

Appendix A

Loading Dock Management Plan

Macquarie

**Sydney Metro Martin Place
Integrated Station Development**

**North Tower, SSD DA Stage 2:
Loading Dock Management Plan**

CSWSMP-MAC-SMN-OM-REP-999901

Rev 2 | 28 February 2019

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 264684

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1 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.

This report defines the demand, requirements and operation of the loading dock so that it may be operated safely, efficiently and effectively. It will:

Determine the vehicle demand that the tower and associated retail areas above and below ground, are likely to generate and use the information to set out the loading dock requirements and specifications;

Define the overall logistics strategy to be employed for the movement of goods into, and waste and goods out of, the development; and

Define how the loading dock will operate and the facilities be managed as a basis for the design.

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.

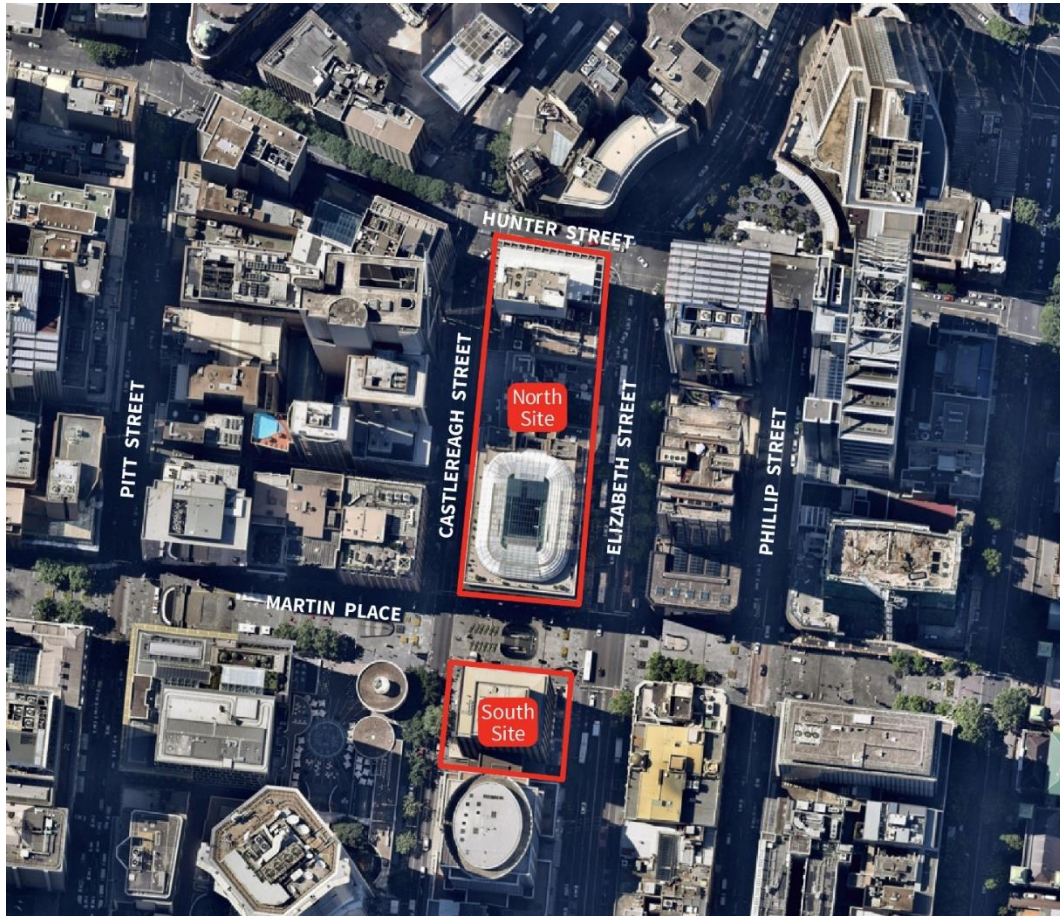


Figure 1: Aerial Photo of the North and South Site of the Metro Martin Place Precinct

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

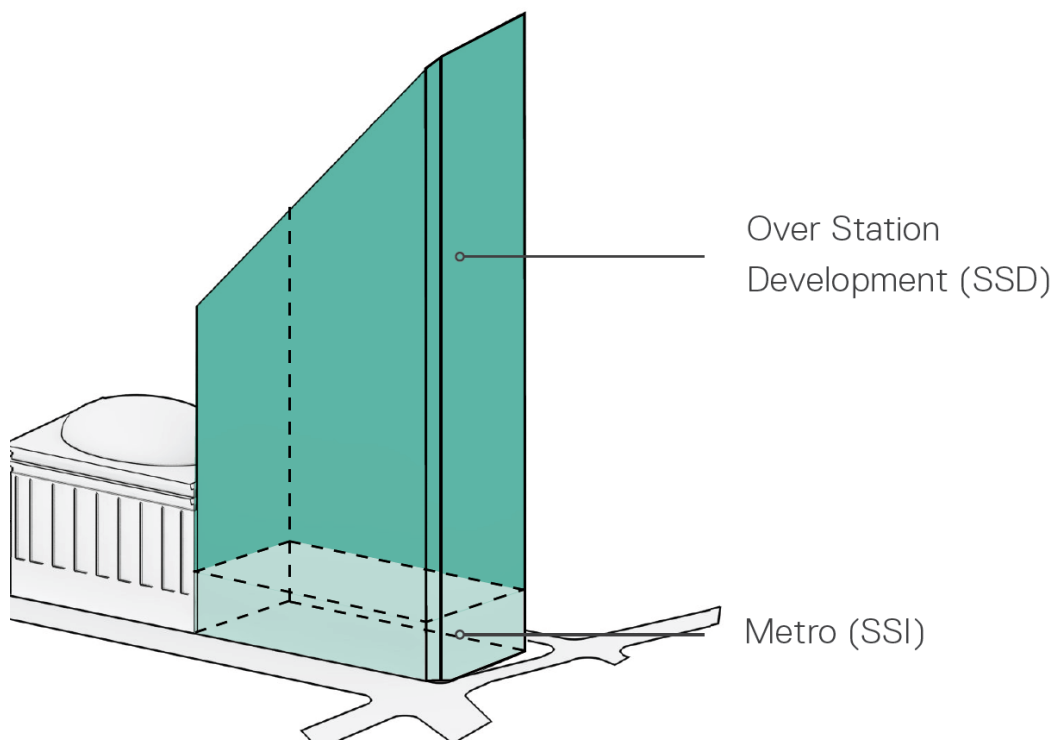
A maximum total GFA of 125,437m² across both sites

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 level¹



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.

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 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).

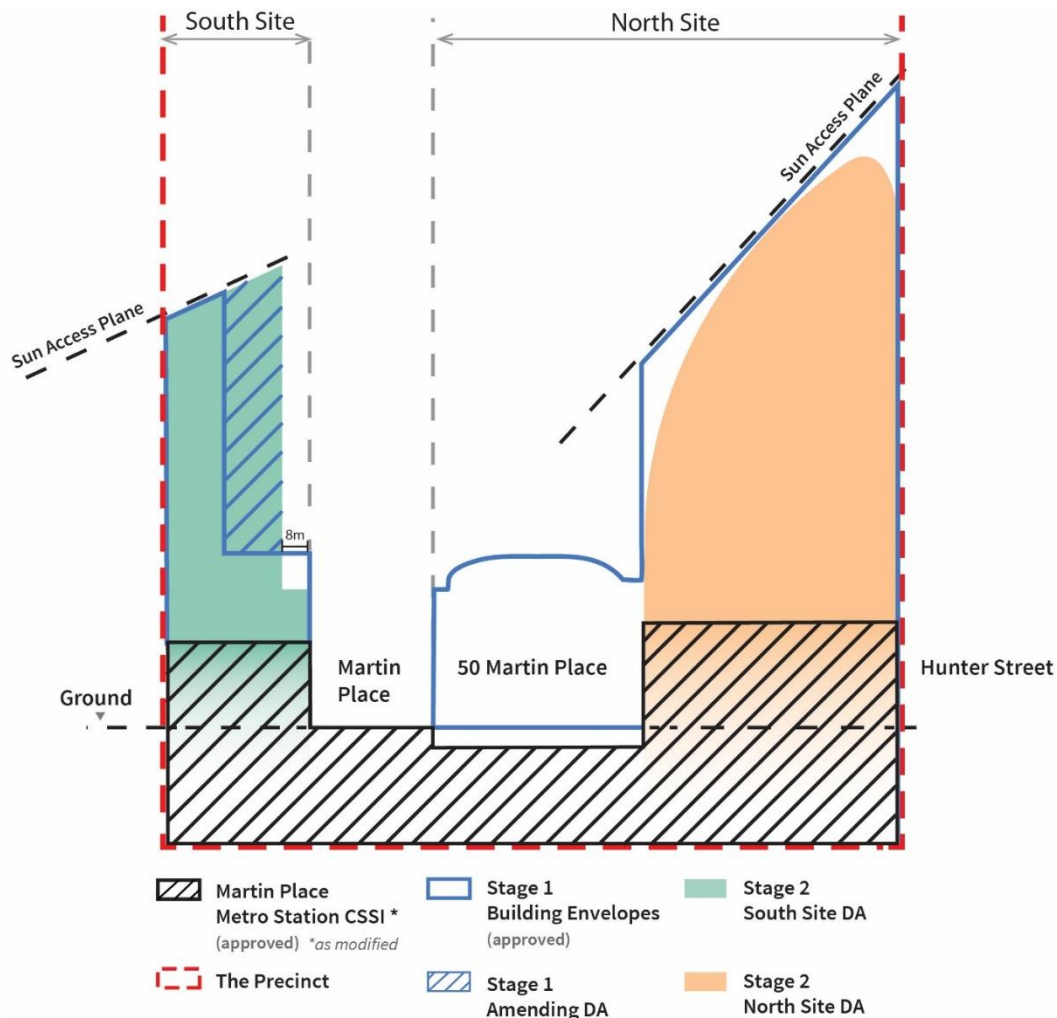


Figure 3: Relationship of key planning applications to the Stage 2 North Site DA (this application)

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 has been prepared having regard to the SEARs as follows:

The EIS shall include a traffic, parking and access assessment providing:

details of existing and proposed vehicle access arrangements, including parking, loading dock and servicing management with consideration of precinct wide shared loading docks and/or remote or off-site loading zone hub facilities, ensuring all servicing and loading occurs on-site and does not rely on kerbside controls.

The EIS must include all relevant plans, architectural drawings, diagrams and relevant documentation required under Schedule 1 of the EP&A Regulation 2000. Provide these as part of the EIS rather than as separate documents.

In addition, the EIS must include the following:

Draft loading dock management plan.

Furthermore, Condition B9 of the Development consent, Section 4.38 of the Environmental Planning and Assessment Act 1979, states:

The Applicant shall provide a loading dock management plan, prepared in consultation with Council and the Sydney Coordination Office of TfNSW, with any Future Development Application(s). The loading dock management plan shall include, but not limited to, the following:

- a) detailed swept path analysis of service vehicles accessing the loading docks
- b) confirmation that vehicular access is located as far as reasonably practical away from the traffic control signals on Castlereagh Street and will not result in queuing on Castlereagh Street
- c) sufficient capacity exists for the service vehicle demands of the development and Sydney Metro
- d) management of incidents at the access to the loading docks
- e) loading bay management details, including service vehicle movements during peak periods
- f) management of conflicts between pedestrians and the service vehicles using the loading bays
- g) arrangements to accommodate the development's servicing requirements, including consideration of off-site consolidation
- h) identification of the site logistics infrastructure and activities that form part of the development
- i) details of a pre-booking system
- j) details of certification with relevant standards, including relevant Australian Standards.

2 Scope

This plan specifically considers the servicing requirements for the majority of the site elements; however, some areas have been excluded or partially included as shown in Table 1.

Table 1 Consideration of site elements

Consideration of site elements	
Site Element	Consideration
Metro Martin Place station.	Partially included. 1 x SRV loading bay is required to be provided for the exclusive use of Sydney Metro in the North Site.
Retail and public concourses below street level, excluding a pedestrian link beneath 50 Martin Place.	Included. Retail and public concourses included.
Facilities and technical rooms below street level that supports the operations of the North Tower.	Included.
North Tower Over Station Development (OSD).	Included.
North Tower and Station entrances, retail and public concourses at street level.	Included.
Technical rooms and risers within the North Tower which support the operation of the Station.	Included.

2.1 Applicable Standards

Designed with reference to:

- Australian Standard AS2890.2-2002 Off-street Commercial Vehicle Facilities
- Sydney Development Control Plan 2012

The proposed design is in accordance with AS2890.2-2002 and has been agreed to by the City of Sydney. This LDMP meets the minimum requirements for the layout of the facility, for the loading and unloading of commercial vehicles, including design requirements for access driveways across the property boundary and for internal circulation roadways. Various departures from the standard have been addressed in this LDMP (see Table 2).

Table 2 Departures from AS2890.2-2002

Departures from Australian Standard	
Clause	Comments and Mitigation
4.1 General (c) “The design of the service areas shall include the... provision of an appropriate number of SRV bays to accommodate maintenance and other site servicing vehicles.”	No long-dwell vehicles (e.g. maintenance and trade vehicles) will be permitted into the loading dock. These will be re-directed by the dock master to a nominated public carpark suitable for the relevant service vehicles.
Table 4.1 Service Bay Dimensions Recommended Vertical Clearance (min) SRV: 3.5m MRV: 4.5m	The Australian Standard (AS2890.2—2002) places no requirement on the vehicle clearance head height for Loading Docks. It merely stipulates the limiting dimensions of potential vehicles.
4.3.1 (h) A major service area should accommodate at least one HRV on a regular service basis.	The waste management contractors will be employed to collect refuse from the site using vehicles that will not be restricted by the height of the Loading Dock.

2.2 Referenced Documents

- CSWSMP-MAC-SMP-AT-DRG-308012: North Tower Level LG General Arrangement
- CSWSMP-MAC-SMP-AT-DRG-308112: North Tower Level B1 General Arrangement
- DD-A-9000 02.02.18 Rev 01: North Tower area schedule (NLA)
- SK-A-3050: LONG SECTION (Grimshaw)
- CSWSMP-MAC-SMO-WS-REP-999901: OSD Waste Management Plan
- CSWSMP-MAC-SMA-TF-PLN-999901: Traffic and Transport Design Report
- CSWSMP-MAC-SMP-SC-SMP-999901: Security Management Plan
- CSWSMP-MAC-SMA-SC-IMP-999901: Precinct Wide Incident Management Plan

3 Site Details

3.1 Area Use

The relevant elements of the development for the purposes of this report are the North Tower, above and below ground retail, restaurant/café areas, lobby areas and the Metro Martin Place station (through the North Tower loading dock).

Current estimated Gross Floor Area (GFA) and area use information for the North Tower is provided in Table 3. These have been used as the basis for vehicle demand calculations.

Table 3 Tower area use and estimated GFA

Tower area use and GFA	
Area Use	North Tower
	GFA (m2)
Office	70,224
Retail	1,251.5
Restaurant/Café	1,251.5
Lobby	-
Total	72,727

3.1.1 Tenancy

No assumptions have been made on whether the development will be single or multiple tenancy. This plan has been developed to take into account both possibilities.

3.1.2 Tower Concourse Link

A key consideration in the development of this strategy has been the pedestrian link under 50 Martin Place connecting the North Tower to the South Tower (shown in Figure 4). It is understood that this link will be public-facing and in mostly constant use. As such, it has been deemed unsuitable for the movement of any significant quantity of goods and waste. Only in exceptional circumstances will small quantities of goods be moved from the North Tower loading dock to South Tower tenants.

