URBIS

TRANSPORT IMPACT ASSESSMENT

Huntingwood Processing Expansion

Prepared for

CHARTER HALL HOLDINGS PTY LTD

23 August 2021

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We acknowledge, in each of our offices the Traditional Owners on whose land we stand.

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1. INTRODUCTION

1.1. OVERVIEW

This Transport Impact Assessment has been prepared by Urbis Pty Ltd (Urbis) on behalf of Charter Hall Holdings Pty Ltd (the Applicant) to support a State Significant Development Application (SSDA) for the proposed expansion of the existing food processing operations located at 65 Huntingwood Drive Huntingwood (the site).

1.2. REPORT STRUCTURE

This report outlines the assessment of the potential transport impacts of the proposed development, including consideration of the following:

- Existing transport and traffic networks serving the site.
- Existing travel behaviours and land uses in the surrounding area.
- Review of construction traffic impacts.
- Review of the proposed vehicle parking design requirements.
- The traffic generating characteristics of the proposed development.
- Travel demand management measures supported by a green travel plan.
- The transport and traffic implications of the proposed development and mitigation measures required to support the redevelopment.

Table 1 identifies the traffic and transport specific requirements in the issued SEARs and where they are addressed in this report

Table 1 SEARs Requirements

SEARs Requirement	Section of This Report
Details of all traffic types and volumes likely to be generated during construction and operation, including a description of: *key access / haul routes* *employee shift change pattern* *24-hour temporal profile of truck generation*	▪ Section 3.1 Expected traffic generation ▪ Section 3.5 Staging of Works ▪ Section 3.6 Anticipated Haulage Routes ▪ Vehicle Access Vehicle Access ▪ Section 7.3 Traffic and Access
Consideration of the existing traffic generated by the existing operation.	▪ Section 2.3.4 Traffic Volume
An assessment of the predicted impacts of this traffic on road safety and the capacity of the road network, including consideration of cumulative traffic impacts at key intersections using SIDRA or similar traffic model.	▪ Section 7.3.3 Background Traffic Growth ▪ Section 7.3.4 Intersection operation
Plans demonstrating how all vehicles likely to be generated during construction and operation and awaiting loading, unloading or servicing can be	▪ Section 3.1 Expected traffic generation

SEARs Requirement	Section of This Report
accommodated on the site to avoid queuing in the street network.	▪ Section 3.2 Parking ▪ Section 3.5 Staging of Works ▪ Section 4.2 Vehicle Access ▪ Section 4.3 Internal Road Network ▪ Section 4.7 Loading and Servicing Areas ▪ Section 7.3 Traffic and Access
Details and plans of any proposed internal road network, loading dock servicing and provisions, on-site parking provisions, and sufficient pedestrian *and cyclist facilities, in accordance with the relevant Australian Standards and how the development integrates with the existing site operations.*	▪ Section 4.2 Vehicle Access ▪ Section 4.3 Internal Road Network ▪ Section 4.7 Loading and Servicing Areas ▪ Section 5 Car Parking Design Review ▪ Section 6 Heavy Vehicle Parking Review
Identification of any dangerous goods likely to be transported on arterial and local roads to/ from the site and, if necessary, the preparation of an incident management strategy.	▪ Section 4.10 Dangerous Goods
Details of the largest vehicle anticipated to access and move within the site, including swept path analysis and swept path diagrams depicting vehicles entering, exiting and manoeuvring throughout the site.	▪ Section 6 Heavy Vehicle Parking Review ▪ Appendix B Swept Paths

2. EXISTING CONDITIONS

2.1. THE SITE

Component	Description
Address and Legal Description	65 Huntingwood Drive, Huntingwood Lot 1 DP866251
Site Area	Total area of 163,933 m^2 (16.4 ha)

The site is located within the Huntingwood Industrial Estate, 32km west of the Sydney CBD and 4km south of Blacktown Town Centre. The site is situated along the southern boundary of Huntingwood, bordering the Western Motorway (M4) to the south and Huntingwood Drive to the north.

The site is occupied by the existing Arnott's Biscuits food processing (bakery) facility which operates 24 hours a day, seven days a week. The site currently contains three large freestanding industrial buildings, the main 'L-shaped' processing building to the north and two warehouses to the south. The balance of the site includes small ancillary buildings, car parking, loading areas and privately used open space. The northwest corner of the site currently acts as on-site detention (OSD) basin.

The north-western edge of the site sits up to approximately 4m above the surrounding road reserves. The balance of the site is reasonably flat with a slight fall towards the northwest.

Vehicular access to the site for light vehicles is via an existing entry and exit driveway (Liberty Road) at the Huntingwood Drive frontage. Separate heavy vehicle access to the site is available from Huntingwood Drive adjacent to the eastern boundary. Heavy vehicle access to the high-bay warehouse is also available from Brabham Drive. The site currently has 355 car parking spaces, 260 located in the main car park near the oval and 95 located in the southeast corner of the site. **Figure 1** details the site area. While the site contains both a processing facility and a high-bay warehouse, these two components operate in an independent nature from each other, with their own access points and car parking areas.

Figure 1 Subject site

Source: Urbis

Figure 2 Site context

Source: Urbis

2.2. LAND USE PATTERNS

The site is located in the Huntingwood Industrial estate in IN2 zoned land. The site is used as a major processing centre and distribution hub for Arnott's. Site activities include baking, packing, storage and loading for product distribution on an industrial scale. The site currently has 2 vehicle parking areas that accommodate both delivery vehicle parking and employee parking on site.

The site surrounds more IN2 zoned land to the north and east while land to the west falls under the jurisdiction of the State Environmental Planning Policy (SEPP) Western Sydney Parklands (WSP) 2009. The M4 is located to the south of the site and the closest access point from the site is the Reservoir Road on/off-ramps via the Great Western Highway. Trips to the subject site are primarily by employees and delivery vehicle drivers.

The closest town centre to the site is Blacktown. Blacktown town centre contains a train station, hospital and various amenities such as doctors, schools and a Service NSW. Westpoint Blacktown is a regional shopping centre in Blacktown which contains supermarkets and department stores.

2.3. EXISTING TRANSPORT NETWORK

2.3.1. Road Hierarchy

Roads within NSW are categorised in the following two ways:

- By Classification (ownership).
- By the function that they perform.

Road Classification

Roads are classified (as defined by the Roads Act 1993) based on their importance to the movement of people and goods within NSW (as a primary means of communication).

The classification of a road allows Transport for NSW (TfNSW) to exercise authority on all or part of the road. Classified roads include Main Roads, State Highways, Tourist Roads, Secondary Roads, Tollways, Freeways and Transitways.

For management purposes, TfNSW has three administrative classes of roads. These are

- **State Roads** – Major arterial links through NSW and within major urban areas. They are the principal traffic carrying roads and are fully controlled by TfNSW with maintenance fully funded by TfNSW. State Roads include all Tollways, Freeways and Transitways; and all or part of a Main Road, Tourist Road or State Highway.
- **Regional Roads** – Roads of secondary importance between State Roads and Local Roads which, with State Roads provide the main connections to and between smaller towns and perform a sub arterial function in major urban areas. Regional roads are the responsibility of councils for maintenance funding, though TfNSW funds some maintenance based on traffic and infrastructure. Traffic management on Regional Roads is controlled under the delegations to local government from TfNSW. Regional Roads may all or part of a Main Road, Secondary Road, Tourist Road or State Highway; or other roads as determined by TfNSW.
- **Local Roads** – The remainder of the council-controlled roads. Local Roads are the responsibility of councils for maintenance funding. TfNSW may fund some maintenance and improvements based on specific programs (e.g. urban bus routes, road safety programs). Traffic management on Local Roads is controlled under the delegations to local government from TfNSW.

Functional Hierarchy

Functional road classification involves the relative balance of mobility and access functions. TfNSW defines four levels in a typical functional road hierarchy, ranking from high mobility and low accessibility to high accessibility and low mobility. These road classes are

- Arterial Roads – generally controlled by TfNSW, typically no flow limit and are designed to carry vehicles long distances between regional centres.
- Sub-Arterial Roads – can be managed by either TfNSW or local council. Typically, their operating capacity ranges between 10,000 and 20,000 vehicles per day. The aim is to carry through traffic between specific areas in a sub-region or provide connectivity from arterial road routes (regional links).
- Collector Roads – provide connectivity between local roads and the-arterial road network and typically carry between 2,000 and 10,000 vehicles per day.
- Local Roads – provide direct access to properties and the collector road system and typically carry between 500 and 4,000 vehicles per day.

2.3.2. Surrounding Roads

The characteristics of the surrounding road network are detailed in **Table 2**. The surrounding road network is shown in **Figure 3**.

Table 2 Characteristics of surrounding roads

Road	Huntingwood Drive	Brabham Drive	Liberty Road	Great Western Highway	Reservoir Road	Western Motorway (M4)
Classification	Local	Local	Private	State	State	State
Functional hierarchy	Major Collector	Sub-Arterial	Local Access	Arterial	Sub-Arterial	Arterial
Sealed (yes / no)	Yes	Yes	Yes	Yes	Yes	Yes
Movement lanes	One lane in each direction.	Two lanes in each direction.	One lane in each direction.	Two lanes in each direction.	Two lanes in each direction.	Three lanes in each direction.
Parking lanes	Yes	No	Yes	No	No	No
Carriageway width (approx.)	8.5 m	15 m	13 m	16.6 m	15 m	30 m
Signposted speed	60	60	60	80	60	100
Line marking / divided lanes	Yes	Yes	No	Yes	Yes	Yes
Pedestrian pathways	Yes	Yes	Yes	No	No	No
Bus stops	Yes	Yes	No	Yes	No	No
Other features	N/A	Median strip separating directional flow.	N/A	Median strip separating directional flow.	N/A	Median strip separating directional flow.

Source: Nearmap, Google Street View

Figure 3 Surrounding road network

Source: Urbis

2.3.3. Surrounding Intersections

The intersections controlling access in the vicinity of the site include:

- Huntingwood Drive and Brabham Drive (priority controlled).
  - Northwest corner of the site.
- Huntingwood Drive and Liberty Road (priority controlled).
  - Northeast corner of the site.
  - Directly north of westernmost Huntingwood Drive site entrance.

Intersections of the surrounding road network:

- Huntingwood Drive and Great Western Highway (signalised right turn/priority controlled left turn).
- Great Western Highway and Reservoir Road (signalised straight on and right turn/priority controlled left turn.
- Reservoir Road and Western Motorway (signalised straight on/priority controlled left turn).
- Brabham Drive and Great Western Highway (signalised left turn, right turn and straight on).
- Brabham Drive and Peter Brock Drive (priority controlled)

The intersections are shown in **Figure 4.**

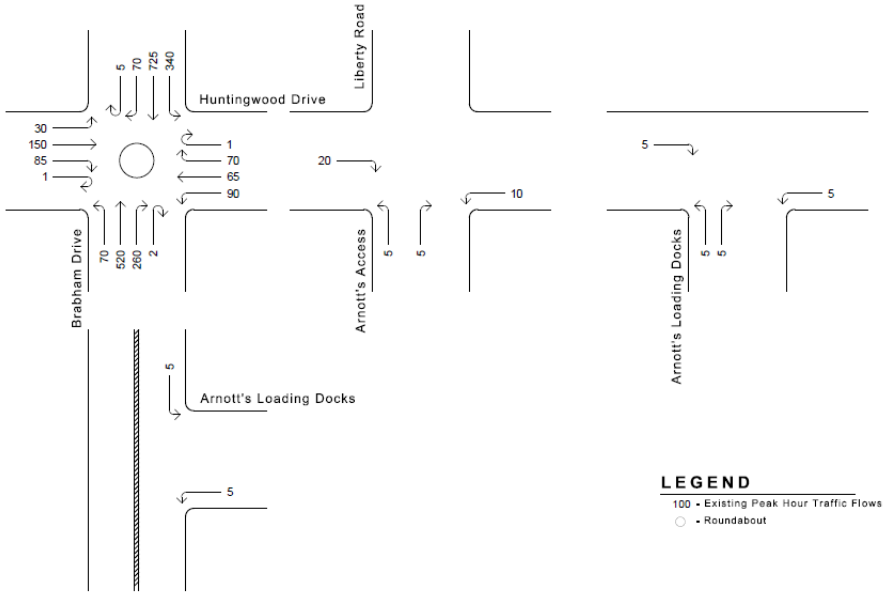
Figure 4 Surrounding intersections

Source: Urbis

2.3.4. Traffic Volume

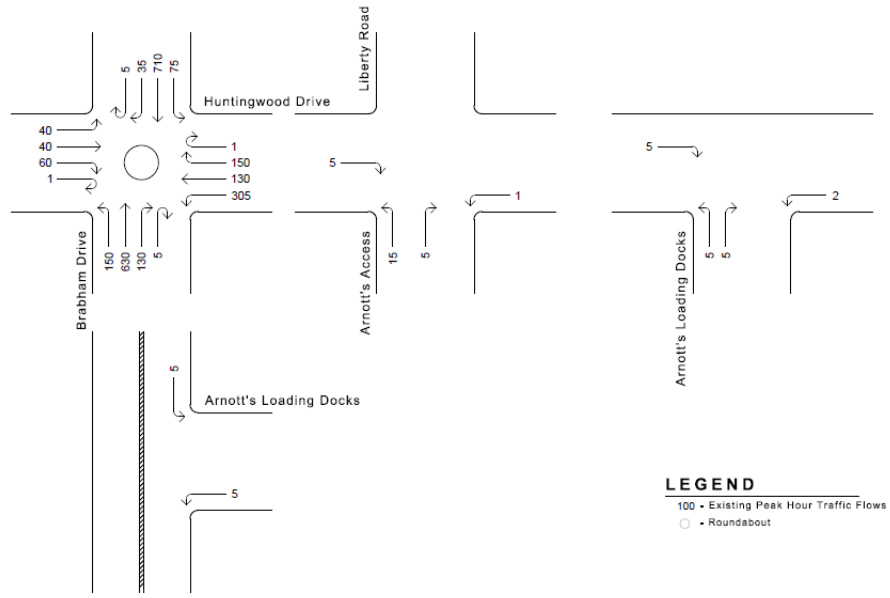
Traffic volumes for the network surrounding the existing facility were collected for both the AM and PM weekday peaks in 2018 using manual intersection counts. One traffic count was taken along Huntingwood Drive between the intersection at Brabham Drive and the easternmost access to the facility on Huntingwood Drive and recorded heavy vehicles entering and existing the site. The other traffic count was taken along Brabham Drive between the existing facility entrance on Brabham Drive and the intersection with Huntingwood Drive. The intersection of Brabham Drive and Huntingwood Drive recorded traffic flows from all directions. **Figure 5** and **Figure 6** show the traffic volumes of the AM peak (7:45 – 8:45) and PM peak (16:30 – 17:30) at these locations. The information provided did not specify vehicle types. The network peak described above did not coincide with the site peak period.

Figure 5 AM peak traffic volumes (7:45 – 8:45)



Source: Colston Budd Rogers & Kafes Pty Ltd

Figure 6 PM peak traffic volumes (16:30 – 17:30)



Source: Colston Budd Rogers & Kafes Pty Ltd

Table 3 summarises all vehicle movements passing the entrances to the facility during the AM and PM peaks on both Huntingwood and Brabham Drives.

Table 3 Summary of vehicle volumes

AM (7:45-8:45)		**PM (16:30-17:30)**	
Huntingwood Drive			
EB	WB	EB	WB
736	221	246	603
Brabham Drive			
NB	SB	NB	SB
852	902	935	980

Source: Colston Budd Rogers & Kafes Pty Ltd

While there are no heavy vehicle specific traffic counts, it can be assumed that only heavy vehicles used the accesses labelled 'Arnott's Loading Docks' in the diagrams. This results in 10 heavy vehicles entering at the Huntingwood Drive loading dock access and 5 heavy vehicles entering at the Brabham Drive loading dock access points during the AM network peak. There were 10 and 5 heavy vehicles exiting the site via the respective access points during the AM network peak. During the PM network peak, 7 heavy vehicles entered at the Huntingwood Drive loading dock access while 5 heavy vehicles entered at the Brabham Drive loading dock access. There were 10 and 5 heavy vehicles exiting the site via the respective access points during the PM network peak.

The westernmost access on Huntingwood Drive labelled 'Arnott's Access' in the diagrams provides access to the current staff car park. It is assumed that all vehicles using this access are light vehicles. During the AM peak, a total of 30 light vehicles entered and 10 light vehicles exited the facility using this access. During the PM peak, a total of 6 light vehicles entered and 20 light vehicles exited the facility using this access.

2.3.5. Existing Shift Demand

Table 4 outlines the current shift times and number of staff for the existing processing facility (known as HW1) and the high-bay warehouses in the southern portion of the site.

Table 4 Existing shift times and demand

Shift time	**7:00-15:00**	**15:00-23:00**	**23:00-7:00**
Number of staff (HW1)	174	77	109
Number of staff (high-bay warehouses)	20	20	20

Source: Arnott's

2.3.6. Existing Intersection Operation

The operation of the key intersections surrounding the site area have been assessed using SIDRA INTERSECTION, a computer-based modelling package that calculates intersection performance.

The commonly used measure of intersection performance, as defined by the *TfNSW Guide to Traffic Generating Developments 2002* and *Technical Direction TDT 2013/ 04 Guide to Traffic Generating*

Developments Updated traffic surveys (TDT 2013/ 04) is vehicle delay. SIDRA intersection determines the average delay that vehicles encounter and provides a measure of the level of service.

Table 5 shows the criteria that SIDRA INTERSECTION adopts in assessing the level of service.

Table 5 Intersection level of service criteria

Level of Service	Average Delay (sec/vehicle)	Signals or Roundabout	Give Way or Stop Sign
A	<14	Good operation	Good operation
B	15-28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29-42	Satisfactory	Satisfactory
D	43-56	Operating near capacity	Near capacity and accident study required
E	57-70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control model	At capacity, requires other control mode
F	>70	Overcapacity	Overcapacity

Source: TfNSW Guide to Traffic Generating Developments 2002 and Technical Direction TDT 2013/ 04 Guide to Traffic Generating Developments Updated traffic surveys (TDT 2013/ 04).

Table 6 shows a summary of the operation of the surveyed intersections in 2018, with full results presented in **Appendix A** of this report. It is noted that the key study intersections have been analysed as a network in SIDRA intersection. The information that Urbis was provided with to do the SIDRA intersection analysis indicated the network peak times were 7:45-8:45 and 16:30-17:30. Vehicle types were not provided. Given the development is located in an industrial estate, it has been assumed that 10% of all vehicles are heavy vehicles. It has also been assumed that 100% of vehicles using the 'Arnott's Loading Dock' accesses were heavy vehicles.

Table 6 Existing operating conditions

Location	Time	Level of Service	Degree of Saturation	Average Delay (sec)	Delay to Critical Movements (sec)	Queue Length to Critical Movements (metres)	Critical Movement
HD/BD	AM Network Peak (7:45-8:45)	A	0.621	9.0 sec	19.3 sec	21.0 m	U-turn from BD north
BD/ALD		N/A	0.258	0.1 sec	11.9 sec	0.2 m	Left turn from ALD to BD

Location	Time	Level of Service	Degree of Saturation	Average Delay (sec)	Delay to Critical Movements (sec)	Queue Length to Critical Movements (metres)	Critical Movement
HD/LR		N/A	0.354	0.5 sec	29.2 sec	0.8 m	Right turn from LR to HD
HD/ALD		N/A	0.411	0.3 sec	30.6 sec	0.6 m	Right Turn from ALD to HD
HD/BD	PM Network Peak (18:30-17:30)	B	0.974	13.5 sec	36.5 sec	57.9 m	U-turn from HD east
BD/ALD		N/A	0.308	0,1 sec	14.3 sec	0.3 m	Left turn from ALD to BD
HD/LR		N/A	0.271	0.6 sec	23.9 sec	0.3 m	Right turn from LR to HD
HD/ALD		N/A	0.319	0.5 sec	20.5 sec	0.7 m	Right turn from ALD to HD
HD – Huntingwood Drive, BD – Brabham Drive, LR – Liberty Road, ALD – Arnott's Loading Dock, ACP-Arnott's Car Park (opposite Liberty Road)							

Source: SIDRA INTERSECTION, Urbis

The results of the SIDRA modelling indicate the existing network is currently performing adequately. The intersection of Huntingwood Drive and Brabham Drive currently experience a level of service (LoS) A during the AM peak period and a level of service B during the PM peak period. This indicates that the intersection has good operation during the AM peak and a good operation with acceptable delays during the PM peak. Vehicles that exit the site during the network peaks have a negligible impact on the network.

