoning system fitted to the crane (Section crane crew competence this Plan).

Separate vertical and horizontal communication channels shall be provided and established protocols in place and utilised prior to slewing into another crane's radius (Section on communications this Plan).

As outlined in GMR 4.6.8, Lendlease operations where an adjacent construction project is not managed or controlled by Lendlease, any crane(s) that could encroach the operating radius of a crane(s) on the Lendlease operation should result in arrangements between the project teams to agree and implement preventative controls (e.g., zoning or other controls) to prevent any potential for crane-to-crane collision.

Protocol – working in a shared zone

All tower cranes shall not operate within 5 metres of each other without an automated anti-collision and zoning system in operation and set to a minimum distance of 5 metres apart.

Under exceptional circumstances where multiple cranes are required to operate in close proximity, i.e., the automated anti-collision and zoning system is deactivated, a specific SWMS must be developed and implemented. In addition, an additional Crane Lifting Coordinator is allocated to directly supervise the close proximity works. This includes situations where the proximity of mobile cranes or concrete static booms may be close to tower cranes (i.e., within 5m of each other). Where these exceptional circumstances arise, the following additional requirements shall include:

- the Crane Operator shall first consult with the Crane Lifting Coordinator and crane crew and receive approval from the Crane Lifting Coordinator and the other Crane Operator(s).
- Doggers are to act as a spotter to ensure that jibs maintain a minimum clearance of 5m to all elements of the adjacent crane.
- At the conclusion of the close proximity works the Crane Lifting Coordinator must verify and receive confirmation from the Crane Operator that the automated anti-collision and zoning system has been reactivated.
- Crane Operators will communicate via the in-crane intercom and the Doggers will communicate via radio or in person.

Note: The automated anti-collision and zoning system is to be treated as a backup secondary safety system not as a primary safety system.

Protocol – automated anti-collision or zoning system out of service

In the event that the anti-collision and zoning system is out of service, e.g., power outage or surge to any crane or a system fault, the following protocol shall be followed.

- Crane Operators are to communicate the fault immediately to the Crane Lifting Coordinator, Site Manager or other nominated Lendlease employee.
- The Crane Lifting Coordinator will advise the Crane Operator of the affected crane to land any loads that are suspended on the hook where possible, luff the jib to the crane's required stowing radius and await further instructions. (Note: The crane may need to be slewed to allow other cranes to continue working with automated anti-collision and zoning still active).
- Should the Crane Lifting Coordinator assess that any tower crane needs to go into anti-collision or zoning override to continue operating, all cranes that will be affected must land their suspended loads where possible and operators and crews shall await further directions.
- The Crane Lifting Coordinator will assess which cranes are the most important and which areas need to be serviced. The Crane Lifting Coordinator may allow cranes to start operating one crane at a time but only in designated areas that exclude other operating cranes from coming in contact with each other.
- Ongoing monitoring shall be undertaken by the Crane Lifting Coordinator to the affected areas of work and which cranes will be allowed to operate may require change due to demand.

Crane Operators must note in the comments section of the logbook the following – details of the fault, timings of being switched off and on, error code and details of the authorisation and by whom allowing the override/deactivation including time and duration that the anti-collision or zoning is deactivated.

For example:

@ 7:00am 17/5/18 Anti-collision not operational due to power outage of crane X or error code 234 showing on the anti-collision display. Reported the incident to the Crane Lifting Coordinator.

@ 7.45am authorised by Crane Lifting Coordinator to override the anti-collision system while fault to crane X was diagnosed. Anti-collision reactivated @ 8.50am.

Appendix Six of this Management Sub-Plan must also be completed to record instances where the anti-collision system or Zoning has been deactivated.

APPENDIX 3 CRANE LIFTING COORDINATOR DUTIES

The responsibilities of Crane Lifting Coordinator shall include the following:

- Must have formal training in lifting and rigging; hold as a minimum an Intermediate Rigger High Risk Work Qualification and have at least two years' experience as a crane lifting co-ordinator across multiple crane operations.
- Must have a Verification of Competency (VOC) verified by the projects site manager prior to commencement as a Crane Lifting Co-ordinator to ensure a minimum of 2 years' experience.
- Oversee and manage the use of all crane and hoisting equipment including passenger/material hoists at the project.
- Monitor work practices and procedures to achieve consistency with company policies and procedures to ensure the working environment remains safe.
- Complete training in the Lendlease Global Minimum Requirements for Environment, Health & Safety.
- Complete training in Lendlease Chain of Responsibility Awareness to comply with National Heavy Vehicle Transport Legislation.
- Complete formal 'Loader' training and 'Packer' training under National Heavy Vehicle Transport Legislation Chain of Responsibility where required to exercise judgement in the packing or loading, or supervision of packing or loading, of any heavy vehicle over 4.5t gross vehicle mass, that intends to transport the goods (the load) on a public roadway.
- Retain a copy of and be familiar with the National Heavy Vehicle Transport Legislation Chain of Responsibility Load Restraint Guide, where required to exercise judgement in the packing or loading, or supervising packing or loading, of any heavy vehicle over 4.5t gross vehicle mass, that intends to transport the goods (the load) on a public roadway.
- Retain a copy of and be familiar with the Lendlease Construction Slinging & Lifting Guidelines.
- Maintain access to the Lendlease Early Warning Network for weather.
- Routinely review tower crane security procedures and physical security to achieve compliance with GMR4.6.5.
- Monitor Crane Operator working hours to minimise the risk of fatigue.
- Hold strong verbal, written and administration skills.
- Assist in the development and oversee the implementation of the Crane Management Sub Plan including assessment of crane crew training needs, verification of crane crew competency, refinement of crane crew work practices and consultation and participation in the development of safe work method statements (SWMS) and review of backup processes when automated anti-collision and zoning is not operational.
- Provide input in the development and review of slinging and lifting related SWMS, required for high risk construction work or work that requires a High Risk Work Licence and ensure that all crane crew personnel have participated and been consulted on and inducted in the content of all SWMS related to crane operations.