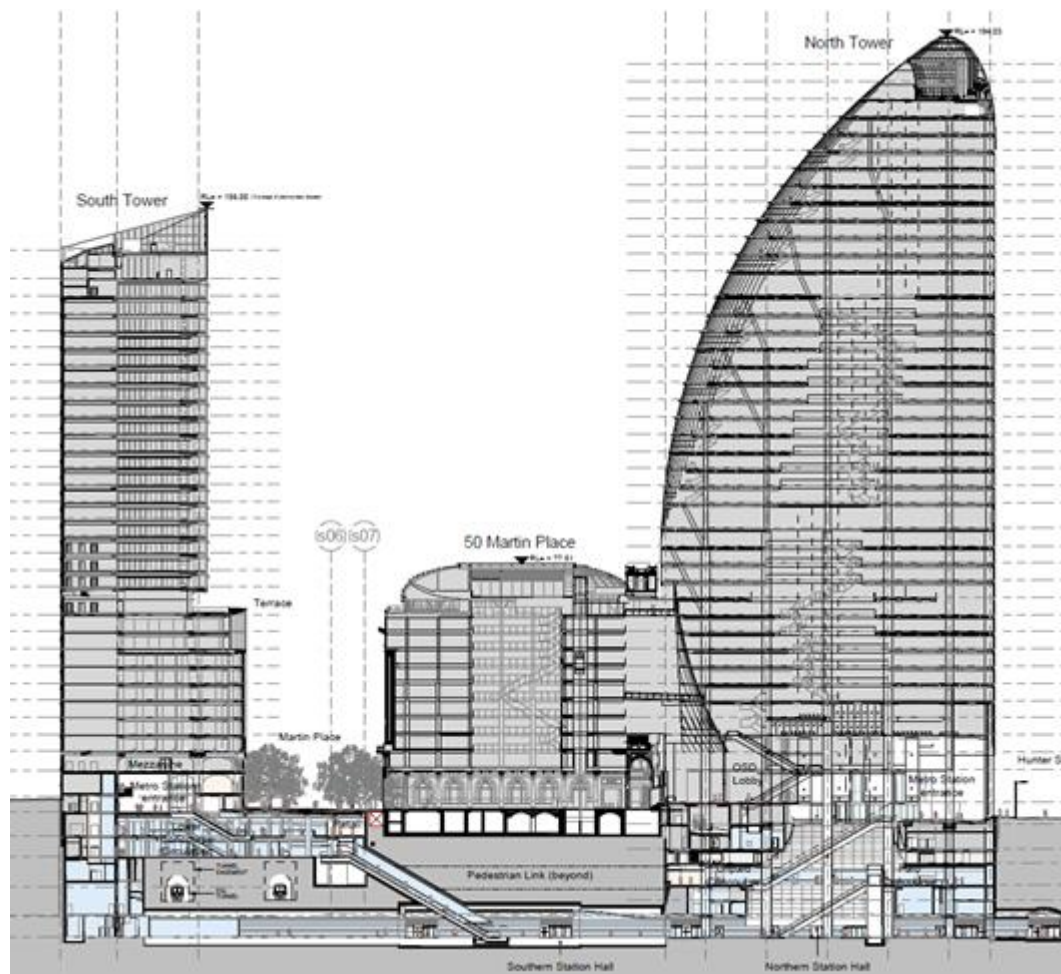


Figure 4: Major site elements (section)

3.2 Loading Dock Provision & Layout

The basement area of the tower is constrained due to the spatial requirements of the Metro Martin place station and the OSD. This has necessitated a more compact loading dock layout than would be ideal for a development of this size. The site will be serviced using:

The North Tower loading dock, located at Level B1 in the North Tower, consisting of 6 loading bays; 3 x Medium Rigid Vehicle (MRV) and 3 x Small Rigid Vehicle (SRV). Note that 1 x SRV loading bay in the North Tower has been provisioned on a transition ramp. This complies with AS2890.2-2002 as the ramp does not exceed 1:25.

The station loading bay, located at Level B1 in the North Tower loading dock, consisting of 1 loading bay (1 x SRV) for the exclusive use of Sydney Metro.

The layout of the loading bays is shown in Figure 5.

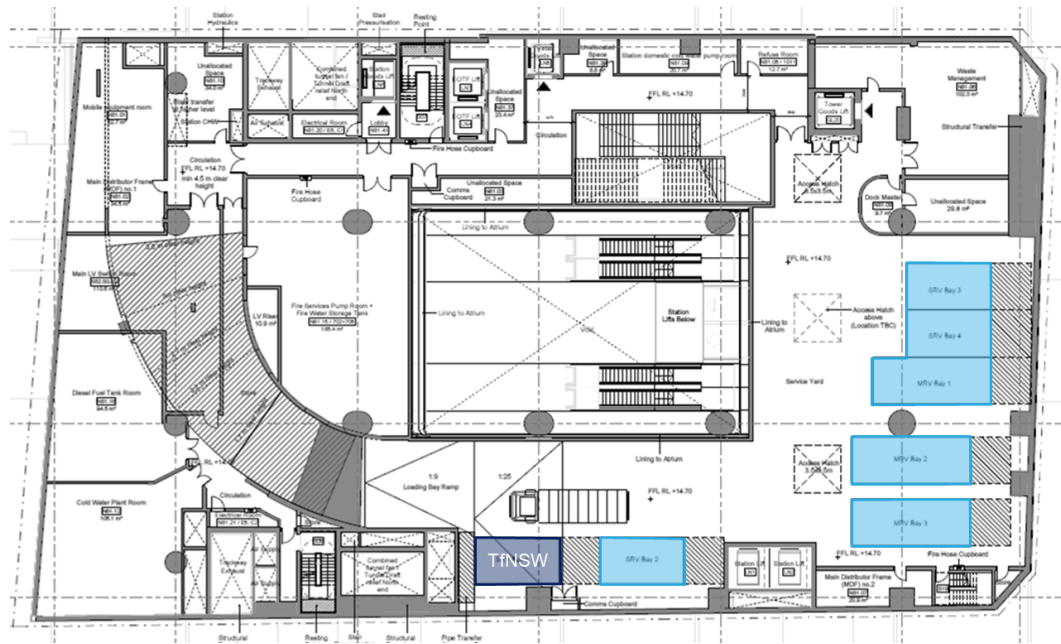


Figure 5: North Tower loading bay layout (B1 level)

4 Logistics Strategy

This section presents the over-arching logistics concept that defines the management of the loading docks and sets out the key principles.

As this LDMP outlines the approach and strategy, a detailed Loading Dock Operational Plan with processes and procedures will be developed to facilitate the readiness for the day one of operations of the North Tower. The Loading Dock Operational Management Plan will include requirements for the supply chain and provide mitigation strategies for identified risks to the South Tower loading dock operations. Alternate approved off-street loading dock locations may be considered to provide risk mitigation for the South Tower.

In addition, a precinct wide management plan will be prepared providing a governance structure for the operation and management of common areas and shared facilities.

4.1 Key Principles

An independent logistics approach to managing the North and South Tower loading docks has been adopted. The approach assumes that the loading docks will operate independently with the North Tower (or other approved location) providing flexibility for the operation for the South Tower should an incident occur, and the dock be inaccessible. The logistics concept showing the movements of goods and vehicles is described in Figure 6.

The key operating principles of the approach are:

- a) No long-dwell vehicles (e.g. maintenance and trade vehicles) will be permitted into either loading dock. These will be re-directed to a nominated public carpark suitable for the relevant service vehicles.
- b) A loading dock booking system will be employed to control access to dock and spread the demand profile over the day. Deliveries will be required to be pre-booked to an allocated time slot of 30 minutes maximum dwell time. Vehicles will only be allowed to approach loading bays once the occupying vehicle has departed from the bay. The marshalling time required is taken into account with the online booking system.
- c) Loading dock operating hours will be 14 hours per day seven days per week, though be available for exceptional out-of-hours deliveries 24 hours per day. Note that this is a calculated operating window. Should efficiencies arise and be achieved once operational, then this operating window may be reduced.
- d) As the strategy is based on an on-line booking system, the suppliers will be required to deliver according to the scheduled times. Should a vehicle arrive outside the scheduled window, the Dock Master will have the discretion to re-schedule or accept the vehicle if there is space available. The Dock Master also has the discretion to use MRV bays for SRVs as the need arises. The Dock Master will also shorten or lengthen the dwell time dependent on the goods being delivered.

- e) A dock master and a concierge service or delivery runner will be present during the loading dock operating hours, where practicable. The concierge or runner will move goods away from the loading dock once off-loaded and deliver to the target user.
- f) No goods will be moved via the pedestrian link under 50 Martin Place between the South and North Towers. It is understood that this link will be public-facing and in mostly constant use. As such, it has been deemed unsuitable for the movement of any significant quantity of goods and/or waste.
- g) Supply chain consolidation of goods should be considered though is not necessary for the loading dock to operate.

Further detail is provided in subsequent sections of this plan.

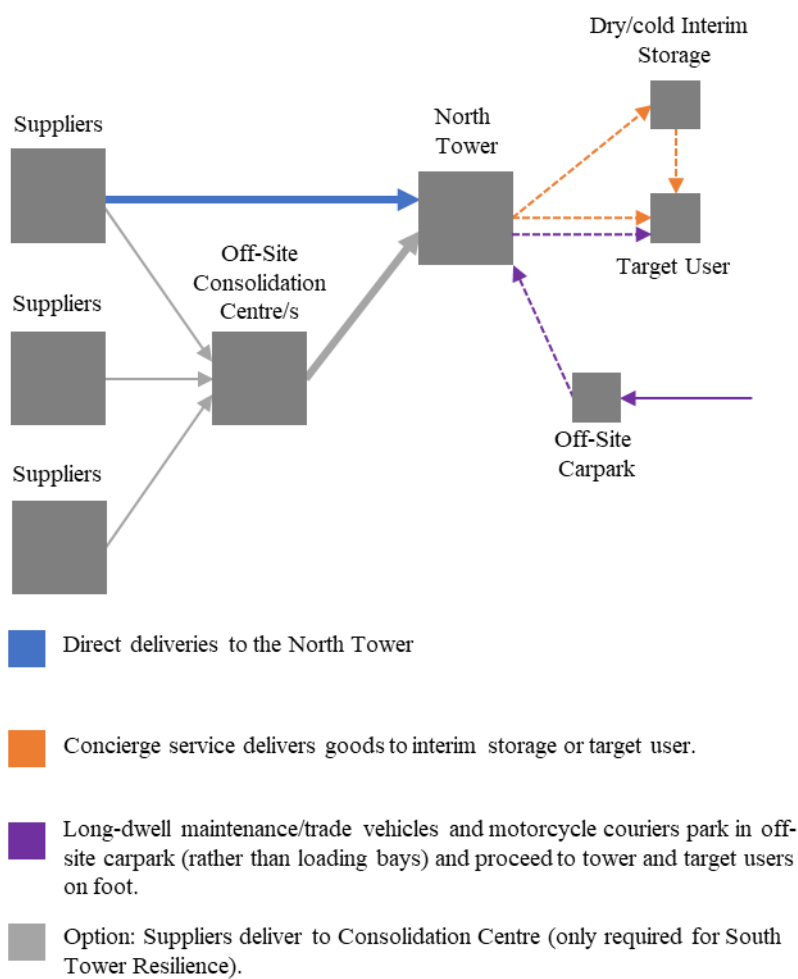


Figure 6: Logistics model indicating potential use of supply chain consolidation

4.2 Proposed Principles of an Operational Management Plan

The Operational Management Plan will equip the Facilities Operations team with the requirements for the day-to-day operations of the North Tower. The preliminary principles to be included for this approach are:

- Key processes and procedures including those needed for in the case of a risk arising (see Table 8);
- Key objectives of the logistics strategy, including vehicle reduction in the dock, reduced dwell time and an avoidance of congestion in the street and through the loading dock access route;
- Roles and responsibilities for loading dock staff including dock master and the concierge service and/or delivery runners;
- Communication protocols between building users' and the loading dock management;
- Training requirements for the management system, safety practices and vehicle marshalling;
- Key performance indicators (KPIs) including dwell times, safety and customer service;
- Procurement agreements of service providers, such as waste

5 Vehicle Demand

This section sets out the estimated number of daily deliveries and loading bay requirements for each area use within the development.

Trip generation rates are derived from survey information of similar mix-use developments to determine the number of delivery and servicing trips expected to be made to the development.

5.1 Typical Vehicle Types

Typical vehicles delivering goods to the development, including their estimated turnaround time, are shown in Table 4.

It would be expected that a development the size of the North Tower would also be serviced by larger HRV (12.5m). However, due to the constrained manoeuvring area available this is not possible and an MRV is the maximum size design vehicle provisioned for; as is common in CBD loading docks.

Table 4 Servicing and delivery vehicle types and turnaround times

Servicing and delivery vehicle types and turnaround times			
Vehicle Type	Vehicle	Characteristics	Typical Turnaround Time (minutes)
Bicycle		Bicycle couriers	-
Motorcycle		Motorcycle couriers.	-
Long-stay service vehicle		Typically, does not exceed SRV specifications.	45
Small Rigid Vehicle (SRV)		Typically, 6.4m length, 4 Tonne load capacity, single rear axle and either single or dual tyres.	10 – 15
Medium Rigid Vehicle (MRV)		Typically, 8.8m length, 8 Tonne load capacity, single rear axle and dual tyres.	15 – 20

Note that while the above turnaround times are typical for the vehicle types described, a booking slot of 30 minutes has been assumed to allow for arrival time variations. The booking system is described in further detail late in this document.

5.2 Daily Delivery Trips

This section presents the assumed number of daily delivery trips for the development and the loading bay requirements to manage the daily demand.

The estimated daily trips to the site were calculated using an in-house vehicle generation tool developed to utilise Arup research and other survey information from similar mixed-use developments. The generation tool applies a delivery vehicle trip rate for each of the proposed area uses to the relevant GFA for that area use.

The trip rates, which are expressed as vehicles per 100m² GFA per day, have been derived from survey data from office, retail and other facilities, as well as relevant design guidelines and local authority regulations. The surveys recorded vehicle arrival and departure times, vehicle type and size of goods vehicle use to make the delivery.

The following assumptions have been used to determine daily number of delivery trips:

- 0.18 vehicles/100m²/day for office/commercial deliveries;
- 0.53 vehicles/100m²/day for retail deliveries;
- 2.20 vehicles/100m²/day for restaurant/café deliveries;
- Station loading dock bays provided within North Tower and provides sufficient capacity for Metro requirements;
- NLA figures assumed to be 85% of GFA for all areas; and
- Floor area allocated for retail is assumed to be 50% retail and 50% restaurant/café until otherwise confirmed.

The number of daily deliveries to the loading dock, based on the area schedule, have been calculated and are shown in Table 5.

Table 5: Daily deliveries

Daily deliveries		
Area Use	North Tower GFA (m2)	Daily Trips (Unconsolidated)
Office	70,224	127
Retail	1,251.5	7
Restaurant/Café	1,251.5	28
Total	72,727	162 ¹

¹ Bicycle and motorcycle couriers are excluded from trip calculations

From the daily trips rates, the minimum loading bay requirement has been calculated, and is presented in

Table 6.

Table 6: Loading bay requirement

Loading bay requirement			
Vehicle	Min. Loading Bay Size (m)	Arup Calculated Requirement	No. Provisioned
MRV	W3.5 x L8.8	3	3
SRV	W3.5 x L6.4	3	3
Total		6	6¹

¹ 3 SRV, 3 MRV bays in North Tower loading dock. Excludes loading bay designated for exclusive use of Sydney Metro

Assuming a 30-minute booking slot provided for each vehicle (regardless of size) and a 14-hour operating window, the capacity of the dock would exceed the minimum requirement of 162. In fact, the dock will cater for 168 trips (or booking slots) per day, or 12 per hour. The calculated demand of 162 trips/booking slots per day (11.5 trips per hour) allowing an additional level of operational flexibility.

6 Loading Dock Access

6.1 Street Entry

Entry to the North Tower loading dock is via Castlereagh Street. This is a one-way street southbound and consists of one bus lane and one traffic lane. On the both sides of the road, there are parking lanes which are mainly designated as loading bays or bus zones on weekdays. This loading dock strategy specifically excludes the utilisation of any on-street loading facilities.

Traffic control signals are located on the intersections of Castlereagh Street with Martin Place and Hunter Street. The entrance to the loading dock has been located as far as possible from the signals as shown in Figure 7.

