SYDNEY METRO MARTIN PLACE STATION – INTEGRATED STATION DEVELOPMENT

CONSTRUCTION MANAGEMENT PLAN NORTH SITE STAGE 2 DA

CSWSMP-MAC-SMA-CM-REP-000120

Rev	Date	Details / Description
00	26/05/17	Sydney Metro Martin Place Station Precinct – ECI Issue
01	20/09/17	Metro Martin Place – GMP Issue for Review
02	06/10/2017	Metro Martin Place – GMP Issue update
03	27/10/2017	Metro Martin Place – USP Issue update
04	27/7/2018	Metro Martin Place – Draft DA Submission
05	22/08/2018	Metro Martin Place – Final DA Submission
06	03/09/2018	Metro Martin Place – Revised Final DA Submission

TABLE OF CONTENTS

1.0 INTRODUCTION

This report supports a State Significant Development (SSD) Development Application (DA) (SSD DA) submitted to the Minister for Planning (Minister) pursuant to Part 4 of *the Environmental Planning and Assessment Act 1979* (EP&A Act) on behalf of Macquarie Corporate Holdings Pty Limited (Macquarie), who is seeking to create a world class transport and employment precinct at Martin Place, Sydney.

The SSD DA seeks approval for the detailed design and construction of the **North Site** Over Station Development (OSD), located above and integrated with Metro Martin Place station (part of the NSW Government's approved Sydney Metro project). The northern entrance to Metro Martin Place station will front Hunter Street, Elizabeth Street and Castlereagh Street, with the North Site OSD situated above.

This application follows the approval granted by the Minister for a Concept Proposal (otherwise known as a Stage 1 SSD DA) for two OSD commercial towers above the northern and southern entrances of Metro Martin Place station (SSD 17_8351). The approved Concept Proposal establishes building envelopes, land uses, Gross Floor Areas (GFA) and Design Guidelines with which the detailed design (otherwise known as a Stage 2 SSD DA) must be consistent.

This application does not seek approval for elements of the Metro Martin Place Precinct (the Precinct) which relate to the Sydney Metro City and Southwest project, which is subject to a separate Critical State Significant Infrastructure (CSSI) approval. These include:

- Demolition of buildings on the North Site and South Site;
- Construction of rail infrastructure, including station platforms and concourse areas;
- Ground level public domain works; and
- Station related elements in the podium of the North Tower.

However, this application does seek approval for OSD areas in the approved Metro Martin Place station structure, above and below ground level, which are classified as SSD as they relate principally to the OSD. These components are within the Sydney Metro CSSI approved station building that will contain some OSD elements not already approved by the CSSI Approval. Those elements include the end of trip facilities, office entries, office space and retail areas, along with other office/retail plant and back of house requirements that are associated with the proposed OSD and not the rail infrastructure.

Context

The New South Wales (NSW) Government is implementing Sydney's Rail Future (Transport for NSW, 2012), a plan to transform and modernise Sydney's rail network so that it can grow with the city's population and meet the needs of customers in the future.

Sydney Metro is a new standalone rail network identified in Sydney's Rail Future. The Sydney Metro network consists of Sydney Metro Northwest (Stage 1) and Sydney Metro City and Southwest (Stage 2).

Stage 2 of Sydney Metro entails the construction and operation of a new metro rail line from Chatswood, under Sydney Harbour through Sydney's CBD to Sydenham and onto Bankstown through the conversion of the existing line to metro standards. The project also involves the delivery of seven (7) new metro stations, including Martin Place.

This step-change piece of public transport infrastructure once complete will have the capacity for 30 trains an hour (one every two minutes) through the CBD in each direction catering for an extra 100,000 customers per hour across the Sydney CBD rail lines.

On 9 January 2017 the Minister approved the Stage 2 (Chatswood to Sydenham) Sydney Metro application lodged by Transport for NSW (TfNSW) as a Critical State Significant Infrastructure (CSSI) project (reference SSI 15_7400). Work is well underway under this approval, including demolition of buildings at Martin Place.

The OSD development is subject to separate applications to be lodged under the relevant provisions of the EP&A Act. One approval is being sought for the North Site – this application – and one for the South Site via a separate application.

Site Description

The Metro Martin Place Precinct relates to the following properties (refer to **Figure 1**):

- 50 Martin Place, 9 – 19 Elizabeth Street, 8 – 12 Castlereagh Street, 5 Elizabeth Street, 7 Elizabeth Street, and 55 Hunter Street (North Site);
- 39 – 49 Martin Place (South Site); and
- Martin Place (that part bound by Elizabeth Street and Castlereagh Street).

This application relates **only to the North Site**, being the city block bounded by Hunter Street, Castlereagh Street, Elizabeth Street, and Martin Place (refer to **Figure 1**).

The South Site (39 – 49 Martin Place) is the subject of a separate Stage 2 SSD DA.

Figure 1 – Aerial Photo of the North and South Site of the Metro Martin Place Precinct

Background

Sydney Metro Stage 2 Approval (SSI 15_7400)

The Sydney Metro CSSI Approval approves the demolition of existing buildings at Martin Place, excavation and construction of the new station (above and below ground) along with construction of below and above ground structural and other components of the future OSD, although the fit-out and use of such areas are the subject of separate development approval processes.

On 22 March 2018, the Minister approved Modification 3 to the Sydney Metro CSSI Approval. This enabled the inclusion of Macquarie-owned land at 50 Martin Place and 9-19 Elizabeth Street within Metro Martin Place station, and other associated changes (including retention of the opening to the existing MLC pedestrian link).

Concept Proposal (SSD 17_8351)

On 22 March 2018, the Minister approved a Concept Proposal (SSD 17_8351) relating to Metro Martin Place Precinct. The Concept Proposal establishes the planning and development framework through which to assess the detailed Stage 2 SSD DAs.

Specifically, the Concept Proposal encompassed:

- Building envelopes for OSD towers on the North Site and South Site comprising:
  - 40+ storey building on the North Site (see **Figure 2**)
  - 28+ storey building on the South Site
  - Concept details to integrate the North Site with the existing and retained 50 Martin Place building (the former Government Savings Bank of NSW)
- Predominantly commercial land uses on both sites, comprising office, business and retail premises
- A maximum total GFA of 125,437m^2 across both sites
- Design Guidelines to guide the built form and design of the future development
- A framework for achieving design excellence
- Strategies for utilities and services provision, managing drainage and flooding, and achieving ecological sustainable development
- Conceptual OSD areas in the approved Metro Martin Place Metro station structure, above and below ground level[1]

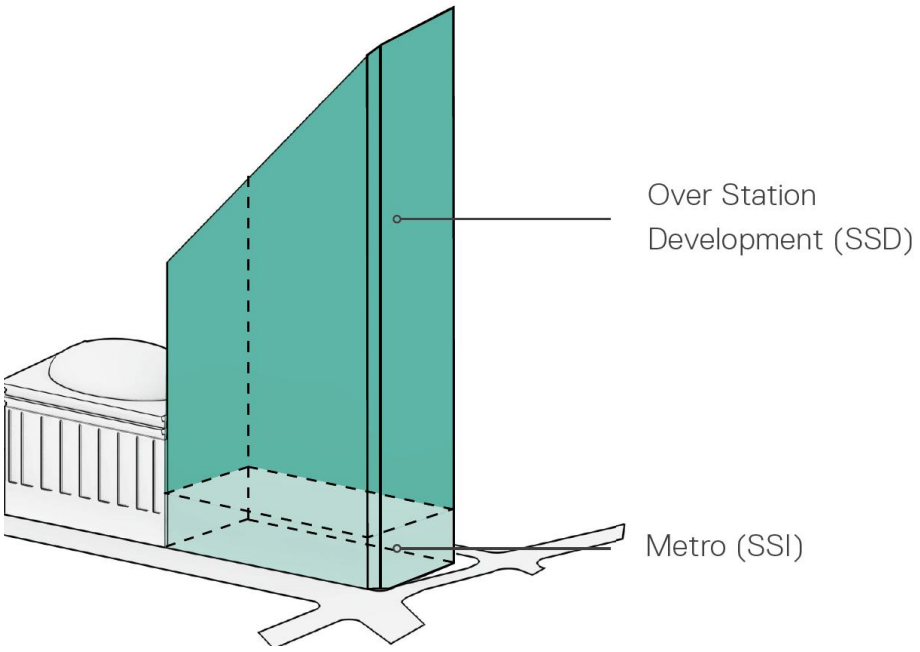

Figure 2 – North Site Approved OSD Building Envelope

Planning Proposal (PP_2017_SYDNE_007_00) - Amendment to Sydney LEP 2012

The Planning Proposal (PP_2017_SYDNE_007_00) sought to amend the development standards applying to the Metro Martin Place Precinct through the inclusion of a site-specific provision in the Sydney Local Environmental Plan (LEP) 2012. This site-specific provision reduced the portion of the **South Site** that was subject to a 55 metre height limit from 25 metres from the boundary to

[1] *Refers to those components within the Metro CSSI approved station envelope that will contain some OSD elements not approved in the CSSI consent. Those elements include the end of trip facilities, office entries, office space and retail areas, along with other office/retail plant and back of house requirements that are associated with the proposed OSD and not the rail infrastructure.*

Martin Place, to 8 metres, and applies the Hyde Park North Sun Access Plane to the remainder of the South Site, forming the height limit of the tower. It also permits a revised FSR of 22:1 on the South Site and 18.5:1 on the North Site. These amendments were gazetted within Sydney LEP 2012 (Amendment No. 46) on 8 June 2018 and reflect the new planning controls applying to the Precinct.

Overview of the Proposed Development

The subject application seeks approval for the detailed design, construction and operation of the North Tower. The proposal has been designed as a fully integrated station and OSD project that intends to be built and delivered as one development, in-time for the opening of Sydney Metro City and Southwest in 2024. This application seeks consent for the following:

- The design, construction and operation of a new 39 storey commercial OSD tower (plus rooftop plant) within the approved building envelope for the North Site, including office space and retail tenancies.
- Physical connections between the OSD podium and the existing 50 Martin Place building, to enable the use of the North Site as one integrated building.
- Vehicle loading areas within the basement levels.
- Extension and augmentation of physical infrastructure / utilities as required.
- Detailed design and delivery of 'interface areas' within both the approved station and Concept Proposal envelope that contain OSD-exclusive elements, such as end of trip facilities, office entries, office space and retail areas not associated with the rail infrastructure.

Planning Approvals Strategy

The *State Environmental Planning Policy (State and Regional Development) 2011* (SEPP SRD) identifies development which is declared to be State Significant. Under Schedule 1 and Clause 19(2) of SEPP SRD, development within a railway corridor or associated with railway infrastructure that has a capital investment value of more than $30 million and involves commercial premises is declared to be State Significant Development (SSD) for the purposes of the EP&A Act.

The proposed development (involving commercial development that is both located within a rail corridor and associated with rail infrastructure) is therefore SSD.

Pursuant to Section 4.22 of the EP&A Act a Concept DA may be made setting out concept proposals for the development of a site (including setting out detailed proposals for the first stage of development), and for which detailed proposals for the site are to be the subject of subsequent DAs. This SSD DA represents a detailed proposal and follows the approval of a Concept Proposal on the site under Section 4.22 of the EP&A Act.

Submitted separately to this SSD DA is a SSD DA for the South Site (Stage 2 South Site SSD DA). A Stage 1 Amending SSD DA to the Concept Proposal (Stage 1 Amending DA) has also been submitted that has the effect of aligning the approved South Site envelope with the new planning controls established for the South Site (achieved through the site specific amendment to the Sydney LEP 2012).

Figure 3 below is a diagrammatic representation of the suite of key planning applications undertaken or proposed by Macquarie and their relationship to the subject application (the subject of this report).

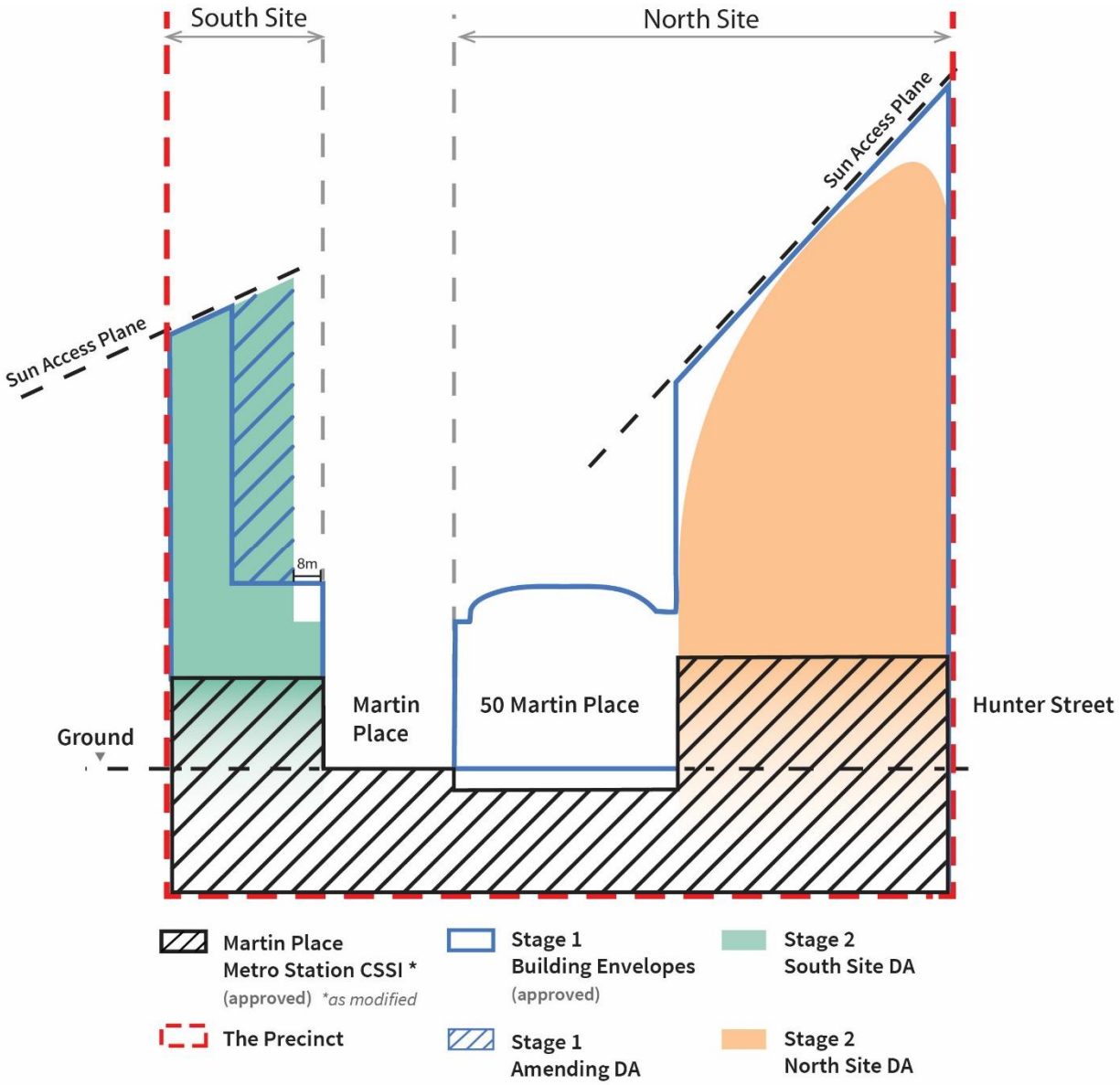

Figure 3 – Relationship of key planning applications to the **Stage 2 North Site DA** (this application)

The Department of Planning and Environment have provided Secretary's Environmental Assessment Requirements (SEARs) to the applicant for the preparation of an Environmental Impact Statement for the proposed development.

This Report

This Construction Management Plan (CMP) details Lendleases' overall construction methodology for the delivery of North Tower. It is envisaged that this CMP will evolve during the detailed design phase and pre-construction phase. Please note the images and Figures contained herein are diagrammatic and indicative and subject to design development.

In the following sections, we have set out how we will construct the North Tower including our processes and controls, management of the live interfaces and how we will finalise, commission and meet the required handovers for the North Tower.

This CMP also defines the impacts of the proposed construction activities on areas within the Metro Martin Place precinct. This plan details our construction methodology, sequence and logic mitigating potential construction risks to the Metro Martin Place precinct and its stakeholders.

Our proactive approach is underpinned by the following overriding and non-negotiable objectives:

- Maintain business continuity of adjoining properties;
- To deliver a flagship project for our client on time to the highest safety and superior quality;
- Communicate in a timely fashion with all relevant stakeholders what, when and how we are planning to undertake;
- Positive public perception of the project during the construction works;
- Use experienced and competent subcontractors with appropriate resources to deliver their works in the manner we prescribe; and
- Hands-on control of subcontractors from active Lendlease site supervision.

Macquarie will have five key outcomes from the Lendlease Construction Management Plan:

QUALITY	CERTAINTY	PARTNERSHIP	CAPABILITY	COMPLIANCE
				
· Comprehensive quality control system applied across all aspects of design, procurement and delivery	· Robust management processes across all areas of the business · Demonstrated and strong delivery experience	· Transparency of management processes · Shared responsibilities applied to the project team · Collaboration with Client and contractor market	· Extensive industry experience of the project leadership in delivery	· Processes that meet Macquarie, industry and company certification requirements · AEO accreditation aligned to QA performance

2.0 DESCRIPTION OF PROPOSED WORKS

2.1 Precinct Description

The Metro Martin Place precinct development consists of the Martin Place Metro station, OSD and the associated integrated civic, retail and commercial areas. This proposed redevelopment is to create a transportation metro precinct that offers mixed use space including commercial office space, modern retail outlets and civic space areas. The OSD comprises two commercial towers: the North Tower consists of 39 storeys of office space, and the South Tower consists of 29 storeys of office space. The South Tower will be constructed over the existing Eastern Suburbs Line (ESL).

The site is to be split into three construction zones (North Tower, South Tower and Below Ground Station Box) as per Figure 1 shown below. The precinct is located between Hunter Street to the North, 39 Martin Place to the South, Elizabeth Street to the East and Castlereagh Street to the West.

Figure 1 – Metro Martin Place Precinct Development

The building located at 39 Martin Place is currently being demolished by the Tunnel and Station Excavation Works (TSE) Contractor prior to Lendlease commencing site establishment and is not related to this application. The excavation in the South plot will also be completed by the TSE Contractor and is not related to this application. The TSE subcontractor is currently completing the demolition of 55 Hunter Street, 5 Elizabeth Street, 7 Elizabeth Street, and 8A-12 Castlereagh Street, which form part of the North Tower site and have previously been approved as part of the CSSI. 9-19 Elizabeth Street will be demolished by Lendlease prior to the excavation of the North shaft under the CSSI consent.

The North Tower OSD Construction works are the subject of this application.

Below the plans that contain the construction related content are listed.

Condition B12 of the Stage 1 Consent notes that the following plans are required to be prepared under this Consent:

a) Construction Pedestrian and Traffic Management Plan – *appendix to the Traffic, Transport, Pedestrian and Parking Report by Arup.*

b) Cumulative Construction Impact Assessment – *Acoustic Report by Arup.*

c) Noise and Vibration Impact Assessments - *Acoustic Report by Arup.*

d) Community Consultation and Engagement Plans – Consultation Report by Ethos Urban

e) Construction Waste Management Plan; and – *Waste Management Plan by Arup*

f) Air Quality Management Plan - A*ir Quality report by Arup.*

These plans are being prepared as part of an overall Construction Environmental Management plan, and further develop the strategies implemented for the CSSI delivery, including detailed impacts due to increased construction vehicles on traffic, pedestrian management, and interaction with surrounding receptors.

2.2 Description of the Works

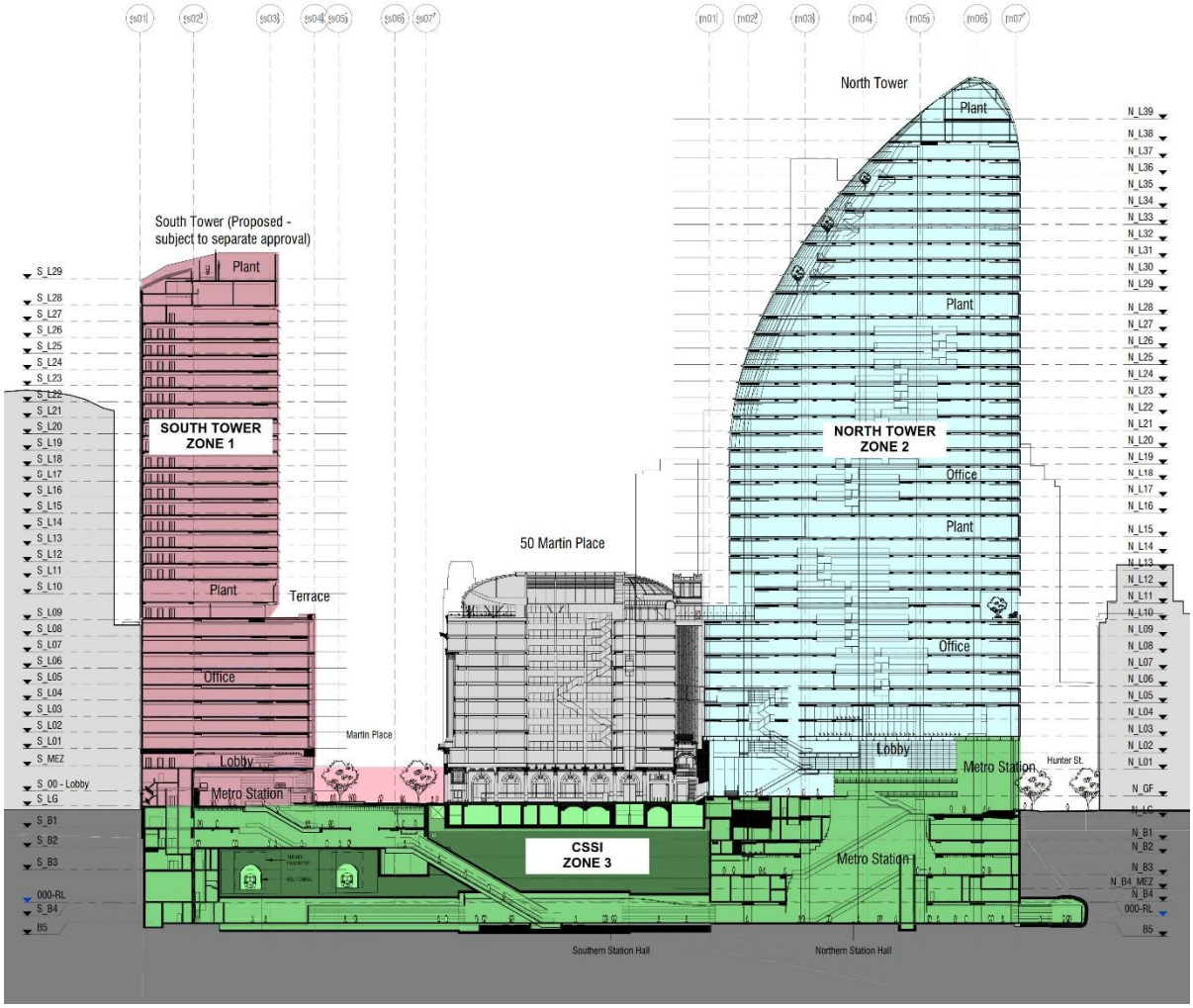

Figure 2 – Construction Zone Break Up

The Metro Martin Place precinct design proposal indicated in Figure 2 above, involves the redevelopment of the site, as well as accommodates the following:

- Integration of an underground pedestrian link under 50 Martin Place, new metro train station and associated tunnel fit-out.
- Construction of the 39 story North Tower, comprising a reinforced concrete structure with a glass lift core on Castlereagh Street;
- Construction of the 29 story South Tower, comprising a rear core reinforced concrete structure with a podium level to 45 metres;
- Integration of the North Tower and 50 Martin Place with interconnecting bridges at nominated levels, and a link to the ground floor.
- Retail and Public domain spaces to both North and South Towers.

