WAVERLEY COUNCIL

Waverley Council
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55 Spring Street, Bondi Junction NSW 2022
ABN: 12 502 583 608

Our ref: PP-1/2015
Your ref: PP_2016_WAVER_003_00

9 August 2017

NSW Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001
Attention: Karen Armstrong, Director - Sydney Region East

PLANNING PROPOSAL FOR 194-214 OXFORD STREET AND 2 NELSON STREET, BONDI JUNCTION

Dear Karen,

On 18 July 2017, Council resolved not to support the proposal based on the outcome of the exhibition period and the assessment of the planning proposal by Council officers. The planning proposal was placed on public exhibition between 8 February – 10 March 2017 and received 412 submissions, 396 of which were opposed to the proposal.

In accordance with Section 58(4) of the *Environmental Planning and Assessment Act 1979* Council recommends that the planning proposal not proceed.

One of the critical components of the planning proposal was the nexus drawn by the JRPP between the development standards sought and the public benefits offered. A significant portion of Council's assessment focused on this issue. The appropriateness of Council continuing with planning agreement negotiations following its recommendation not to proceed was raised with your team in July 2017 and remains unresolved. Council seeks the Department's advice regarding a process for securing an appropriate public benefit should the proposal proceed to finalisation.

Please find enclosed the following documentation:

1. Council assessment report – 18 July 2017.
2. Excerpt of minutes for 18 July 2017 Council Meeting.

If you have any questions, please feel free to contact Dan Starreveld, Principal Strategic Planner, on 9083 8053 or via email at dan.starreveld@waverley.nsw.gov.au.

Yours Sincerely,

George Bramis
A/Director
Waverley Futures

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REPORT
CM/7.1/17.07

Subject: **Planning Proposal at 194-214 Oxford Street and 2 Nelson Street, Bondi Junction - Post-exhibition Report**

TRIM No.: PP-1/2015

Author: Dan Starreveld, Principal Strategic Planner

Director: Peter Monks, Director, Waverley Futures

RECOMMENDATION:

That Council:

1. Not supports the planning proposal at 194–214 Oxford Street and 2 Nelson Street, Bondi Junction, for the following reasons:

   (a) The proposed height and floor space ratio will result in an overdevelopment of the site and will present an unacceptable built form scale, particularly to Oxford Street.

   (b) The proposal has not sufficiently addressed the impacts of bulk and scale on heritage items on the subject site (Norfolk Island Pine) and in the surrounding area (Nelson Hotel).

   (c) The majority of community feedback received opposes the proposal.

   (d) The proposal does not provide a public benefit offer consistent with Council's Planning Agreement Policy 2014 and the public benefit offered is inadequate compared to benchmarks as stated in the draft District Plans. No planning agreement has been entered into as part of this planning proposal.

   (e) The proposal results in a net community benefit that does not adequately offset the scale and density of development sought on the subject sites.

   (f) The proposal is inconsistent with the recommendations of the Government Architect's Office Final Report on the West Oxford Street Precinct Plan.

   (g) Inconsistency with the following directions under Waverley Together 3:

      i. L5a - Ensure planning controls for new buildings and building upgrades deliver high quality urban design that is safe and accessible, in which heritage and open space is recognised, respected and protected.

      ii. L5b - Protect and maintain heritage significant buildings while ensuring they are fit for use.

      iii. L5c - Consider the use of planning controls and agreements to provide improvements to built infrastructure.

2. Agrees to forward this report and any other relevant information to the Department of Planning and

Environment (DPE), acting as a delegate of the Greater Sydney Commission, to make a final decision regarding the planning proposal.

1. Executive Summary

The Department of Planning and Environment (the Department) granted a Gateway Determination for the planning proposal relating to 194-214 Oxford Street and 2 Nelson Street, Bondi Junction (the subject site). The proposal seeks to amend the Waverley Local Environmental Plan (LEP) 2012 in relation to the subject site by:

- Increasing the height standard from 15 metres to 36 metres;
- Increasing the floor space ratio standard from 1.5:1 to 3.5:1;
- Removing the heritage status of 4 terrace houses at 194-200 Oxford Street; and
- Correcting a zoning anomaly on the corner of Syd Einfeld Drive and York Road as identified by the Roads and Maritime Services (RMS).

The Gateway Determination required Council to place the planning proposal on public exhibition for a period of 28 days (Attachment 1). This report details the outcome of the public exhibition period and the feedback received from the community (412 submissions received).

This report also includes an assessment of the planning proposal in accordance with the criterion set out in the Department of Planning and Environment's (DPE) "A Guide to preparing Planning Proposals" (August 2016).

2. Introduction/Background

2.1 The site and surrounds

The subject sites (comprising a western and eastern site) are located at the western end of the Bondi Junction Centre and are bounded by Syd Einfeld Drive to the north, Nelson Street to the east, Oxford Street to the south and York Street to the west (see Figure 1).

The western site consists of six (6) properties with an area of 1,490m^2, including:

- 194 - 200 Oxford Street (Lots 10, 11, 12 and 13 DP 260116) - four x two storey row houses.
- 202 - 210 Oxford Street (Lot 1 DP 79947 and Lot 16 DP 68010) - car and truck hire business and includes an office reception and vehicle display area.
- 214 Oxford Street (Lot 1 DP 708295) - shop top housing style building which is currently occupied as a commercial premises.

The eastern site is known as 2 Nelson Street (SP 34942) and contains a two storey residential flat building located to the north of Osmund Lane. 2 Nelson Street has a site area of 991m^2.

The total site area for the subject sites is 2,481m^2.

Figure 1 – Aerial photograph of subject sites at 194-214 Oxford Street and 2 Nelson Street, Bondi Junction (identified by red outline)

The following series of photographs have been sourced from the planning proposal documentation submitted by the applicant and illustrate the site and surrounds.

Photo 1: View of the site taken from the intersection of Oxford Street and York Road, Bondi Junction. It shows the existing row houses, car yard and shop top housing.

Photo 2: View of the row houses at: 194-200 Oxford Street.

Photo 3: View of the car and truck rental facility at 204-212 Oxford Street.

Photo 4: View of the shop top development at No 214 Oxford Street (site identified in red). This shows the mixed use occupation of the shop top housing.

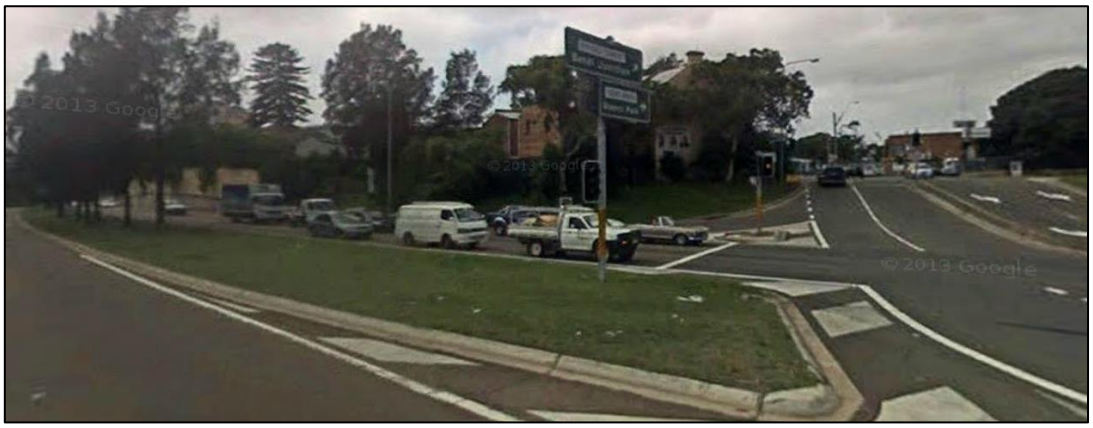


Photo 5: View of the rear of the sites taken from Syd Einfeld Drive looking south-east. This shows the side and rear of the row houses at 194-200 Oxford Street (right) and the rear of 204-212 Oxford Street (centre) currently occupied as a car rental premises.

Photo 6: View of the existing apartment building and garage structure at 2 Nelson Street taken from the intersection of Nelson Street and Osmund Lane looking north-west. The central tree is also listed as a local heritage item. A key pedestrian path of travel is located along the eastern boundary and connects to the pedestrian bridge over Syd Einfeld Drive.

2.2 West Oxford Street Precinct Plan

The site formed part of the West Oxford Street Precinct Plan which was an ideas-driven investigation focusing on the western end of Oxford Street, Bondi Junction. Using the design charrette process, concepts for the area were developed by three multi-disciplinary design teams to enable Council and the community to visualise ideas and opportunities for the precinct.

A final report was prepared in partnership with the Government Architect's Office (GAO). The report details all of the design ideas for the area which are categorised into the broad themes of traffic, public domain, art, culture and heritage, and built form. The final report considered community feedback received in late 2014 on the ideas in the draft report via submissions and a statistically valid phone survey.

On 31 March 2015, the West Oxford Street Precinct Plan report was adopted by Council. All recommendations relating to changes in height and floor space standards for the subject sites as part of the West Oxford Street Precinct Plan were deferred pending a thorough assessment of the planning proposal.

2.3 Current planning controls for subject site

The Waverley Local Environmental Plan 2012 (WLEP 2012) applies to the subject sites which are zoned B4 Mixed Use with a maximum height of 15 metres and floor space ratio of 1.5:1 (refer to Figures 2, 3 and 4).

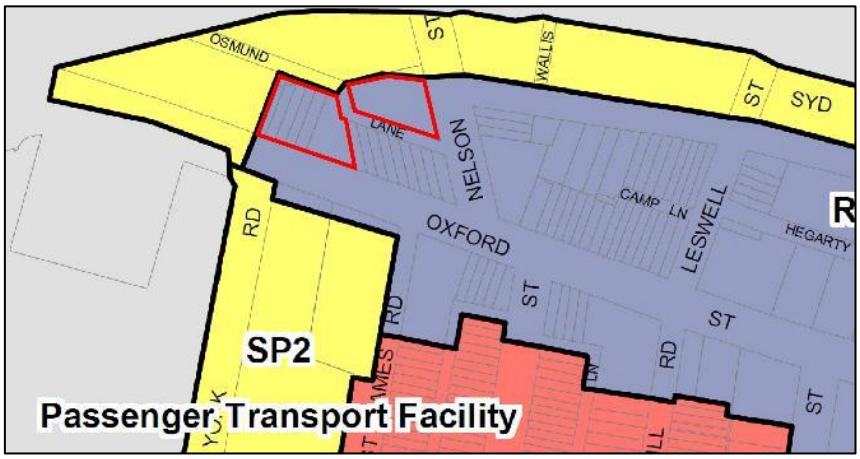


Figure 2: Land Use Zoning – B4 Mixed Use [site outlined in red]

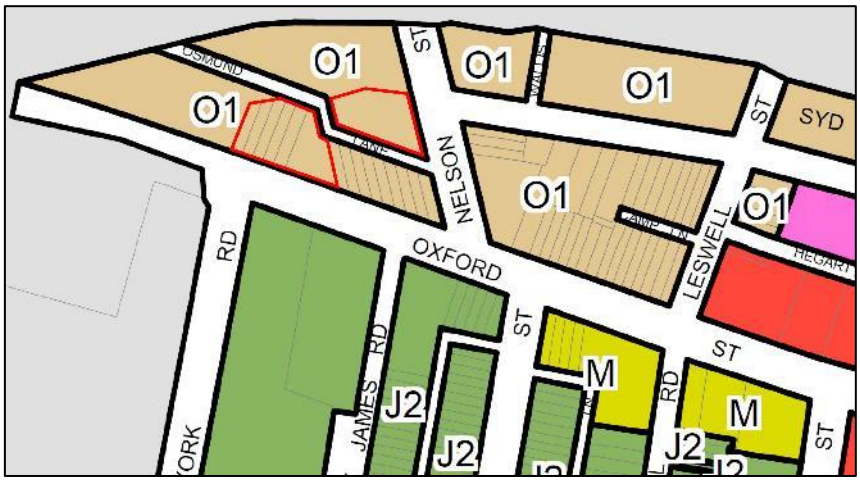


Figure 3: Height of Buildings – 15m [site outlined in red]

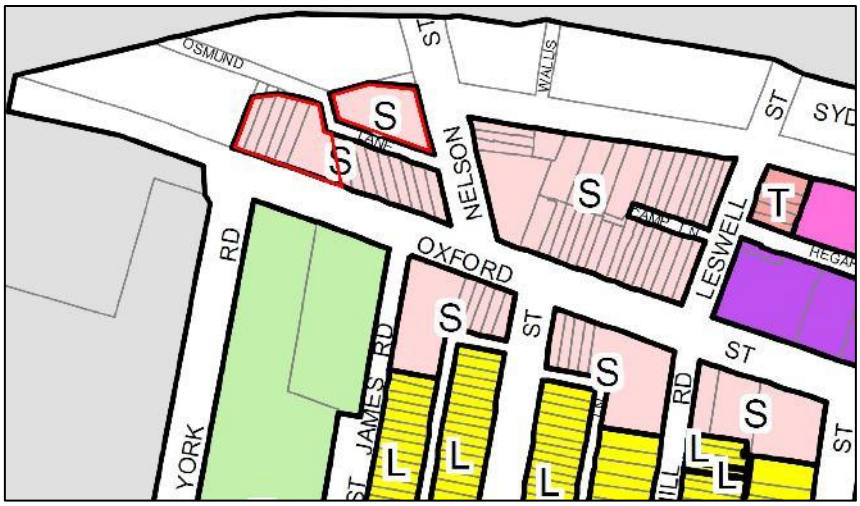


Figure 4: FSR – 1.5:1 [site outlined in red]

Clause 5.10 - Heritage Conservation and Schedule 5 - Environmental Heritage of the WLEP2012 require development consent for any demolition or alteration to an item of environmental heritage and also for the erection a building on land on which a heritage item is located or that is within a heritage conservation

area. Figure 5 below indicates the location of heritage items and conservation areas in relation to the subject site.

Figure 5: Items of Environmental Heritage and Heritage Conservation Areas [site outlined in blue]

Clause 6.5 of the WLEP2012 requires development consent for identified sites in the Bondi Junction Centre zoned B4 Mixed Use that must not be granted for a building unless the building has an active street frontage, particularly for the purposes of business or retail premises, at the ground and first floor. As provided in Figure 6 below, the subject sites are required to have an active street frontage along the Oxford Street address.

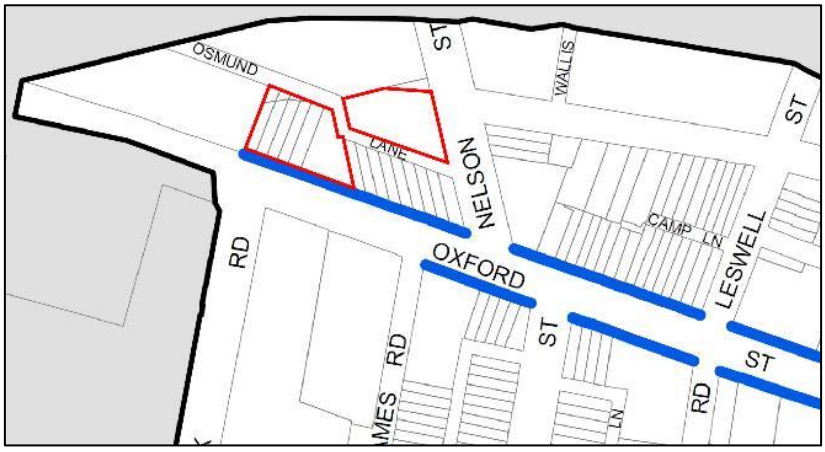


Figure 6: Required Active Street Frontages [site outlined in red]

2.4 Planning Proposal documentation & history

On 11 March 2015, City Plan Services submitted a planning proposal on behalf of Stargate Property Group, the land owners of the subject sites. The proposal originally sought to amend the WLEP 2012 in relation to 194-204 Oxford Street and 2 Nelson Street ('the sites') to:

- Increase the height standard from 15 metres to 38 metres;
- Increase the floor space ratio standard from 1.5:1 to 5:1; and
- Remove the heritage status of 4 terrace houses at 194-200 Oxford Street.

Council officers reviewed the initial planning proposal documentation and initiated an informal public notification period seeking preliminary comments. Ongoing discussions were held with the applicant in the initial stages of the assessment and, as a result, Council sent preliminary assessment comments and a request for additional information to the applicant on 24 August 2015.

Amended Planning Proposal

Council officers then met with the applicant on 17 September 2015 and 13 October 2015 to consider more suitable standards for the subject sites. The applicant provided an amended concept design to Council on 13 October 2015 (shown in Figure 7 below), which in summary:

- Reduced the proposed height from 38m to 36m.
- Reduced the proposed floor space ratio standard from 5:1 to 3.5:1.
- Minimised overshadowing to adjoining residential properties.
- Provides an increased separation between the indicative residential tower forms of 24 metres in accordance with the State Environmental Planning Policy 65 (Design Quality of Residential Apartment Development) and the Apartment Design Guide.
- Reconfigured the proposed public plaza on Nelson Street to allow for increased solar access to the plaza and increased curtilage from the neighbouring heritage items (Norfolk Island Pine and Nelson Hotel).
- Reconfigured the proposed through-site link to allow for better pedestrian amenity and to maintain the fine grain aesthetic of the Oxford Street streetscape.
- Reconfigured the proposed vehicular access and rear lane (Osmund Lane) to allow for a wider carriage width, two-way paved access and for driveway access directly with the western end of Osmund Lane.
- Created a 2/3 storey street wall to continue the existing pattern along Oxford Street.
- Allowed for increased solar access and amenity to any potential redevelopment of adjoining sites, particularly 216-230 Oxford Street, Bondi Junction.

Figure 7: ***Indicative*** photomontage of subject planning proposal from corner of Oxford Street and Nelson Street.

On 15 December 2015, the revised planning proposal was considered by Council and it resolved as follows:

"Council does not support the planning proposal at 194-204 Oxford Street and 2 Nelson Street, Bondi Junction for the following reasons:

1. *The proposed height will result in the overdevelopment of the site and present an unacceptable built form scale, particularly to Oxford Street, in an area that borders the Mill Hill Conservation area.*
2. *The proposal will result in unacceptable overshadowing of the public domain and Centennial Park.*
3. *The proposal may set a precedent for adjoining sites seeking additional height and floor space.*
4. *The proposal is not in the public interest of the West Oxford Street Precinct.*
5. *The proposal is in excess of the current LEP height limit of 15m and the FSR of 1.5:1"*

Pre-Gateway Review

Consequently, the applicant lodged a pre-gateway review for the planning proposal (36m height and 3.5:1 FSR) with the Department of Planning and Environment on 4 January 2016. The Department of Planning and Environment's Pre-Gateway Review Information Assessment and Recommendation Report (22 April 2016) recommended:

> *"…the proposal be referred to the Sydney East Joint Regional Planning Panel for independent review. The proposal demonstrates broad strategic and site-specific merit."*

On 31 May 2016, the Joint Regional Planning Panel considered the proposal and recommended that the planning proposal submitted to Council seeking to amend the building height to 36 metres and FSR to 3.5:1 for both sites proceed to a Gateway Determination with the following requirements met before the proposal is exhibited:

- *The applicant is to enter into negotiations for a planning agreement with Waverley Council;*
- *The applicant is to prepare a site-specific DCP, which shall be exhibited together with the planning proposal;*
- *A clause should be included in the draft LEP requiring a design competition to be held before a development application is lodged. The design competition should be run according the Director-General's Design Competition Guidelines.*

The Department of Planning and Environment issued a Gateway Determination (Attachment 1) for the applicant's proposal on 22 December 2016 requiring general updates to the planning proposal documentation for community consultation.

2.5 Planning Agreement

The applicant's planning proposal is accompanied by a public benefit offer (detailed later in this report). The public benefit offer was placed on public exhibition with the applicant's planning proposal. Council has not entered into a planning agreement with the applicant in relation to the public benefit offer. An assessment of the public benefit offer is provided under 4.2(c) ("Is there net community benefit?") of this report.

Council have a draft methodology for valuing uplift from planning proposals and associated planning agreements and process for negotiating planning agreements of this nature. This draft methodology adopts a value sharing approach, seeking to share 50% of the profit generated from any planning uplift associated with a rezoning. The public benefit offer does not employ this methodology.

2.6 Site-specific Development Control Plan (DCP)

A site-specific Development Control Plan was drafted by Council and was placed on public exhibition with the applicant's planning proposal. The site-specific Development Control Plan outlines objectives and controls for built form, design excellence, public domain and transport, and includes possible design outcomes for the subject sites. Should the Department of Planning and Environment, as delegate for the Greater Sydney Commission, determine to support the applicant's planning proposal, the site-specific Development Control Plan will be incorporated as an amendment into the Waverley Development Control Plan 2012 for any future development application.

2.7 Design Competition

In accordance with the Department of Planning and Environment's Gateway Determination the applicant has provided a statement of intent regarding a local provision for an architectural design competition. Council has separately prepared a design excellence clause to apply to certain areas in Waverley (including

the subject site) which forms part of the housekeeping amendment to the Waverley Local Environmental Plan (WLEP Amendment 12). The amendment is awaiting finalisation with the Department of Planning and Environment.