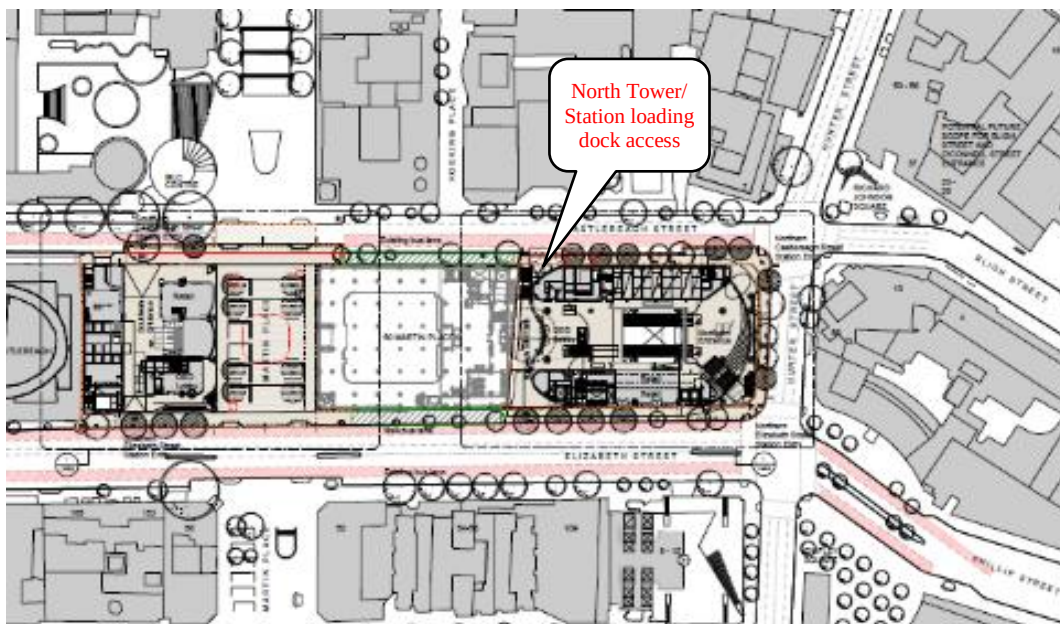


Figure 7: Loading dock entrance

6.2 Driveway

The North Tower dock driveway is approximately 10m in width (12.5m at the edge of roadway) with the footpath gradient 1:40 up to the property line. The first 2.3m of the driveway has a 1:9 gradient before levelling for 3m. A height clearance of 3.6m is provided on entry to the property and throughout the service area.

The driveway traverses a footpath, bringing vehicular and pedestrian movement paths into conflict. Safety measures to be implemented at the driveway to provide a safe environment for pedestrian and vehicle movements include the following:

- Warning signage on each side of the crossover for pedestrians and signage for drivers leaving the driveway;
- Yellow flashing warning lights, or similar, at the site boundary for pedestrians as vehicles depart the site;

- CCTV surveillance of the access with connection to the security office or the dock masters' office;
- An intercom at the entry with an audible device to talk to security;
- Mirrors to assist exiting drivers to view pedestrians on the footpath; and
- Pin code entry pad and swipe access on the boom gate

6.3 Ramp

The North Tower dock ramp width is not sufficient to accommodate two-way movements along its entire length. Therefore, a traffic control system is proposed to ensure only one vehicle at a time passes the narrowest section of the ramp. This will take the form of a combined boom gate/traffic light system for vehicles entering and a traffic light for vehicles exiting.

Insofar as operationally possible, priority will be given to vehicles entering the site in order to reduce the risk of vehicle queuing occurring on entry. The potential for queuing, however, is further mitigated by the operation of a booking system.

The gradient of the main ramp is 1:6.5 which is the maximum recommended under AS2890.2, with 1:9 transitions for 5m at both ends of the ramp, and a further 1:25 transition at the bottom end of the ramp. This will ensure that the required clearance of 3.6m is met.

7 Loading Dock Operation

7.1 Operations Management

The loading dock will be managed by the Facilities Manager in accordance with the requirements outlined in this document. The loading dock will have a dock master on-site during the hours of operation to coordinate the safe movement of goods, vehicles and personnel within the loading dock area.

A concierge service or delivery runner will operate with personnel tasked with the onward movement of goods from loading dock areas to interim storage or target users.

The principal facilities and areas for the operation of the loading dock are presented in Figure 8 and Figure 9.

Further detail on the distribution routes for goods from the loading dock throughout the tower are presented in Appendix B.

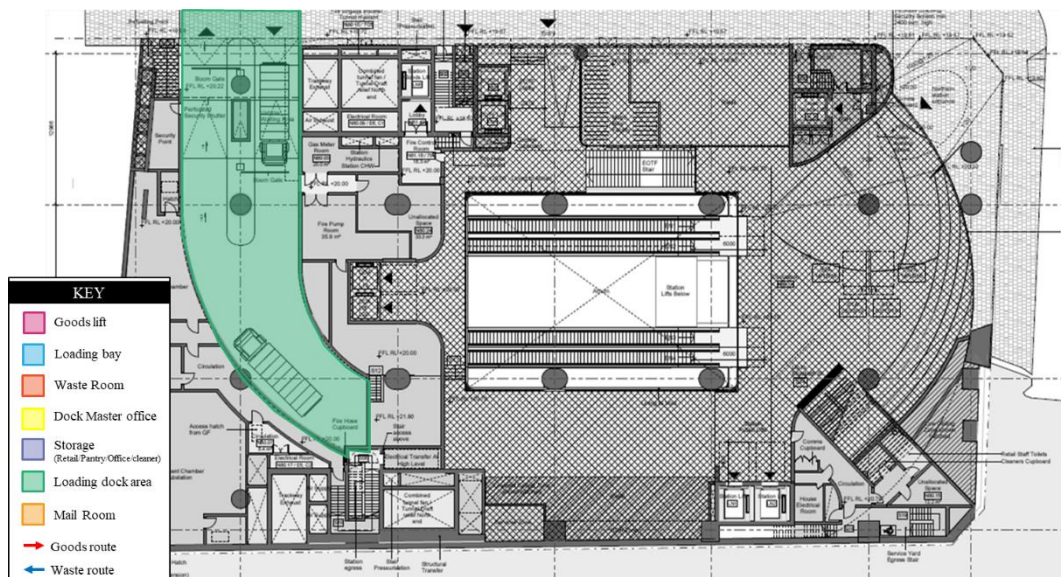


Figure 8: LG level loading dock facilities

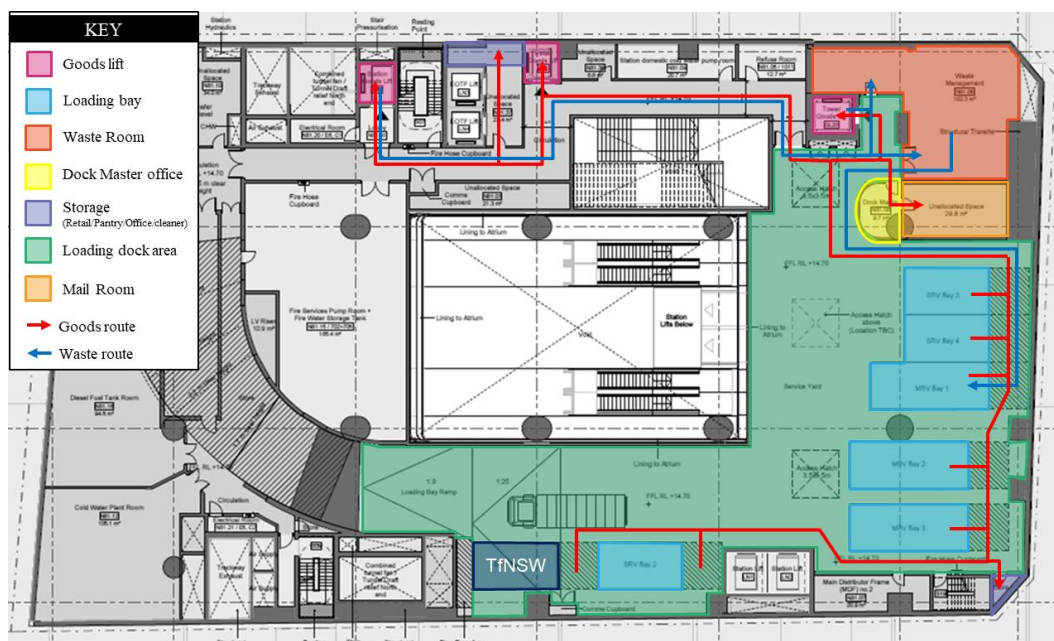


Figure 9: B1 level loading dock facilities

A loading dock Operational Management Plan will be developed at a later stage to equip the facilities operations team with the requirements for the day-to-day operations of the North Tower.

7.2 Delivery and Servicing Arrangements

A range of items will be demanded by tenants in the development. Table 7 describes how deliveries and servicing arrangements will be managed by the type of goods demanded.

Table 7: Potential Delivery arrangements by goods type should a consolidation approach be introduced to the loading dock management system

Potential Delivery arrangements	
Goods Type	Arrangement
Retail goods	50% of retail deliveries will be consolidated and received to the loading dock.
Food and beverage (cold/fresh)	50% of cold/fresh goods are consolidated through supply chain. Deliveries are received to the loading dock.
Food and beverage (dry)	50% of food and beverage deliveries (dry) will be consolidated and deliveries are received to the North Tower dock then driven to South Tower loading dock by same vehicle ('milk run').
Office goods	70% of daily consumables will be consolidated and deliveries are received to the loading dock.
Exhibition/auditorium goods/equipment	Deliveries received out of hours. Booking required.
Bulky/exceptional goods, i.e. construction supplies (fit-outs) and waste removal	Outside of operating hours by prior arrangement and booking.

Sydney Metro deliveries/collections	Exclusive-use loading bay provided. Booking required.
Motorcycle courier deliveries/collections	Redirected off-site to nominated local carpark
Bicycle courier deliveries/collections	Bicycle couriers will use the End of Trip Facilities (EOTF) for access to the tower. They may park their bicycle using on street parking or at the entrance of the EOTF.
Mail	Received by the North Tower loading dock for target users in the North Tower. Booking required.
Personal goods (e.g. flowers or online packages)	No personal deliveries will be allowed to enter the site, these deliveries will be redirected off-site (e.g. to preferred carrier, consolidation centre, or package lockers), unless other arrangements are made by the tenants/occupants.
Long-dwell vehicles (e.g. servicing, trades and maintenance)	Long term deliveries will be re-directed to a nominated local carpark (suitable for the relevant vehicle) unless there is an urgent maintenance or repair requiring an onsite vehicle.

7.3 Hours of Operation

The loading dock will be available 24 hrs per day, with an operational window of 14 hours per day – 5am to 7pm – 7 days per week. This period has been selected to allow for operational flexibility in the timing of deliveries with non-priority deliveries retimed to lower demand periods. Should efficiencies arise and be achieved once operational, then this operating window may be reduced.

On occasion, it will be necessary to receive deliveries (e.g. for exhibitions, building materials, plant and other equipment) and removal of builders' waste out of hours. The provision of access outside of operational hours will be at the discretion of, and special arrangement by, the Facilities Manager who may grant access as required. Booking via the booking system will be required.

7.4 Booking System

In order for the tower to be adequately serviced, a delivery booking system will be utilised. The major benefit of the implementation of such a system is demand levelling and reducing loading bay requirement. The allocation of deliveries to timeslots prevents a 'peak hour' for delivery vehicles occurring at the loading dock, which can lead to congestion, delays and incidents. It also largely mitigates the risk of vehicle queues forming to enter the site, blocking the flow of traffic on Castlereagh Street. It has been assumed that flexibility to the dock operations has been provided by allowing an increased maximum dwell time for from 20 minutes to 30 minutes booking slots will operate for the docks and that the Station loading bay, within the North Tower, will also be subject to pre-booking.

The implementation of this system also aims to streamline internal logistics (the onward goods distribution from the loading dock to target users), as the input of goods to the dock is known in advance and sufficient manual handling equipment and resources can be planned to meet demand. As the strategy is based on an on-line booking system, the suppliers will be required to deliver according to the

scheduled times. Should a vehicle arrive outside the scheduled window, the Dock Master will have the discretion to re-schedule or accept the vehicle if there is space available. The Dock Master will also have the discretion to re-schedule the use of MRV bays for SRVs as the need arises. The Dock Master will also shorten or lengthen the dwell time dependent on the goods being delivered.

7.4.1 Typical Operation

There are a number of commercial delivery booking systems available. The functionality of a typical system is outlined below:

A delivery or service vehicle operator logs a delivery or service requirement with the loading dock through an online/mobile app and selects from a list of available timeslots. The delivery or service vehicle operator is provided with:

- The loading dock entry address and allocated a loading bay for delivery;
- A security code to be used at the entrance to the dock for access;
- Contact information for the dock operator and instructions if a timeslot is unable to be met;
- The vehicle operator is sent a reminder notification or text message to alert them that their timeslot is upcoming; and
- Upon arrival at the correct dock, the vehicle operator uses the security code provided to gain access to the site, unload goods or provide service, and uses the code to leave the dock area.

7.4.2 Examples

There are numerous examples of managed loading docks in the Sydney CBD. Two examples are as follows:

Barangaroo

- Precinct style dock serving entire Barangaroo development.
- Bookings made in advance through Bestrane.
- No booking = no entry!
- Vehicles are pre-allocated a space within the loading dock based on the building they are servicing and the size of the vehicle.
- Dock master on site between 6am and 6pm, however 24-hour access to the dock is provided.
- Centralised precinct courier / mail room located within the dock.

200 George Street

- Concierge directs all deliveries through to loading dock.
- Bookings for deliveries made in advance through 'Scatter' system. This is associated with availability of the goods lift rather than the spaces within the dock.

- No booking required for couriers. Most of them are known to the dock master who simply directs them to their space.
- Separate contractor parking on B1 (bookings required).
- Dock master on site between 6.30am and 6.30pm.
- Bookings only from 7pm.

7.5 Access Control

The North Tower will maintain a consistent procedure for controlling access to the loading docks.

Outside of operating hours, vehicular and personnel access to the loading dock will be controlled by a roller shutter door.

During operating hours (when security and dock master are present), the roller door will remain open and boom gates will control vehicular access into and out of the loading dock.

Access will be granted only to those vehicles that are booked via the loading dock booking system. Signage to this effect will be displayed prominently at the loading dock entrance to deter entry attempts by unbooked vehicles.

Depending on the software used, drivers will either receive a code which they will be able to use at the boom gate to access the site and will be directed to their pre-booked space by the dock master. Alternatively, they will communicate with the dock master via intercom before being granted access and being directed to their pre-booked space.

The North Tower will include a traffic control system to facilitate the movement of vehicles along the ramp. This traffic light system will facilitate the two-way movement of traffic via a system that is based on sensors and traffic lights.

Vehicles may be refused entry for reasons such as arriving before or after their allocated time slot, not having a booking or entering the driveway by mistake. Rejected vehicles will not be granted entry into the loading dock. Should a vehicle be refused entry at the boom gate (via intercom communication with the dock master), they will be required to wait until met by the dock master or security personnel. The dock master/security personnel will stop the passage of pedestrians on the footpath and instruct the driver of the vehicle to reverse safely on to Castlereagh Street and move away.

7.6 Waste Collection

Waste and recycling will be collected outside of operational hours to ensure minimal impact on the operation of loading dock. Waste bins will be provided, moved to the loading dock area after hours by the facilities management team and stored in one loading bay ready for collection. The waste contractor will collect the bins before commencement of the dock operations. The facilities management team will return the bins to the waste room.

The waste management contractors will be employed to collect refuse from the site using vehicles that will not be restricted by the height of the Loading Dock.

7.7 Loading Dock Management

The loading dock makes provision for a dock master office. This typically houses a desk and chair, computer equipment, small amount of interim storage and other facilities required for the dock master to perform their duties.

The dock master will ensure the loading dock (including designated safe walking routes) are kept clear of goods at all times and ensure delivery vehicles strictly adhere to their allotted booking slot. Any vehicles overstaying their booking will be moved on to ensure later bookings are not affected.

