Appendix J
Transport Assessment Plan
(including Green Travel Plan)

JMT CONSULTING

Powerhouse Ultimo Renewal

Transport Assessment

Prepared for: **Create NSW**

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PROJECT INFORMATION

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1 Introduction

1.1 Background

This transport assessment report has been prepared by JMT Consulting on behalf of the Department of Enterprise, Investment and Trade (Create NSW) to support a State Significant Development (SSD) Development Application (DA) for alterations and additions to Powerhouse Ultimo at 500 Harris Street, Ultimo.

The Powerhouse Ultimo Renewal is a transformative $480-$500 million investment by the NSW Government to establish a world-class museum that will significantly contribute to an important and developing part of Sydney. The renewal will see Powerhouse Ultimo deliver a programming focus on design and fashion, presenting exhibitions that showcase the Powerhouse Collection, international exclusive exhibitions and programs that support the design and fashion industries.

1.2 Process

The Powerhouse Ultimo Renewal project is for the purposes of an 'information and education facility' with a capital investment value of more than $30 million, and such is classified as State Significant Development (SSD) pursuant to Section 13(1) of Schedule 1 of State Environmental Planning Policy (Planning Systems) 2021.

The delivery of the new Creative Industries Precinct for Powerhouse Ultimo will occur in stages, comprising the following:

- **Stage 1** – Concept DA establishing the planning, design, and assessment framework for the Powerhouse Ultimo Renewal Project including the indicative land uses, maximum building envelopes, general parameters for the future layout of the site, and strategies to guide the subsequent detailed design phases of the project including Urban Design Guidelines and Design Excellence Strategy.
- **Architectural Design Competition** – A competitive design process to critically analyse and provide design alternatives for the Powerhouse Ultimo Renewal project in accordance with the planning and development framework established for the site under the Concept DA. A winning design will be selected by a jury of experts and will inform the subsequent detailed design and assessment phase (Stage 2) of the project.

- **Stage 2** – A Detailed DA confirming the ultimate architectural design and operation of Powerhouse Ultimo and assessing any associated planning and environmental impacts. This Detailed DA will seek consent for the detailed design, construction and operation of the proposed development and follows the same planning assessment and determination process as the Concept DA (Stage 1).

1.3 Site context

Powerhouse Ultimo is situated upon the lands of the Gadigal people of the Eora Nation. It is located within the City of Sydney Local Government Area and its primary address is 500 Harris Street, Ultimo.

The site contains two heritage-listed buildings, being the 'Ultimo Power House' (c.1899-1905) and the 'Former Ultimo Post Office including interior' (c.1901), both of which are listed on the State Heritage Register under the Heritage Act 1997.

Other buildings within the site include the former tram shed (Harwood Building) and the 1988 museum building fronting Harris Street (Wran Building). A café building has been constructed immediately to the south of the Power House at the northern end of the Ultimo Goods Line. Located at the corner of Harris Street and Macarthur Street is a forecourt that acts as the main public entrance to the site, but provides limited activation and is disconnected from higher-quality urban spaces including the Ultimo Goods Line.

The primary focus of the Powerhouse Ultimo Renewal project is the museum to the north of Macarthur Street and bounded by Harris Street, Pier Street and the light rail corridor. However, some enabling and minor decoupling works will occur within the broader Powerhouse Ultimo precinct.

No substantive works or changes in use are proposed to the Harwood Building located between Macarthur Street and Mary Ann Street.

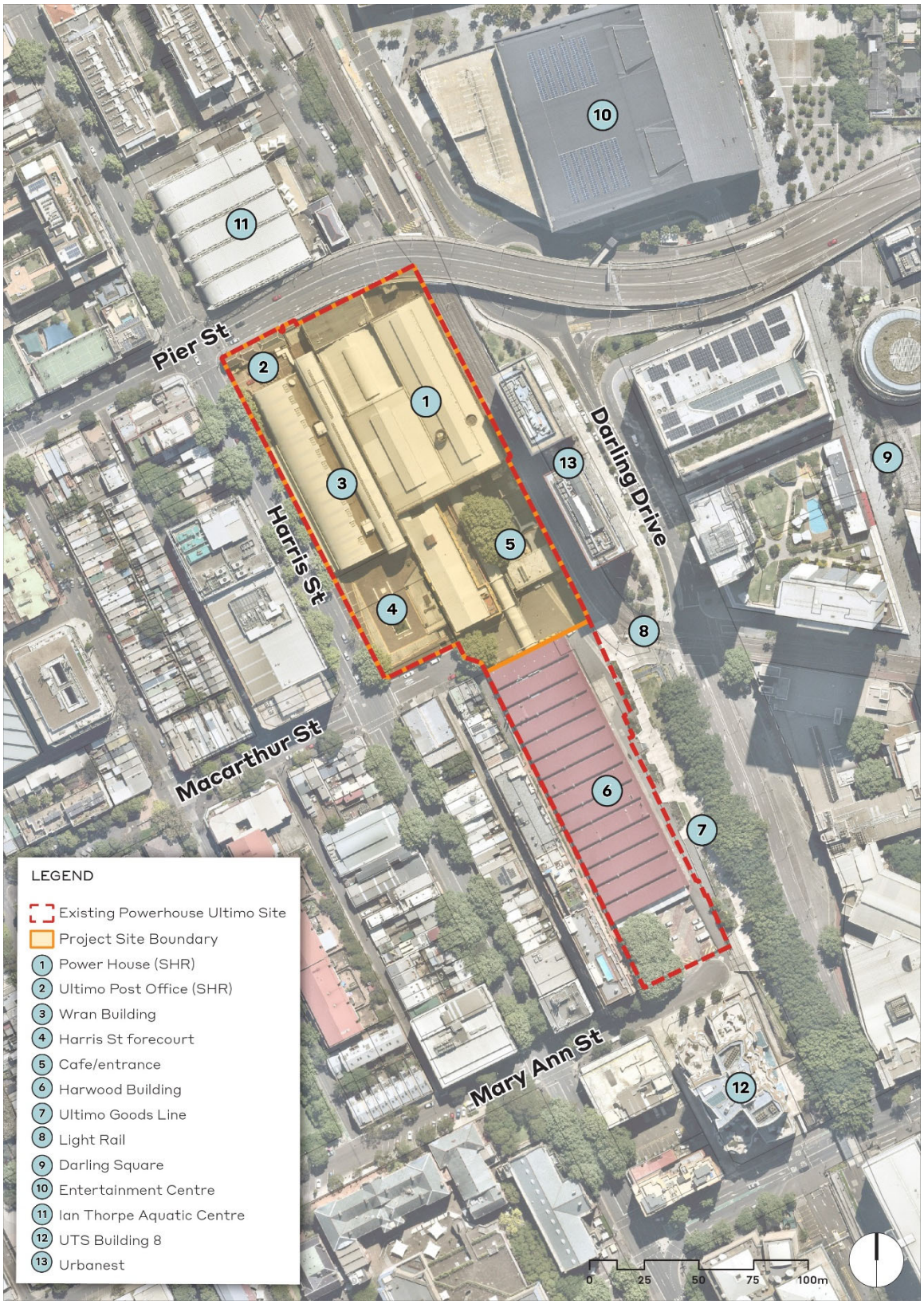

Figure 1 Indicative site plan and key features

Source: Ethos Urban

1.4 Overview of proposal

This Concept DA sets the vision for the renewal of Powerhouse Ultimo and the creation of the Powerhouse Creative Industries Precinct, with the detailed design, construction, and operation of the project to be sought at a separate and future stage (Stage 2). Concept approval is sought for the following:

- A maximum building envelope for any new buildings and alterations and additions to existing buildings retained on the site.
- Use of the new spaces and built form as an 'information and education facility' including exhibition, education, and back of house spaces, and a range of related and ancillary uses to contribute to the operation of Powerhouse Ultimo.
- Endorsement of Urban Design Guidelines and a Design Excellence Strategy to guide the detailed design of the future building, internal spaces, and public domain areas that will be the subject of a competitive design process and a separate and future DA (Stage 2).
- An updated Draft Conservation Management Plan to ensure that future development occurs in a manner that is compatible with, and facilitates the conservation of, the heritage values of the site.
- General functional parameters for the future design, construction, and operation of buildings and uses on the site including the principles and strategies for the management of transport and access, flooding, sustainability, heritage and the like.

Figure 2 Powerhouse Ultimo Renewal – artists impression of reference design

1.5 Secretary's Environmental Assessment Requirements

The Department of Planning, Industry and Environment (DPIE) issued a list of the Secretary's Environmental Assessment Requirements (SEARs) which inform the Environmental Impact Statement (EIS). Table 1 lists the SEARs that are specific to transport and accessibility.

Table 1 Response to SEARs

SEARs – Traffic, Transport and Accessibility	Section Discussed
Provide a transport and accessibility impact assessment, which includes	
an analysis of the existing transport network, including the road hierarchy and any pedestrian, bicycle or public transport infrastructure, current daily and peak hour vehicle movements, and existing performance levels of nearby intersections.	3
details of the proposed development, including pedestrian and vehicular access arrangements (including swept path analysis of the largest vehicle and height clearances), parking arrangements and rates (including bicycle and end-of-trip facilities), drop-off/pick-up-zone(s) and bus bays (if applicable), and provisions for servicing and loading/unloading	1.4, 4
analysis of the impacts of the proposed development (including justification for the methodology used), including predicted modal split, a forecast of additional daily and peak hour multimodal network flows as a result of the development (using industry standard modelling), identification of potential traffic impacts on road capacity, intersection performance and road safety (including pedestrian and cyclist conflict) and any cumulative impact from surrounding approved developments.	4
measures to mitigate any traffic impacts, including details of any new or upgraded infrastructure to achieve acceptable performance and safety, and the timing, viability and mechanisms of delivery (including proposed arrangements with local councils or government agencies) of any infrastructure improvements in accordance with relevant standards.	4.9
proposals to promote sustainable travel choices for employees, residents, guests and visitors, such as connections into existing walking and cycling networks, minimising car parking provision, encouraging car share and public transport, providing adequate bicycle parking and high quality end-of-trip facilities, and implementing a Green Travel Plan.	5

2 Policy Context

2.1 Pyrmont Peninsula Place Strategy

The Pyrmont Peninsula Place Strategy (PPPS) was finalised in December 2020. The place strategy provides a 20-year plan for future growth in the peninsula, with up to 23,000 more jobs and up to 4,000 new homes. The Powerhouse Ultimo Renewal is a key government investment that will support the strategic directions and 'big moves' identified in the PPPS. The site is identified under the PPPS as being capable of change, and Powerhouse Ultimo is identified as a significant contributor to the growth of knowledge-based jobs, innovation and creative, cultural and community uses within the Peninsula.

The strategy identifies a number of transport related items relevant to the Powerhouse Utlimo Renewal including dedicated bus corridor on Harris Street, continuous pedestrian connection linking the Goods Line to Pyrmont Street and a future metro station to the north of the site as indicated in Figure 3.