2.3.7. Crash History

Crash and casualty statistics from TfNSW's Centre for Road Safety were analysed in the area immediately surrounding the site for the five years between 2015 and 2019. There were 10 crashes recorded in the 5-year period between 2015 and 2019. None of these crashes was fatal. These crashes are detailed in **Table 7**.

Table 7 Crashes in the vicinity of the site between 2015 and 2019

Year	Degree of crash	RUM description	Natural lighting
2015	Serious injury	Other pedestrian	Daylight
	Minor injury	Cross traffic	Darkness

Year	Degree of crash	RUM description	Natural lighting
2017	Minor injury	Cross traffic	Dawn
	Moderate injury	Left off carriageway into object/parked vehicle	Darkness
2018	Serious injury	Left off carriageway into object/parked vehicle	Darkness
	Non-casualty	Other same direction	Darkness
	Moderate injury	Rear end	Daylight
2019	No-casualty	Rear end	Dusk
	Moderate injury	Cross traffic	Daylight
	Serious injury	Right near	Daylight

Source: Crash and Casualty Statistics, Centre for Road Safety TfNSW Crash and Casualty Statistics, Centre for Road Safety TfNSW

Five of these crashes occurred at the intersection of Huntingwood Drive and Brabham Drive, one crash occurred on Brabham Drive and four occurred on Huntingwood Drive. the location of these crashes is shown in **Figure 7**. The nature of the crashes that are away from the roundabout suggests driver error and may not be indicative of any underlying road safety issues. The roundabout crashes could be the result of speed or sight distance/perception issues when approaching and exiting the roundabout. As a result, these roundabout crashes are likely the result of road safety issues and are not related to access to the subject site.

Figure 7 Location of Crashes

Source: Crash and Casualty Statistics, Centre for Road Safety TfNSW Crash and Casualty Statistics, Centre for Road Safety TfNSW

2.3.8. Walking and Cycling Network

There is limited cycling connectivity directly to the site. There is an off-road cycleway that runs along Huntingwood Drive to the west of Brabham Drive, however, this provides no connection to the wider cycling network. There is an off-road separated cycleway that runs along the M4 and M7 which are close to the site.

There are footpaths along Huntingwood Drive and Brabham Drive that provide pedestrian connections to the broader industrial estate. However, the site is more than a 2 kilometre walk away from the nearest residential area. Few workers would choose to walk to work from local residential areas. The existing facility has change rooms with showers and lockers for staff members, however, there is currently no dedicated bicycle parking.

2.3.9. Public Transport Network

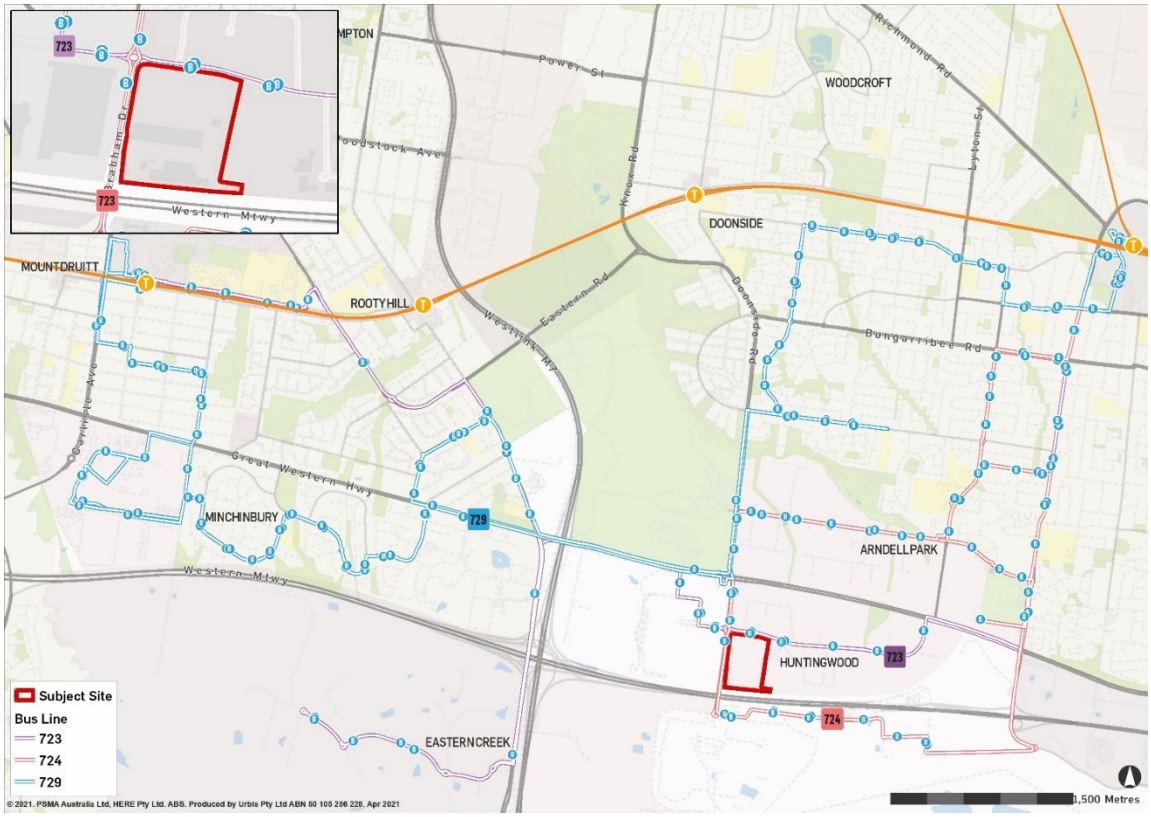
There are two bus stops located out the front and adjacent to the site on Huntingwood Drive and one bus stop located adjacent to the site on Brabham Drive. The stops located on Huntingwood Drive are serviced by the 723 while the stop located on Brabham Drive is serviced by the 724. The details of these routes are listed below:

- 723 – Mount Druitt to Blacktown via Eastern Creek (running every 20 minutes).
- 724 – Blacktown to Arndell Park via Huntingwood (loop service running every 30 minutes).

Additionally, if employees walk around 750m to the northwest, they can access bus stops on the Great Western Highway that is serviced by the 729 from Mount Druitt to Blacktown via Minchinbury.

These services provide connections to other key public transport nodes such as Blacktown, Rooty Hill and Mount Druitt. These locations provide both rail and bus connections to Macquarie Park, Rouse Hill, Parramatta, Penrith, Liverpool and the Sydney CBD. **Figure 8** details the bus routes that service the site. Despite providing good connections, these services are relatively infrequent, and the loop service, in particular, tends to weave through suburban streets rather than get from the bus stops near the site to a major transport node quickly.

Figure 8 Public transport that services the site

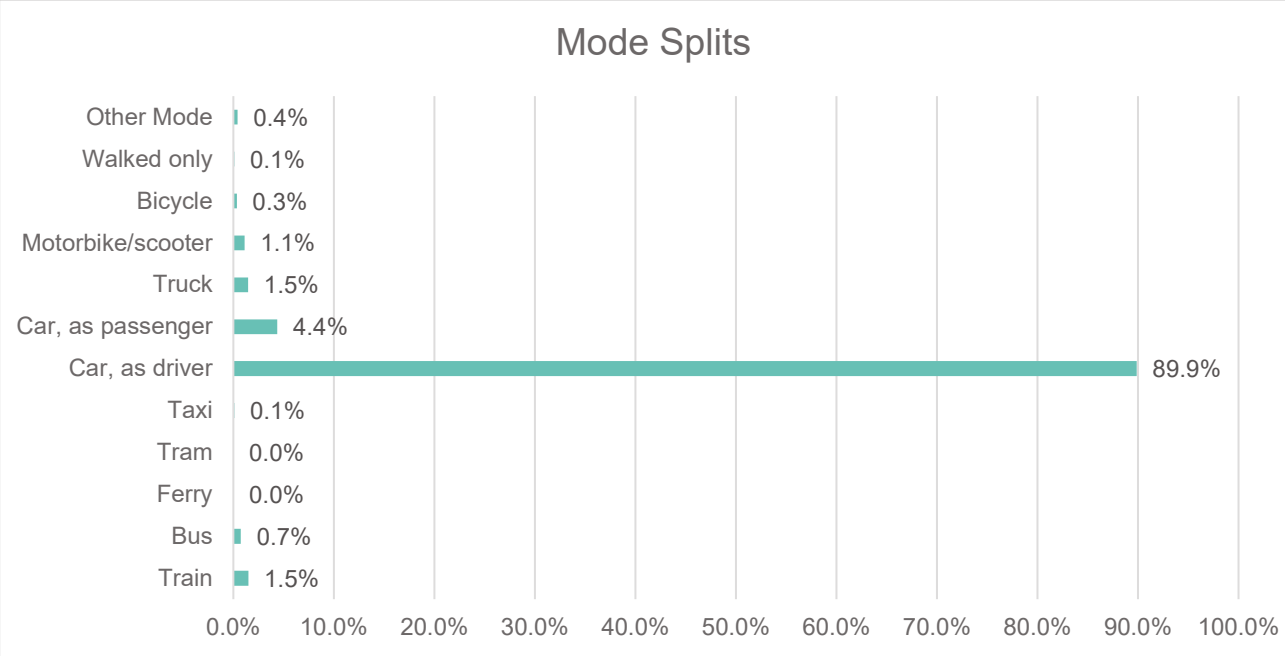


Source: Urbis

2.4. MODE SPLITS

An analysis of the Australian Bureau of Statistics (ABS) census data was undertaken to determine the mode splits currently used within the ABS Destination Zone (DZN) that encompasses the site. The destination zone used also encompasses properties as far west as Brabham Drive, as far north as the Great Western Highway, as far east as Reservoir Road and as far south as the Western Motorway. People who did not go to work, worked from home or did not state how they went to work were excluded from this analysis. **Figure 9** shows mode splits within the destination zone.

Figure 9 Mode splits



Source: ABS Tablebuilder - https://auth.censusdata.abs.gov.au/webapi/jsf/tableView/tableView.xhtml#

Car as driver is by far the most prominent mode of transport accounting for nearly 90% of commutes to work by mode. This is likely the result of the industrial park being isolated from any nearby residential areas and major public transport nodes, as well as a lack of cycling infrastructure connecting to the site. More frequent and direct bus services, as well as better cycling connections, may help to reduce the car as the primary mode of transport.

3. CONSTRUCTION TRAFFIC IMPACTS

3.1. EXPECTED TRAFFIC GENERATION

The construction contractor anticipates a peak of approximately 50 deliveries a day generated by construction vehicle movements. This peak is likely to only occur during concrete pours which are a very limited part of the construction program. The contractor anticipates an average of 5 deliveries per day during the construction period. To manage the traffic impact that these vehicle movements will have, the contractor has proposed the encouragement of

- Staggered delivery times throughout the day.
- Set-down areas for trucks to stand and wait to be unloaded.
- Traffic control at entry points.
- Sequencing of construction works to minimise major vehicle movements overlapping.
- The pre-fabrication of products where possible.

Construction vehicles likely to be required during the works include

- Articulated trucks (semi-trailers) used for the delivery of heavy machinery and structural steel.
- Rigid trucks (including tippers) to collect demolition materials and excavated materials as well as the delivery of steel member and glazed windows, etc.
- Concrete pumps and concrete agitators.
- Smaller delivery trucks and utility vehicles.
- Private vehicles for workers, visitors, and management staff.

The contractor has provided estimates of the average number of workers accessing the site per day at different construction stages, which are as follows

- Site preparation and enabling works: 15 persons per day.
- Construction of the new processing facility: 150 persons per day.
- Given the location of the site, public transport usage by workers will be encouraged but it is acknowledged that most construction workers will likely drive as they will be transporting their tools and equipment.
- To reduce the number of workers driving to the site, shuttle services are being arranged by the contractor to transport construction workers from their respective bases to the site.

3.2. WORK TIMES

Standard hours of construction are proposed:

- 7.00am to 5.00pm on Monday to Friday; and
- 8.00am to 1.00pm on Saturday.
- No work on Sundays and Public Holidays

3.3. PARKING

All construction workers will not be allowed to park their vehicles within the site. To ensure that the surrounding street network does not become filled with workers parking their vehicles, shuttle services will be arranged to transport tradesmen to the site from their respective bases. The use of public transport is also to be encouraged.

The works will be undertaken in three phases. During the first phase, Arnott's staff will park in the existing staff car park. During the second phase, Arnott's staff parking will be moved to the south of the site, adjacent to the existing high-bay warehouse. During the third stage, Arnott's staff will park in the completed multi-storey basement car park that will be constructed during the first and second stage. The location and nature of these parking zones are shown in **Figure 11**, **Figure 12** and **Figure 13** in **Section 3.5** of this report.

The temporary car parking arrangements that will be used in phase 2 (Construction Stage 1) will utilise 3 separate car parking areas. The details of these areas are:

- Western hardstand area to be line marked in accordance with AS 2890.1. This area will accommodate 95 car parking spaces.
- Eastern hardstand area to be line marked in accordance with AS 2890.1. This area will accommodate 80 car parking spaces.
- Existing car park located to the east of the high-bay warehouse. This car park accommodates 95 car parking spaces.

Access to all of these car parking areas will be via the existing loading dock entrance on Brabham Drive. Measures will be taken to ensure the safe passage of vehicles through the loading docks to the temporary car parking areas, and for pedestrians travelling between the car park and buildings within the site. This will be undertaken using signage, barriers and fencing where appropriate. The current parking demand for the existing facility is approximately 260 spaces. The temporary car parking area will accommodate a total of 280 spaces during the construction phase.

Temporary car parking will include an area of existing hardstand to the north of the high-bay warehouses. The number and type of heavy vehicles that would normally be accessing this area is detailed in **Table 12** of this report, however it involves a maximum of 35 vehicles that are spread evenly between 6am and 10pm. Given the size of the hardstand area associated with the high-bay warehouses and the known vehicle generation, there will be sufficient space to support the temporary car park without impacting heavy vehicle movements to the loading area.

Figure 10 details the temporary car parking arrangements to be used during Construction Stage 1.

Figure 10 Temporary car parking arrangements

Source: FDC

3.4. NATURE OF LOADS AND MONITORING

Traffic monitoring during the construction phase will include daily pre-start visual inspections of vehicles to ensure that the vehicles are in good working order and follow manufacturer specifications. Noise controls (efficient silencers, low-noise mufflers, etc.) must be installed and maintained (where reasonable and practicable).

Civil works vehicles including standard construction materials, concrete, prefabricated components, and steel reinforcement shall have their loads covered.

Street sweeping shall be undertaken following sediment tracking from the site. No building materials, waste, machinery, or related matter shall be stored on the road or footpath.

3.5. STAGING OF WORKS

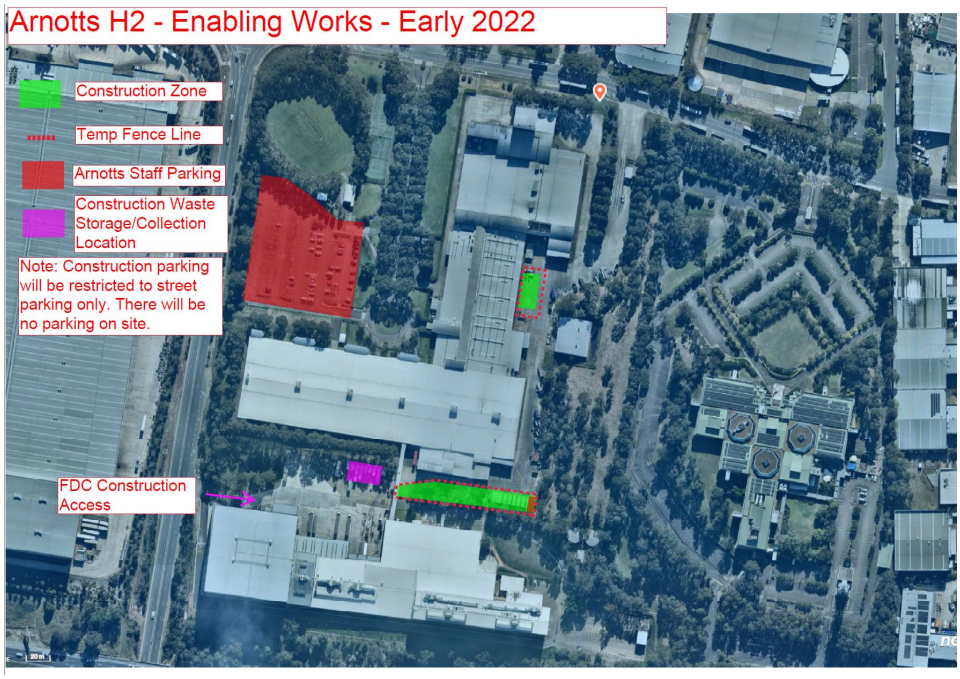
There will be three phases of construction works on the site. These are Site Preparation and Enabling Works, Construction Stage 1 and Construction Stage 2.

Site Preparation and Enabling Works are anticipated to commence in early 2022 (subject to approval) and will involve the enabling works required for the two main construction phases. Construction access will be via the existing loading dock driveway on Brabham Drive. This stage will also involve the establishment of the temporary staff parking areas located adjacent to the high-bay warehouse.

Construction Stage 1 is anticipated to be undertaken from Q2 2022 (subject to approval). This stage will involve the establishment of the main construction zone in the northwest corner of the site, the establishment of a construction waste storage area, the establishment of a construction loading area and the construction of the new multi-storey basement car park. Construction access will be via the existing loading dock access located on Huntingwood Drive.

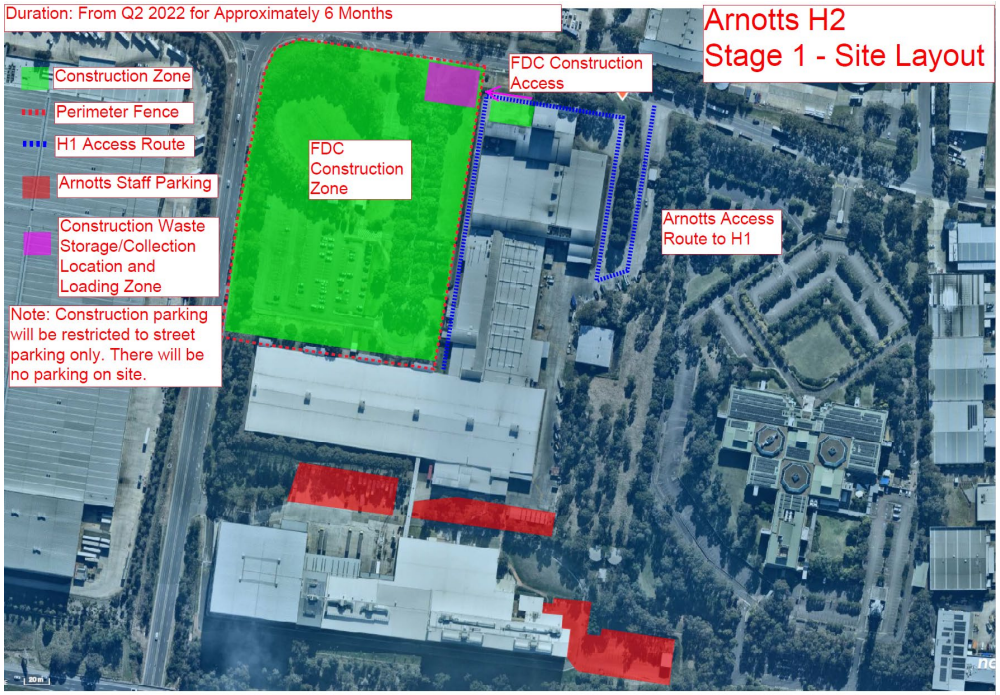
Construction Stage 2 is anticipated to be undertaken from Q3 2022 until the completion of the new facility (subject to approval). This stage will involve the construction of the new production facility, loading dock and overhead conveyor belt between the new facility and the high-bay warehouse. The construction access will remain the same as Stage 1. Employees of Arnott's will park their cars in the new multi-storey basement car park completed in Stage 1. Access to this car park will be separated from all construction traffic. Measures will be taken to ensure the safe passage of employees walking between the existing facility and the new employee car park. **Figure 11**, **Figure 12** and **Figure 13** show the layout of each construction phase.