The current layout for the North Tower loading dock provides 3m of clear space behind each loading bay to allow for tail lifts and for the offloading of goods. Safe routes for the movement of people and goods between the loading bays and goods lifts that avoid vehicle manoeuvring areas have also been designated. Pavement markings will be required to indicate safe access for people and delivery movement through the loading dock area.

Incidents occurring within the loading dock area, or at the loading dock entrance, will be managed in accordance with the Precinct Wide Incident Management Plan.

As this LDMP outlines the approach and strategy, a detailed Loading Dock Operational Management Plan with processes and procedures will be developed in readiness for day one of operation of the North Tower. The Loading Dock Management Plan will include requirements for the supply chain and provide mitigation strategies for identified risks to the South Tower loading dock operations.

7.8 Associated Infrastructure

This section describes the associated infrastructure required for the loading dock to operate effectively.

7.8.1 Interim Goods Storage

Space has been provided in the loading dock area for the temporary storage of goods that have been delivered and are waiting to be moved to their final destination. The concierge service will manage the interim storage rooms.

7.8.2 Mail Room

The tower includes a mail room (located at B1 level) for the receipt and sortation of mail, see Figure 9.

7.8.3 Goods Lifts

Direct access has been provided for the movement of goods from the loading docks to the goods lifts. From the lifts, goods will be distributed to target users.

The North Tower loading dock will utilise three (3) goods lifts for vertical circulation with selection depending on the final destination of the goods (identified in Figure 9). The lifts are the:

- Station Goods Lift (LN6). For use by Sydney Metro operations and OSD by arrangement;
- Retail Goods Lift (LN5); and
- Tower Goods Lift (GL20).

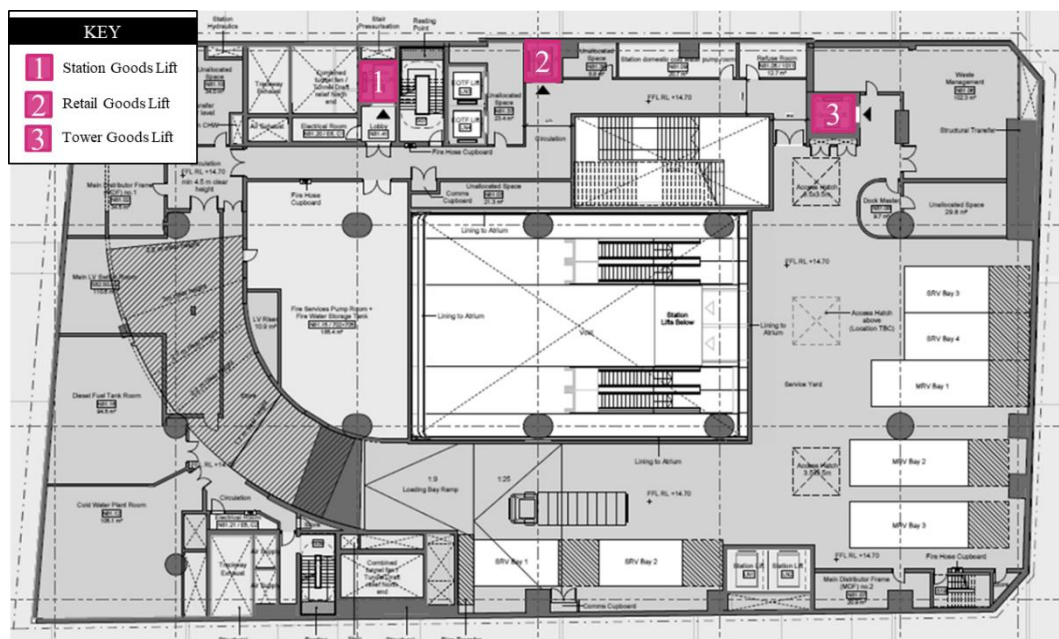


Figure 10: Location of goods lifts within Basement

7.9 Risk and Mitigation Strategies

7.9.1 Risks

A degree of *flexibility* has been built in to the assumptions used in this plan. For example, 30mins booking slots have been assumed to allow for variations in arrival times of vehicles even though turn-around times are typically 15-20mins. A 14-hour operating window has been designated to provide the flexibility to retime lower priority deliveries to quieter parts of the day.

7.9.2 Mitigation Strategies

To test the logistics and loading dock management strategy, several incidents have been considered for the loading dock. In each case, operational procedures are proposed to maintain the flow of deliveries into the docks. Mitigation strategies

have been prepared to address identified risks. The mitigation strategies are as shown below:

Table 8: Mitigation Strategies for potential risks

Mitigation Strategies for potential risks	
Incident and Impact	Response
Blocked access - A vehicle has broken down at the entrance driveway to the loading dock and cannot be moved. This has prevented other service vehicles accessing the loading docks.	A towing service will be called immediately to remove the vehicle. Deliveries will be re-timed through the dock management system. Carriers will be advised by text message of the changed time slot.
Blocked access – The roller shutter door has failed to open blocking the entry or exit. This has prevented service vehicles entering or exiting the loading docks.	A maintenance worker will be called immediately to fix the roller shutter door. An authorised traffic controller will be called onto the site to allow for vehicles to enter and exit the facility the using the exit or entry lane. Deliveries will be re-timed through the dock management system until the traffic controller is onsite. Carriers will be advised by text message of the changed time slot.
Blocked access – The boom gate has failed blocking the entry or exit to the dock. This has prevented service vehicles from entering the site.	A maintenance worker will be called immediately to fix the boom gate. An authorised traffic controller will be called onto the site to allow for vehicles to enter and exit the facility the using the exit or entry lane. Deliveries will be re-timed through the dock management system until the traffic controller is onsite. Carriers will be advised by text message of the changed time slot.
Delivery outside of booking slot - A vehicle has arrived at the entrance to the loading dock without a booking. This has temporarily blocked access for booked vehicles.	The driver will communicate via intercom with dock master. Option 1 - The Dock Master will have discretion to allow entry if there is available capacity either during peak hours or non-peak hours. Option 2 - If there is no available capacity within the dock the driver will be asked to turn vehicle away, assisted by the dock master to move away safely. The dock master will be appropriately trained and equipped to do this task.
Balance of MRVs and SRVs – There are more MRVs requiring access to the site than SRVs.	Should the tenancy mix require a change in the split of MRVs and SRVs entering the site, the Dock Master will have the option to reallocate time slots allowing shorter dwell times for specific deliveries and then creating additional slots, or extend the hours of operation beyond 5:00am to 7:00pm.
Driver taking too long to deliver - A driver has had an issue making a delivery and has exceeded the delivery slot allocated. This will impact other vehicles arriving for their booked timeslot and delay the daily operation.	The dock master will be responsible for monitoring delivery timeslots and moving on slow drivers. This will be further mitigated by drivers not leaving the loading dock area, with a concierge service or delivery runner, responsible for the onward movement of goods from loading dock/interim storage to target user.

Mitigation Strategies for potential risks	
Incident and Impact	Response
Urgent access - A burst water pipe has occurred within the South Tower loading dock requiring urgent access for responders. The plumbing contractor vehicle requires exclusive use of the loading dock for some time in order to resolve the issue. This has prevented other service vehicles accessing the South Tower loading dock, requiring the North Tower loading dock to provide resilience for the South Tower..	A plumbing contractor will be called immediately to respond to the issue. Critical deliveries (e.g. fresh produce) will be directed to the North Tower loading dock, non-critical deliveries will be re-timed through the dock management system. Non-critical North Tower deliveries will be retimed to free capacity if required. Carriers will be advised by text message of the changed location and time for delivery. Goods will be moved from the North Tower dock to South Tower users through the pedestrian link under 50 Martin Place, public street level thoroughfares or via the consolidation centre vehicle.

7.10 Swept Path Analysis

Swept path analysis has been conducted to ascertain whether the arrangement of the loading dock is able to accommodate the manoeuvring and parking of service vehicles requiring access.

The swept path analysis was conducted for the following vehicle sizes:

- Medium Rigid Vehicle (MRV); and
- Small Rigid Vehicle (SRV)

The vehicles used for the tracking were Austroads 2013 design vehicles, provided in the vehicle library of the vehicle tracking software. The swept path analysis drawings are appended to this report.

8 Agency Consultations

The table below summarises the agency consultations that were held throughout 2018. Table 9 details the queries of various stakeholders throughout the development of this Loading Dock Management Plan and documents the comments and mitigation measures that Arup provided to address the concerns raised. The relevant agencies involved in these consultations consisted of Savills, the Sydney Coordination Office, the City of Sydney, Macquarie Capital, Lendlease and Arup.

Table 9 Summary of Agency Consultations

Date	Attendees	Purpose	Issue	Comments & Mitigation
30-04-18	Holly Rhoades (Savills) Stephanie Ballango (Savills) Alex Prenzel (Savills) Michael Stokoe (SCO) Matt Hazard (SCO) Phil Ransom (MacCap) Anthony Henry (MacCap) Angela Roche (Lendlease) Peter Scuderi (Arup) Chris Boge (Arup) Libby Ashton (Arup) Nick Suslak (Arup)	Meeting with Sydney Coordination Office to review the Stage 2 SSDA over station development Loading Dock Management Plans for the North and South sites	1. SCO requested to see scenarios of the docks during incidences. 2. SCO were concerned that the North Tower required more bays, as their in-house tool suggested the Arup recommendation was not sufficient. 3. SCO were concerned that suppliers would park in the street if they can't get to the loading dock. 4. SCO queried the procedure of goods distribution throughout the facility.	1. Arup provided detailed contingency arrangements to provide resilience for the North Tower loading dock for various scenarios. 2. The Arup tool has been developed using research from facilities which are similar to this development, thus these calculations are considered to be justifiable. 3. Strict processes and procedures will need to be upheld by the dock master, security and FM staff. 4. Further detail was provided regarding goods distribution to various users such as food and beverage, retail and personal deliveries, waste arrangements, handling of trades, consolidated deliveries and interim storage.

Date	Attendees	Purpose	Issue	Comments & Mitigation
24-05-18	Michael Stokoe (SCO) Matt Hazard (SCO) Katherine McCray (SCO) Angela Roche (Lendlease) Megan Rolls (Lendlease) Peter Kazaglis (Lendlease) Toni Blume (Lendlease) Phil Ransom (MacCap) Alex Prenzel (Savills) Holly Rhoades (Savills) Peter Scuderi (Arup) Andrew Hulse (Arup) Libby Ashton (Arup)	Meeting with the SCO to discuss the progress made on the LDMP for both the North and South towers. Arup presented two options: a. Separate towers b. One precinct These options were used as discussion themes in the meeting.	1. Dwell time was discussed, it was agreed that extra resilience was required for the vehicle dwell times. 2. It was agreed that on-site logistics management would be required to manage deliveries. 3. Arup and SCO agreed that for consolidation and resilience purposes that option B is the best approach.	1. A degree of resilience has been built in to the delivery booking slots, 30min booking slots have been assumed to allow for variations in the arrival times of vehicles. 2. The proposed operation of the dock is highly managed, employing an on-site dock master and concierge service to ensure goods are received and moved to target users in a safe and efficient manner. 3. A precinct wide approach was adopted, though Option A was subsequently adopted with the North Tower providing the South Tower with resiliency when responding to various incidents (see Table 8).
25-07-18	Phil Ransom (Macquarie) Michael Stokoe (SCO) Alex Prenzel (Savills) Stephen Spacey (Sydney Metro) Peter Scuderi (Arup)	Meeting with Macquarie to discuss the vehicle Logistics Strategy and loading docks for the North and South towers.	1. SCO held concerns regarding the operational effectiveness of the fully managed docks 2. Sydney Metro queried the procedures that will be in place to ensure the security levels are maintained and that unauthorised and potentially dangerous vehicles are not provided with access.	1. The LDMP highlights the importance of trained dock master and their role in the effective management of the loading docks. All deliveries must be booked in (and screened for security) via the computerised loading dock management system, if vehicles that do not have a booking arrive at the loading dock they will be turned away by the dock master. 2. Depending on the software used, drivers will either receive a code which they will be able to use at the boom gate to access the site and will be directed to their pre-booked space by the dock master. Alternatively, they will communicate with the dock master via intercom before being granted access and being directed to their

Date	Attendees	Purpose	Issue	Comments & Mitigation
				pre-booked space. For more information see section 7.5.

9 Conclusion

As has been demonstrated in this LDMP, the North Site loading dock has been designed to deliver an efficient operation while minimising its impact on city infrastructure.

Operationally, it demonstrates that sufficient vehicle manoeuvring envelopes and capacity exists for the level of demand that the development is expected to generate. The proposed operation of the dock is highly managed, employing a pre-booking system, on-site dock master and concierge service or delivery runner to ensure goods are received and moved to target users in a safe and efficient manner.

The plan requires no use of on-street loading bays, minimises the risks of vehicles queuing onto Castlereagh Street and disrupting traffic flows, proposes measures to minimise the risk of vehicle-pedestrian collisions at the driveway-footpath interface and outlines mitigation strategies to be employed should disruption to operations occur. As such, risks of impacts to the city have been mitigated insofar as possible. For these reasons, the LDMP meets the requirements of SEARS and conditions of SSDA Stage 1.

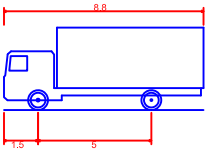
Appendix A

Swept Path Analysis



- Legend
- Body Envelope
 - 300mm Envelope
 - 600mm Envelope
 - Wheel Envelope

Design Vehicle(s)



MRV - Medium Rigid Vehicle
Overall Length 8.800m
Overall Width 2.500m
Overall Body Height 3.633m
Min Body Ground Clearance 0.428m
Track Width 2.500m
Lock to Lock Time 4.00 sec
Curb to Curb Turning Radius 10.000m

D	28/02/18	JRT	AMH	AMH
Base drawings issue 25/01/18				
C	12/02/18	JRT	AMH	AMH
Base drawings issue 25/01/18				
B	18/08/17	JRT	AMH	AMH
Western turntable added				
A	12/04/17	JRT	AMH	AMH
For Information				
Issue	Date	By	Chkd	Appd