This report covers the North Tower only.

The Station works which are approved under the CSSI will be carried out by a separate Lendlease construction team who will work closely with the North and South Tower construction team to ensure a seamless interface between the North Tower, South Tower and Station works as fitout works will be occurring on the station at the same time as OSD works. The station works are subject to a separate CMP.

2.3 Supply Chain Procurement

The precinct scale, technical complexity, programme challenges, and quality requirements of the Metro Martin Place precinct, dictate that the selection of the appropriate subcontractors will be critical in meeting the demands of the project. Lendlease will ensure that there is flexibility and redundancy in the supply chain procurement in the way in which the work activity packages are defined from an overarching scope of works and risk management perspective.

Lendlease has identified the below trades as critical to the success of the Metro Martin Place project:

- Formwork - post-tensioning, concrete supply and place;
- Tower façade;
- Structural Steel;
- Waterproofing; and
- Mechanical / Building Management Services, electrical, hydraulic, and fire services trades.

We will engage subcontractors and supply chain partners that have a proven track record on complex, precinct scale, rail infrastructure projects and CBD high-rise commercial projects

Our procurement strategy and associated programme is derived from lead times determined from the overall construction program. Initial focus will be on the Design and Construct (D&C) services subcontractors, structure and façade contractors. We will utilise the pre-construction phase for procurement activities for all critical trade packages.

2.4 Authorities and Utilities Management

At various stages, external approval of components of the works will be required, including:

- Transport for NSW (TfNSW) which incorporates:
- Sydney Trains;
- Sydney Metro;
- Roads Maritime Services (RMS); and
- NSW Fire & Rescue.
- City of Sydney;
- CBD Co-ordinator Generals Office;

- NSW Office of Environment and Heritage
- Heritage Council
- NSW Fire and Rescue
- Ausgrid;
- Sydney Water;
- Jemena; and
- Other relevant utility providers.

Our approach with these authorities will differ depending on the respective requirements, however fundamentally Lendlease will seek:

- Prior coordination with stakeholder and client partners to ensure all approaches are aligned;
- Early contact to mitigate potential delays and identify potential issues; and
- Establishment of common contacts that can provide continuity of service on the project. To this end, early introductory meetings will be appropriate (i.e. City of Sydney, TfNSW and Ausgrid).

Lendlease understands that Macquarie have commenced discussions with a number of Authorities, Lendlease will work closely with Macquarie's team to further develop the authority engagement and management strategy.

2.5 Programme

Please refer to GMP Submission Programme submission.

2.6 Hours of Construction

Main site working hours will be governed by the final State Significant Development Application (DA) consent conditions. For the purposes of initial construction planning we anticipate these to be:

Monday to Friday:	7am – 7pm
Saturday:	7am – 5pm
Sunday:	No work

In addition to the above working hours, there will be occasional periods when out of hours works are required. Prior to scheduling any out of hours works, Lendlease will agree the process with the Department of Planning and Environment as required and address the approvals and additional measures required. The nature of these works would typically include erection of hoardings, erecting and dismantling tower cranes, works to footpaths, services connections and other works that interface with the surrounding ground plane.

2.7 Hoardings

Lendlease understands that the demolition / excavation contractor (TSE package) will have established the site with various hoarding and gantries to carry out the work to ensure safety compliance in-line with the WHS Act and associated industry codes of practice.

Lendlease will utlise these existing A-Class hoardings and gate entries to ensure the site security is maintained at all times, and install B-Class hoardings during the bulk excavation to provide workforce accommodation. Additional gates will also be installed as the construction progresses to facilitate access to loading docks and the building perimeter.

B Class hoardings will be erected during the excavation works to the Elizabeth, Hunter, and Castlereagh Street frontages in accordance with the Site Establishment Plans contained in this plan.

B Class hoarding can incorporate City of Sydney, Macquarie, Lendlease and Sydney Metro co-branding and may be updated throughout the project in-line with the project requirements. Lendlease have assumed that hoardings can be erected 2 weeks prior to contract start date

Figure 3 –B Class Hoarding North & South Buildings along Castlereagh St

2.8 Site Security and Gates

The site perimeter will be secure at all times with no unauthorised access permitted. The site perimeter will be secured with full height plywood to the inside face of all B Class hoardings.

Out of hours security patrols will be utilised strategically during the project. The focus will be on the back end of the project, as the potential for theft and vandalism increases. Shutdown periods (Christmas and Easter) will also be monitored by external security services.

CCTV with active motion sensors will be used to track any unauthorised access to tower cranes, man and materials hoists, and site accommodation.

Construction worker access to the site will be strictly controlled through our secured gate system and individuals will require a personalised identity swipe cards. This creates a live record of the workers on-site at any given time, and in case of an emergency and during an evacuation.

2.9 Site Accommodation / Amenities and Project Office

Lendlease places emphasis on the quality and amenity of the project and accommodation facilities. Quality facilities set a standard and a level of expectation that we expect our staff and subcontractors to take with them to the workface on-site.

Accommodation and amenities for the construction workforce will be provided in stages. Initial site accommodation sheds will be erected on top of the Class B gantry hoardings, with a 10kPa capacity to the roof of the sheds, to allow materials handling over the site sheds.

As construction progresses and backpropping is stripped, the capacity of the on-site accommodation and amenities will be further expanded by constructing purpose built undercover accommodation. This will cater for the increase in workforce numbers and also facilitate dry access to various workfaces. The North Tower site accommodation will be relocated from the initial B Class hoarding establishment down to B2, with supplementary accommodation being established on L3 and L4.

Lendlease project office is co-located with the Macquarie team for the duration of the project, in a commercial building within close proximity to the site.

3.0 NORTH TOWER

3.1 Site Establishment and Logistics Overview

The planning and methodology assessment for the project has identified several key stages in the general configuration of the site during construction. This section provides an overview of the overall approach adopted with a detailed description of these stages provided below. Please refer to detailed site establishment staging plans located in this section.

During site establishment for the CSSI works, Lendlease will utlise the existing A-Class hoardings and gate entries to ensure the site security is maintained at all times. During bulk excavation (CSSI works) B-Class hoardings will be installed, along with additional gates will also be installed as the construction progresses to facilitate access to loading docks and the building perimeter.

The North Tower site will bounded by Class B hoardings along Castlereagh St and Elizabeth St on the Western and Eastern elevations respectively and along Hunter St on the Northern perimeter. These Class B hoardings will extend along the west and east elevations of 50 Martin Place, to cater for increasing workforce housed in the additional site sheds atop the Class B Hoarding. This accommodation will be removed and Class B relocated back to site boundaries once the basement structure is completed and stripped, facilitating establishment of internal accommodation on B2 level.

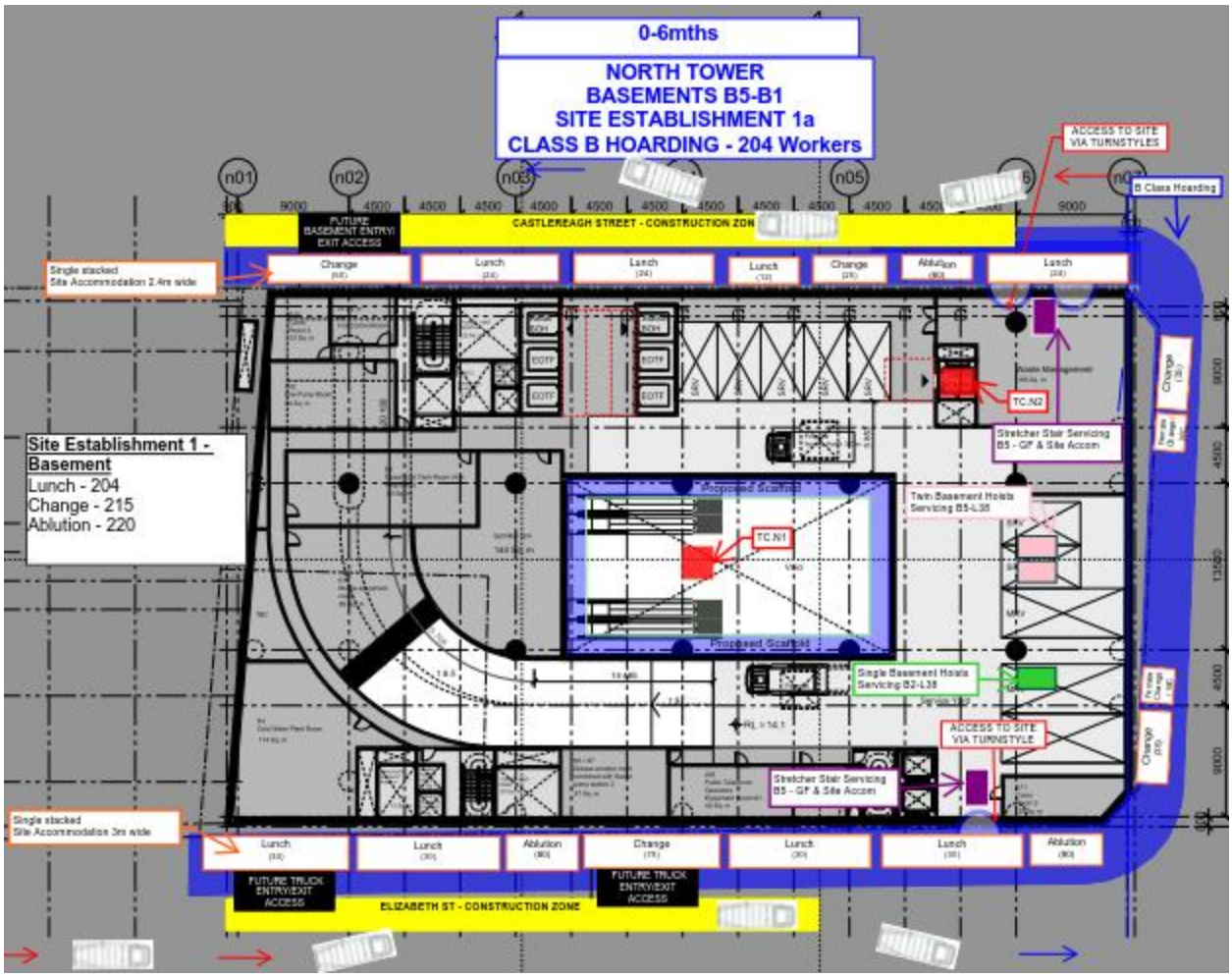

Figure 4 – Initial Site Establishment during Basement Structure Phase

3.2 Site Establishment

As per Section 2.1.7 and 2.1.9, the project site accommodation will change to cater for the growing workforce demand over the life of the development. The North Tower site accommodation is staged to provide for a peak workforce of 700 workers as follows:

- **Stage 1 – 0-14mths** – Site Accommodation on B Class Hoarding accommodates maximum of 300 workers.
- **Stage 2 – 15-17mths** – Once the B2 structure is complete and stripped, site accommodation will be relocated to B2 and will accommodate 400 workers.
- **Stage 3** – **from 18mths onwards** – Once first typical floors are stripped; overflow accommodation opens on L3 & L4 to supplement B2 accommodation and cater for up to 700 workers at the peak of North Tower construction.

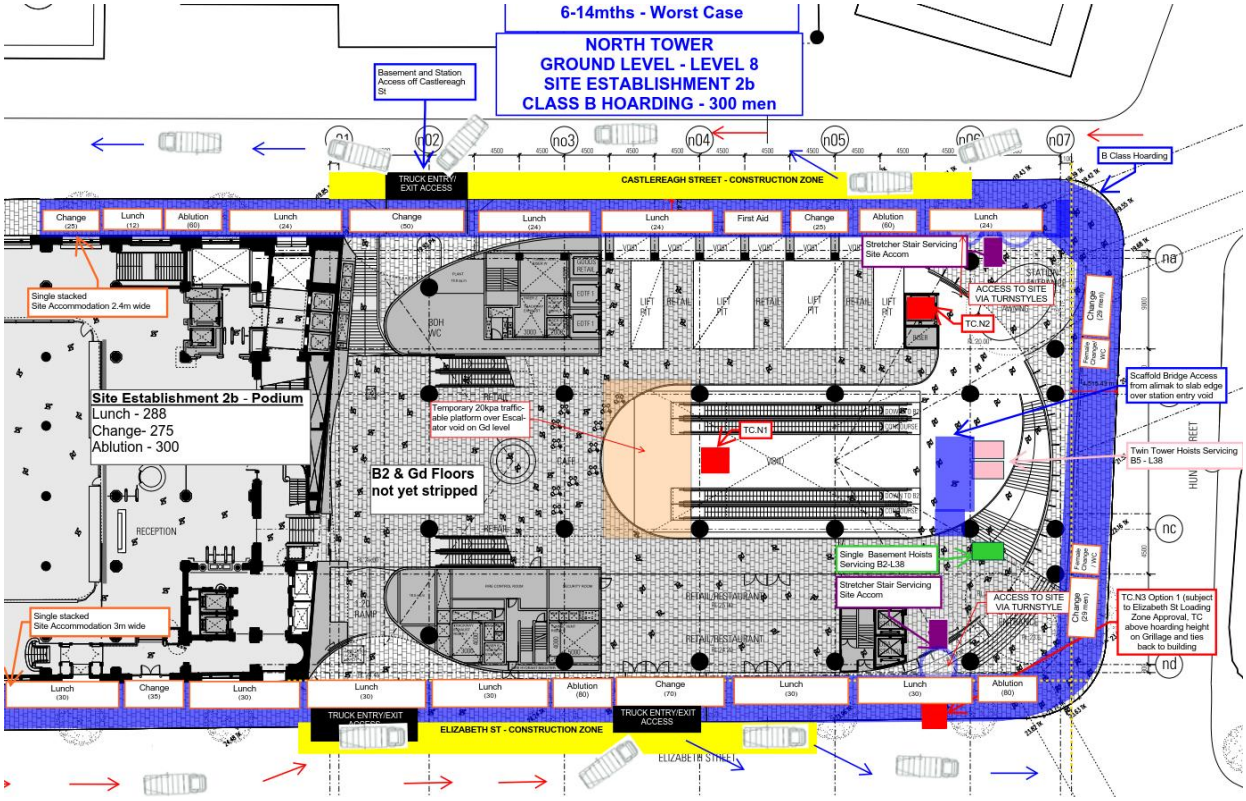

Figure 5 - Site Establishment during Podium Tower Structure Phase

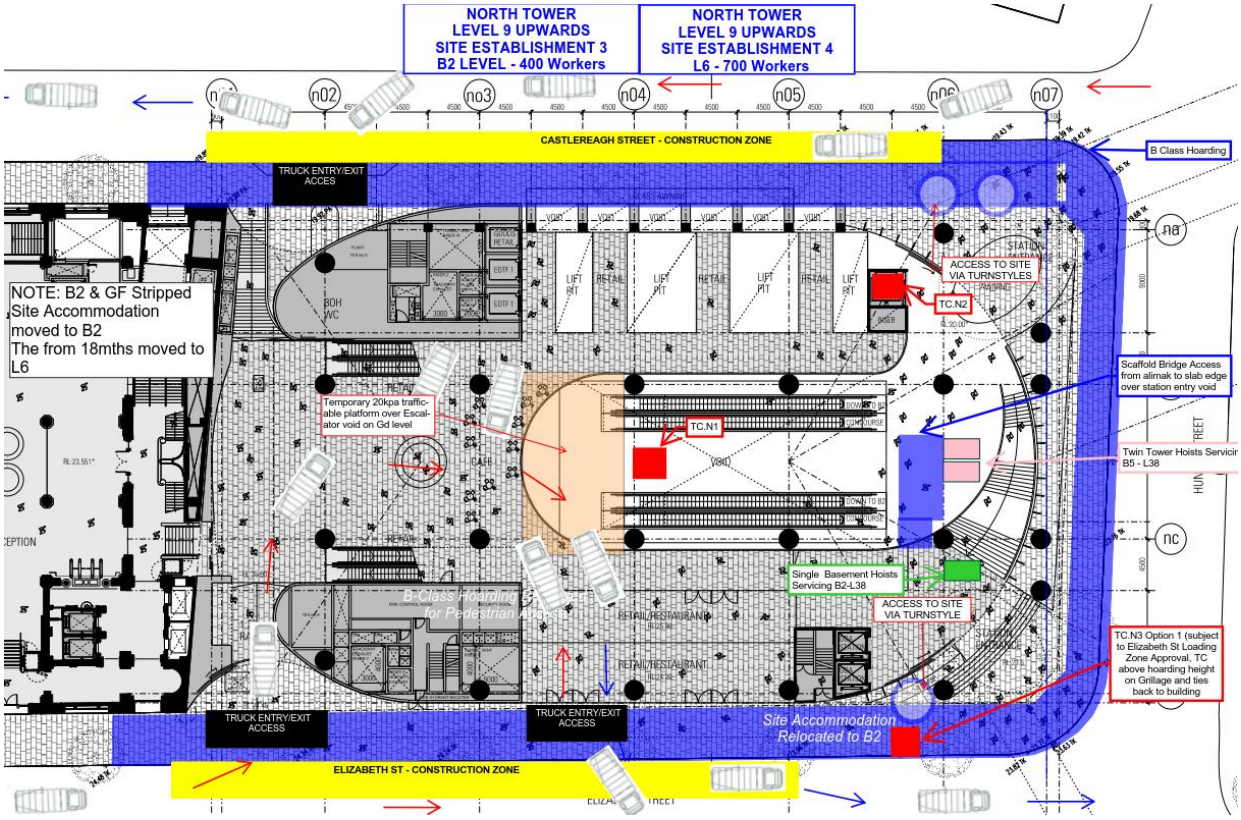

Figure 6 – Site Establishment Mid-Rise Tower Structure Post Stripping of Ground Level

The End of Trip Facility area on B2 has been selected as the primary undercover site accommodation location for the North Tower, as shown in Figure 7 below. This area provides ease of access from site entry at ground level via fire stairs, man and materials hoist, and builders lift in Goods Lift 19 when operational. The minimal fit-out works to this End of Trip Facility area on B2 also allows site accommodation to remain on B2 for the longest possible time prior fit-out and project handover.