Figure 11 Site Preparation and Enabling Works



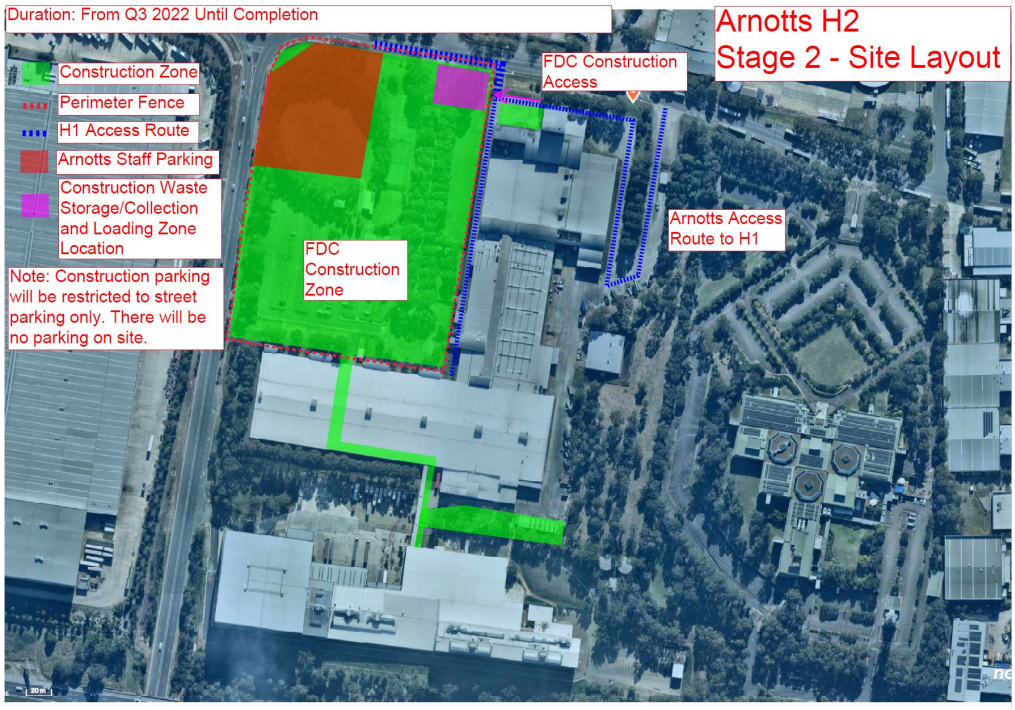
Source: Nearmap modified by FDC

Figure 12 Construction Stage 1



Source: Nearmap modified by FDC

Figure 13 Construction Stage 2



Source: Nearmap modified by FDC

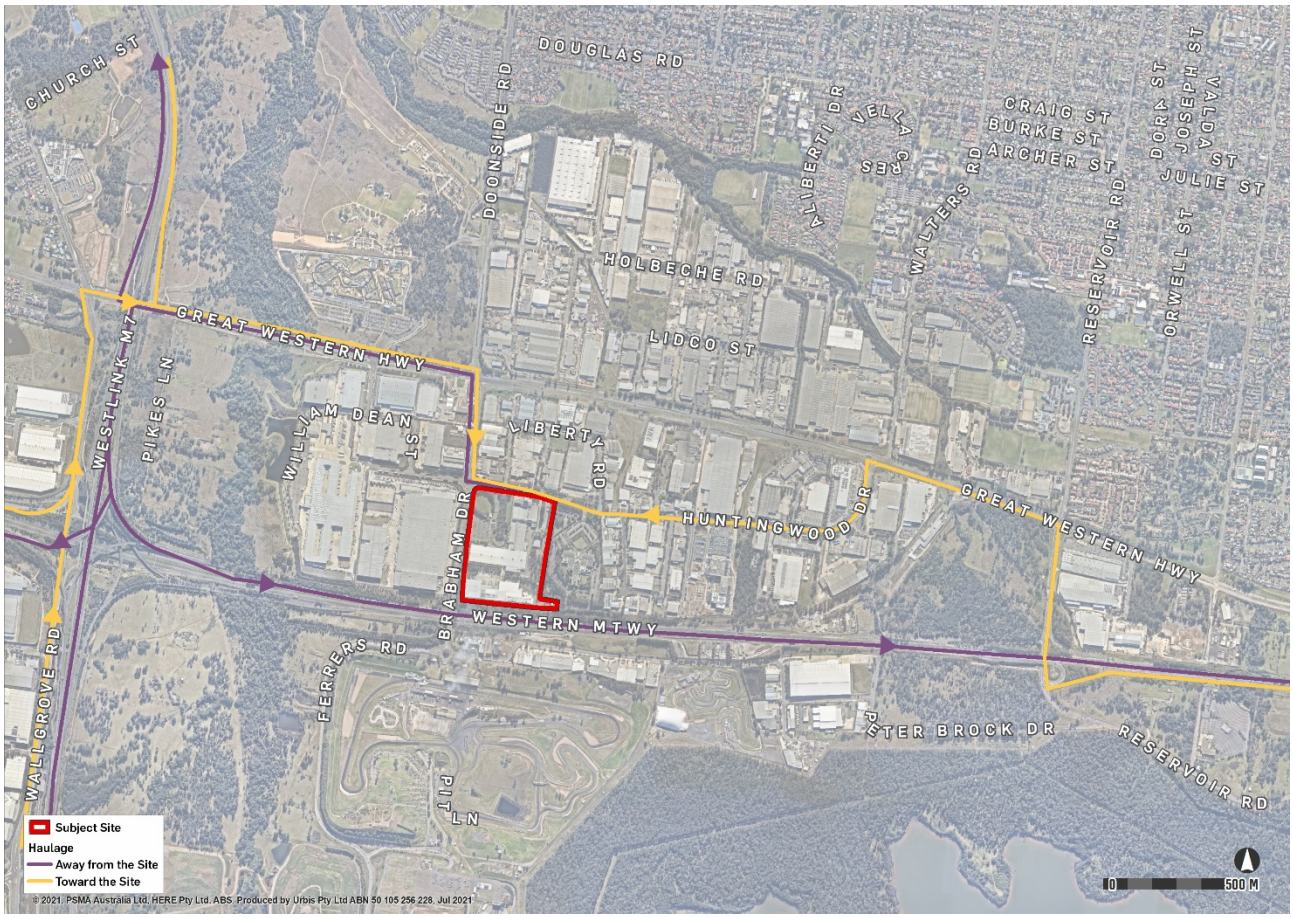
3.6. ANTICIPATED HAULAGE ROUTES

The anticipated haulage routes of vehicles providing deliveries to and from the site during construction are shown in **Figure 14**. All construction vehicles will access the site via the easternmost entrance on Huntingwood Drive during the construction stages.

Deliveries from the east or west of the site will typically access the site via the Western Motorway and will turn off at either the Reservoir Road exit or Light Horse Interchange before continuing along the Great Western Highway and then turn onto either Huntingwood or Brabham Drives to access the site. Deliveries from the north will travel along the Westlink before exiting at the Great Western Highway and then turn onto Brabham Drive to access the site. Deliveries from the south will travel along the Westlink before turning off at the Wallgrove Road exit. Vehicles will then turn onto the Great Western Highway before turning onto Brabham Drive to access the site.

A dilapidation report of the surrounding infrastructure and roads is to be undertaken before construction. This report will form the basis for comparison after all construction works are completed. It is noted that public way damage, (roadways, kerb and or gutter or footpath), should it occur due to the movements to or from the site, shall be rectified by the contractor, before completion of work.

Figure 14 Anticipated haulage routes of construction vehicles



Source: Urbis

4. DEVELOPMENT PROPOSAL

4.1. OVERVIEW

The SSDA outlines the proposed expansion of the existing food processing operations to support the growing demand for products produced by Arnott's at their Huntingwood facility. **Table 8** outlines the elements of the proposed development.

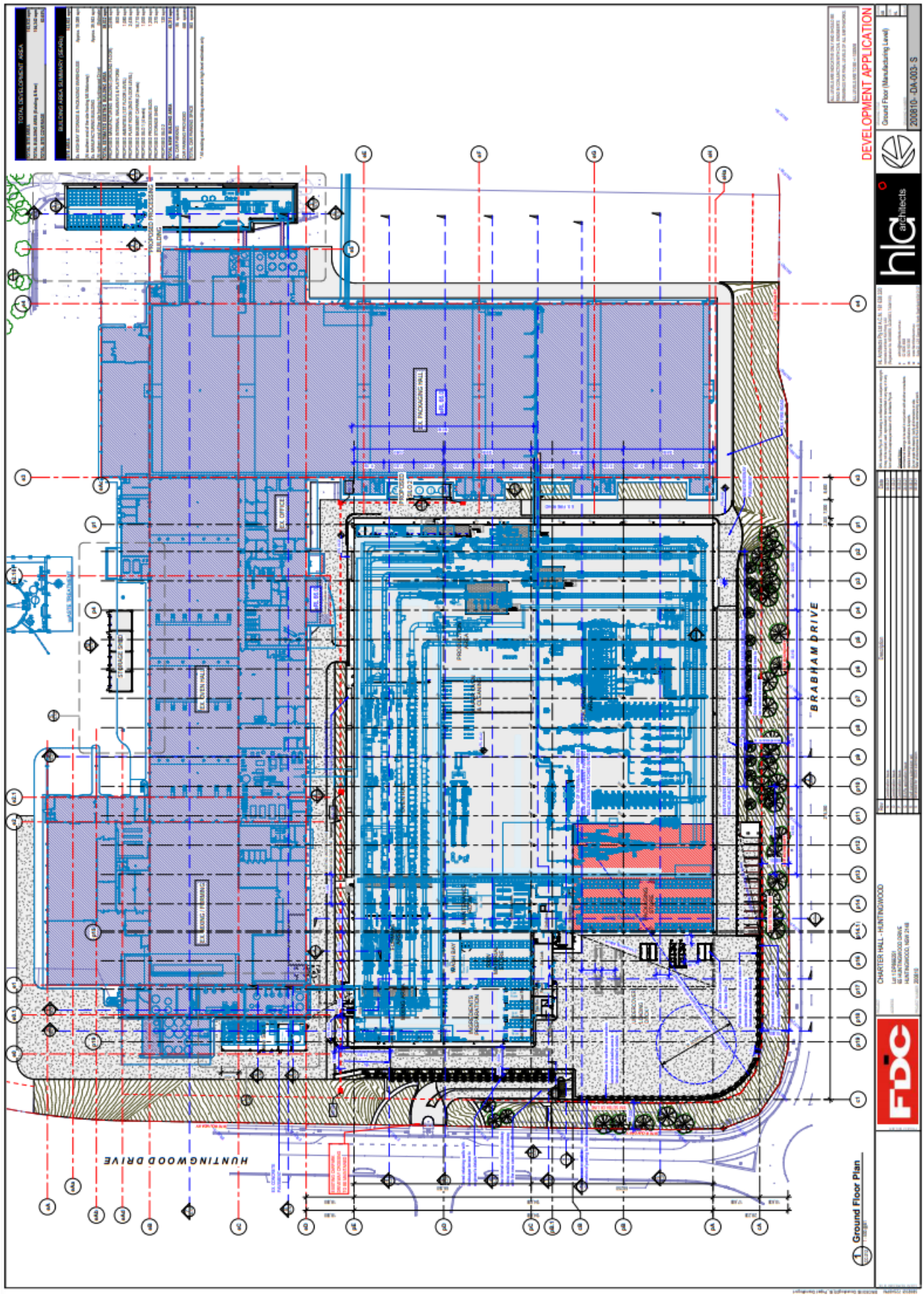
Table 8 Elements of the proposed development

Element	Proposed
Site Preparation	▪ Removal of existing car parking, driveway and ancillary structures. ▪ Vegetation clearing. ▪ Excavation for car park and bulk earthworks and supporting structures. ▪ Drainage connections. ▪ Land stabilisation.
Development summary	▪ Construction of a new processing facility (24,775 m^2) with first-floor amenities in the northwest corner of the site (known as HW2). ▪ Construction of a new ingredient silo building (1,000 m^2) along the Huntingwood Drive frontage. ▪ Construction of a storage building (270 m^2) to the east of the existing building. ▪ Construction of a new processing building (1,200 m^2) and ingredient silo building (120 m^2) to the south of the main facility. ▪ Replacement of the existing on-site detention basin (OSD) basin with an OSD tank below the basement car park. ▪ Landscaped setbacks along both street frontages to screen the new processing facility and loading area.
Access and Parking	▪ New loading area above two levels of car parking (468 spaces) at the northwest corner of Huntingwood Drive and Brabham Drive. ▪ Demolition of the existing 260 car parks located at the northwestern portion of the site. ▪ Trucks will utilise the existing access point adjacent to the eastern boundary of the site. ▪ The existing (westernmost) vehicle access to Huntingwood Drive will be retained and upgraded to provide access to the new basement car park. ▪ The existing car park in the southeastern corner of the site is to be retained (95 spaces).

Source: Urbis

The Concept Plan of the proposed new facility is illustrated in **Figure 15**.

Figure 15 Proposed Concept Plan



Source: FDC

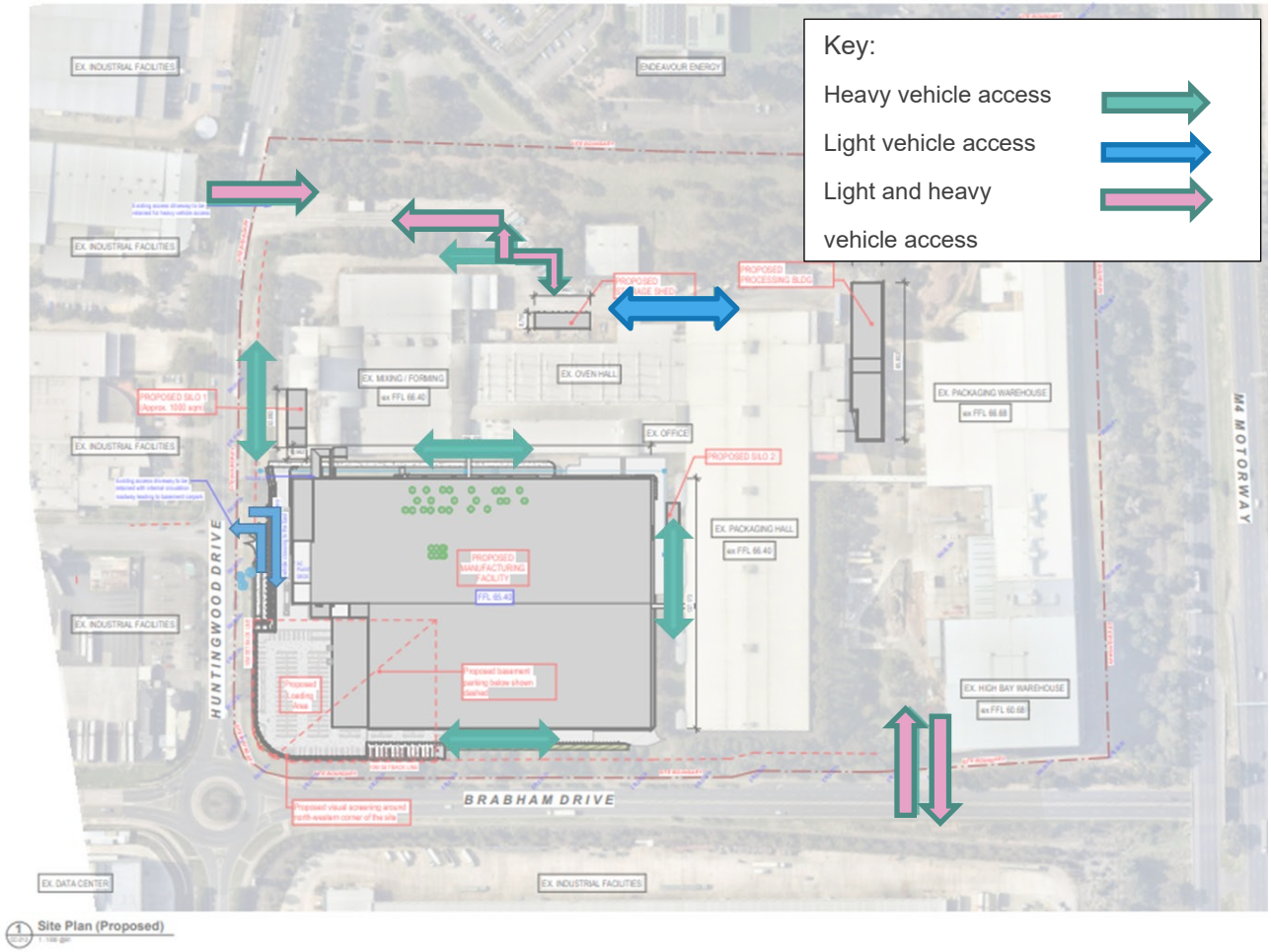
4.2. VEHICLE ACCESS

The proposal will retain all the existing entry points in some way. The purpose of the driveway located on Brabham Drive will be maintained. The easternmost driveway on Huntingwood Drive will be retained as a heavy vehicle access point for access to the new loading area. The westernmost driveway on Huntingwood Drive will be retained to provide access to the new basement parking area. Vehicle access points are shown in **Figure 16**.

Heavy vehicles associated with the proposed main processing building (HW2) will access this loading area via the existing internal road that runs along the northern side of the site. Access to this road will require vehicles to do a U-turn movement once it has entered the site from the easternmost Huntingwood Drive entrance. The hardstand area associated with this U-turn movement is large enough to support the turning movement of the largest vehicle accessing the new main processing building (HW2).

The smaller processing building proposed to the south of the existing facility will be serviced by a small van or the like for deliveries of products only. This van will unload on the existing hardstand area adjacent to the building. Materials delivered by this vehicle will be unloaded by forklift. Given the size of the existing hardstand area, there is sufficient space for a vehicle of this nature to manoeuvre into a position suitable for unloading.

Figure 16 Vehicle access points



Source: HLA Architects modified by Urbis

Vehicle access points

- Heavy vehicles (Huntingwood Drive) – via existing easternmost access on Huntingwood Drive. This is to become the primary heavy vehicle access for the new production hall, existing production hall, and the new storage/ warehouse buildings.
- Heavy vehicles (Brabham Drive) – via existing loading dock entrance on Brabham Drive.

- Light vehicles – via the existing westernmost access on Huntingwood Drive, to become the new entrance to the basement car park.

4.3. INTERNAL ROAD NETWORK

The circulation of the internal road network is shown in **Figure 16**. Heavy vehicles and light vehicles will use separate entrances. Light vehicles will be accessing the new basement car park and heavy vehicles will be accessing loading and service areas. **Table 9** shows the widths of the internal road network that form part of the proposed development.

Table 9 Internal road types

Name	Width at widest point	Road access points	Function
Loading area entrance	12 m	From existing internal road running adjacent to Huntingwood Drive.	Access to the loading area.
Loading area	60 m	From the loading area entrance road or the service road wrapping around the proposed building.	Access to the loading area.
Service road wrapping around the proposed building	6.5 m	From the loading area entrance, the western end of the loading area or the existing fire road running adjacent to Huntingwood Drive.	Access to the rear of the proposed building.

Source: Urbis

4.4. CAR PARKING

A total of 468 car spaces will be provided on-site in the new basement car parking section for employees and visitors. This is in addition to the 95 car parking spaces provided in the south-eastern corner of the site.

The car parking and heavy vehicle parking provision and design is discussed in more detail in **Sections 5** and **6** of this report.

4.5. MOTORCYCLE PARKING

Six motorcycle parking spaces will be provided on the second level of the proposed basement car park.

The car parking and heavy vehicle parking provision and design is discussed in more detail in **Sections 5** and **6** of this report.

4.6. HEAVY VEHICLE PARKING

Four heavy vehicle parking spaces will be provided in the loading and servicing area of the proposed development to fulfil the servicing and delivery requirements of the proposed development.