The design excellence clause will apply to the subject site and require in-depth consideration of a number of matters including, but not limited to, overshadowing of the surrounding area including Centennial Park and the impact on heritage items in the vicinity of the site.

The site-specific Development Control Plan also includes objectives and controls relating to design excellence with a requirement that a design competition be carried out in accordance with the 'Draft Waverley Design Excellence and Competitive Design Policy' (to be prepared pending finalisation of Council's 2016 Housekeeping Amendment to WLEP).

3. Relevant Council Resolutions

Council or Committee Meeting and Date	**Minute No.**	**Decision**
Council Meeting 15 December 2015	CM/7.1/15.12	That Council does not support the planning proposal at 194-204 Oxford Street and 2 Nelson Street, Bondi Junction for the following reasons: 1. The proposed height will result in the overdevelopment of the site and present an unacceptable built form scale, particularly to Oxford Street, in an area that borders the Mill Hill Conservation area. 2. The proposal will result in unacceptable overshadowing of the public domain and Centennial Park. 3. The proposal may set a precedent for adjoining sites seeking additional height and floor space. 4. The proposal is not in the public interest of the West Oxford Street Precinct. The proposal is in excess of the current LEP height limit of 15m and the FSR of 1.5:1
Operations Committee Meeting 31 March 2015	OC/5.1/15.03(2)	[Relevant parts] That Council: 1. Notes that the West Oxford Street Design Charrette produced ideas for the future of West Oxford Street. The ideas were publicly exhibited and tested in a statistically valid survey. 2. Notes the 'West Oxford Street Design Charrette Summary Report and Recommendations' prepared by the Government Architect's Office. … 4. Agrees with the following approach that has been recommended based on the assessment of the submissions received from the public exhibition, the Government Architects Report and the ideas from the design charrette teams that for the Waverley LEP 2012 (WLEP) floor space ratio and height of buildings controls: … b) That any decision on whether changes to the WLEP 2012 are warranted relating to blocks 1, 2 and 3a as identified on Map 2 [provided below] be deferred until the

		assessment of the Planning Proposal received for 194–214 Oxford Street and 2 Nelson Street has taken place. Understand that the assessment and investigations will consider use, heritage, overshadowing, wind effects, impact on the skyline, views and vistas of Centennial Park, design excellence and traffic impacts. … Sends an information sheet on the Planning Proposal received for 194–214 Oxford Street and 2 Nelson Street to the residents in the surrounding area up to Denison Street, Birrell Street and Syd Einfeld Drive and send a copy to Woollahra Council.

4. Discussion

4.1 Community Consultation

The public exhibition period was notified in the Wentworth Courier and was open for 31 days from 8 February 2017 to 10 March 2017 inclusive. The planning proposal was exhibited at the Customer Service Centre, Waverley Library and on Council's 'Have Your Say' website. Approximately 1600 residents were notified by letter with a total of 412 submissions received. A breakdown of the submissions received is noted below:

- Submissions opposing 396
- Submissions in support 10
- Agency feedback 6

Matters raised by objectors

The submissions opposing the planning proposal covered a range of matters from urban amenity, traffic and parking, height, impacts upon Centennial Park, removal of heritage, public school capacity and pedestrian safety. The most common issues raised are categorised into the following areas:

- Traffic and parking (69%)
- Height/density, urban design and amenity (64%)
- Centennial Park (54%)
- Heritage (41%)

Traffic and parking

With regard to traffic and parking the submissions identified current traffic conditions and the congestion experienced in this locality as a significant concern. The recent approval of other larger developments in Bondi Junction were cited as a reason for the additional delays experienced by residents particularly in the morning peak period at Nelson Street, Oxford Street and Denison Street. The introduction of a development on the subject sites would therefore introduce additional traffic to an already congested road network.

Limited on-street parking capacity was another issue consistently raised. Objectors noted the difficulties in finding car spaces under the current conditions and that the introduction of additional residents would further reduce the availability of spaces for residents. This issue was also linked with the proposed number of on-site parking and that there weren't enough spaces to accommodate the potential future development resulting from the planning proposal. Pedestrian safety was another particular concern identified, particularly for those who use the overpass between Woollahra and Bondi Junction along Nelson Street.

The traffic concerns are an important consideration which are further addressed under the "Traffic and Parking" heading of this report (refer to Section 4.2 (i)).

Height/density, urban design and amenity

Generally, objectors consider the planning proposal to result in "unsustainable overdevelopment" that will result in a significant increase to residents in the area which will not be adequately serviced by existing infrastructure – particularly the public transport system and local schools.

A common theme raised in submissions is the protection of the "local village" feel and character of the western end of Oxford Street. Objections state that the density and height of the proposal will "destroy the amenities, local character and charm of what already exists" in the area. The western end of Oxford Street is identified in submissions as unique and "is not, and has never been, part of Bondi Junction Centre."

The most significant amenity issue raised by objectors was the overshadowing generated by the proposed buildings and how this will impact upon the existing character of the area. Of particular concern is overshadowing of existing residential properties, the public domain and Centennial Park. The density and scale of the proposal was noted as a concern with respect to the potential for resultant wind tunnelling around the subject site and the public domain in its vicinity.

Objectors also fear that the proposed height is not sympathetic to the area and will set a precedent for future developments. Some submissions note that Waverley has already met its housing targets and additional density on the subject sites is not justified.

Submissions also queried the value of the proposed public domain improvements and whether these could be considered a community benefit. The plaza and through-site link "does not go anywhere" and provides as much, if not more, value to the proposed retail tenancies proposed for the ground floor level. The lack of useable cycle paths or significant improvements to local footpaths highlighted that the proposal does not deliver any substantial improvements to the public domain.

Centennial Park

Another concern raised in submissions related to the protection of the existing amenity and heritage value of Centennial Park. Of particular concern was the lack of detail in the proposal about how the buildings may affect views to and from the Park and that the proposed western building casts unreasonable shadow onto its north-eastern corner. Many submissions challenged the assertion that this area of the Park was unused.

The Queens Park Precinct Executive Committee also raised the issue that the proposed increase in density would dramatically increase the number of people residing and visiting the site, negatively impacting on the amenity of residents and Park users. The impact on Centennial Park is discussed further under Section 4.2(i) of this report.

Heritage

Many submissions raised fears that the removal of heritage items at 194-200 Oxford Street will set a precedent for the removal of heritage items elsewhere. Many objections share the sentiment that "the Waverley LEP was updated in 2012 [and] it purposefully reduces the allowable height towards the West end of Oxford Street so that the heritage character of this part of Bondi Junction and the surrounding fabric can remain intact." The impact upon heritage is discussed further under Section 4.2(g) of this report.

Other issues raised

Many concerns were raised about the planning proposal process and the decisions made to date as "Waverley Council has already rejected this proposal [and] can see no justification for it to be approved by a subsequent review." Many objectors challenged the State Government as being the planning authority for a planning proposal of this nature and stressed that Council's decision of December 2015 should stand.

Submissions noted that the planning proposal undermines Clause 1.2 of Waverley LEP 2012 which aims to provide "an appropriate transition in building scale around the edge of the commercial centres to protect the amenity of surrounding residential areas" and to 'identify and conserve the cultural, environmental, natural, aesthetic, social and built heritage of Waverley". Any development of the proposed scale and density were therefore considered to be inconsistent with this Clause.

With regard to the cultural character of the area, objectors have noted the distinct "village feel" of the western end of Oxford Street and view this as a transitional area between Bondi Junction Centre and surrounding residential areas. Specifically, the proposed retail tenancies were considered to have a negative impact upon existing nearby retailers and questioned the future success of new retail tenancies given the sites

Furthermore, objectors noted that there are no environmentally sustainable aspects proposed, particularly green building elements such as green walls. Irrespective of this, objectors have also raised that the proposed design competition and process is not enough to ensure a good outcome for the site as the height and density sought by the Planning Proposal is not acceptable on any terms.

Matters raised by supporters

The 10 submissions that expressed support identified the following aspects of the proposal:

- The proposal is a transit oriented development;
- Active frontages and improved pedestrian spaces;
- Shadows cast will not affect residences or the Park;
- Increase in density helps alleviate urban sprawl;
- Upgrade of west Oxford Street intersection;
- Deletion of poorly maintained heritage items; and
- Improved Bondi Junction skyline.

The general sentiment of submissions supporting the planning proposal is that revitalisation of the area will help "get Bondi Junction's pride back again" as the site is currently a "mess" with "dangerous and unsightly back lanes" which will benefit from the proposal's "people friendly streets, landscaping" and public plaza. Supporters also noted that as a result of the proposal "more people = better security for the area."

Supporters also questioned the heritage value of the terraces at 194-200 Oxford Street which were considered "poorly maintained," "have been altered and are marooned in no man's land. They are unsightly as they have had their cement render removed. They are not a good example and are not rare terraces" and there "are sufficient examples of their style in other areas of Bondi Junction."

In terms of the proposed retail and residential uses, supporters noted that the retail tenancies will bring "vitality to that dead end of Oxford Street bringing more shops and services to that area" and that "increasing the supply of housing is necessary to keep prices from going too high" and "will create a flow on effect for young families trying to get into the market in Sydney."

Comment from State Agencies/suppliers

Sydney Water

Sydney Water confirms that the existing drinking water system and wastewater system has capacity to service the proposed development.

Ausgrid

Ausgrid comments provided general conditions to be considered for future development regarding electricity connections for consideration at a development application stage. Ausgrid did not provide any comments about implications of the planning proposal.

Centennial Park and Moore Park Trust (the Trust)

Centennial Park and Moore Park Trust reiterated concerns raised in their previous correspondence to Council from 2015. Particular concerns include "overshadowing, visual impact, increased traffic congestion at the entrance to the Park and increased parking demand inside the Park. The Trust also noted that there may be future management issues with the introduction of "a large number of new residents adjacent to the north east corner of the Park".

The Trust also noted that there had been an upgrade to the Belvedere Amphitheatre to "enhance its capacity to cater for additional, larger and more diverse events" and highlighted that there "is also potential for other recreation facilities in this corner of the Park as recommended in our recently completed Centennial Park Master Plan".

Roads and Maritime Services (RMS)

Roads and Maritime note that support for the Planning Proposal is contingent upon a zoning anomaly being corrected prior to potential gazettal of the plan. The planning proposal mapping documentation has an anomaly that shows land along Syd Enfield Drive incorrectly shown as part of the site area. Prior to the potential gazettal of the plan, the mapping is to be updated to accurately reflect the extent of the freeway boundary, SP2 Classified Road zoning and subject property boundary. The planning proposal's documentation and proposed mapping is to be considered in this context if the pending gazettal of the proposal is finalised by the Department of Planning and Environment. If the subject planning proposal does not proceed, the mapping amendment will be implemented as a future housekeeping amendment to the WLEP 2012.

RMS supports proposed vehicular access to/from the development via Osmund Lane with restriction of vehicular access retained on Syd Enfield Drive and "has no objection to the provision of a 25m right turn lane on Oxford Street on the eastbound approach and the dedication of land, measuring approximately 3 metres in width and 60 metres in length, along Oxford Street to enable the retention of the two eastbound lanes and foot path widths along Oxford Street".

RMS recommends that the "Planning Proposal should be supported by an Infrastructure Staging Plan that identifies the proposed package of infrastructure upgrade works and an associated delivery mechanism for the agreed intersection improvements. The Infrastructure Staging Plan should identify funding responsibilities, timing, [and] cost and trigger points for the delivery of the intersection upgrade and extent of land dedication prior to the gazettal of the plan.

The infrastructure upgrade works and the land dedication from the planning proposal site area along Oxford Street should be confirmed with Roads and Maritime. The intersection treatment would need to be designed in accordance with Austroads standards and the geometric design agreed by Roads and Maritime prior to the execution of any planning agreement for land dedication." This is to be considered as part of

the planning agreement process as assessed under Section 4.2(c) ("Is there net community benefit?") of this report.

In response to RMS comments, it is noted that as per Council's urban design and cycle path considerations for the site (refer to heading "Inconsistency with the design advice provided in the West Oxford Street Design Charrette and Reimagining Syd Einfeld Drive Study" under 4.2(b) of this report), the planning proposal's land dedication, surrounding roadways and footpath arrangement may change.

NSW Environmental Protection Agency (EPA)

EPA commented that the proposal presents "minimal environmental change to the proposed project site" and therefore no further assessment was provided by EPA.

NSW Office of Environment & Heritage (OEH)

OEH commented that the removal of the heritage items from the subject site needs to be considered on the basis of their heritage significance. OEH note that the context of the heritage items on site have been affected due to the freeway development and removal of the other terraces on the western sides. OEH note that the "Architectural Design Report dated 2016 prepared by MHNDU provides detailed shadow analysis, unfortunately, this analysis has not shown the State Heritage Register (SHR) curtilage of the Centennial Park and as a result, the overshadowing impact of the proposed tower, if any, on the Centennial Park cannot be ascertained. Therefore, it is requested that revised shadow diagram indicating the overshadowing impact as a result of the proposed development on the SHR item be undertaken."

Council carried out their own overshadowing analysis (refer to heading "Consideration of the Amenity of Neighbouring Properties" under Section 4.2(i) of this report). The proposed building controls for 194-214 Oxford Street will result in a tower that will overshadow the corner of Centennial Park in the early morning in mid-winter. Centennial Park is a National Heritage site and should not be adversely impacted by the proposal. Overshadowing occurs to a large portion of the corner of Centennial Park between 9am-10.30am mid-winter. During the rest of the year (equinox and summer) the overshadowing is minimal on Centennial Park.

OEH recommend that Waverley Council may wish to give consideration to alternative options which do not involve demolition/ removal of the subject item, but would incorporate the terraces in a broader design option that will extend the heritage character of Oxford Street towards the subject sites when viewed from the east. OEH also recommend that "Council may also wish to give consideration to any adverse impact the proposed development on the subject sites would have on the locally listed items and the heritage conservation areas in the vicinity."

As discussed in Section 4.2(g) of this report, demolition of the existing heritage terraces is only supported if the resultant building is of a higher quality and provides significant community benefit to the surrounding area.

Submissions from adjoining Councils

Randwick City Council (RCC) provided comments on the planning proposal. RCC supports the planning proposal's potential "objectives of achieving sustainable transport … however, it is recommended that consideration is given to provision of car parking in a suitable location to cater to the retail uses of the site. Use of car share and electric bicycle/car charging points within the development to encourage more sustainable travel modes is supported."

The draft Site-specific Development Control Plan prepared by Council (as placed on public exhibition with the planning proposal in accordance with the Gateway Determination provided at Attachment 1 to this

report) has provisions for electrical infrastructure to support charging of electric vehicles and electric bicycles and for a minimum of 5 car share spaces to be provided.

RCC also note that "the Planning Proposal provides an opportunity to review the road layout of Oxford Street between Nelson Street and York Road, to provide safer access to cyclists, and for pedestrians crossing from the subject site to the south side of Oxford Street." As discussed in "Inconsistency with the design advice provided in the West Oxford Street Design Charrette and Reimagining Syd Einfeld Drive Study" under 4.2(b) of this report, Council have given further thought to improving pedestrian and cyclist linkages.

RCC note in order to ensure the delivery of these public benefits "it is recommended that the scope and timing of a VPA is clarified." The planning agreement process has been progressed and carried out as discussed in Section 4.2(c) ("Is there net community benefit?") of this report.

From RCC's review of the planning proposal, it is noted "due to its height, it appears that the proposed development will have some visibility from various parts of Centennial Park, including the vicinity of Oxford Street and more distant areas. It is also expected that some morning overshadowing of the north-east corner of the Parklands will be experienced … [however, the proposal] will not dominate the north-east corner of Centennial Park and will not significantly impact on the streetscape setting of the Parklands, or views to and from the Parklands."

Applicant response to public exhibition

The applicant requested a copy of submissions made throughout the public exhibition period in order to address some of the matters raised. On 10 May 2017, the applicant sent through a 'Response to submissions received' and a 'Photomontage Certificate Report' prepared by Richard Lamb & Associates (refer to Attachments 3 and 4). The Photomontage Certificate Report was prepared in response to the concerns regarding the views to and from the development from certain vantage points within Centennial Park.

4.2 Review of Planning Proposal

An assessment of the planning proposal is included within this section which references and responds to assertions put forward by the community and the applicant.

(a) Is the planning proposal the result of any strategic study or report?

The subject sites have been subject to a number of strategic studies including The Bondi Junction Urban Design Review (BJUDR) and the West Oxford Street Precinct Plan (WOSP).

The BJUDR of 2013 was prepared by City Plan Services with the purpose of reviewing the appropriateness of the controls in WLEP 2012 within the Bondi Junction Centre and to identify sites that were suitable for amended planning controls. The recommendations of the BJUDR focused on improvements to public domain amenity and increases in development potential.

The WOSP design charrette process (as detailed in Section 2.2 of this report) culminated in the preparation of a Final Report in partnership with the Government Architect's Office (February 2015). The Final Report included a number of recommendations for the area which tied any proposed changes in density with significant public domain improvements. It is noted that recommendations on any changes to height or controls were deferred pending a detailed planning proposal assessment of the subject sites.

The removal of the heritage listings for the terrace houses at 194-200 Oxford Street was noted as appropriate if the built form replacing it displayed exceptional architectural design.

The planning proposal includes supporting studies and reports which provide further analysis of the traffic, heritage, urban design, sustainable transport and planning issues for the subject sites.

(b) Is the planning proposal the best means of achieving the objectives or intended outcomes, or is there a better way?

The planning proposal has been prepared in response to the recommendations contained within the Government Architect's Office Final Report for the West Oxford Street Precinct area. The recommendations identified the subject sites as areas for further investigation for potential changes in development standards aligned with public domain improvements.

A planning proposal is the only means of achieving the intended outcomes given that it includes changes to the height and floor space ratio development standards beyond what could be reasonably sought through a Clause 4.6 variation under WLEP 2012 for a development application.

(c) Is there net community benefit?

Council notes the applicant's offer to enter into a planning agreement details the following public benefits:

1. *"Land, for the purpose of road/footpath widening and/or traffic improvements, along the Oxford Street frontage of the site will be dedicated to Waverley Council. Approximately 60m in length by 3.5m in width (208sqm), (page A35-ADR),*
2. *Creation of a Pedestrian/Cycle thru-site link from Oxford Street to Osmund Lane for improved connectivity in and around the area. Approximately 136sqm, (page A35-ADR),*
3. *Creation of a Public Plazetta at street level at No.2 Nelson Street, Bondi Junction. Approximately 311sqm, (page A35-ADR),*
4. *Public Domain works as set out in the public works plan (page A45-ADR) landscape plan prepared by Tract, including but not limited to:*
   - *Street paving*
   - *Street lighting*
   - *Street furniture*
   - *Public Art*
   - *Landscaping*
   - *Stormwater Drainage"*

The applicant's offer is to enter into a Planning Agreement in accordance with the requirements of the *Environmental Planning and Assessment Act 1979* and *Regulations*. The public benefit offer is not consistent with the methodology as per Waverley Council's Planning Agreement Policy 2014 (Draft Amendment No. 1). Council's Planning Agreement Policy 2014 (Draft Amendment No. 1) ('the Policy') was reported to Council on 20 October 2015 seeking endorsement for the purpose of public exhibition. The subject planning proposal was to be utilised as a guide to test the effectiveness of the Policy, prior to the Policy being finalised by Council. However, the public benefit offered as part of this planning proposal is inconsistent with the value sharing methodology.

The appropriateness of the public benefits offered and whether or not the monetary value of the public benefits is comparable to any uplift of the development potential on the subject sites has been assessed.

Importantly, the through-site link and plazetta may not necessarily be dedicated to Council. The works may be required to provide public access to the shops and/or may be necessary as part of development / conditions of development consent. The spaces may be retained as common property under the strata plan. Under this scenario their inclusion in the VPA assessment is questionable.

There is a significant difference between what Council has calculated as the potential profit associated with the value uplift arising from the planning proposal and the value of the public domain improvements

offered by the applicant. Accordingly, negotiations on the proposed planning agreement have not been conducted at this stage.

To further contextualise the public benefit offer associated with the planning proposal, beyond expectations associated with Council's value sharing methodology, the public benefit offer has been compared to the Greater Sydney Commissions draft District Plan Affordable Housing Target.

The draft District Plans released in November 2016 indicated that, when preparing planning proposals or strategic plans for new urban renewal or greenfield areas, the relevant planning authority will include an Affordable Rental Housing Target as a form of inclusionary zoning.

The draft District Plans identify that the Affordable Rental Housing Target should be between 5-10% of floor space uplift associated with planning controls. Based on a 10% uplift, and assuming a mix of one and two bedroom units, the subject planning proposal could provide around seven affordable rental houses. The number of affordable rental units could vary between six and nine, depending on the mix of 1 and two bedroom units.

	Area (sqm)
Current allowable floor space	3,722
Proposed allowable floor space	8,684
Uplift in floor space	4,962
10% Affordable Housing Target	
10% of uplift	496sqm
1 BR apartment - 55sqm	9.0
2 BR apartment - 85sqm	5.8
Mix of 1 and 2 BR apartments - 70sqm	7.1

Assuming an average unit value of around $1.25 million (based on the 1 and 2 bedroom split of 50:50), the contribution of affordable housing that will soon be a mandated public benefit in the District Plan would be valued at around $8.75 million (7 units x $1.25mil).

The proposal makes no offer in regard to the dedication of affordable housing.