- Assist with inspections and audits to ensure they are carried out in a timely manner and implement preventative actions as determined.
- Review and keep up to date with relevant Australian standards, industry standards, codes of practice and Lendlease Global Minimum Requirements for EHS including GMR4.6 and the LLC Slinging & Lifting Guidelines.
- Maintain oversight of
    - lifting operations and assist with and maintain oversight of Special Lifts as defined by GMR4.6.
    - crane inspection and maintenance and oversight of defect rectification;
    - crane specific access and security requirements including shutdown protocols; and
    - manage the use of all crane and hoisting equipment including passenger/material hoists at the project.
- Provide assistance with the procurement of project cranes and ensure that each crane meets the requirements of Australian standards and GMR requirements before commencement of operations at the project.
- Determine if additional standards or regulations are applicable to multiple crane operations, e.g., rail corridor or air space restrictions.
- Verify that all works in the erection, alteration and dismantling of a crane are supervised by a Qualified Person and the required Lendlease Permit to Work is completed.
- Permit Special Lift operations only when independent third party engineer review has been completed (GMR4.6 and approval of the Lift Plan, equipment and procedures has been undertaken and advice from the crane manufacturer or a qualified person is verified as outlined in GMR 4.6.
- Verify that crane and hoist maintenance is scheduled in accordance with the manufacturer's required intervals and that works are performed only by those personnel that meet the required competency requirements, e.g., Fitter/Mechanic. Note that enough time (as designated by the supplier/owner) must be allowed in the program for scheduled maintenance.
- Verify that any proposed crane operation near overhead electric power lines is only undertaken when Lendlease and Local Statutory requirements have been met in addition to the requirements of GMR 4.4.7 and the LLC Permit to Work – Work Near Overhead Assets Or Powerlines is completed and Authorised.
- Stop crane operations if alerted to an unsafe condition affecting those operations.
- Check that the preparation of any area needed to support crane operations has been completed before crane operations commence.
- Check that required traffic/pedestrian controls are in place to restrict unauthorised vehicle or pedestrian access to a crane work area.
- Familiarise personnel involved in crane operations with their responsibilities, assigned duties and the associated hazards related to their work and that all have been formally consulted in the content of any Safe Work Method Statement related to their work duties.
- Assist in the resolution of any environment, health or safety concerns raised by Crane Operator or other Crane Crew personnel.
- Verify that any Dogger/Rigger(s) proposed for appointment to the crane crew is experienced, holds the required tickets of competency, has undertaken verification of competency within the last three

years where required to operate a tower crane or a forklift/industrial lift truck; and meets Lendlease GMR and legislative requirements.

- Maintain oversight of applicable lifting, load restraint and containment requirements when lifting over personnel.
- Verify that crane load slinging/rigging/dogging is performed only by Crane Crew personnel that meet competency and licence requirements.
- Ensure crane lifting operations are coordinated with other interfacing site activities that will be affected by the lift or may affect the lift itself including interface with other cranes and lifting equipment, concrete placement booms and pumps, proximity works with another crane or other interfacings activity as determined.
- Ensure that truck drivers or other non-crane crew personnel remain clear of all slinging and lifting operations when unloading or loading.
- Ensure that traffic and pedestrian control is provided as necessary to restrict unauthorised access to any crane working area and that zoning is operation on all tower cranes that interface with public or other restricted areas, e.g. rail corridor.
- Maintain oversight of tower crane anti-collision functionality and zoning functionality.
- Ensure that all Lendlease Crane Crew lifting gear is regularly inspected and maintained and listed on a Register, including truck access platforms and any gear identified as defective or out of service is removed from service and fitted with an Out of Service Tag and Danger Tag to prevent inadvertent or unintended use.
- Ensure that slinging and lifting techniques comply with Lendlease standards (Lendlease Construction Slinging & Lifting Guidelines) including:
  - no high/low lifts;
  - use of four chain legs where four lifting lugs are provided, e.g. rubbish skips;
  - rubbish skips are covered when lifting;
  - use of approved lifting cages and containers to prevent loose or small material from falling; and
  - adequate access fall protection is used when slinging and lifting loads on the back of a truck.
- Review any proposed use of a Workbox and issue a Permit To Work – Workbox Use only when no other alternative means of access is reasonably practicable.
- Ensure that conditions that may adversely affect crane operations are addressed such as
  - poor soil conditions;
  - heavy rain;
  - extreme cold;
  - wind velocity or gusting winds;
  - fog; and
  - artificial lighting to crane access tower.

APPENDIX 4 INDUCTION INTO THIS PLAN

Lendlease Construction or other project/workplace employees or other workers that are required to manage/coordinate or operate tower cranes as a key part of their roles and responsibilities at the project are to be inducted in this Management Sub Plan evidenced by completing the Table below.

I acknowledge that I have read and understood this Crane Management Sub Plan and my roles and responsibilities/duties in ensuring the implementation of the requirements of the Plan consistent with my role.

Name	Position/ Role	Signature	Date

APPENDIX 5 CASA DOCUMENTATION

NIL

APPENDIX 6 TOWER CRANE ANTI-COLLISION SYSTEM DEACTIVATION REGISTER

Note – this register must be completed every time the tower crane anti-collision system is requested to be deactivated (by the crane operator) and approval has been granted by the Lendlease Construction Site Manager.

Date	Reason to de-activate the Anti-collision system or zoning	Time (Deactivation)	Time (Reactivation)	Requested By (Operator)	Authorised by (LLC Site Manager)