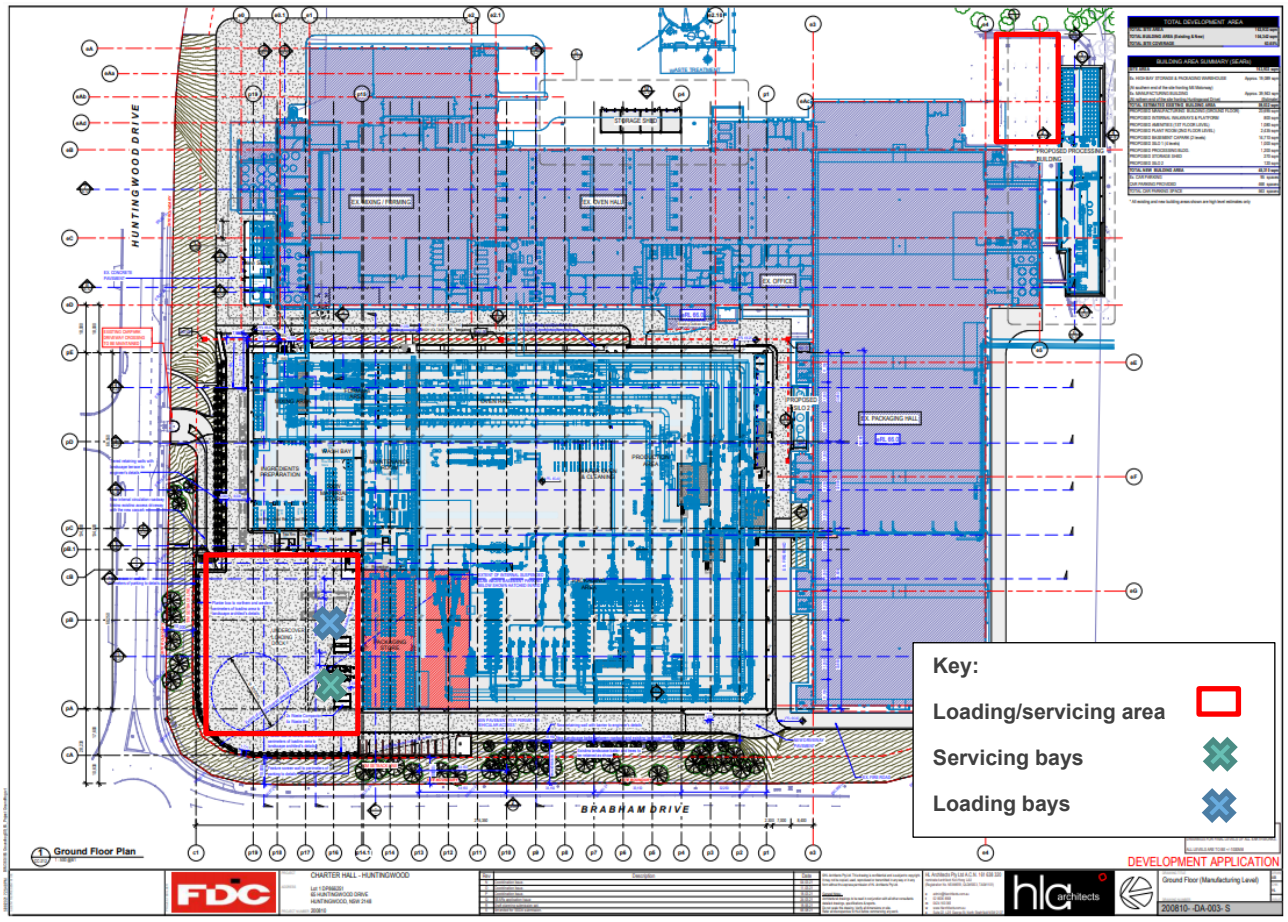
The car parking, heavy vehicle parking provision and design are discussed in more detail in **Sections 5** and **6** of this report.

4.7. LOADING AND SERVICING AREAS

The loading and servicing bays for the proposed development are located in the new designated undercover loading/servicing area that is attached to the new main processing (HW2) building. This area can accommodate four B-doubles at one time. The loading area will have a turntable to assist the largest vehicles (26m B-double) in manoeuvring into the two loading bays. There are two service bays located within the loading/servicing area for waste vehicles to access the waste bins. Access to these service bays will be the same as the loading/servicing area access.

There is an additional loading area associated with the smaller processing building located to the south of the main facility. This loading area will be serviced by a small van, which will manoeuvre into a suitable position for loading/unloading on the existing hardstand area. This hardstand area has sufficient space to support the loading, unloading and manoeuvring of a vehicle of this nature.

Figure 17 Loading and servicing area



Source: FDC modified by Urbis

4.8. BICYCLE FACILITIES

Objectives set out in the Blacktown Development Control Plan 2015 (DCP) Part E Development in the Industrial Zones section 4.8 state, "to ensure that opportunities for cycling to work are realised by encouraging the provision of bicycle parking areas and associated facilities within the workplace." While this objective encourages the incorporation of bicycle facilities, the DCP explicitly states applicants are encouraged and therefore not required to incorporate bicycle storage and end of trip facilities into their development. Any bicycle facilities that are incorporated into the development are to be designed in

accordance with AS 2890.3 and Council guidelines. The development will incorporate 10 bicycle parking spaces into the second level of the proposed basement car park. In addition, the new processing building will include a new changeroom with showers for staff.

4.9. PEDESTRIAN MOVEMENTS

Internal pedestrian movements will be between the car park/truck parking area and the various buildings in the facility. Given the sprawling nature of the facility, it is expected employees and visitors will be moving between different buildings at any given time. Appropriate signage and markings to ensure safe pedestrian movements between each building will be provided and designed in accordance with AS 2890 and Council guidelines. Walkways and clear pedestrian markings are provided where appropriate and will be designed in accordance with AS 2890 and Council guidelines.

4.10. DANGEROUS GOODS

The Applicant has indicated that limited amounts of dangerous goods will be transported to and stored on the site. The SEPP 33 assessment prepared by Riskcon to accompany the SSDA indicates that limited amounts of liquified petroleum gas, ammonia and sodium hydroxide solution may be stored on the site. The amount of these dangerous goods that would be stored on-site will be less than the threshold required for a SEPP 33. These dangerous goods will be transported to the site and stored in a safe manner and location.

5. CAR PARKING DESIGN REVIEW

This section provides a review of the proposed on-site car parking design against the minimum requirements outlined in the Australian Standards (AS 2890.1:2004, AS 2890.3:2015 and AS 2890.6:2009). The proposed on-site car parking includes

- 458 standard car spaces.
- 10 disability car parking spaces.

5.1. CAR SPACE DIMENSIONS

The proposed 90-degree car spaces (excluding disability accessible car spaces) are categorised under the user classes defined in AS2890.1. User class 1 is defined as “Employee and commuter parking (generally, all-day parking)” and is the most appropriate user class for the proposed development. This user class requires spaces to be 2.4 m wide by 5.4 m long and for the aisle width to be 6.2 metres wide.

The proposed development complies with these requirements.

5.2. DISABILITY ACCESSIBLE CAR SPACE DIMENSIONS

The disability accessible parking spaces shall be designed per AS 2890.6, as follows

- The disability accessible car parking space should be designed at 2.4 m width and 5.4 m length.
- Shared space of equal dimensions shall be provided adjacent to the car parking space; and
- Both the car parking space and the shared space should include appropriate line-markings. The shared space should include a bollard to prevent motorists from parking at this location.

The proposed 10 disability accessible car spaces comply with the above requirements.

5.3. LATERAL CLEARANCE REQUIREMENTS

AS 2890.1 requires the provision of an additional 300 mm clearance (for door opening) when car spaces are located adjacent to vertical obstructions higher than 150 mm.

The proposed development complies with this requirement.

5.4. GRADIENTS WITHIN PARKING MODULES

AS 2890.1 stipulates that parking modules, at maximum, should have a grade of 1 in 16 (measured in any direction other than parallel to the angle of parking). Additionally, AS 2890.6 requires that the disability accessible car parking spaces and the shared areas shall not exceed a crossfall of 1:40 in any direction.

The proposed car parking spaces are at grade and therefore comply with the above requirements.

5.5. MOTORCYCLE SPACES

AS 2890.1 requires that motorcycle spaces are 2.5 m long and 1.2 m wide for 90-degree spaces. Motorcycle spaces are not required under any Council or TfNSW guideline for the proposed development.

Six motorcycle spaces will be provided on the second level of the proposed basement car park.

5.6. BICYCLE PARKING SPACES

The objectives set out in the DCP Part E Development in the Industrial Zones section 4.8 states "t*o ensure that opportunities for cycling to work are realised by encouraging the provision of bicycle parking areas and associated facilities within the workplace*." While this objective encourages the incorporation of bicycle facilities, the DCP explicitly states applicants are encouraged, not required, to incorporate bicycle storage and end of trip facilities into their development.

Ten bicycle parking spaces will be provided on the second level of the proposed basement car park.

6. HEAVY VEHICLE PARKING DESIGN REVIEW

This section provides a review of the proposed heavy vehicle parking design against the minimum requirements outlined in the Australian Standard for off-street commercial vehicle facilities (AS 2890.2). The proposed on-site heavy vehicle parking includes:

- Two loading bays.
- Two servicing bays.

The largest vehicle that the site has been designed to accommodate is a B-double, measuring 26 m long and 2.5 m wide.

6.1. HEAVY VEHICLE SPACE DIMENSIONS

Table 10 Heavy vehicle space dimensions

Parking type	Dimensions
Loading-bay	Length – 26 m Width – 3.5 m Height – 5.7 m
Service area	Length – 26 m Width – 3.5 m Height – 5.7 m

Source: FDC

6.2. LOADING AND SERVICE AREA DIMENSIONS

Provision has been made for loading and service bays associated with the proposed main processing building that can be accessed by a B-double equivalent vehicle, which will be line marked to identify it as a loading and servicing area separate from other heavy vehicle traffic flows. AS 2890.2 requires a minimum length of 19 m and minimum width of 3.5 m for MRV service bays. AS 2890.2 stipulates, the height for articulated vehicle service bays is 4.5 m, however, when access to the top of a tall vehicle is required the height should be 5 m.

The loading area for the smaller processing building proposed to the south of the main facility will be within the existing hardstand area, which at its narrowest point is 21 m wide. Considering that this building will be serviced by a small van, this area is more than sufficient to support loading and unloading.

The loading and service areas therefore meet the requirements.

6.3. LOADING AND SERVICE VEHICLE MANOEUVRABILITY

The largest vehicle that can access the site is governed by the constraints of the Right of Way (ROW) configuration. A 26 metre long B-double is nominated as the largest vehicle to access the site. The dimensions of this vehicle are 26 metres by 2.5 metres. This vehicle size has been tested using a swept path scenario found in **Appendix C**

The loading area for the smaller processing building proposed to the south of the main facility will be within the existing hardstand area, which at its narrowest point is 21 m wide. Considering that this building will be

serviced by a small van, this area is more than sufficient to support the movements associated with site access, loading/unloading and site egress for a vehicle type.

6.4. OVERSIZE VEHICLES

There will be no oversized vehicles accessing the proposed development.

7. TRANSPORT IMPACT ASSESSMENT

This section includes the traffic and transport assessment of the proposed development. The additional traffic demands as a result of the proposal have been quantified and the impacts have been assessed.

7.1. PUBLIC AND ACTIVE TRANSPORT

7.1.1. Public Transport

Workers can access the site via public transport services detailed in **Section 2** of this report. The bus stops located on Brabham Drive (serviced by the 724) and Huntingwood Drive (serviced by the 723) provides direct connections to local residential areas such as Blacktown, Mount Druitt, Arndell Park and Rooty Hill. If employees walk to bus stops located at the Great Western Highway and Brabham Drive intersection, they can access the 729 which services Blacktown, Minchinbury and Mount Druitt. The 729 provides a more direct route to Blacktown. These routes provide connection to Mount Druitt, Rooty Hill and Blacktown train stations, enabling access to Sydney's suburban train network, further expanding access to the site by public transport. Use of public transport by workers should be encouraged where possible.

7.1.2. Cycling

There are existing cycling connections along Huntingwood Drive, however, these connections do not link to the cycleways that run adjacent to the M4 and M7. Given the incomplete local cycling network and that the closest residential area is nearly 2 km away via road, cycling is unlikely to be an attractive mode of transport to commute to work. The new basement car park will provide 10 bicycle parking spaces on the second floor. In addition, the new factory building will have a new changeroom with showers for staff members.

7.1.3. Pedestrian Movement

There are pedestrian links from the site to the rest of the industrial park, the closest residential area, Sydney Motorsport Park and the highway service centre on the westbound side of the M4. Only amenities in the industrial park are within a practical walking distance to the site. Employees requiring amenities and services will likely travel within the industrial park if they choose to walk.

7.2. TRAVEL DEMAND MANAGEMENT

A Green Travel Plan (GTP) has been prepared for the site. The purpose of the green travel plan is to identify existing green travel connections to the site, whether this is through active transport or public transport, and develop strategies that promote green travel amongst employees and visitors. A copy of the GTP can be found in **Appendix B**.

7.2.1. Management of Shift Changeover

One of the aims of the GTP was to manage the movement of staff during the shift changeover period. The morning shift changeover for the existing facility (HW1) and the high-bay warehouse (6:30-7:30 AM) could see 329 vehicle movements in and out of the facility (light and heavy vehicles inclusive). Carpooling was identified as an ideal initiative for workers as during the early morning there could be limited public transport service depending on the location of staff residence. If 1 in 5 staff members carpooled, there would be 66 fewer vehicles either entering or exiting the facility during the morning shift changeover.

7.2.2. Identification of Green Travel Network

Research and analysis of the existing green travel network (inclusive of public and active transport) surrounding the site was undertaken. It was identified that on the weekdays there is ample public transport for staff members to utilise. The 723,724 and 729 bus services connect the site to the rail network with buses running to Bankstown Station, which is within a 30-minute bus ride to the site on a weekday. On the weekend public transport is somewhat limited and the 30-minute public transport catchment of the site significantly decreases. As a result, car usage could be higher amongst staff who work on weekends.

The industrial estate where the site is located has good pedestrian connections, with footpaths along most streets connecting the site to amenities within the industrial park. However, given the isolated nature of the industrial estate, a broad range of amenities that could be found in a town centre are well outside a reasonable walking distance to the site. There are limited cycling options to the site. While there is a shared path that runs along part of Huntingwood Drive and Brabham drive, it does not connect to the broader cycling network. The Blacktown City Council Bike Plan proposes the existing shared path along Brabham Drive to be extended up Doonside Road, connecting the residential areas around Doonside and Bungarribee to the site.

7.2.3. Travel Behaviour initiatives

A series of interventions were suggested in the GTP that is tailored to the facility located at 65 Huntingwood Drive. These initiatives include

- Producing a Transport Access Guide (TAG) to inform staff of their travel options and ensuring that this document is updated when necessary.
- Encouraging carpooling by giving staff who carpool priority spaces in the new multi-storey basement car park.
- Incorporation of 10 undercover bicycle parking spaces within the new car parking facility.

7.3. TRAFFIC AND ACCESS

7.3.1. Access and Servicing

Access to the site for heavy vehicles will be via the existing easternmost access point on Huntingwood Drive and the existing access on Brabham Drive. These will provide access to the existing and new loading/servicing areas, which will be located in the new mezzanine area via an extension of the site's northern road. Access to the site for light vehicles will be via the existing westernmost access point on Huntingwood Drive into a new multi-storey basement car park. All access points are designed in accordance with AS 2890, TfNSW and Council guidelines.

7.3.2. Traffic Generation

Traffic generation for the proposed development has been provided in **Table 11** and is based on the maximum number of staff per shift as confirmed by Arnott's. There are three shift times across the day which are the day, afternoon and evening shifts. The existing facility operates 24 hours a day, seven days a week and the proposed development (known as HW2) will operate in a similar manner albeit with different shift times to the existing facility, the existing shift times can be found in **Section 2.3.5** of this report. The times of the shifts for the proposed development will be:

- Day shift – 6 AM to 2 PM.
- Afternoon shift – 2 PM to 10 PM.
- Night shift – 10 PM to 6 AM.

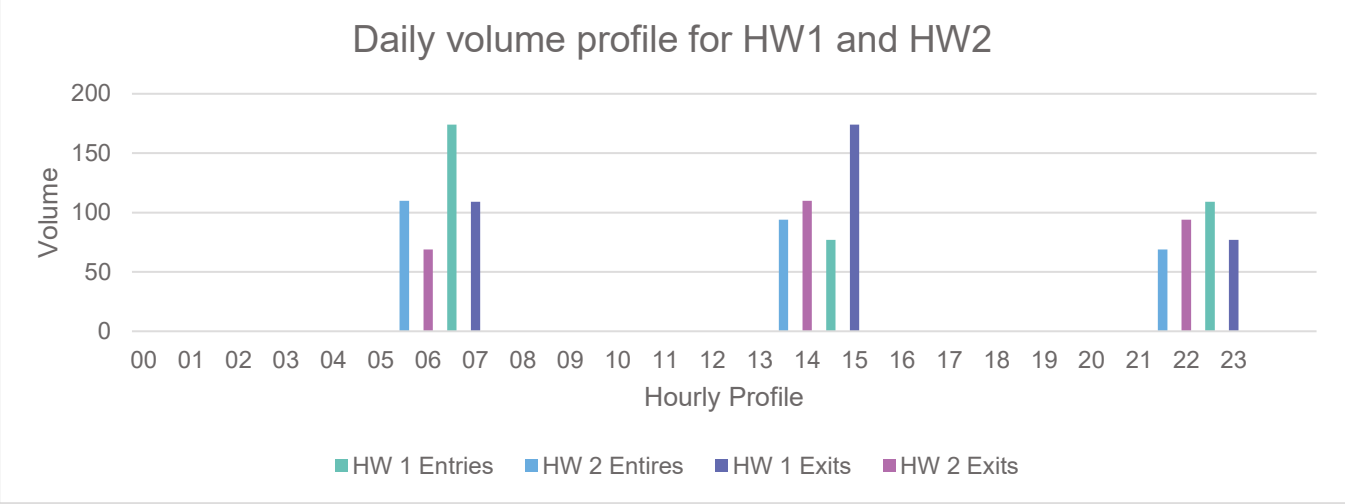
Table 11 Estimated traffic generation by staff

Facility	Shift	Time	Vehicle Entries	Vehicle Exits
Huntingwood 1 (existing)	Day shift changeover	6:30-7:00 AM	174	0
		7:00-7:30 AM	0	113
	Afternoon shift changeover	2:30-3:00 PM	77	0
		3:00-3:30 PM	0	174
	Night shift changeover	10:30-11:00	109	0
		11:00-11:30	0	77
Huntingwood 2 (proposed)	Day shift changeover	5:30-6:00 AM	110	0
		6:00-6:30 AM	0	69
	Afternoon shift changeover	1:30-2:00 PM	94	0
		2:00-3:00 PM	0	110
	Night shift changeover	9:30-10:00	69	0
		10:00-10:30	0	94

Source: Arnott's

Figure 18 shows the daily profile of vehicles arriving for workers associated with the processing facilities (HW1 and HW2) once the proposed development is complete. The site peak period is between 6:30 AM – 7:30 AM. The site peak did not coincide with the network peak.

Figure 18 Daily volume profile for HW1 and HW2



Source: Urbis

There are 273 new staff members associated with HW2. Of these 273, 16 are admin staff that work regular office hours.

Delivery and service vehicle generation has also been provided by Arnott's. **Table 12** details the number and arrival times of different types of service vehicles for the existing facility, proposed additions and the completed facility.

It is noted that outbound stock movements from the site are undertaken from the approved (and unrestricted) high-bay warehouses in the southern portion of the site with access from Brabham Drive. As detailed in **Table 12**, the additional stock processed in the new facility will require a modest increase in the number of heavy vehicles accessing the southern portion of the site.

Table 12 Delivery and service vehicle generation

Vehicle type	Estimated arrival time period	Existing Vehicle Numbers	Expected Additional Daily Vehicle Numbers	Total
Raw Materials				
Semi-trailer tanker	24 hrs a day	12	3	15
Semi-trailer	7 AM - 7 PM	8	4	12
Rigid truck	7 AM - 7 PM	6	1	7
Waste				
Rigid waste collection vehicle	5 AM - 11 PM	6	2	8
Semi-trailer	7 PM - 3 PM	2	1	3
Packing materials				
B-double	7 AM - 6 PM	Once or twice a week – no change		
Semi-trailer	7 AM - 6 PM	7	2	9
Rigid truck	7 AM - 6 PM	5	2	7
High Bay Warehouse				
B-Double	6 AM – 10 PM	9	2	11
Semi-trailer	6 AM – 10 PM	15	2	17
Rigid	6 AM – 10 PM	1	0	1
Container delivery/collection	6 AM – 10 PM	4	2	6
Service and support vehicles				
Courier vans	7 AM - 5 PM	3	1	4

Vehicle type	Estimated arrival time period	Existing Vehicle Numbers	Expected Additional Daily Vehicle Numbers	Total
Engineering service vans	7 AM - 5 PM	1	0	1
Delivery trucks (assume MRV)	7 AM - 5 PM	2	1	3

Source: Arnott's

By comparing shift times, the peak traffic generating period for the proposed development has been identified as 6:30 AM to 7:30 AM. This time period factors in the changeover between the night shift and day shift. During this period in a worst-case scenario, the existing 318 trips by employees during the HW1 shift changeover will move either in or out of the basement car parking area during the shift changeover. During this time period in a worst-case scenario, 1 semi-trailer tanker and 1 rigid waste collection vehicle will access the loading and servicing area of the proposed development. Traffic generated by the new facility (HW2) will arrive and depart outside the peak period.