When assessed against the Policy position of 50% value sharing and the draft District Plans Affordable Rental Housing Targets, the public benefit offered by this planning proposal is inadequate.

The importance of the public benefit offered with this planning proposal is significant. The JRPP chose to support the planning proposal to proceed to public exhibition under the amended form submitted to Council (36m height and 3.5:1 FSR) as it was concerned that any reduction in the floor space of the proposal would also reduce the public benefit that will be possible to negotiate in respect of this proposal.

Council officers have commenced planning agreement negotiations with the applicant. As briefly outlined above, the value of the public benefit offer sits below the value of the uplift as calculated by Council. There has been no agreement at this stage, however should the proposal proceed, the Department of Planning and Environment should include a requirement to provide a reasonable net community benefit commensurate with the value uplift. Any public benefit should be consistent with the Waverley Planning Agreement Planning Agreement Policy 2014 (draft Amendment 1) and the draft Central District Plan affordable housing targets.

(d) Is the planning proposal consistent with the objectives and actions contained within the applicable regional or sub-regional strategy (including the Sydney Metropolitan Strategy and exhibited draft strategies)?

The planning proposal is consistent with the broader objectives and actions contained within *A Plan for Growing Sydney* (Metropolitan Strategy) and the draft Central District Plan. The draft Central District Plan (draft DCP) includes the following specific priorities for Bondi Junction:

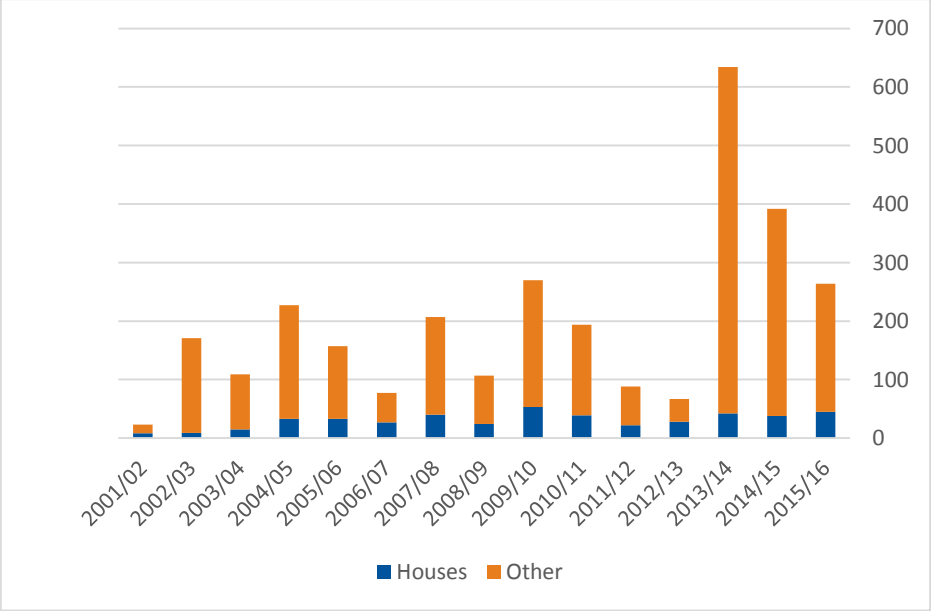
- "Consider potential options for future public transport connections to the south east of the District in order accommodate forecast population and employment growth and provide better connectivity between the south east of the District and the rest of Greater Sydney. This should enhance economic, social and environmental outcomes for the District
- Expand the function and type of land uses in the centre including attracting A-Grade office tenants and knowledge-intensive jobs
- Improve access from the centre of Bondi Junction to nearby open space and recreation facilities such as Queens Park, Centennial Park and Bondi Beach
- Recognise the centre's health attributes to support the Randwick health and education precinct and mechanisms for increasing floor space for health uses, including a health focused business incubator"

The draft CDP also includes a 5-year housing target of 1250 dwellings, 20-year forecasted jobs requirement of between 3200 and 6700, and an affordable housing target of 5-10% (of uplift sought through rezonings) for Waverley. The applicant notes that the planning proposal will "assist the LGA in meeting this [housing] target whilst improving housing choice to meet the demand and lifestyle requirements of the existing and future residents of this area".

Recent supply

A review of recent dwelling approvals in Waverley show that there has been fluctuations in approvals with an average of around 100 dwellings approved per annum since 2001. Approvals have increased dramatically peaking at 643 dwellings from 2013/14, driven by several large tower approvals in Bondi Junction (Figure 8).

Figure 8: Residential building approvals, Waverley

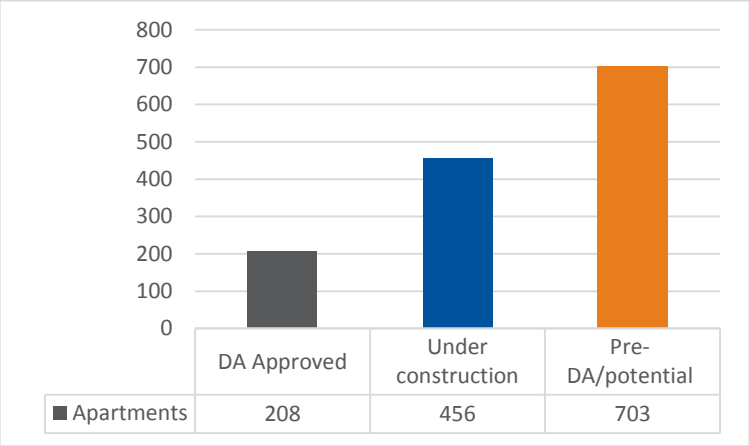


Source: ABS, Building Approvals Cat. No. 8731.0.
Note: 'Other' includes non-detached forms of housing and is likely to be mostly comprised of apartments.

Bondi Junction supply pipeline

Reflecting the above approvals, and considering pre-development application / potential development, there is a large supply pipeline of developments in Bondi Junction expected to be delivered in the coming years. Figure 9 shows that there are approximately 650 apartments approved or under construction and another 700 apartments in the pipeline as potential developments; totalling approximately 1,350 apartments in Bondi Junction alone. In short, the reliance upon a contribution to Waverley's housing targets is therefore not considered a benefit of the planning proposal.

Figure 9: Supply pipeline, Bondi Junction



Source: Waverley Council DA data, 2016; Cordell Construction, 2016.

(e) Is the planning proposal consistent with the local Council's community strategic plan or other local strategic plan?

The table below assesses the consistency of the planning proposal with "Waverley Together 3" and the Delivery Program 2013-2017.

Strategy	Consistent?
C3 - Housing options are available to enable long term residents and those with a connection to the community to remain in Waverley.	
C3a - Promote a mix of housing types in new developments, including housing that is affordable and accessible.	The claim that the proposal will provide affordable housing, and housing for first home buyers, young families and the downsizing elderly (page 26) is not substantiated by any supporting evidence. The planning proposal does not detail the manner in which the mix of housing will be provided and secured for the various groups listed. The commitment can therefore only be taken on face value as there is no legally binding manner proposed by the applicant in which these claims can be secured for community benefit. For example, the draft Public Benefit Offer could have included the provision of a number of affordable housing units. As it stands, the statement in the planning proposal therefore merely conveys that a range of apartment types (including adaptable housing units) could be available at market rates. Should the planning proposal proceed it is considered appropriate for the Greater Sydney Commission or their Delegate to require a minimum provision of 5-10% of apartments in the development to

Strategy	Consistent?
	be dedicated to Waverley Council as affordable housing and for the other claims regarding different buyer groups to be substantiated by the applicant.
C3c - Investigate and pursue housing initiatives through joint venture and other forms of partnership opportunities.	Refer to response to C3a above. This planning proposal process provides an ideal opportunity to pursue a partnership with the property owners in order to secure housing types beyond those ordinarily sought through a redevelopment process.
L1 - Waverley's economy is vibrant and robust and supports the creation of a variety of jobs and business opportunities.	
L1a - Reinforce Bondi Junction's role as a regional centre with a mix of residential, retail, hospitality, business, commercial, professional services and entertainment activities.	The subject site is capable of achieving the Strategy under the current or proposed development standards.
L5 - Buildings are well designed, safe and accessible and the new is balanced with the old.	
L5a - Ensure planning controls for new buildings and building upgrades deliver high quality urban design that is safe and accessible, in which heritage and open space is recognised, respected and protected.	The amended height and floor space ratio controls sought through the planning proposal are inconsistent with this Strategy. The 36m height and floor space ratio of 3.5:1 result in unacceptable built form and scale impacts upon the heritage listed Norfolk Island Pine and Nelson Hotel.
L5b - Protect and maintain heritage significant buildings while ensuring they are fit for use.	Refer to Section 4.2(i). The planning proposal proposes the removal of four heritage listed terraces. Despite this being inconsistent with this Strategy, the professional advice received throughout the WOSP charrette process and the applicant's heritage report all suggest that their removal is possible subject to the replacement building displaying exceptional architectural design.
L5c - Consider the use of planning controls and agreements to provide improvements to built infrastructure.	Refer to Section 4.2(c).

(f) Is the planning proposal consistent with applicable state environmental planning policies?

The planning proposal is consistent with all applicable State Environmental Planning Policies. In relation to compliance with State Environmental Planning Policy 65 (Design Quality of Residential Apartment Development) (SEPP65), the applicant states that "detailed compliance with the SEPP will be demonstrated at the time of making an application for development consent". Any future development application to be submitted to Council for the subject site will be required to demonstrate that the development satisfies the requirements of SEPP65.

(g) Is the planning proposal consistent with applicable Ministerial Directions (s.117 directions)?

The planning proposal is consistent with the applicable Ministerial Directions (s117 directions), except *2.3 Heritage Conservation*. Direction 2.3, in part, states:

> *(4) A planning proposal must contain provisions that facilitate the conservation of:*
> *(a) items, places, buildings, works, relics, moveable objects or precincts of environmental heritage significance to an area, in relation to the historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value of the item, area, object or place, identified in a study of the environmental heritage of the area,*

There are two key heritage aspects of the planning proposal which relate to the removal of the heritage listing for the four terraces at 194-200 Oxford Street and the scale impacts upon the heritage listed Norfolk Island Pine tree and Nelson Hotel. The removal of the heritage listing is discussed further below and the scale impacts are discussed in Section 4.2(i).

The applicant's Heritage Report prepared by Urbis notes that the terraces "were once part of a more comprehensive streetscape of dwellings that were demolished for the expressway" however the "immediate context of the terrace group has changed significantly over time as a result of urbanisation and freeway development and retains little of its original historical setting." Given that these terraces were not identified as rare or numerous but under threat the removal of the listing is considered acceptable on condition.

Removal of the heritage listings for the terraces at 194-200 Oxford Street is only supported if they are replaced by a building of a substantially higher quality and provides significant community benefit and streetscape value to the locality. As part of the West Oxford Street Precinct Plan the design teams worked through a range of design options for the sites including their retention, replacement or adaptation. Should the planning proposal proceed, various design options should be considered as part of a development application process.

(h) Is there any likelihood that critical habitat or threatened species, populations or ecological communities or their habitats will be adversely affected as a result of the proposal?

It is not considered that any critical habitat or threatened species, populations or ecological communities, or their habitats will be adversely affected as a result of the proposal.

(i) Are there any other likely environmental effects as a result of the planning proposal and how are they proposed to be managed?

Traffic and Parking

Council reviewed the planning proposal's Traffic Study (prepared by GTA Consultants) and noted inadequate information had been provided as follows:

- The modelling in the report is based on traffic survey data from March 2013, this data is not acceptable due to the length of time since the survey was carried out and the changed traffic conditions in the Bondi Junction area over this period. Updated surveys must be undertaken to assess the impact of the proposal.
- The intersection models needs to be modelled as a network rather than individual intersections due to their proximity to each other.
- GTA's report post development modelling and phase times is not acceptable as existing phase times need to be applied to all models unless concurrence is received from the RMS to change phase times of the current signals post development.

- All surrounding key intersections need to be modelled particularly the intersection of Osmund Lane and Nelson Street which is not modelled in the report.
- Updated survey data and SIDRA analysis to include a range of traffic growth scenarios including a worst case scenario.
- The report needs to consider the impact of the proposed development on surrounding roads with consideration for local road environmental capacities as well as impacts on local amenities.
- The traffic report needs to provide an assessment of the traffic impacts and a road safety audit/assessment of the proposed access shared zone/laneway along Osmund Lane including details of any mitigation measures proposed (e.g. central median, roundabout, signals).

The above points formed the basis for a consultant brief to independently review the likely traffic impacts associated with the planning proposal. Council engaged Bitzios Consulting to prepare independent Traffic Advice (Attachment 2) for the subject sites. The Traffic Advice includes an assessment of the performance of intersections within a defined study area. A preliminary design Road Safety Audit for the Osmund Lane shared zone was also completed.

The traffic advice regarding the performance of intersections within the study area concluded the following:

- "The development produces an additional 121 vehicles during the critical PM peak hour;
- Most key intersections near the subject site are operating at capacity in the future regardless of the development. In this context, the additional development traffic has a marginal effect on the performance of intersections within the local road network.
- In all cases, queues form at the Oxford Street / Nelson Street intersection which consequentially affect upstream intersections along Oxford Street;
- In general and where possible, the targeted introduction of longer turning pockets/lanes will reduce the incidence of blocking and increase the capacity of intersections;
- Reasonable levels of on-street parking are available over-night, with over 80 spaces available across the study area at both 10pm and 6am. The development is not expected to have a significant impact on available overnight parking capacity; and
- 30% of vehicles surveyed over-night displayed Residential Permits, and hence parking turnover during the hours with parking restriction may be higher than expected due to the expected low use by local residents during these times."

Based on the above advice, the development will have "a marginal effect on the performance of intersections within the local road network". It is however acknowledged that the Oxford Street/Nelson Street & Oxford St/York Road intersections experience considerable queuing and that investigating the phasing of lights may need to be undertaken if this planning proposal is to proceed.

The preliminary design Road Safety Audit for Osmund Lane noted some 'Low' and 'Medium' risks associated with the concept design accompanied by some recommendations aimed at reducing and managing the identified risks. Additional investigations will be required through any future development application in the event that the planning proposal proceeds.

Impact of tower forms of streetscape

Following the West Oxford Street Design Charrette process, the community expressed significant concerns regarding the perceived impacts of tower forms on the streetscape character of the West Oxford Street area. The existing "village feel" is characterised by small 2-3 shop fronts and a fine grain subdivision pattern.

Council officers have previously noted the need for a better heritage response to the listed Norfolk Island Pine at 2 Nelson Street and the neighbouring heritage listed Nelson Hotel, whereby the proposed maximum height and FSR for the site should be reduced. This was seen to elevate the prominence of the Norfolk Island Pine when viewed from the public domain and provide a better transition from the 15m height limits to the east of the subject sites.

It is considered that the proposed 36m height at 2 Nelson Street is unsuitable for this locality (Figure 10). Building height controls for 2 Nelson Street must respond to the existing heritage listed Norfolk Island Pine on the site and be sympathetic to the adjacent heritage item, the Nelson Street Hotel. Built form on this site should be recessive in the streetscape and complement heritage items rather than dominate the urban form. The following figure shows the height proposed under this planning proposal with an indicative height of the heritage listed Norfolk Island Pine (refer to Figure 10).

Figure 10: Proposed development showing an 11 storey tower with a 36 metre height limit. The green line shows the height of the existing heritage listed Norfolk Island Pine (approx. 25m high)

Inconsistency with the design advice provided in the West Oxford Street Precinct Plan and Reimagining Syd Einfeld Drive Study

The design charrette process resulted in three schemes from design experts in architecture, urban design, planning and public art. The built form outcomes from the West Oxford Street Precinct Plan relate to sites 2 and 3 (refer to Figure 11).

The overall heights proposed by the applicant exceed the recommendations from the three design teams. The proposed 36 metre towers on both subject sites do not align with the professional design advice provided. A 36 metre height was noted by one team as an option on site 2, but the consistent advice on site 3 at 2 Nelson Street was for a lower height limit to be more sympathetic to the surrounding heritage context and provide a transition from the lower scale block to the east. Notwithstanding this, a reduced height for both sites was recommended by two of the three design teams which highlights the inappropriateness of the heights sought in this planning proposal.

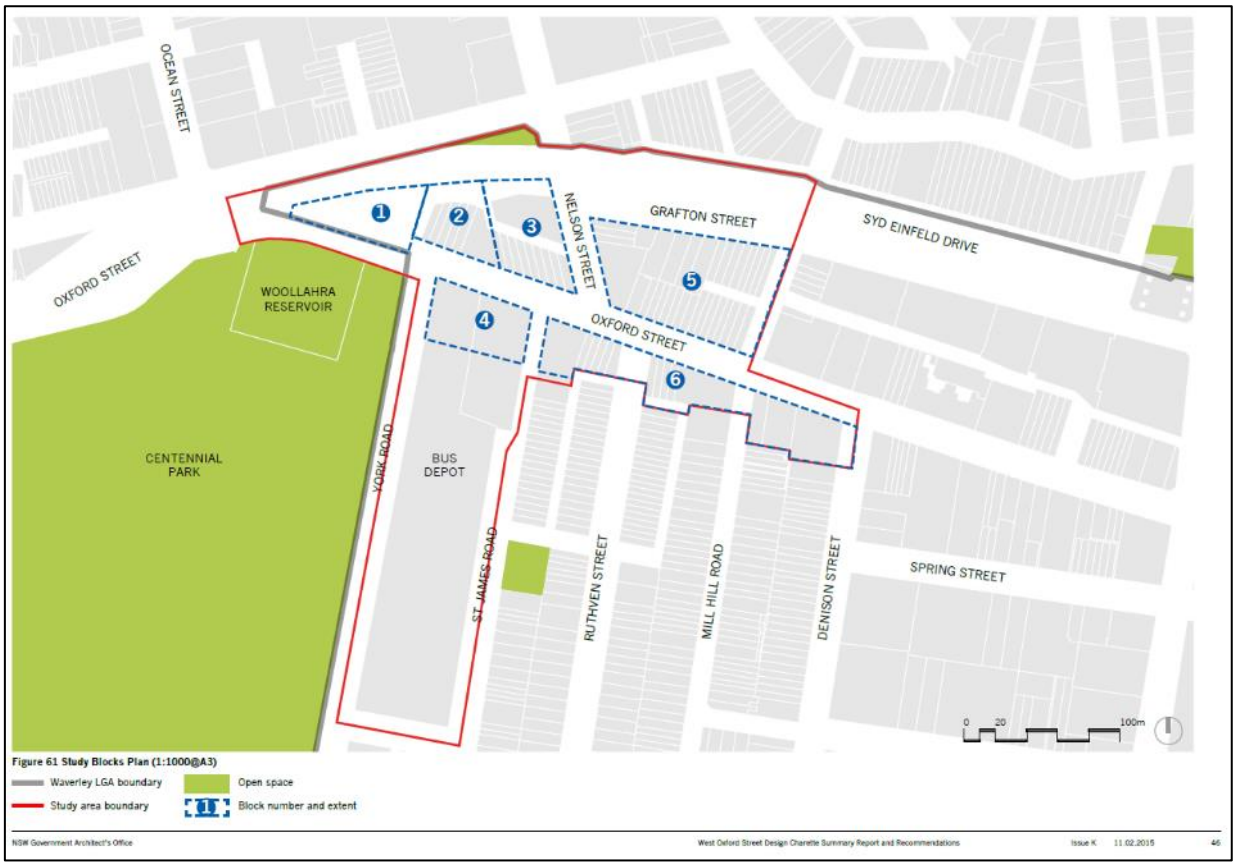


Figure 11: Map identifying blocks specified in the Government Architect Office's report for West Oxford Street (Figure 3 below). In regards to the planning proposal Block 2 includes sites 194-214 Oxford Street and Block 3 includes 2 Nelson Street.

Further work has been conducted in regard to the road widening which may have implications for the site. Hill Thalis has identified the need for improvements to the pedestrian bridge in the Draft Reimagining Syd Einfeld Drive study, which states:

> *"This critical pedestrian and cycle link between Woollahra and Waverley is currently too narrow with poor access at either end. The redesign of the footbridge, combined with the widening of the western verge allows for generous connections from the northern verge of Grafton Street to the proposed terrace along Syd Einfeld Drive. The existing pedestrian bridge, stairs and ramps are not sufficiently generous to connect Nelson Street to Woollahra. A 4m wide bridge is proposed with 2m wide compliant ramps shown indicatively. The bridge is positioned to reinstate the street footpath along the entire west edge of the street."*

Improvements to this pedestrian link would significantly improve accessibility to Bondi Junction contains a number of recommendations potentially impact on the site.

There is an opportunity to convey the following alternative public domain improvements/public benefit works as part of the planning agreement negotiations:

- Land dedication on the western corner of the site that enables reconfiguration of the intersection of Syd Einfeld Drive and York Road as per the Reimagining Syd Einfeld Drive Study (refer to Figure 12).
- Redesign and construction of the Syd Einfeld Drive pedestrian footbridge as per the Reimagining Syd Einfeld Drive Study recommendations.
- The draft Reimagining Syd Einfeld Drive Study will be subject to a future report to Council for endorsement.