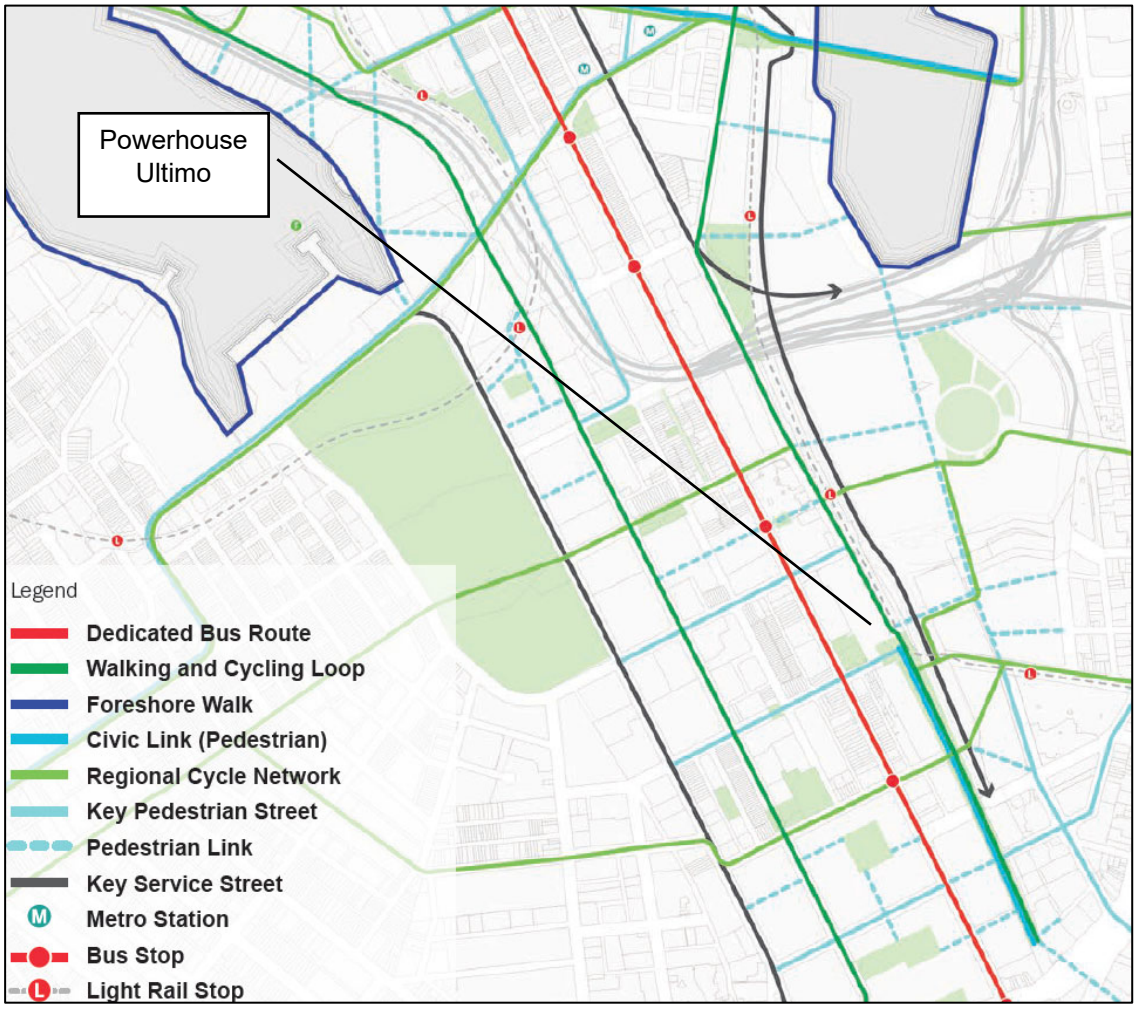

Figure 3 Pyrmont Peninsula Place Strategy movement plan

Source: Department of Planning, Industry and Environment

2.2 Future Transport 2056

The Future Transport Strategy is an update of the 2012 Long Term Transport Master Plan for NSW. It is a 40-year strategy, supported by plans for regional NSW and for Greater Sydney. The strategy outlines that transport is an enabler of economic and social activity and contributes to long term economic, social and environmental outcome. The vision for the strategy is built on six outcomes which are as follows:

- Customer Focused
- Successful Places
- Growing the Economy
- Safety and Performance
- Accessible Services
- Sustainability

The vision for the Powerhouse Ultimo Renewal project is consistent with these outcomes, particularly by facilitating improved pedestrian connections and a providing for a more sustainable precinct.

2.3 NSW Government technical guidelines

The following documents have been considered in this transport strategy for the Powerhouse Ultimo:

- ***RMS Guide to Traffic Generating Developments***

  Used to inform the traffic assessment undertaken for the project including framework for undertaking the transport impact assessment.

- ***NSW Planning Guidelines for Walking and Cycling***

  This document has been used to inform the development of the walking and cycling measures proposed in this strategy as well as appropriate rates for bicycle parking.

- ***Guide to Traffic Management – Part 12: Traffic Impacts of Developments*** (AUSTROADS)

  This guide has been referenced for the appropriate methodology to be used for traffic impact assessment of the development.

3 Existing Transport Conditions

3.1 Current travel patterns

3.1.1 Visitors

JMT Consulting undertook interview surveys at the existing Powerhouse Ultimo to understand the existing travel behaviours of people attending the museum. Surveys were undertaken between 10am-5pm over a typical weekday (Thursday) and weekend (Sunday) in February 2020. These surveys were undertaken prior to the COVID-19 lockdown period and are therefore representative of typical travel conditions to the museum. People were interviewed as they approached the museum entry points on Harris Street and Macarthur Street and asked their mode of arrival. More than 500 responses were gathered across the two survey days.

The findings of the survey are presented in Figure 4. This indicated that public transport is the most popular form of access to the museum, accounting for over half of trips on a weekday and nearly 40% of trips on a weekend. The proportion of people driving to the site is 26% on a weekday and 37% on a weekend – with this increase likely attributable to the higher number of local/domestic visitors and families that visit on a weekend when compared to a weekday. A significant number of trips (approximately 20%) are made by walking only and combined with visits to other sites in the Sydney CBD.

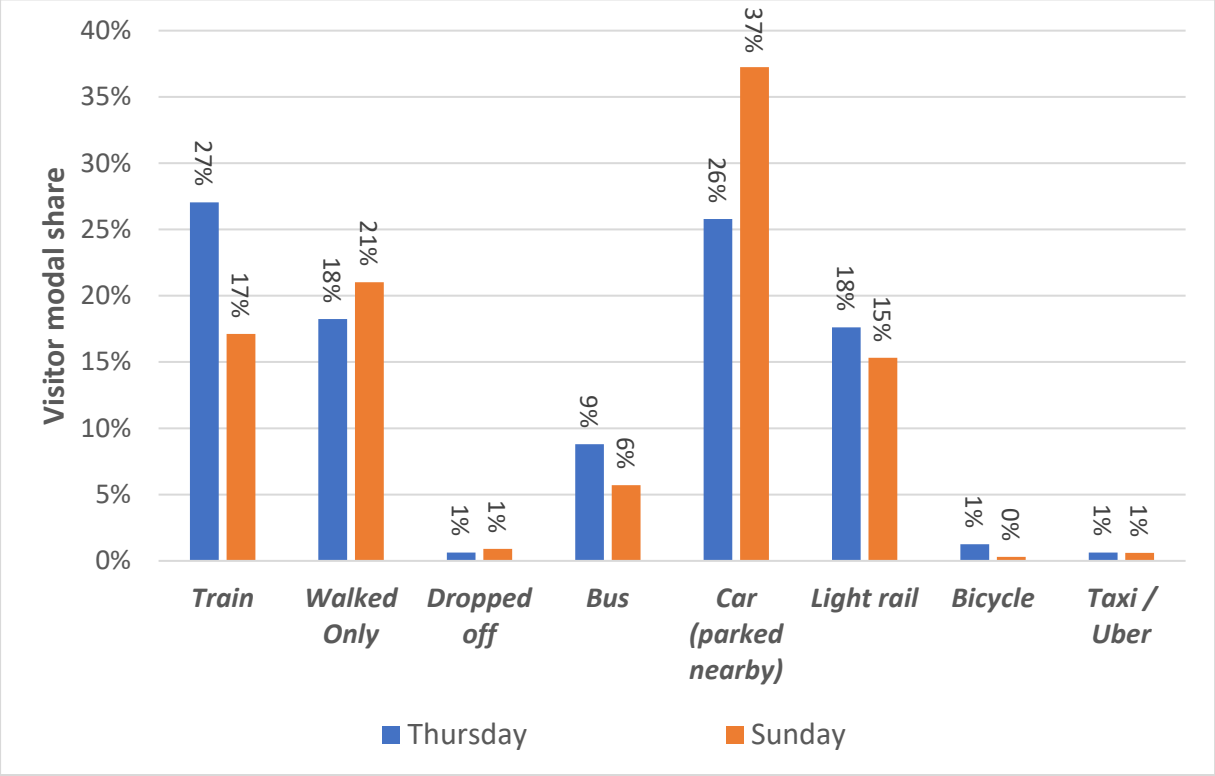

Figure 4 Existing travel behaviour to Powerhouse Ultimo

Visitors arriving by car and parking nearby to the site were asked to nominate the number of people that were in their car. The results of this survey question are summarised in Table 2, and indicate relatively high car occupancy rates of 2.4 and 3.2 for weekdays and weekends respectively.

Table 2 Existing car occupancy for trips to the Powerhouse Ultimo

Number of people in the car	*Percentage of total responses*	
	Weekday	Weekend
1	7%	3%
2	49%	22%
3	39%	34%
4	5%	28%
5	0%	10%
6 or more	0%	3%
Average car occupancy	***2.4***	**3.2**

3.1.2 Staff

2016 Journey to Work (JTW) Census data has been analysed to understand travel patterns of workers in Ultimo. This indicates public transport accounts for approximately half of all work related trips, reflecting the strong accessibility of the area.

Table 3 Existing journey to work mode share of workers of Ultimo

Mode of Travel	Mode Share
Car Driver	33%
Car Passenger	2%
Train	35%
Bus	14%
Walk Only	12%
Light rail	2%
Bicycle	1%
Other (Bicycle / Ferry / Motorcycle)	1%
Total	**100%**

3.2 Walking and cycling network

The site is well serviced by a number of key walking and cycling routes, providing connections to key destinations such as Darling Harbour, the Sydney CBD and Central Station as indicated in Figure 5 below. The Goods Line (see Figure 6) facilitates a continuous connection between the site and Central Station / Railway Square, while a shared path on Darling Drive provides connectivity to Darling Harbour, the Sydney CBD and into Pyrmont. Public bicycle parking is available on streets surrounding the site, with an example shown in Figure 7 on the following page.

Figure 5 Existing walking and cycling connections

Figure 6 Shared pathway on the Goods Line

Figure 7 Public bicycle parking on Mary Ann Street

3.3 Public transport

The site is well connected by a range of public transport services including:

- Light rail, with stops on both the Inner West and CBD and South East light rail line within 800m of the site.
- Heavy rail, with Central Station and Town Hall approximately 10 minutes walk from the site; and
- Bus, with bus stops located on Harris Street immediately adjacent to the UCIP. Railway Square bus terminus is also within convenient walking distance via the Goods Line.

A key indicator of the level of public transport accessibility a site contains is the number of locations accessible within a 30 minute public transport catchment. A key objective of the Greater Sydney Commission's Greater Sydney Region Plan is to deliver a 30-minute city where jobs, services and quality public transport spaces are in easy reach.

As illustrated in Figure 8 a number of key employment centres across Sydney can be reached within 30 minutes public transport travel time of the site, including Central / Redfern, Sydney CBD, North Sydney CBD, St Leonards, Green Square and Mascot. The highly accessible nature of the site facilitates the use of public transport services as described in subsequent sections of this document.

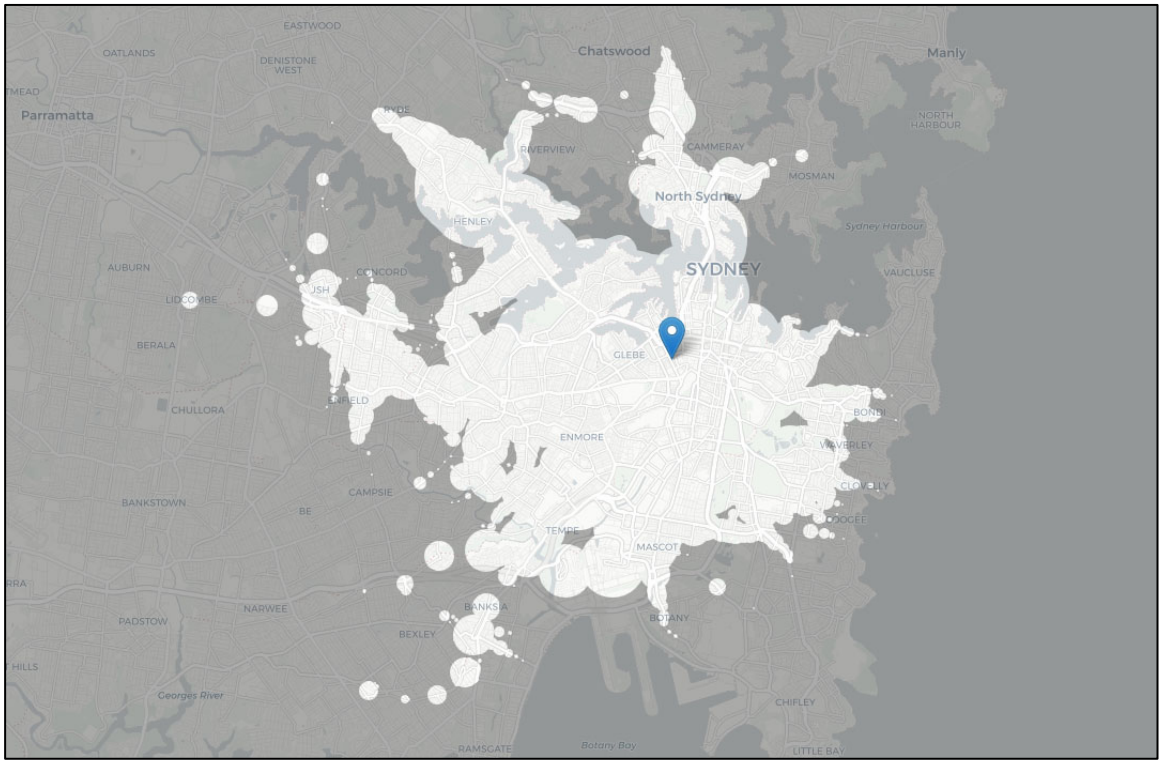

Figure 8 30 minute public transport catchment from Powerhouse Ultimo

Source: https://www.mapnificent.net/sydney

3.3.1 Heavy rail

Central Station is located within close walking distance of the site with a high quality pedestrian connection provided via the Goods Line. Train services operating at this station include:

- Sydney Trains T1- this connects the City to Emu plains, Richmond and Berowra;
- Sydney Trains T2 – this connects the City to Parramatta and Leppington;
- Sydney Trains T3 – this connects the City to Liverpool and Lidcombe;
- Sydney Trains T4 – this runs from Bondi junction to Waterfall and Cronulla;
- Sydney Trains T7 – this connects the City to Sydney Olympic parka and Blacktown;
- Sydney Trains T8 – this connects the City to Macarthur via the Airport;
- Sydney Trains T9 – this runs from Gordon to Hornsby vis the City;
- Blue Mountains Line;
- Central Coast & Newcastle line;
- South Coast line – providing connections to Port Kembla and Kiama; and
- Southern highlands Line – providing connection to Campbelltown and Goulburn.