Blacktown City Council was contacted to request background traffic information for both Huntingwood and Brabham Drives in order to assess the identified peak of 6:30 AM to 7:30 AM. The Council officer that was contacted suggested that Urbis undertake their own traffic counts if required. No traffic counts were taken during this period as they are not in the network peak period. The identified site peak period does not coincide with the network peak period.

Figure 19 and **Figure 20** show the site peak hour traffic movements in and out of the facility once the proposed development is completed.

Figure 19 Huntingwood Drive access vehicle movements into and out of the site during the peak period once the development is completed

Source: Nearmap modified by Urbis

Figure 20 Brabham Drive access vehicle movements into and out of the site during the peak period once the development is completed

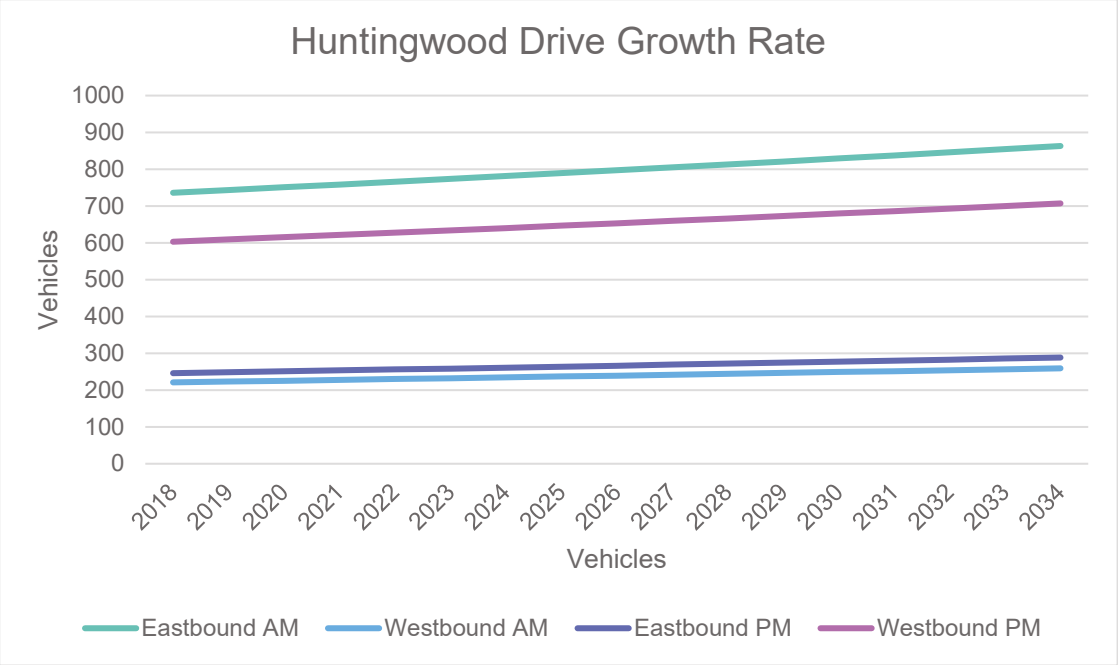
Source: Nearmap modified by Urbis

7.3.3. Background Traffic Growth

Background traffic growth for both Brabham Drive and Huntingwood Drive is assumed to be 1% due to the surrounding lands already being developed. A 1% growth rate has been applied to the network peak period traffic counts that were recorded in 2018 to the following 10 years after the expected completion date of the development in 2024.

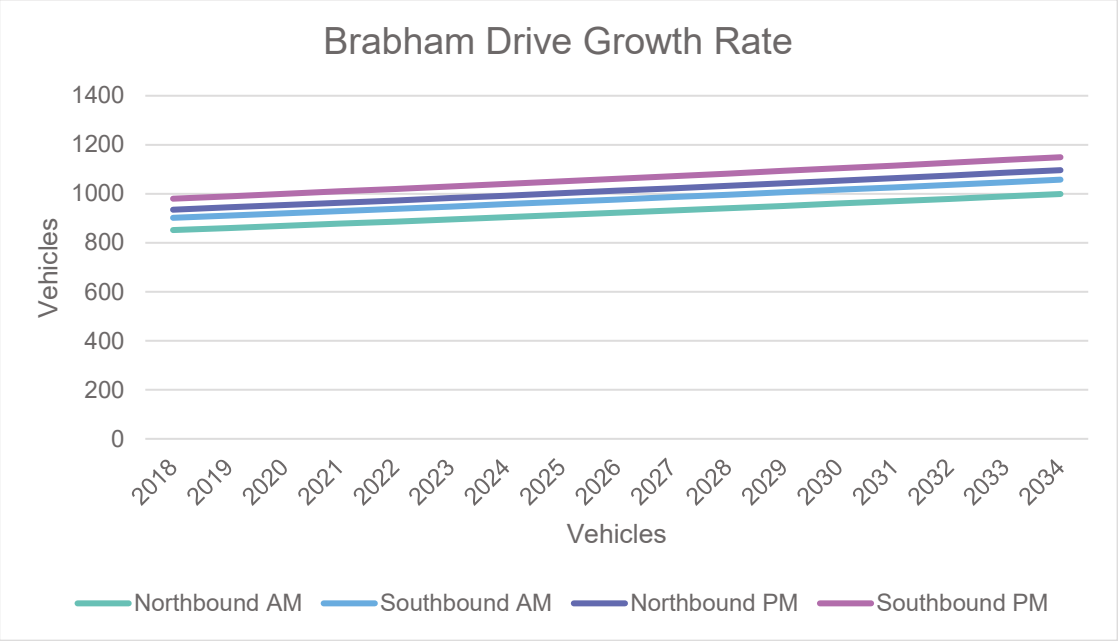
Figure 21 and **Figure 22** show the traffic growth along Brabham Drive and Huntingwood Drive during the AM and PM peaks between 2018 and 2034. Based on the number of future employees the proposed development will need, the proposed development will have a negligible impact on future traffic growth.

Figure 21 Huntingwood Drive traffic growth



Source: Colston Budd Rogers & Kafes Pty Ltd

Figure 22 Brabham Drive traffic growth



Source: Colston Budd Rogers & Kafes Pty Ltd

7.3.4. Intersection operation

The following section summarises the results of the SIDRA INTERSECTION analysis undertaken during the AM and PM network peaks in both 2024 and 2034.

2024 Road Network without Development Intersection Performance

A summary of the results of the SIDRA INTERSECTION analysis for the 2024 network intersection performance (anticipated opening) without development is shown in **Table 13**. The detailed results are provided in **Appendix A**.

Table 13 Intersection level of service 2024 network without development

Location	Time	Level of Service	Degree of Saturation	Average Delay (sec)	Delay to Critical Movements (sec)	Queue Length to Critical Movements (metres)	Critical Movement
HD/BD	AM Network Peak (7:45-8:45)	A	0.710	10.6 sec	22.4 sec	29.9 m	U-turn from BD north
BD/ALD		N/A	0.273	0.1 sec	12.6 sec	0.2 m	Left turn from ALD to BD
HD/LR		N/A	0.464	0.6 sec	32.7 sec	1 m	Right turn from LR to HD
HD/ALD		N/A	0.435	0.3 sec	36.2 sec	0.8 m	Right Turn from ALD to HD
HD/BD	PM Network Peak (18:30-17:30)	B	1.075	27.4 sec	101.5 sec	109.9 m	U-turn from HD east
BD/ALD		N/A	0.322	0.1 sec	15.1 sec	0.3 m	Left turn from ALD to BD
HD/LR		N/A	0.287	0.6 sec	26.7 sec	19.3 m	Right turn from LR to HD
HD/ALD		N/A	0.335	0.6 sec	23.2 sec	0.8 m	Right turn from ALD to HD
HD – Huntingwood Drive, BD – Brabham Drive, LR – Liberty Road, ALD – Arnott's Loading Dock, ACP-Arnott's Car Park (opposite Liberty Road)							

Source: SIDRA INTERSECTION, Urbis

2024 Road Network with Development Intersection Performance

A summary of the results of the SIDRA INTERSECTION analysis for the 2024 network intersection performance (anticipated opening) with development is shown in **Table 14**. The detailed results are provided in **Appendix A**.

Table 14 Intersection level of service 2024 network with development

Location	Time	Level of Service	Degree of Saturation	Average Delay (sec)	Delay to Critical Movements	Queue Length to Critical Movements	Critical Movement
HD/BD	AM Network Peak (7:45-8:45)	B	0.711	10.6 sec	22.5 sec	30 m	U-turn from BD north
BD/ALD		N/A	0.273	0.1 sec	12.6 sec	0.2 m	Left turn from ALD to BD
HD/LR		N/A	0.466	0.6 sec	32.8 sec	1 m	Right turn from LR to HD
HD/ALD		N/A	0.437	0.4 sec	36.4 m	0.8 m	Right Turn from ALD to HD
HD/BD	PM Network Peak (18:30-17:30)	C	1.076	27.7 sec	102.7 sec	109.9 m	U-turn from HD east
BD/ALD		N/A	0.332	0.1 sec	15.1 sec	0.3 m	Left turn from ALD to BD
HD/LR		N/A	0.287	0.6 sec	26.8 m	20.5 m	Right turn from LR to HD
HD/ALD		N/A	0.335	0.6 sec	23.3 sec	1 m	Right turn from ALD to HD
HD – Huntingwood Drive, BD – Brabham Drive, LR – Liberty Road, ALD – Arnott's Loading Dock, ACP-Arnott's Car Park (opposite Liberty Road)							

Source: SIDRA INTERSECTION, Urbis

2034 Road Network without Development Intersection Performance

A summary of the results of the SIDRA INTERSECTION analysis for the 2034 network intersection performance without development is shown in **Table 15**. The detailed results are provided in **Appendix A**.

Table 15 Intersection level of service 2034 network without development

Location	Time	Level of Service	Degree of Saturation	Average Delay (sec)	Delay to Critical Movements	Queue Length to Critical Movements	Critical Movement
HD/BD	AM Network Peak (7:45-8:45)	B	0.834	14.7 sec	31.1 sec	51.1 m	U-turn from BD north
BD/ALD		N/A	0.302	0.1 sec	14.0 sec	0.3 m	Left turn from ALD to BD
HD/LR		N/A	0.542	0.6 sec	41.7 sec	1.3 m	Right turn from LR to HD
HD/ALD		N/A	0.413	0.4 sec	33.5 sec	0.3 m	Right Turn from ALD to HD
HD/BD	PM Network Peak (18:30-17:30)	E	1.272	67.1 sec	268.5 sec	109.3 m	U-turn from HD east
BD/ALD		N/A	0.341	0.1 sec	16.3 sec	0.3 m	Left turn from ALD to BD
HD/LR		N/A	0.271	0.5 sec	26.0 sec	157. 9 m	Right turn from LR to HD
HD/ALD		N/A	0.370	0.8 sec	29.5 sec	20.1 m	Right turn from ALD to HD
HD – Huntingwood Drive, BD – Brabham Drive, LR – Liberty Road, ALD – Arnott's Loading Dock, ACP-Arnott's Car Park (opposite Liberty Road)							

Source: SIDRA INTERSECTION, Urbis

2034 Road Network with Development Intersection Performance

A summary of the results of the SIDRA INTERSECTION analysis for the 2034 network intersection performance with development is shown in **Table 16**. The detailed results are provided in **Appendix A**.

Table 16 Intersection level of service 2034 network with development

Location	Time	Level of Service	Degree of Saturation	Average Delay (sec)	Delay to Critical Movements	Queue Length to Critical Movements	Critical Movement
HD/BD	AM Network Peak (7:45-8:45)	B	0.834	14.7 sec	31.1 sec	51.3 m	U-turn from BD north
BD/ALD		N/A	0.302	0.1 sec	14.0 sec	0.3 m	Left turn from ALD to BD
HD/LR		N/A	0.543	0.6 sec	41.8 sec	1.3 m	Right turn from LR to HD
HD/ALD		N/A	0.413	0.4 sec	33.5 sec	0.7 m	Right Turn from ALD to HD
HD/BD	PM Network Peak (18:30-17:30)	E	1.274	67.6 sec	270.3 sec	109.9 m	U-turn from HD east
BD/ALD		N/A	0.341	0.1 sec	16.3 sec	0.3 m	Left turn from ALD to BD
HD/LR		N/A	0.271	0.5 sec	26.1 sec	157.9 m	Right turn from LR to HD
HD/ALD		N/A	0.370	0.8 sec	29.5 sec	22 m	Right turn from ALD to HD
HD – Huntingwood Drive, BD – Brabham Drive, LR – Liberty Road, ALD – Arnott's Loading Dock, ACP-Arnott's Car Park (opposite Liberty Road)							

Source: SIDRA INTERSECTION, Urbis

Summary of SIDRA INTERSECTION Findings

The upgraded facility is anticipated to be operational by 2024. When the facility is operational, there will be one additional heavy vehicle accessing the site during both peak periods. It has been assumed that this vehicle will be accessing the site through the 'Arnott's Loading Dock Access' located off Huntingwood Drive. It has been assumed that this vehicle will access the site using Brabham Drive north of Huntingwood Drive and Huntingwood Drive, this is also assumed for the vehicle exiting the site.

In 2024, the roundabout at the intersection of Huntingwood Drive and Brabham Drive will still be operating at a satisfactory level during both peaks once the development is operational. Impacts of the site access points on the road network will remain negligible.

In 2034, the roundabout at the intersection of Huntingwood Drive and Brabham Drive will still be operating at a satisfactory level during the AM peak, however, during the PM peak LoS E is experienced with an average delay time of 67.1 seconds and degree of saturation of 1.272. While this is not a satisfactory performance level, it is completely unrelated to the operations of the Arnott's site, with the difference in performance (with and without development) within the margin of error. During the PM peak, eastbound traffic along Huntingwood Drive will have a queue 290 metres long from the roundabout. As a result of the queue, both of the entrances to the site on Huntingwood Drive will need "Keep Clear" markings to maintain access to the site for delivery vehicles and existing office-based staff.

7.4. PARKING PROVISION

The TfNSW Guide to Traffic Generating Developments (TfNSW Guide) and Blacktown DCP stipulates car parking rates for different land uses. These rates and calculation of total off-street parking requirements for the site are outlined in **Table 17** and **Table 18**.

The proposed development can accommodate the off-street parking requirements of the site based on the known shift profiles as outlined in **Section 3.5**. However, the parking generation rates from the TfNSW Guide and the Blacktown DCP are provided in **Tables 17** and **18** for comparison. While the proposed parking supply does not meet these requirements, it is more than adequate to meet the expected demand for parking by staff.

The parking rate calculation for the proposed facility based on the TfNSW Guide is 30,330 m^2 of GFA* and includes:

- Proposed processing buildings.
- Proposed internal walkways and platform.
- Proposed amenities.
- Proposed plant room.
- Proposed ingredient silos.

The parking rate calculation for the existing facility based on the TfNSW Guide is 52,089 m^2 of GFA*.

Table 17 TfNSW Guide to Traffic Generating Developments car parking rates

Land use	Quantum/detail (GFA)	Parking provision rate	Minimum parking requirement
Factory (proposed)	30,330 m^2 GFA	1.3 spaces per 100 m^2 of GFA	395
Factory (existing)	33,000 m^2 GFA	1.3 spaces per 100 m^2 of GFA	429

Land use	Quantum/detail (GFA)	Parking provision rate	Minimum parking requirement
Warehouse (existing)	19,089 m^2 GFA	1 space per 300 m^2 of GFA	64

Source: TfNSW Guide to Traffic Generating Developments version 2.2 2002 section 5.11.1 Factories, 5.11.2 Warehouses

**It is noted that the TfNSW Guide defines GFA differently from that of the Blacktown DCP. Under the TfNSW Guide, GFA for a "factory" includes any manufacturing process within the meaning of the Factories, Shops and Industries Act 1962. This includes all areas associated with the manufacturing of a product. There was no defined definition of GFA for a warehouse, the same definition of GFA used for a factory was applied to determine the warehouse GFA.*

The parking rate calculation for the proposed facility based on the Blacktown DCP is 26,245 m^2 of GFA* and includes:

- Proposed processing buildings.
- Proposed amenities (includes 650 m^2 of GFA for office space).
- Proposed storage shed.

The parking rate calculation for the existing facility based on the Blacktown DCP is 47,784 m^2 of GFA*.

Table 18 Blacktown DCP compliance

Land use	Requirement	GFA detail	Minimum parking requirement
Light industry, general industry, heavy industry and warehouse or distribution centre (proposed)	1 space per 75 m^2 GFA Plus 1 space per 40 m^2 GFA for the office component	General Industry = 25,595 m^2 GFA Office component = 650 m^2 GFA	358
Light industry, general industry, heavy industry and warehouse or distribution centre (existing)	1 space per 75 m^2 GFA Plus 1 space per 40 m^2 GFA for the office component	General Industry = 29,228 m^2 GFA Office component = 18,556 m^2 GFA	699

Source: Blacktown Development Control Plan 2015 Part A and Part E

** The Blacktown DCP defines GFA differently to the TfNSW Guide. The Blacktown DCP excludes areas such as plant rooms, stairwells, elevators, air-conditioning generation areas basements and certain terrace areas from any GFA calculation. These areas have been excluded from the GFA calculations relevant to the Blacktown DCP together with the ingredient silos as they are not accessible areas for staff.*

Table 19 highlights the total number of parking spaces within the site once the development is completed.

Table 19 Total number of car parking spaces

Detail	Number of car parking spaces
Existing number of car parks	355
Number of car parks being removed as part of this development	(260)
Number of car parks being added as part of this development	468
Net number of car parks	563

Source: Urbis

Given the total car parking demand for the existing facility is known, a car parking rate for the existing site was developed. This car parking rate was then applied to the total GFA of the site once the proposed development is completed. The GFA used for the proposed development is the one that was used in the TfNSW Guide to Traffic Generating Developments parking calculation found in **Table 17**.

Table 20 and **Table 21** stipulate the parking rates for the additional floor space on the site.

Table 20 Existing parking rate

Current site GFA	Current number of car parking spaces	Parking rate
59,089 m^2 GFA	355	0.60 parking spaces per 100 m^2 of GFA

Source: Urbis

Table 21 Completed site parking rate

Completed site GFA	Parking rate	Car parking spaces required
89,632 m^2 GFA	0.60 parking spaces per 100 m^2 of GFA	537

Source: Urbis

Table 20 demonstrates the current car parking rate of the site based on the existing GFA. **Table 21** applies this parking rate of the existing facility to the fully upgraded facility. This results in 537 car parking spaces required on the site. The completed site will have 563 car parking spaces.

The net number of car parks within the site once the proposed development is completed is 563. This figure includes the 468 car parks in the proposed multi-storey basement car park and the 95 existing car parks located in the south-eastern corner of the site that are being retained. Given that the total parking demand for the completed facility is known (refer to **Sections 3.5** and **7.3.2**), there will be more than enough car parking within the site to provide for staff. For more information on parking demand for the entire facility once completed, please refer to the GTP found in **Appendix B.**

8. CONCLUSION

The proposal involves the expansion of the existing food processing facility at the site and involves a new processing building and a new multi-storey basement car park and loading dock with access to Huntingwood Drive adjacent to Liberty Road. This new facility will result in a significant change in shift operations to ensure that the changeover period between shifts occurs outside the traffic network peak.

To support the development, a GTP has been prepared for the site. The GTP outlines strategies to maximise the green travel network connecting to the site, enabling a reduced impact on the surrounding road network.

While the adjacent traffic network will have increased congestion from the time of completion to 2034 during the PM network peak period, this is not as a result of the proposed development. Improvements (outside the scope of the development) for the Huntingwood Drive /Brabham Drive intersection should be considered.

The largest vehicle to use the development will be a 26m B-Double which will access the site from the existing heavy vehicle driveway on Huntingwood Drive. All swept paths for the B-Double and other vehicles have been checked and provide adequate clearances.

The development includes 468 car parking spaces (including 10 disability accessible spaces), 10 bicycle parking spaces and six motorcycle spaces and complies with the requirements of the BDCP and the TfNSW Guide to Traffic Generating Developments.