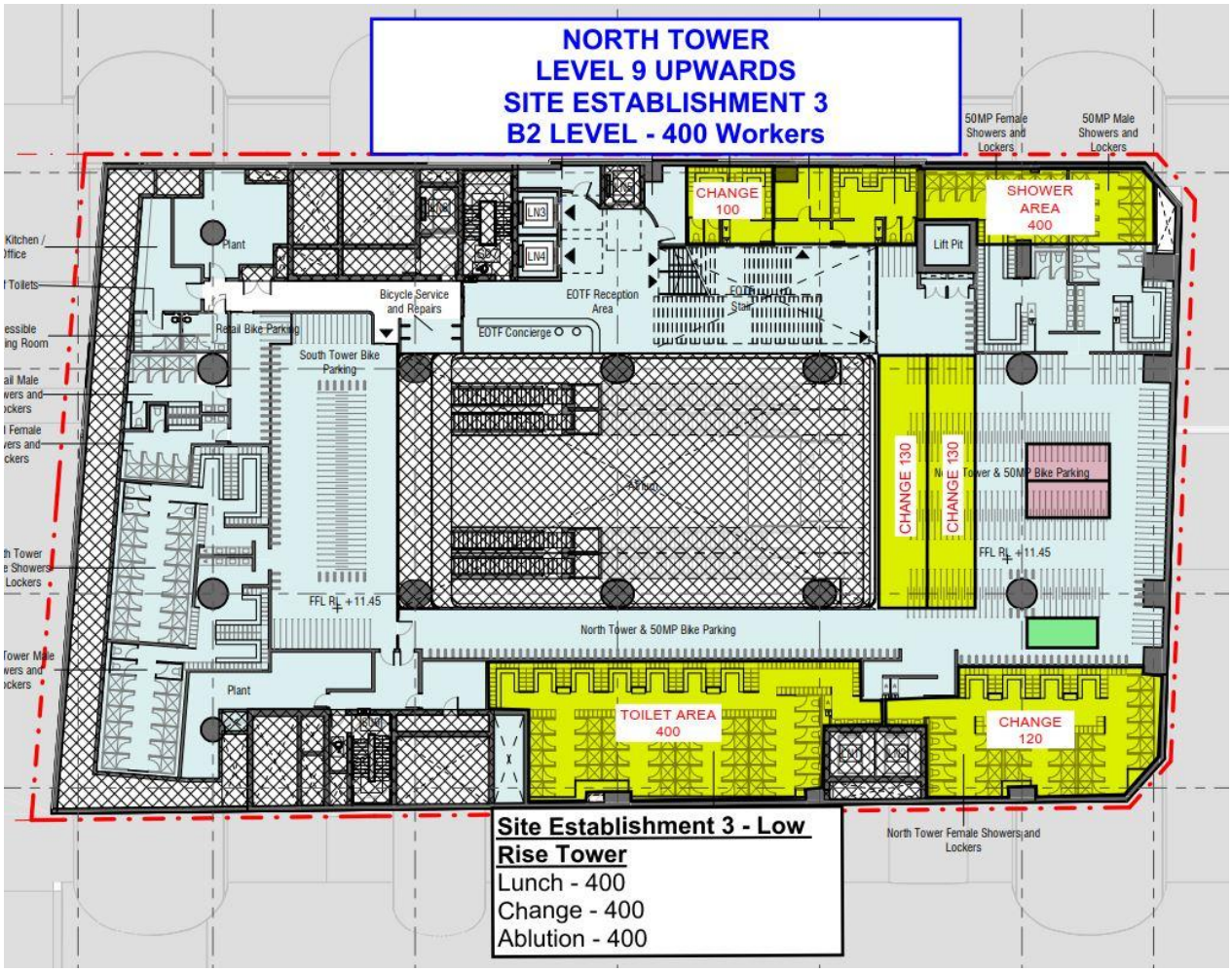

Figure 7 – Site Accommodation relocated from B Class Hoarding to B2

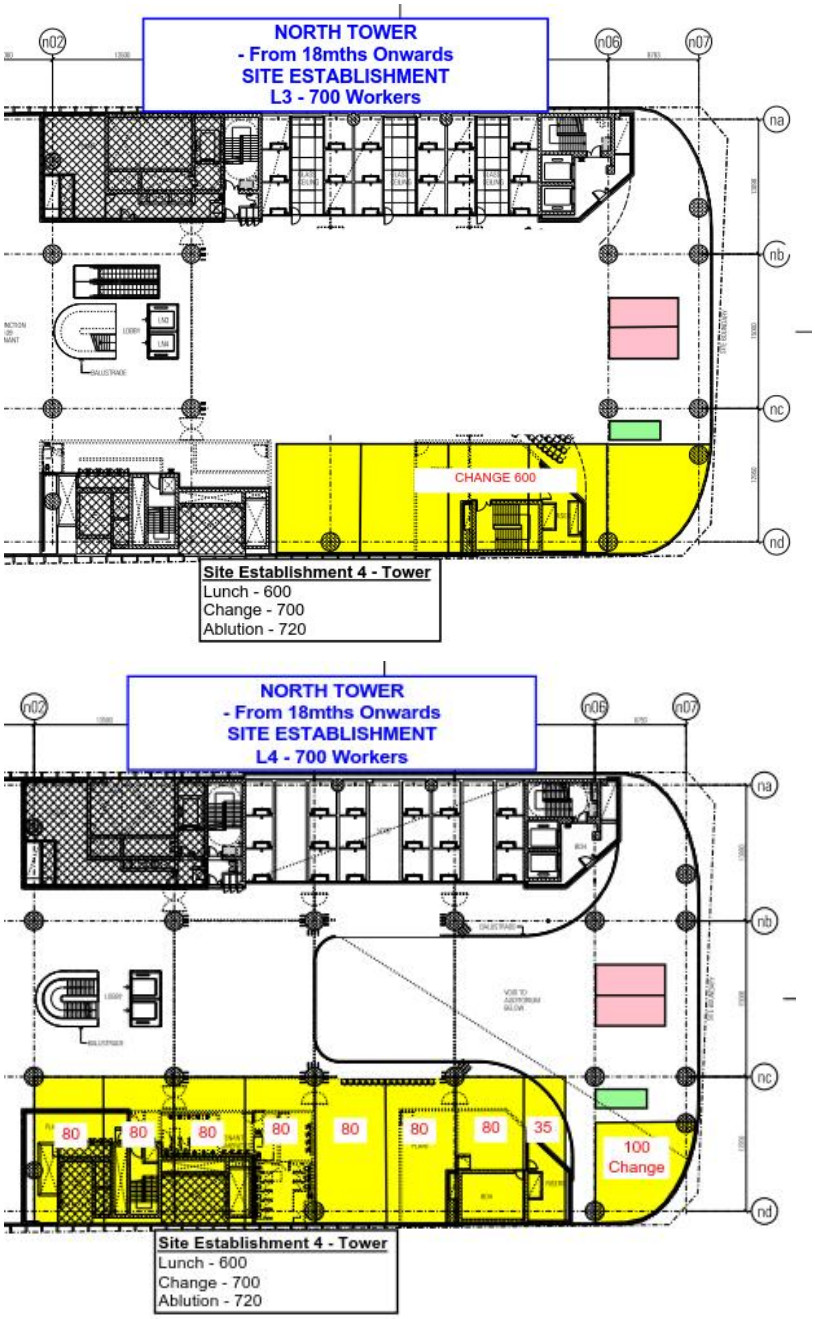

Figure 8 – Overflow site accommodation established on L3 & L4

3.3 Surveys and Monitoring

Lendlease acknowledges that the procurement of the demolition contractor and TSE Contractor will be undertaken by the State and a full dilapidation and archival record will be handed over to Lendlease prior to commencement.

Considering the above, we have allowed for the following works:

- Site handover inspection with Sydney Metro;
- Procure separate dilapidation reports at the completion of the earthworks phase for; Rail Tunnels, and Metro Martin Place station, 50 Martin Place, adjoining pedestrian footpaths

and road ways to Elizabeth St, Hunter St and Castlereagh St, adjoining areas of the Martin Place Concourse and adjacent façades and external areas; and

- The necessary vibration monitoring and back to base alarm monitoring to ensure the nominated accepted level stipulated by Sydney Metro.

Lendlease has allowed for the engagement of a consultant during the course of the construction works. The consultant will provide detailed advice and practical methodologies in the form of a construction acoustic management plan, in order to manage the potential noise issues with the adjacent sensitive receivers. Lendlease has extensive experience in managing these issues on similar CBD projects and will look to introduce the following measures on similar projects such as:

- Noise monitoring (as previously mentioned);
- Positioning major plant away from sensitive receiver boundaries; and
- Where applicable treating plant with mufflers and noise mitigating filters.

The noise and vibration construction assessment report, will detail the criteria and protocols for vibration and noise protocols to the surrounding properties. This report details a number of sensitive receivers above ground being:

- 50 Martin Place;
- Channel 7; and

3.4 Materials Handling and Cranage

3.4.1 Cranes

A detailed cranage analysis has been undertaken to determine the type, size, position and quantity of cranes required for the most efficient material handling solution for the project. A series of internal workshops were undertaken to develop our proposed strategy. Our selected strategy is the utilisation of three (3) tower cranes for the North Tower.

The tower cranes in this CMP will be used for the OSD construction. Materials handling for the station fit out will be delivered using basement access routes, which will be already constructed.

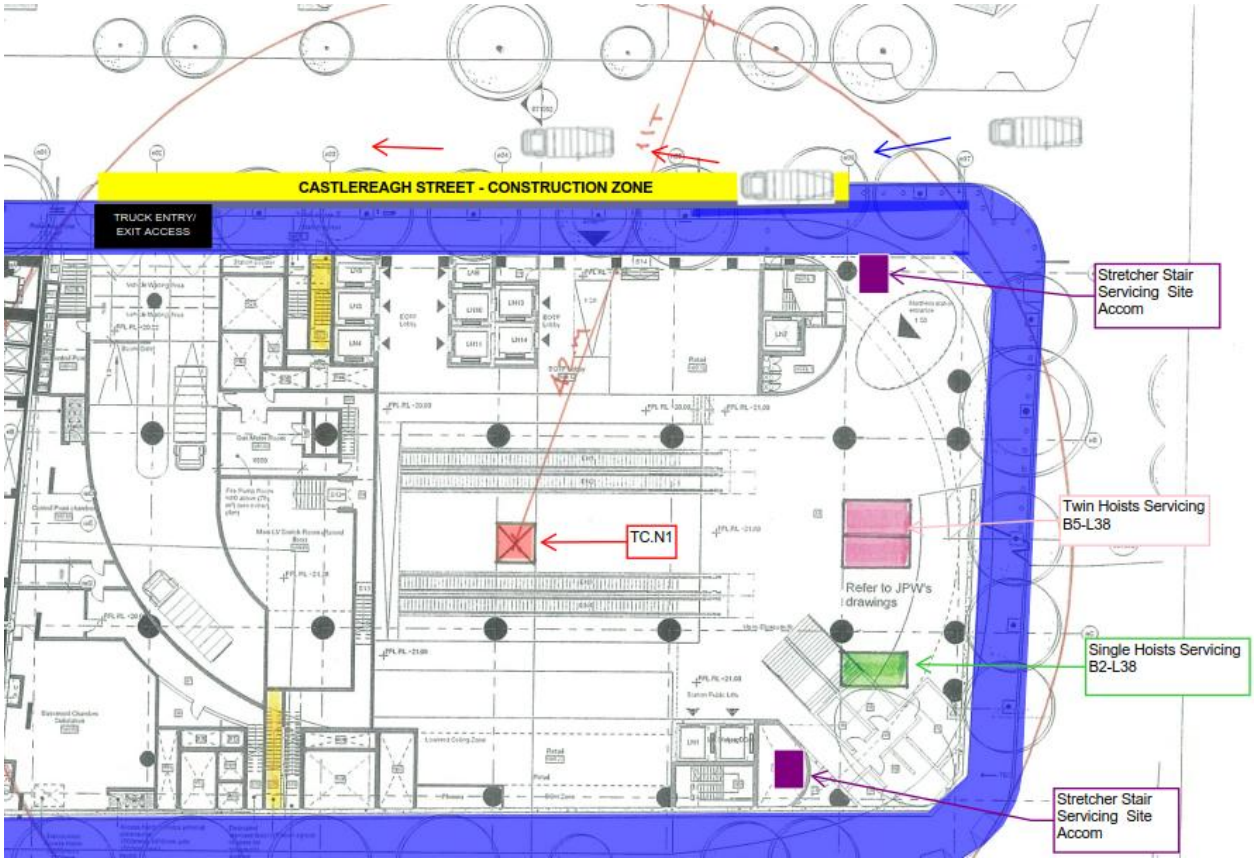

Figure 9 – Materials Handling Plan – North Building Basement Phase

Tower Crane 1 will be positioned centrally to the floor plate and will be founded on B5. This crane is proposed to be a Favelle Favco M390D tower crane with a 42m boom and a lifting capacity of 11t at the tip of the boom. It will be equipped with an external climbing frame and tied into the concrete structure. The central position provides hook coverage to the core area and the floor plate, with the construction zones on Elizabeth St and Castlereagh St respectively. This tower crane will be both used for loading and unloading materials into the station box area and servicing the tower floors. This tower crane will be erected via mobile crane and will be dismantled using Tower Crane 3 from Elizabeth St.

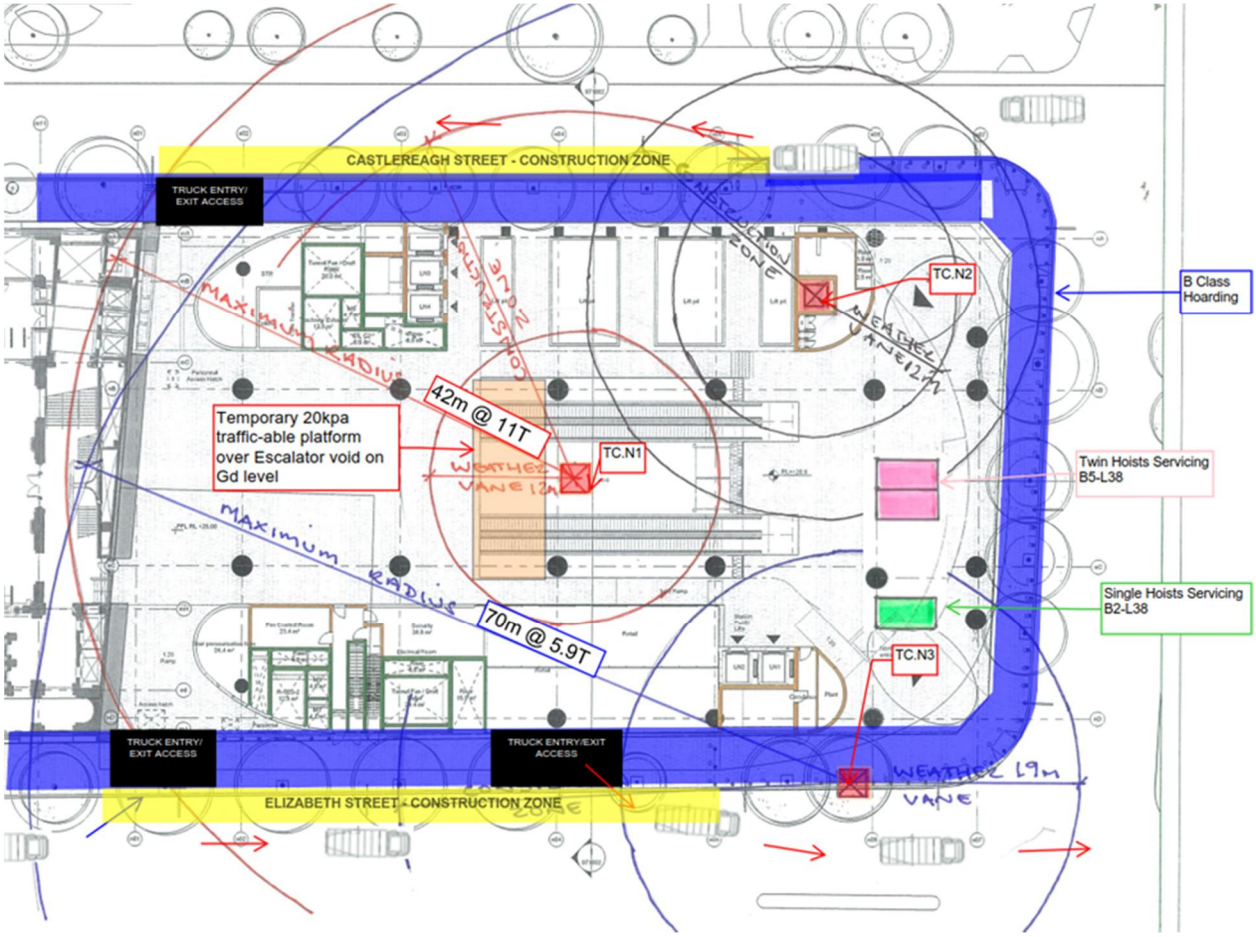

Figure 10 – Materials Handling Plan – North Building Tower Phase

Tower Crane 2 will be an internal climber positioned within Goods Lift Core 2 in the North-West corner. The crane proposed is a Favelle Favco M390D tower crane with a 57.5m boom and lifting capacity of 6t at the tip of the boom. This position provides crane hook coverage to the entire site including the loading platforms. This tower crane will be erected via Tower Crane 1 and will be dismantled by Tower Crane 3.

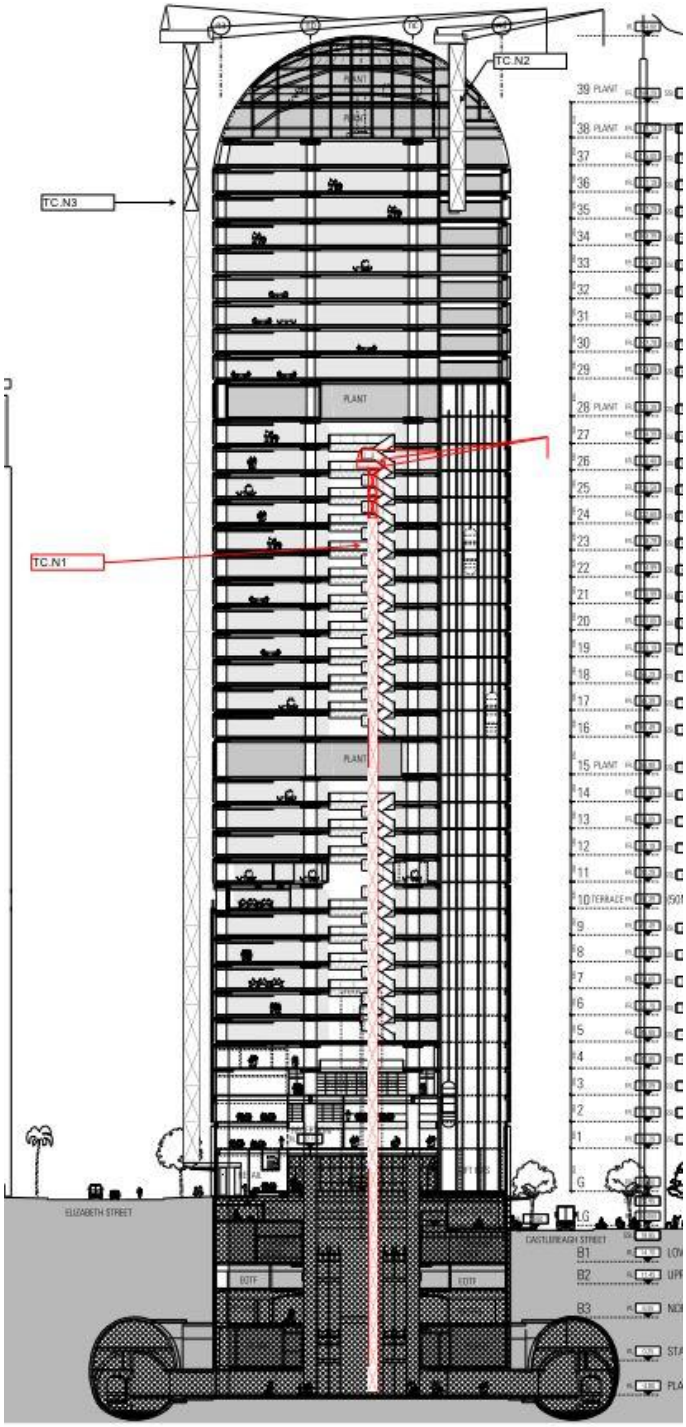

Figure 11 – Materials Handling Plan – North Building Tower Phase

Tower Crane 3 will be positioned on the North-Eastern corner on an offset grillage, as shown on the Figure 11 above, and will be a Favelle Favco M630D tower crane with a 70m boom and lifting capacity of 5.9t at the tip of the boom. It will be equipped with an external climbing frame and tied into the concrete structure. This position provides hook coverage to the majority of the site including the loading platforms and the construction zone of Elizabeth Street, but can reach Castlereagh St loading zone when required. This tower crane will be erected via Tower Crane 1

and will be dismantled using a mobile crane from Elizabeth St, after climbing down. This crane has been sized to lift large plant and equipment to L28 plantroom.

3.4.2 Man and Materials Hoists

Moving materials and workers up and down the structure will be by means of man and material hoists:

- Initially a twin hoist will be installed with initial establishment of the site to provide access to B5 Platform Level, serving every floor up to L38. This ensures that the workforce can traverse between floors efficiently and safely.
- An additional single hoist will be installed to accommodate peak labour force serving every floor B2 to L39

On Ground level and L1, a temporary scaffold access bridge links will be provided over the entry voids from hoist locations to slab edges. Careful consideration has been given to the quantity and location of the hoists to minimise delay to critical plant on L15, L28 and L39. Both twin and single hoists have been located internally within the floor footprint as follows;

- The internal location provides adequate vertical transportation to each level of the tower.
- The tower extends to full site boundary so external hoists extending to all levels, including basement cannot be accommodated.
- The current typical floor plate includes a perimeter edge beam, complicating materials access to an external hoist.
- Hoists are located centrally to north of floor plate to align with concrete Pour 1. This provides immediate man and materials access to lead concrete pours.

The hoists will be progressively removed once the temporary fit- out and commissioning of the internal builder's lift Goods Lift 19 is completed. In addition, both low-rise and mid-rise lifts will be utilised as builders' lifts once commissioned and operational.

3.5 Perimeter Edge Protection

3.5.1 Perimeter Screens

Perimeter captive screens will be erected to provide edge protection for the tower structure from Levels 3 -39; screens commencing on L3 on east, west and north elevations. To reduce any programme risks associated with the crane being out of service due to weather conditions on the North, East and West elevations, the screens will be self-climbing. Lendlease has engineered the structure to take the imposed loads of the self-climbing screens. These screens will also have small apertures on the cladding to reduce the risk of wind-blown materials penetrating the screen cladding.

The screens will cover three (3) levels of the structure below the leading deck and half a floor height above the leading deck for reinforcement, post tensioning and concrete placement works prior to the screen jumping to the next level.

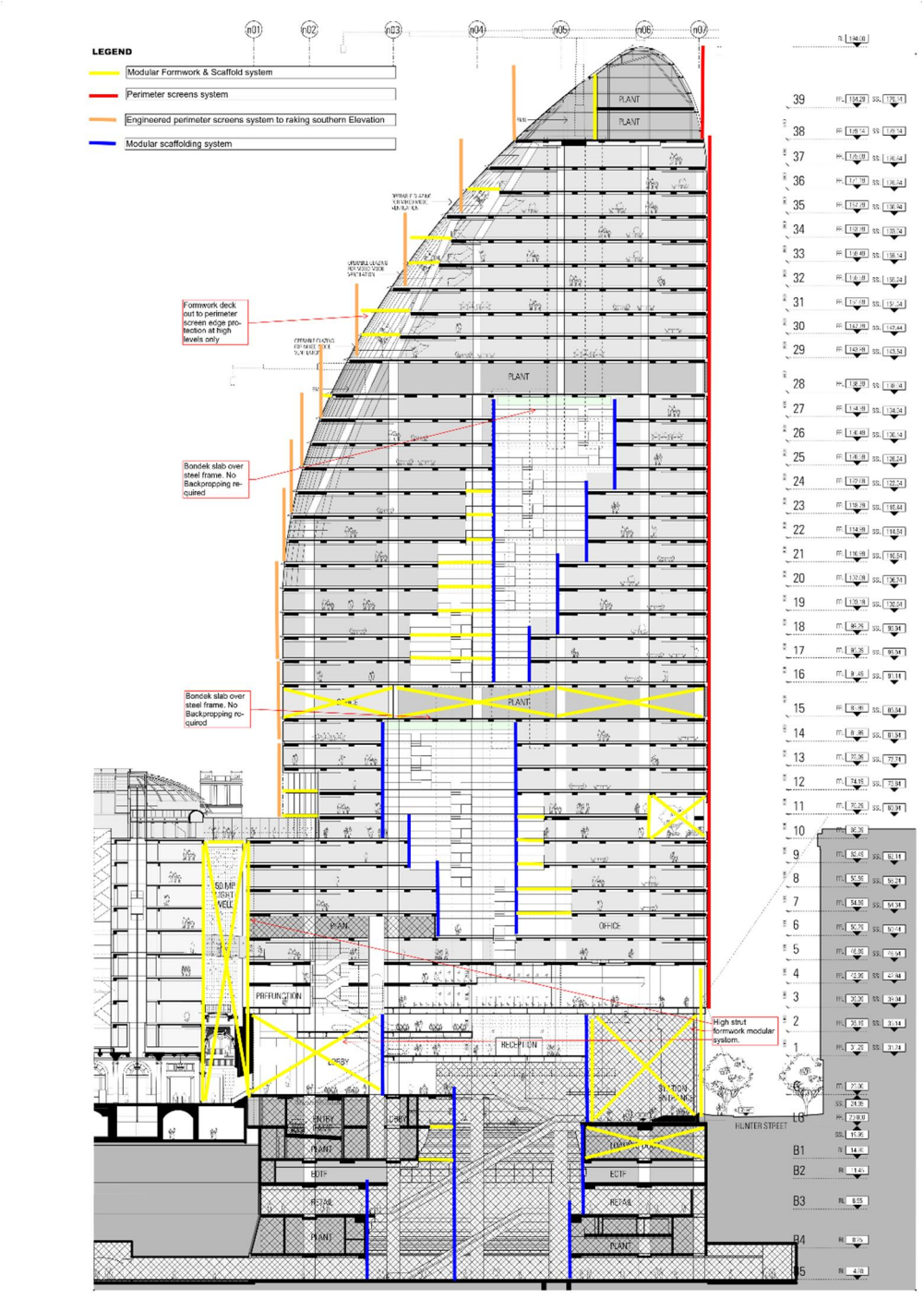

Figure 12 – North Tower Structure Perimeter Protection; Perimeter Screens, Formwork System, Scaffold

As the screens are progressively climbed, perimeter edge protection will be provided by a system or fixed perimeter handrail such as the WorkRight handrail system. Additionally, full height slab to soffit perimeter shade cloth containment screens will also be provided to fully encapsulate the perimeter of the structure, to prevent the potential fall of materials above the perimeter handrail system. Self-climbing screens do not rely on tower cranes and will prevent materials and debris from falling from the towers.