3.3.2 Bus network

Bus stops are located on Harris Street immediately adjacent to the site entry, with these stops servicing the 501 bus route between Parramatta and Central Station. There are a number of other bus stops in close walking distance of the site, including Railway Square which accommodates 50 to 120 buses per hour.

3.3.3 Light rail

The site is also serviced by both the CBD and South East and Inner West Light Rail lines. The CBD and South East line rail connects the site to Randwick and Kingsford, as well as north to Circular Quay through the Sydney CBD. The nearest station on this line is located on George Street (Chinatown station). The Inner West light rail runs from Central to Dulwich Hill, with the stop located on Hay Street at Paddy's Markets or on Pyrmont Street (Exhibition Centre). Light rail services typically operate at intervals of between 6-8 minutes throughout the day.

Figure 9 Light rail line adjacent to the site

3.3.4 Future public transport network

The NSW Government is progressing planning and construction work on the Sydney Metro network which will directly benefit the Powerhouse Ultimo site and the surrounding Pyrmont/Ultimo area more broadly. This project will increase the already strong public transport accessibility to the site and benefit the overall transport network.

Sydney Metro City and Southwest is currently under construction and expected to be operational by 2024. New stations will be provided in the Sydney CBD and both Pitt Street (at Park Street) and Central Station – both within viable walking distance of the Powerhouse Ultimo site.

Sydney Metro West is an underground metro railway that will link the Parramatta and Sydney CBDs, expected to be operational by the end of this decade. New metro rail will become the fastest, easiest and most reliable journey between the Sydney and Parramatta CBDs. The station at Pyrmont will be located between Pyrmont Bridge Road and Union Street – less than ten minutes walk from the Powerhouse Ultimo site. This service will significantly enhance public transport accessibility to the area and provide connections to future metro lines as outlined in the TfNSW Future Transport 2056 document.

Figure 10 Future Sydney Metro network

Source: Transport for NSW

3.3.5 Public transport overview

An overview of the various forms of public transport servicing the Powerhouse Ultimo site, both currently and following the introduction of the Sydney Metro network, is presented in Figure 11 below.

Figure 11 Overview of existing and future public transport services

3.4 Road network

To manage the extensive network of roads for which councils are responsible under the Roads Act 1993, Transport for NSW (TfNSW) in partnership with local government established an administrative framework of *State, Regional,* and *Local Road* categories. State Roads are managed and financed by TfNSW and Regional and Local Roads are managed and financed by councils.

Key State and Regional roads which provide access to the site are illustrated in Figure 12 below, which demonstrates the Powerhouse Ultimo is very well connected to the surrounding State and Regional road network.

The site is primarily serviced by the State Roads including Harris Street, Wattle Street and the Western Distributor which provides access to Sydney's broader arterial road network. The site is also serviced by a number of Regional roads including Pier Street / Goulburn Street and Harbour Street. Macarthur Street and Mary Ann Street are both local roads under the control of City of Sydney Council.

Figure 12 Surrounding road network

3.5 Vehicle access

Vehicle access into the site is currently via the following means, as illustrated in Figure 13 below:

- Staff / contractor parking accessed via Pyrmont Street (underneath Pier Street overpass), Mary Ann Street and Macarthur Street (staff parking located to the east of the Harwood Building)
- Loading and servicing via Macarthur Street, with the main loading dock located within the Harwood Building (see Figure 14). For large museum deliveries trucks manoeuvre within the main forecourt area at the eastern end of Macarthur Street and reverse back within the eastern building (see Figure 15).

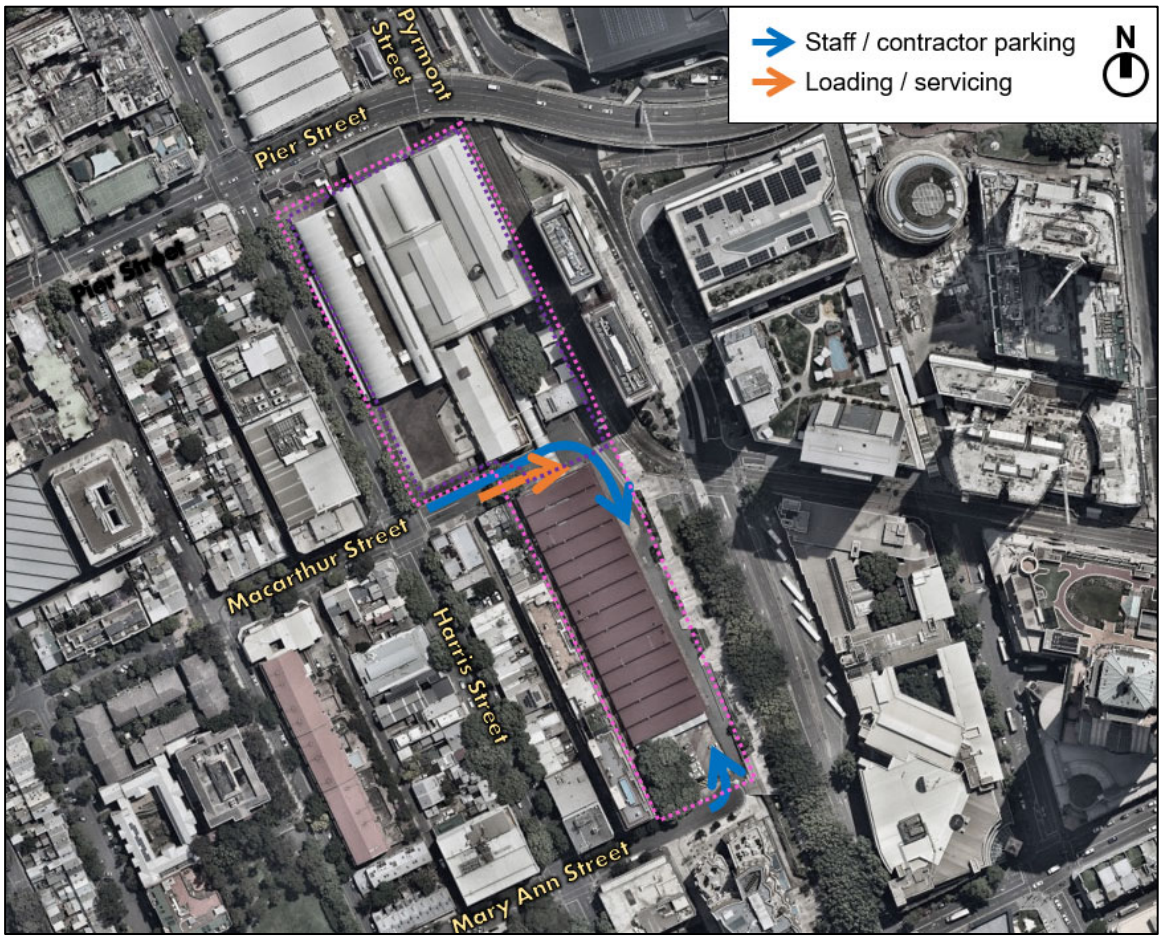

Figure 13 Existing vehicle access arrangements

Figure 14 Existing loading / servicing area outside Harwood Building

Figure 15 Loading area for large vehicles -eastern building

3.6 Car parking

No public car parking is available at the Powerhouse Ultimo site. Instead there are a number of existing off-street car parking areas in close walking distance of the site used by the general public containing over 2,000 parking spaces as shown in Figure 16. These car parking stations include:

- Market City car park (approximately 600 spaces)
- International Convention Centre (approximately 500 spaces)
- Darling Quarter car park (approximately 500 spaces)
- 187 Thomas Street car park (approximately 100 spaces)
- Novotel Sydney Central (approximately 600 spaces)

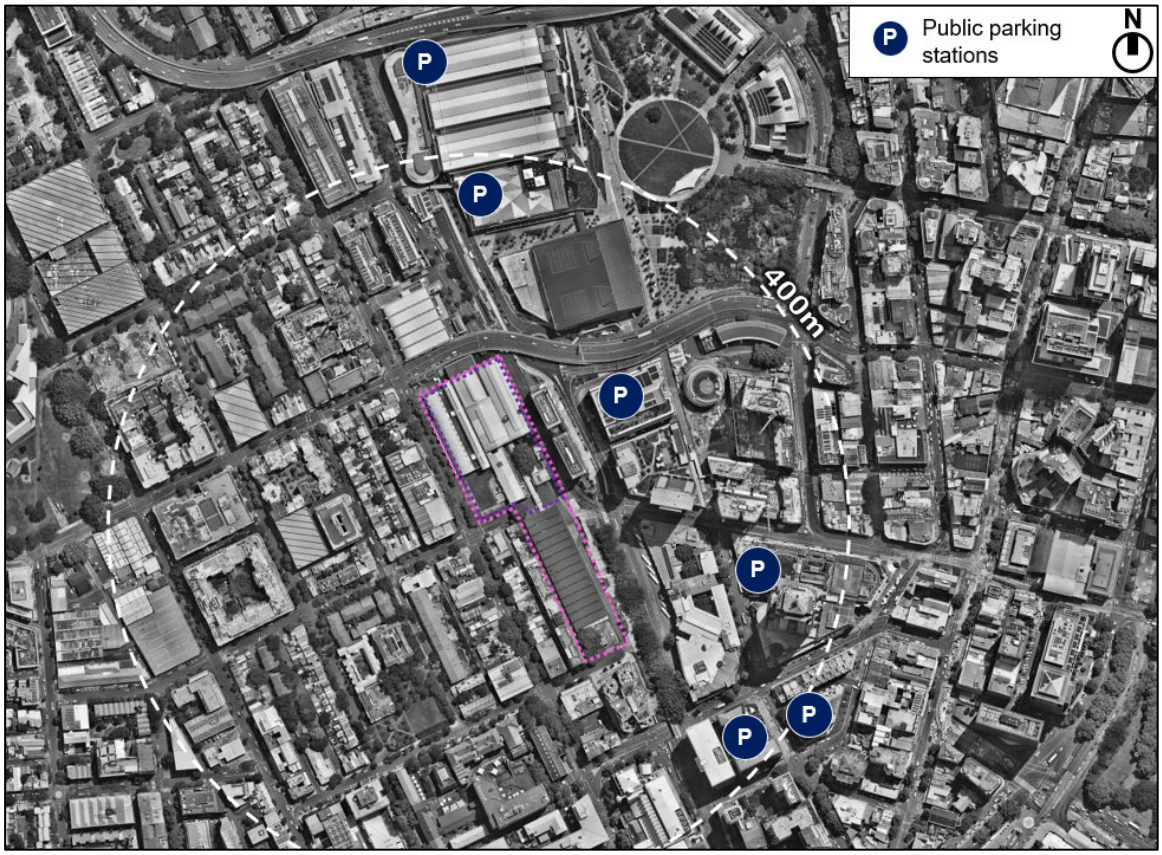

Figure 16 Existing off-street public car parking areas

Approximately 40 staff/contractor parking spaces are available at the southern end of the site accessed off Mary Ann Street (see Figure 17) as well as to the east of the Harwood Building (see Figure 18) accessed off Macarthur Street.