Based on the assessments contained within this report, the development satisfies all relevant SEARs.

9. DISCLAIMER

This report is dated 15 July 2021 and incorporates information and events up to that date only and excludes any information arising, or event occurring, after that date which may affect the validity of Urbis Pty Ltd **(Urbis)** opinion in this report. Urbis prepared this report on the instructions, and for the benefit only, of Charter Hall Holdings Pty Ltd **(Instructing Party)** for the purpose of Transport Impact Assessment **(Purpose)** and not for any other purpose or use. To the extent permitted by applicable law, Urbis expressly disclaims all liability, whether direct or indirect, to the Instructing Party which relies or purports to rely on this report for any purpose other than the Purpose, and to any other person which relies or purports to rely on this report for any purpose whatsoever (including the Purpose).

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This report has been prepared with due care and diligence by Urbis and the statements and opinions given by Urbis in this report are given in good faith and in the reasonable belief that they are correct and not misleading, subject to the limitations above.

APPENDIX A SIDRA NETWORK SUMMARY REPORTS

Appendix Figure 1 Existing Network AM

NETWORK SUMMARY

Network: N101 [Existing AM (Network Folder: General)]

New Network
Network Category: (None)

Network Performance - Hourly Values

Performance Measure	Vehicles	Per Unit Distance	Persons
Network Level of Service (LOS)	LOS B		
Speed Efficiency	0.87		
Travel Time Index	8.58		
Congestion Coefficient	1.15		
Travel Speed (Average)	52.3 km/h		52.3 km/h
Travel Distance (Total)	2873.5 veh-km/h		3448.1 pers-km/h
Travel Time (Total)	54.9 veh-h/h		65.9 pers-h/h
Desired Speed (Program)	60.0 km/h		
Demand Flows (Total for all Sites)	6529 veh/h		7835 pers/h
Arrival Flows (Total for all Sites)	6529 veh/h		7835 pers/h
Demand Flows (Entry Total)	2640 veh/h		
Midblock Inflows (Total)	29 veh/h		
Midblock Outflows (Total)	-24 veh/h		
Percent Heavy Vehicles (Demand)	10.4 %		
Percent Heavy Vehicles (Arrival)	10.4 %		
Degree of Saturation	0.621		
Control Delay (Total)	6.85 veh-h/h		8.22 pers-h/h
Control Delay (Average)	3.8 sec		3.8 sec
Control Delay (Worst Lane)	30.6 sec		
Control Delay (Worst Movement)	30.6 sec		30.6 sec
Geometric Delay (Average)	2.0 sec		
Stop-Line Delay (Average)	1.8 sec		
Ave. Queue Storage Ratio (Worst Lane)	0.07		
Total Effective Stops	2071 veh/h		2485 pers/h
Effective Stop Rate	0.32	0.72 per km	0.32
Proportion Queued	0.30		0.30
Performance Index	110.0		110.0
Cost (Total)	2601.99 $/h	0.91 $/km	2601.99 $/h
Fuel Consumption (Total)	348.0 L/h	121.1 mL/km	
Fuel Economy	12.1 L/100km		
Carbon Dioxide (Total)	834.7 kg/h	290.5 g/km	
Hydrocarbons (Total)	0.066 kg/h	0.023 g/km	
Carbon Monoxide (Total)	0.841 kg/h	0.293 g/km	
NOx (Total)	2.733 kg/h	0.951 g/km	

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 20)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: Standard Left.

Network Performance - Annual Values

Performance Measure	Vehicles	Persons
Demand Flows (Total for all Sites)	3,134,147 veh/y	3,760,977 pers/y
Delay	3,287 veh-h/y	3,944 pers-h/y
Effective Stops	994,011 veh/y	1,192,813 pers/y
Travel Distance	1,379,259 veh-km/y	1,655,111 pers-km/y
Travel Time	26,361 veh-h/y	31,633 pers-h/y
Cost	1,248,953 $/y	1,248,953 $/y
Fuel Consumption	167,059 L/y	
Carbon Dioxide	400,642 kg/y	
Hydrocarbons	32 kg/y	
Carbon Monoxide	404 kg/y	
NOx	1,312 kg/y	

Source: SIDRA INTERSECTION, Urbis

Appendix Figure 2 Existing network PM

NETWORK SUMMARY

Network: N101 [Existing PM (Network Folder: General)]

New Network
Network Category: (None)

Network Performance - Hourly Values						
Performance Measure	**Vehicles**		**Per Unit Distance**		**Persons**	
Network Level of Service (LOS)	LOS B					
Speed Efficiency	0.82					
Travel Time Index	7.98					
Congestion Coefficient	1.22					
Travel Speed (Average)	49.1	km/h			49.1	km/h
Travel Distance (Total)	2882.1	veh-km/h			3458.6	pers-km/h
Travel Time (Total)	58.7	veh-h/h			70.5	pers-h/h
Desired Speed (Program)	60.0	km/h				
Demand Flows (Total for all Sites)	6463	veh/h			7756	pers/h
Arrival Flows (Total for all Sites)	6463	veh/h			7756	pers/h
Demand Flows (Entry Total)	2619	veh/h				
Midblock Inflows (Total)	24	veh/h				
Midblock Outflows (Total)	-23	veh/h				
Percent Heavy Vehicles (Demand)	10.4	%				
Percent Heavy Vehicles (Arrival)	10.4	%				
Degree of Saturation	0.974					
Control Delay (Total)	10.07	veh-h/h			12.08	pers-h/h
Control Delay (Average)	5.6	sec			5.6	sec
Control Delay (Worst Lane)	36.5	sec				
Control Delay (Worst Movement)	43.2	sec			43.2	sec
Geometric Delay (Average)	1.8	sec				
Stop-Line Delay (Average)	3.8	sec				
Ave. Queue Storage Ratio (Worst Lane)	0.53					
Total Effective Stops	2295	veh/h			2754	pers/h
Effective Stop Rate	0.36		0.80	per km	0.36	
Proportion Queued	0.30				0.30	
Performance Index	155.5				155.5	
Cost (Total)	2745.77	$/h	0.95	$/km	2745.77	$/h
Fuel Consumption (Total)	356.0	L/h	123.5	mL/km		
Fuel Economy	12.4	L/100km				
Carbon Dioxide (Total)	853.8	kg/h	296.2	g/km		
Hydrocarbons (Total)	0.069	kg/h	0.024	g/km		
Carbon Monoxide (Total)	0.857	kg/h	0.297	g/km		
NOx (Total)	2.841	kg/h	0.986	g/km		

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 20)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: Standard Left.

Network Performance - Annual Values				
Performance Measure	**Vehicles**		**Persons**	
Demand Flows (Total for all Sites)	3,102,316	veh/y	3,722,780	pers/y
Delay	4,832	veh-h/y	5,799	pers-h/y
Effective Stops	1,101,629	veh/y	1,321,955	pers/y
Travel Distance	1,383,427	veh-km/y	1,660,112	pers-km/y
Travel Time	28,183	veh-h/y	33,820	pers-h/y
Cost	1,317,968	$/y	1,317,968	$/y
Fuel Consumption	170,903	L/y		
Carbon Dioxide	409,805	kg/y		
Hydrocarbons	33	kg/y		
Carbon Monoxide	411	kg/y		
NOx	1,364	kg/y		

Source: SIDRA INTERSECTION, Urbis

Appendix Figure 3 2024 without development AM

NETWORK SUMMARY

Network: N101 [2024 without development AM (Network Folder: General)]

New Network
Network Category: (None)

Network Performance - Hourly Values						
Performance Measure	**Vehicles**		**Per Unit Distance**		**Persons**	
Network Level of Service (LOS)	LOS B					
Speed Efficiency	0.85					
Travel Time Index	8.37					
Congestion Coefficient	1.17					
Travel Speed (Average)	51.2	km/h			51.2	km/h
Travel Distance (Total)	3071.3	veh-km/h			3685.6	pers-km/h
Travel Time (Total)	60.0	veh-h/h			72.0	pers-h/h
Desired Speed (Program)	60.0	km/h				
Demand Flows (Total for all Sites)	6980	veh/h			8376	pers/h
Arrival Flows (Total for all Sites)	6980	veh/h			8376	pers/h
Demand Flows (Entry Total)	2855	veh/h				
Midblock Inflows (Total)	24	veh/h				
Midblock Outflows (Total)	-77	veh/h				
Percent Heavy Vehicles (Demand)	10.3	%				
Percent Heavy Vehicles (Arrival)	10.3	%				
Degree of Saturation	0.710					
Control Delay (Total)	8.65	veh-h/h			10.38	pers-h/h
Control Delay (Average)	4.5	sec			4.5	sec
Control Delay (Worst Lane)	36.2	sec				
Control Delay (Worst Movement)	36.2	sec			36.2	sec
Geometric Delay (Average)	2.0	sec				
Stop-Line Delay (Average)	2.5	sec				
Ave. Queue Storage Ratio (Worst Lane)	0.09					
Total Effective Stops	2459	veh/h			2951	pers/h
Effective Stop Rate	0.35		0.80	per km	0.35	
Proportion Queued	0.32				0.32	
Performance Index	130.0				130.0	
Cost (Total)	2839.23	$/h	0.92	$/km	2839.23	$/h
Fuel Consumption (Total)	378.4	L/h	123.2	mL/km		
Fuel Economy	12.3	L/100km				
Carbon Dioxide (Total)	907.2	kg/h	295.4	g/km		
Hydrocarbons (Total)	0.073	kg/h	0.024	g/km		
Carbon Monoxide (Total)	0.914	kg/h	0.297	g/km		
NOx (Total)	2.982	kg/h	0.971	g/km		

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: New South Wales.

Network Performance - Annual Values				
Performance Measure	**Vehicles**		**Persons**	
Demand Flows (Total for all Sites)	3,350,400	veh/y	4,020,481	pers/y
Delay	4,151	veh-h/y	4,982	pers-h/y
Effective Stops	1,180,363	veh/y	1,416,436	pers/y
Travel Distance	1,474,238	veh-km/y	1,769,086	pers-km/y
Travel Time	28,809	veh-h/y	34,571	pers-h/y
Cost	1,362,831	$/y	1,362,831	$/y
Fuel Consumption	181,633	L/y		
Carbon Dioxide	435,475	kg/y		
Hydrocarbons	35	kg/y		
Carbon Monoxide	439	kg/y		
NOx	1,431	kg/y		

Source: SIDRA INTERSECTION, Urbis

Appendix Figure 4 2024 without development PM

NETWORK SUMMARY

Network: N101 [2024 without development PM (Network Folder: General)]

New Network
Network Category: (None)

Network Performance - Hourly Values						
Performance Measure	**Vehicles**		**Per Unit Distance**		**Persons**	
Network Level of Service (LOS)	LOS D					
Speed Efficiency	0.70					
Travel Time Index	6.62					
Congestion Coefficient	1.44					
Travel Speed (Average)	41.7	km/h			41.7	km/h
Travel Distance (Total)	3029.0	veh-km/h			3634.8	pers-km/h
Travel Time (Total)	72.6	veh-h/h			87.1	pers-h/h
Desired Speed (Program)	60.0	km/h				
Demand Flows (Total for all Sites)	6806	veh/h			8168	pers/h
Arrival Flows (Total for all Sites)	6783	veh/h			8139	pers/h
Demand Flows (Entry Total)	2722	veh/h				
Midblock Inflows (Total)	80	veh/h				
Midblock Outflows (Total)	-18	veh/h				
Percent Heavy Vehicles (Demand)	10.3	%				
Percent Heavy Vehicles (Arrival)	10.4	%				
Degree of Saturation	1.075					
Control Delay (Total)	21.37	veh-h/h			25.64	pers-h/h
Control Delay (Average)	11.3	sec			11.3	sec
Control Delay (Worst Lane)	94.8	sec				
Control Delay (Worst Movement)	101.5	sec			101.5	sec
Geometric Delay (Average)	1.8	sec				
Stop-Line Delay (Average)	9.5	sec				
Ave. Queue Storage Ratio (Worst Lane)	1.00					
Total Effective Stops	3268	veh/h			3921	pers/h
Effective Stop Rate	0.48		1.08	per km	0.48	
Proportion Queued	0.31				0.31	
Performance Index	238.2				238.2	
Cost (Total)	3294.72	$/h	1.09	$/km	3294.72	$/h
Fuel Consumption (Total)	395.8	L/h	130.7	mL/km		
Fuel Economy	13.1	L/100km				
Carbon Dioxide (Total)	948.7	kg/h	313.2	g/km		
Hydrocarbons (Total)	0.081	kg/h	0.027	g/km		
Carbon Monoxide (Total)	0.957	kg/h	0.316	g/km		
NOx (Total)	3.130	kg/h	1.033	g/km		

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: New South Wales.

Network Performance - Annual Values				
Performance Measure	**Vehicles**		**Persons**	
Demand Flows (Total for all Sites)	3,267,032	veh/y	3,920,438	pers/y
Delay	10,257	veh-h/y	12,308	pers-h/y
Effective Stops	1,568,494	veh/y	1,882,193	pers/y
Travel Distance	1,453,918	veh-km/y	1,744,702	pers-km/y
Travel Time	34,842	veh-h/y	41,810	pers-h/y
Cost	1,581,464	$/y	1,581,464	$/y
Fuel Consumption	190,006	L/y		
Carbon Dioxide	455,391	kg/y		
Hydrocarbons	39	kg/y		
Carbon Monoxide	460	kg/y		
NOx	1,502	kg/y		

Source: SIDRA INTERSECTION, Urbis

Appendix Figure 5 2024 with development AM

NETWORK SUMMARY

Network: N101 [2024 with development AM (Network Folder: General)]

New Network
Network Category: (None)

Network Performance - Hourly Values						
Performance Measure	**Vehicles**		**Per Unit Distance**		**Persons**	
Network Level of Service (LOS)	LOS B					
Speed Efficiency	0.85					
Travel Time Index	8.36					
Congestion Coefficient	1.17					
Travel Speed (Average)	51.2	km/h			51.2	km/h
Travel Distance (Total)	3073.0	veh-km/h			3687.6	pers-km/h
Travel Time (Total)	60.1	veh-h/h			72.1	pers-h/h
Desired Speed (Program)	60.0	km/h				
Demand Flows (Total for all Sites)	6986	veh/h			8384	pers/h
Arrival Flows (Total for all Sites)	6986	veh/h			8384	pers/h
Demand Flows (Entry Total)	2857	veh/h				
Midblock Inflows (Total)	26	veh/h				
Midblock Outflows (Total)	-79	veh/h				
Percent Heavy Vehicles (Demand)	10.4	%				
Percent Heavy Vehicles (Arrival)	10.4	%				
Degree of Saturation	0.711					
Control Delay (Total)	8.68	veh-h/h			10.41	pers-h/h
Control Delay (Average)	4.5	sec			4.5	sec
Control Delay (Worst Lane)	36.4	sec				
Control Delay (Worst Movement)	36.4	sec			36.4	sec
Geometric Delay (Average)	2.0	sec				
Stop-Line Delay (Average)	2.5	sec				
Ave. Queue Storage Ratio (Worst Lane)	0.09					
Total Effective Stops	2465	veh/h			2958	pers/h
Effective Stop Rate	0.35		0.80	per km	0.35	
Proportion Queued	0.32				0.32	
Performance Index	130.3				130.3	
Cost (Total)	2842.66	$/h	0.93	$/km	2842.66	$/h
Fuel Consumption (Total)	379.1	L/h	123.4	mL/km		
Fuel Economy	12.3	L/100km				
Carbon Dioxide (Total)	908.9	kg/h	295.8	g/km		
Hydrocarbons (Total)	0.073	kg/h	0.024	g/km		
Carbon Monoxide (Total)	0.915	kg/h	0.298	g/km		
NOx (Total)	2.992	kg/h	0.974	g/km		

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 20)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: Standard Left.

Network Performance - Annual Values				
Performance Measure	**Vehicles**		**Persons**	
Demand Flows (Total for all Sites)	3,353,432	veh/y	4,024,118	pers/y
Delay	4,166	veh-h/y	4,999	pers-h/y
Effective Stops	1,183,109	veh/y	1,419,731	pers/y
Travel Distance	1,475,025	veh-km/y	1,770,031	pers-km/y
Travel Time	28,837	veh-h/y	34,604	pers-h/y
Cost	1,364,475	$/y	1,364,475	$/y
Fuel Consumption	181,958	L/y		
Carbon Dioxide	436,276	kg/y		
Hydrocarbons	35	kg/y		
Carbon Monoxide	439	kg/y		
NOx	1,436	kg/y		

Source: SIDRA INTERSECTION, Urbis

Appendix Figure 6 2024 with development AM

NETWORK SUMMARY

Network: N101 [2024 with development PM (Network Folder: General)]

New Network
Network Category: (None)

Network Performance - Hourly Values						
Performance Measure	**Vehicles**		**Per Unit Distance**		**Persons**	
Network Level of Service (LOS)	LOS D					
Speed Efficiency	0.69					
Travel Time Index	6.59					
Congestion Coefficient	1.44					
Travel Speed (Average)	41.6	km/h			41.6	km/h
Travel Distance (Total)	3029.5	veh-km/h			3635.4	pers-km/h
Travel Time (Total)	72.9	veh-h/h			87.4	pers-h/h
Desired Speed (Program)	60.0	km/h				
Demand Flows (Total for all Sites)	6811	veh/h			8173	pers/h
Arrival Flows (Total for all Sites)	6786	veh/h			8144	pers/h
Demand Flows (Entry Total)	2722	veh/h				
Midblock Inflows (Total)	84	veh/h				
Midblock Outflows (Total)	-20	veh/h				
Percent Heavy Vehicles (Demand)	10.4	%				
Percent Heavy Vehicles (Arrival)	10.4	%				
Degree of Saturation	1.076					
Control Delay (Total)	21.63	veh-h/h			25.96	pers-h/h
Control Delay (Average)	11.5	sec			11.5	sec
Control Delay (Worst Lane)	96.0	sec				
Control Delay (Worst Movement)	102.7	sec			102.7	sec
Geometric Delay (Average)	1.8	sec				
Stop-Line Delay (Average)	9.6	sec				
Ave. Queue Storage Ratio (Worst Lane)	1.00					
Total Effective Stops	3288	veh/h			3946	pers/h
Effective Stop Rate	0.48		1.09	per km	0.48	
Proportion Queued	0.31				0.31	
Performance Index	239.1				239.1	
Cost (Total)	3306.11	$/h	1.09	$/km	3306.11	$/h
Fuel Consumption (Total)	396.8	L/h	131.0	mL/km		
Fuel Economy	13.1	L/100km				
Carbon Dioxide (Total)	951.1	kg/h	314.0	g/km		
Hydrocarbons (Total)	0.081	kg/h	0.027	g/km		
Carbon Monoxide (Total)	0.960	kg/h	0.317	g/km		
NOx (Total)	3.142	kg/h	1.037	g/km		

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 20)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: Standard Left.