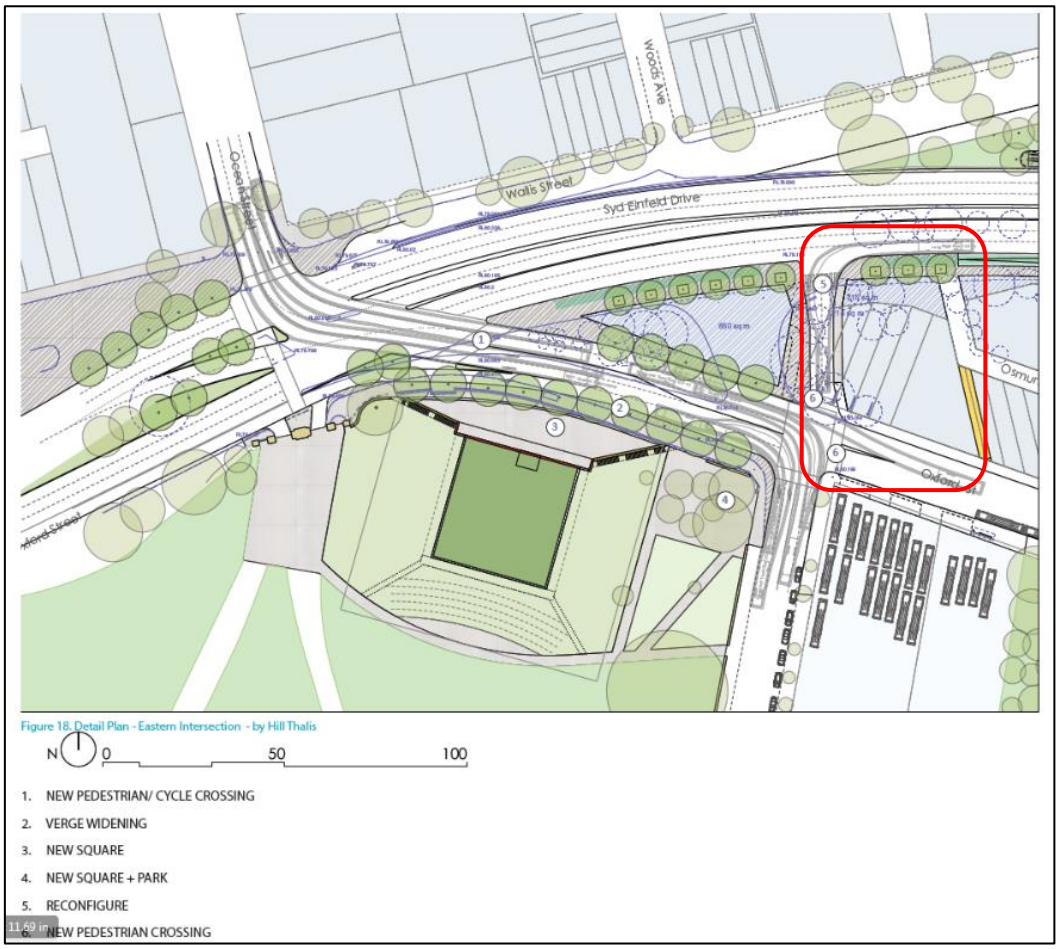


Figure 12: Proposed redesign of the Syd Einfeld Drive, Oxford Street, Ocean Street and York Street intersection.

Consideration of the Amenity of Neighbouring Properties

Council's shadow impact analysis of the proposed indicative building footprints is provided as follows. Figures 13 to 20 show impacts on neighbouring properties to the south east of the site and Centennial Park to the south west. Blue shadows indicate existing shadows and yellow indicates proposed 36m (approx. 11 storeys).

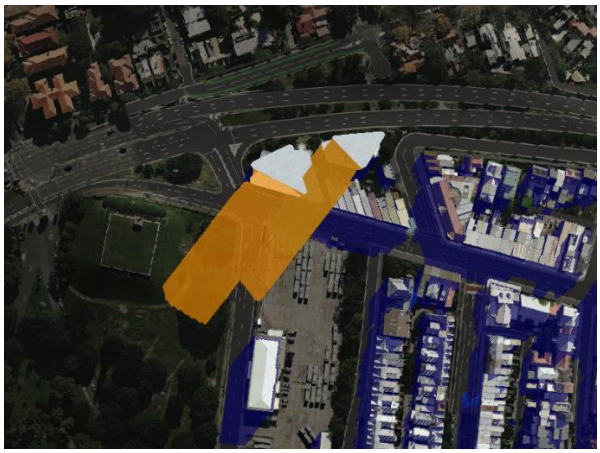


Figure 13 - 9am Winter

Figure 14 - 9.30am Winter

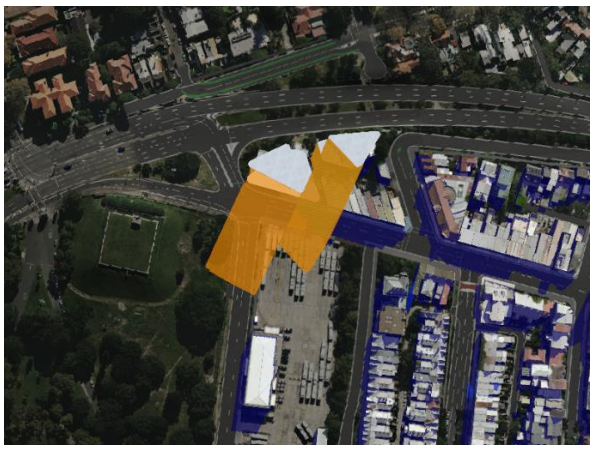


Figure 15 - 10am Winter

Figure 16 - 11am Winter

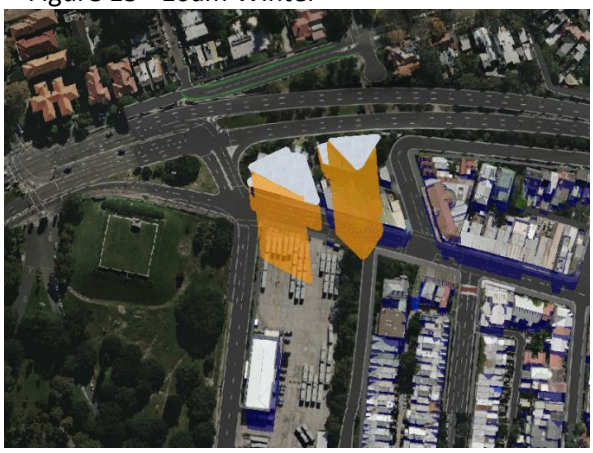


Figure 17 - 12pm Winter

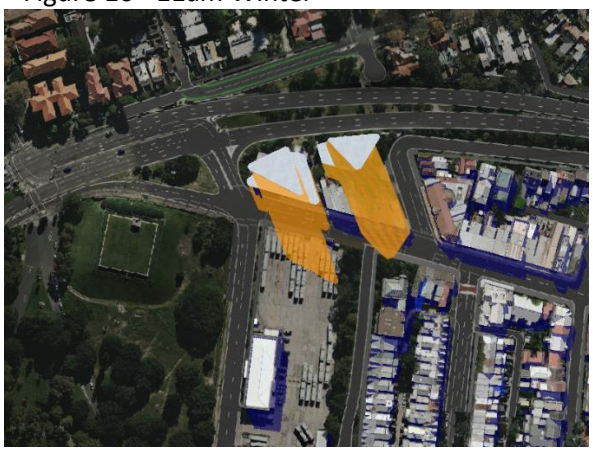


Figure 18 - 1pm Winter

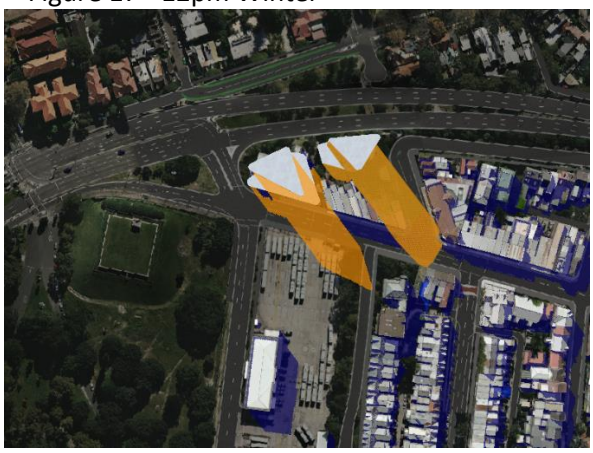


Figure 19 - 2pm Winter

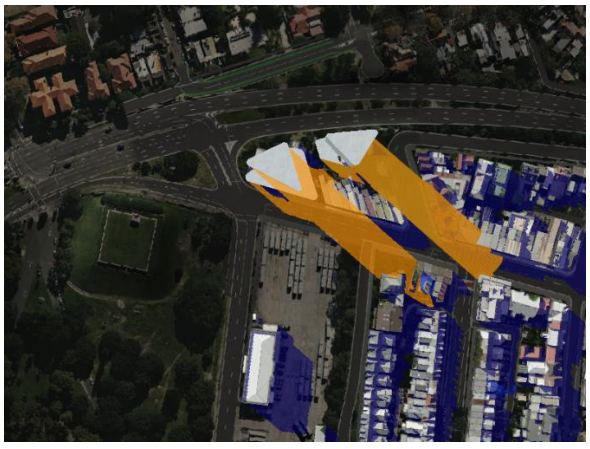


Figure 20 - 3pm Winter

The proposed tower at 194-214 Oxford Street overshadows the corner of Centennial Park in the early morning in mid-winter. Overshadowing occurs between 9am to approximately 10.30am mid-winter to the corner of Centennial Park. This extent of overshadowing is generally considered to be acceptable given that this is the worst case scenario and it leaves the park relatively early in the morning with full solar access for the remainder of the day. During the remainder of the year (equinox and summer) the overshadowing is minimal on Centennial Park.

It should however be noted that the area of the park which is overshadowed is identified by the Centennial Park Masterplan as the site for a future skate facility. Additionally, the area was identified by all three design teams in the West Oxford Street Design Charrette process as a potential future access point, connecting Bondi Junction with Centennial Park by opening a new Park entrance on the corner of Oxford Street and York Road.

The additional height of a 36m tower form at 2 Nelson Street results in additional overshadowing of the public domain in winter. Figure 21 shows the 3pm winter perspective showing the length of shadowing from the 36 metre building height (yellow). This is the northern edge of the Mill Hill Conservation Area and includes a popular outdoor seating space currently utilised by residents and visitors (refer to Figure 22). Maintaining uninterrupted solar access along the southern retail frontages is fundamental to the enjoyment of the public domain and should be protected to retain the 'village feel' and to reduce overshadowing of heritage items such as the Nelson Hotel.

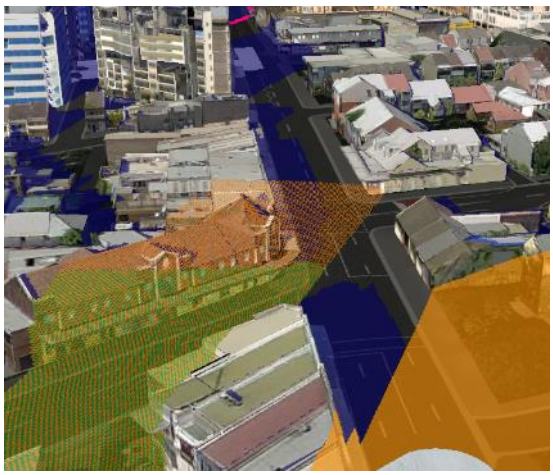


Figure 21: Overshadowing impacts

Figure 22: Existing outdoor seating

(j) How has the planning proposal adequately addressed any social and economic effects?

The commercial and retail tenancies at the western end of Oxford Street have limited growth opportunities. The absence in the area of a substantial western anchor, limited population growth in the area, as well as a relatively poor public domain arrangement which lacks excellent pedestrian connections through the area, results in a lack of active uses and spaces configured to create a desirable setting at street level. An amended proposal, reduced in scale, has the potential to re-invigorate the western end of Bondi Junction and activate the West Oxford Street Precinct.

(k) Is there adequate public infrastructure for the planning proposal?

There is inadequate public transport (train and bus) and open space within the vicinity of the site to accommodate the planning proposal. Section 4.2 (i) notes that the phasing of lights in the vicinity of the site should be considered to improve the performance of the intersections particularly at Oxford Street/Nelson Street and Oxford Street/York Road.

(l) What are the views of State and Commonwealth Public Authorities consulted in accordance with the gate way determination and have they resulted in any variations to the planning proposal?

As discussed in Section 3.1 of this report, Council consulted with State Agencies as required.

5. Relationship to Waverley Together 3 & Delivery Program 2013-17

The relationship to *Waverley Together 3* and *Delivery Program 2013-17* is as follows:

Direction:	L1 Waverley's economy is vibrant and robust and supports the creation of a variety of jobs and business opportunities.
Strategy:	L1a Reinforce Bondi Junction's role as a regional centre and a focus for retail, hospitality, business, commercial and professional services and entertainment activities.
Deliverable:	Well utilised, integrated and welcoming public and private domains in

	Bondi Junction achieved through the development approval process
Direction:	L5 Buildings are well designed, safe and accessible and the new is balanced with the old.
Strategy:	L5a Ensure planning and building controls for new buildings and building upgrades deliver high quality urban design that is safe and accessible, in which heritage and open space is recognised, respected and protected.
Deliverables:	- Comprehensive local environment plan (LEP) updated annually in line with Council's Land Use Strategy and the requirements of the NSW Department of Planning & Infrastructure - Strategic Land Use policies and plans reviewed regularly
Direction:	L5 Buildings are well designed, safe and accessible and the new is balanced with the old.
Strategy:	L5c Consider the use of planning controls and agreements to provide improvements to built public infrastructure.
Deliverable:	Opportunities to deliver public infrastructure through Voluntary Planning Agreements (VPA)

6. Financial impact statement/Timeframe/Consultation

Financial Impact Statement

There have been no upfront or recurrent costs associated with this Planning Proposal other than staff and consultancy costs associated with the administration, assessment and exhibition of the proposal and these have been budgeted.

Timeframe

The estimated timeframe for completing the LEP amendment is set out below and satisfies the requirement of 9 months specified in the Gateway Determination:

Gateway Determination	22 December 2016
Public Exhibition	8 February - 10 March 2017
Report to Council	July 2017
Consideration by Department of Planning and Environment	July - December 2017

Consultation

Public consultation

As discussed in Section 3.1 of this report, Council carried out a community consultation period in accordance with the Gateway Determination (Attachment 1) for the subject planning proposal.

7. Conclusion

The public exhibition period highlighted the community opposition to the planning proposal noting a number of significant issues with the proposal.

The planning proposal should not proceed as the amendment to height and floor space ratio results in an overdevelopment of the site. In particular, the tower at 2 Nelson Street will dominate the heritage listed Norfolk Island Pine and will not provide an acceptable transition between the adjoining 15m block to the east which includes the heritage listed Nelson Hotel.

Despite Council officers previously noting merit in a reduced scheme, the JRPP found that the planning proposal had strategic merit in the 36m height and 3.5:1 floor space ratio standard as an avenue for additional public benefit. As detailed in Section 4.2(c) of this report, the public benefit offer put forward by the applicant does not provide a public benefit offer consistent with Council's Planning Agreement Policy 2014 and the public benefit offered is inadequate compared to benchmarks as stated in the draft District Plans.

The planning proposal therefore cannot be supported.

8. Attachments

1. Gateway Determination & Letter to Council - 22 December 2016
2. Bitzios Traffic Advice (abridged) July 2017
3. Submission Response - City Plan - May 2017
4. Photomontage Certification Report - RLA - 26 April 2017

ATTACHMENT 1 - Gateway Determination dated 22 December 2017

NSW GOVERNMENT Planning & Environment

Gateway Determination

***Planning proposal (Department Ref: PP_2016_WAVER_003_00)**: to amend height and floor space ratio controls for 194-214 Oxford Street and 2 Nelson Street, Bondi Junction.*

I, the Executive Director, Regions, Planning Services at the Department of Planning and Environment as delegate of the Greater Sydney Commission, have determined under section 56(2) of the *Environmental Planning and Assessment Act 1979* (the Act) that an amendment to the Waverley Local Environmental Plan (LEP) 2012 to amend height and floor space ratio controls for 194-214 Oxford Street and 2 Nelson Street, Bondi Junction should proceed subject to the following conditions:

1. Prior to community consultation, the planning proposal is to be updated as follows:

   (a) to demonstrate consistency with the draft Central District Plan, released on 21 November 2016;
   (b) the proposed LEP mapping and planning proposal be updated to reflect the correct SP2 Infrastructure zoning identified on the corner of Syd Einfield Drive and York Street;
   (c) remove the proposed design excellence local provision including bonus provision scheme for undertaking a design competition;
   (d) provide a statement of intent regarding a local provision for an architectural design competition to apply to this site, conducted in accordance with the Design Excellence Guidelines as issued by the Secretary and amended from time to time, and addressing:
      - overshadowing of surrounding area including Centennial Park;
      - the impact on heritage items in the vicinity of the site; and
   (e) a site specific draft DCP is to be exhibited with the planning proposal.

2. Community consultation is required under sections 56(2)(c) and 57 of the Act as follows:

   (a) the planning proposal must be made publicly available for a minimum of **28 days**; and
   (b) the relevant planning authority must comply with the notice requirements for public exhibition of planning proposals and the specifications for material that must be made publicly available along with planning proposals as identified in section 5.5.2 of *A Guide to Preparing LEPs* (NSW Department of Planning and Environment 2016).

3. Consultation is required with the following public authorities under section 56(2)(d) of the Act and/or to comply with the requirements of relevant section 117 Directions:

   - Woollahra Council;

- Randwick Council;
- Office of Environment and Heritage;
- Transport for NSW;
- Roads and Maritime Services;
- Energy Australia;
- Sydney Water;
- Department of Education and Communities,
- NSW Ministry of Health; and
- Centennial Park and Moore Park Trust

Each public authority is to be provided with a copy of the planning proposal and any relevant supporting material, and given at least 21 days to comment on the proposal.

4. A public hearing is not required to be held into the matter by any person or body under section 56(2)(e) of the Act. This does not discharge Council from any obligation it may otherwise have to conduct a public hearing (for example, in response to a submission or if reclassifying land).

5. The timeframe for completing the LEP is to be **12 months** from the week following the date of the Gateway determination.

Dated 22nd day of December 2016

Stephen Murray
Executive Director, Regions
Planning Services
Department of Planning and Environment

Delegate of the Greater Sydney Commission

PP_2016_WAVER_003_00 (16/01614)

NSW GOVERNMENT Planning & Environment

Our ref: PP_2016_WAVER_003_00 (16/01614)

Arthur Kyron
General Manager
Waverley Council
55 Spring Street
Bondi Junction NSW 2022

Dear Mr Kyron

Planning proposal to amend Waverley Local Environmental Plan 2012

I am writing in response to your Council's request for a Gateway determination under section 56 of the Environmental Planning and Assessment Act 1979 (the Act) in respect of the planning proposal to amend height and FSR controls at 194-214 Oxford Street and 2 Nelson Street, Bondi Junction.

As delegate of the Greater Sydney Commission, I have now determined the planning proposal should proceed subject to the conditions in the attached Gateway determination.

Council may still need to obtain the agreement of the Department's Secretary to comply with the requirements of relevant Section 117 Directions, particularly with regard to Direction 2.3 Heritage Conservation. Council should ensure this occurs prior to the plan being made.

In accordance with the recommendations of the Panel as part of the Pre-Gateway review, it is agreed that the planning proposal provides an opportunity to address improvements to the intersection of Oxford and York Streets and access between Bondi Junction and Centennial Park. This relates to the consideration of traffic and public domain improvements. Council is requested to consider this issue and undertake relevant consultations to address this matter.

Plan making powers were delegated to councils by instrument of delegation dated 14 October 2012. It is noted that Council has accepted this delegation. I have considered the nature of Council's planning proposal and have decided not to issue an authorisation for Council to exercise delegation to make this plan, as the proposal involves a number of policy matters.

The amending Local Environmental Plan (LEP) is to be finalised within 12 months of the week following the date of the Gateway determination. Council should aim to commence the exhibition of the planning proposal as soon as possible. Council's request for the Department of Planning and Environment to draft and finalise the LEP should be made 6 weeks prior to the projected publication date.

Department of Planning and Environment
320 Pitt Street Sydney 2000 | GPO Box 39 Sydney 2001 | planning.nsw.gov.au

The State Government is committed to reducing the time taken to complete LEPs by tailoring the steps in the process to the complexity of the proposal, and by providing clear and publicly available justification for each plan at an early stage. In order to meet these commitments, the Greater Sydney Commission may take action under section 54(2)(d) of the Act if the time frames outlined in this determination are not met.

Should you have any queries in regard to this matter, I have arranged for Ms Charlene Nelson of the Department's regional office to assist you. Ms Nelson can be contacted on (02) 9274 6570.