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Client
Grimshaw

Job Title
SMMPS
North Tower

Drawing Title
Turning Paths
Main access

Scale at A3
1:200

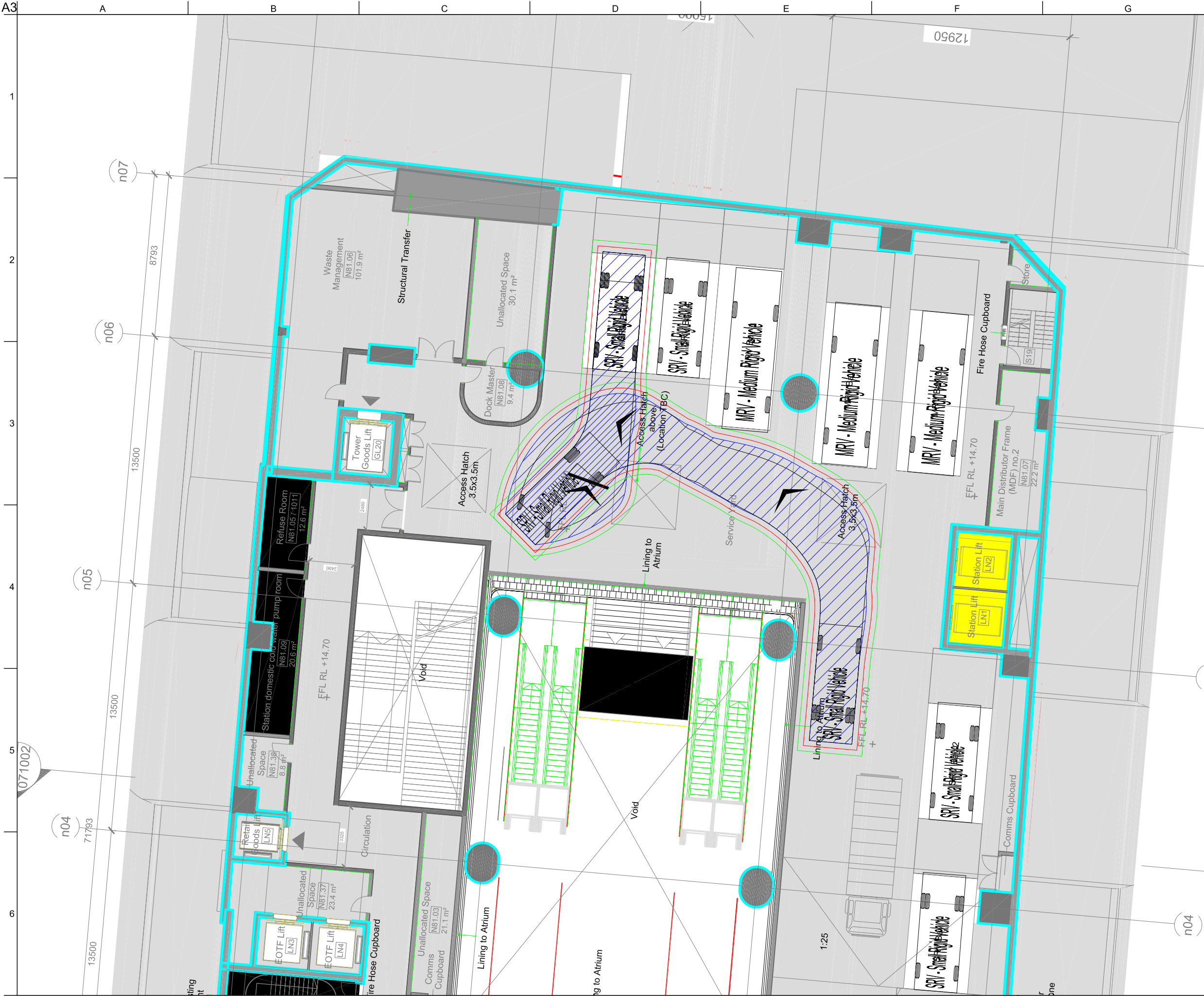
Discipline
Transport

Drawing Status
Draft

Job No
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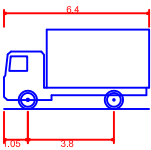
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Issue
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- Legend
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 - 300mm Envelope
 - 600mm Envelope
 - Wheel Envelope

Design Vehicle(s)



SRV - Small Rigid Vehicle
Overall Length 6.400m
Overall Width 2.330m
Overall Body Height 3.500m
Min Body Ground Clearance 0.398m
Track Width 2.330m
Lock-to-lock time 4.00s
Curb to Curb Turning Radius 7.100m

H	28/02/18	JRT	AMH	AMH
G	12/02/18	JRT	AMH	AMH
F	20/11/17	JRT	AMH	AMH
E	17/11/17	JRT	AMH	AMH
D	06/11/17	JRT	AMH	AMH
C	31/10/17	JRT	AMH	AMH
B	18/08/17	JRT	AMH	AMH
A	31/05/17	JRT	AMH	AMH
Issue	Date	By	Chkd	Appd

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Client
Grimshaw

Job Title
SMMPS
North Tower

Drawing Title
Turning Paths
Loading dock
North-western bay

Scale at A3
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Discipline
Transport

Drawing Status
Draft

Job No
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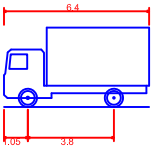
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Issue
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 - Wheel Envelope

Design Vehicle(s)



SRV - Small Rigid Vehicle
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Overall Width 2.330m
Overall Body Height 3.500m
Min Body Ground Clearance 0.398m
Track Width 2.330m
Lock-to-lock time 4.00s
Curb to Curb Turning Radius 7.100m

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Client
Grimshaw

Job Title
SMMPs
North Tower

Drawing Title
Turning Paths
Loading dock
Northern bay

Scale at A3
1:200

Discipline
Transport

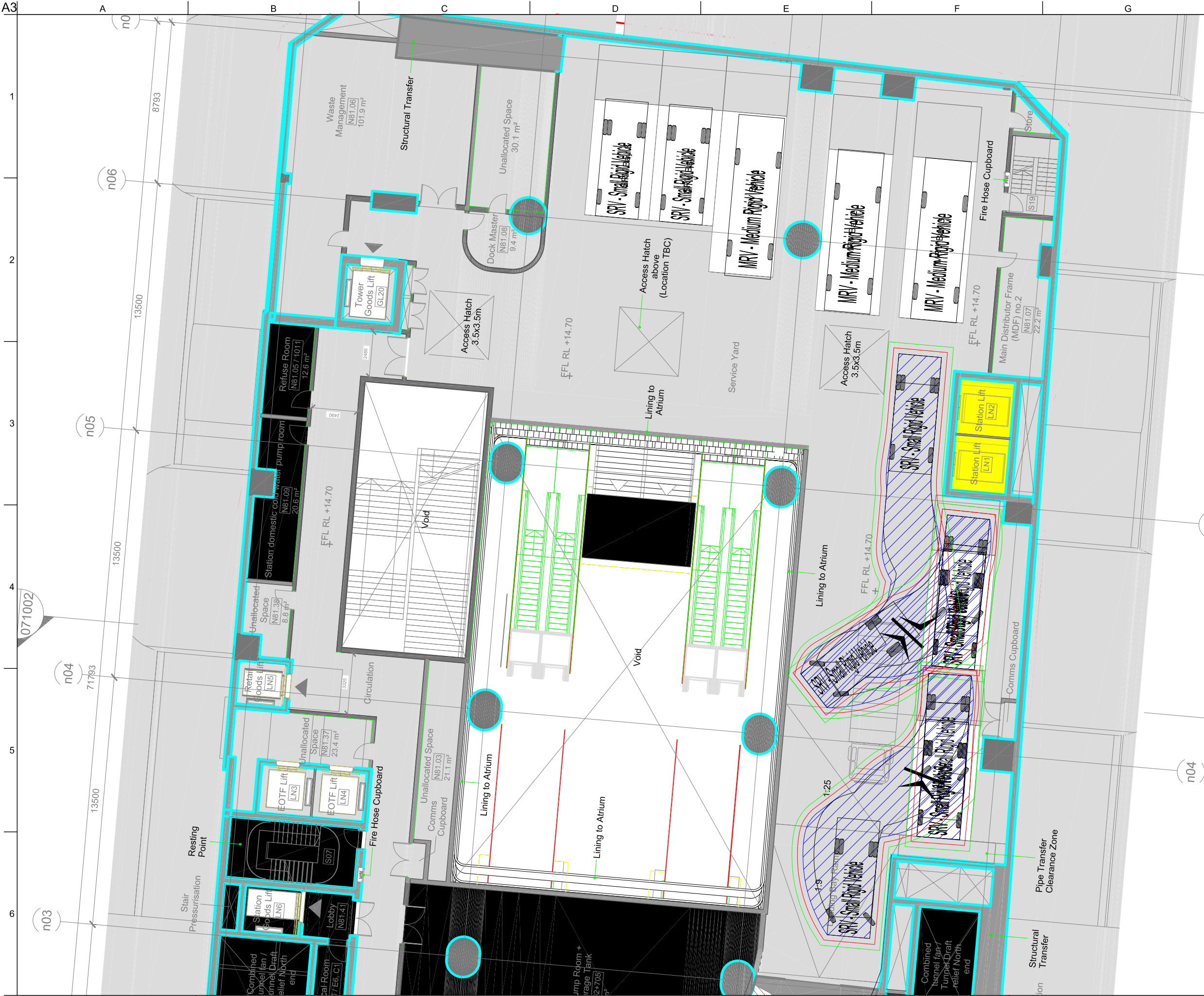
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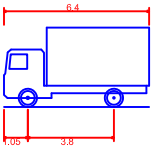
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Issue
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 - 300mm Envelope
 - 600mm Envelope
 - Wheel Envelope

Design Vehicle(s)



SRV - Small Rigid Vehicle
Overall Length 6.400m
Overall Width 2.330m
Overall Body Height 3.500m
Min Body Ground Clearance 0.398m
Track Width 2.330m
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Client
Grimshaw

Job Title
SMMPs
North Tower

Drawing Title
Turning Paths
Loading dock
Eastern bays

Scale at A3
1:200

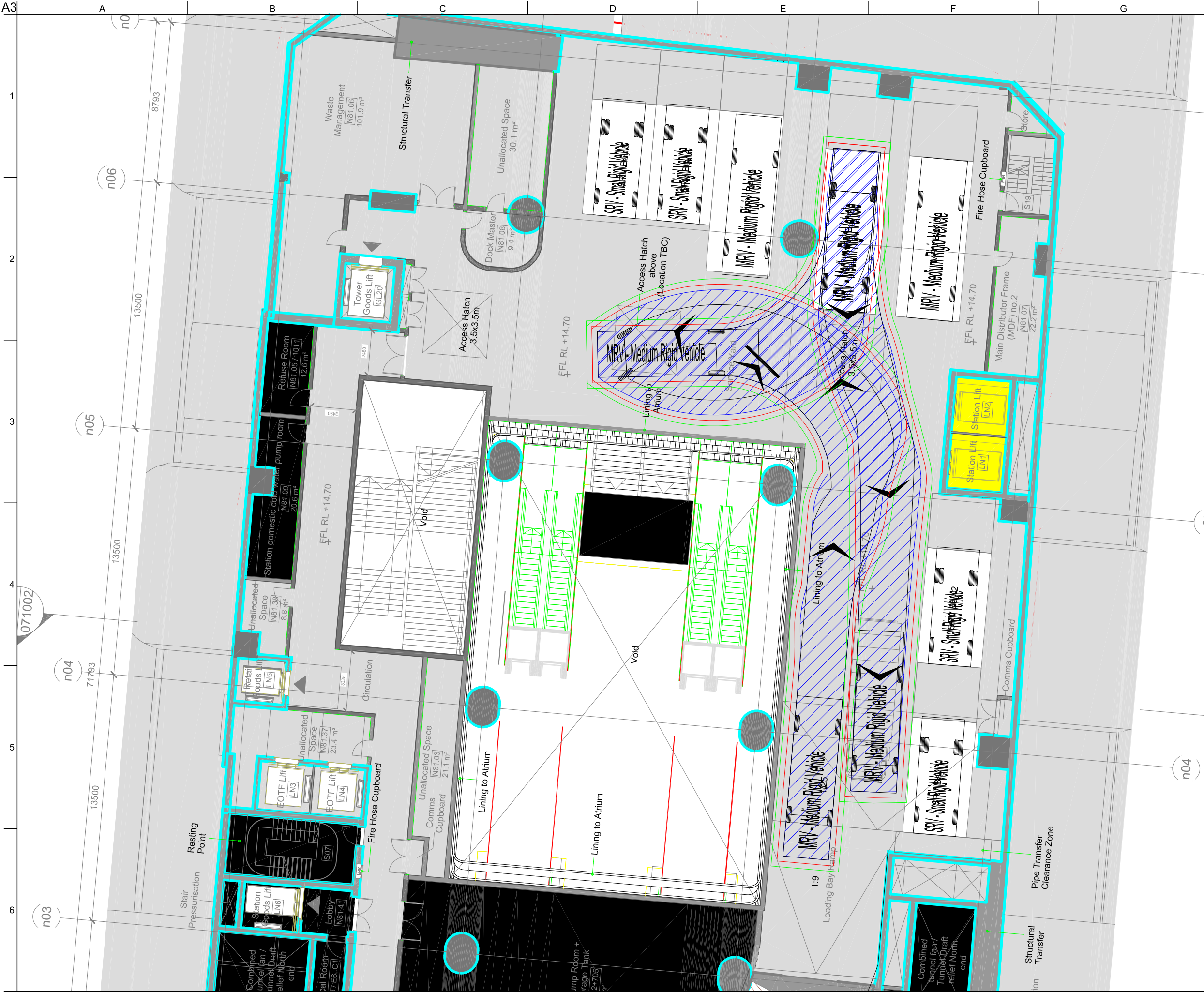
Discipline
Transport

Drawing Status
Draft

Job No
247838

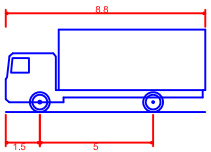
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Issue
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- Legend
- Body Envelope
 - 300mm Envelope
 - 600mm Envelope
 - Wheel Envelope

Design Vehicle(s)



MRV - Medium Rigid Vehicle
Overall Length 8.800m
Overall Width 2.500m
Overall Body Height 3.633m
Min Body Ground Clearance 0.428m
Track Width 2.500m
Lock to Lock Time 4.00 sec
Curb to Curb Turning Radius 10.000m

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Client
Grimshaw

Job Title
SMMPS
North Tower

Drawing Title
Turning Paths
Loading dock
Northern MRV 1

Scale at A3
1:200

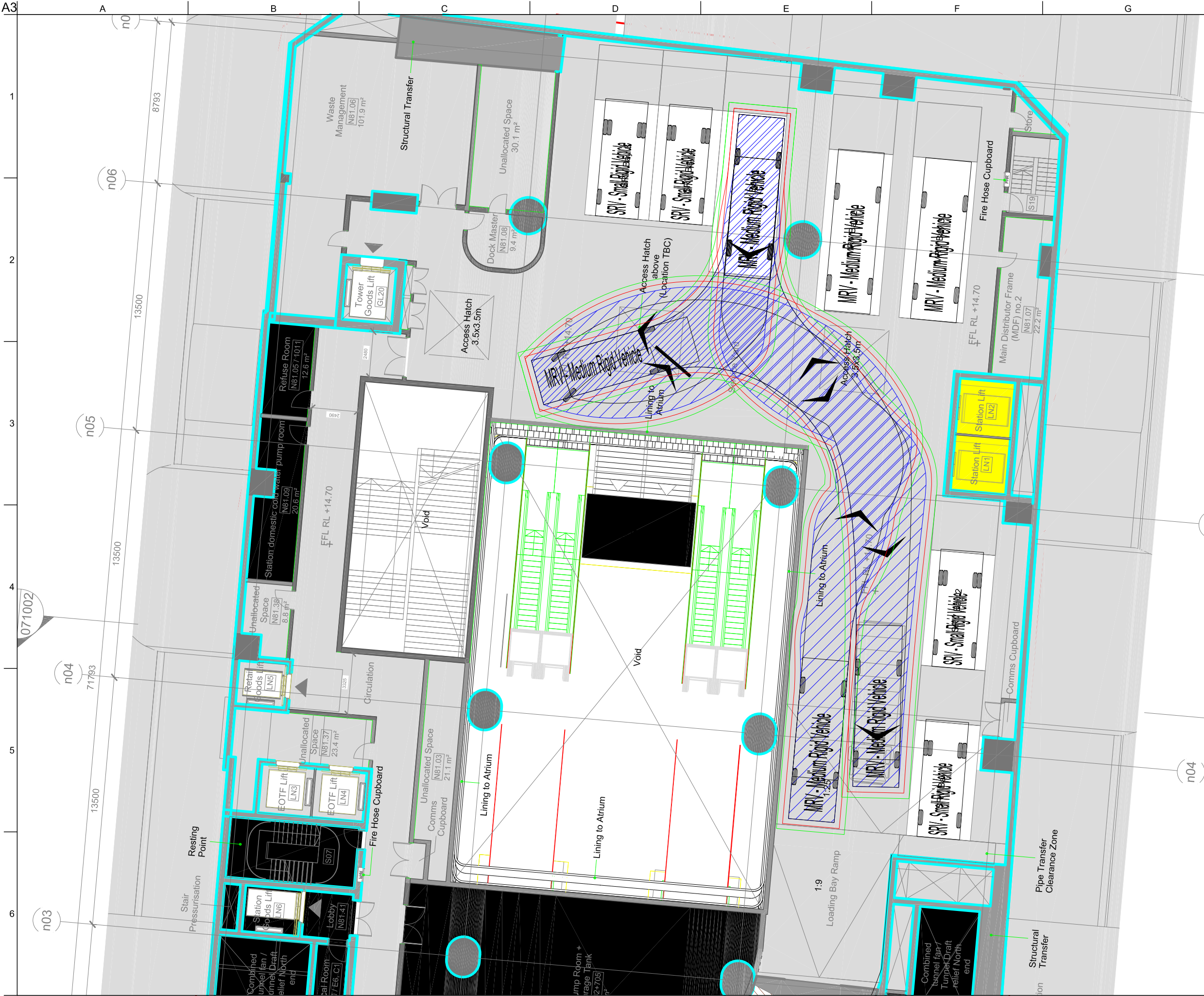
Discipline
Transport

Drawing Status
Draft

Job No
247838

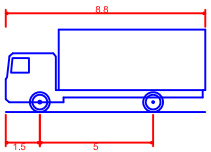
Drawing No
SKT105

Issue
H



- Legend**
- Body Envelope
 - 300mm Envelope
 - 600mm Envelope
 - Wheel Envelope

Design Vehicle(s)