Figure 17 Existing staff/contractor at the southern end of the site

Figure 18 Staff/Contractor parking adjacent to the Harwood Building

3.7 Coaches

A coach set-down and pick up zone currently exists on Harris Street immediately adjacent to the site entry point as shown in Figure 19 below. Coaches can use this zone, which extends for approximately 75m, at the following times of day:

- Weekdays – 10am to 3pm
- Saturdays – 9am to 5pm

Once coaches drop off passengers they typically utilise the nearby coach parking area available along Darling Drive to wait prior to returning for pick up. The area can accommodate approximately four coaches at any one time which is sufficient to accommodate current demands.

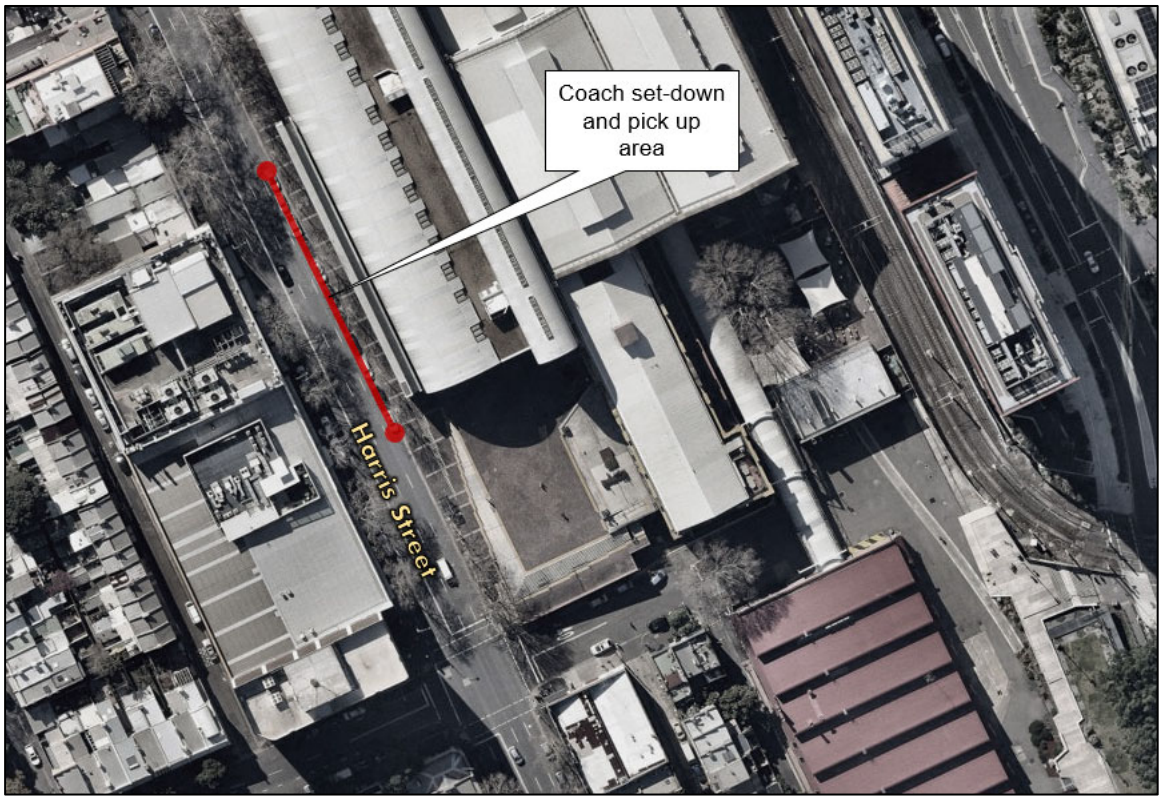

Figure 19 Existing coach parking area on Harris Street

4 Transport Impact Assessment

4.1 Forecast mode share

The forecast mode share for visitors travelling to the Powerhouse Ultimo has been forecast based on:

- Findings of the travel surveys undertaken in 2020 at the site;
- The current and future transport environment in Ultimo, taking into consideration future public transport enhancements arising from the Sydney Metro project; and
- The policy of not providing any on-site visitor parking for the Powerhouse Ultimo

The forecast mode shares for visitors for both a weekday and a weekend is presented in Figure 20 below. This indicates public transport will be the primary mode of travel to the site for visitors, comprising over half of trips to the site on weekdays. In line with the findings of the travel surveys, weekends will see higher rates of car usage given the greater number of family groups travelling to the museum during these times.

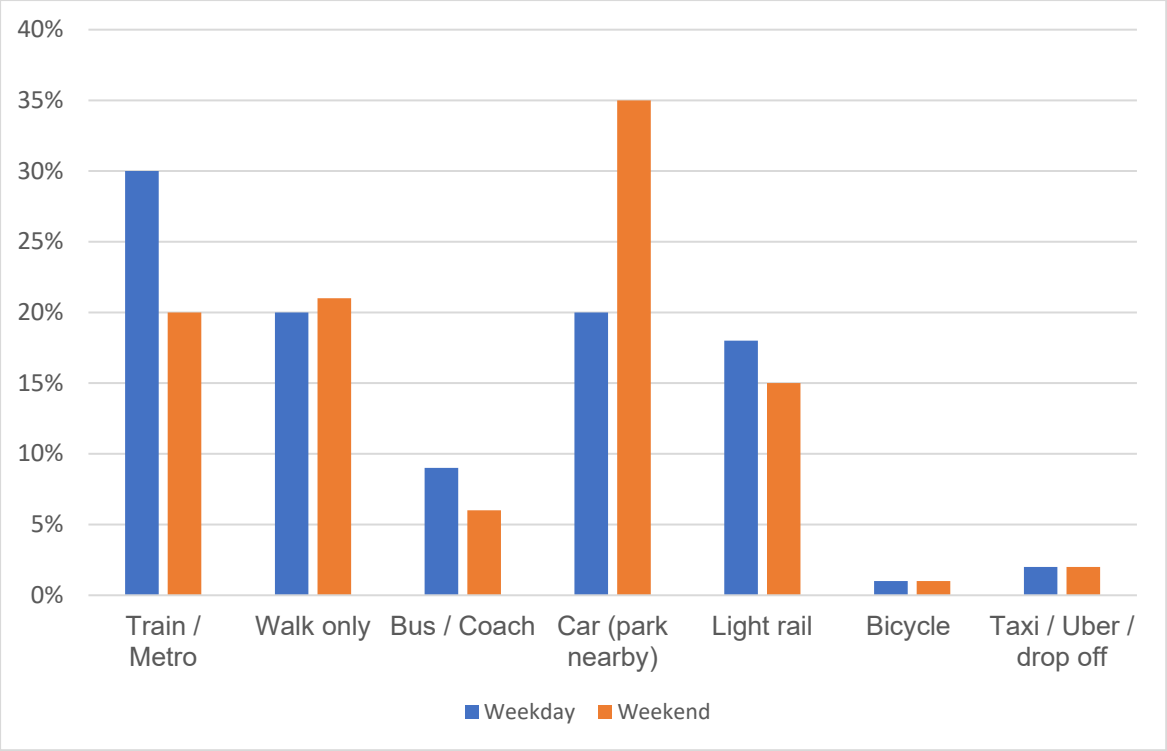

Figure 20 Forecast mode share forecasts for visitors

4.2 Travel demand

4.2.1 Forecast activity profile

Detailed activity profiles for both visitor arrivals and departures to the Powerhouse Ultimo, based on current and expected visitation behaviours, is shown in Figure 21 below. This indicates that visitors will be arriving and departing the site constantly throughout the day, rather than all arriving and departing at the same time. This spread of arrivals and departures throughout the day and evening reduces the pressure on the transport network by limiting the number of people movements during peak hours of the day.

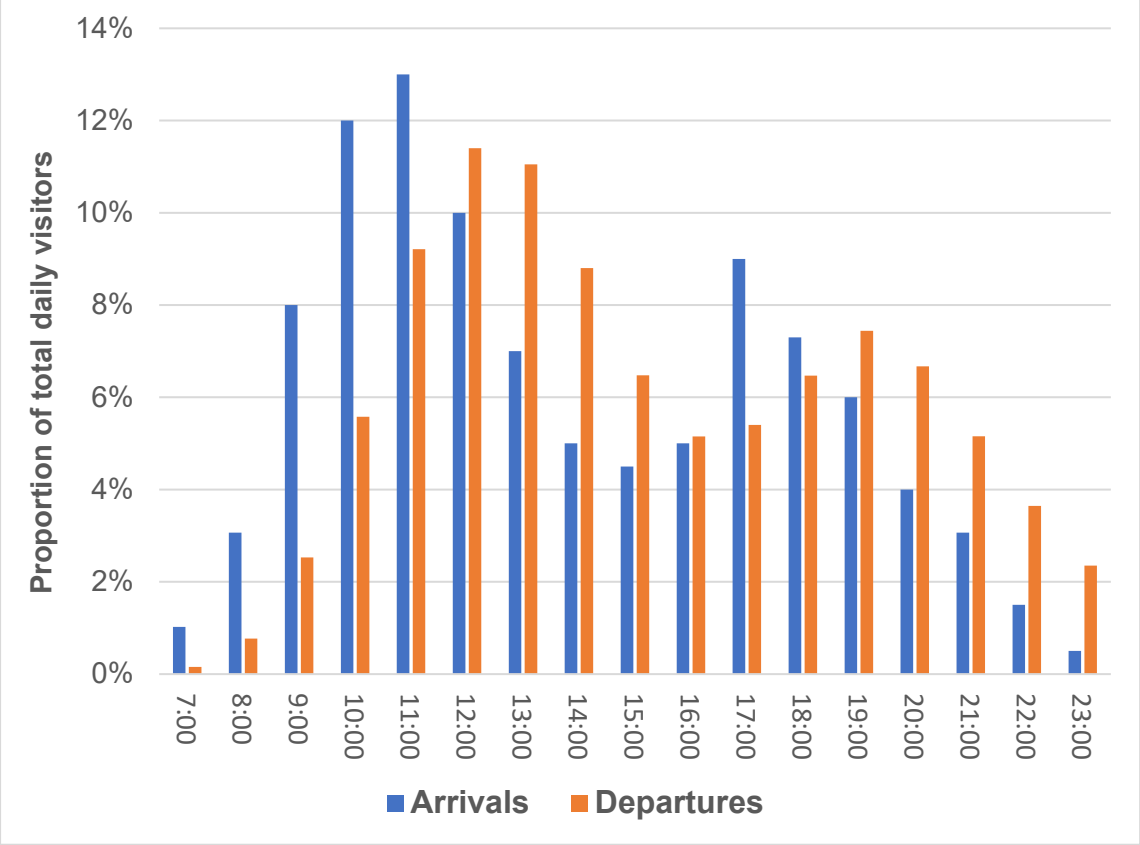

Figure 21 Forecast visitor arrival / departure profile

4.2.2 Forecast daily visitation

Over the course of a typical weekday and weekend it is forecast the Powerhouse Ultimo will generate the following levels of visitation:

- 5,000 visitors per day over a typical weekday
- 6,000 visitors per day over a typical weekend

It is important to recognise however that the Powerhouse Ultimo site currently generates a significant level of visitation on a daily basis. Most recent data prior to the COVID-19 pandemic indicated an annual visitation to the site of 757,000 people. Therefore the net increase in visitation as a result of the proposal would be as follows:

- 3,100 visitors per day over a typical weekday
- 3,720 visitors per day over a typical weekend

4.2.3 Future travel demand

The increased level of travel demand to the Powerhouse Ultimo site for a typical weekday and weekend is summarised in Table 4 and Table 5 respectively. These forecasts have been developed based on the forecast future modal split and expected arrival and departure times of people visiting the site.

This assessment has confirmed that the supporting transport network has the ability and capacity to accommodate future travel requirements. The additional demand on the train/metro network will be in the order of 100 – 200 passengers per hour which can be comfortably accommodated on the range of rail and metro services to be in place.