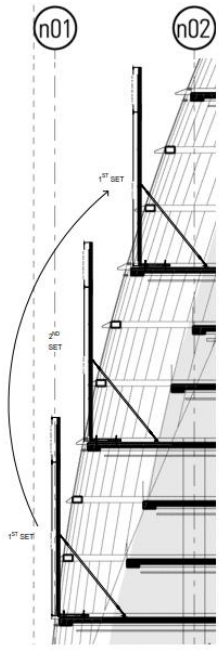

Figure 13 – Perimeter Screens to High Rise Raking Southern Elevation

The perimeter screen to the high-rise raking structure on the South elevation, above the 50 Martin Place structure (refer Figure 13 above), will be installed by one of the tower cranes on a level-by-level basis as the structure is built from L27. These screens will need to be customised to the perimeter edge detail. During the detailed design phase Lendlease will continue to work with our supply chain to further investigate time and cost efficiencies to ensure the leading edge of the raked structure is always protected.

3.5.2 Scaffolding

Scaffold will be required across the North Tower in various areas to provide safe working platform and access including the following areas:

- Basement escalator void B5-LG (7 levels);
- Bridges to Alimak Platforms GF-L1 (3 levels);
- Low Rise Atrium void L5-15 (10 levels);
- Mid Rise Atrium void L16-28 (12 levels);
- Rooftop Plantrooms; and
- In the lift atrium to install the steel beams.

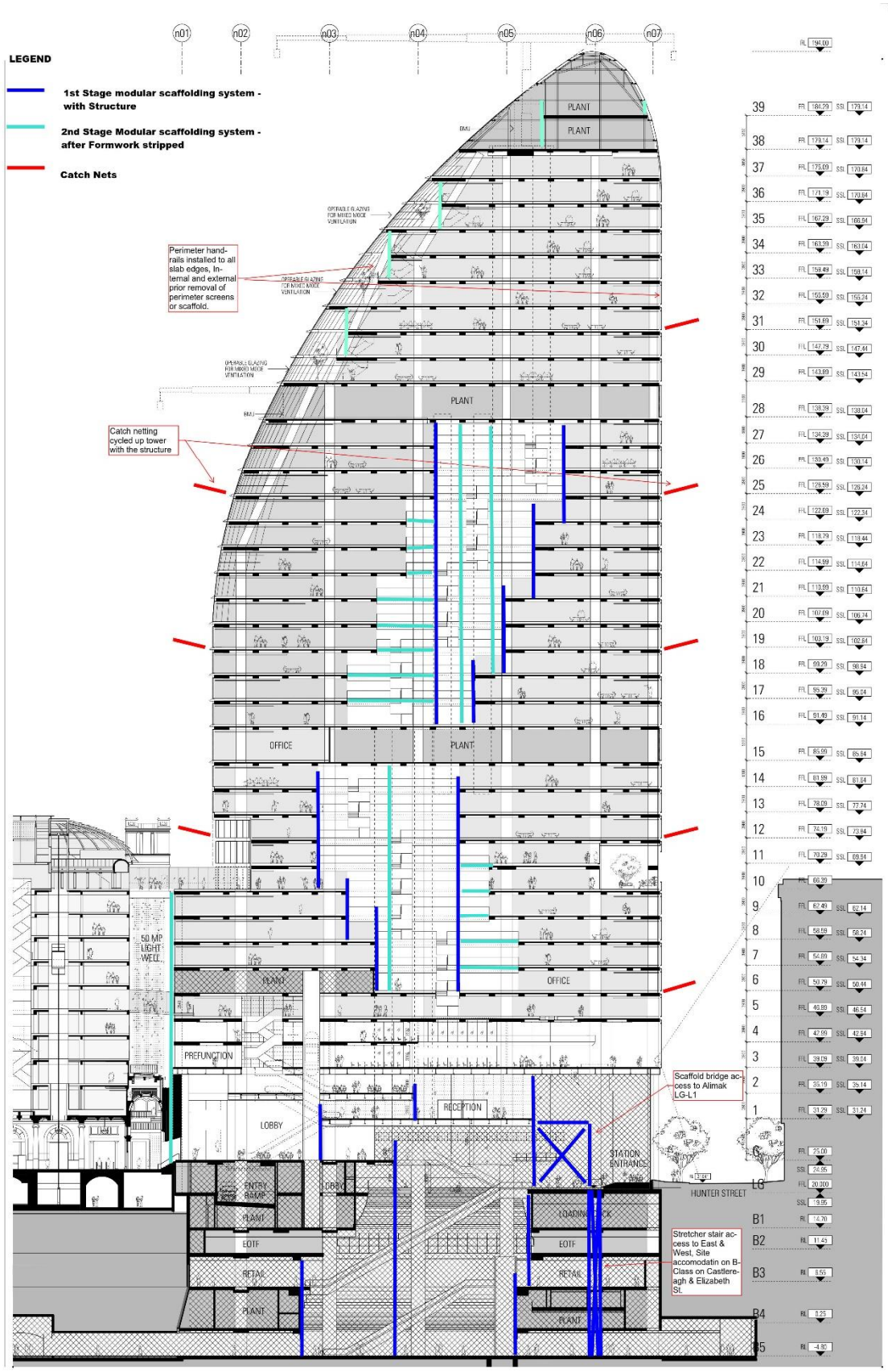

Figure 14 – North Tower Perimeter Protection Post-Structure Completion

3.5.3 Edge Protection System

On completion of structure and prior to removal of perimeter screens and scaffold, the following Edge Protection System is installed as follows:

- WorkRight edge fence installed post slab pour, and prior to Perimeter screen or scaffold removal.
- WorkRight cantilever fan installed at nominated levels and cycled up tower. Note – fan rated to 7kj (100kg dropped from 7m).
- WorkRight netting installed post fence installation.

Figure 15 – Secondary Edge Protection - WorkRight Fan & Netting

3.6 Waste Management

Lendlease will ensure our supply chain is responsible and accountable for maintaining a clean, clear and safe working environment. Rubbish bins will be provided to all work areas and will be regularly removed to the central skip bin location by the subcontractors for collection and transport from the site to the waste recycle facility.

Bins will be moved via the man and materials hoists or by the crane, dependant on the where they are being loaded from, and the waste material being removed from site. Crane lifted steel bins will be used to service the top floors where structure trades are working, and large Otto bins will service the lower levels where fit-out and service trades are working. The site skips will be centrally located at B1 loading dock to ensure an easier pick up by our bin contractor.

Rubbish will be separated at the approved waste management centre. Auditable records will be kept of quantities of all materials both recycled and disposed to landfill. Records will be monitored to ensure Lendlease internal recycling targets are achieved or exceeded. This information will be collected and reported in compliance with our Environmental Management Plan and its Waste Management and Recycling Sub-Plan over the duration of the project. A sample summary is graphically and statistically referenced on the following pages.

Percentage Waste Recycled to date =	2686.03 Tonnes / 2707.35 Tonnes	99.21%

Waste Fraction	Total Quantity Generated		Total Recycled		Total Disposed off		Recovery Rate
Heavy	411.11	Tonnes	411.11	Tonnes	0.00	Tonnes	100.00%
Light	29.67	Tonnes	28.19	Tonnes	1.49	Tonnes	94.99%
TOTAL	440.78	Tonnes	439.29	Tonnes	1.49	Tonnes	99.66%

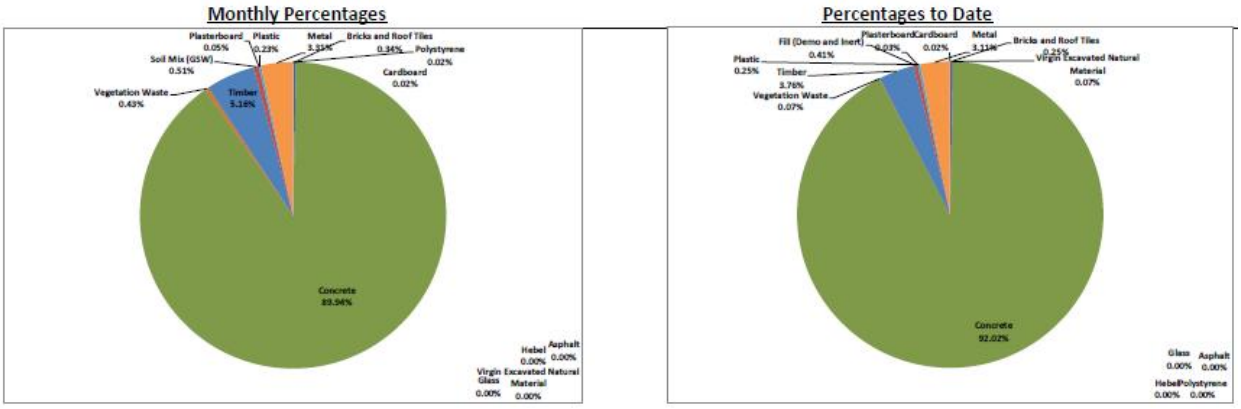

Figure 16 – Waste Management Reporting

To ensure the Metro Martin Place meets its sustainability targets, waste management reports will show monthly and cumulative performance.

3.7 Temporary Works

At various stages of construction, a number of temporary works items will be required to support the North Tower works including:

- B Class Hoardings along site perimeter;
- Class B Hoarding Site Access Steel Gantries;
- Trafficable steel access decks to western lift core lobbies. These temporary decks provide trafficable access way from the concrete slab over the lift atrium to launch tower façade panels onto western elevation (please refer to section 4.10.4 for more detail);
- Temporary trafficable platform over station void on ground level;
- Self-climbing perimeter screens;
- Self-climbing Jumpforms to cores;
- Scaffold access runway to hoists LG-L;
- Crane footings, climbing pockets in core, offset grillages and ties; and
- Man & Materials and Formwork Hoists.

These items will be carefully planned, scrutinised, fully engineered, certified and EH&S compliant.

3.8 Emergency Procedures

In conjunction with the detailed project EH&S plan, an emergency response and site evacuation plan will be developed and implemented prior to the commencement of on-site works. Lendlease will develop emergency evacuation points in conjunction with City of Sydney and other stakeholders to determine an appropriate location for the egress of the site workforce should emergency evacuation procedures be required. Our plan will be updated as the configuration of

the site develops and changes. We will also conduct regular emergency evacuation drills during the project.

3.9 Structure

The fundamental strategy for the structure construction will be to maintain a consistent pour sequence, achieving continuity for both subcontractor and materials handling resources. To achieve this, the typical floor above ground will be constructed using a four (4) pour sequence, allowing the structure to develop into a repeatable form. We have also assumed the ground floor slab design will accommodate 20kPa load for our materials handling purposes.

Figure 17 – North Building - Structural Works

3.9.1 Basement Structure

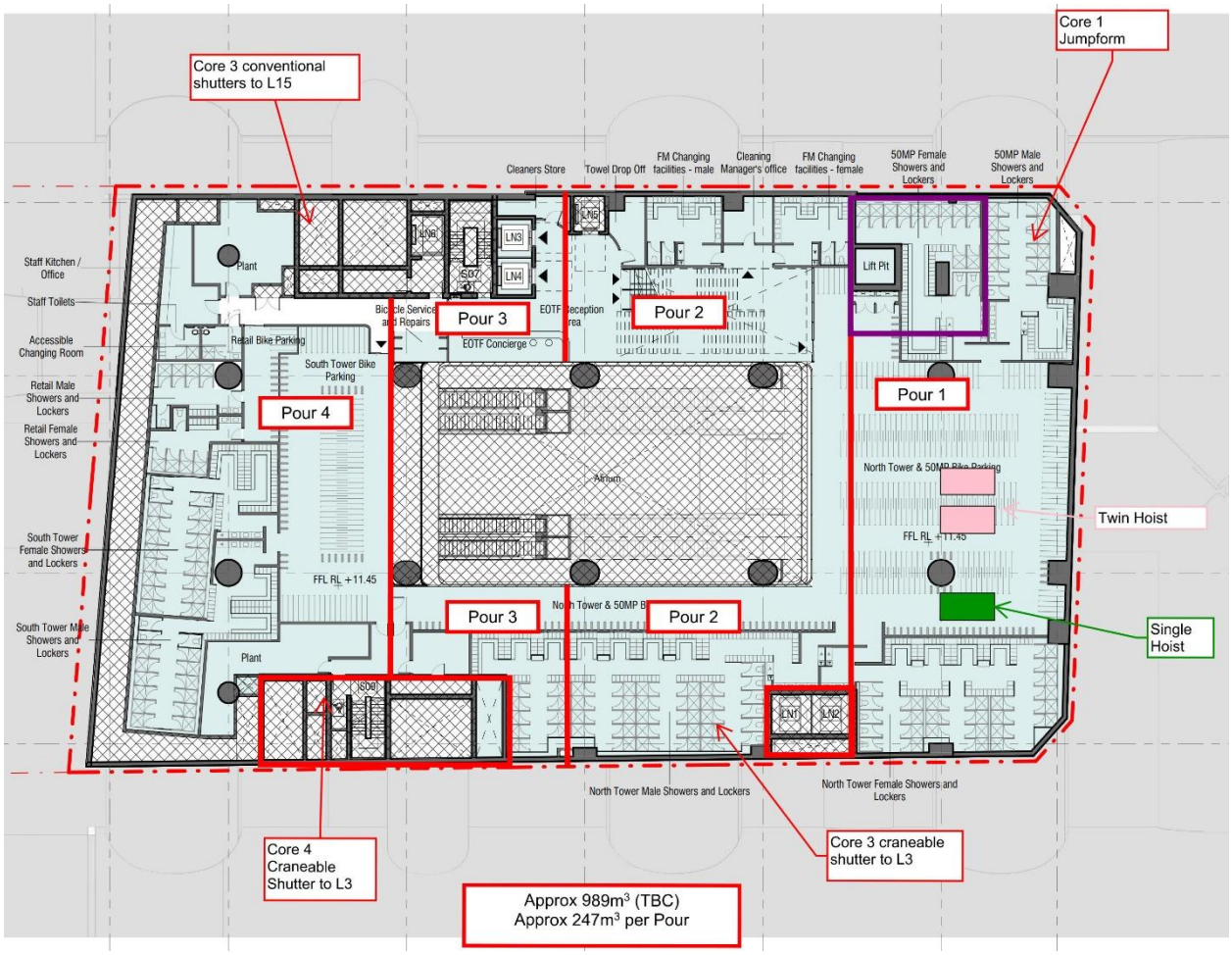

Figure 18 – North Building – B2 Structure

The above Figure 18 shows the proposed concrete pour methodology, core delineation, man and materials implemented on a typical basement floor.

3.9.2 Core Structure

The core will advance ahead of the suspended slabs below and will be serviced by the tower crane with access provided internally to the leading deck. The structural core design, as currently documented not all cores are conducive to the preferred self-climbing Jumpform option due to the lack of uniformity and at basement levels.

As such, Lendlease continues to work with Structural Engineer during detailed design phase to further rationalise the core design to incorporate a self-climbing, crane independent Jumpform System as early as possible. However, until this rationalised core design is realised, the following sequencing has been programmed in relation to Cores for our GMP planning and pricing proposes:

- **Core 1** – North West Corner Goods Lifts – Jumpform commencing on LG, extending to L38 in a reduced form to suit the architectural shape of the building
- **Core 2** –North East Corner Station Public Lifts – cranable shutters commencing on B3, to the underside of level 5 in a reduced extent to suit

- **Core 3** – South West corner – Jumpform commencing on B5 extending to L28 in a reduced form to suit the architectural shape of the building
- **Core 4** – South East corner –cranable shutters commencing on B4 to underside of level 6

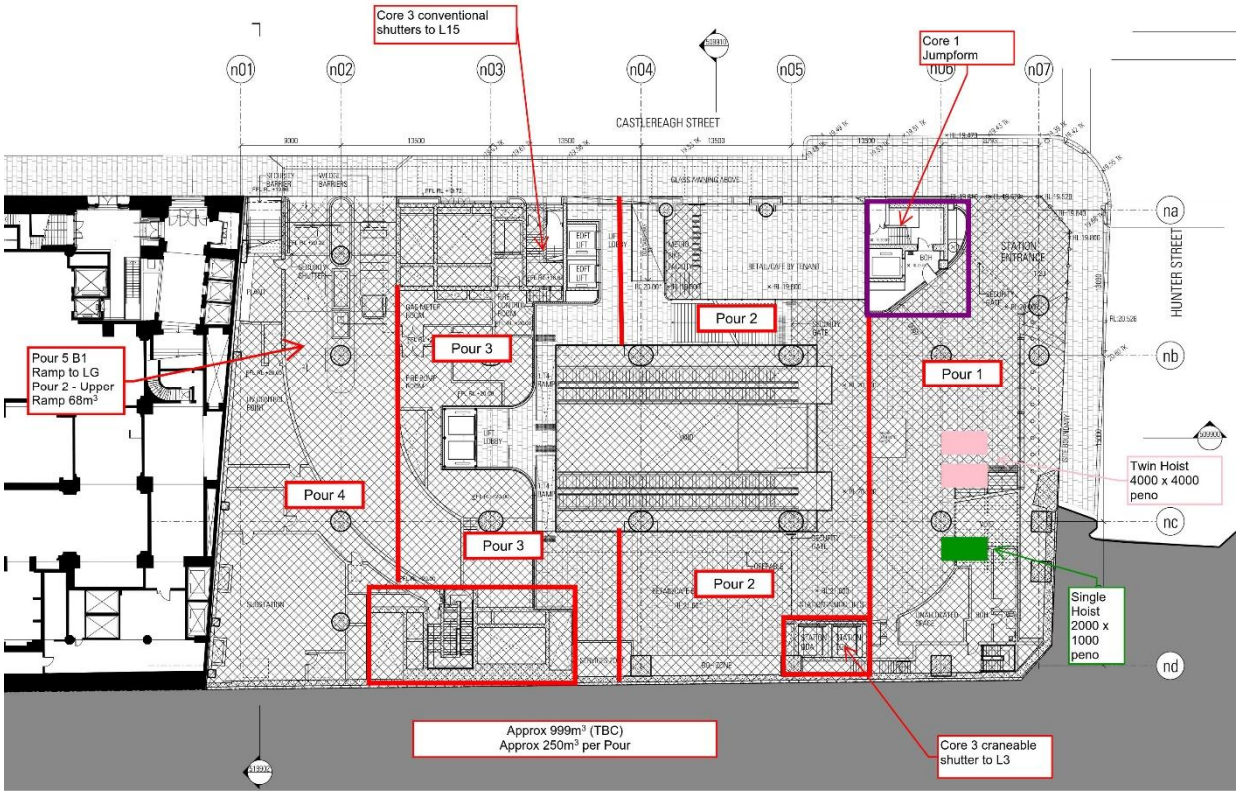

Figure 19 – North Building – LG Level illustrating 4 Main Cores

3.9.3 L3 Jump Structure

Lendlease have proposed a Jump Steel Structure from Ground level to L3. The accelerated Jump structure allows the typical tower floors to commence whilst constructing L1 & L2 concurrently.

Figure 20 – L3 Jump Steel Structure

The L3 Jump Steel Structure incorporates the use of Concrete Filled Steel tubing columns, structural steel framework and permanent metal-form slab to L3 to be constructed as follows:

- Concrete Cores are formed and poured ahead;
- Steel tube columns to be lifted into place, with columns infilled with concrete and allowed to cure;
- Steel structural floor framing will be lifted into position by tower crane into and fixed on-site by riggers;
- Smaller steel members installed;
- Permanent metal-formwork applied to the structural steel; and
- The typical form, reinforcement and pour sequence commences from Pour 1 to Pour 4 as shown in Figure 21 below.

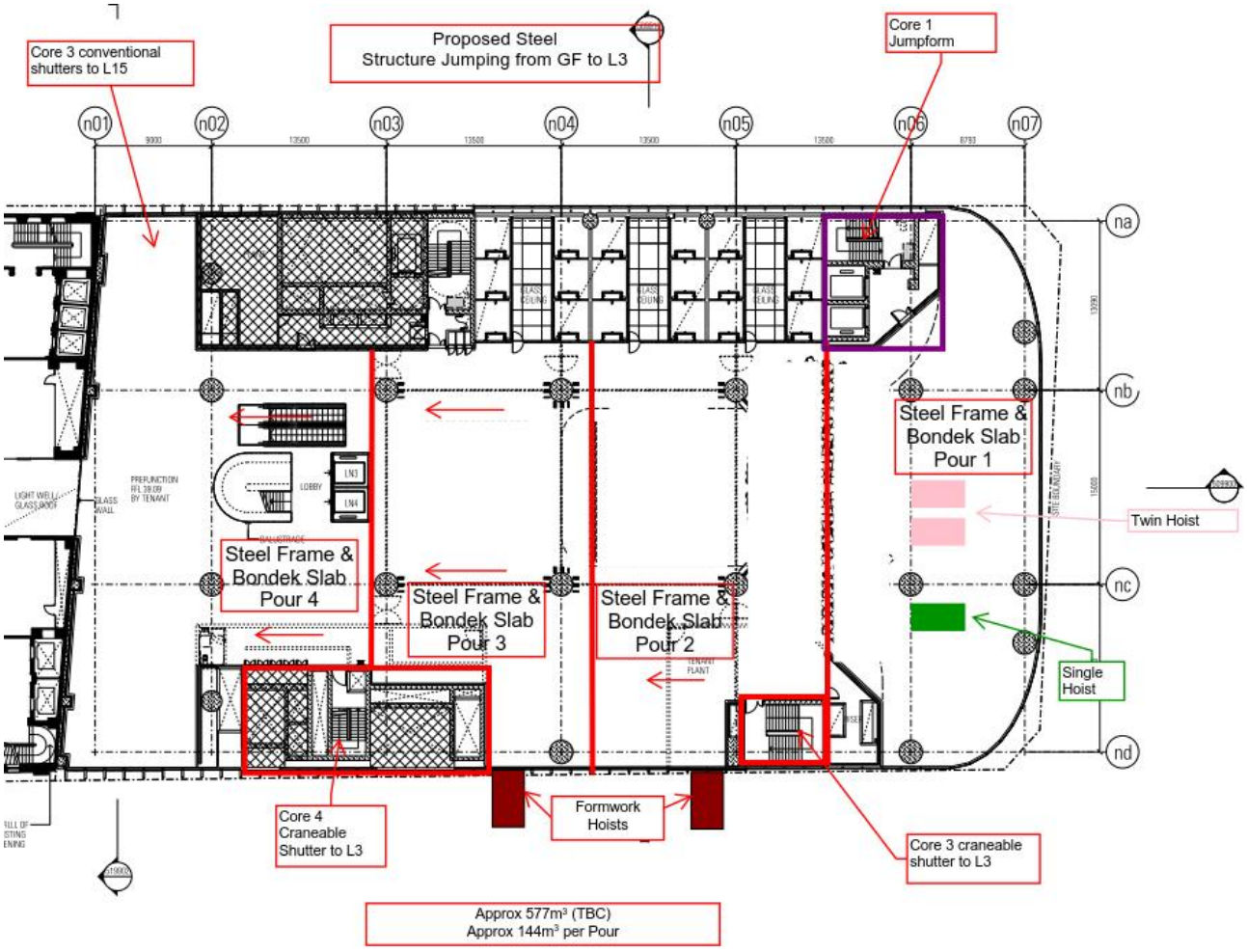

Figure 21 – North Building – L3 Jump Steel Structure

The Jump Steel design and methodology will be further developed during the detailed design phase.