MRV - Medium Rigid Vehicle
Overall Length 8.800m
Overall Width 2.500m
Overall Body Height 3.633m
Min Body Ground Clearance 0.428m
Track Width 2.500m
Lock to Lock Time 4.00 sec
Curb to Curb Turning Radius 10.000m

H	28/02/18	JRT	AMH	AMH
G	12/02/18	JRT	AMH	AMH
F	20/11/17	JRT	AMH	AMH
E	17/11/17	JRT	AMH	AMH
D	06/11/17	JRT	AMH	AMH
C	31/10/17	JRT	AMH	AMH
B	18/08/17	JRT	AMH	AMH
A	31/05/17	JRT	AMH	AMH
Issue	Date	By	Chkd	Appd

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Client
Grimshaw

Job Title
**SMMPs
North Tower**

Drawing Title
**Turning Paths
Loading dock
Northern MRV 3**

Scale at A3
1:200

Discipline
Transport

Drawing Status
Draft

Job No
247838

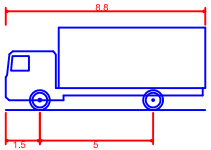
Drawing No
SKT106

Issue
H



- Legend
- Body Envelope
 - 300mm Envelope
 - 600mm Envelope
 - Wheel Envelope

Design Vehicle(s)



MRV - Medium Rigid Vehicle
Overall Length 8.800m
Overall Width 2.500m
Overall Body Height 3.633m
Min Body Ground Clearance 0.428m
Track Width 2.500m
Lock to Lock Time 4.00 sec
Curb to Curb Turning Radius 10.000m

J	28/02/18	JRT	AMH	AMH
I	12/02/18	JRT	AMH	AMH
H	20/11/17	JRT	AMH	AMH
G	17/11/17	JRT	AMH	AMH
F	10/11/17	JRT	AMH	AMH
E	06/11/17	JRT	AMH	AMH
D	31/10/17	JRT	AMH	AMH
C	18/08/17	JRT	AMH	AMH
B	02/06/17	JRT	AMH	AMH
A	31/05/17	JRT	AMH	AMH
Issue	Date	By	Chkd	Appd

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Client
Grimshaw

Job Title
SMMPS
North Tower

Drawing Title
Turning Paths
Loading dock
Northern MRV 2

Scale at A3
1:200

Discipline
Transport

Drawing Status

Draft

Job No
247838

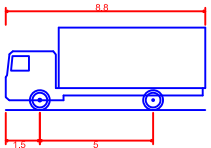
Drawing No
SKT107

Issue
J



- Legend
- Body Envelope
 - 300mm Envelope
 - 600mm Envelope
 - Wheel Envelope

Design Vehicle(s)



MRV - Medium Rigid Vehicle
Overall Length 8.800m
Overall Width 2.500m
Overall Body Height 3.633m
Min Body Ground Clearance 0.428m
Track Width 2.500m
Lock to Lock Time 4.00 sec
Curb to Curb Turning Radius 10.000m

I	28/02/18	JRT	AMH	AMH
H	12/02/18	JRT	AMH	AMH
G	20/11/17	JRT	AMH	AMH
F	17/11/17	JRT	AMH	AMH
E	06/11/17	JRT	AMH	AMH
D	31/10/17	JRT	AMH	AMH
C	18/08/17	JRT	AMH	AMH
B	02/06/17	JRT	AMH	AMH
A	31/05/17	JRT	AMH	AMH
Issue	Date	By	Chkd	Appd

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Client
Grimshaw

Job Title
SMMPS
North Tower

Drawing Title
Turning Paths
Loading dock
Garbage loading options

Scale at A3
1:250

Discipline
Transport

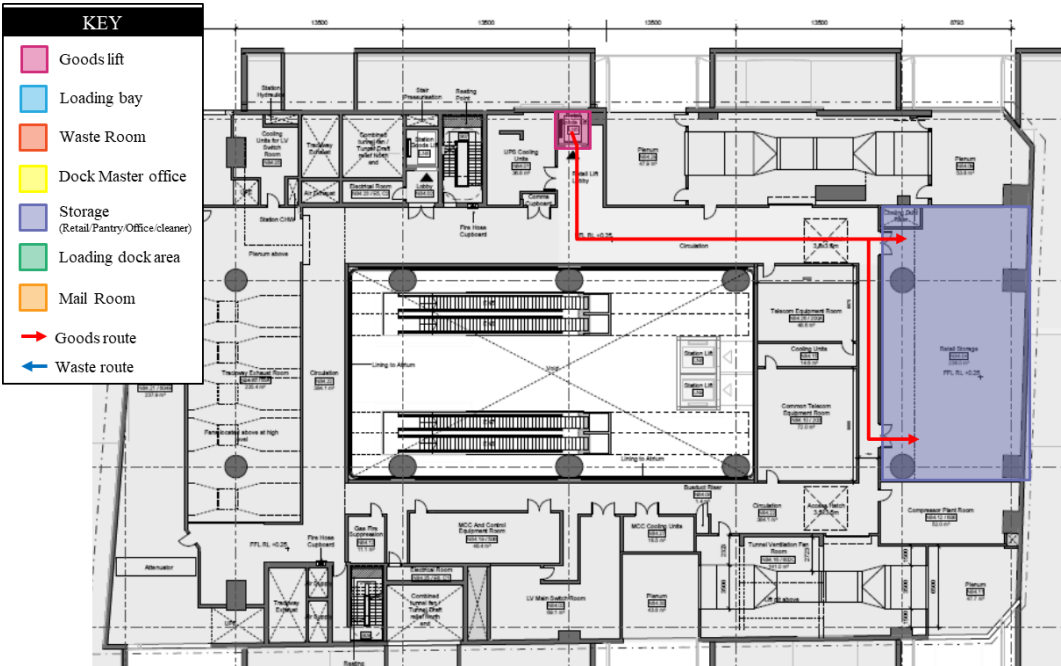
Drawing Status
Draft

Job No 247838	Drawing No SKT108	Issue I
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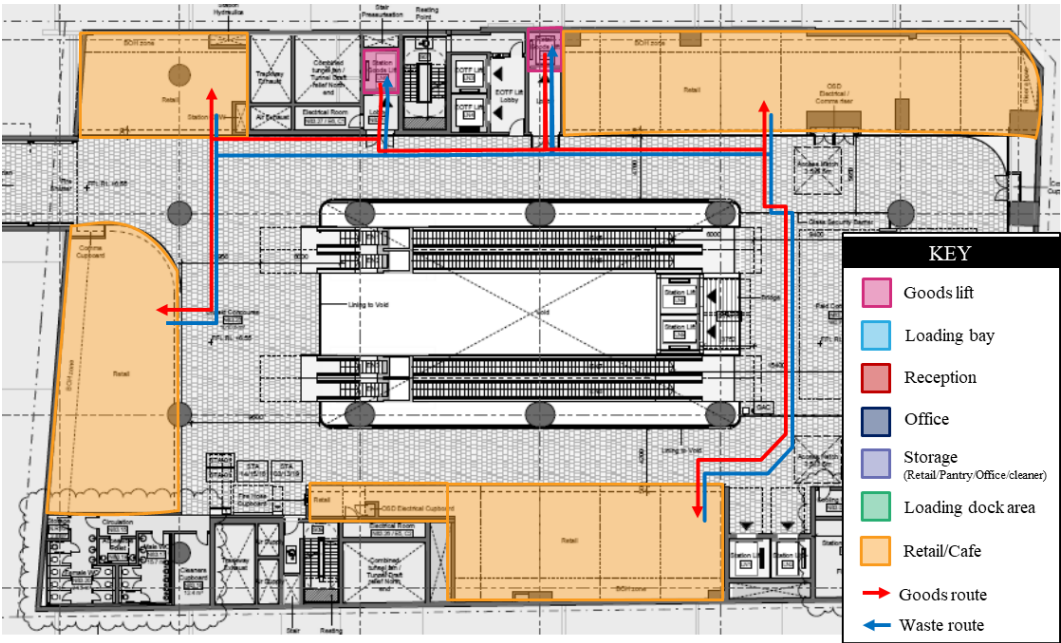
Appendix B

Goods Distribution Routes

LEVEL B4 PLAN – STATION PLANT



LEVEL B3 PLAN – CONCOURSE

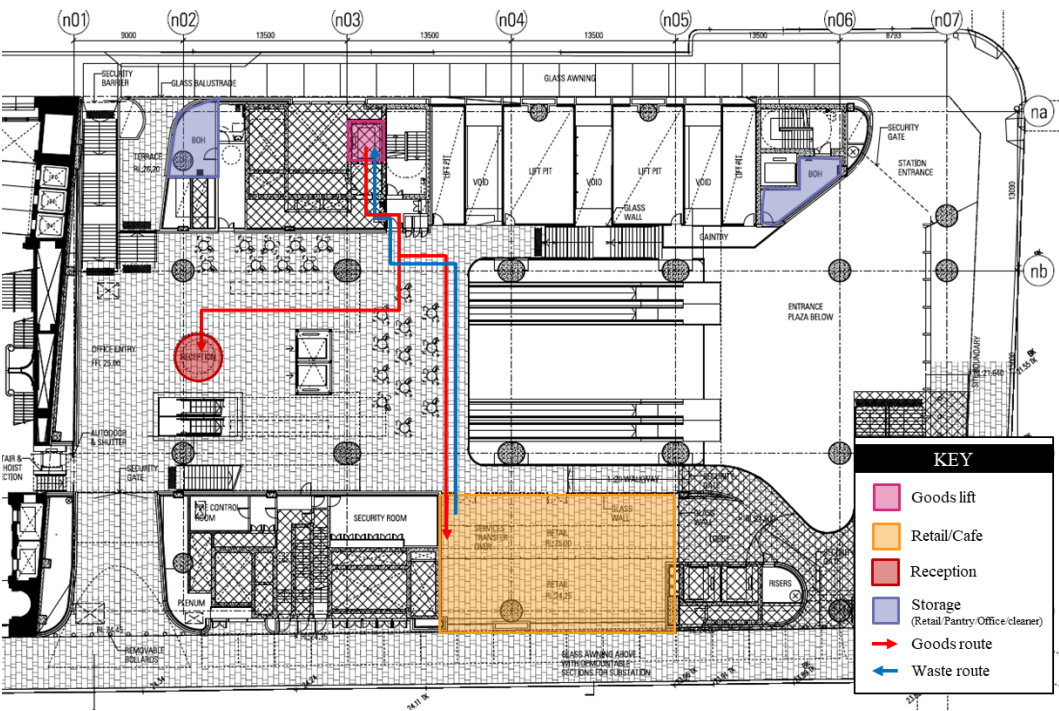


KEY

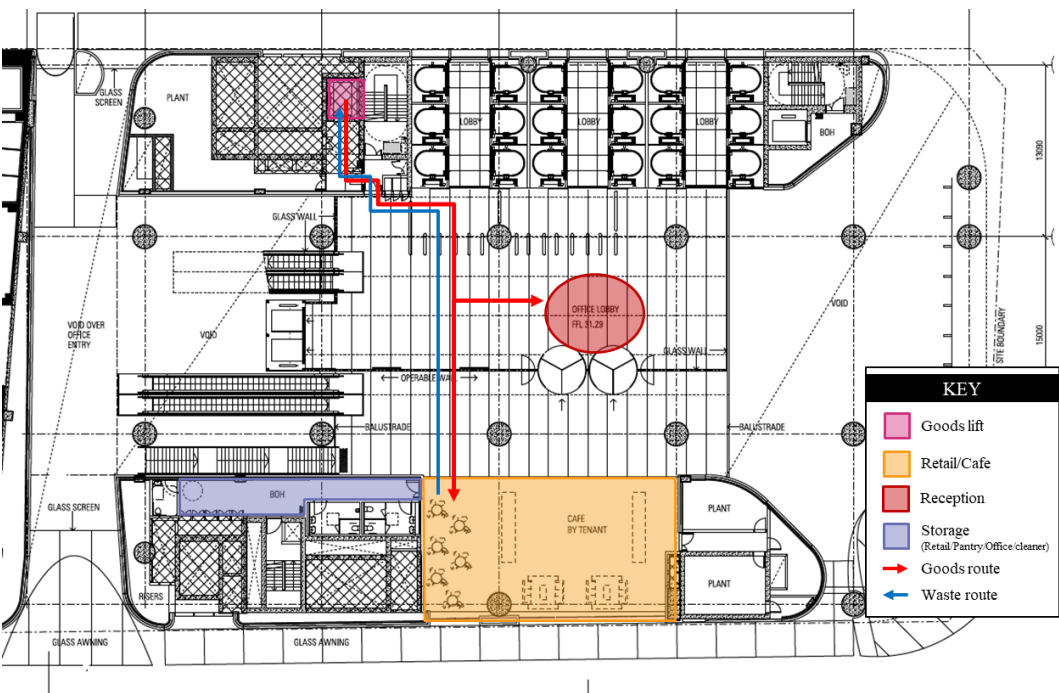
- Goods lift
- Retail/Cafe
- Reception
- Storage (Retail/Pantry/Office cleaners)
- Goods route
- Waste route

[illegible]