Yours sincerely

22 December 2016

Stephen Murray
Executive Director, Regions
Planning Services

Encl: Gateway Determination

OXFORD STREET AND NELSON STREET JUNCTION, BONDI

TRAFFIC ADVICE

FOR

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Project No:	P3133	Version No:	003	Issue date:	11-July-2017

DOCUMENT CONTROL SHEET

Issue History

Report File Name	Prepared by	Reviewed by	Issued by	Date	Issued to
P3133.001R Oxford Street and Nelson Street Bondi Junction Traffic Advice	G. Yin	A. Giyahi	A.Giyahi	19/06/2017	Angela Hynes Waverley Council Angela.hynes@waverley.nsw.gov.au
P3133.002R Oxford Street and Nelson Street Bondi Junction Traffic Advice	G. Yin / S. Daizli	D.Bitzios	A.Giyahi	26/06/2017	Tim Sneesby Waverley Council tim.sneesby@waverley.nsw.gov.au
P3133.003R Oxford Street and Nelson Street Bondi Junction Traffic Advice	G. Yin / S. Daizli	T.Wheatley	T. Wheatley	11/07/2017	Tim Sneesby Waverley Council tim.sneesby@waverley.nsw.gov.au

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Appendix B: SIDRA Intersection Performance Summaries
Appendix C: Road Safety Audit Report

1. INTRODUCTION

1.1 BACKGROUND

1.1.1 History

In October 2015, a Planning Proposal was submitted to Waverley Council by City Plan Services Pty Ltd on behalf of Westgate BJ Pty Ltd, relating to the western end of Bondi Junction Town Centre, also known as Oxford Street West Precinct.

The Proposal explains and justifies the intended effect of amendments to the Waverley Local Environment Plan (LEP) 2012, site specific for No's 194-214 Oxford Street and No 2. Nelson Street, Bondi Junction.

Bitzios Consulting was engaged by Waverley Council to undertake a Traffic Impact Assessment (TIA) of the proposed development concept as part of the Planning Proposal. The findings of this report are expected to inform the preparation of the post-exhibition report to Council and may be included as an attachment to the Council Report.

1.1.2 Planning Proposal

The planning controls that are sought to be amended for the site through the proposal include:

- Increasing the Floor Space Ratio (FSR) from 1:5 to 3.5:1;
- Increasing the allowable building height from 15m to 36m;
- Removing heritage status of No 194-200 Oxford Street, Bondi Junction; and
- Introduce new clause for design excellence

These amended planning controls will make way for proposed development to achieve the following objectives:

- enhance the future character of Bondi Junction as a strategic centre by enabling redevelopment of the site for higher density mixed use development that contributes to the achievement of employment and housing targets;
- provide an enhanced built form outcome which will enable the provision of improved public domain areas at street level near Centennial Park;
- provide better access and permeability by site improvements to traffic, pedestrian and cycling connectivity;
- incentivising investment and revitalisation to create an alternate shopping and living experience at the gateway to Bondi Junction; and
- introduce design excellence provisions to ensure 'key sites' within the Waverley LGA exhibit high design and architectural standards.

The proposal was issued a *Gateway Determination* in December 2016. Public exhibition of the Proposal was conducted from 8 February 2017 to 10 March 2017, with approximately 400 submissions received from the community. The impact of the proposal upon local traffic and parking conditions was one of the primary concerns raised during the consultation period.

1.2 LOCATION

The site is located at the western-most end of the Bondi Junction town centre, bounded by Syd Einfeld Drive, Oxford Street and Nelson Street, as shown in Figure 1.1. The site is currently zoned as *Mixed Use (B4)* under *Waverley LEP (2012)*, with buildings in the surrounding area comprised of residential dwellings with commercial frontages at street level.

Source: NSW SIX Maps

Figure 1.1: Site Location

2. LITERATURE REVIEW

2.1 TRAFFIC REPORT FOR THE DEVELOPMENT APPLICATION

A traffic report was produced by GTA Consultants in 2016 as a part of the development application for 214-218 Oxford Street and 2 Nelson Street, Bondi Junction. This report is provided in Appendix A.

Report's Recommendations

The GTA report identified:

- a Traffic generation of 121 vehicles/hour during peak periods;
- a minimum parking provision of 101 spaces (residential provision only);
- that the traffic volumes due to post-development traffic generation was found to adversely affect the capacity of the Oxford Street/York Road intersection; and
- a recommendation for the installation of a 25m long right turn bay at the Oxford Street/York Road intersection (westbound on Oxford Street) to reduce future queues to 124m (from 207m).

Growth Factoring Limitations

The growth factor to estimate future year traffic volumes was taken from traffic counts conducted by Roads and Maritime Services (RMS) of eastbound traffic along Syd Einfeld Drive, approximately 20m north of Oxford Street. These counts indicated -3% growth between 2006 and 2016 and -0.4% growth between 2013 and 2016. Based on these rates, an assumption of zero growth was deemed appropriate.

Traffic volumes of Syd Einfeld Drive are essentially a function of the signal green times which release traffic at either end of this road. A negative growth rate may simply have indicated less green time allocated to the through movement phase rather than a reduction in through traffic demand. Also, traffic varies from day to day for a variety of reasons and comparing recorded volumes at a specific point is time is often not a reliable method for calculating underlying traffic demand. Population growth, employment growth and increasing parking demands are better proxies for traffic growth in/near key centres than simply relying on specific point-in-time traffic counts

Limited Modelling

The SIDRA Intersection models developed for the purpose of assessing intersection performance included two intersections: York Road / Oxford Street and Oxford Street / Nelson Street. Whilst these intersections are located closest to the development, a number of other intersections are located nearby the development and could be potentially be affected by the increase in traffic due to the development and due to background population growth. More specifically, there are six intersections within a 300m section of Oxford Street near the site.

Further, traffic queues found at York Road / Oxford Street were found to exceed 200m affecting both the Nelson Street / Oxford Street and Ruthven Street / Oxford Street intersections. The Ruthven Street / Oxford Street intersection was not included in the GTA analysis.

2.2 GOVERNING DOCUMENTS

2.2.1 Waverley Local Environment Plan 2012

The *Waverley Local Environment Plan 2012* (LEP) is the principal planning instrument used by Waverley Council to regulate land use affecting planning and development decisions within the Waverley LGA.

The LEP contains zoning and land use information, specifying what uses are permitted or prohibited in each zone. Development controls include height of buildings, floor space ratios, incentives for affordable housing, provisions for the reservation of land, protection of trees and heritage conservation, and a number of other environmental requirements.

The purpose of the Planning Proposal is to modify and make amendments to the LEP, including building height, floor space ratios and heritage building status.

2.2.2 Waverley Development Control Plan

Waverley Council's *Development Control Plan 2012* (DCP) aims to steer the development of the Waverley area in line with the visions of the various overarching strategies. It supports the controls outlined in the LEP with more specific planning and design guidelines including built form controls, parking, biodiversity and tree preservation, signage, heritage conservation and safety.

The DCP provides guidelines for new residential developments as well as residential alterations and extensions. It also details general controls for commercial developments, and identifies areas where more specific guidelines apply, such as the Bondi Junction town centre, the Bondi beachfront and the local villages.

2.2.3 Waverley Transport Plan 2011

The Waverley Transport Plan was released in December 2011 and addresses key transport issues across the Waverley LGA by developing sustainable transport options over the next 10 years. The key aims of the strategic plan include:

- People regularly use public transport particularly for trips to work and our beaches;
- Roads and intersections are safer and less congested;
- Parking both on street and off street is equitably accessed and effectively managed;
- People frequently walk and ride their bikes particularly for local trips;
- Public transport, cycling and pedestrian alternatives are improved and encouraged;
- All pedestrian routes are high quality, safe and accessible;
- Our bike network and facilities are safe and connected; and
- All stakeholder needs for improvement to transport effectiveness and usefulness are appropriately planned and delivered.

2.2.4 Transport for NSW Shared Zone Guidelines

Transport for NSW's Safer Speeds Policy and Guideline on Shared Zones (published July 2012) provides the policy and guidelines for the identification and installation of Shared Zones such that pedestrians and vehicles may share a road space safely.

The document helps to identify the road and traffic issues that need to be considered in designing and implementing Shared Zones.

3. EXISTING CONDITIONS

3.1 LOCAL ROAD NETWORK

3.1.1 Oxford Street

Oxford Street is a regional road (classified by RMS), linking the Sydney CBD to Bondi Junction and the Eastern Suburbs.

It is primarily one lane in each direction with a speed limit of 50km/h, three signalised intersections and several side streets. Ticketed on-street parking is present on both sides of the road between Nelson Street and Newland Street. Oxford Street is a bus route for multiple bus services leaving Bondi Junction Interchange towards the city and includes multiple bus stops.

3.1.2 York Road

York Road is a regional road linking Bondi Junction and Randwick. It is a two-lane, two-way road with kerbside parking in each direction and a sign-posted speed limit of 50km/h. York Road is in a low-density residential area, runs parallel to Centennial Park on the eastern side and provides entry/exit access for the Waverley Bus Depot.

3.1.3 Syd Einfeld Drive

Syd Einfeld Drive is a state road with three lanes of traffic in each direction. This road is used as a main bypass for Bondi Junction, and provides a major transport corridor between the Sydney CBD, the Eastern Suburbs and eastern beaches.

Syd Einfeld Drive has a sign posted speed limit of 80km/h between York Road and Old South Head Road, 60km/h between Moore Park Road and York Road, with another 40m section limited to 60km/h west of the intersection with Old South Head Road.

No dedicated cycling infrastructure exists on Syd Einfeld Drive.

3.1.4 Nelson Street

Nelson Street is a two-lane local road with ticketed parking located on its eastern side and a Loading Zone on its western side, south of Osmund Lane. It intersects with Oxford Street and Osmund Lane, before turning east and becoming Grafton Street. Wide footpaths are provided along both sides of Nelson Street. The assumed speed limit is 50km/h.

3.1.5 Grafton Street

Grafton Street is a two-lane local road with kerbside parking in each direction. It runs parallel to Syd Einfeld Drive and connects with Nelson Street to the west and Adelaide Street to the east, providing access to Woollahra and surrounds by the intersections.

3.1.6 Osmund Lane

Osmund Lane is a narrow, two-way local road, approximately 4.8m wide, and forms the eastern approach to the intersection with Nelson Street. It currently provides access to the rear of properties fronting Oxford Street. A turn-around facility is located at the end of Osmund Lane.

3.2 JOURNEY TO WORK

Based on *Journey to Work Data* provided by the Bureau of Transport Statistics, a substantial number of residents use public transport to travel from the study area while most workers utilise private vehicles to travel to the study area.

The journey to work mode share for workers (inbound trips) and residents (outbound trips) are presented in Table 3.1 and shown in Figure 3.1.

Table 3.1: Mode Share of Workers and Residents

Mode	To Study Area (Workers)	From Study Area (Residents)
Private Vehicle	43%	36%
Train	29%	32%
Bus	12%	12%
Walk	9%	10%
Passenger	4%	4%
Other	4%	5%

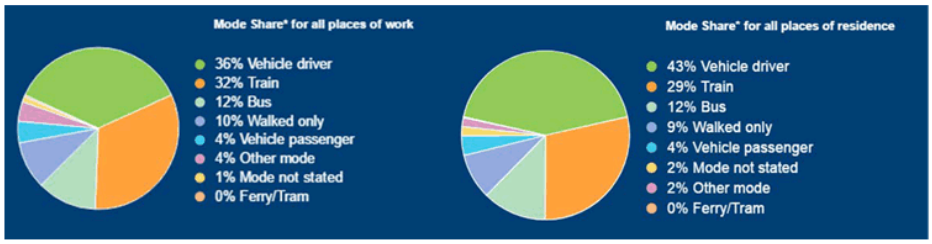


Figure 3.1: Mode Share of Residents (left) and workers (right) in the Study Area

3.3 PUBLIC TRANSPORT

3.3.1 Buses

Oxford Street caters for seven bus routes as listed in Table 3.2.

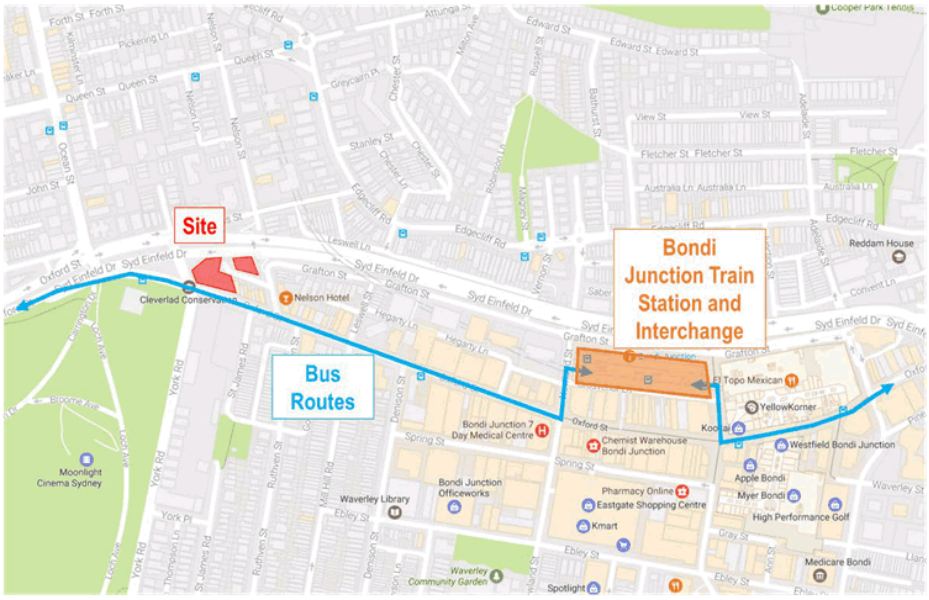
Table 3.2: Bus Routes Along Oxford Street, Bondi Junction

Route No.	Destination
333	Circular Quay to North Bondi via Bondi Junction
352	Bondi Junction to Marrickville Metro via Oxford Street, Crown Street and King Street
355	Bondi Junction to Marrickville Metro via Moore Park & Erskineville
380	Circular Quay to Watson's Bay via Bondi Junction
389	Maritime Museum to North Bondi
440	Rozelle to Bronte via Bondi Junction
M40	Chatswood to Bondi Junction

Inbound and outbound bus stops are located within 100m of the site on Oxford Street east of Nelson Street. The Waverley Bus Depot is also located opposite the site on Oxford Street.

3.3.2 Train Station

Bondi Junction Train Station and Interchange is located within walking distance of the site at approximately 650m. It is serviced by the T4 Eastern Suburbs & Illawarra Line, with trains every three minutes during peak periods and every 10 minutes at other times. The location of the site relative to Bondi Junction Train Station and Interchange is shown in Figure 3.2.

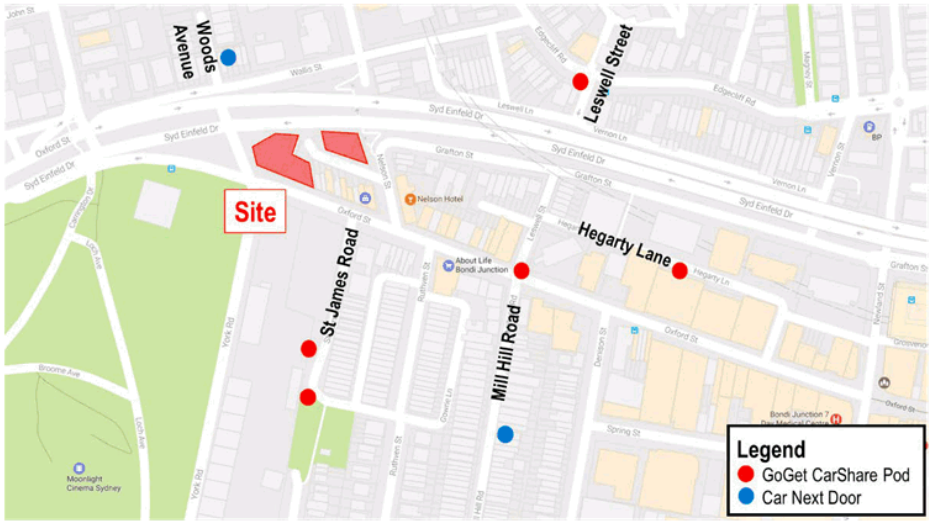


Adopted from Google Maps

Figure 3.2: Buses and Train Station in Bondi Junction

3.4 CAR SHARE

The Oxford Street West Precinct and surrounding areas include five *GoGet* CarShare Pods and two *Car Next Door* sharing vehicles. Their locations are indicated in Figure 3.3.



Adopted from Google Maps

Figure 3.3: Car Sharing Locations

3.5 ACTIVE TRANSPORT

3.5.1 Cycling

The Oxford Street Cycleway is located approximately 150m west of the site, starting at the Carrington Road Gates to Centennial Park, running parallel to Oxford Street on the southern side. A shared path exists along the south side of Oxford Street from Carrington Drive Gates to York Road connecting Oxford Street West Precinct to the Oxford Street cycleway and Centennial Park.

Whilst no formal cycling infrastructure is currently present, Oxford Street west is a popular cycling route connecting Bondi Junction, Centennial Park and the City. It is considered a *'main bicycle route on high-traffic street'* in the Cycling in Waverley and Woollahra cycling map, as shown in Figure 3.4.

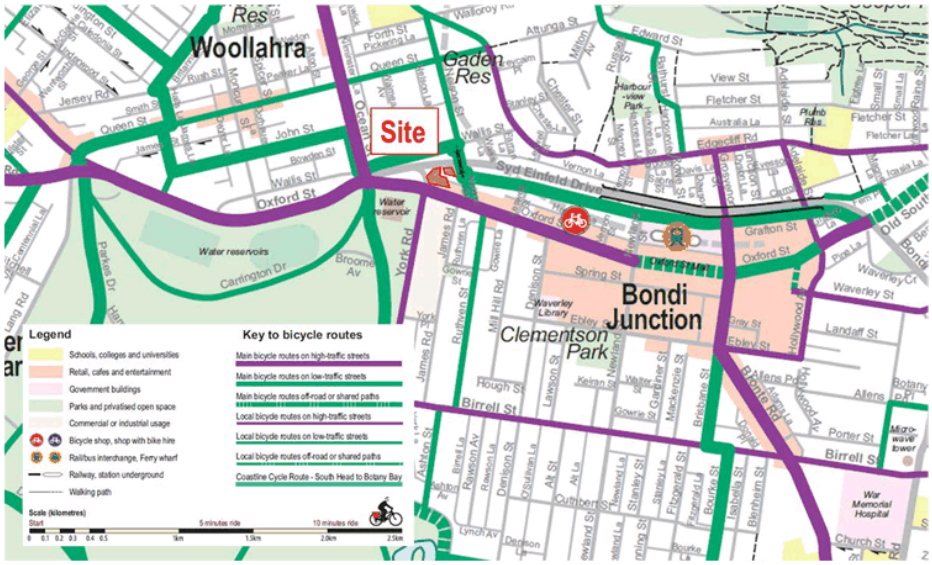


Figure 3.4: Waverley and Woollahra Cycling Map

3.5.2 Pedestrians

Pedestrians are provided for by footpaths on both sides of Oxford Street, Nelson Street, Grafton Street and York Road. Footpaths are also provided on the narrower side streets. Pedestrian traffic in the area is generally high due to commercial and retail frontages along Oxford Street. The site is also located well within a public transport catchment area.

A pedestrian bridge over Syd Einfeld Drive to Wallis Street (Woollahra) is located at the corner of Nelson Street and Grafton Street, immediately north-east of the site.

Pedestrian crossing facilities near the site include:

- Signalised crossing – south approach at Oxford Street/York Road intersection;
- Signalised crossing – west and north approaches at Oxford Street/Nelson Street intersection; and
- Zebra crossing – east and south approaches of Oxford Street/Denison Street intersection.

4. PROPOSED DEVELOPMENT

The proposed development includes:

- Tower A and B at a height of 36m each;
- A total of 94 apartments and 831m^2 of retail space;
- Urban streetscaping, including a Public "Plazetta" adjacent to Nelson Street;
- Improved cycling and pedestrian connections; and
- A shared zone along Osmund Lane.

The proposal aims to prioritise sustainable transport opportunities, including walking and cycling, by maximising access to and connectivity with the surrounding areas via the proposed site link with pedestrian/bicycle/traffic improvements and road widening as well as improved access to public transport, nearby centres and activity hubs.

The proposed development concept is shown in Figure 4.1.

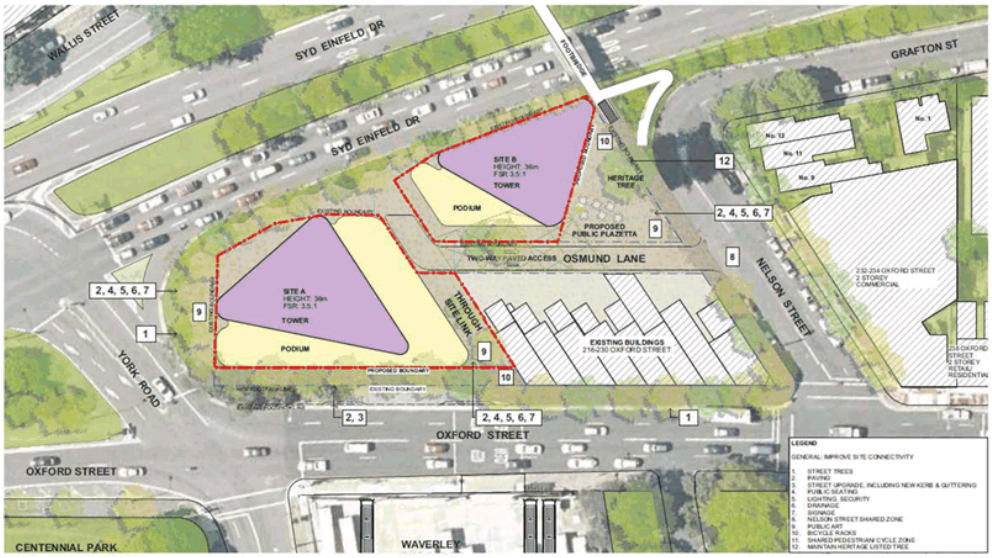


Figure 4.1 Proposed Development Concept

5. INTERSECTION PERFORMANCE ASSESSMENT

To identify the impacts of development-generated traffic, the performance of relevant intersections within the local road network near the development site were assessed using SIDRA Intersection analysis.