Figure 22 – L3 Jump Structure Jumped, facilitating early commencement typical floors above

3.9.4 Typical Floors

The tower typical floor plate will consist of four pour work areas sequenced from north to south, with temporary man & materials hoist serving the lead deck of Pour 1, with typically two (2) formwork hoists located outside Pour 1/2 and 3/4 breaks respectively.

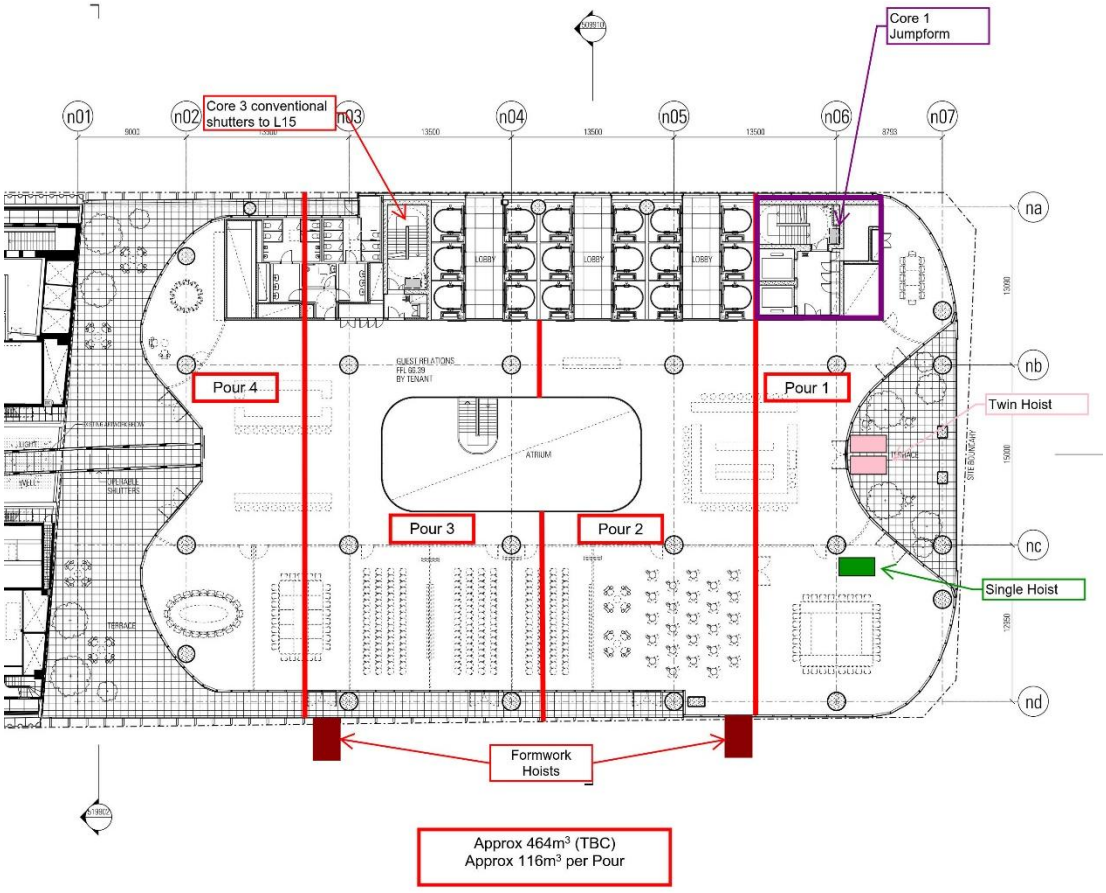

Figure 23 – North Building – L10 Typical Low-Rise Slab

The above Figure 23 shows the proposed concrete pour methodology, core delineation, formwork hoists, man and materials hoist implemented on a typical floor. These will be utilised to ensure material are recycled from the lower floors in a productive manner and the use of the formwork hoist to undertake this activity takes the reliance off the tower cranes.

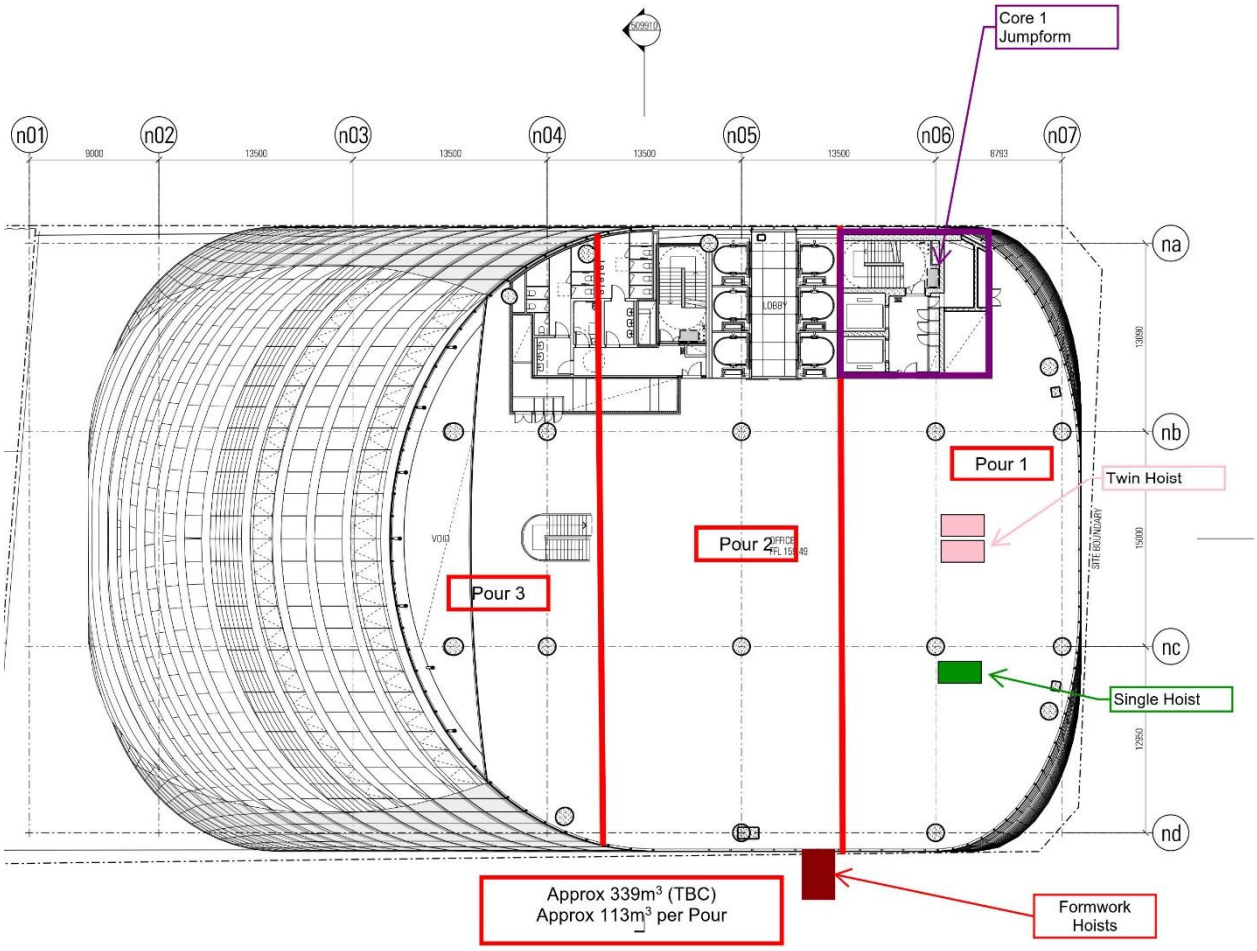

Figure 24 – North Building – L33 Typical High-Rise Slab

As the structure progresses, the number of pours per floor reduces to 3 from L30, finally reducing to 2 pours to cater for the smaller high-rise floor plates from L34 and up.

3.9.5 Formwork

The structure will incorporate multiple formwork systems such as jump forms to core structure, beam formwork using frames and tables, high strutting and intermediate props to metal formwork soffits, column forms and the like.

With the setbacks of some areas of the low-rise podium structure, there are a number of cantilevered concrete slabs that will require high strutting formwork extending from LG to underside of L3 on north elevation, GF to underside of L3 on southern elevation. Formworkers will utilise a modular formwork and scaffold system, designed and certified by independent Structural Engineer, to provide safe working access and support the structural wet load of the concrete above.

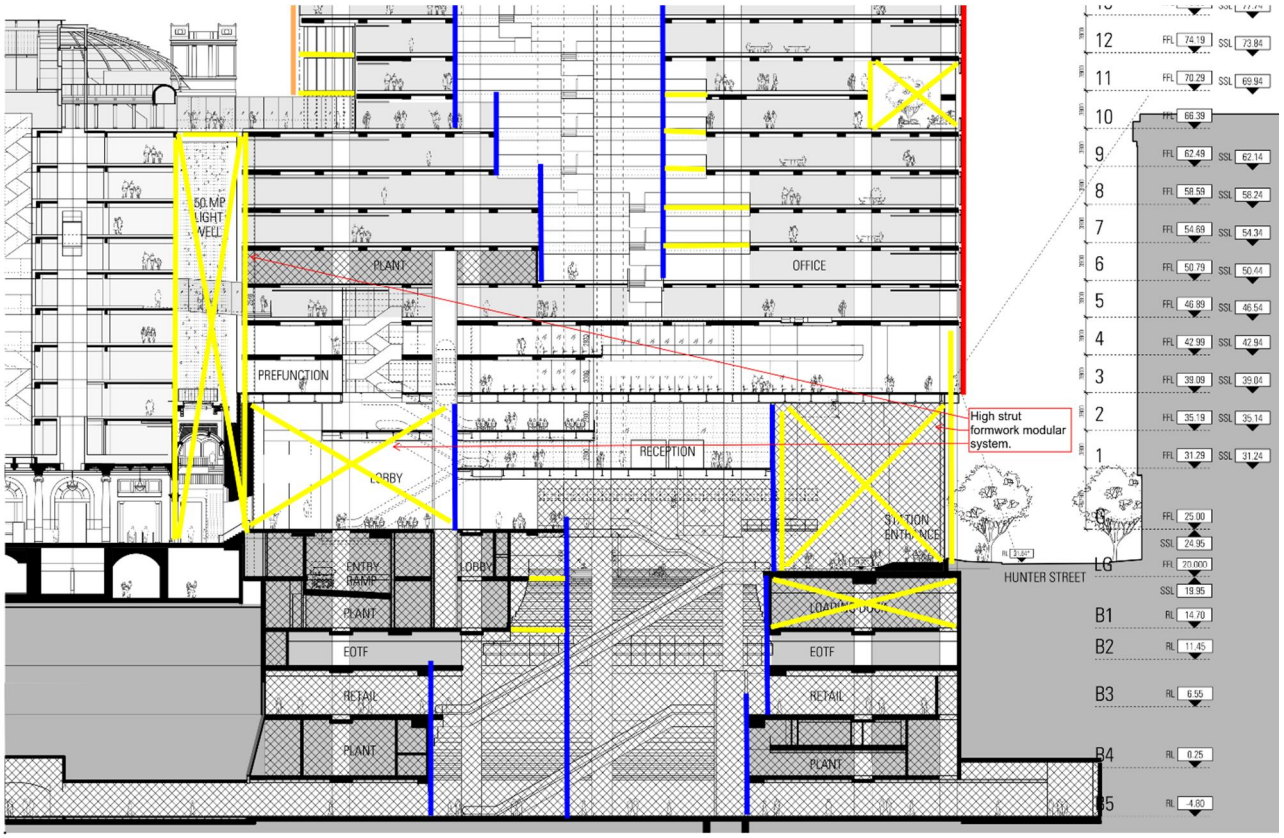

Figure 25 – North Building Section - Illustrating the extent of High Strutting Formwork

The typical floors will see band beams and slabs formed using table formwork system. These formwork systems have been optimised and improved at Lendlease's Barangaroo project and will be further enhanced for the Martin Place Metro Project. To reduce the dependency on the Tower Cranes, two (2) formwork hoist will be installed on the Eastern elevation.

3.9.6 External Bracing & Western Elevation Structure

Due to the lack of a large lift core through the building, concrete and steel "mega braces" are required to be constructed along west, east and northern elevations to stiffen the tower structure.

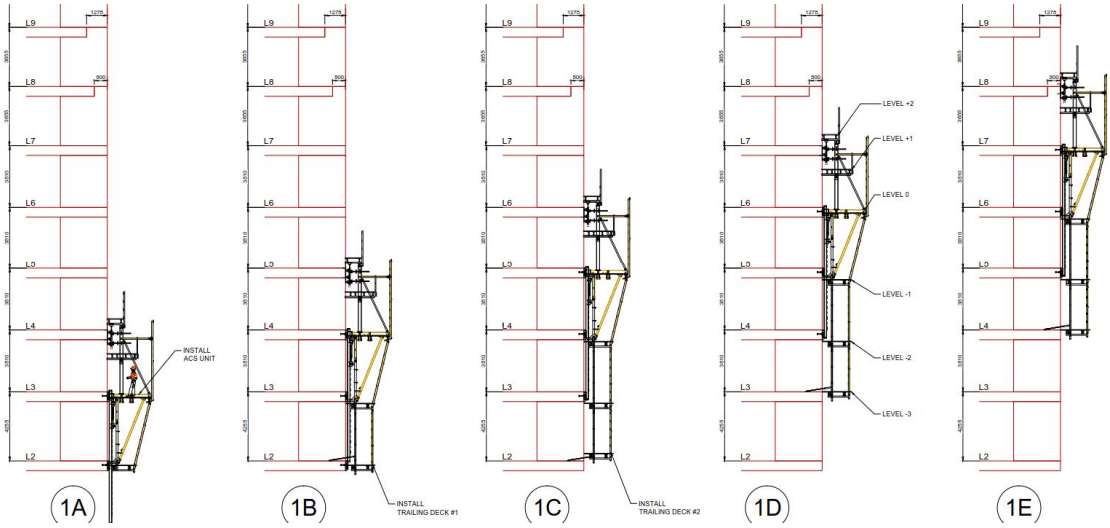

Figure 30 – Proposed Wall Climbing System Western Elevation RC elements outside Steel Lift Core

The concrete to these “mega braces”, will need to have a flow additive to the mix, to warrant the right consistency and ensure that the concrete flows into the fixed connections at the column to column interfaces.

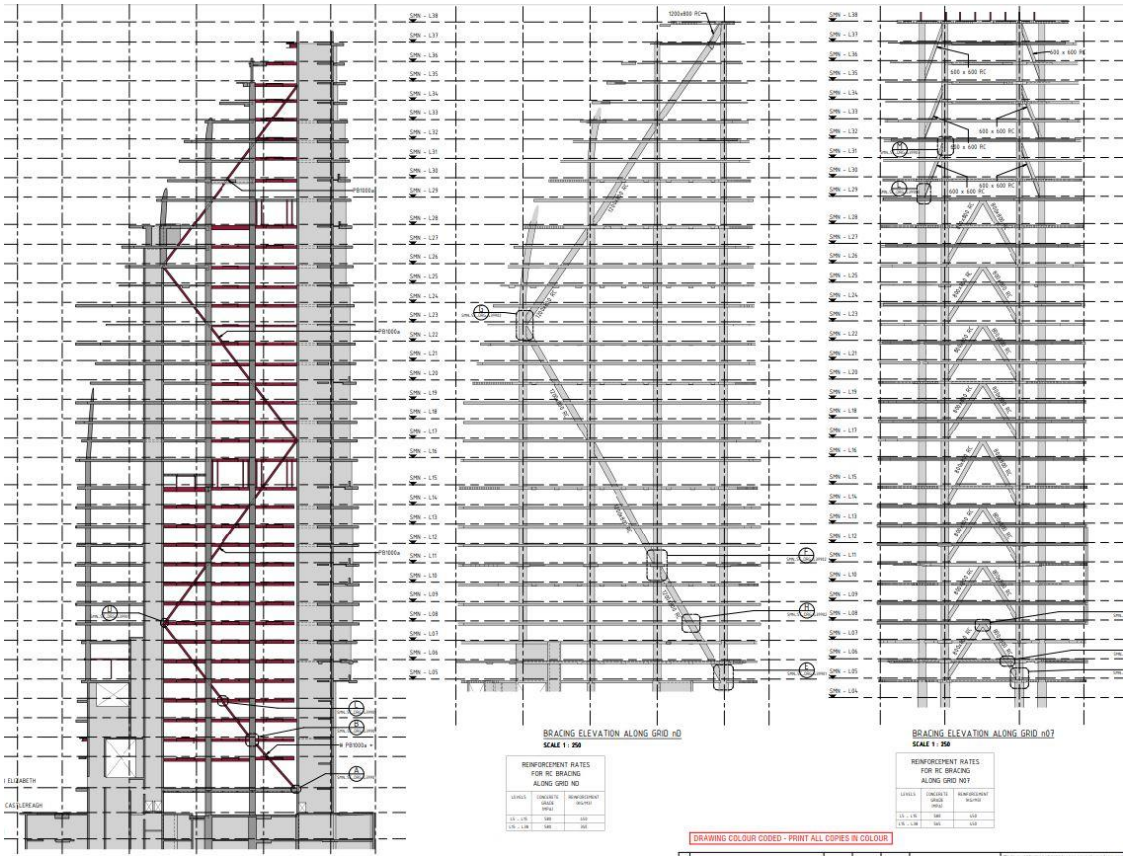

Figure 31 – External Bracing

3.9.7 Concrete Pours

The concrete pour sequence has been selected to maximise continuity of the structural trades, facilitating resource balancing of trades between multiple work areas and maintaining consistent cycle times. These pours have been sized to ensure pumping, placing and finishing will be completed within the nominated site working hours.

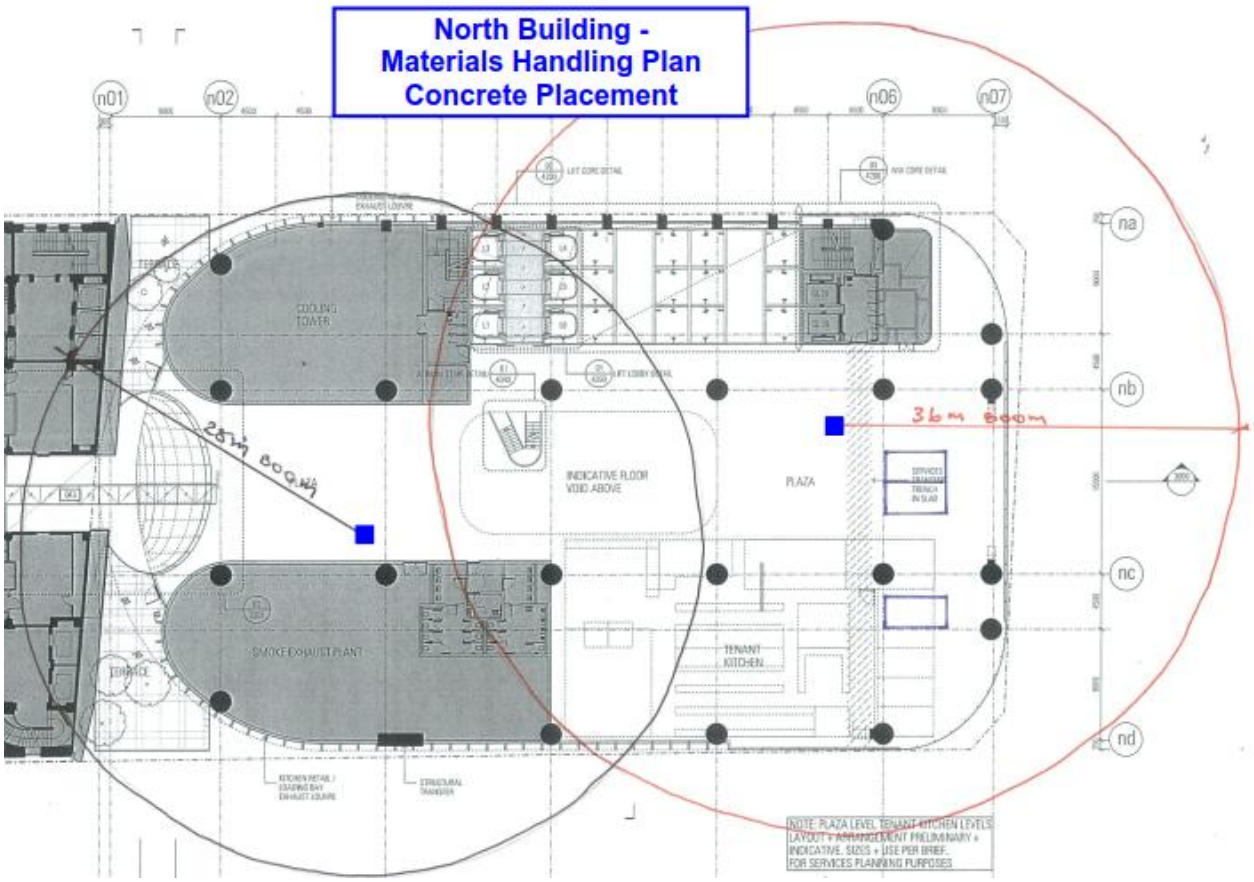

Figure 262 – North Tower – Concrete Placement Booms

Two (2) concrete placing booms will be set up to provide concrete placement to both the core and suspended slabs. The placing booms will be located at either end of the floor plates as shown in the Figure 26 above, and will be climbed progressively with the structure. As the structure progresses and retreats north, the southern placing boom will be removed.

The initial concrete pours to the foundations, slab on ground, main core and suspended basement slabs will be carried out with the use of a mobile concrete pump located on the Elizabeth St Construction Work Zone.

Minor structural modifications and a detailed high strutting strategy is being developed to adapt the existing ground floor area into a suitable work zone. On completion and stripping of ground level, a temporary 20kPa working platform will be installed to part of the station escalator voids to maximise trafficable space on ground level.

A static concrete pump and line will be located on the ground floor, allowing a two-truck feed with drive-in and drive-out access from Elizabeth St. This will facilitate timely completion of typical floor concrete pours.

3.9.8 Structural Steel

The most critical area of structural steel will be the dome façade (Levels 38-39). This structural steel will be manufactured and trial assembled off site so that when it is delivered to site it facilitates a more efficient on-site installation.