Table 4 Forecast increase in travel demand - weekday

Time	Net Increase in Arrivals + Departures Per Hour (weekday)								
	Train / Metro	Walk only	Taxi / Uber / drop off	Bus	Coach	Car (park nearby)	Light rail	Bicycle	**Total**
7:00	8	5	1	1	1	5	5	0	**27**
8:00	28	18	2	4	5	18	17	1	**92**
9:00	77	51	5	10	13	51	46	3	**256**
10:00	130	87	9	17	22	87	78	4	**434**
11:00	161	107	11	21	27	107	97	5	**537**
12:00	161	107	11	21	27	107	96	5	**536**
13:00	144	96	10	19	24	96	86	5	**480**
14:00	91	61	6	12	15	61	55	3	**304**
15:00	79	52	5	10	13	52	47	3	**262**
16:00	37	25	2	5	6	25	22	1	**124**
17:00	105	70	7	14	17	70	63	3	**350**
18:00	207	138	14	28	34	138	124	7	**689**
19:00	202	134	13	27	34	134	121	7	**672**
20:00	168	112	11	22	28	112	101	6	**560**
21:00	123	82	8	16	21	82	74	4	**411**
22:00	77	51	5	10	13	51	46	3	**257**
23:00	43	29	3	6	7	29	26	1	**143**
Total	**1840**	**1227**	**123**	**245**	**307**	**1227**	**1104**	**61**	

Table 5 Forecast increase in travel demand - weekday

Time	Net Increase in Arrivals + Departures Per Hour (weekend)								
	Train / Metro	Walk only	Taxi / Uber / drop off	Bus	Coach	Car (park nearby)	Light rail	Bicycle	**Total**
7:00	7	7	1	1	1	12	5	0	**33**
8:00	22	23	2	4	2	39	17	1	**110**
9:00	62	65	6	12	6	108	46	3	**308**
10:00	104	109	10	21	10	182	78	5	**521**
11:00	129	135	13	26	13	226	97	6	**644**
12:00	129	135	13	26	13	225	96	6	**643**
13:00	115	121	12	23	12	202	86	6	**576**
14:00	73	77	7	15	7	128	55	4	**365**
15:00	63	66	6	13	6	110	47	3	**315**
16:00	30	31	3	6	3	52	22	1	**148**
17:00	84	88	8	17	8	147	63	4	**419**
18:00	165	174	17	33	17	289	124	8	**826**
19:00	161	169	16	32	16	282	121	8	**806**
20:00	128	134	13	26	13	224	96	6	**640**
21:00	99	104	10	20	10	173	74	5	**493**
22:00	62	65	6	12	6	108	46	3	**309**
23:00	34	36	3	7	3	60	26	2	**171**
Total	**1466**	**1539**	**147**	**293**	**147**	**2565**	**1099**	**73**	

4.3 Vehicle access arrangements

The reference scheme prepared for the Concept Proposal includes a new vehicle access to the Harris Street buildings on the northern side of Macarthur Street. This access point has been designed to accommodate vehicles up to a Heavy Rigid Vehicle (HRV) which is 12.5m long and up to 4.5m high. The indicative location of this vehicle access point is shown in Figure 22 below and has been selected to:

- Take advantage of the ground levels and minimise the extent of ramping required within the site boundary;
- Allow for vehicles to enter and exit the site in a forwards direction, consistent with City of Sydney Council's policy for new development; and
- Allow for the creation of a pedestrianised, vehicle free zone immediately to the east which will connect through to the northern end of the site.

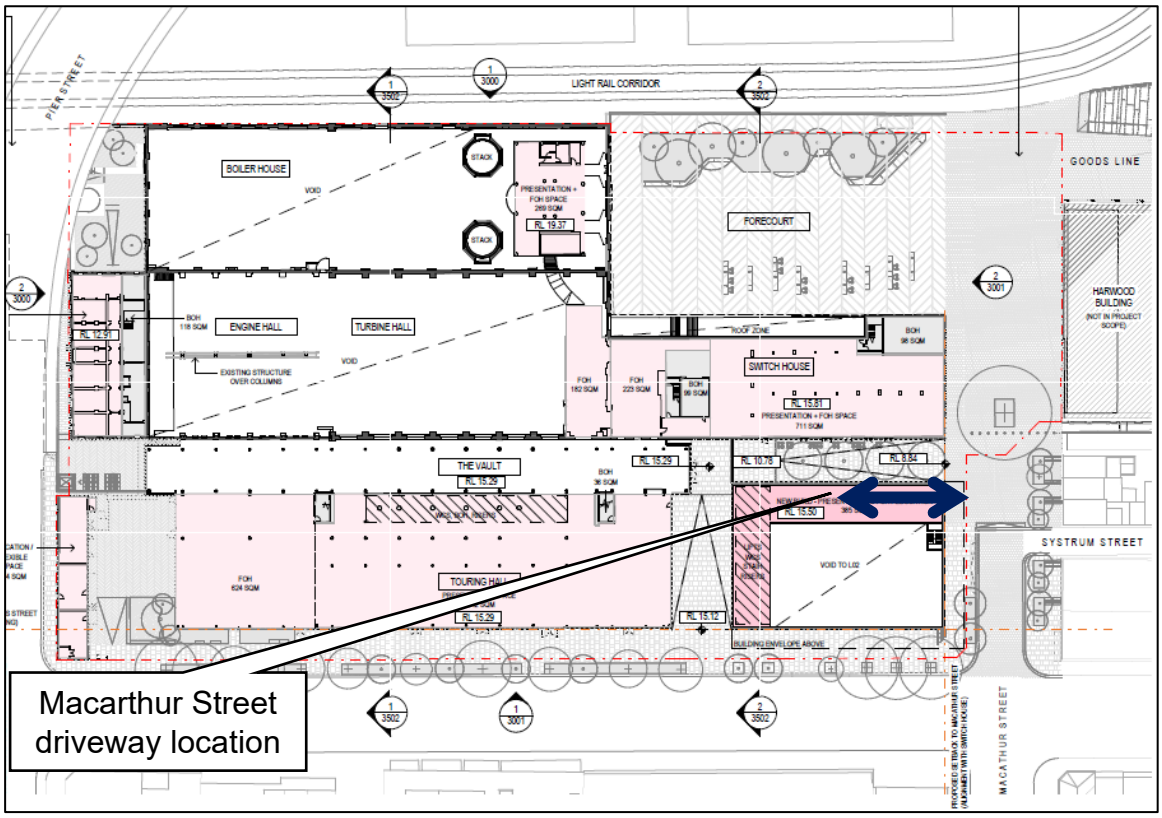

Figure 22 Proposed vehicle access point – Harris Street buildings

As part of the reference scheme prepared for the Concept Proposal, pedestrians would be encouraged to walk on the southern side of Macarthur Street to access the site through a wider footpath and improved landscaping and public treatment. To emphasise pedestrian priority along the northern side of the street, the driveway would be designed to fully integrate with the adjoining footpath. This would all be at one continuous level, with an appropriate pavement treatment which is designed for pedestrians, across which vehicles can pass slowly.

The future Macarthur Street driveway would provide access to a loading dock servicing the museum. This will remove the need for vehicles to drive through the public domain and park adjacent to the Harwood Building as previously indicated in Section 3.5 of this document. Vehicle swept path analysis was undertaken to confirm the suitability of a loading dock in this location, with outputs provided in Figure 23 below. This shows that a Heavy Rigid Vehicle (HRV) and Medium Rigid Vehicle (MRV) could park in the loading dock side by side and enter/exit independently of one another.

A service corridor would be provided which would allow goods to be transported between the loading dock and the switch house to the east. There is a goods lift within the switch house that would then allow goods to be transported to the upper levels of the building.

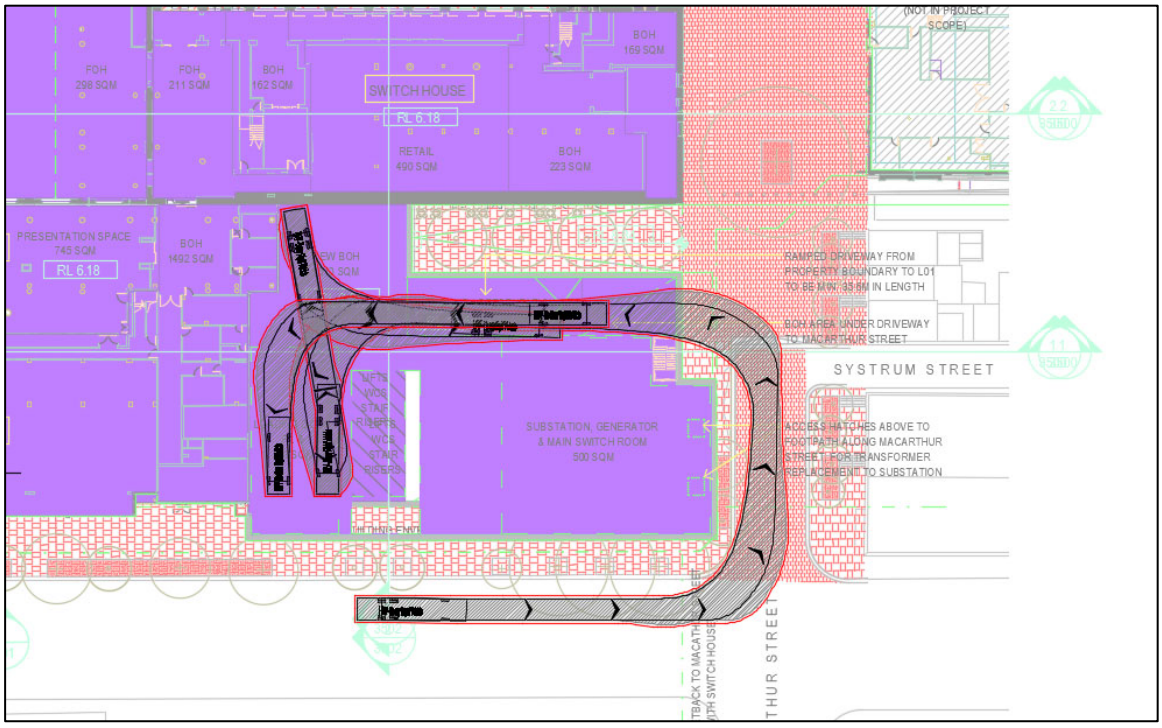

Figure 23 Vehicle swept path analysis – Harris Street building loading dock

Large 19m trucks (semi-trailers) with up to a 4.5m height clearance may require access to the site to transport very large collection items to/from the Presentation Spaces. Given the site constraints it is not practical to design a dedicated loading area for these large vehicles or vehicles with a head height of over 3.8m. Instead these vehicles would need to drive into the forecourt area of Macarthur Street and reverse back into the site adjacent to the Turbine Hall or Boiler House as shown in Figure 24. All deliveries of this nature would need to be pre-booked in advance with museum staff, undertaken outside of regular museum hours and under the supervision of on-site personnel and traffic controllers. Movements would be infrequent – approximately one every month.

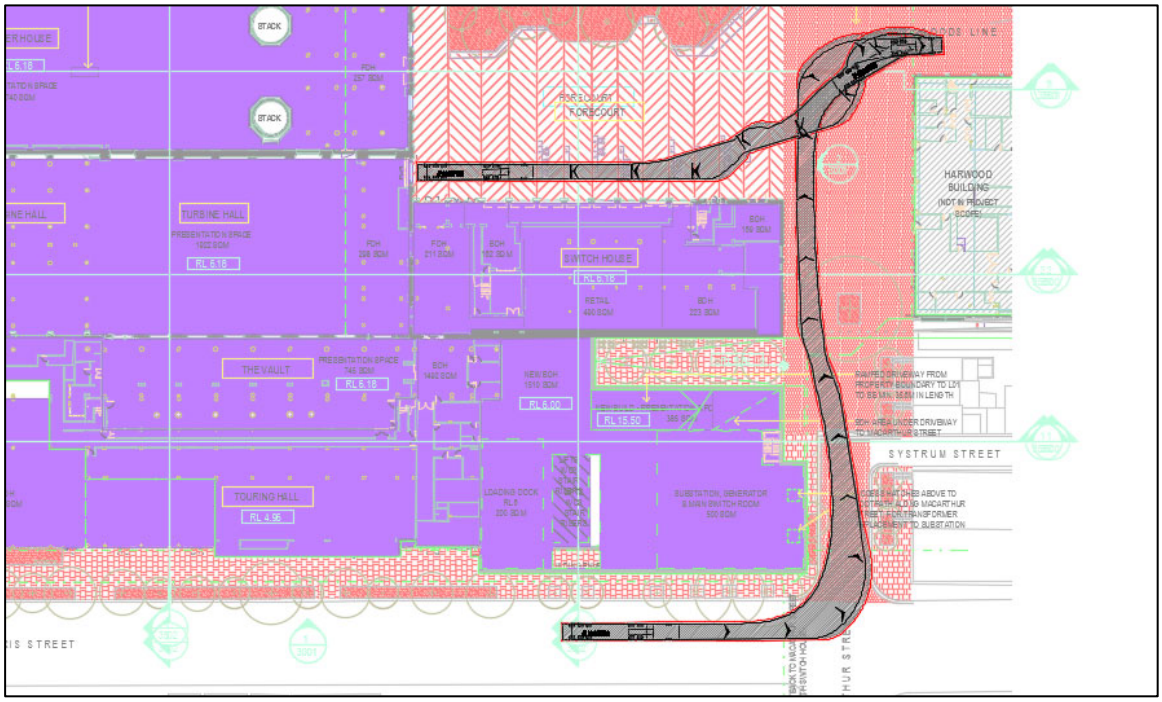

Figure 24 19m semi-trailer vehicle swept path

It should be noted that these vehicle access arrangements are subject to change dependent on the outcome of the competitive design competition and subsequent Stage 2 Development Application. The arrangements indicated are representative of that outlined in the reference scheme only prepared for the purposes of this Concept Proposal. The loading arrangements contemplated under the reference scheme are considered suitable to meet the needs of the Powerhouse Ultimo without impacting the safety or efficiency of the adjacent transport network. The reference scheme does not propose direct vehicle access from Harris Street (being a classified State road) with all access proposed via the adjoining local road network.