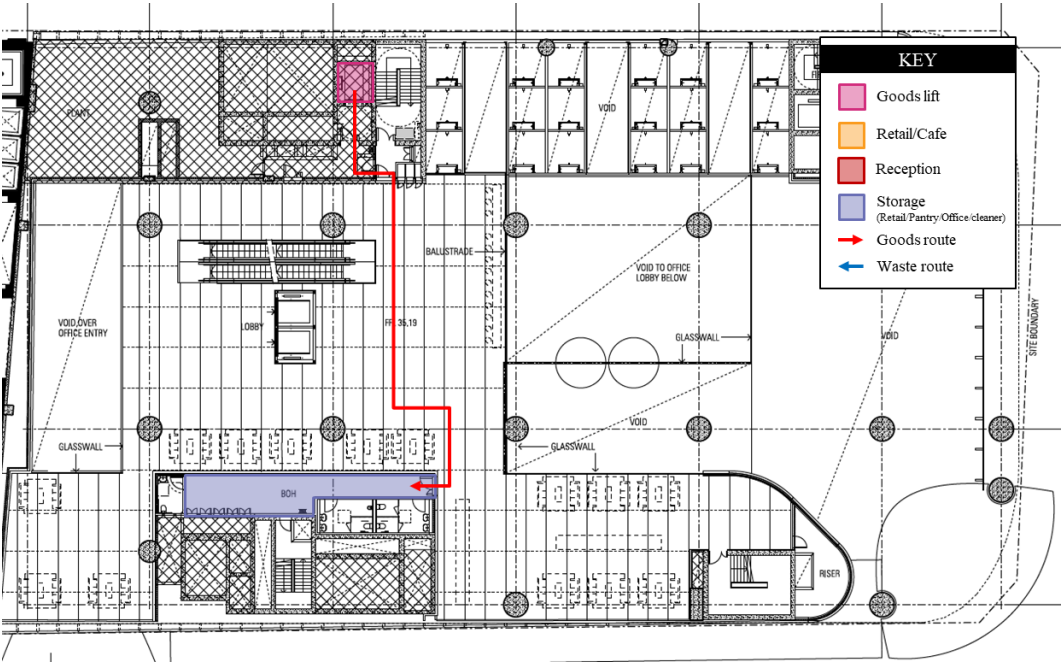
LEVEL 00 GROUND FLOOR PLAN



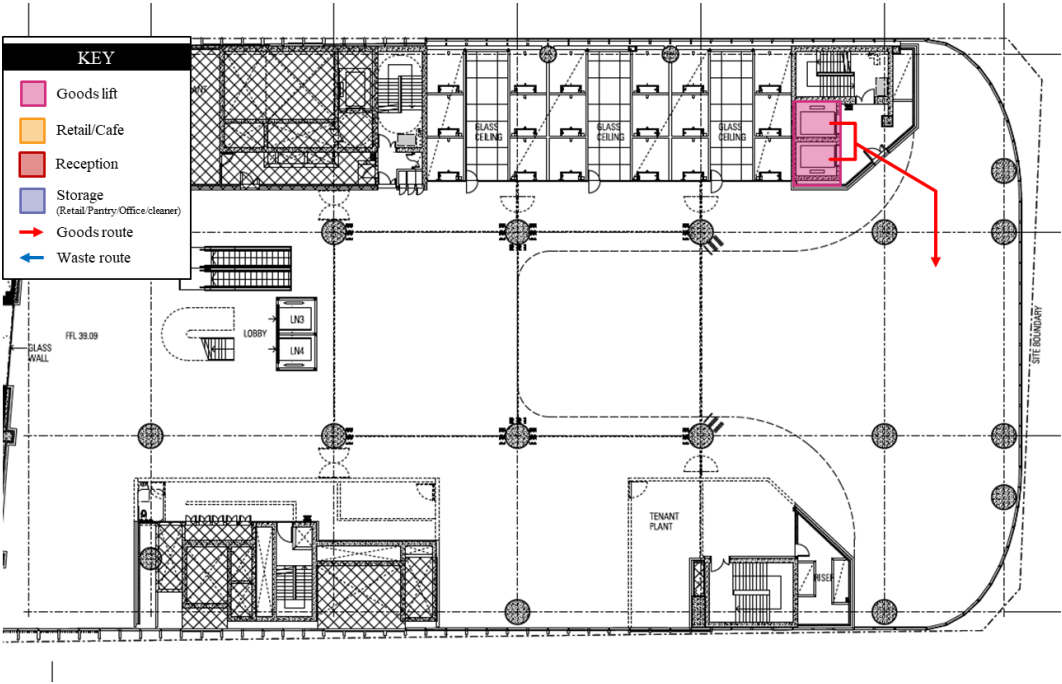
LEVEL 01 PLAN



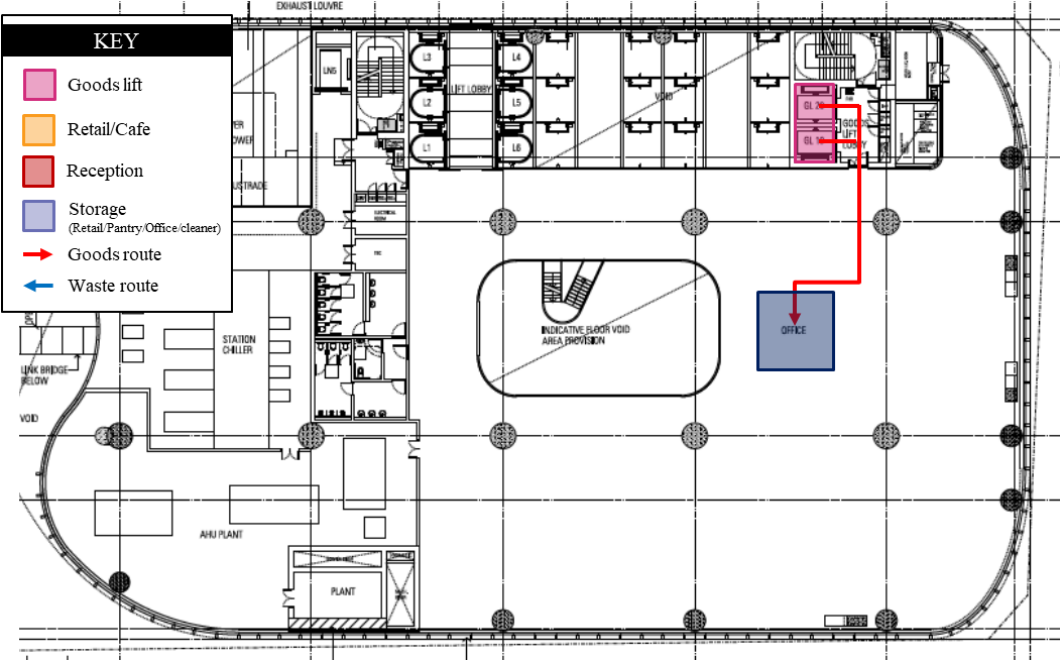
LEVEL 02 PLAN



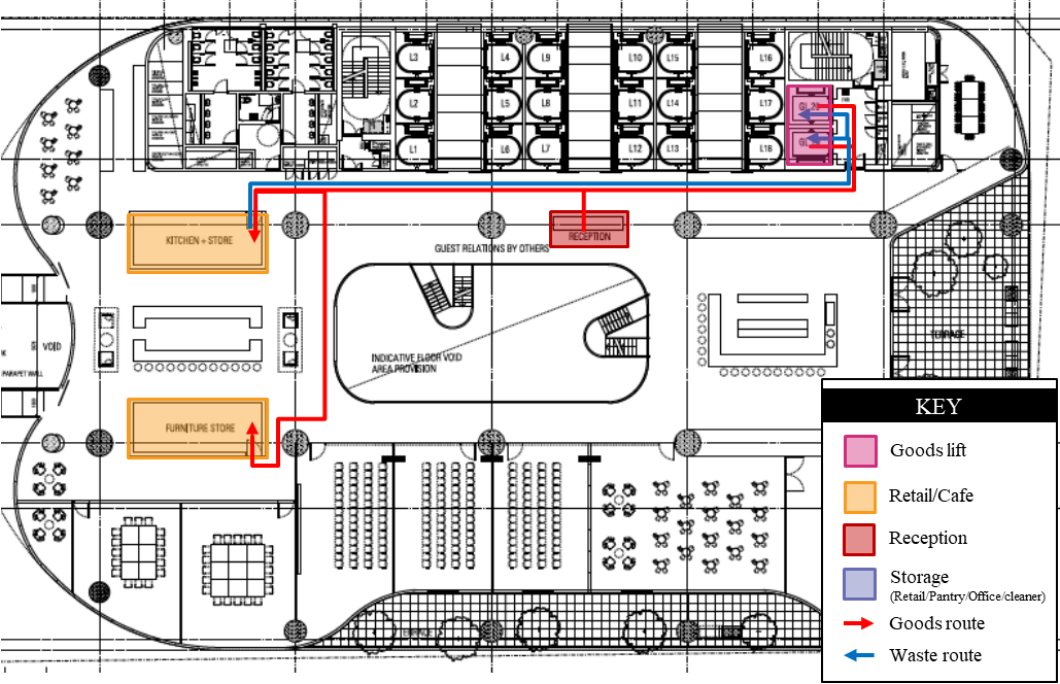
LEVEL 03 PLAN



INDICATIVE OFFICE PLAN



LEVEL 10 PLAN



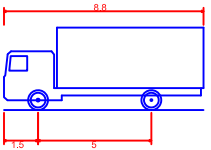
Appendix B

Swept Path Analysis



- Legend
- Body Envelope
 - 300mm Envelope
 - 600mm Envelope
 - Wheel Envelope

Design Vehicle(s)



MRV - Medium Rigid Vehicle
Overall Length 8.800m
Overall Width 2.500m
Overall Body Height 3.633m
Min Body Ground Clearance 0.428m
Track Width 2.500m
Lock to Lock Time 4.00 sec
Curb to Curb Turning Radius 10.000m

D	28/02/18	JRT	AMH	AMH
Base drawings issue 25/01/18				
C	12/02/18	JRT	AMH	AMH
Base drawings issue 25/01/18				
B	18/08/17	JRT	AMH	AMH
Western turntable added				
A	12/04/17	JRT	AMH	AMH
For Information				
Issue	Date	By	Chkd	Appd

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Client
Grimshaw

Job Title
SMMPS
North Tower

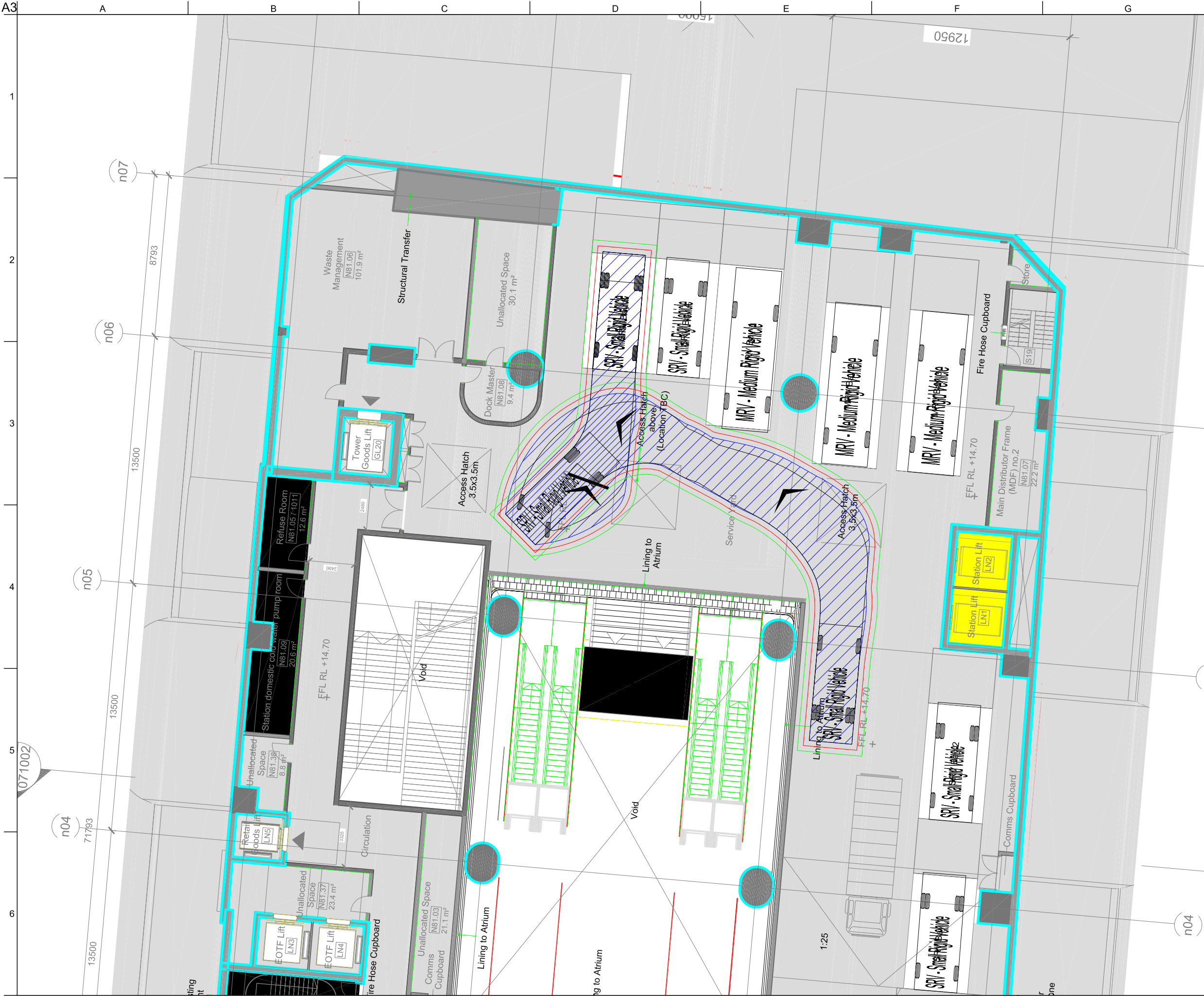
Drawing Title
Turning Paths
Main access

Scale at A3
1:200

Discipline
Transport

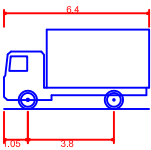
Drawing Status
Draft

Job No 247838	Drawing No SKT100	Issue D
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- Legend
- Body Envelope
 - 300mm Envelope
 - 600mm Envelope
 - Wheel Envelope

Design Vehicle(s)



SRV - Small Rigid Vehicle
Overall Length 6.400m
Overall Width 2.330m
Overall Body Height 3.500m
Min Body Ground Clearance 0.398m
Track Width 2.330m
Lock-to-lock time 4.00s
Curb to Curb Turning Radius 7.100m

H	28/02/18	JRT	AMH	AMH
G	12/02/18	JRT	AMH	AMH
F	20/11/17	JRT	AMH	AMH
E	17/11/17	JRT	AMH	AMH
D	06/11/17	JRT	AMH	AMH
C	31/10/17	JRT	AMH	AMH
B	18/08/17	JRT	AMH	AMH
A	31/05/17	JRT	AMH	AMH
Issue	Date	By	Chkd	Appd

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Client
Grimshaw

Job Title
SMMPS
North Tower

Drawing Title
Turning Paths
Loading dock
North-western bay

Scale at A3
1:200

Discipline
Transport

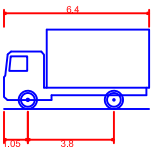
Drawing Status
Draft

Job No 247838	Drawing No SKT102	Issue H
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- Legend
- Body Envelope
 - 300mm Envelope
 - 600mm Envelope
 - Wheel Envelope

Design Vehicle(s)



SRV - Small Rigid Vehicle
Overall Length 6.400m
Overall Width 2.330m
Overall Body Height 3.500m
Min Body Ground Clearance 0.398m
Track Width 2.330m
Lock-to-lock time 4.00s
Curb to Curb Turning Radius 7.100m

G	28/02/18	JRT	AMH	AMH
F	12/02/18	JRT	AMH	AMH
E	20/11/17	JRT	AMH	AMH
D	17/11/17	JRT	AMH	AMH
C	31/10/17	JRT	AMH	AMH
B	18/08/17	JRT	AMH	AMH
A	31/05/17	JRT	AMH	AMH
Issue	Date	By	Chkd	Appd