Steel columns will be manufactured and delivered to site with moment connections already installed that will require bolted connection on-site only. This will minimise on-site welding and ensure consistent quality control of welds within the factory environment.

Steel beams will be delivered to site and craned to the floor in stillages. Steel delivered in stillages, will be stacked in the correct sequence for steel installation. Beams will be pinned into position and a follow up bolting crew will complete the connection while the beam installation team progresses with further beam installation.

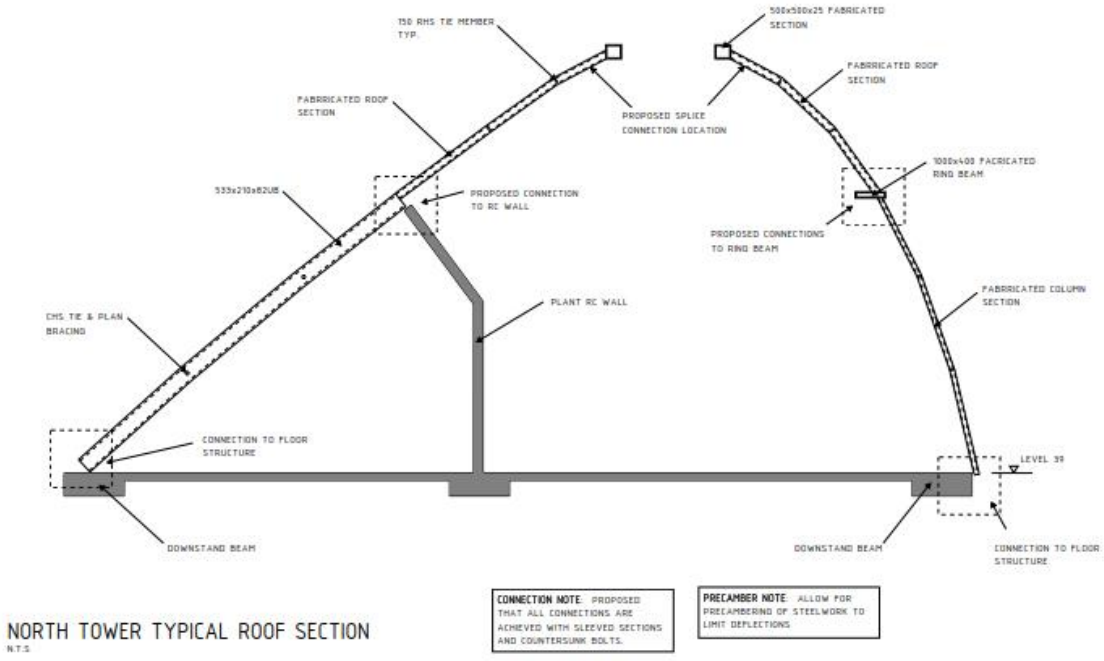

Figure 273 – North Building Dome Structural Steel

The remaining elements of structural steel are to support the southern elevation high rise façade, plant area (e.g. Levels 38-39), beams in fire stairs, steel within the podium area, modular façade elements and street awnings where applicable, will be installed progressively to allow completion of the subsequent trade works.

The lift atrium structural steel members will be pre-fabricated, test fitted off site, delivered to site, lifted and installed via tower cranes with access to steel members via Elevated Work Platforms (EWP). Scaffold and temporary access platforms will be cycled up the lift atrium in stages, providing safe working access for EWPs. This installation method has been successfully completed on the 126 Philip Street project.

3.10 Façade

The North Tower façade consists of multiple elements, but the general installation principles will be consistent across these façade types and elements. Currently, for GMP pricing, programming and planning purposes, Lendlease has assumed a unitised panel system will be adopted for all façade types including:

- Low rise podium façade GD Level – L2.
- Thru Site Link Façade L2 – L10.
- Tower Façade L2 – L38.
- Louvres to Plantroom levels including; L5, L15, L38.
- Rooftop Dome Façade L38 – L39.

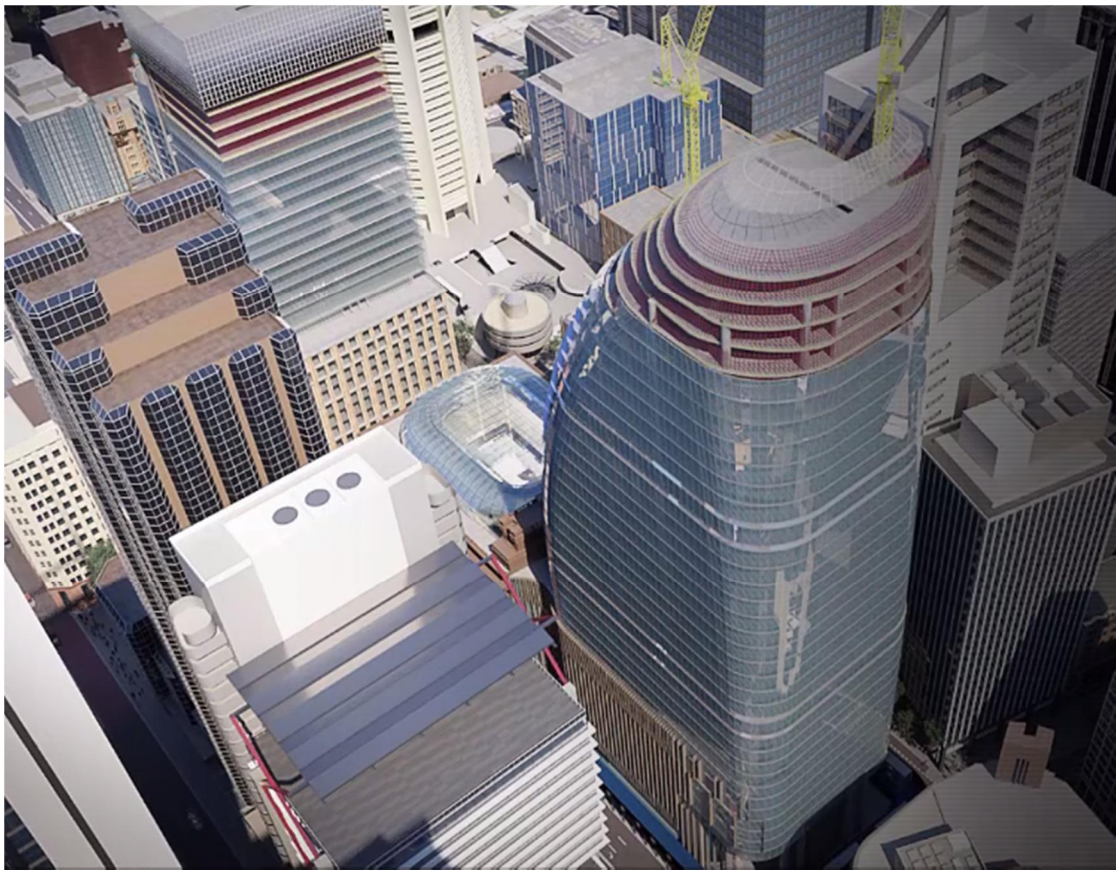

Figure 284 – North Tower Façade - Curtain Wall & Rooftop Dome

3.10.1 Podium Façade

Figure 295 – North Tower- Elizabeth St Podium Façade

The podium façade predominately, ground level - L5, will be installed as a unitised wall panel system installed from floors where possible. This low-level podium façade will also incorporate some insitu elements; including retail awnings and glass shopfronts installed from ground level, using elevated working platforms and Maeda crane.

3.10.2 Tower Façade

The tower façade (Level 5 - 38) consists of a unitized glazed curtain wall system. The installation of the typical floor façade panels will be installed using a crown Walkie Reach (WR) with a jib and winch attached as follows:

- Façade stillages are transferred from the loading platform to the storage area.
- The façade panel is removed from the stillage by WR and positioned in assembly area.
- Any fins, shading elements or the second skin as is the case on the South Tower are fitted Clearshield can be applied to the glass at this stage.
- The façade panel is picked up by the crawler crane. The panel is horizontal on WR tines and transported to the perimeter zone of slab at the install location.
- WR with jib section is positioned two floors above and ropes down to install level.
- The façade panel is connected and weight is slowly taken up from WR above.
- The WR on the install level moves the base of the façade panel out over the handrail and until the full weight is taken from the WR above.
- The façade panel is positioned and bolted off.
- This process is repeated until the typical floor façade installation is complete.

Figure 306 – Façade panels launched with WR.

Figure 317 – Façade panels lifted with WR with jib.

The main benefit of this façade installation system is that it is installed independently, and not subject to the time and weather delays associated with tower crane use. This installation sequence is contained on the tower floors, with façade panels preloaded onto floors by the tower crane prior to installation sequence commencing and as such is quite efficient and productive.

The racked Southern façade from (Levels 14-38) will be installed in a similar fashion to the typical vertical façade curtain wall panels however with a Maeda Crane positioned on the extended concrete floors.

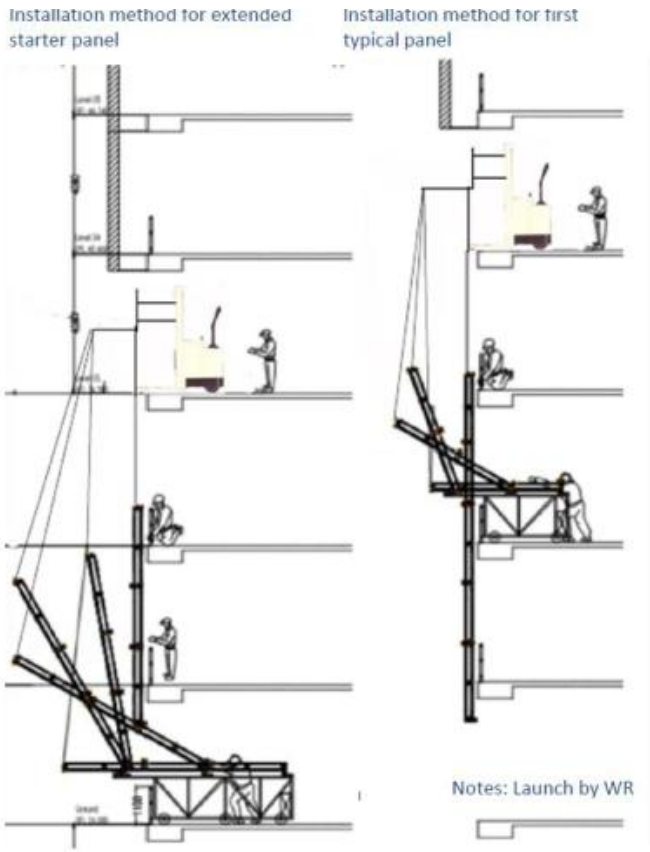

Figure 38 – A sectional view of the panel installation described previously

3.10.3 Non-Typical Tower Façade – Lift Cores

The following steps outline the façade installation methodology for the non-typical façade panels, located behind core walls and the like, where access for a Maeda crane above is not possible.

- Façade stillages are transferred from the loading platform to the storage area.
- The façade panel is removed from the stillage by WR and positioned in assembly area.
- Clearshield can be applied to the glass.
- The façade panel is picked up by the WR. The panel is horizontal on WR tines and transported to the perimeter zone of slab where the hoist mounted to the monorail is located.
- The winch on the monorail located several floors above is positioned and ropes down.
- The façade panel is connected and weight is slowly taken up by the winch above.
- The WR on the install level moves the base of the façade panel out over the handrail and until the full weight is taken from the winch above.
- Once hoisted and in the vertical position, the panel is transferred horizontally via the monorail.
- The façade panel is positioned and bolted off.
- This process is repeated until the typical floor façade installation is complete.

3.10.4 Non-Typical Tower Façade – Rooftop Dome

The following steps outline the façade installation methodology for the non-typical façade panels to the top of the dome:

- Pre-fit aluminium secondary framing to the steel structure.
- Façade panels are hoisted to the upper roof levels by the tower crane and the stillages are transferred from the loading platform to the storage area
- The façade panel is removed from the stillage by WR and cleaned and prepared for installation in assembly area.
- Survey and check alignment of extrusion fitted to steel frame and fit gutter gaskets.
- Clearshield can be applied to the glass.
- It is envisaged that the roof top dome façade will be installed from the top down with the upper most panels being installed with the tower crane.
- The remaining façade panels will be picked up by the WR. The panel is horizontal on WR tines and transported to a position directly below its install location
- A Maeda 405 crane will be used with a glass sucker unit to lift and positioned the glass panel. Working from the top down.
- The façade panel is positioned and bolted off.
- This process is repeated until the façade installation is complete. And may require numerous relocations of the Maeda crane.

Figure 39 – Curved Façade to Southern Elevation and Rooftop Dome

3.10.5 Waterproofing System

A waterproofing system will be required to the following areas i.e. concourse levels, station retaining walls, bathrooms, external planters, balconies and terraces.

It is critical that the membrane works are installed correctly and efficiently as the quality of the installation ensures the long-term durability and that the membrane is not compromised.

The formula is achieving the required outcome is threefold:

- Selecting the best suited product for the specific waterproofing application.
- Integrating workable termination and joint details into the architectural and subcontractor design elements such as façade components and services penetrations.
- Competent product installation, QA and protection to the completed membranes.
- Waterproofing details are a specialist area and Lendlease will peer review the architectural details through our specialist team of internal design resources, prior to final design detailing and procurement of these works.

3.11 Building Services

3.11.1 Services Overview

The Building Services installation through to commissioning of all systems for the complete Metro Martin Place is critical for the overall successful delivery of the whole precinct. As such, the detailed design, installation, testing and commissioning of each of the building services installations will be undertaken by specialist subcontractors. To also ensure the requirements of the project are adhered to, the individual service installation will also be reviewed and approved by the Independent Commissioning Agent (ICA). The ICA will be involved in all stages of the project from initial design reviews, workshop drawing review / approval through to final witness testing of the installed systems.

Due to the technical complexity, construction challenges, ESD and quality requirements of the Metro Martin Place, the selection of the right subcontractor and supply chain will be critical. To this point, Lendlease will only engage tier one design and construct services subcontractors with proven ability to provide the expertise, knowledge, resources, and skills necessary in their specialised fields to meet the complex requirements of the project.

The building services subcontractors will become integral members of our team, and will include but not be limited to:

- Mechanical Services.
- Electrical Services.
- Generator Services.
- Security Services.
- Communication Services.
- Hydraulic Services.
- Dry and Wet Fire Services.
- Vertical Transportation (Lift and Escalator).
- Building Management System.

3.11.2 Site Builders Supply

Each floor will have a builder's supply that reticulates from a rising tee off box, three phase supply will be available in the core area, builders supply DBs will be positioned on the floors to ensure we comply with AS/NZS 3012, Electrical Practices for Construction work (COP) and the Lendlease GMRs. Lighting and Nurse Call systems will utilise a Low Voltage (LV) 24V Smart Safety Lighting system, the installation will meet AS/NZS 3012, Electrical Practices for Construction work (COP) and the Lendlease GMRs. Due to the size and duration of the project we will have a dedicated subcontractor team ensuring the builders supply is maintained throughout the construction programme.

3.11.3 Plantrooms

The installation of plantrooms on Levels B4, B1, LG, L0, L1, L2, L3, L4, L5, L6, L15, L28, L38, L39 will commence immediately after formwork is stripped to these levels. Where possible, major Plant and equipment i.e. chillers and gensets, will be procured early, installed, and formed around with the structure. This is preferred to avoid unnecessary access penetrations in the structure to be infilled at a later date; thereby delaying the services rough-in, plantroom fit-out and commissioning works.

Services plantroom components can be fabricated and prepared off-site such as risers, plantroom sections, and at times above ceiling corridor services. Pre-fabrication significantly reduces the raw

materials, waste and contaminates on-site. Experience detailed planning is required and we have demonstrated improvements to timelines and especially quality.

3.11.4 Services Risers & Rough-in

Within the main works, the services installation will be carried out over a number of stages and across numerous work faces, all under the guidance of the specialist subcontractors' supervision, Services Project Managers, Services Engineer and Services Supervision.

Services rough-in will commence once back-propping is removed and floor areas become available. The trade sequence will follow through as indicated in the construction program on a trade-by-trade, area by area and level-by-level basis. The installation of main plant, vertical services risers and lift installation works will be completed in parallel with the works on each floor.

Areas requiring particular attention will be those associated with the services infrastructure, risers, plant rooms, HV substations, LV switch rooms, fire control rooms, etc. These rooms will be prioritised for completion to allow for the individual services subcontractors to commence their detailed installations. Early access to these critical services rooms will allow for the commencement of pre-commissioning and testing works prior to the final individual system commissioning.

Lendlease will also ensure that deliveries are minimised and optimised on-site to reduce the amount of truck movements in and around the CBD. To reduce the amount of deliveries related to the services installation Lendlease propose to maximise the amount of pre-fabrication opportunities of all services installation. This will include business as usual prefabricated main services risers and where the opportunity exists, individual services risers. This will reduce site movements and achieve a factory grade quality for all major services components.

Figure 320– Pre-fabricated Ductwork to Services Risers

Figure 32*0* above, shows the pre-fabricated mechanical duct risers being installed, this technique minimises site congestion, has a high degree of quality control as it is produced offsite, is productive and safer to install.

The main challenge initially with the services works will be the accurate coordinated rough-in. The installers will benefit from fully coordinated construction documentation generated through the digital engineering / co-ordination process. Individual services to each area must be completed and pre-tested prior to proceeding to the next area.

3.11.5 Services Fit-off

Services fit-off will follow once the sequence of internal fit-out works has progressed. The challenge at this point in the project is to ensure work sequences are maintained and clearly defined including adequate resourcing so that final testing and commissioning periods are not compromised

Externally, all utility incoming house service connections i.e. permanent power, water, gas and communications connections will be completed on program to ensure commissioning and testing can commence as scheduled.

Plant and equipment to be installed on the Martin Place Metro Project will be supplied by recognised and reputable manufacturers and leaders in providing high quality solutions. Careful consideration will be given to the sustainability and energy efficiently requirements of the equipment to ensure the whole of life (WOL) and ESD requirements are achieved.

Plant and equipment will also be installed to achieve ease of access for maintenance in accordance with best practice and WH&S guidelines, thus ensuring safety of all facility, operations and service personnel

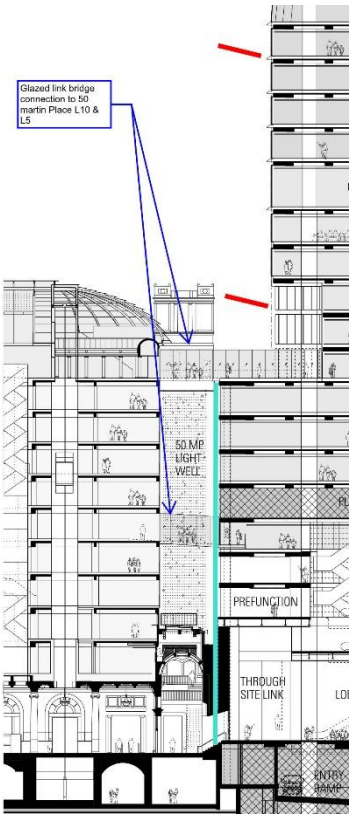

Figure 41 – South Elevation Link Connection and Protections to 50 Martin Place

3.11.6 Connections and Break-throughs to Heritage 50 Martin Place

There are a number connections and break-throughs to the adjoining 50 Martin Place along the Southern elevation at levels L00, L3, L5 and L10 as shown in Figure above. To facilitate the completion of these detailed connections, a scaffold will be erected locally from L00 – L10. This scaffold will also provide a safe working platform for all interface works to 50 Martin Place including:

- Demolition break throughs to existing 50 Martin Place (services isolations and stakeholder notifications completed prior to commencement of any interface works to 50 Martin Place).
- Installation of a new stone façade to existing 50 Martin Place north elevation.
- Installation of structural steel framework and glass to bridge connections on L00, L3, L5, L10 as shown above.

3.12 Internal Works – Fit-out and Finishes

The base build fit-out sequence will be undertaken as follows:

- High level services rough in and riser rough in.
- Façade complete and ceiling margin installation.
- Full height wall framing / blockwork.
- Rough in of services in wall.
- Hold Point inspection and sign offs prior to second side wall sheeting.
- Wall sheeting (Post Façade Completion).
- Wet area fit-out inclusive of all vanities, and FFE and items.
- Specialist finishes to core wall where applicable.
- Access floor installation.
- Services fit-off and part commissioning.
- Painting.
- Install ceiling tiles.
- Builders clean.
- Final Commissioning.

4.0 COMBINED TRAFFIC AND PEDESTRIAN MANAGEMENT

4.1 Traffic Management Overview

Lendlease understand one of the keys to the successful delivery of Metro Martin Place will be managing the flow of materials and equipment into and out of the construction site whilst maintaining a continuity of business for the CBD – *Keep the City Moving.* We believe it is imperative that our planning considers and successfully manages the maintenance of pedestrian and traffic flow to the surrounding buildings and roads.

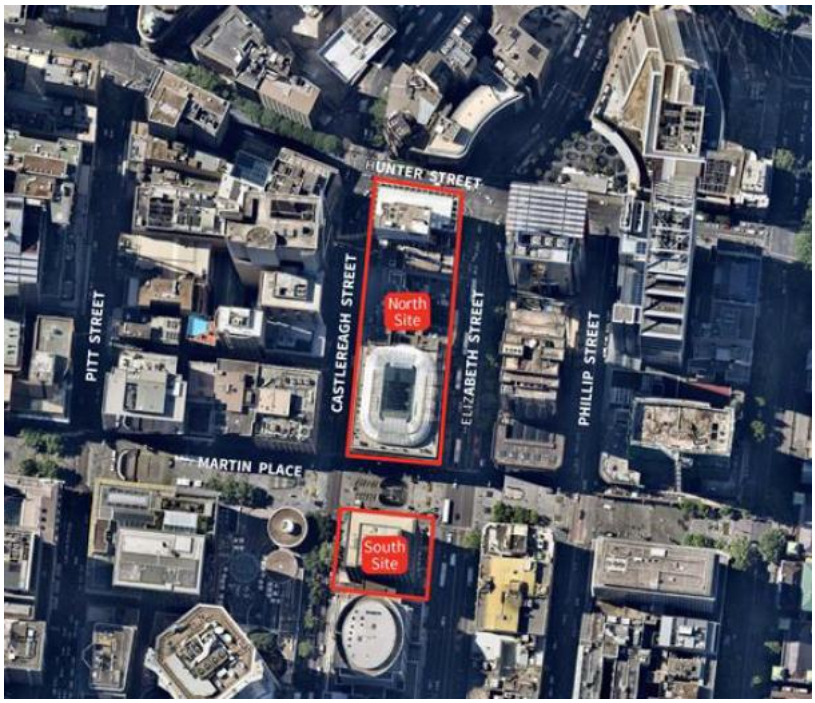

Figure 332 – Metro Martin Place Surrounding Road Network

To do this Lendlease will be adopting a number of key traffic management strategies to minimise and mitigate Metro Martin Place's effects on the surrounding CBD:

- Engagement of Traffic Management Consultant to compile an overall Traffic Management Plan, specific Traffic Control Plans detailing each management of pedestrian, vehicular construction and operational traffic at each stage of works;
- Ensure that the Traffic Management Plan aligns with Arups report and adequately addresses the Framework Construction Pedestrian and Traffic Management Plan
- Adopting an online material booking system to facilitate efficient just in time delivery of construction materials, alleviating traffic congestion.
- Encouraging staff, consultants and subcontractors to adopt a Green Travel Plan for this project with use of public transport to and from site.