4.4 Cycling

4.4.1 Bicycle routes

The City of Sydney cycling strategy and action plan 2018 – 2030 proposes a number of enhancements to the local and regional bicycle network which will improve access for staff and visitors travelling to the Powerhouse Ultimo. In particular an enhanced east-west connection is proposed which will link the site (on Mary Ann Street) with the Sydney CBD via Hay Street and Glebe via Kelly Street. New north-south connections are also proposed on Jones Street and Pyrmont Street. The proposed network of routes is shown in Figure 25 below.

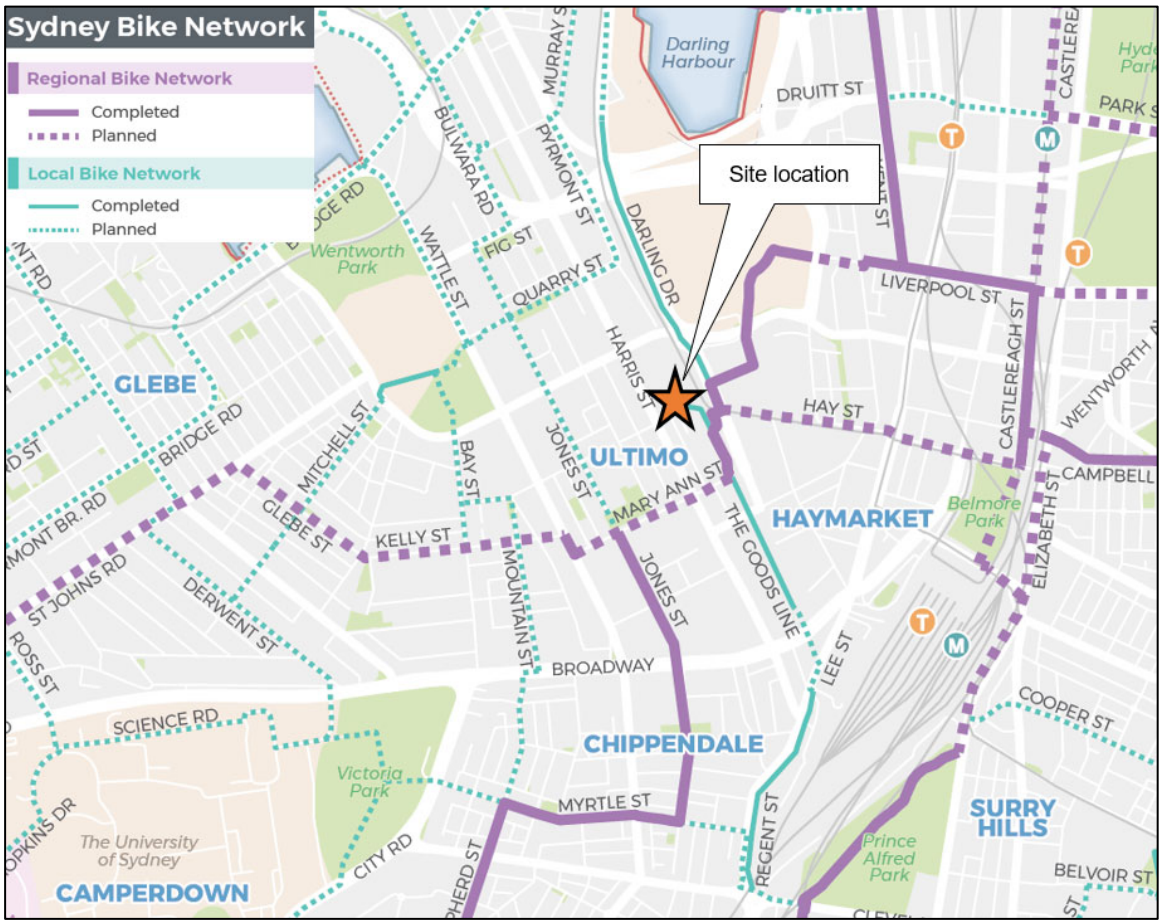

Figure 25 Proposed City of Sydney cycling network

Source: City of Sydney cycling strategy and action plan 2018

4.4.2 Bicycle parking

To encourage access by bicycle to the Powerhouse Ultimo, bicycle parking is proposed for staff and visitors of the site. As part of the reference design for the project bicycle parking has been included both within the building as well as the adjoining public domain. The number and location of bicycle parking spaces will be confirmed as part of the detailed Stage 2 Development Application for the site following the completion of the competitive design competition. At this stage the following bicycle parking provision has been made:

Staff bicycle parking

Bicycle parking for staff has been provided at a rate of approximately 1 space for every 13 staff members, or 7.5% of the building population. This bicycle parking rate aligns with the requirements under Green Star. Based on the peak staff population of 200 employees at the Powerhouse Ultimo 15 bicycle parking spaces would be required. These parking spaces will be located in a secure (lockable) undercover area. End of trip facilities (lockers, showers and change areas) will be provided for staff within the site.

Visitor bicycle parking

It is expected that between 1% and 2% of total visitors to the Powerhouse Ultimo will arrive by bicycle. On a typical weekday / weekend there could be as many as 2,000 visitors on site at one time. Therefore the current design has accommodated 40 bicycle parking spaces within the public domain for use by visitors. It should be noted that the public domain design does not preclude increases to this number of spaces in future. The operator will monitor the demand for visitor bicycle parking and, should demand warrant, provide additional capacity.

4.5 Public transport

The number of additional trips by public transport modes was determined in Section 4.5 (Travel Demand). The total number of visitors arriving by various public transport modes is summarised in Table 6, with 359 additional weekday peak hour trips and 322 additional weekend peak hour trips (two-way).

Table 6 Additional public transport trips

Mode	Additional public transport trips (peak hour)	
	Weekday	***Weekend***
Train / metro	207	165
Light rail	124	124
Bus	28	33
Total	***359***	***322***

In the context of:

- The modest increase in the number of additional trips generated on the public transport network;
- The already strong public transport network servicing the Ultimo precinct, including good quality pedestrian connections to high frequency public transport services; and
- The future public transport projects currently being delivered or planned by the NSW Government such as Sydney Metro West and Sydney Metro City and South West

No further enhancements to the public transport network are considered necessary to support the Powerhouse Ultimo project. The number of public transport trips generated by the project will be confirmed as part of the detailed Stage 2 Development Application for the site following the completion of the competitive design competition.

4.6 Coaches

The Concept Proposal seeks to retain the existing coach set down – pick up facility on the eastern side of Harris Street - adjacent to the museum entry point. As previously described in Section 3.7 this parking area can accommodate up to four coaches at any one time which is sufficient to meet the needs of the museum both now and into the future.

Providing parking for coaches within the site boundary was not supported on the basis that:

- It would significantly detract from the public domain within the site due to the turning circle requirements for these vehicles. Macarthur Street is a relatively narrow street and requiring 14.5m long coaches to enter and exit this street throughout the day is not considered a desirable outcome nor consistent with the character of the street.
- It would result in additional conflicts between vehicles and pedestrians walking on Macarthur Street.
- Parking for buses/coaches would likely need to be provided adjacent to or in close proximity to the site loading dock, including sharing an access point from Macarthur Street. Therefore children hopping on/off coaches would conflict with large service vehicles entering/exiting the loading dock.

A more appropriate solution is to utilise existing kerbside space on the eastern side of Harris Street for drop off and pick up purposes – consistent with current operations for the Powerhouse Ultimo. This would provide passengers (particularly school children) with safe and convenient access to the site via the future central access way through the site. The hours of operation for coach set down and pick up (Weekdays 10am to 3pm and Saturdays – 9am to 5pm) would be maintained however discussions with City of Sydney Council and Transport for NSW may take place prior to the opening of the museum to have these revised if needed. This will be confirmed as part of the detailed Stage 2 Development Application for the site following the completion of the competitive design competition.

4.7 Emergency vehicles

Emergency vehicle access into the Powerhouse Ultimo would be maintained via Macarthur Street as part of the reference scheme prepared to support the Concept Proposal. All emergency vehicles will be afforded access on Macarthur Street to the eastern end of the site, or if necessary into the site itself via the new driveway on Macarthur Street.

4.8 Car parking

The reference scheme prepared to support the Concept Proposal does not propose any on-site car parking for visitors, with public transport to be promoted as the preferred mode of access to the site. This is consistent with current operations for the museum. No visitor parking on the site is proposed to maximise the amount of publicly accessible open space and minimise the traffic impacts arising from the development – particularly given the strong public transport links within Ultimo and the adjacent Sydney CBD.

For those that choose to drive to the site, there are a number of public car parks within close walking distance of the site as previously indicated in Section 3.6 of this document.

Based on the forecast arrival and departure profile, as well as the average occupancy of 2.4 people per car (as determined from travel surveys at the museum), the number of parked cars associated with the Powerhouse Ultimo can be determined – shown in Figure 26. This indicates that the site may generate an additional parking demand of approximately 80 cars on a weekday, which can easily be accommodated in nearby off-street car parking areas where capacity exists for multiple thousands of vehicles at any one time.

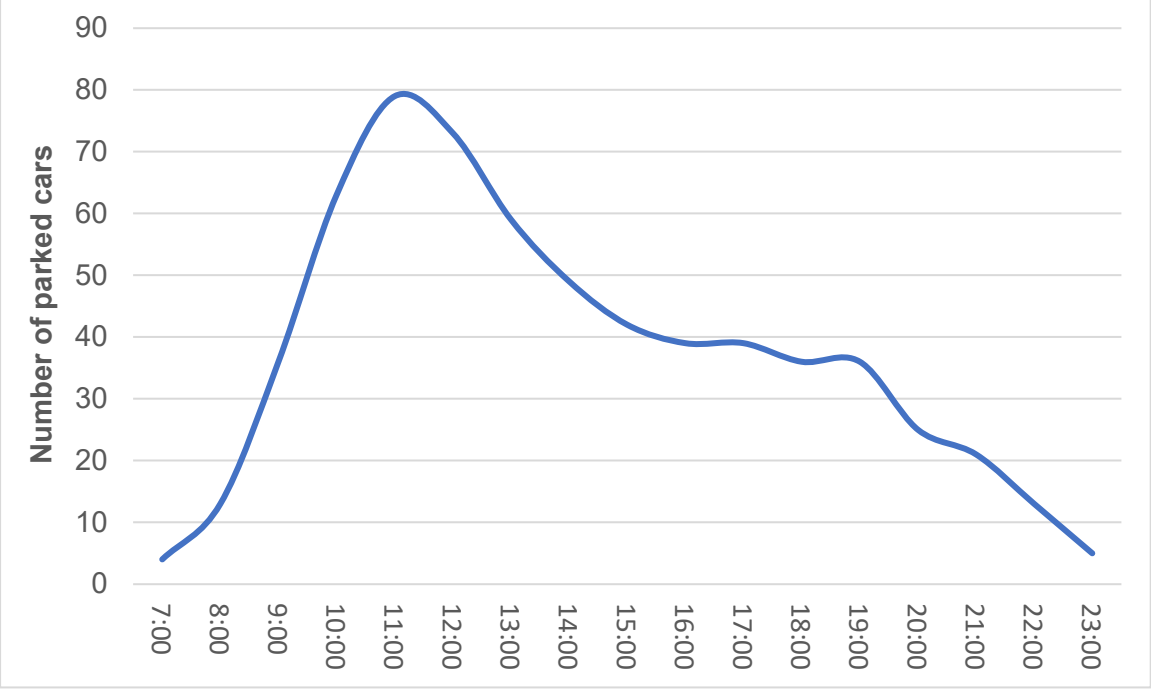

Figure 26 Forecast additional parking demand – typical weekday

4.9 Road network impacts

The proposal is not expected to generate any impacts on the surrounding road network. As indicated in Figure 27 the number of vehicles generated in the critical morning and evening peak hours of 8am-9am and 5pm-6pm respectively would be a modest 16 vehicles in the morning peak hour and 61 vehicles in the PM peak hour. The busiest times with respect to vehicle movements is expected to be in the 'shoulder' period between the morning and afternoon commuter peaks, as well as the following the conclusion of the PM peak hour.