5.1 TRAFFIC GENERATION

Roads and Maritime Services *Guide to Traffic Generating Developments (2002)* and Roads and Maritime Services *Technical Direction 2013/04a* were used to provide a basis for assumed traffic generation rates as shown in Table 5.1.

Table 5.1 Development Traffic Generation

Site	Land Use	Peak Traffic Generation Rate	Quantity	Peak Traffic Generation (veh/hr)
A and B	Residential Apartments	0.19/unit	94 units	18
	Retail	12.3/100m^2	831m^2	103
			Total	121

It expected that peak traffic generation would most likely occur during the evening commuter peak period due to the relative proportion of traffic generated by the retail component of the development.

It was assumed the retail space of the proposed development could accommodate a mix of retail businesses presented in the *Roads and Maritime Services Guide to Traffic Generating Developments (2002).*

5.2 GROWTH RATE

A growth rate of 2% per annum was applied to develop future background traffic at 10 years post-opening of the development. This is considered a reasonable indication of likely population and employment growth in Bondi Junction generally. Furthermore, based on :Profile ID" data, the average annual population growth rate for the past five years was 1.5% and traffic growth typically is slightly higher than population growth, albeit that the level of traffic growth could be considered conservatively high in this case due to the presence of mature public and active transport networks..

5.3 SIDRA ANALYSIS

5.3.1 Intersections Assessed

Traffic surveys and IDM data were used to establish input traffic volumes and signal phasing. Diagrams representing traffic volumes at each intersection are provided in Appendix B.

The intersections included in the analysis are listed in Table 5.2.

Table 5.2: Intersections Included in SIDRA Modelling

Intersection Number	Intersection Roads	Intersection Type
101	Oxford Street/Syd Einfeld Drive/Ocean Street	Signalised
102	Syd Einfeld Drive/York Road	Signalised
103	Oxford Street/York Road	Signalised
104	Osmund Lane / Nelson Street	Signalised
105	Oxford Street / Nelson Street	Priority (Give-Way)
106	Oxford Street / Ruthven Street	Priority (Give-Way)
107	Oxford Street / Leswell Street / Mill Hill Road	Priority (Give-Way)
108	Oxford Street / Denison Street	Priority (Give-Way)
109	Oxford Street / Newland Street	Signalised
110	Newland Street / Grafton Street	Signalised

The intersections assessed along with the study area are shown in Figure 5.1.

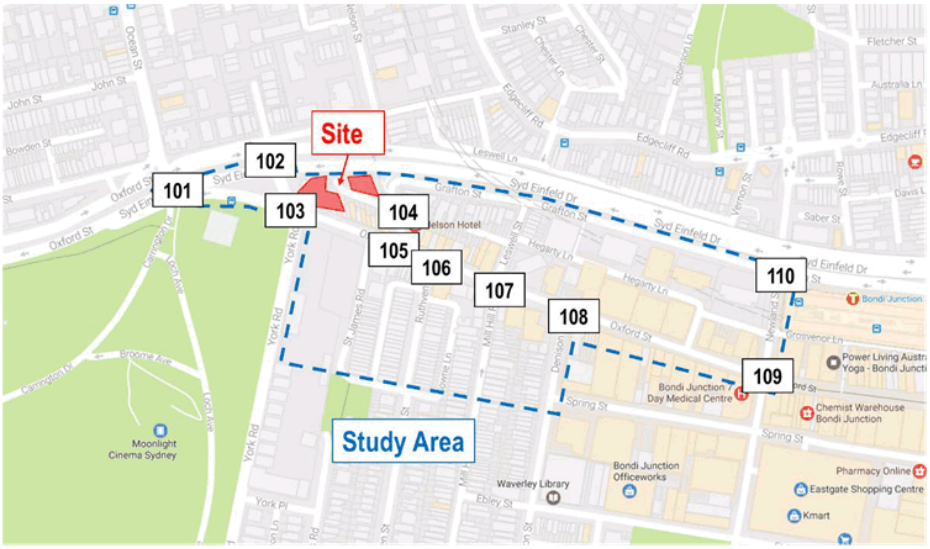


Figure 5.1: Intersections Included in Model and Study Area

5.3.2 Assessment Criteria

Roads and Maritime Services defines assessment criteria to evaluate the performance of intersections, primarily based on average delay encountered by vehicles at the intersection. SIDRA modelling software determines this average delay for vehicles and provides a measure of the level of service.

Table 5.3 outlines the criteria adopted by Roads and Maritime Services in assessing the level of service.

Table 5.3 RMS Level of Service Assessment Criteria

Level of Service	Average Delay (seconds/vehicle)	Traffic Signals and Roundabouts	Give Ways and Stop Signs
A	< 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity, roundabouts require other control mode	At capacity, requires other control mode
F	70+	Above capacity	Above capacity

Source: RMS RTA Guide to Traffic Development (2002)

Level of Service (LoS) D is typically taken as the minimum acceptable performance level of urban signalised intersections.

5.3.3 Model Scenarios

The scenarios analysed were:

- Existing traffic conditions;
- Existing traffic conditions with additional development traffic volumes;
- Existing traffic conditions and 2% growth at 10 years; and
- Existing traffic conditions with additional development traffic and 2% growth at 10 years.

5.3.4 Model Assumptions

The following assumptions were made:

- all generated traffic uses Osmund Lane to access / leave the site parking;
- site peak traffic generation was applied in AM, PM and Saturday peak periods;
- generated traffic was proportioned 15% inbound and 85% outbound during the AM peak;
- generated traffic was proportioned 85% inbound and 15% outbound during the PM peak;
- generated traffic was proportioned 50% inbound and 50% outbound during Saturday peak; and
- traffic distribution was assumed to be proportionate with existing traffic distributions at intersections.

5.4 SIDRA RESULTS

5.4.1 AM Peak

Intersection performance summaries for intersections for the AM peak period across all scenarios are displayed in tables Table 5.4 through to Table 5.777, including outputs for Degree of Saturation (DoS), Average Vehicle Delay, level of Service (LoS) and 95th Percentile Back of Queue (queue length).

Existing Traffic Conditions

Table 5.4 summarises the results of the SIDRA traffic model under existing traffic conditions in the study area. Results are shown overall per intersection.

Table 5.4 AM Peak Existing Traffic Scenario Results

Intersection	Degree of Saturation (DoS)	Average Delay (sec)	Overall Level of Service (LoS)	95th Percentile Queue (m)	Comments
Syd Einfeld Drive / Oxford Street / Ocean Street	0.89	18.8	LOS B	269.2	LOS D through movements from Oxford Street (west approach)
Syd Einfeld Drive / York Road	0.908	13.4	LOS A	283.9	LOS C left turn from Syd Einfeld Drive (east approach)
Oxford Street / York Road	0.875	18.8	LOS B	174.2	LOS D right turn from York Road (south approach), affects heavy vehicles only.
Nelson Street / Osmund Lane	0.163	0.3	NA	10.9	Queueing on Nelson Street due to downstream queueing (Oxford Street Intersection)
Oxford Street / Nelson Street	0.444	16.8	LOS B	67.6	overall good, queueing on Oxford Street (W)
Oxford Street / Ruthven Street	0.472	2.2	NA	49.7	queueing on Oxford Street due to downstream queueing at Nelson Street
Oxford Street / Leswell Street / Mill Hill Road	0.396	2.9	NA	7.5	overall good, LOS C right turn from Mill Hill Road (south approach)
Oxford Street / Denison Street	0.382	4.1	NA	15.6	No issues
Oxford Street / Newland Street	0.527	19.3	LOS B	77.4	LOS D right turn from Oxford Street (west approach), queueing on Newland Street (south approach)
Newland Street / Grafton Street	0.874	23.1	LOS B	100.2	LOS D on Grafton Street (east and west approaches) Queueing on Grafton Street and Newland Street

Model outputs are consistent with site observations on the day of survey. Overall, intersections within the study area are performing above the acceptable level LoS D with LoS B or better. Some specific movement at Syd Einfeld Drive, Oxford Street / Ocean Street intersection, Oxford Street / Newland Street intersection and Newland Street / Grafton Street intersection are operating less well but at the acceptable level of LOS D.

Existing plus Development Traffic

Table 5.5 summarises the performance of local intersections under existing plus additional development traffic.

Table 5.5 AM Peak Existing plus Additional Development Traffic Scenario Results

Intersection	Degree of Saturation (DOS)	Average Delay (sec)	Overall Level of Service (LOS)	95th Percentile Queue (m)	Comments
Syd Einfeld Drive / Oxford Street / Ocean Street	0.894	19.1	LOS B	273.5	LOS D for all movements and queueing along Oxford Street (west approach)
Syd Einfeld Drive / York Road	0.908	13.3	LOS A	283.9	overall good, queueing along Syd Einfeld Drive (east approach)
Oxford Street / York Road	0.916	22.3	LOS B	196.8	LOS D for all movements and queueing on York Road (south approach)
Nelson Street / Osmund Lane	0.252	1.5	NA	11.3	Queueing on Nelson Street due to downstream queueing (Oxford Street Intersection)
Oxford Street / Nelson Street	0.496	19.9	LOS B	81.4	Queues on Oxford Street affect upstream intersections (Osmund Lane and Ruthven Street)
Oxford Street / Ruthven Street	0.474	2.2	NA	66.3	Queueing on Nelson Street due to downstream queueing (Nelson Street intersection)
Oxford Street / Leswell Street / Mill Hill Road	0.398	2.9	NA	7.9	overall good
Oxford Street / Denison Street	0.383	4.1	NA	15.6	overall good
Oxford Street / Newland Street	0.528	19.5	LOS B	77.5	LOS D movements from Oxford Street (west), queueing along Newland Street (north and south approaches)
Newland Street / Grafton Street	0.875	23.1	LOS B	100.3	LOS D movements along Grafton Street (east and west approaches) with queueing on Grafton Street (east)

Overall, intersections within the study area are performing above the acceptable level at LOS C or better. A number of particular vehicle movements are operating at the acceptable level of LOS D. Queues along Newland Street exceed the queue storage capacity and affect upstream intersections at Spring Street and at Grafton Street.

Future Traffic Conditions

Table 5.6 summarises intersection performance under future (10 year) traffic conditions.

Table 5.6 AM Peak Future Traffic Scenario Results

Intersection	Degree of Saturation (DoS)	Average Delay (sec)	Overall Level of Service (LoS)	95th Percentile Queue (m)	Comments
Syd Einfeld Drive / Oxford Street / Ocean Street	1.219	140.8	LOS F	1218.7	**LOS F** for all movements along Oxford Street (west approach) with extensive queueing
Syd Einfeld Drive / York Road	0.935	17.2	LOS B	316.6	LOS B for all movements along Syd Einfeld Drive (east approach) with acceptable queueing
Oxford Street / York Road	1.425	454.7	LOS F	1432.6	**LOS F** for movements along York Road (south approach) and Oxford Street East (through and right turns) with extensive queueing
Nelson Street / Osmund Lane	0.196	0.3	NA	38.2	Minor queueing on Nelson Street due to downstream queueing (Oxford Street intersection)
Oxford Street / Nelson Street	0.847	30.6	LOS C	94.5	LOS D for right turn movements from Oxford Street (east approach), queueing along Oxford Street (west approach). other queues affect upstream intersections (Ruthven Street and Osmund Lane)
Oxford Street / Ruthven Street	0.679	3.7	NA	98.6	Queueing on Oxford Street due to downstream queueing (Nelson Street intersection)
Oxford Street / Leswell Street / Mill Hill Road	0.554	4.3	NA	89.9	**LOS E** for right turn movements from Mill Hill Road (primarily heavy vehicles). Queueing along Oxford Street due to downstream queues.
Oxford Street / Denison Street	0.921	12.8	NA	138.9	queueing along Denison Street
Oxford Street / Newland Street	0.973	50.6	LOS D	283.7	**LOS E** for right turn movements from Newland Street (north approach) with queueing on north and south approaches. LOS C for movements along Oxford Street (west approach)
Newland Street / Grafton Street	1.195	130.8	LOS F	442.4	**LOS F** for through and right turn movements along Grafton Street (east approach), large left turn volumes from east approach causing queues blocking other traffic.

The major intersections are operating at capacity (LOS F) with a number of movements along Grafton Street and Newland Street also operating at either LOS E or LOS F.

It should be noted that most intersections are operating at or above "practical capacity" which for signalised intersections is a degree of saturation exceeding 0.90.

Future plus Development Traffic Conditions

Table 5.777 summarises local intersection performance under future traffic (10 years) plus additional development traffic.

Table 5.7 AM Peak Future plus Additional Development Traffic Scenario Results

Intersection	Degree of Saturation (DoS)	Average Delay (sec)	Level of Service (LoS)	95th Percentile Queue (m)	Comments
Syd Einfeld Drive / Oxford Street / Ocean Street	1.224	143.1	**LOS F**	1235.5	**LOS F** for through movements along Oxford Street (west approach) and extensive queueing
Syd Einfeld Drive / York Road	0.939	17.4	LOS B	316.6	**LOS F** for all movements along Syd Einfeld Drive (east approach) and extensive queueing
Oxford Street / York Road	1.448	491.4	**LOS F**	1433	**LOS F** for movements along York Road (south approach) and Oxford Street (east approach), extensive queueing on York Road (south)
Nelson Street / Osmund Lane	0.276	1.4	NA	64.1	Queueing on Nelson Street due to downstream queueing (Oxford Street intersection)
Oxford Street / Nelson Street	0.953	50.2	LOS D	105.6	**LOS E** and **F** movements along Oxford Street (east approach), with queueing on Oxford Street (west approach). Queues along Oxford Street affect upstream intersections
Oxford Street / Ruthven Street	0.682	3.7	NA	98.6	Queueing on Oxford Street due to downstream queueing (Nelson Street intersection)
Oxford Street / Leswell Street / Mill Hill Road	0.558	4.4	NA	99.7	Queueing on Oxford Street (east approach) due to downstream queues
Oxford Street / Denison Street	0.925	13.1	NA	142.3	queueing on Denison Street
Oxford Street / Newland Street	0.973	50.4	**LOS D**	284.7	**LOS F** for left turn movements on Newland Street (south approach), and queues along north and south approaches, affecting upstream intersections (Grafton Street and Spring Street)
Newland Street / Grafton Street	1.188	114.6	**LOS F**	432	**LOS F** movements along Grafton Street (east approach with extensive queueing).

Results indicate the intersections of Syd Einfeld Drive / Oxford Street, Oxford Street / York Road, and Grafton Street / Newland Street are operating below the acceptable LOS F. All other intersections are operating at the acceptable level of LOS D with a number of particular movements along Grafton Street and Newland Street operating at either LOS E or LOS F.

Queues along Syd Einfeld Drive, Oxford Street, York Road and Grafton Street are extensive, affecting intersection operation and affecting adjacent intersections.

It should be noted that most intersections are operating at or above practical capacity, with degrees of saturation well exceeding 0.80 (for unsignalised intersections) and 0.90 for signalised intersections.

5.4.2 AM Peak Results Comparison

A comparison of results under "background" and "with development" traffic conditions was conducted to highlight issues or changes to the local network as a result of the introduction of additional traffic.

Comparison of Existing Scenarios

Table 5.8 through to Table 5.10 provide comparisons of Delays and Level of Service (LOS), Degree of Saturation (DOS) and blockages.

Table 5.8 AM Peak Traffic Comparison (Delays and Level of Service)

Intersection	Average Delay (sec) existing	Average Delay (sec) Exist.+ Dev	LoS Existing	LoS Exist. + Dev.
Syd Einfeld Drive / Oxford Street / Ocean Street	18.8	19.1	LOS B	LOS B
Syd Einfeld Drive / York Road	13.4	13.3	LOS A	LOS A
Oxford Street / York Road	18.8	22.3	LOS B	LOS B
Nelson Street / Osmund Lane	0.3	1.5	NA	NA
Oxford Street / Nelson Street	16.8	19.9	LOS B	LOS B
Oxford Street / Ruthven Street	2.2	2.2	NA	NA
Oxford Street / Leswell Street / Mill Hill Road	2.9	2.9	NA	NA
Oxford Street / Denison Street	4.1	4.1	NA	NA
Oxford Street / Newland Street	19.3	19.5	LOS B	LOS B
Newland Street / Grafton Street	23.1	23.1	LOS B	LOS B

A comparison of vehicle delays shows a small overall increase, primarily at the major intersections at Syd Einfeld Drive, Oxford Street and York Road. The level of service (based on Roads and Maritime Services performance criteria) remain unchanged.

Overall, intersections within the study area are performing at a satisfactory level (Level of Service B or above) with the addition of development traffic under current conditions.

Table 5.9 AM Peak Traffic Comparison (Degree of Saturation)

Intersection	DoS Existing	DoS Existing and Development
Syd Einfeld Drive / Oxford Street / Ocean Street	0.89	0.894
Syd Einfeld Drive / York Road	0.908	0.908
Oxford Street / York Road	0.875	0.916
Nelson Street / Osmund Lane	0.163	0.252
Oxford Street / Nelson Street	0.444	0.496
Oxford Street / Ruthven Street	0.472	0.474
Oxford Street / Leswell Street / Mill Hill Road	0.396	0.398
Oxford Street / Denison Street	0.382	0.383
Oxford Street / Newland Street	0.527	0.528
Newland Street / Grafton Street	0.874	0.875

Overall, there are marginal increases across the network with the largest increase occurring at the Nelson Street and Osmund Lane intersection due to the additional traffic generated by the proposed development. All other intersections remain relatively stable.

It should be noted the major intersections along Syd Einfeld Drive, Oxford Street and York Road are currently operating at a Degree of Saturation above 0.90, indicating that the intersection is operating at or exceeding practical capacity.

Table 5.10 AM Peak Traffic Comparison (Back of Queue-Worst Movement)

Intersection	Back of Queue (Exist. Traffic, m)	Back of Queue (Exist + Dev. Traffic, m)
Syd Einfeld Drive / Oxford Street / Ocean Street	269.2	273.5
Syd Einfeld Drive / York Road	283.9	283.9
Oxford Street / York Road	174.2	196.8
Nelson Street / Osmund Lane	10.9	11.3
Oxford Street / Nelson Street	67.6	81.4
Oxford Street / Ruthven Street	49.7	66.3
Oxford Street / Leswell Street / Mill Hill Road	7.5	7.9
Oxford Street / Denison Street	15.6	15.6
Oxford Street / Newland Street	77.4	77.5
Newland Street / Grafton Street	100.2	100.3

The largest increase in queue length occurs at the Oxford Street / York Road intersection with an increase of approximately 20m (equivalent to three vehicles). Queues along Nelson Street (at Oxford Street) increased by over 10m.

Whilst queue increases are minimal, the proximity of intersections within the network in conjunction with queue increases may have an noticeable effect on the performance of the network, particularly along Oxford Street.

It should also be noted queues along Nelson Street, Oxford Street and Grafton Street exceed the capacity of the respective approaches to those intersections, with or without the addition of development traffic.

A comparison of the modelled road network in both scenarios has revealed the following:

- little change in performance of intersections despite the introduction of more than 100veh/hr;
- an increase in overall average delay increase of approximately 1 second across the network over the peak hour and average increase to queues by approximately one metre;
- increase in blockages towards the larger intersections, namely Syd Einfeld Drive, Oxford Street and Ocean Street, Syd Einfeld Drive and York Road, and Oxford Street and York Road; and
- Oxford Street and Nelson Street intersection causes queueing along Oxford Street affecting upstream intersections at Ruthven Street and Leswell Street / Mill Hill Road.

A comparison of blockage probability across the network reveals an increase in blockage at the Oxford Street / Nelson Street intersection, as shown in Figure 5.2 with red indicating the most severe impacts.