4.2 Existing Traffic Management and Control

The existing site has a number of trafficable street frontages. The North site has three trafficable street frontages; the South Site has two as follows:

- *Castlereagh Street – Hunter to King St* – is a one-way street southbound and consists of one bus lane and one traffic lane. On both sides of the road, there are designated parking

lanes, loading bays or bus zones during weekdays. This should facilitate construction zone access to both North and South Buildings for duration of the development pending approval by the relevant authorities.

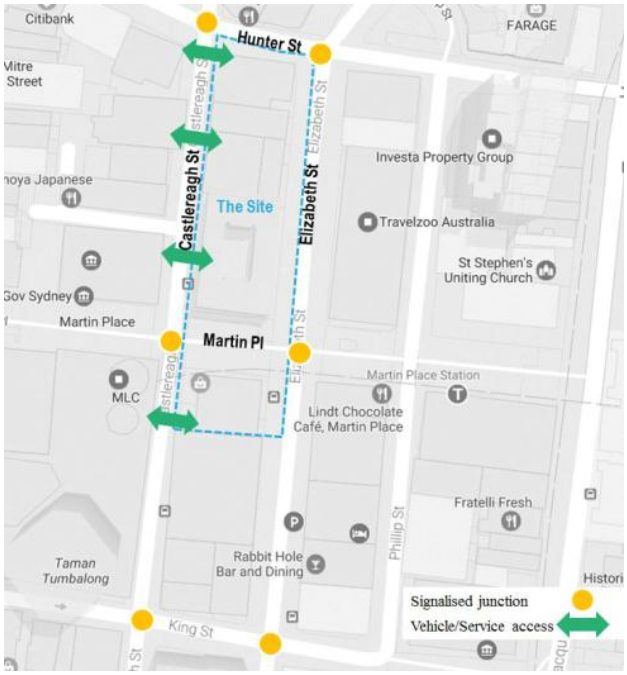

Figure 343 – Existing Vehicular Access Points

- Elizabeth Street – Hunter to King St – is a two-way street consisting of one traffic lane and bus lanes in each direction. Northbound, north of Martin Place, there are three traffic lanes and no bus lanes.
- On both sides of the road, there are parking lanes which are mainly designated as loading bays or bus zones on weekdays, with on-street parking permitted at weekends (apart from the western side of the road, north of Martin Place which is mainly 'no stopping'). Early discussions with City of Sydney have indicated that construction zone access to Elizabeth St may be feasible.

We have identified the existing kerbside uses along Castlereagh St and Elizabeth St with the weekday daytime uses of these streets shown in Figure 35 below. As indicated by City of Sydney, it is expected that the volume of buses on Elizabeth St will be significantly reduced with the opening of the Sydney Light Rail. On this basis, we have assumed that a off peak construction zone on Elizabeth St will be permitted.

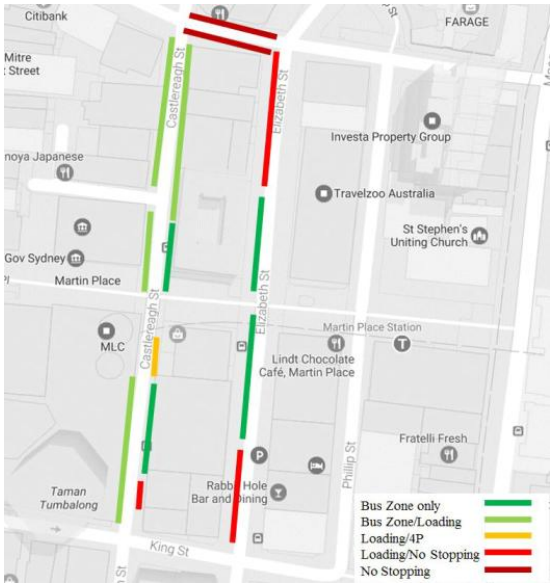

Figure 354 – Existing Weekday daytime kerbside uses

4.3 Existing Pedestrian Management and Control

The TSE Contractor's planning for pedestrian management and access across Martin Place is not yet known. We appreciate the TSE Contractors approach to pedestrian management over the preceding 3years, prior to OSD works commencing in Nov 2021 will largely dictate future pedestrian patterns and influence our approach to pedestrian management in and around Martin Place.

During the detail design phase, we will review the TSE Contractor's approach and develop our Pedestrian Management Plan to best accommodate the changing pedestrian flows and patterns to Martin Place in conjunction with our construction staging for the precinct.

4.4 Proposed Construction Zones

See below the proposed construction zones for North Building on Castlereagh St to west, and Elizabeth St to the east.

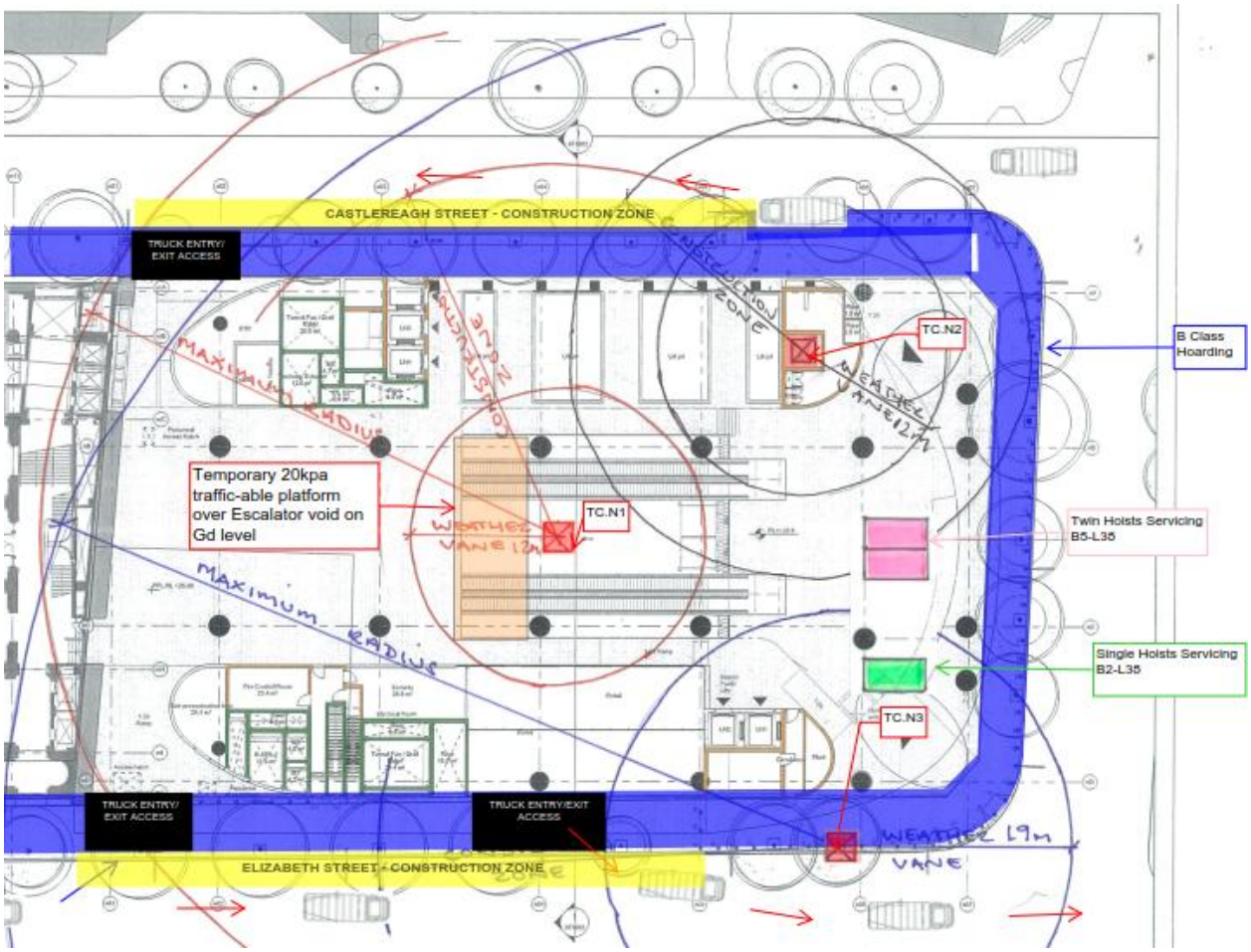

Figure 365 – North Building Construction Zones – Tower Phase

Further to our initial discussions with Council, we propose to retreat the Elizabeth St construction zone to 20m once Ground level structure is completed and stripped, facilitating concrete to be delivered and pumped from within site footprint on ground level as shown in Figure 36.

We will work with local City of Sydney, TfNSW, CBD Co-ordinators Office and Sydney Buses to secure the necessary construction zone approvals and vehicular access required off both Elizabeth and Castlereagh St throughout the duration of Metro Martin Place development.

4.5 Proposed Construction Traffic Management and Control

During the detailed design phase Lendlease will develop, in conjunction with the relevant authorities, a detailed Traffic Management Plan to identify, document and implement the strategy for managing pedestrian and traffic construction movements for the precinct. This TMP will also include a Traffic Control Plan for each stage of construction works, across all key work areas - in particular the services infrastructure and public domain works outside of site footprint.

Traffic management and control will be established across all major roads and interfaces across the project. Traffic control in the form of traffic controllers, warning lights and pedestrian boom gates will be in place at all site access/egress and construction zones to ensure:

- Segregation of the general public from truck movements in and out of the project.
- Segregation of construction worker access from construction vehicular access in and out of the project.
- Materials and deliveries do not impede public roadways or footpaths.
- Streamlining of time taken for truck movements in and out of the project.
- For access details to the station refer to the station CMP.

4.6 Construction Deliveries

It is imperative that our planning considers and successfully manages the maintenance of pedestrian and traffic flow to the surrounding buildings and roads.

To do this Lendlease will consider adopting an oline material booking system on this project. This system allows the external supply chain to book a delivery to the project through an online portal which can be live streamed to the Crane Co-ordinator, Materials Handling Foremen and Site Managers via computer or field device.

Booking delivery times can be allocated to each on-site construction / loading zone and each mode of materials handling; Tower Crane, Man & Materials Hoist, Builders Lifts, Gantry Crane. This online system will provide a means of:

- Booking, reallocating deliveries in ‘real time’;
- Controlling and prioritising deliveries to site based on critical path activities;
- Ensuring materials are delivered to work areas as they are needed – minimising materials stored on-site;
- Ensuring cranes, hoists, builders lifts are fully utilised; and
- Formal allocation of construction and loading zones for Metro deliveries.

This daily information can then be printed out or sent electronically to the team, RMS, City of Sydney as required to ensure that effective just in time deliveries occur on-site and traffic congestion around construction loading zones are avoided.

Lendlease has used this system at Barangaroo and at the North Connex Project with success, and will adopt it on this project given the CBD location constraints.

4.7 Construction Worker Access to Site

With no parking available on-site, all subcontractors and construction workers will be encouraged to use public transport via nearby train stations, buses and ferry networks.

Figure 4637 – Main Public Transport Nodes Surrounding the Project

5.0 SUSTAINABLITY IN DELIVERY

5.1 Introduction

Sustainability has been an integral part of our culture for more than 50 years. Making a difference in our communities, improving health and safety standards and reducing our environmental impacts are central to our business strategy. We believe it's the right thing to do. But it's also the smart thing to do, because it creates long-term value and reduces operational and financial risk.

Lendlease has a group-wide Sustainability Framework in place to provide discipline and focus for all our efforts and activities on what matters most to Lendlease and our stakeholders. At the core of this strategy remains the recognition that people are at the heart of why, how and what we do. We have adopted an integrated approach that encompasses environmental, social and economic performance.

This framework encompasses 12 elements with long term goals, as well as nearer 2020 targets for energy, water and waste. Our sustainability commitment and capability is unrivalled in Australia as evidenced by more than 100 Green Star, Infrastructure Sustainability, LEED and WELL ratings across our Australian projects.

Our commitments to Sustainability through the Design of the Metro Martin Place project are detailed elsewhere but the following pages outline our approach to Sustainability with regards to the Construction Management Plan.

5.2 OSD - Sustainability in Delivery

In addition to Metro Station commitments above, Lendlease has set some exciting and ambitious targets for the over station development of Metro Martin Place. These targets include:

- 6-star Green Star for the two commercial towers.
- 90% construction waste diversion targets.
- Commitment to a healthy workforce with our high-performance site sheds.
- 60% of reinforcement steel to be recycled.
- 30% by mass of Portland cement in all concrete with supplementary cementitious material.

5.3 Construction Carbon and Energy Management

To forecast and track Carbon and Energy performance, Lendlease uses an online aggregation platform that site engineers and construction managers complete monthly. Primarily this is about meeting our obligations under the National Greenhouse and Energy Reporting (NGERs) legislation but it also assists us in managing project costs and ultimately about reducing our environmental footprint. This platform can be used to provide timely performance metrics that can be communicated to all stakeholders in digestible form; reporting at project reviews, digital tracking displays on site, equivalency to everyday metrics such as distances driven in a car, number of swimming pools of water saved, 'elephants-worth' of waste etc. It also allows our teams an opportunity to demonstrate the carbon impact of the efficiency initiatives that we may deploy at various stages of our projects through our *Site Sustainability Standards*, for instance:

- LED temporary lighting.
- High efficiency air conditioning units in site accommodation.
- Improved site metering and load switching.
- Electric tunnelling machines in-lieu of diesel.
- Biodiesel and ethanol fuel mixes for all external plant and equipment.
- Use of non-potable stormwater and groundwater capture for dust suppression.

As well as tracking and minimising our energy consumption for the project as a whole, this process will be used to quantify and demonstrate our obligation to offset carbon emissions required for the delivery of the Metro Station.

5.4 Waste Management and Recycling

Trade subcontractors are encouraged to consider initiatives that reduce waste across the whole lifecycle of material procurement from sourcing raw materials, production, manufacturing, packaging, distribution, potential for reuse and recycling, operation, maintenance or disposal of the products being provided. Our EH&S Delivery Standards require that all projects minimise Construction and Demolition (C&D) waste with many CBD projects achieving reported recycling rates of more than 90% via the off-site sorting capabilities of our waste contractors.

Lendlease ensures all waste is correctly handled by utilising only experienced third party waste disposal contractors who are selected to ensure compliance with all legislative requirements in handling, transport and disposal of waste. The Green Building Council of Australia has developed guidelines for sustainable waste management that our waste contractors must verify compliance with through independent certification. In addition to C&D waste, as a part of the Lendlease Site Sustainability Standards all sites must provide:

- Paper, bottle, plastic (co-mingle) and printer cartridge recycling.
- 80% recycled paper for photocopiers with default B&W, double-sided printing.
- Reusable cups, utensils and plates to eliminate plastic and paper kitchen supplies.

These mandatory initiatives lead to high recycling rates from our site offices.

5.5 Materials Management

The construction industry is becoming increasingly aware of non-financial risks in the supply chain, leading to a common commitment to engage more closely with suppliers to increase environmental and social awareness and drive innovation. In some cases, this also means better understanding the capacity and capability of local suppliers to prioritise their participation where possible.

Traditional ‘tender review management systems’ that mechanically collect safety, environmental and quality criteria from suppliers can be very inefficient if the same supplier is being asked the same questions by many different project teams. Further, the assessment of the responses can be inconsistent, depending on the level of experience or knowledge of the assessor.

In early 2016, Lendlease invested in a supply chain prequalification system called Browz that requires suppliers and subcontractors to answer a range of questions around quality, safety, sustainability and workforce management before they can tender on Lendlease projects. Questions cover off legal and compliance requirements as well as allowing companies to demonstrate differentiation particularly in the area of safety and sustainability, typically driven by a broader organisational purpose and values. This framework is also used to identify suppliers and subcontractors in high impact categories that may consistently have non-compliances and offer them training and assistance to improve.

Lendlease will build on our experience and knowledge of Browz to develop a supply chain pre-qualification process for the Metro Martin Place project that simplifies the collection of important non-financial information about our suppliers and subcontractors. Browz is particularly useful in identifying risks associated with country-of-origin, high impact materials and how companies address human rights for their employees and their suppliers.

Lendlease will ensure adequate training is available for suppliers and where appropriate, we will share experiences through appropriate industry channels, like the Australian Supply Chain Sustainability School, the ISCA and the GBCA to fast-track industry capability and capacity within the supply chain.

5.6 Workforce Development

A key area within direct control of the Construction Management Plan will be to drive social sustainability outcomes in the area of Workforce Development. The Sustainability Management Plan will include initiatives that provide local sustainable employment, mitigate skills shortages and gaps, improve capability of industry and generate major social-economic benefits to individuals and communities through infrastructure investment. The objectives of the Workforce Development plan are:

- ***Sustainable Employment***: create opportunities now that produce targeted and transferrable skills, resolve local skill shortages and respond to changing job roles in the industry.
- ***Diversity***: create employment opportunities that increase diversity and inclusion and work with people to overcome barriers.
- ***Inspiring future talent***: create opportunities to engage young people through education and work experience and support vocational career development.
- ***Life-long Learning***: help employees obtain the skills for now and the future.
- ***Productive Partnerships***: work with key delivery partners to ensure we achieve outcomes.
- ***Creating genuine business opportunities***: increase opportunities for local businesses, Small and Medium-Sized Enterprises (SMEs), Social Enterprises and Aboriginal owned businesses.
- ***Developing partner businesses***: support key business partners to increase capabilities and capacities.

One recent Lendlease example that meets many of the objectives above, has been the Barangaroo Skills Exchange (BSX) at the $6B Barangaroo Urban Regeneration Project in Sydney. Some of the outcomes achieved at BSX include:

- 2016 Australian Training Awards Industry Collaboration Award.
- 20,162 new Accredited Skills Qualifications.
- 103,134 learning outcomes.
- 236 Indigenous people involved.
- 813 Indentured apprentices (66% skilled work on site), 64 of which were Indigenous apprentices.
- 10,637 construction workers trained.

The Workforce Development Plan for Metro Martin Place will outline our approach to achieving social sustainability outcomes. Some initiatives that we will consider include:

- Targeting entry level construction positions for under-represented groups including Aboriginal people, long-term unemployed, women, youth, refugees and asylum seekers and people experiencing homelessness, through our partnerships with Whitelion, Careers Trackers and CareerSeekers;
- Driving gender diversity through targeted recruitment of women into senior leadership, management, and non-traditional trade positions;
- Engaging a significant number of apprentices and trainees to contribute to the next generation of skilled workers;
- Implementing a project specific Aboriginal Participation Plan in line with Lendlease's Elevate RAP;
- Encouraging future talent and engaging with local schools and colleges;
- Directly engaging with and supporting, the NSW Infrastructure Skills Centre to maximise industry participation, workforce skills development and workforce diversity outcomes on the project;
- Engaging local SMEs, Aboriginal owned businesses and Social Enterprises to ensure supply chain and workforce diversity outcomes;
- Implement a targeted Small Business Development program to help nurture and grow small businesses on the project; and
- Proposed use of BSX or other Lendlease Skills Exchanges for the delivery of project training and Sydney Metro's programs.

5.7 Stakeholder Management

5.7.1 Managing Enquiries and Complaints

Lendlease understands that all enquiries and complaints from the community can provide valuable feedback about the project's activities and must be responded to in a timely and consistent manner.

The key principles which underpin our approach are

- Proactive – identify and report issues and build solutions into the program where possible
- Accessible – ensure the team are accessible for the duration of the project
- Responsive – respond in an effective manner to individual concerns. Resolve issues to the satisfaction of all involved in the shortest time possible
- Sensitive – understand the needs of stakeholders and the community and minimise disruptions and impacts where possible

Enquiries and complaints may be received directly by members of the S&CLT or indirectly via Sydney Metro's Community Information Line, postal address and email address. A dedicated member of the S&CLT will be on call to receive enquiries during business hours.

The S&CLT is responsible for managing all complaints and enquiries relating to the project. They will seek input and assistance from key members of the project team as needed but will remain the main point of contact until the enquiry is answered.

The procedures for responding to enquiries will be covered in the project induction for all staff and contractors.

All enquiries and complaints will be responded to in accordance with the Sydney Metro Community Complaints Management System and Overarching Community Communications Strategy , including the recording of all enquiries into the Consultation Manager database.

5.7.2 Events Management

The contractor will coordinate with key stakeholders regarding events occurring within Martin Place to prevent potential conflicts. It is expected that the majority of events will occur outside of the nominated work hours, either being held at night or on weekends.

Figure 47 - Shows the draft community engagement template that will be applied to Metro Martin Place.

5.8 Managing Homelessness in the vicinity of the Project

Lendlease recognises that homelessness is a complex and growing issue for the City of Sydney. Lendlease's experience and track record of interacting with the homeless community in many parts of Sydney provides a solid basis to mitigate any impact on the local homeless community ensuring at all times they are treated with empathy and dignity.

Building on our experiences in the delivery of 60 Martin Place and the resources summarised in the Sydney Metro Interim Strategy for Management of Homeless People During Construction (July 2017), we will develop a Homeless Community Plan ("HCP") that outlines Lendlease's approach to managing interactions, mitigating impacts and supporting programs for the benefit of the homeless community in Martin Place. Lendlease will consult and partner with not-for-profit organisations with the appropriate skills and connections, such as the City of Sydney Homelessness Unit, Salvation Army, Whitelion, St Vincent de Paul and Wesley Mission, to further our understanding of the particular issues at Martin Place. The plan will address key factors in the homeless community including cultural diversity, mental health, domestic violence, asylum seekers, juveniles and minors.

Lendlease HCP will be based on a progressive refinement and focussing of activities that balance the depth of support against the breadth of stakeholders.