It is important to recognise that, given no on-site car parking is to be provided as part of the project, these additional vehicle trips will be dispersed across a number of public car parking stations in the surrounding area rather than converging on a single location, minimising the road network impacts of the proposal. Given that these small number of vehicles will be dispersed across a number of different vehicle routes and locations, the impacts to the road network arising from the Powerhouse Ultimo Renewal are considered negligible, with no additional road infrastructure required to support the project.

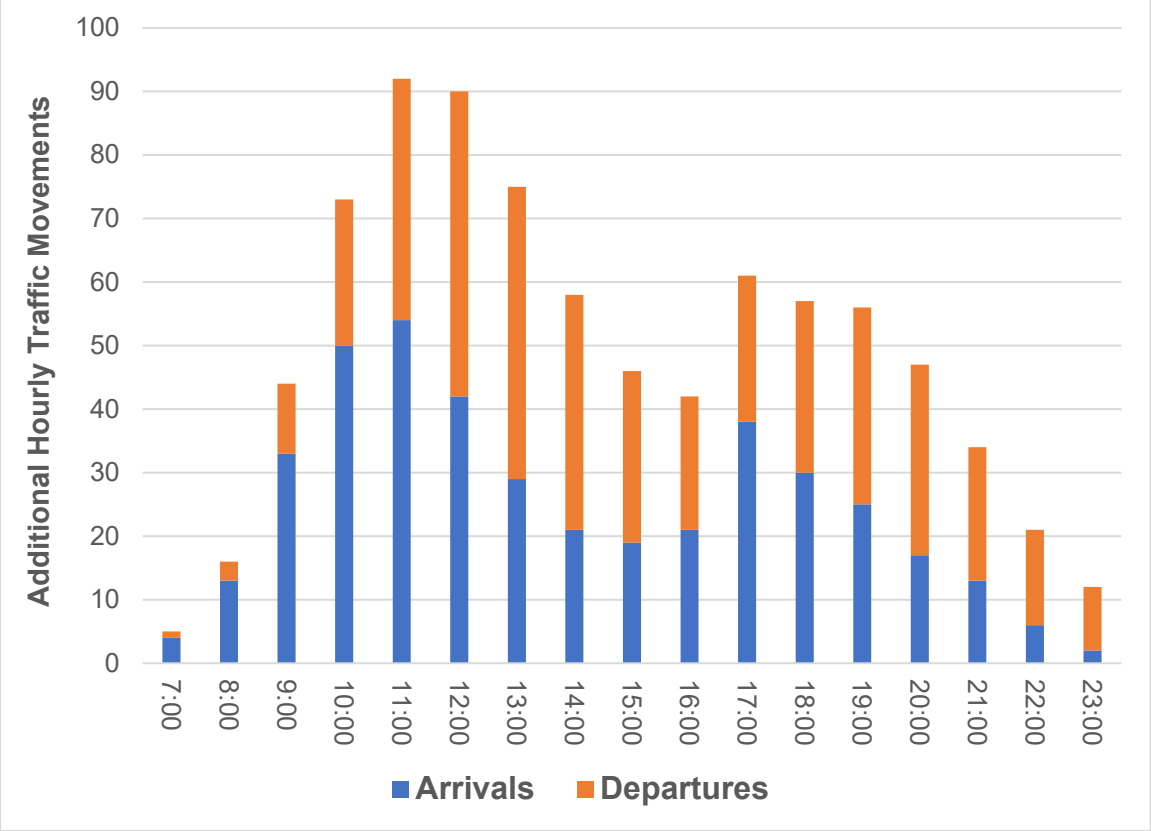

Figure 27 Forecast additional traffic movements generated by the proposal

4.10 Road user safety

Some specific measures with regards to road user safety that the reference scheme prepared for the Powerhouse Ultimo Concept Proposal has incorporated into the design are as follows:

- The proposal makes provisions for setbacks along Harris Street and Macarthur Street to provide a generous space for pedestrians travelling to and from the site.
- The reference scheme has made provision for the majority of back of house (i.e. servicing / loading) activities to be undertaken on-site rather than on Macarthur Street as is currently the case. This approach reduces conflicts between service vehicles and pedestrians walking in the precinct.
- The reference scheme envisages widening of the Macarthur Street southern footpath to provide additional space for pedestrians away from traffic using Macarthur Street.
- The future Macarthur Street driveway considered in the reference scheme would be designed to fully integrate with the adjoining footpath at one continuous level – emphasising pedestrian priority.
- The reference scheme does not propose any on-site visitor car parking which will promote public transport, walking and cycling as the primary mode of access to the site. This measure will reduce overall traffic movements in and around the site, minimising conflicts with pedestrians and cyclists.

Coach drop off and pick up is to occur on the eastern side of Harris Street rather than within the site. This provides for an improved safety outcome by ensuring pedestrians (especially school children) will not conflict with large service vehicles entering/exiting the loading dock

5 Preliminary Green Travel Plan

5.1 Travel plan overview

A preliminary Green Travel Plan (GTP) has been developed for the Powerhouse Ultimo Concept Proposal. The purpose of this preliminary plan is to identify measures to promote the use of sustainable modes of transport as a means of accessing the site and reduce private vehicle dependency. These measures will be further refined as the project progresses, particularly during the Stage 2 Development Application as well as through a detailed Green Travel Plan to be prepared prior to the occupation of the site.

5.2 Objectives

The GTP aims to encourage and support the broader use of sustainable travel options by staff and visitors of the museum. It focuses on minimising the impact of travel to the museum on the local and wider transport network and encourages those accessing the museum to do so by sustainable modes of transport, thereby reducing car dependency for staff and visitors.

The key objectives of the GTP are to:

- Achieve a high modal share for public transport, cycling and walking journeys for staff and visitors of the Powerhouse Ultimo;
- Reduce private vehicle dependency as a means of access to the Powerhouse Ultimo;
- Ensure adequate facilities are provided at the site to enable users to travel by sustainable transport modes; and
- Raise awareness of, and actively encourage the use of, sustainable transport amongst users.

The GTP for the Powerhouse Ultimo responds to these objectives by:

- Promoting alternatives to the car and encouraging increased public transport, walking and cycling usage;
- Reducing the environmental impacts associated with vehicle movements by raising travel awareness and encouraging travel by more sustainable transport modes, to reduce private car usage;
- Connecting the site to the surrounding community by the strong promotion of walking and cycling, thus minimising the impact on the adjacent road network; and
- Promoting public transport connections in the area including heavy rail, bus light rail services and future metro services.

5.3 Target mode shares

Having regard for existing travel behaviours (noted in Section 3.1), the planned improvement in public transport services to the area including Sydney Metro, as well as the proposal not to provide any visitor car parking for the Powerhouse Ultimo, mode share targets have been developed for travel to the site. These targets are identified in Table 7

Table 7 Target mode shares

Mode of Travel	Target Mode Share	
	Staff	Visitors
Private vehicle	20%	20%
Public transport, walking or cycling	80%	80%

5.4 Implementation and management

A staff member of the Powerhouse will be responsible for the implementation of the plan, including:

- Communicating the travel plan to stakeholders;
- Promote awareness of the plan and associated initiatives;
- Providing travel information for staff and visitors;
- Developing and disseminating appropriate travel plan marketing information, and to ensure that all relevant and up to date material is provided on the Powerhouse website;
- To liaise with other venues and Government agencies to develop a collaborative approach to Travel Plan initiatives;
- To evaluate the benefit of the proposed measures to identify any changes required to the Travel Plan; and
- Overseeing the implementation and effectiveness of the Plan

In order to secure a successful Travel Plan, the Powerhouse will continue to engage with key transport agencies and stakeholders such as Transport for NSW and City of Sydney Council. This will assist in designing and operating services which best support the needs of staff, residents and visitors, and therefore promoting high levels of sustainable transport modes.

The Plan is a 'living' document, so measures excluded at this time could be reconsidered or reintroduced at any time in the future. It is recognised that travel needs, and patterns will change, and new measures will become available. The Plan will be periodically reviewed to ensure that the objectives are being met.

5.5 Potential measures

An overview of the potential measures proposed are described in the following sections. These measures will be refined as the project progresses, particularly during the Stage 2 Development Application as well as through a detailed Green Travel Plan to be prepared prior to the occupation of the site.

Table 8 lists the potential measures which are not exhaustive and may change with time, and as a living document the Travel Plan will require the periodic updating of the list of measures.

Table 8 Potential travel plan measures

Measure	Description of measure	Relevant transport mode	Audience	
			Staff	Visitors
Staff cycle advice	Advice on cycling and walking routes	Cycling/ Walking	✓	
Safety training	Cycle safety training courses (provided by others) for staff to improve cycling confidence.	Cycling	✓	
Staff induction	All event day staff members to be made aware of the travel plan as part of their induction process, including a tour of end of trip facilities on site and available non-car travel options	All modes	✓	
Walking & cycling map	Produce a map showing cycle and walking routes and bicycle parking in the area	Cycling/ Walking	✓	✓
Transport Access Guide	Prepare a detailed Transport Access Guide (TAG) prior to the occupation of the site which details various ways to travel to the site via sustainable transport modes	All modes	✓	✓
End of trip facilities	Provision of end of trip facilities for staff	Cycling/ Walking	✓	
Bicycle parking	On site cycle parking, the use of these spaces will be monitored and requirements reviewed based on their usage.	Cycling	✓	✓
	Ensure bicycle parking is clearly visible or provide signage to direct people to cycle bays	Cycling	✓	✓
Real time information	Provide information on public transport journey times to the Powerhouse Ultimo via links to existing journey planning websites.	Public Transport	✓	✓
Shift working	Flexible start and finish times for staff, to allow them to take advantage of off-peak fares and support public transport.	Public Transport	✓	
Public transport use	Encourage public transport use for business travel	Public Transport	✓	
Information on website	Information on public transport timetables, pedestrian and cycle routes and facilities. Advertise the parking limitations and restrictions.	All modes	✓	✓
Visitor Information	Provide travel information to visitors via the Powerhouse website, including potentially at point of ticket purchase.	All modes		✓
Car parking	No on-site parking to be provided as part of the Powerhouse Ultimo project	Parking	✓	✓

5.6 Travel access guide

The information provided within the detailed GTP, to be prepared prior to the occupation of the site, will be provided to staff and visitors in the form of a package of easy to understand travel information known as a Transport Access Guide (TAG). This will be included on the Powerhouse website, with a link to the TAG potentially emailed to visitors following the purchase of their tickets.

TAGs provide customised travel information for people travelling to and from a particular site using sustainable forms of transport – walking, cycling and public transport. It provides a simple quick visual look at a location making it easy to see the relationship of site to train stations, light rail stations, bus stops and walking and cycling routes. Such TAGs encourage the use of non-vehicle mode transport and can reduce associated greenhouse gas emissions and traffic congestion while improving health through active transport choices.

They can take many forms from a map printed on the back of business cards or brochures. Best practice suggests that the information should be as concise, simple and site centred as possible and where possible provided on a single side/sheet. If instructions are too complex, people are likely to ignore them.

5.7 Monitoring and review

In order for the Travel Plan to be effective it must be monitored on a regular basis (every one to two years) to ensure that the objectives are being met. The monitoring measures could include:

- Collecting data on employee travel patterns for journeys to work (through surveys or analysing journey to work or Opal data)
- Visitor travel patterns via interview surveys.
- Review the number of people using public transport in the area through a review of Opal patronage data and counts at the major event bus terminals
- Utilisation of bicycle parking facilities in the precinct.

6 Preliminary Construction Pedestrian Traffic Management Plan

6.1 Overview

For the purposes of the Concept Proposal a preliminary Construction Pedestrian Traffic Management Plan (CTPMP) has been prepared. This preliminary CPTMP outlines the key principles for how construction may be carried out on the site, subject to further planning to be undertaken during subsequent stages of the project. As the project is in very early concept phase details around construction timeframes, methodology and processes are not yet clear.

Prior to the commencement of construction for the Powerhouse Ultimo site, a detailed CPTMP will be prepared. The purpose of the CTPMP is to assess the proposed access and operation of construction traffic associated with the proposed development with respect to safety and capacity. The Contractor will be responsible for preparing the CTPMP, ensuring the following are addressed:

- Proposed construction vehicle routes;
- Indicative construction programme;
- Expected construction vehicle types and volumes;
- Car parking arrangements and site access during construction;
- Safety measures to minimise impacts to pedestrians and cyclists. T

The Contractor will also be responsible for monitoring and coordinating all vehicles entering and exiting the site.