Network Performance - Annual Values				
Performance Measure	**Vehicles**		**Persons**	
Demand Flows (Total for all Sites)	3,269,053	veh/y	3,922,863	pers/y
Delay	10,385	veh-h/y	12,462	pers-h/y
Effective Stops	1,578,303	veh/y	1,893,964	pers/y
Travel Distance	1,454,153	veh-km/y	1,744,983	pers-km/y
Travel Time	34,974	veh-h/y	41,969	pers-h/y
Cost	1,586,933	$/y	1,586,933	$/y
Fuel Consumption	190,481	L/y		
Carbon Dioxide	456,550	kg/y		
Hydrocarbons	39	kg/y		
Carbon Monoxide	461	kg/y		
NOx	1,508	kg/y		

Source: SIDRA INTERSECTION, Urbis

Appendix Figure 7 2034 without development AM

NETWORK SUMMARY

Network: N101 [2034 without development AM (Network Folder: General)]

New Network
Network Category: (None)

Network Performance - Hourly Values						
Performance Measure	**Vehicles**		**Per Unit Distance**		**Persons**	
Network Level of Service (LOS)	LOS B					
Speed Efficiency	0.81					
Travel Time Index	7.84					
Congestion Coefficient	1.24					
Travel Speed (Average)	48.3	km/h			48.3	km/h
Travel Distance (Total)	3316.1	veh-km/h			3979.4	pers-km/h
Travel Time (Total)	68.6	veh-h/h			82.3	pers-h/h
Desired Speed (Program)	60.0	km/h				
Demand Flows (Total for all Sites)	7574	veh/h			9088	pers/h
Arrival Flows (Total for all Sites)	7574	veh/h			9088	pers/h
Demand Flows (Entry Total)	3152	veh/h				
Midblock Inflows (Total)	18	veh/h				
Midblock Outflows (Total)	-209	veh/h				
Percent Heavy Vehicles (Demand)	10.3	%				
Percent Heavy Vehicles (Arrival)	10.3	%				
Degree of Saturation	0.834					
Control Delay (Total)	13.14	veh-h/h			15.77	pers-h/h
Control Delay (Average)	6.2	sec			6.2	sec
Control Delay (Worst Lane)	37.8	sec				
Control Delay (Worst Movement)	41.7	sec			41.7	sec
Geometric Delay (Average)	2.0	sec				
Stop-Line Delay (Average)	4.3	sec				
Ave. Queue Storage Ratio (Worst Lane)	0.13					
Total Effective Stops	3177	veh/h			3812	pers/h
Effective Stop Rate	0.42		0.96	per km	0.42	
Proportion Queued	0.35				0.35	
Performance Index	170.5				170.5	
Cost (Total)	3221.36	$/h	0.97	$/km	3221.36	$/h
Fuel Consumption (Total)	422.1	L/h	127.3	mL/km		
Fuel Economy	12.7	L/100km				
Carbon Dioxide (Total)	1011.5	kg/h	305.0	g/km		
Hydrocarbons (Total)	0.083	kg/h	0.025	g/km		
Carbon Monoxide (Total)	1.018	kg/h	0.307	g/km		
NOx (Total)	3.334	kg/h	1.005	g/km		

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: New South Wales.

Network Performance - Annual Values				
Performance Measure	**Vehicles**		**Persons**	
Demand Flows (Total for all Sites)	3,635,369	veh/y	4,362,443	pers/y
Delay	6,306	veh-h/y	7,567	pers-h/y
Effective Stops	1,524,740	veh/y	1,829,688	pers/y
Travel Distance	1,591,742	veh-km/y	1,910,091	pers-km/y
Travel Time	32,922	veh-h/y	39,507	pers-h/y
Cost	1,546,254	$/y	1,546,254	$/y
Fuel Consumption	202,608	L/y		
Carbon Dioxide	485,515	kg/y		
Hydrocarbons	40	kg/y		
Carbon Monoxide	489	kg/y		
NOx	1,600	kg/y		

Source: SIDRA INTERSECTION, Urbis

Appendix Figure 8 2034 without development PM

NETWORK SUMMARY

Network: N101 [2034 without development PM (Network Folder: General)]

New Network
Network Category: (None)

Network Performance - Hourly Values						
Performance Measure	**Vehicles**		**Per Unit Distance**		**Persons**	
Network Level of Service (LOS)	LOS E					
Speed Efficiency	0.49					
Travel Time Index	4.29					
Congestion Coefficient	2.06					
Travel Speed (Average)	29.2	km/h			29.2	km/h
Travel Distance (Total)	3310.2	veh-km/h			3972.2	pers-km/h
Travel Time (Total)	113.4	veh-h/h			136.1	pers-h/h
Desired Speed (Program)	60.0	km/h				
Demand Flows (Total for all Sites)	7472	veh/h			8966	pers/h
Arrival Flows (Total for all Sites)	7391	veh/h			8869	pers/h
Demand Flows (Entry Total)	3064	veh/h				
Midblock Inflows (Total)	112	veh/h				
Midblock Outflows (Total)	-103	veh/h				
Percent Heavy Vehicles (Demand)	10.3	%				
Percent Heavy Vehicles (Arrival)	10.4	%				
Degree of Saturation	1.272					
Control Delay (Total)	57.20	veh-h/h			68.64	pers-h/h
Control Delay (Average)	27.9	sec			27.9	sec
Control Delay (Worst Lane)	261.8	sec				
Control Delay (Worst Movement)	268.5	sec			268.5	sec
Geometric Delay (Average)	1.9	sec				
Stop-Line Delay (Average)	26.0	sec				
Ave. Queue Storage Ratio (Worst Lane)	1.00					
Total Effective Stops	5554	veh/h			6665	pers/h
Effective Stop Rate	0.75		1.68	per km	0.75	
Proportion Queued	0.32				0.32	
Performance Index	351.4				351.4	
Cost (Total)	4864.33	$/h	1.47	$/km	4864.33	$/h
Fuel Consumption (Total)	492.7	L/h	148.9	mL/km		
Fuel Economy	14.9	L/100km				
Carbon Dioxide (Total)	1179.6	kg/h	356.4	g/km		
Hydrocarbons (Total)	0.113	kg/h	0.034	g/km		
Carbon Monoxide (Total)	1.210	kg/h	0.366	g/km		
NOx (Total)	3.779	kg/h	1.142	g/km		

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 10)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: New South Wales.

Network Performance - Annual Values				
Performance Measure	**Vehicles**		**Persons**	
Demand Flows (Total for all Sites)	3,586,358	veh/y	4,303,630	pers/y
Delay	27,455	veh-h/y	32,946	pers-h/y
Effective Stops	2,665,998	veh/y	3,199,198	pers/y
Travel Distance	1,588,883	veh-km/y	1,906,659	pers-km/y
Travel Time	54,430	veh-h/y	65,316	pers-h/y
Cost	2,334,878	$/y	2,334,878	$/y
Fuel Consumption	236,514	L/y		
Carbon Dioxide	566,214	kg/y		
Hydrocarbons	54	kg/y		
Carbon Monoxide	581	kg/y		
NOx	1,814	kg/y		

Source: SIDRA INTERSECTION, Urbis

Appendix Figure 9 2034 with development AM

NETWORK SUMMARY

Network: N101 [2034 with development AM (Network Folder: General)]

New Network
Network Category: (None)

Network Performance - Hourly Values						
Performance Measure	**Vehicles**		**Per Unit Distance**		**Persons**	
Network Level of Service (LOS)	LOS B					
Speed Efficiency	0.81					
Travel Time Index	7.84					
Congestion Coefficient	1.24					
Travel Speed (Average)	48.3	km/h			48.3	km/h
Travel Distance (Total)	3317.5	veh-km/h			3981.0	pers-km/h
Travel Time (Total)	68.7	veh-h/h			82.4	pers-h/h
Desired Speed (Program)	60.0	km/h				
Demand Flows (Total for all Sites)	7579	veh/h			9095	pers/h
Arrival Flows (Total for all Sites)	7579	veh/h			9095	pers/h
Demand Flows (Entry Total)	3154	veh/h				
Midblock Inflows (Total)	19	veh/h				
Midblock Outflows (Total)	-211	veh/h				
Percent Heavy Vehicles (Demand)	10.3	%				
Percent Heavy Vehicles (Arrival)	10.3	%				
Degree of Saturation	0.834					
Control Delay (Total)	13.18	veh-h/h			15.82	pers-h/h
Control Delay (Average)	6.3	sec			6.3	sec
Control Delay (Worst Lane)	37.9	sec				
Control Delay (Worst Movement)	41.8	sec			41.8	sec
Geometric Delay (Average)	2.0	sec				
Stop-Line Delay (Average)	4.3	sec				
Ave. Queue Storage Ratio (Worst Lane)	0.14					
Total Effective Stops	3183	veh/h			3820	pers/h
Effective Stop Rate	0.42		0.96	per km	0.42	
Proportion Queued	0.35				0.35	
Performance Index	170.9				170.9	
Cost (Total)	3224.71	$/h	0.97	$/km	3224.71	$/h
Fuel Consumption (Total)	422.6	L/h	127.4	mL/km		
Fuel Economy	12.7	L/100km				
Carbon Dioxide (Total)	1012.8	kg/h	305.3	g/km		
Hydrocarbons (Total)	0.083	kg/h	0.025	g/km		
Carbon Monoxide (Total)	1.019	kg/h	0.307	g/km		
NOx (Total)	3.341	kg/h	1.007	g/km		

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 20)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: Standard Left.

Network Performance - Annual Values				
Performance Measure	**Vehicles**		**Persons**	
Demand Flows (Total for all Sites)	3,637,895	veh/y	4,365,474	pers/y
Delay	6,327	veh-h/y	7,593	pers-h/y
Effective Stops	1,528,030	veh/y	1,833,637	pers/y
Travel Distance	1,592,414	veh-km/y	1,910,896	pers-km/y
Travel Time	32,954	veh-h/y	39,545	pers-h/y
Cost	1,547,860	$/y	1,547,860	$/y
Fuel Consumption	202,852	L/y		
Carbon Dioxide	486,121	kg/y		
Hydrocarbons	40	kg/y		
Carbon Monoxide	489	kg/y		
NOx	1,604	kg/y		

Source: SIDRA INTERSECTION, Urbis

Appendix Figure 10 2034 with development PM

NETWORK SUMMARY

Network: N101 [2034 with development PM (Network Folder: General)]

New Network
Network Category: (None)

Network Performance - Hourly Values						
Performance Measure	**Vehicles**		**Per Unit Distance**		**Persons**	
Network Level of Service (LOS)	LOS E					
Speed Efficiency	0.48					
Travel Time Index	4.27					
Congestion Coefficient	2.06					
Travel Speed (Average)	29.1	km/h			29.1	km/h
Travel Distance (Total)	3311.3	veh-km/h			3973.5	pers-km/h
Travel Time (Total)	113.9	veh-h/h			136.6	pers-h/h
Desired Speed (Program)	60.0	km/h				
Demand Flows (Total for all Sites)	7477	veh/h			8972	pers/h
Arrival Flows (Total for all Sites)	7395	veh/h			8874	pers/h
Demand Flows (Entry Total)	3066	veh/h				
Midblock Inflows (Total)	112	veh/h				
Midblock Outflows (Total)	-104	veh/h				
Percent Heavy Vehicles (Demand)	10.3	%				
Percent Heavy Vehicles (Arrival)	10.4	%				
Degree of Saturation	1.274					
Control Delay (Total)	57.65	veh-h/h			69.18	pers-h/h
Control Delay (Average)	28.1	sec			28.1	sec
Control Delay (Worst Lane)	263.6	sec				
Control Delay (Worst Movement)	270.3	sec			270.3	sec
Geometric Delay (Average)	1.9	sec				
Stop-Line Delay (Average)	26.2	sec				
Ave. Queue Storage Ratio (Worst Lane)	1.00					
Total Effective Stops	5580	veh/h			6696	pers/h
Effective Stop Rate	0.75		1.69	per km	0.75	
Proportion Queued	0.32				0.32	
Performance Index	352.9				352.9	
Cost (Total)	4882.54	$/h	1.47	$/km	4882.54	$/h
Fuel Consumption (Total)	493.9	L/h	149.2	mL/km		
Fuel Economy	14.9	L/100km				
Carbon Dioxide (Total)	1182.4	kg/h	357.1	g/km		
Hydrocarbons (Total)	0.113	kg/h	0.034	g/km		
Carbon Monoxide (Total)	1.213	kg/h	0.366	g/km		
NOx (Total)	3.789	kg/h	1.144	g/km		

Network Model Variability Index (Iterations 3 to N): 0.0 %
Number of Iterations: 5 (Maximum: 20)
Largest change in Lane Degrees of Saturation or Queue Storage Ratios for the last three Network Iterations: 0.0% 0.0% 0.0%
Network Level of Service (LOS) Method: SIDRA Speed Efficiency.
Software Setup used: Standard Left.

Network Performance - Annual Values				
Performance Measure	**Vehicles**		**Persons**	
Demand Flows (Total for all Sites)	3,588,884	veh/y	4,306,661	pers/y
Delay	27,672	veh-h/y	33,206	pers-h/y
Effective Stops	2,678,429	veh/y	3,214,116	pers/y
Travel Distance	1,589,401	veh-km/y	1,907,281	pers-km/y
Travel Time	54,657	veh-h/y	65,588	pers-h/y
Cost	2,343,621	$/y	2,343,621	$/y
Fuel Consumption	237,061	L/y		
Carbon Dioxide	567,539	kg/y		
Hydrocarbons	54	kg/y		
Carbon Monoxide	582	kg/y		
NOx	1,819	kg/y		

Source: SIDRA INTERSECTION, Urbis

APPENDIX B GREEN TRAVEL PLAN

65 HUNTINGWOOD DRIVE HUNTINGWOOD – GREEN TRAVEL INITIATIVES STATEMENT

Prepared for Charter Hall Holdings Pty Ltd

URBIS

09 AUGUST 2021

CONTENTS

THE PROPOSAL

The proposed development is located at 61 Huntingwood Drive, Huntingwood. The surrounding area is characterised predominantly by commercial and industrial land uses (**Figure 1**).

The proposal will see the expansion of the existing Arnott's biscuit manufacturing facility to include a new production hall with a loading dock. The new facility (HW2) will result in an additional 273 staff, adding to the existing 360 staff associated with the current facility (HW1). There are also 60 additional staff that support the high-bay warehouse (HB) on the site. In total there will be 633 staff working in shifts at the site across a 24-hour period. **Table 1** details how staff will be distributed across three shifts. The shift times for workers in HW1 and HW2 are detailed in **Tables 1** and **2** below.

Table 1: No. of staff and shifts of HW1+high-bay warehouse (current)

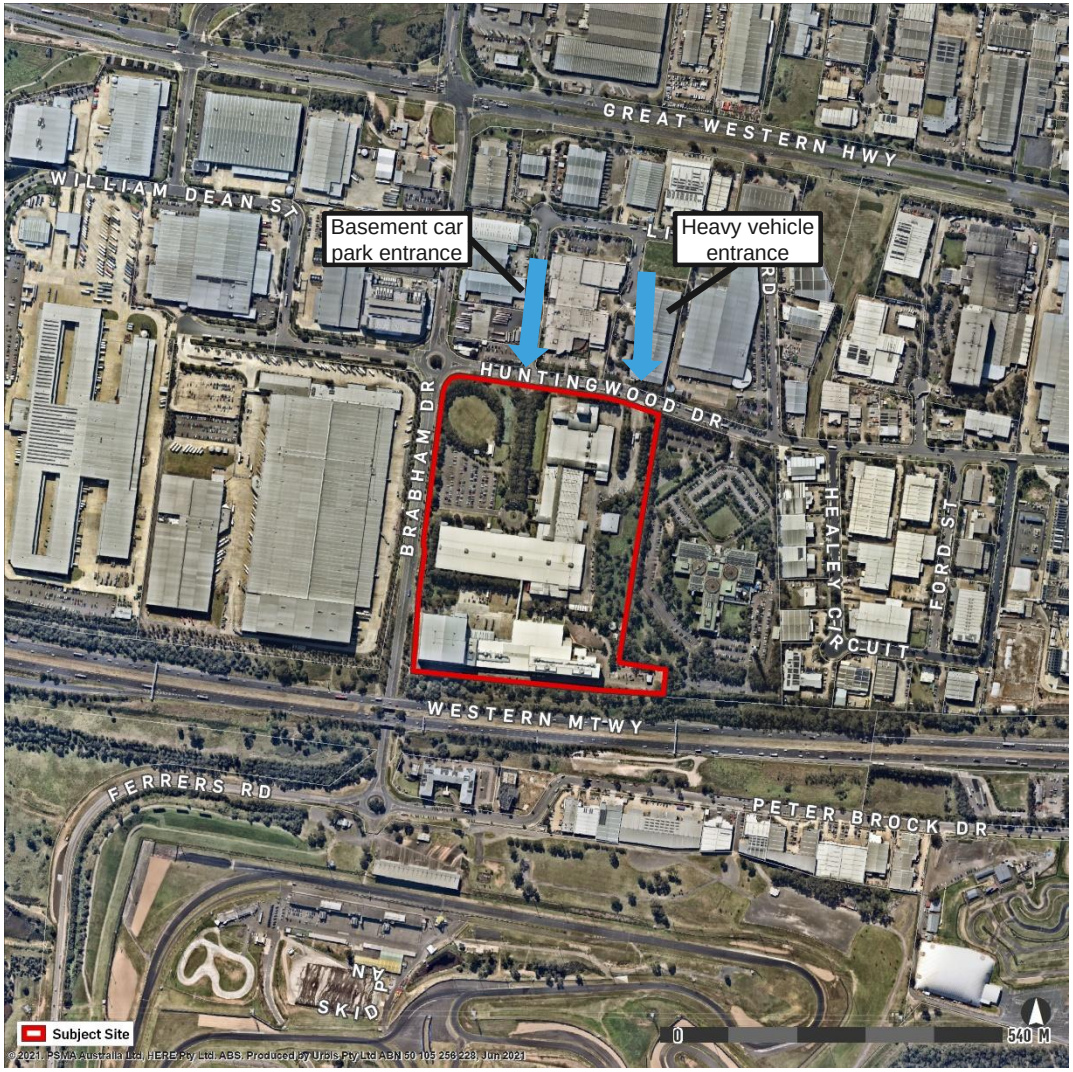
Morning Shift (7:00 AM – 3:00 PM)	Afternoon Shift (3:00 PM – 11:00 PM)	Night Shift (11:00 PM – 7:00 AM)
174 (HW1)	77 (HW1)	109 (HW1)
20 (HB)	20 (HB)	20 (HB)

Table 2: No. of staff and shifts of HW2 (proposed)

Morning Shift (6:00 AM – 2:00 PM)	Afternoon Shift (2:00 PM – 10:00 PM)	Night Shift (10:00 PM – 6:00 AM)
110	94	69

new multi-storey basement car park.

Figure 1: Subject site and surrounding area



MANAGING TRAVEL AND SHIFT CHANGE-OVER

The Night Shift to Morning Shift change-over for HW1 is the busiest shift change-over period. If all the employees drove their own cars to work individually, there will be a 329 traffic movements in or out of the facility at between 6:30 and 7:30 AM.

Figure 2 graphically displays what this would look like (as Scenario 1) compared to if one in five people carpooled to work (Scenario 2).

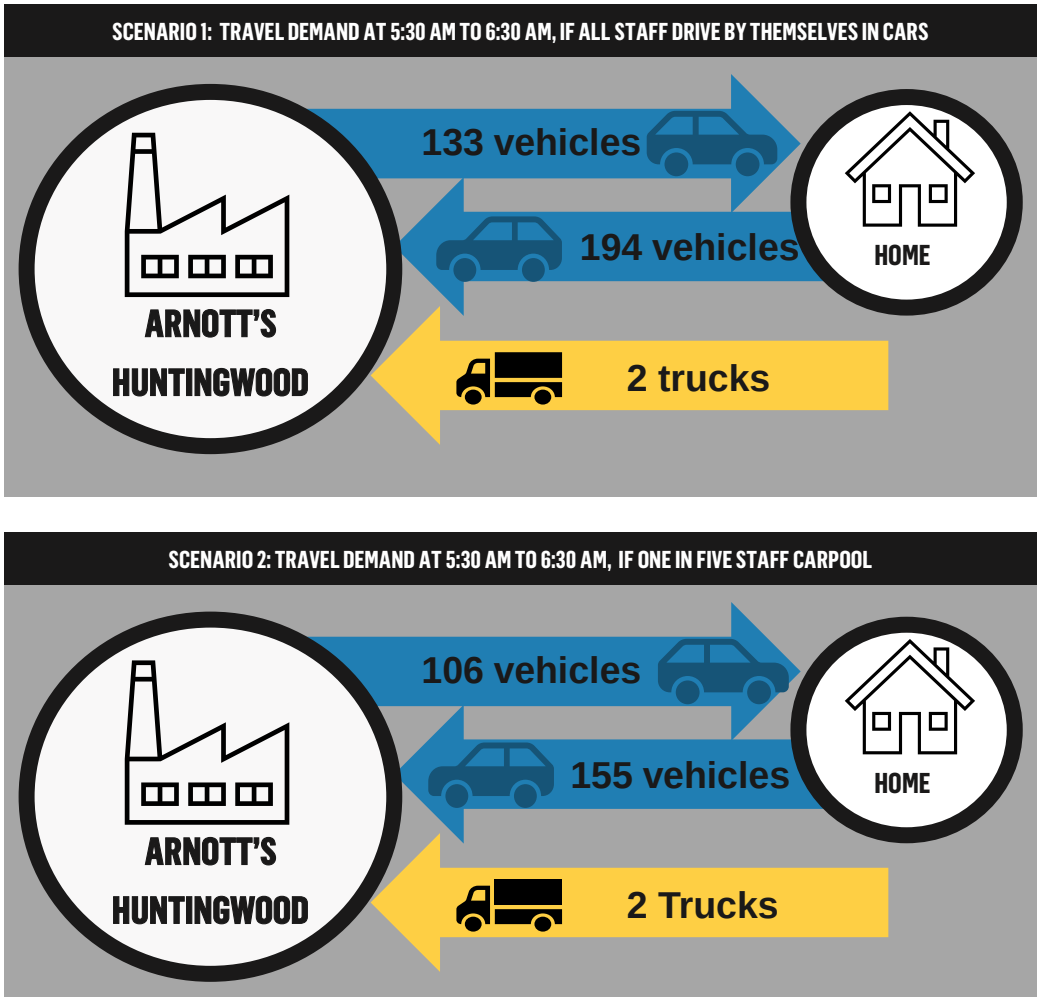
Should Scenario 2 occur, this would result in 66 fewer cars accessing the site between 6:30 AM and 7:30 AM. This highlights the power of carpooling, particularly in a shift-change over time such as the early morning or weekends, when public transport options are limited (see Page 6).