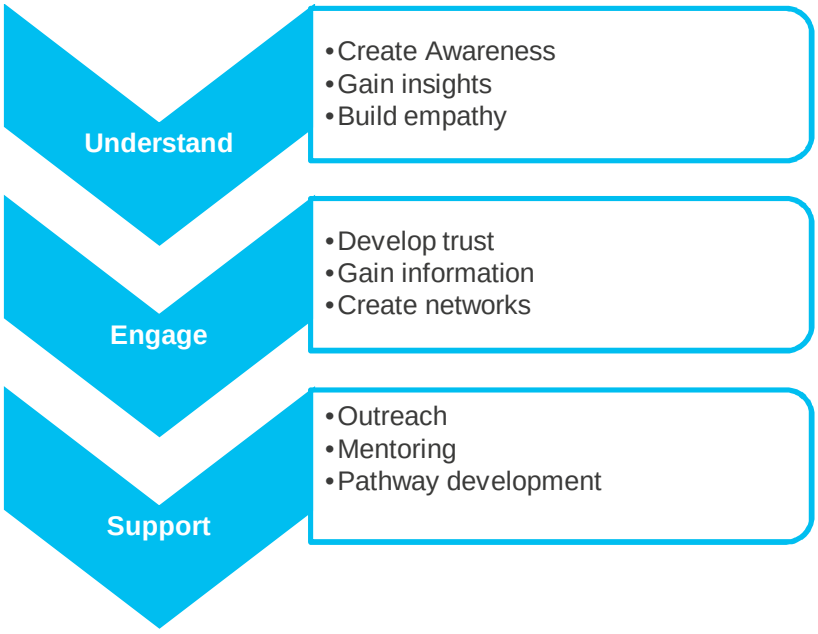

Figure 48 – Approach to a Homeless Community Plan

5.8.1 Understand

The HCP starts with gaining a much deeper understanding of the homeless community in the vicinity of Martin Place beyond the high-level statement of needs. This will be undertaken with specialist partners well known to Lendlease, who already have many insights to inform a plan. A widespread understanding of the needs of these key stakeholders will be promoted by including awareness training, messaging and protocols in site inductions undertaken by all construction staff.

5.8.2 Engage

Lendlease's HCP will frame engagement strategies for the homeless community as a whole, to build trust and establish an information flow that keeps the community safe, informed and treated with respect. Working with specialist partners our Stakeholder Manager will facilitate effective and efficient implementation of activities and engagement. This will include site walks to engage with the homeless community, sharing important delivery information and identifying the needs of individuals, refining the engagement strategy within the HCP as necessary.

5.8.3 Support

Addressing homelessness takes more than the offer of some food and a chat. To break the cycle a deeper approach is necessary, where individuals who are at-risk of spiralling further into homelessness and/or drug abuse, have access to and are encouraged to make use of services and opportunities that can create positive change in their lives – outreach.

Working with Partners like City of Sydney, Salvation Army, Vinnies and Whitelion, we will link homeless people to services that can help them develop a pathway suitable for their needs. This could include crisis support and services such as housing, health, drug and alcohol programs, family counselling, legal services, re-engagement back into school, or assisting young people to find suitable work.

Support typically requires 'case management' to provide specific strategies and action plans for supporting the homeless including targeted outreach. This case management will be provided by industry providers with support provided by Lendlease where appropriate.

6.0 PROJECT COMPLETION

6.1 Overview

Lendlease understands that the success of Metro Martin Place will be determined by the efficient completion, commissioning and handover of the Station, North and South Tower works respectively.

Over the many years in operation, Lendlease has developed a number of succinct processes and systems to manage and coordinate a seamless project completion, commissioning and handover. We will work closely with the Independent Commissioning Agent to develop a Commissioning Management Plan during the detailed design phase.

The purpose of the Completion Management Plan is to set out and establish the activities that will be undertaken by Lendlease and all its sub-contractors in order to achieve completion. This plan outlines the methodologies to ensure that the building works, inclusive of testing and commissioning are completed to the satisfaction of all stakeholders. The Handover and Completion Management Plan will be structured to meet the following objectives:

- Providing a consistent and systematic approach to the delivery, testing and commissioning of the building works.
- Providing a seamless move of the Principal / tenant into their new building.
- Providing effective communication to the Principal of all relevant information relating to the establishment, commissioning and transition of Facility Manager / Maintenance staff.
- Providing timely and sufficient training, education for the effective use of the equipment and systems.

Below are the fundamental steps that will be implemented to deliver on these project completion objectives:

- Identify the key contractual dates and Principals requirements to successfully complete the Project.
- Identify all the key stakeholders associated with commissioning, completion and transition.
- Establish key representatives of the wider project team that will be the completion committee.
- Organise and participate in project completion meetings.
- Appreciate the importance of planning for completion and prepare a completion program.
- Prepare tools for the various components of Project Completion.

Lendlease will utilise a series of methodologies as a subset of each of the required steps. These include:

- Managing, coordinating the preparation and implementing each of the subcontractor's and suppliers' commissioning and handover plans with the others, including identification of all acceptance criteria, with the subcontractors and suppliers.
- Preparing and implementing coordinated commissioning and handover plans for parts of the works as part of the Project Plan with the applicable subcontractors and in liaison with other stakeholders.
- Ensuring and verifying with the subcontractors and suppliers that all necessary acceptance tests and demonstrations of commissioning are carried out in preparation for handover.
- Inspecting subcontract works prior to progressive completion and final completion under the subcontracts.

- Preparing lists of defective work and reviewing those prepared and certified by the subcontractors and suppliers in accordance with agreed Defects Management and Rectification procedures to be agreed with the Principal.
- Ensuring that defect completion is achieved in accordance with the program and where practical be “defect” free at practical completion.
- Ensuring that sufficient training is provided for the Building Management resources in the operation of the works in accordance with the requirements of the subcontracts and the contract and the specifications.
- Responding to, and ensuring the rectification of, identified defects within the required time.
- Obtaining and verifying the subcontract ‘Certificates of Compliance’ and completion certificates for the works.
- Proposed Tools and Techniques to be utilised as part of the Completion and Handover Plan for the Project include the following:
- Cause and effects integrated testing matrix. Lendlease will produce test methodologies to validate the fire system in fire mode.
- Subcontractor commissioning interface matrix.
- Subcontractor inspection test plans.
- Defect registers will be implemented to record and close out defects.
- Ongoing reporting of O&M Manual status.
- Commissioning Managers roles and responsibilities to include verification and checking the Operation Maintenance Manual documentation including test data and asset registers.
- Drafting and implementation of a Completion program.
- Checklist of deliverables necessary for completion.
- Handover sign-off.
- Training signoff.

6.2 Completion of Works

Prior to the initiation of any commissioning or testing regimes the elemental QA inspections will be completed to ensure that the systems have been installed in accordance with the requirements of the project specifications. The review of works prior to technical completion tests will ensure that all systems have been prepared to enable a successful test to be completed.

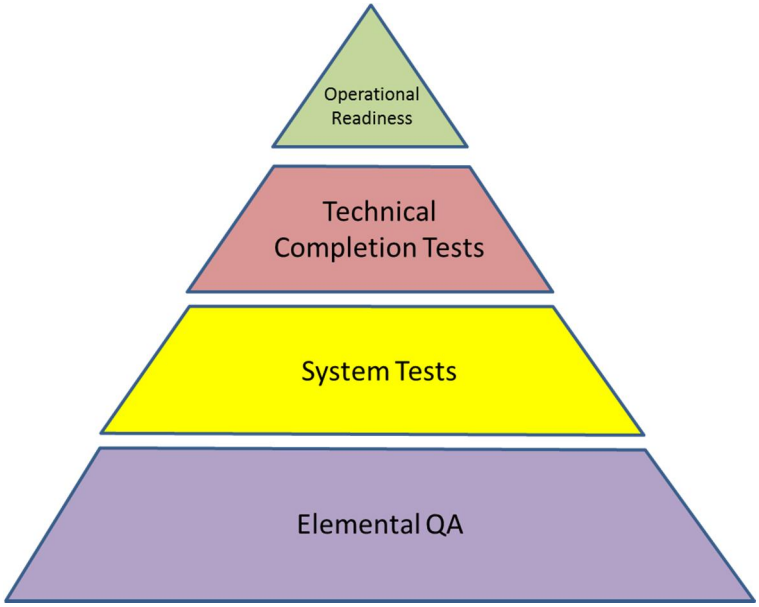

Figure 4938 – System Testing Hierarchy

The Figure 493849 above shows the general relationship between the various stages of the works during the development phase and their progressive refinement. Each stage is reliant on the successful completion of the previous stage. The phases noted can be generally defined as follows:

Elemental QA – Quality Assurance that record compliance of the completed works to the applicable specifications, codes and standards.

System Tests - Completion Tests that relate to a single Service discipline that confirm the service meets the Design Requirements and performance criteria.

Integrated Tests - Completion Tests that span across more than one Service discipline and are performed to confirm correct function and that transfer of data is achieved.

Operational Readiness - Completion Tests that are required to be undertaken to test the operational performance of the Facility ensuring that the Facility is fit for the intended purposes.

6.3 Quality Management

A Metro Martin Place Quality Management Plan (QMP) will be developed during the detailed design phase. The QMP will provide the framework for managing and monitoring delivery quality on the project. Specifically, the following areas will be addressed in the QMP:

- Setting and monitoring document control processes across the project including require control documents and tracking of construction documentation;
- Setting out individual responsibilities for quality management on the project: people and roles including competencies;
- Determining level of QA documentation required from subcontractors and consultants which will be incorporated in respective packages;
- Set out ITP process and requirements of submitted and approving ITP forms;
- Management of Project internal administration documentation;
- System and subcontractor audit process and timetable;
- Corrective Action procedures and Non-Conformances;
- Running the QA system on the Aconex; and

- Compliance with Lendlease certifications including AS/NZS ISO 9001:2008.

This QMP is a management tool and control measure, however the real driver for delivering high quality on the project will be the culture driven through the project by the Lendlease Project Team with their subcontractors working collaboratively in setting and maintaining standards.

6.4 Defect Management

Lendlease has a sound understanding of the high-quality focus required on commercial projects, in particular 'Premium Grade' projects where attention to detail and a methodical approach are critical. A pivotal component of the overall quality management system implemented on our commercial projects is the defect identification and rectification process.

The formalised defect control process begins, with a systematic inspection, record and issue of base defects and incomplete works for each level at completion of base build fit-out trade works. This is carried out by the finishes foreman and respective site engineer, and is utilised to ensure early capture of defective works, and incomplete items that will impact the finalisation of the level finishes, and subsequent final defect inspections.

This also serves as a hold point to ensure subcontractor resources are controlled and directs focus back to completing works to the highest quality and restrict the tendency for works to proceed up the tower despite incomplete works being left behind. These items are recorded and issued utilising the defect management system which is internet based, mobile, automated and tailored action lists are issued directly to the relevant trade.

6.4.1 Consultant Defect Inspection

Upon confirmation, the open defect items have been closed out, the Consultants will then be invited.

to inspect a suitable number of floors at a time. As for the previous stage, wherever there are items identified, they are logged on the defect management system and issued to the responsible party for action. Lendlease views this process as a collaborative process that has been productive on a number of previous projects in establishing clear expectations in relation to quality and detailing at an early stage.

6.4.2 Principals Representative Defect Inspection

At this point, the floors will be ready for presentation to the Principal's Representative for inspection. Lendlease has found it is often advantageous to combine this inspection with the previous stage with the architect and expedite the inspection process, where consistent positive results are being achieved. Defects from the result of these inspections will be rectified and second inspections will be arranged to close out these items.

6.5 Pre-Commissioning Dust Control and Builders Clean

The initial Builder's clean will be undertaken progressively as areas are completed and locked off. This will be completed prior to testing of any mechanical duct work to avoid intrusion of dust into the mechanical system. This will facilitate final defect rectifications and include the removal all protection and general construction dirt and dust from the building.

Then, shortly before handover and in parallel to final testing and commissioning of the building, a final clean will commence and work progressively through the levels. It is critical at this stage to programme and maintain a works sequence to systematically work area by area and level by level. This will achieve a better final result than working on a large number of concurrent workfaces.

External façades will be cleaned using the BMU with common areas and entrances being the final areas to be cleaned.

Critical in achieving a satisfactory final clean is having works areas locked down and secured. To this end we will designate one of our Senior Engineers to manage the completion works and employ additional security staff during this phase of the Project. Access will be controlled by temporary construction cylinders, and protocols restricting access to authorised site personnel will be put in place. Temporary access cards will be circulated to utilise the security system once this is commissioned.

7.0 COMMISSIONING, TESTING AND WITNESSING

Lendlease's demonstrated expertise in commissioning complex large scale developments and holistic approach to the commissioning process will achieve the mutual goal of a maintainable, sustainable, safe functional clinical environment.

We plan to engage with the project Stakeholders and Principal early to ensure transparency in planning of the commissioning process for both Station and Over Station Development Works respectively. This will ensure completion will be defect free and ready for operation, by fully informed and trained building management personnel and User Groups.

7.1 Commissioning Strategy

The commissioning strategy involves clearly defined planning and processes. There are three planned stages of completion; firstly, to achieve substantial completion, secondly the commencement of the mandatory validation period, and finally project completion. The Independent Commission Agent will be engaged during construction to assist with defining these outcomes, adding value to the installation and familiarising themselves with site prior to practical completion. The Commissioning Management Plan will identify:

- Scopes of work and deliverables;
- Programme of works (critical adequate testing and commissioning durations are maintained);
- Roles and responsibilities including additional specialist commissioning consultants;
- Lines of communication and reporting; and
- Approvals, sign-offs, witness testing.

Comprehensive checklists will be prepared for each system, area and stage of the project. The commissioning requirements and activities associated with the following building services will be fully detailed within the Commissioning Management plan:

- Mechanical;
- HV, LV electrical and lighting;
- Security;
- Building Management and Energy Monitoring Systems;
- Hydraulics;
- Fire protection systems;
- Essential systems;
- Vertical transport; and
- ICT, communications systems & AV.

Lendlease Technology will be responsible for managing the ICT Integration Requirements for the project and in supporting the integration testing and commissioning process for each of the ICT systems across the following stages of integration:

- ICT infrastructure;
- Message integration; and
- Systems integration.

The proposed methodology for commissioning of all services on the project follows the process shown in the diagram below, and is based on iterations with witness testing at key stages to ensure operational requirements are being met. This process will follow completion programme which will ensure timely completion of milestones.

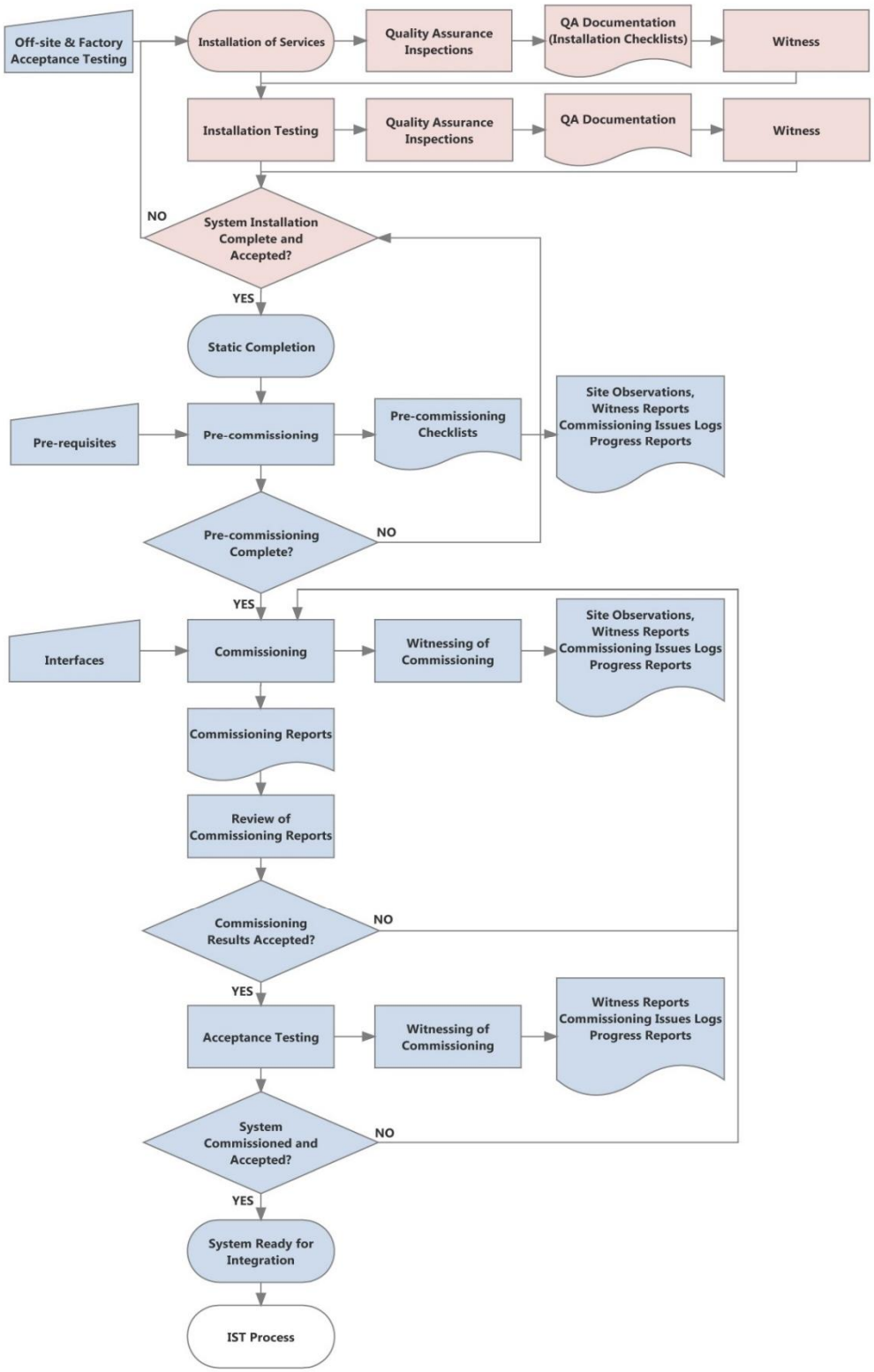

Figure 5039 – Services Installation, Testing and Commissioning Process

Figure 5039*50* above defines the commissioning and testing workflow from; the respective service installation; to completion of system tests; finally progressing to an overall integrated buildings system test.

7.2 OSD Commissioning and Testing Procedures/Methodology

Robust commissioning and testing procedures will be developed during detailed design phase to ensure that all functional components of Metro Martin Place have been tested, commissioned to ensure that the Facilities are operating as intended and to confirm that the facilities have been constructed in accordance with the applicable standards and codes. ICA will produce a detailed commissioning plan. It is noted that this document does not cover all systems but does adequately establish a procedure to be applied for all systems.

In order to satisfy the requirements of the commissioning plan, a commissioning manual will be produced for each of the key services/system disciplines on the project. The manual will contain a summary of scope, details of commissionable systems, list of applicable technical procedure tests, detailed procedures for each test, and sections to record results.

The manual will be updated to record changes to procedures, and for inclusion of results so that there is a complete record for each discipline of all commissioning and testing. As a minimum commissioning and testing procedures will be developed for the following services:

- Electrical distribution network;
- Electrical services;
- Mechanical services;
- Central plant system;
- Power generation systems;
- Fire services;
- Evacuation systems;
- Duress systems;
- Security and access control services;
- CCTV systems;
- Hydraulic services;
- Audio visual systems;
- Communications systems;
- Integration between systems;
- Telephony systems;
- Building envelope performance;
- Building management system; and
- Asset management system.

8.0 PROJECT FINALISATION AND HANDOVER

8.1 Occupation Certificate

Once services commissioning is significantly complete, essential services certification will commence system by system, including Consultants sign-offs and NSW Fire & Rescue inspection. Building areas will be inspected by the PCA, fire engineer, access consultant and other relevant consultants. These inspections will typically identify any defects or remaining works which Lendlease will then execute to enable issuing of the Occupation Certificate (or SSD approval equivalent).

Our Design Managers with support from our Services Managers will oversee the final certification process. The preparation will commence six months prior to completion with discussions with the Principal Certifying Authority (PCA) and a list of deliverable documents will be agreed upon. Compilation of the documents from subcontractors and consultants will provide the basis for draft and final submissions to the PCA.

During the latter part of construction Lendlease will lead interim PCA and fire engineer inspections to ensure these consultants inspect the works in progress and are given the opportunity to identify any potential installation non-compliances. We will also track compliance with any open DA conditions in our monthly reports.

8.2 Operation and Maintenance Manuals

Operations and Maintenance (O&M) documentation will be recorded in the O&M Track - WebFM system. The operations and maintenance manuals will be progressively completed. The WebFM system is an online database system. The system enables users to access the information at any time to validate progress. It also has detailed workflow control to track the formal submission of sections as they are completed. The O&Ms will be submitted in draft form prior to practical completion.

The contents of the O&M Manuals will include:

- **Introduction** - Section to define the scope of works and general information about the project.
- **Assets** – Information that describes the equipment, building elements and assets that are completed during the works.
- **Maintenance** – Information that defines the relevant schedule of tasks required to periodically inspect and maintain the building components described in the Assets Section in order to ensure design life and to comply with the manufacturer's recommendations.
- **Operations** – Information that describes the operation of building systems including key instructions, methods and tools that may be required to ensure that systems perform as specified. It should also provide the user with sufficient information to trouble shoot minor problems without the need to engage with third party suppliers.
- **Warranties and Certificate** – Reference information that outline specific certifications and warranties relating to the assets. This section also includes for the results of commissioning and verification.
- **Spares** – Information relating to spare parts including details of suppliers.
- **Contact** – Information relating to organisations or individuals who should be contacted to offer assistance with the completed project.
- **Drawings and References** – Information relating to as built documentation, specifications, supplier document's and the like that will assist in the operations and the maintenance of the project works.

The structure of the O&M manual is divided along building system demarcations such as electrical, hydraulics, mechanical etc. This will be reviewed as the manuals progress to ensure that the content is easy to navigate and concise.

8.2.1 As Built Drawing Schedules and Tracking

All as built documentation will also be recorded in the O&M Track – WebFM system. Drawings will be progressively uploaded as the works are completed. Records will also be maintained within the Aconex systems until they have reached as – built status. At this point the drawings will be uploaded into the WebFM system to record the as built drawing.

8.2.2 Acceptance of Manuals: Submissions and Approvals

The subcontractors and suppliers will create the relevant content for the O&M manuals and upload this documentation. When the subcontractor/supplier is satisfied the content is suitable for review, they will submit to Lendlease and Consultants for review, using the internal work flow system within O&M Track. Review and comments will be recorded and provided to the author of the manual via the WebFM system. Following the closeout of the Lendlease and Consultant comments the O&M manuals will be submitted to the consortium for review using the same workflow process. O&M track provides graphical reporting tools that will be used to report on the progress of completion of the manuals including the progress of all review workflows.

8.3 Training

The final aspect of commissioning is the training of and handover to the building operators. This will incorporate final services commissioning and operator training activities. The main focus will be on the various building services operations and the presentation of the electronic O&M information. Other operational and handover issues, such as key systems, façade cleaning, maintenance of finishes and the like, will also be covered. Draft O&M documentation will be issued to the building operators prior to completion of the construction works.

We will provide the Metro Martin Place facilities Managers with open site access during the final six months of construction and commissioning, in agreement with the Principal. We encourage early involvement of the building operators as this creates a familiarisation and technical understanding of the operating building services which is invaluable post-handover.

Earlier User Group consultation will have established the key personnel required to be trained in the new building systems. A series of comprehensive one-on-one training sessions will be conducted prior to handover to provide a ‘Soft Landing’ for the building users, and to ensure the building operators are fully trained and appropriately prepared to run and manage the facility from day one.