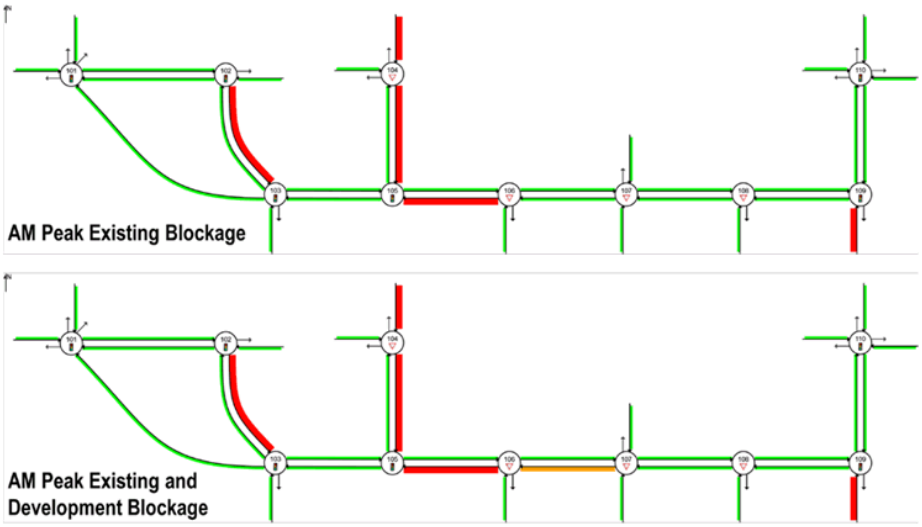


Figure 5.2 AM Peak Existing Traffic Comparison (Blockage Probability)

Blockage probability increases at the Oxford Street / Nelson Street intersection due to additional development traffic turning in and out of Nelson Street, influencing queue length along Oxford Street during the AM peak.

Comparison of Future Scenarios

Table 5.12 through to

Table 5.13 provide comparisons of Delays and Level of Service (LOS), Degree of Saturation (DOS) and Back of Queue respectively.

Table 5.11 AM Peak Future Scenario Comparison (Delay, Level of Service)

Intersection	Average Delay (sec) Exist.	Average Delay (sec) Exist + Dev.	LoS Exist.	LoS Exist. + Dev.
Syd Einfeld Drive / Oxford Street / Ocean Street	140.8	143.1	**LOS F**	**LOS F**
Syd Einfeld Drive / York Road	17.2	17.4	LOS B	LOS B
Oxford Street / York Road	454.7	491.4	**LOS F**	**LOS F**
Nelson Street / Osmund Lane	0.3	1.4	NA	NA
Oxford Street / Nelson Street	30.6	50.2	LOS C	LOS D
Oxford Street / Ruthven Street	3.7	3.7	NA	NA
Oxford Street / Leswell Street / Mill Hill Road	4.3	4.4	NA	NA
Oxford Street / Denison Street	12.8	13.1	NA	NA
Oxford Street / Newland Street	50.6	50.4	LOS D	LOS D
Newland Street / Grafton Street	130.8	114.6	**LOS F**	**LOS F**

Overall, there is an increase in delays across most intersections.

The intersection of Oxford Street / York Road undergoes the largest change in performance, operating at LOS F with extensive queues as a result of additional traffic. This is caused by blockage of the through lane on the southern approach due to the number of left turning vehicles at Oxford Street.

The Oxford Street / Nelson Street intersection performs at the minimum acceptable level (LOS D).

Table 5.12 AM Peak Future Scenario Comparison (Degree of Saturation)

Intersection	Degree of Saturation (DoS) Future	Degree of Saturation (DoS) Future and Development
Syd Einfeld Drive / Oxford Street / Ocean Street	1.219	1.224
Syd Einfeld Drive / York Road	0.935	0.939
Oxford Street / York Road	1.425	1.448
Nelson Street / Osmund Lane	0.196	0.276
Oxford Street / Nelson Street	0.847	0.953
Oxford Street / Ruthven Street	0.679	0.682
Oxford Street / Leswell Street / Mill Hill Road	0.554	0.558
Oxford Street / Denison Street	0.921	0.925
Oxford Street / Newland Street	0.973	0.973
Newland Street / Grafton Street	1.195	1.188

The results show that most intersections exhibit a degree of saturation well above 0.90, indicating intersections are operating beyond their practical capacity, irrespective of additional development traffic.

Table 5.13 AM Peak Future Scenario Comparison (Back of Queue)

Intersection	Back of Queue Future (m)	Back of Queue Future and Development (m)
Syd Einfeld Drive / Oxford Street / Ocean Street	1218.7	1235.5
Syd Einfeld Drive / York Road	316.6	316.6
Oxford Street / York Road	1432.6	1433
Nelson Street / Osmund Lane	38.2	64.1
Oxford Street / Nelson Street	94.5	105.6
Oxford Street / Ruthven Street	98.6	98.6
Oxford Street / Leswell Street / Mill Hill Road	89.9	99.7
Oxford Street / Denison Street	138.9	142.3
Oxford Street / Newland Street	283.7	284.7
Newland Street / Grafton Street	442.4	432

The results indicate significant increases at Oxford Street / Nelson Street, and Nelson Street / Osmund Lane intersections. Queueing along Oxford Street affects multiple intersections due to their proximity.

Blockages

Figure 5.3 compares blockage probability at intersections within the road network with red areas indicating the most severe impacts.

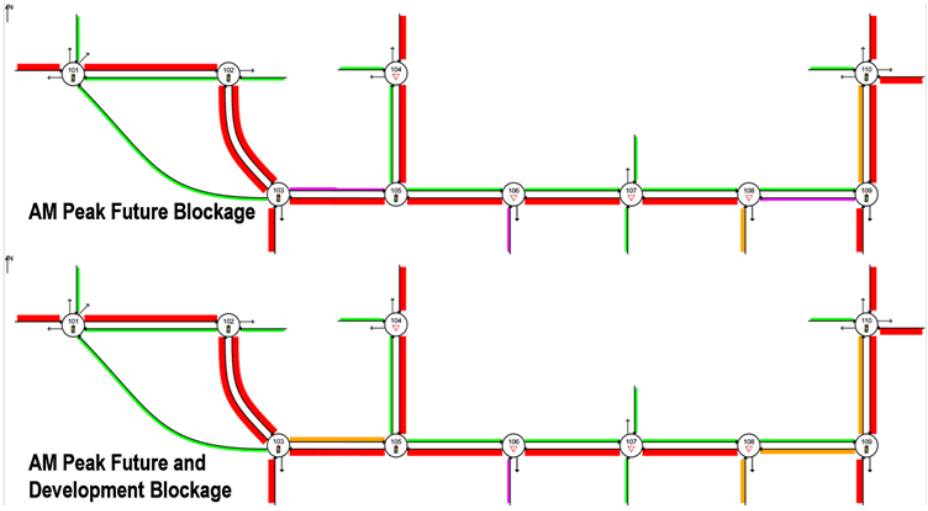


Figure 5.3 AM Peak Future Traffic Comparison (Blockage Probability)

Blockage probability is high along Oxford Street (westbound) under future traffic conditions. Blockage probability increases at Oxford Street / Denison Street, and at Nelson Street / Oxford Street intersections.

5.4.3 PM Peak

Intersection performance summaries for intersections for the PM peak period across all scenarios are displayed in tables Table 5.14 through to Table 5.171717 , including outputs for Degree of Saturation (DoS), Average Vehicle Delay, Level of Service (LoS) and 95th Percentile Back of Queue (queue length).

Existing Conditions

Table 5.14 summarises local intersection performance during the PM peak period under existing traffic conditions.

Table 5.14 PM Peak Existing Traffic Scenario Results

Intersection	Degree of Saturation (DoS)	Average Delay (sec)	Level of Service (LoS)	95th Percentile Queue (m)	Comments
Syd Einfeld Drive / Oxford Street / Ocean Street	0.892	11	LOS A	148.5	LOS C for left turn movements from Ocean Street (north approach)
Syd Einfeld Drive / York Road	0.778	10.4	LOS A	141.4	LOS C for left turn and through movements from Syd Einfeld Drive (east approach)
Oxford Street / York Road	0.844	15.4	LOS B	149.3	LOS C for all movements along Oxford Street (east approach) with extended queueing
Nelson Street / Osmund Lane	0.141	0.2	NA	16.4	Queueing on Nelson Street due to downstream queueing (Oxford Street intersection)
Oxford Street / Nelson Street	0.62	19.2	LOS B	70.6	LOS C for right turn movements along Oxford Street (east approach), queues affect upstream intersections
Oxford Street / Ruthven Street	0.318	1.5	NA	60.1	Queueing on Oxford Street due to downstream queueing
Oxford Street / Leswell Street / Mill Hill Road	0.306	1.9	NA	41	LOS B for right turn movements along Oxford Street and Mill Hill Road.
Oxford Street / Denison Street	0.49	3.9	NA	19.3	queueing on Oxford Street (west approach) due to right turning vehicles onto Denison Street
Oxford Street / Newland Street	0.897	34.8	LOS C	119.6	queueing on Newland Street (north and south approaches)
Newland Street / Grafton Street	0.945	35.1	LOS C	174	**LOS E** for through movements along Grafton Street (east approach) due to lane blockage. **LOS E** movements along Grafton Street (west approach) with queueing on Grafton Street (east approach)

Overall, intersections are operating above the minimum acceptable level (LOS D), with movements along Grafton Street operating at LOS E.

Queues along Newland Street exceed approach capacities and affect upstream intersections at Spring Street / Grafton Street. Queues at the Oxford Street / Nelson Street intersection affect adjacent intersections along Oxford Street.

Existing and Development Conditions

Table 5.15 summarises local intersection performance during the PM peak period under existing traffic and additional development traffic conditions.

Table 5.15 PM Peak Existing and Development Traffic Scenario Results

Intersection	Degree of Saturation (DoS)	Average Delay (sec)	Level of Service (LoS)	95th Percentile Queue (m)	Comments
Syd Einfeld Drive / Oxford Street / Ocean Street	0.893	11	LOS A	148.5	LOS C for right turn movements along Syd Einfeld Drive (east approach) and left turn movements from Ocean Street. Queueing on Ocean Street.
Syd Einfeld Drive / York Road	0.805	10.8	LOS A	147.3	LOS D for left turn movements along Syd Einfeld Drive (east approach)
Oxford Street / York Road	0.847	15.4	LOS B	149.3	LOS C for movements along Oxford Street (east approach) with queueing
Nelson Street / Osmund Lane	0.155	1.3	NA	19.7	Queueing on Nelson Street due to downstream queueing (Oxford Street intersection)
Oxford Street / Nelson Street	0.644	20.5	LOS B	76.1	LOS C for right turn movements along Oxford Street (east approach), queues on Oxford Street (west approach) and other queues affecting upstream intersections.
Oxford Street / Ruthven Street	0.321	1.5	NA	70.3	Queueing on Nelson Street due to downstream queueing
Oxford Street / Leswell Street / Mill Hill Road	0.316	2	NA	50.2	Queueing on Oxford Street due to downstream queueing
Oxford Street / Denison Street	0.573	4.2	NA	19.7	overall good
Oxford Street / Newland Street	0.912	35.8	LOS C	124.1	LOS D for movements along Newland Street (south approach), LOS D for right turn movements along Newland Street (north approach)
Newland Street / Grafton Street	0.952	36.5	LOS C	170.3	**LOS F** for right turn movements along Grafton Street (east approach), **LOS E** for left turn movements and LOS D for through and right movements along Grafton Street (west approach)

Overall, intersections are operating above the minimum acceptable level of service, with movements along Grafton Street operating at LOS E and LOS F.

Queues at Oxford Street / Nelson Street affect upstream queues along Oxford Street. Signalised intersections within the network are running at or near capacity.

Future Traffic Conditions

Table 5.161616 summarises PM peak period intersection performance under future (10 year) traffic conditions..

Table 5.16 PM Peak Future Traffic Scenario Results

Intersection	Degree of Saturation (DoS)	Average Delay (sec)	Level of Service (LoS)	95th Percentile Queue (m)	Comments
Syd Einfeld Drive / Oxford Street / Ocean Street	1.069	28.1	LOS B	164.2	**LOS E** for all movements from Ocean Street (north approach), **LOS F** for right turn movements from Syd Einfeld Drive (east approach)
Syd Einfeld Drive / York Road	0.929	15.2	LOS B	213.4	LOS D for movements along Syd Einfeld Drive (east approach) and extensive queues
Oxford Street / York Road	1.013	46.6	LOS D	149.3	**LOS F** for movements along Oxford Street (eastern approach) and queues
Nelson Street / Osmund Lane	0.169	0.2	NA	39.9	overall good, queueing on Nelson Street due to downstream queueing (Oxford Street intersection)
Oxford Street / Nelson Street	0.745	21.1	LOS B	108	queueing on Oxford Street (west). Other queues affecting downstream intersections
Oxford Street / Ruthven Street	0.442	2.3	NA	73.1	Queueing on Oxford Street due to downstream queues
Oxford Street / Leswell Street / Mill Hill Road	0.391	2.7	NA	51.7	Queueing on Oxford Street due to downstream queues
Oxford Street / Denison Street	0.729	5.7	NA	38.9	Queueing on Oxford Street due to downstream queues
Oxford Street / Newland Street	0.937	36.7	LOS C	161.4	LOS D for movements along Newland Street (north and south approaches) and queueing
Newland Street / Grafton Street	1.188	185.3	**LOS F**	626.3	**LOS F** for movements along east, north and west approaches. **LOS E** along Newland Street Right Turn (south approach). extensive queueing on Newland Street (north approach) and Grafton Street (east approach)

Overall, intersections are operating above the minimum acceptable level, with movements along Newland Street / Grafton Street operating at LOS E or LOS F.

Future plus Development Traffic Conditions

Table 5.171717 summarises PM peak period intersection performance under future (10 year) traffic plus additional development traffic conditions.

Table 5.17 PM Peak Future plus Development Traffic Scenario Results

Intersection	Degree of Saturation (DoS)	Average Delay (sec)	Level of Service (LoS)	95th Percentile Queue (m)	Comments
Syd Einfeld Drive / Oxford Street / Ocean Street	1.07	55.9	**LOS D**	662.6	**LOS F** for movements along Syd Einfeld Drive Right Turn (E) and Ocean Street
Syd Einfeld Drive / York Road	1.142	89.2	**LOS F**	270.1	**LOS F** for movements along Syd Enfield Drive (east and west approaches), extensive queues
Oxford Street / York Road	1.013	46.2	LOS D	149.3	**LOS F** for right turn movements from Oxford Street (east approach), long queues along Oxford Street (east)
Nelson Street / Osmund Lane	0.183	1.2	NA	45.2	overall good, queueing on Nelson Street due to downstream queueing (Oxford Street intersection)
Oxford Street / Nelson Street	0.772	23.1	LOS B	119.7	LOS D for right turn movements from Oxford Street (east approach), long queues on Oxford Street (west). Queues affect downstream intersections.
Oxford Street / Ruthven Street	0.456	2.4	NA	87.4	queueing on Oxford Street due to downstream queueing
Oxford Street / Leswell Street / Mill Hill Road	0.426	2.7	NA	64.4	queueing on Oxford Street due to downstream queueing
Oxford Street / Denison Street	0.743	5.9	NA	41	overall good
Oxford Street / Newland Street	0.965	39.5	LOS C	176	**LOS E** for movements along Newland Street (south approach), **LOS E** right turn movements from Newland Street (north approach), and extensive queueing along Newland Street approaches
Newland Street / Grafton Street	1.227	224	**LOS F**	703.6	**LOS F** for all approaches, extensive queueing on Grafton Street (east) and Newland Street (north)

5.4.4 PM Comparison

A comparison of results under "existing traffic" and "with development traffic" conditions was conducted to highlight issues or changes to the local network as a result of the introduction of additional traffic.

Comparison of Existing Traffic Scenarios

Table 5.18 through to Table 5.20 provide comparisons of Delays and Level of Service (LOS), Degree of Saturation (DOS) and 95th Percentile Back of Queue under existing traffic and existing combined with development traffic conditions.

Table 5.18 PM Peak Traffic Comparison (Delays and Level of Service)

Intersection	Average Delay (sec) Exist.	Average Delay (sec) Exist.+ Dev.	LoS Exist.	LoS Exist. + Dev.
Syd Einfeld Drive / Oxford Street / Ocean Street	11	11	LOS A	LOS A
Syd Einfeld Drive / York Road	10.4	10.8	LOS A	LOS A
Oxford Street / York Road	15.4	15.4	LOS B	LOS B
Nelson Street / Osmund Lane	0.2	1.3	NA	NA
Oxford Street / Nelson Street	19.2	20.5	LOS B	LOS B
Oxford Street / Ruthven Street	1.5	1.5	NA	NA
Oxford Street / Leswell Street / Mill Hill Road	1.9	2	NA	NA
Oxford Street / Denison Street	3.9	4.2	NA	NA
Oxford Street / Newland Street	34.8	35.8	LOS C	LOS C
Newland Street / Grafton Street	35.1	36.5	LOS C	LOS C

A comparison of vehicle delays shows little change, with very few increases to delays at intersections along Oxford Street, including the Oxford Street & Nelson Street intersection. Levels of Service remain unchanged with the additional development traffic. All intersections are operating at an acceptable Level of Service.

Table 5.19 PM Peak Traffic Comparison (Degree of Saturation)

Intersection	DoS Exist.	DoS Exist. + Dev.
Syd Einfeld Drive / Oxford Street / Ocean Street	0.892	0.893
Syd Einfeld Drive / York Road	0.778	0.805
Oxford Street / York Road	0.844	0.847
Nelson Street / Osmund Lane	0.141	0.155
Oxford Street / Nelson Street	0.62	0.644
Oxford Street / Ruthven Street	0.318	0.321
Oxford Street / Leswell Street / Mill Hill Road	0.306	0.316
Oxford Street / Denison Street	0.49	0.573
Oxford Street / Newland Street	0.897	0.912
Newland Street / Grafton Street	0.945	0.952

Overall, there are marginal worsening across the network as a result of development traffic and intersections remain relatively stable.

It should be noted that a number of intersections are currently operating at a Degree of Saturation above 0.90, indicating the intersection is exceeding its practical capacity. This is irrespective of the additional development traffic.

Table 5.20 PM Peak Traffic Comparison (Back of Queue)

Intersection	Back of Queue (Exist. Traffic, m)	Back of Queue (Exist. + Dev. Traffic, m)
Syd Einfeld Drive / Oxford Street / Ocean Street	148.5	148.5
Syd Einfeld Drive / York Road	141.4	147.3
Oxford Street / York Road	149.3	149.3
Nelson Street / Osmund Lane	16.4	19.7
Oxford Street / Nelson Street	70.6	76.1
Oxford Street / Ruthven Street	60.1	70.3
Oxford Street / Leswell Street / Mill Hill Road	41	50.2
Oxford Street / Denison Street	19.3	19.7
Oxford Street / Newland Street	119.6	124.1
Newland Street / Grafton Street	174	170.3

The largest increase in queue length occurs at the Oxford Street / Ruthven Street intersection, an increase of approximately 10m, primarily caused by queueing at the Oxford Street / Nelson Street intersection.

Whilst queue increases are minimal, the spacing of intersections within the network in conjunction with queue increases may have an effect on the performance of the network, particularly along Oxford Street.

It should also be noted queues along Nelson Street, Oxford Street (at York Road, Nelson Street, Ruthven Street and Mill Hill Road) and Grafton Street (at Newland Street) exceed the storage capacity of the respective approaches to those intersections, with and without the addition of development traffic.

Blockages

A comparison of blockage probability under existing and with additional development traffic conditions reveal little change in blockage probability as shown in Figure 5.4.

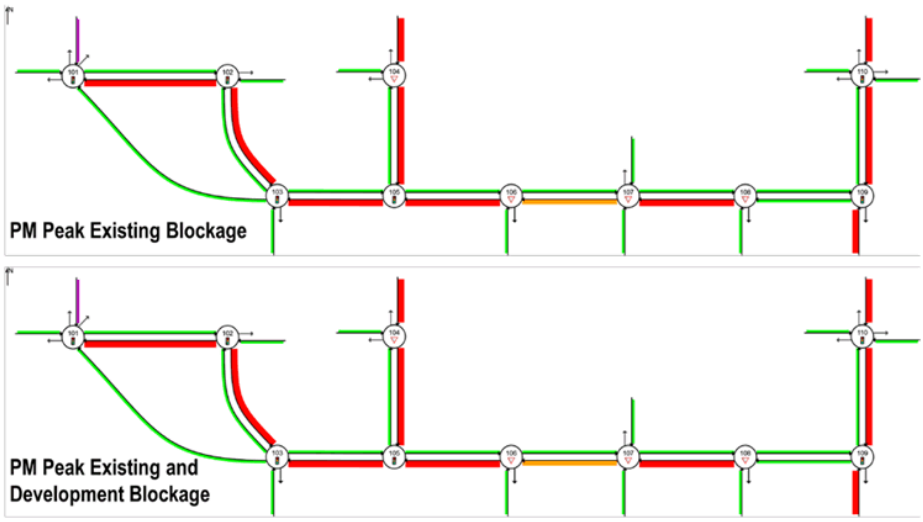


Figure 5.4 PM Peak Existing Traffic Conditions Comparison (Blockage Probability)

Comparison of Future Scenarios

Table 5.212121 through to Table 5.232323 provide comparisons of Delays and Level of Service (LOS), Degree of Saturation (DOS) and Back of Queue for the future year modelled scenarios.