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Client
Grimshaw

Job Title
SMMPs
North Tower

Drawing Title
Turning Paths
Loading dock
Northern bay

Scale at A3
1:200

Discipline
Transport

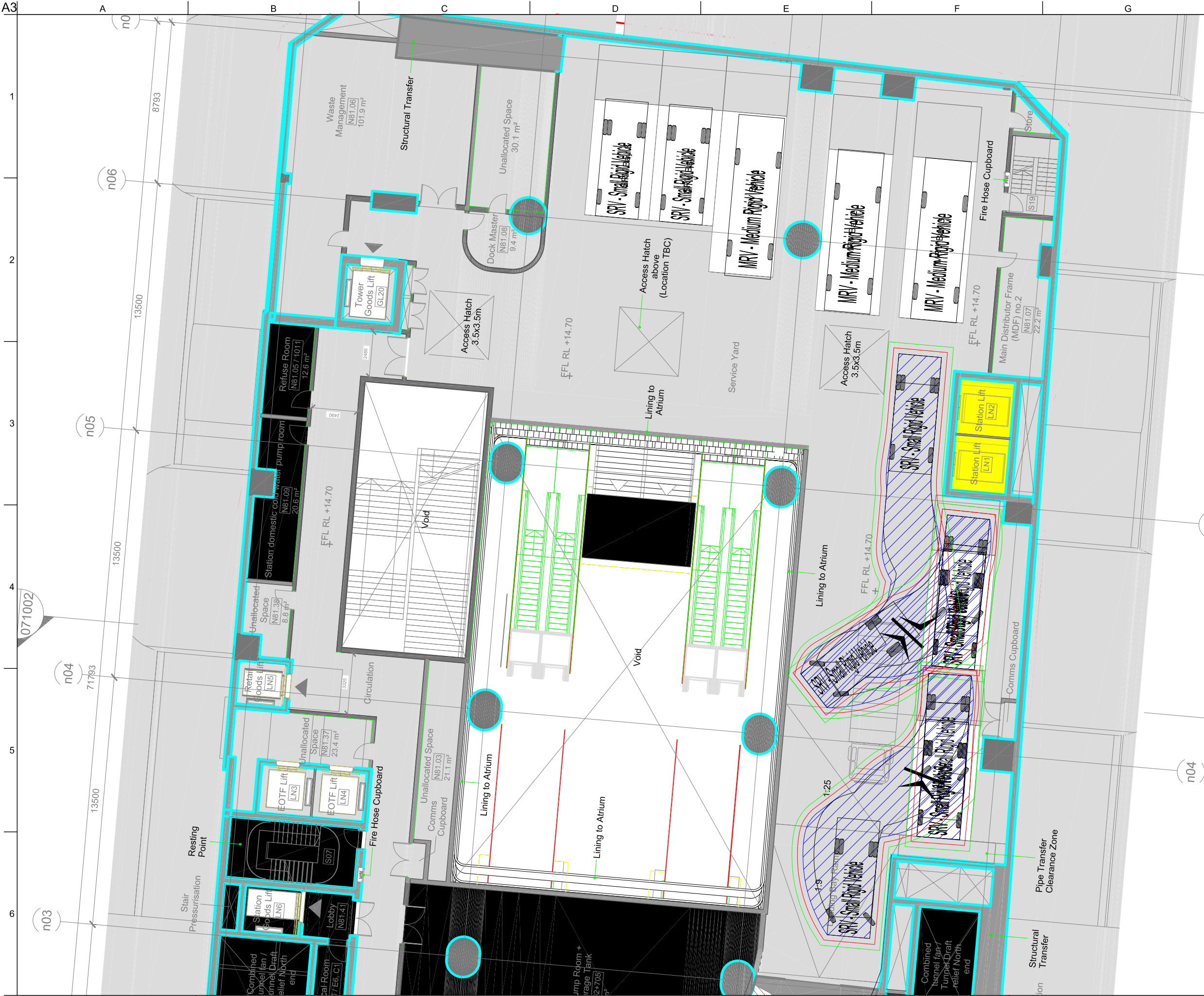
Drawing Status

Draft

Job No
247838

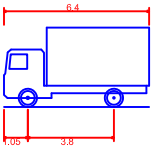
Drawing No
SKT103

Issue
G



- Legend
- Body Envelope
 - 300mm Envelope
 - 600mm Envelope
 - Wheel Envelope

Design Vehicle(s)



SRV - Small Rigid Vehicle
Overall Length 6.400m
Overall Width 2.330m
Overall Body Height 3.500m
Min Body Ground Clearance 0.398m
Track Width 2.330m
Lock-to-lock time 4.00s
Curb to Curb Turning Radius 7.100m

I	28/02/18	JRT	AMH	AMH
H	12/02/18	JRT	AMH	AMH
G	20/11/17	JRT	AMH	AMH
F	17/11/17	JRT	AMH	AMH
E	10/11/17	JRT	AMH	AMH
D	06/11/17	JRT	AMH	AMH
C	31/10/17	JRT	AMH	AMH
B	18/08/17	JRT	AMH	AMH
A	31/05/17	JRT	AMH	AMH
Issue	Date	By	Chkd	Appd

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Client
Grimshaw

Job Title
SMMPs
North Tower

Drawing Title
Turning Paths
Loading dock
Eastern bays

Scale at A3
1:200

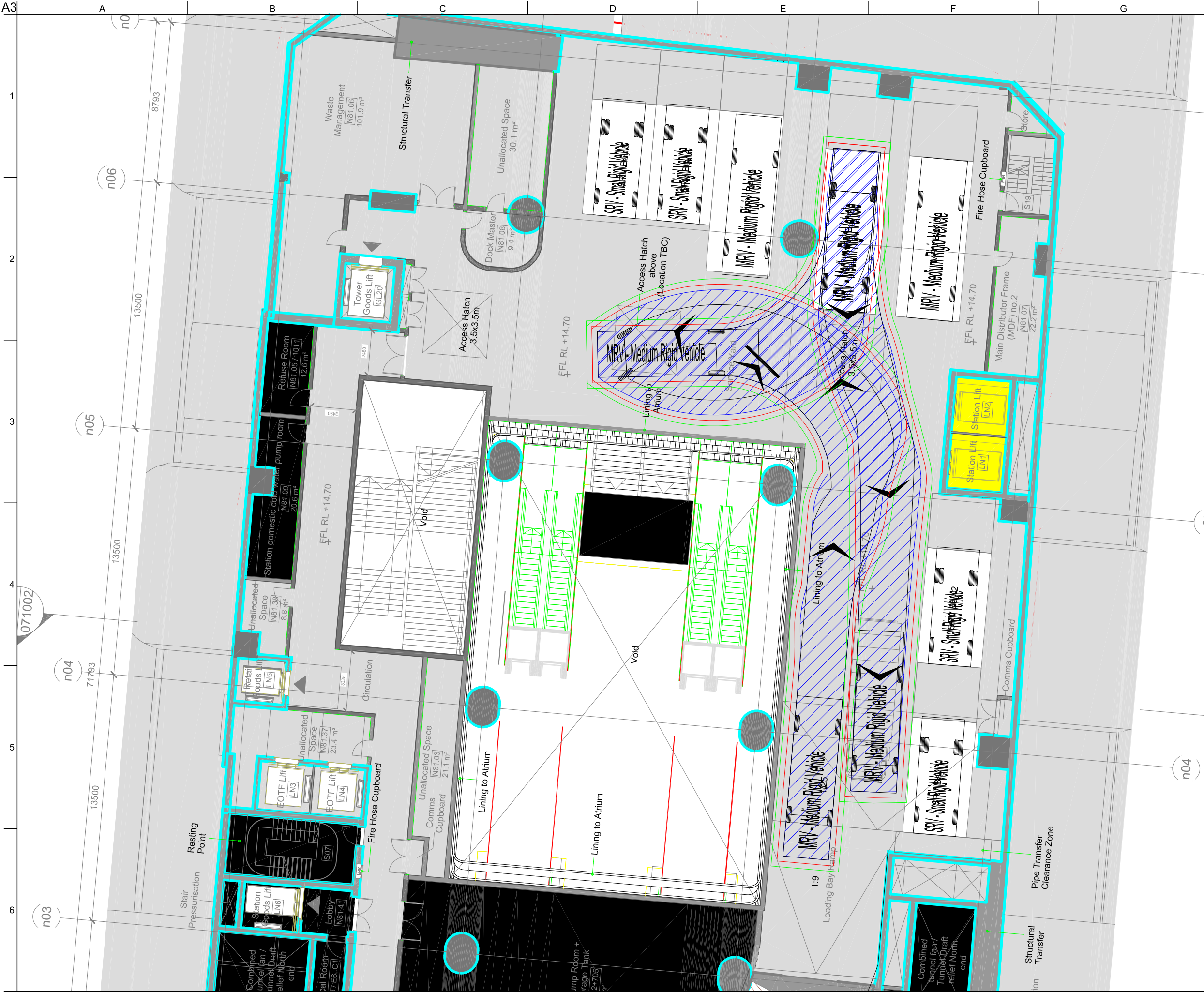
Discipline
Transport

Drawing Status
Draft

Job No
247838

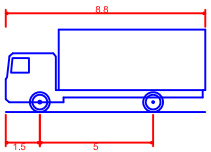
Drawing No
SKT104

Issue
H



- Legend
- Body Envelope
 - 300mm Envelope
 - 600mm Envelope
 - Wheel Envelope

Design Vehicle(s)



MRV - Medium Rigid Vehicle
Overall Length 8.800m
Overall Width 2.500m
Overall Body Height 3.633m
Min Body Ground Clearance 0.428m
Track Width 2.500m
Lock to Lock Time 4.00 sec
Curb to Curb Turning Radius 10.000m

H	28/02/18	JRT	AMH	AMH
G	12/02/18	JRT	AMH	AMH
F	20/11/17	JRT	AMH	AMH
E	17/11/17	JRT	AMH	AMH
D	06/11/17	JRT	AMH	AMH
C	31/10/17	JRT	AMH	AMH
B	18/08/17	JRT	AMH	AMH
A	31/05/17	JRT	AMH	AMH
Issue	Date	By	Chkd	Appd

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www.arup.com.au

Client
Grimshaw

Job Title
SMMPS
North Tower

Drawing Title
Turning Paths
Loading dock
Northern MRV 1

Scale at A3
1:200

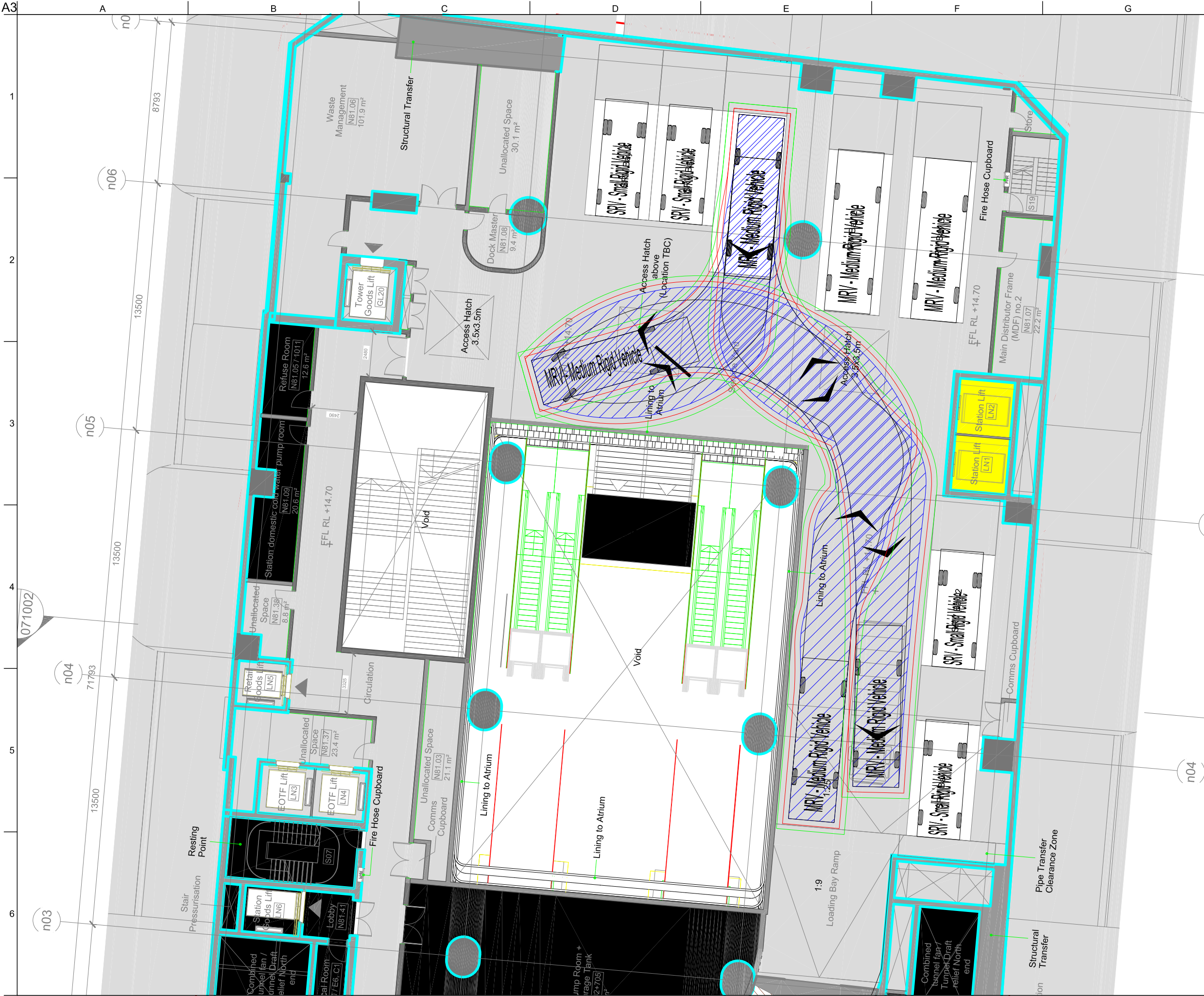
Discipline
Transport

Drawing Status
Draft

Job No
247838

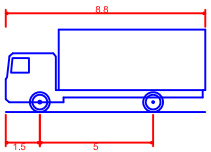
Drawing No
SKT105

Issue
H



- Legend**
- Body Envelope
 - 300mm Envelope
 - 600mm Envelope
 - Wheel Envelope

Design Vehicle(s)



MRV - Medium Rigid Vehicle
Overall Length 8.800m
Overall Width 2.500m
Overall Body Height 3.633m
Min Body Ground Clearance 0.428m
Track Width 2.500m
Lock to Lock Time 4.00 sec
Curb to Curb Turning Radius 10.000m

H	28/02/18	JRT	AMH	AMH
G	12/02/18	JRT	AMH	AMH
F	20/11/17	JRT	AMH	AMH
E	17/11/17	JRT	AMH	AMH
D	06/11/17	JRT	AMH	AMH
C	31/10/17	JRT	AMH	AMH
B	18/08/17	JRT	AMH	AMH
A	31/05/17	JRT	AMH	AMH
Issue	Date	By	Chkd	Appd

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Client
Grimshaw

Job Title
**SMMPs
North Tower**

Drawing Title
**Turning Paths
Loading dock
Northern MRV 3**

Scale at A3
1:200

Discipline
Transport

Drawing Status
Draft

Job No
247838

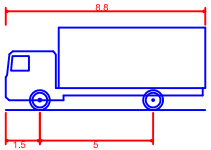
Drawing No
SKT106

Issue
H



- Legend
- Body Envelope
 - 300mm Envelope
 - 600mm Envelope
 - Wheel Envelope

Design Vehicle(s)



MRV - Medium Rigid Vehicle
Overall Length 8.800m
Overall Width 2.500m
Overall Body Height 3.633m
Min Body Ground Clearance 0.428m
Track Width 2.500m
Lock to Lock Time 4.00 sec
Curb to Curb Turning Radius 10.000m

J	28/02/18	JRT	AMH	AMH
I	12/02/18	JRT	AMH	AMH
H	20/11/17	JRT	AMH	AMH
G	17/11/17	JRT	AMH	AMH
F	10/11/17	JRT	AMH	AMH
E	06/11/17	JRT	AMH	AMH
D	31/10/17	JRT	AMH	AMH
C	18/08/17	JRT	AMH	AMH
B	02/06/17	JRT	AMH	AMH
A	31/05/17	JRT	AMH	AMH
Issue	Date	By	Chkd	Appd

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Client
Grimshaw

Job Title
SMMPS
North Tower

Drawing Title
Turning Paths
Loading dock
Northern MRV 2

Scale at A3
1:200

Discipline
Transport

Drawing Status

Draft

Job No
247838

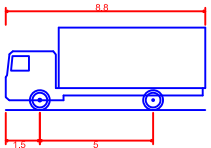
Drawing No
SKT107

Issue
J



- Legend
- Body Envelope
 - 300mm Envelope
 - 600mm Envelope
 - Wheel Envelope

Design Vehicle(s)



MRV - Medium Rigid Vehicle
Overall Length 8.800m
Overall Width 2.500m
Overall Body Height 3.633m
Min Body Ground Clearance 0.428m
Track Width 2.500m
Lock to Lock Time 4.00 sec
Curb to Curb Turning Radius 10.000m

I	28/02/18	JRT	AMH	AMH
H	12/02/18	JRT	AMH	AMH
G	20/11/17	JRT	AMH	AMH
F	17/11/17	JRT	AMH	AMH
E	06/11/17	JRT	AMH	AMH
D	31/10/17	JRT	AMH	AMH
C	18/08/17	JRT	AMH	AMH
B	02/06/17	JRT	AMH	AMH
A	31/05/17	JRT	AMH	AMH
Issue	Date	By	Chkd	Appd

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Client
Grimshaw

Job Title
SMMPS
North Tower

Drawing Title
Turning Paths
Loading dock
Garbage loading options

Scale at A3
1:250

Discipline
Transport

Drawing Status
Draft

Job No 247838	Drawing No SKT108	Issue I
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A	31/05/17	JRT	AMH	AMH
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For Information