Under both scenarios there would also be one semi-trailer and one rigid waste collection vehicle access the site at this time, albeit from a different entrance to that of the basement car park.

GREEN TRAVEL INITIATIVE

Carpooling with other workers will be encouraged at Arnott's, Huntingwood. Designated car parking spaces (in the most convenient locations in the basement car park) will be set aside for those arriving with more than one person in their car. This will send a message to employees that carpooling is encouraged and rewarded.

Figure 2: Two scenarios illustrating shift change over



= 66 (20 PER CENT) DECREASE
IN CARS IN NIGHT SHIFT TO MORNING SHIFT CHANGE-OVER

EXISTING GREEN TRANSPORT NETWORK

WALKING AND CYCLING CATCHMENTS

Figure 3 shows the 800 metre walking catchment and the three kilometre cycling catchment surrounding the site. These catchments show the actual distance using the street network.

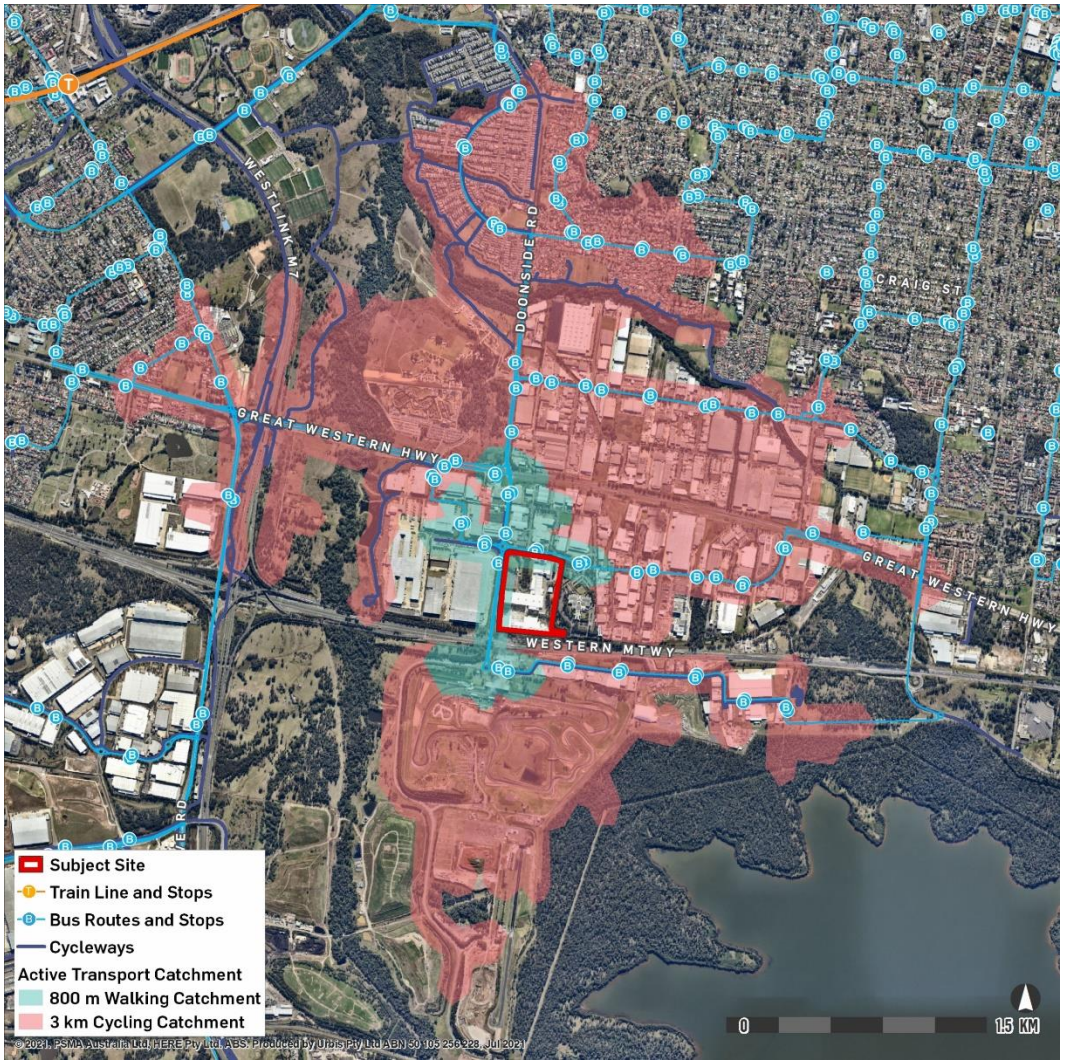
The area is relatively flat which makes it ideal for walking and cycling trips, however there is a lack of shared paths to facilitate cycling. The Blacktown City Council Bike Plan proposes the existing shared path along Brabham Drive to extend up Doonside Road, connecting the residential areas around Doonside and Bungarribee to the site. There will be ten bicycle parking spaces will be incorporated into the development.

There are bus stops along Brabham Drive, Huntingwood Drive and the Great Western Highway served by the 723, 724 and 729. These routes connect to the Mount Druitt, Blacktown and Arndell Park. Stops for all these routes are within the 800 metre walking catchment. Bus stops are conveniently located in front of the facility on Doonside Road and Huntingwood Drive.

GREEN TRAVEL INITIATIVE

The information to the right on walking and safe cycling routes in the area will be provided to staff.

Figure 3: Active Transport Catchments

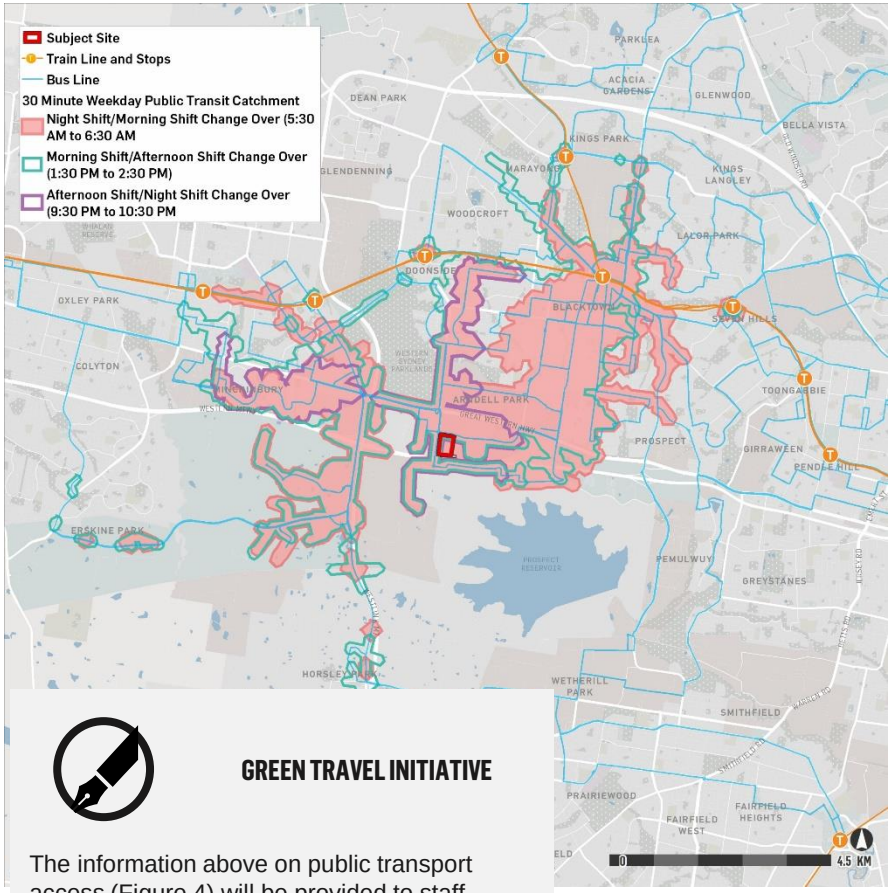


EXISTING GREEN TRANSPORT NETWORK

PUBLIC TRANSPORT CATCHMENT

Figure 4 and **Figure 5** show the 30 minute public transport catchment surrounding the site at the peak activity times of midday on the weekend and 5 pm on a weekday. As public transport is limited at some times of the day and on weekends carpooling will also be emphasises.

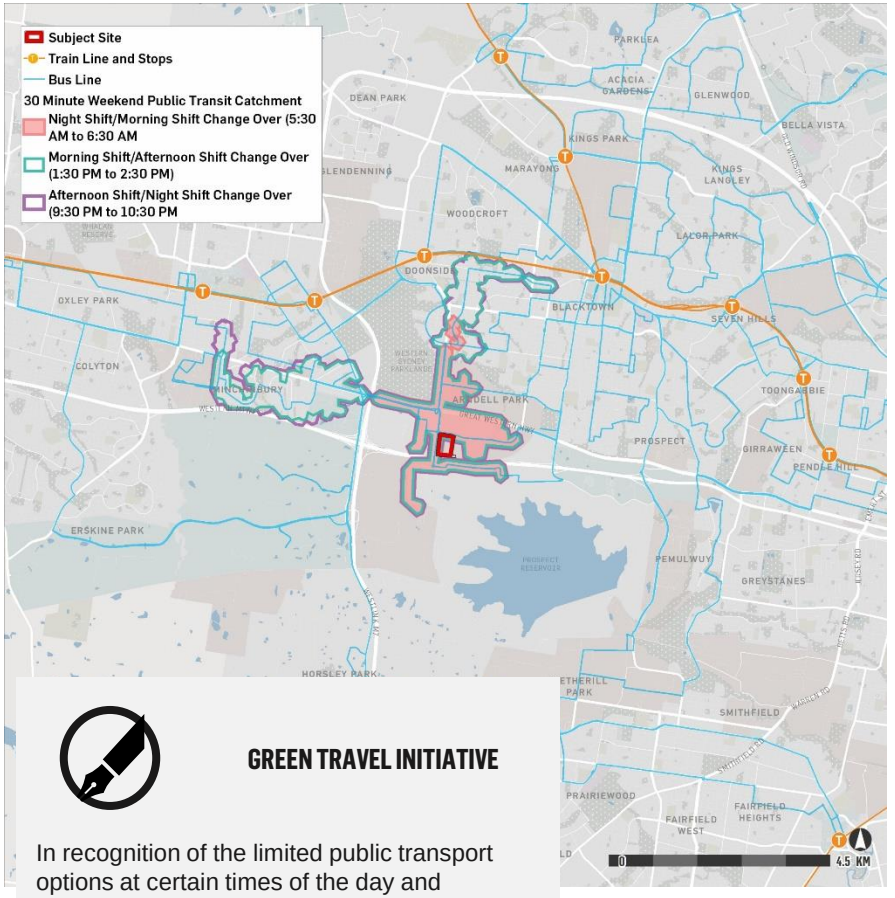
Figure 4: Weekday Public Transport Catchment During Shift Changeovers



GREEN TRAVEL INITIATIVE

The information above on public transport access (Figure 4) will be provided to staff. Information for staff will also include information on the nearest bus stops and train stations.

Figure 5: Weekday Public Transport Catchment During Shift Changeovers)



GREEN TRAVEL INITIATIVE

In recognition of the limited public transport options at certain times of the day and particularly at weekend, carpooling is to be encouraged.

TRAVEL BEHAVIOUR INITIATIVES

This page contains tailored initiatives that will be undertaken by the Arnott's Huntingwood facility to ensure that staff members use sustainable transport modes whenever possible to access the site. They are separated into two levels, with the intention to both encourage through the provision of information as well as intervening to ensure staff are only driving and parking on-site where there is a need.

Level 1
Encouraging/Informing

Produce a Transport Access Guide (TAG) to inform staff of their travel options (include maps contained in this document- Figure 3 and Figure 4).

Update the company intranet to ensure the TAG is accessible and staff have the information they need.

Use the TAG as part of employment documentation to encourage walking, cycling, public transport and carpooling.

Level 2
Intervening

Staff that carpool will have dedicated spaces in the most convenient locations in the car park.

Incorporate 10 undercover bicycle parking spaces within the proposed basement carpark.

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APPENDIX C SWEPT PATHS

e0
e0.1
e1
e2
e2.1
Single Unit (non Bus) (12.5 m)
B-Double (26.0m)
2
DA-211
1
DA-211
-

2
DA-210
5
DA-120
p19
p15
EX. MIXING / FORMING
EX. OVEN
SITE BOUNDARY
6,450
1
DA-120
3
DA-120
New Silo 1
4
DA-120

EX. MIXING / FORMING

EX. OVEN HAL

New Silo 1

6,450

3
DA-120

4
DA-120

2
DA-331

4
DA-200

FFL 66.20

7,650

11,170

RRD

10,700

10,700

10,700

10,700

11,050

EXISTING UNDERGROUND
HIGH VOLTAGE LINE

HV-10

1:20 PEDESTRIAN ACCESS RAMP TO
H1 FACILITY

UP

COL

21,0006%

Cream Mixer

MIXING AREA

FORMING
AREA

OVEN HALL

WASH BAY

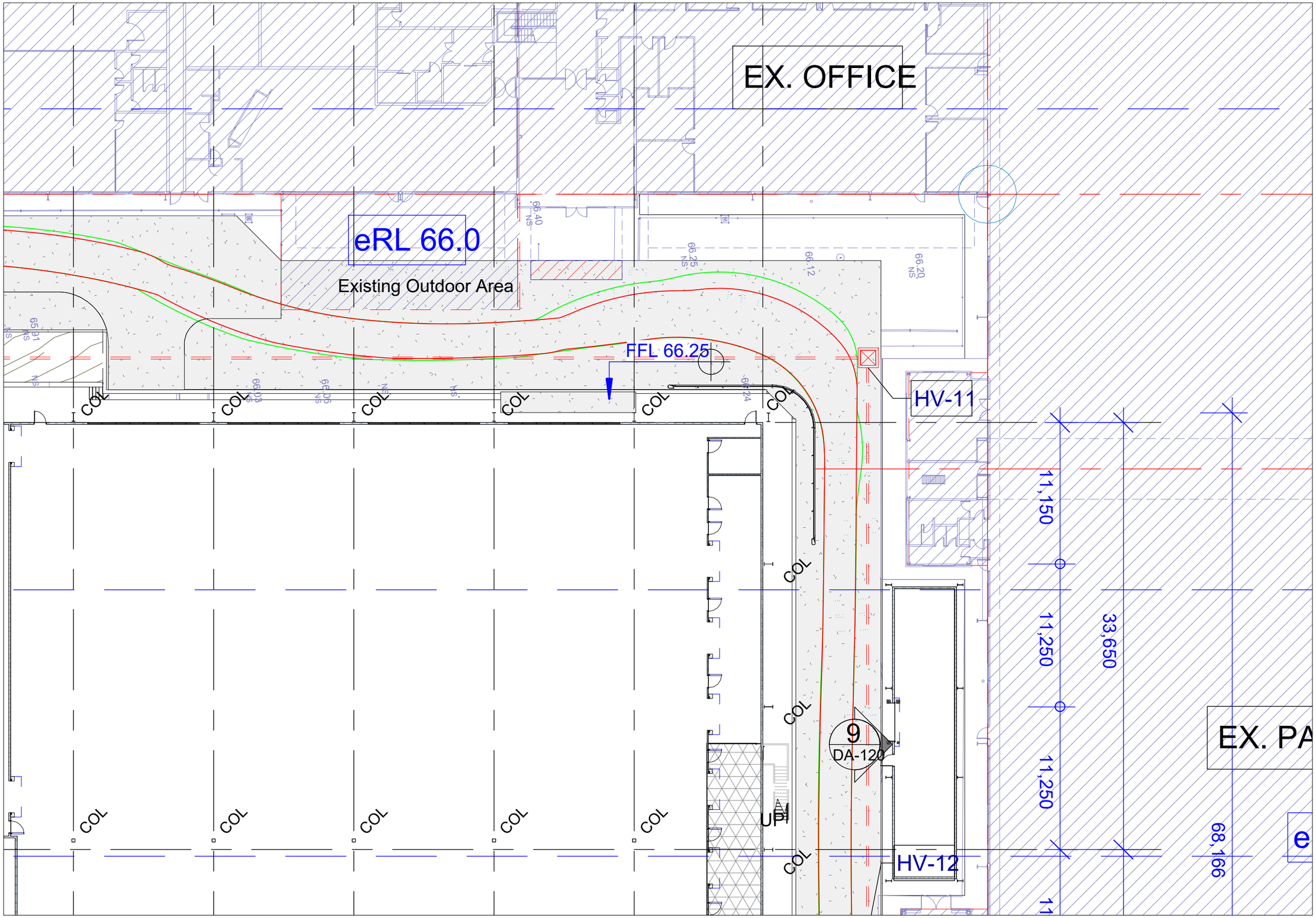
INGREDIENTS
PREPARATION

MAINTENANCE
ROOM

RAW

FFL 65.40

WAFER OVEN
& CLEANING


EX. OFFICE
eRL 66.0
Existing Outdoor Area
FFL 66.25
HV-11
HV-12
9
DA-120
UP
COL
11,150
11,250
33,650
68,166
EX. PA

AREA

COL

11,250

11,250

11,250

11,150

1,075

FFL 66.00

New Landscape batter between roadway and existing landscape area

55,250

Existing landscape batter and trees to
be retained as shown

NEW DRIVEWAY
PAVEMENT

pC
pB.1
cB
pB
pA
cA
134,800
134,800
68,250
17,600
28,230
10,630
1
DA-200
1
DA-210
3
DA-211
Feature screen wall to perimeters of parking to details
ERL58.38
ERL57.77
ERL56.82
ERL56.31
ERL56.91
10M SETBACK LINE
SITE BOUNDARY
10,000
Office
Tea Rm
Charging Room
Air Lock
Uniforms
Reception
UNDERCOVER LOADING DOCK
PACKAGING STORE
5,000
5,000
5,000
3,000
1,771
UP
VOID (Basement parking B2 below)
10M SETBACK LINE
SITE BOUNDARY
10,000
ERL57.26
ERL57.45
33,1
33,1
COL

Basement-01
Lift Lobby

RAMP UP FROM
BASEMENT B2

Basement -01
Carparking

FFL 62.20

RAMP DOWN 1:8

RAMP DOWN TO
BASEMENT B2

60.10 NS

60.27 NS

62.21 NS

60.53 GPIT

INV RL59.67

INV RL59.96

INV RL61.23

375

250

Lift Lobby

RAMP UP FROM
BASEMENT B2

Basement -01
Carparking

FFL 62.20

RAMP DOWN 1:8

RAMP DOWN TO
BASEMENT B2

DN

INV RL61.23
250

RAMP UP TO
BASEMENT B1

RETAINING WALL

Basement-02
Lift Lobby

RAMP UP 1:8

1:3 LANSCAPE BATTER

Basement -02
Carparking

FFL 59.00

BASEMENT B1
EXIT RAMP DOWN FROM

FEATURE PERFORATED SCREEN

10 M BUILDING SETBACK LINE

6X MOTORBIKE
PARKING

RETAINING WALL

Lift Lobby

RAMP UP 1:8

BASEMENT B1
EXIT RAMP DOWN FROM

1:3 LANSCAPE BATTER

Basement -02
Carparking

FFL 59.00

6X MOTORBIKE
PARKING

UP

LIBERTY ROAD

c1

CARPARK ENTRY

CARPARK EXIT

STREET ACCESS POINT

10,000
Landscape Setback

PEDESTRIAN ACCESS
FOOTPATH FROM
HUNTINGWOOD DRIVE

1
DA-200

3,000 600 3,000 1,500

pB.1

cB

RAMP UP TO
BASEMENT B1

RETAINING WALL

RAMP UP 1:8

LAND FILL

2
DA-211

1
DA-211

1:3 LANSCAPE

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T