6.2 Work hours

Consistent with standard City of Sydney guidelines working hours for the project would likely be as follows:

- Monday to Friday 7.00am and 6.00pm
- Saturday 8:00am and 1:00pm
- Sunday/ public holiday No work

6.3 Construction vehicle routes

The construction vehicles routes to be utilised for the Powerhouse Ultimo site would be selected in order to:

- Restrict vehicle access to the State and Regional road network, and not impact the amenity of residential streets;
- Avoid impacting concurrent construction projects in the vicinity of the site; and
- Minimise impacts to the public transport network

The potential construction vehicle routes are illustrated in Figure 28 and include:

From the north: Harbour Bridge – Western Distributor – Harris Street

From the south and east: Cross City Tunnel – Harbour Street – Pier Street - Harris Street

From the west: Anzac Bridge– Allen Street – Harris Street

From the west and south: Parramatta Road – Broadway – Wattle Street – Fig Street - Harris Street

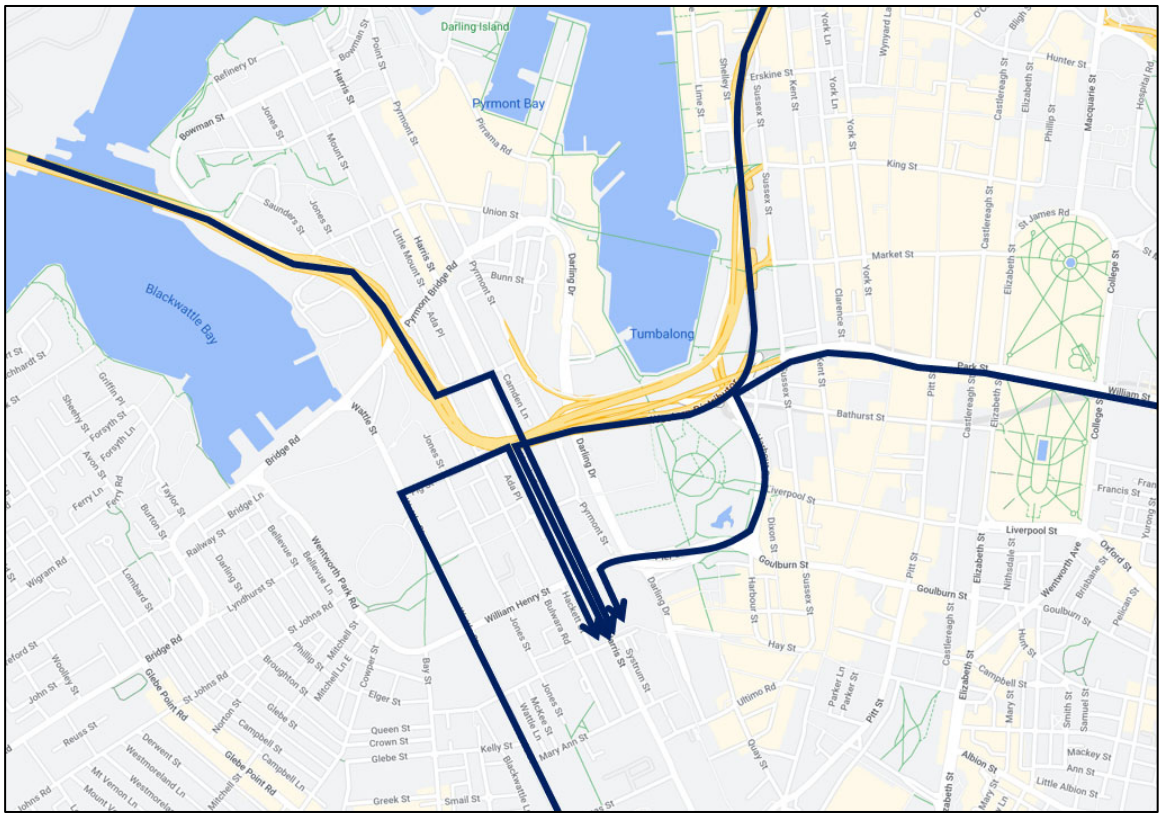

Figure 28 Potential construction vehicle routes

6.4 Construction vehicle volumes

The number of construction vehicles accessing the site on a typical day may be in the order of 50-60 vehicles. This figure will be confirmed following the appointment of a contractor and will form part of the detailed CPTMP to be prepared prior to the commencement of construction.

6.4.1 Work zones

To facilitate the construction, a work zone may be required to be established adjacent to the site. The most logical place for a work zone would be in the existing 'No Parking' area on the eastern side of Harris Street (see Figure 29) which is currently used by coaches during the day. This zone would not require the removal of any on-street parking and only be in place up until 3pm, at which time it would revert to a Clearway as per current conditions. A B-Class hoarding would be installed adjacent to the work zone to provide protection to pedestrians walking along Harris Street.

The need for a works zone in this, or other locations, would form part of the detailed CPTMP to be prepared prior to the commencement of construction.

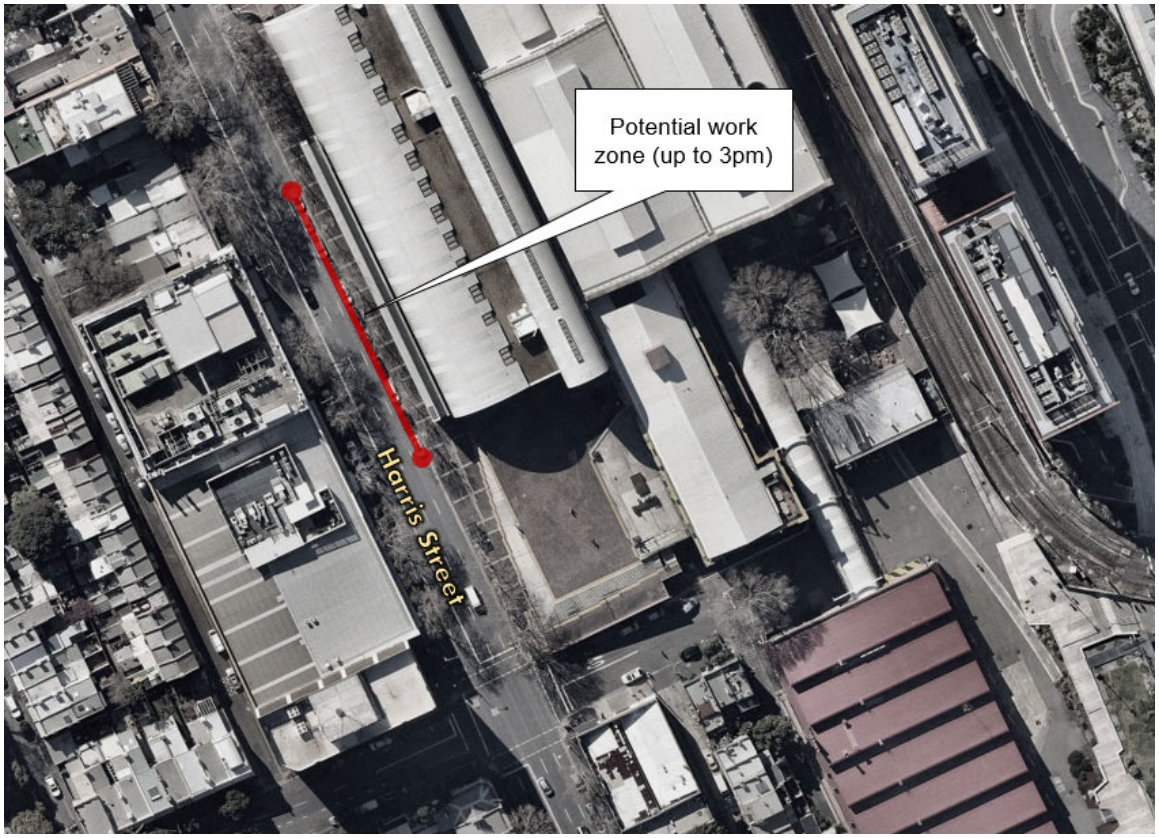

Figure 29 Potential Harris Street work zone location

6.5 Mitigation measures

Mitigation measures would be adopted during construction to ensure traffic movements have minimal impact on surrounding land uses and the community in general, and may include the following:

- Trucks to minimise the use local streets for access to the construction site;
- Trucks to enter and exit the site in a forward direction;
- Pedestrians near the ingress/egress points will not be held unnecessarily.
- At construction vehicle access/egress points, priority is to be given to trucks accessing the site over trucks egressing the site so as to have no impact to traffic flow on surrounding roads (unless exceptional circumstances do not permit)
- Trucks to not circulate on the road network to wait to enter the site (unless exceptional circumstances do not permit)
- Restrict construction vehicle activity to designated routes which do not utilise any local roads;
- Truck drivers will be advised of the designated truck routes to/ from the site;
- Construction access from the external road network to mainly occur at signalised intersection;
- Pedestrian movements adjacent the construction site will be managed and controlled by site personnel where required;
- Pedestrian warning signs and construction safety signs/devices to be utilised in the vicinity of the site and to be provided in accordance with WorkCover requirements;
- Construction activity to be carried out in accordance with approved hours of work;
- Truck loads would be covered during transportation off-site;
- Activities related to the construction works would not impede traffic flow along adjacent roads;
- Construction vehicles not to queue on adjacent streets
- During site induction, workers will be informed of the existing bus, train and light rail network servicing the site; and
- Development and enforcement of driver charter.

These mitigation measures will be further developed as the project progresses and outlined in detail in the CPTMP to be prepared prior to the commencement of construction.

7 Summary

This transport assessment has been prepared to support a Concept SSDA for the renewal of Powerhouse Ultimo and the creation of the Powerhouse Creative Industries Precinct, with the detailed design, construction, and operation of the project to be sought at a separate and future stage (Stage 2).

The site of the Powerhouse Ultimo already enjoys strong levels of public transport accessibility, with nearby access to heavy rail, bus and light rail facilities, This public transport access will be further enhanced in future through the provision of Sydney Metro City and Southwest and Sydney Metro West projects. A range of travel demand management measures have been proposed as part of a preliminary green travel plan to promote travel to the site by non-car modes and take advantage of this high quality public transport infrastructure. Bicycle parking and end of trip facilities will also be provided to support cycling as a mode of transport to the site.

Visitors are generally expected to arrive and depart the site constantly throughout the day, rather than all arriving and departing at the same time. This spread of arrivals and departures reduces the pressure on the transport network by limiting the number of people movements during peak hours of the day. The assessment has confirmed that the transport network supporting the site is capable of accommodating the expected travel demands generated over a typical day.

The reference scheme prepared for the Concept Proposal includes a new vehicle access to the Harris Street buildings on the northern side of Macarthur Street - removing the need for vehicles to drive through the public domain and park adjacent to the Harwood Building. This future vehicle access will be confirmed as part of the detailed Stage 2 Development Application for the site following the completion of the competitive design competition.

The proposal includes no on-site car parking bays for private vehicles, with public transport to be promoted as the primary mode of access to the site. For those that choose to drive to the site, there are a number of public car parks within close walking distance to the site. The relatively small number of additional vehicle trips generated by the proposal will be dispersed across a number of different vehicle routes, with the impacts to the road network arising from the Powerhouse Ultimo Renewal considered negligible.

A suite of transport measures has been proposed to support the development of the site and mitigate the impacts on the transport network. These mitigation measures are summarised in Table 9.

Table 9 Proposed mitigation measures

Proposed Mitigation Measure	Timing
Preparation of a detailed Construction Pedestrian Traffic Management Plan (CPTMP) that includes the following: - Detailed construction program - Forecast vehicle movements - Staff transport arrangements - Location of works zones - Location of cranes - Proposed mitigation measures	Prior to commencement of demolition / construction on site following Stage 2 detailed DA approval
Transport access strategy to minimise points of conflicts between vehicles and pedestrians within the public domain, with the project to support on-site loading and servicing	To be incorporated as part of Stage 2 design
Preparation of a detailed Green Travel Plan to support sustainable travel to and from the site and measures to monitor the effectiveness of the plan	Prior to occupation of the site.
Preparation of a detailed loading dock management plan that includes the following: - Loading dock management details - Service vehicle volumes including size and frequency - Details around incident management at the access to the loading dock; - Management of conflicts between pedestrians and vehicles accessing the loading dock via Macarthur Street.	Prior to occupation of the site.
No on-site parking for staff or visitors to manage the traffic impacts of the proposal	n/a
Provision of secure bicycle parking at the Powerhouse Ultimo for staff and parking within the public domain for visitors	Following occupation of the site
Provision of good quality pedestrian connections between the Powerhouse Ultimo and the surrounding transport network, particularly through to the Goods Line	Following occupation of the site