Table 5.21 PM Peak Future Scenario Comparison (Delay, Level of Service)

Intersection	Average Delay (sec) Exist.	Average Delay (sec) Exist. + Dev.	LoS Exist.	LoS Exist. + Dev.
Syd Einfeld Drive / Oxford Street / Ocean Street	28.1	55.9	LOS B	**LOS D**
Syd Einfeld Drive / York Road	15.2	89.2	LOS B	**LOS F**
Oxford Street / York Road	46.6	46.2	LOS D	LOS D
Nelson Street / Osmund Lane	0.2	1.2	NA	NA
Oxford Street / Nelson Street	21.1	23.1	LOS B	LOS B
Oxford Street / Ruthven Street	2.3	2.4	NA	NA
Oxford Street / Leswell Street / Mill Hill Road	2.7	2.7	NA	NA
Oxford Street / Denison Street	5.7	5.9	NA	NA
Oxford Street / Newland Street	36.7	39.5	LOS C	LOS C
Newland Street / Grafton Street	185.3	224	**LOS F**	**LOS F**

Overall, there is an increase in delays across most intersections. The intersection of Syd Einfeld Drive / York Road undergoes the largest change in performance, operating at LOS F as a result of the additional traffic. This is caused by the increase of right turning traffic from Syd Einfeld Drive (west) to York Road.

The Oxford Street / Nelson Street intersection performs at LOS B with and without additional traffic.

Table 5.22 PM Peak Future Scenario Comparison (Degree of Saturation)

Intersection	Degree of Saturation (DoS) Exist.	Degree of Saturation (DoS) Exist. + Dev.
Syd Einfeld Drive / Oxford Street / Ocean Street	1.069	1.07
Syd Einfeld Drive / York Road	0.929	1.142
Oxford Street / York Road	1.013	1.013
Nelson Street / Osmund Lane	0.169	0.183
Oxford Street / Nelson Street	0.745	0.772
Oxford Street / Ruthven Street	0.442	0.456
Oxford Street / Leswell Street / Mill Hill Road	0.391	0.426
Oxford Street / Denison Street	0.729	0.743
Oxford Street / Newland Street	0.937	0.965
Newland Street / Grafton Street	1.188	1.227

The comparison shows that some intersections exhibit a degree of saturation well above 0.90, indicating intersections are operating beyond their practical capacity, both with and without the development traffic.

Table 5.23 PM Peak Future Scenario Comparison (Back of Queue)

Intersection	Back of Queue Exist. (m)	Back of Queue Exist. + Dev. (m)
Syd Einfeld Drive / Oxford Street / Ocean Street	164.2	662.6
Syd Einfeld Drive / York Road	213.4	270.1
Oxford Street / York Road	149.3	149.3
Nelson Street / Osmund Lane	39.9	45.2
Oxford Street / Nelson Street	108	119.7
Oxford Street / Ruthven Street	73.1	87.4
Oxford Street / Leswell Street / Mill Hill Road	51.7	64.4
Oxford Street / Denison Street	38.9	41
Oxford Street / Newland Street	161.4	176
Newland Street / Grafton Street	626.3	703.6

The comparison indicates an overall increase in queue length over the network, with significant increases at Syd Enfield Drive / Oxford Street / Ocean Street, Syd Einfeld / York Road, Newland Street / Grafton Street, and Nelson Street / Osmund Lane intersections.

Queueing along Oxford Street (at Nelson Street) extends to adjacent upstream intersections at York Road / Osmund Lane.

A comparison of blockage probability under existing and additional development traffic conditions reveal little change in blockage probability as shown in Figure 5.555. This figure does however indicate that most intersections within the network are operating beyond capacity under these scenarios.

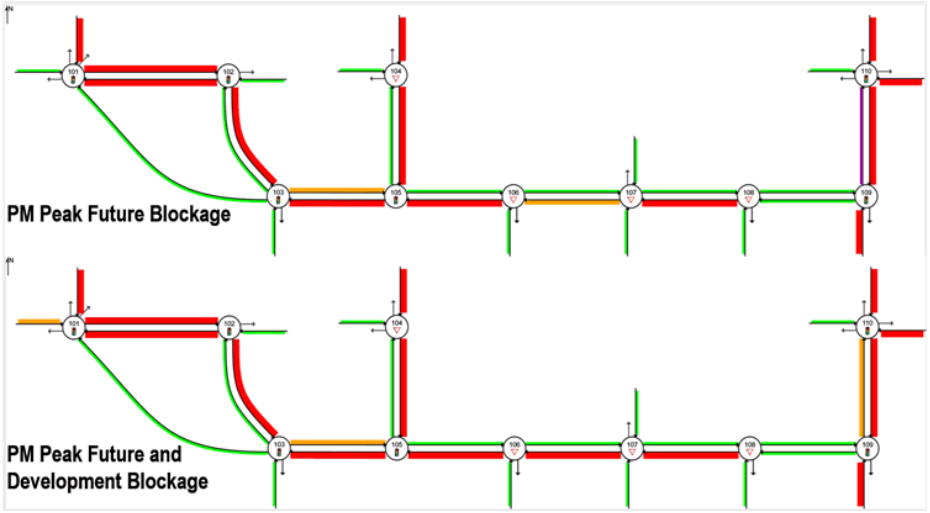


Figure 5.5 PM Peak Future Traffic Conditions Comparison (Blockage Probability)

5.4.5 Saturday Peak

Intersection performance summaries for intersections for the Saturday peak period across all scenarios are displayed in Table 5.24 through to Table 5.27 including outputs for Degree of Saturation (DoS), Average Vehicle Delay, Level of Service (LoS) and 95th Percentile Back of Queue (queue length).

Existing Conditions

Table 5.24 summarises local intersection performance during the Saturday peak period under existing traffic conditions.

Table 5.24 Saturday Peak Existing Traffic Scenario Results

Intersection	Degree of Saturation (DoS)	Average Delay (sec)	Level of Service (LoS)	95th Percentile Queue (m)	Comments
Syd Einfeld Drive / Oxford Street / Ocean Street	0.91	26.8	LOS B	297.7	LOS D for movements along Oxford Street (west approach) and extensive queueing
Syd Einfeld Drive / York Road	0.765	12.7	LOS A	161	LOS C for movements along Syd Enfield Drive (east approach) and queueing
Oxford Street / York Road	0.905	25.5	LOS B	115	LOS D for through movements along York Road (north approach), queueing on York Road (south approach)
Nelson Street / Osmund Lane	0.129	0.1	NA	47.5	queueing on Nelson Street due to downstream queueing (Oxford Street intersection)
Oxford Street / Nelson Street	0.911	14.9	LOS B	44.1	**LOS E** for right turn movements from Nelson Street (north approach), queues affect upstream intersections
Oxford Street / Ruthven Street	0.301	1.1	NA	9.3	queueing on Oxford Street due to downstream queueing
Oxford Street / Leswell Street / Mill Hill Road	0.294	1.6	NA	3.8	No issues
Oxford Street / Denison Street	0.309	3.4	NA	14.9	No issues
Oxford Street / Newland Street	0.926	36.6	LOS C	109.8	LOS D for movements along Newland Street (south approach) right turn from Newland Street (north approach). Queues along Newland Street (both approaches)
Newland Street / Grafton Street	0.913	28.4	LOS B	95.5	**LOS E** for through and right turn movements from Grafton Street (east), blocked by large volume of left turns

Existing plus Development Traffic Conditions

Table 5.25 summarises local intersection performance during the Saturday peak period under existing plus additional development traffic conditions.

Table 5.25 Saturday Peak Existing plus Development Traffic Scenario Results

Intersection	Degree of Saturation (DoS)	Average Delay (sec)	Level of Service (LoS)	95th Percentile Queue (m)	Comments
Syd Einfeld Drive / Oxford Street / Ocean Street	0.906	26.6	LOS B	298.6	LOS D for movements along Oxford Street (west approach) and extensive queueing on east and west approaches
Syd Einfeld Drive / York Road	0.772	12.7	LOS A	161.2	queueing Syd Einfeld Drive (east approach)
Oxford Street / York Road	0.905	26.5	LOS B	149.3	LOS D for through movements along York Road (north approach), queues on York Road (south approach) and Oxford St (east approach)
Nelson Street / Osmund Lane	0.16	1.2	NA	52.8	queueing on Nelson Street due to downstream queueing (Oxford Street intersection
Oxford Street / Nelson Street	0.91	19.3	LOS B	47.2	**LOS E** right turn movements from Nelson Street, queues affect upstream intersections
Oxford Street / Ruthven Street	0.306	1.1	NA	21.5	queueing on Oxford Street due to downstream queueing
Oxford Street / Leswell Street / Mill Hill Road	0.3	1.6	NA	5.6	No issues
Oxford Street / Denison Street	0.312	3.4	NA	15.9	No issues
Oxford Street / Newland Street	0.977	43.3	LOS D	136.5	**LOS E** for movements along Newland Street (south), with queues along Newland Street (both approaches)
Newland Street / Grafton Street	0.918	28.5	LOS C	96.6	**LOS E** for through and right turn movements from Grafton Street (east approach). LOS D for movements from Grafton Street (west approach), queueing along Grafton Street (east)

Future Traffic Conditions

Table 5.26 summarises local intersection performance during the Saturday peak period under future traffic conditions.

Table 5.26 Saturday Peak Future Traffic Scenario Results

Intersection	Degree of Saturation (DoS)	Average Delay (sec)	Level of Service (LoS)	95th Percentile Queue (m)	Comments
Syd Einfeld Drive / Oxford Street / Ocean Street	1.019	62.3	**LOS E**	618.4	**LOS F** for through movements from Oxford Street (west approach) and extensive queues
Syd Einfeld Drive / York Road	0.909	19.3	LOS B	239.4	LOS D for movements along Syd Einfeld Drive (east approach) and queueing
Oxford Street / York Road	1.673	383.1	**LOS F**	700.8	**LOS F** for movements on York Road (both approaches), queues on York Road (south approach) and Oxford Street (east approach)
Nelson Street / Osmund Lane	0.154	0.1	NA	65.9	queueing on Nelson Street due to downstream queueing (Oxford Street intersection
Oxford Street / Nelson Street	0.901	21.6	LOS B	81.4	**LOS E** right turn from Nelson Street (north approach), queues affect upstream intersections
Oxford Street / Ruthven Street	0.363	1.4	NA	51.5	queueing on Oxford Street due to downstream queueing
Oxford Street / Leswell Street / Mill Hill Road	0.375	1.8	NA	32.9	overall good, queueing on Oxford Street due to downstream queueing
Oxford Street / Denison Street	0.455	3.9	NA	20.3	overall good, queueing on Oxford Street due to downstream queueing
Oxford Street / Newland Street	0.988	46.4	LOS D	175.1	**LOS E** for movements along Newland Street (south approach), queueing on Newland Street (both approaches) affecting upstream intersections (Grafton Street and Spring Street)
Newland Street / Grafton Street	1.596	209.6	**LOS F**	723.2	**LOS F** for movements along Grafton Street (east) and extensive queueing

Future plus Development Traffic Conditions

Table 5.27 summarises local intersection performance during the Saturday peak period under future plus development traffic conditions.

Table 5.27 Saturday Peak Future plus Development Traffic Scenario Results

Intersection	Degree of Saturation (DoS)	Average Delay (sec)	Level of Service (LoS)	95th Percentile Queue (m)	Comments
Syd Einfeld Drive / Oxford Street / Ocean Street	1.026	65.7	**LOS E**	645.2	**LOS F** for movements along Oxford Street (west approach), and extensive queueing
Syd Einfeld Drive / York Road	0.918	21.3	LOS B	259.4	**LOS E** for left turn movements from Syd Enfield Drive (east approach), and extensive queues
Oxford Street / York Road	1.74	414.2	**LOS F**	751.8	**LOS F** York Road S and N, extensive queueing York Road S
Nelson Street / Osmund Lane	0.181	1.1	NA	70.4	queueing on Nelson Street due to downstream queueing (Oxford Street intersection
Oxford Street / Nelson Street	0.912	24.8	LOS B	98.9	**LOS E** Right turn from Nelson Street, queues on oxford Street affect upstream intersections at Osmund Lane and Ruthven Street
Oxford Street / Ruthven Street	0.365	1.4	NA	62.9	queues resulting from downstream intersection at Nelson Street
Oxford Street / Leswell Street / Mill Hill Road	0.381	1.8	NA	42.9	queues on Oxford Street result of downstream queueing
Oxford Street / Denison Street	0.572	4.3	NA	24.5	No issues
Oxford Street / Newland Street	0.993	48.5	LOS D	181.2	**LOS F** Newland Street S, excessive queueing Newland Street both approaches
Newland Street / Grafton Street	1.596	225.1	**LOS F**	723.2	**LOS F** Grafton Street E, excessive queueing Grafton Street E **LOS E** Newland Street S and Grafton Street W

5.4.6 Saturday Peak Comparison

A comparison of results under existing plus development traffic conditions for the Saturday peak period was conducted to highlight impacts on the local network as a result of additional traffic.

Existing Traffic Conditions

Table 5.28 through to Table 5.30 provide comparisons of Delays and Level of Service (LOS), Degree of Saturation (DOS) and 95th Percentile Back of Queue under existing traffic and combined with development traffic conditions.

Table 5.28 Saturday Peak Existing Traffic Comparison (Delays and Level of Service)

Intersection	Average Delay (sec) Exist.	Average Delay (sec) Exist. + Dev.	LoS Exist.	LoS Exist. + Dev.
Syd Einfeld Drive / Oxford Street / Ocean Street	26.8	26.6	LOS B	LOS B
Syd Einfeld Drive / York Road	12.7	12.7	LOS A	LOS A
Oxford Street / York Road	25.5	26.5	LOS B	LOS B
Nelson Street / Osmund Lane	0.1	1.2	NA	NA
Oxford Street / Nelson Street	14.9	19.3	LOS B	LOS B
Oxford Street / Ruthven Street	1.1	1.1	NA	NA
Oxford Street / Leswell Street / Mill Hill Road	1.6	1.6	NA	NA
Oxford Street / Denison Street	3.4	3.4	NA	NA
Oxford Street / Newland Street	36.6	43.3	LOS C	LOS D
Newland Street / Grafton Street	28.4	28.5	LOS B	LOS C

A comparison of vehicle delays shows little change across the network, with very few increases to delays at intersections along Oxford Street. The intersection of Oxford Street / Nelson Street experiences an increase in delays of five seconds. Levels of Service across the network remain unchanged with the additional development traffic. All intersections are operating at an acceptable Level of Service.

Table 5.29 Saturday Peak Existing Traffic Comparison (Degree of Saturation)

Intersection	DoS Exist.	DoS Exist. + Dev.
Syd Einfeld Drive / Oxford Street / Ocean Street	0.91	0.906
Syd Einfeld Drive / York Road	0.765	0.772
Oxford Street / York Road	0.905	0.905
Nelson Street / Osmund Lane	0.129	0.16
Oxford Street / Nelson Street	0.911	0.91
Oxford Street / Ruthven Street	0.301	0.306
Oxford Street / Leswell Street / Mill Hill Road	0.294	0.3
Oxford Street / Denison Street	0.309	0.312
Oxford Street / Newland Street	0.926	0.977
Newland Street / Grafton Street	0.913	0.918

Overall, there are marginal increases in DoS across the network as a result of development traffic. Intersections remain relatively stable.

It should be noted a number of intersections are currently operating at a Degree of Saturation above 0.90, indicating the intersection is or its practical exceeding capacity. This is irrespective of the additional development traffic.

Table 5.30 Saturday Peak Existing Traffic Comparison (Back of Queue)

Intersection	Back of Queue (Exist. Traffic, m)	Back of Queue (Exist. + Dev. Traffic, m)
Syd Einfeld Drive / Oxford Street / Ocean Street	297.7	298.6
Syd Einfeld Drive / York Road	161	161.2
Oxford Street / York Road	115	149.3
Nelson Street / Osmund Lane	47.5	52.8
Oxford Street / Nelson Street	44.1	47.2
Oxford Street / Ruthven Street	9.3	21.5
Oxford Street / Leswell Street / Mill Hill Road	3.8	5.6
Oxford Street / Denison Street	14.9	15.9
Oxford Street / Newland Street	109.8	136.5
Newland Street / Grafton Street	95.5	96.6

The largest increase in queue length occurs at the Oxford Street / Ruthven Street intersection, an increase of approximately 10m, primarily caused by queueing downstream at the Oxford Street / Nelson Street intersection.

Whilst queue increases are minimal, due to the spacing of intersections within the network, any changes to queue lengths have an effect on the performance of the network, particularly at intersections along Oxford Street. It should also be noted queues along Nelson Street, Oxford Street (at York Road, Nelson Street, Ruthven Street and Mill Hill Road) and Grafton Street (at Newland Street) exceed the capacity of the respective approaches to those intersections, both with and without the addition of development traffic.

A comparison of blockage probability under existing and additional development traffic conditions reveal an increase along the Oxford Street south approach to the Syd Einfeld Drive / Oxford Street / Ocean Street intersection, shown in Figure 5.6, with red areas showing most severe queuing.

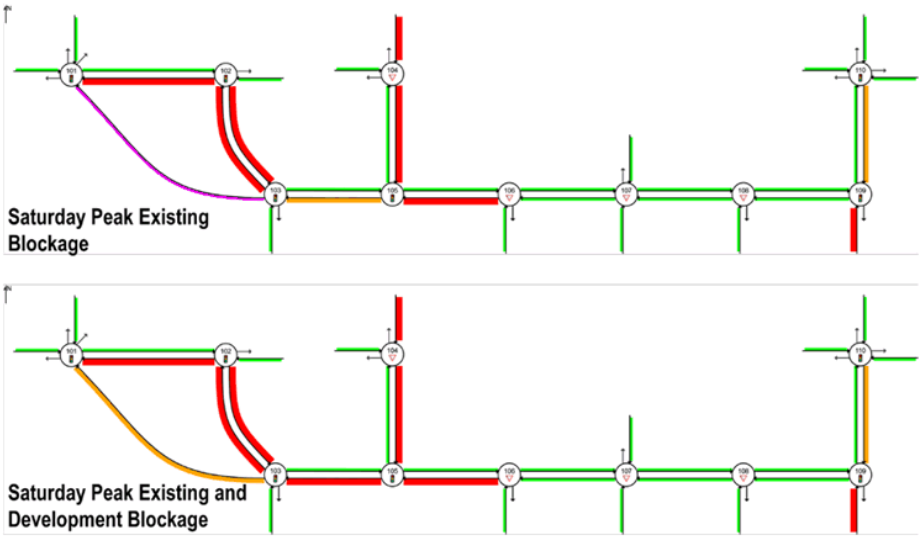


Figure 5.6 Saturday Peak Existing Traffic Conditions Comparison (Blockage Probability)

Future Traffic Conditions

Table 5.31 through to Table 5.33 provide comparisons of Delays and Level of Service (LOS), Degree of Saturation (DOS) and Back of Queue under future traffic and additional development traffic conditions.

Table 5.31 Saturday Peak Future Traffic Comparison (Delay, Level of Service)

Intersection	Average Delay (sec) Exist.	Average Delay (sec) Exist. + Dev.	LoS Exist.	LoS Exist. + Dev.
Syd Einfeld Drive / Oxford Street / Ocean Street	62.3	65.7	**LOS E**	**LOS E**
Syd Einfeld Drive / York Road	19.3	21.3	LOS B	LOS B
Oxford Street / York Road	383.1	414.2	**LOS F**	**LOS F**
Nelson Street / Osmund Lane	0.1	1.1	NA	NA
Oxford Street / Nelson Street	21.6	24.8	LOS B	LOS B
Oxford Street / Ruthven Street	1.4	1.4	NA	NA
Oxford Street / Leswell Street / Mill Hill Road	1.8	1.8	NA	NA
Oxford Street / Denison Street	3.9	4.3	NA	NA
Oxford Street / Newland Street	46.4	48.5	LOS D	LOS D
Newland Street / Grafton Street	209.6	225.1	**LOS F**	**LOS F**

Overall, there is a small increase in delays across the whole network. However, Level of Service remains unchanged at each intersection.

The intersection of Newland Street / Grafton Street experiences the greatest increase in delays, and operates at a LoS F.

The introduction of development traffic in the future scenario has little effect on traffic performance relative to the future base case. However, it should be noted that long delays are experienced at a number of intersections regardless of whether development-generated traffic is included or not.

Table 5.32 Saturday Peak Future Traffic Comparison (Degree of Saturation)

Intersection	Degree of Saturation (DoS) Exist.	Degree of Saturation (DoS) Exist. + Dev.
Syd Einfeld Drive / Oxford Street / Ocean Street	1.019	1.026
Syd Einfeld Drive / York Road	0.909	0.918
Oxford Street / York Road	1.673	1.74
Nelson Street / Osmund Lane	0.154	0.181
Oxford Street / Nelson Street	0.901	0.912
Oxford Street / Ruthven Street	0.363	0.365
Oxford Street / Leswell Street / Mill Hill Road	0.375	0.381
Oxford Street / Denison Street	0.455	0.572
Oxford Street / Newland Street	0.988	0.993
Newland Street / Grafton Street	1.596	1.596

The comparison shows overall increases in traffic through the intersections, but the DoS remains relatively similar. Whilst the addition of development traffic has little effect on the network performance, it should be noted that more than half of the intersections exhibit a degree of saturation well above 0.90, indicating intersections are operating beyond their practical capacity, both with and without additional development traffic.

Table 5.33 Saturday Peak Future Traffic Comparison (Back of Queue)

Intersection	Back of Queue Exist. (m)	Back of Queue Exist. + Dev. (m)
Syd Einfeld Drive / Oxford Street / Ocean Street	618.4	645.2
Syd Einfeld Drive / York Road	239.4	259.4
Oxford Street / York Road	700.8	751.8
Nelson Street / Osmund Lane	65.9	70.4
Oxford Street / Nelson Street	81.4	98.9
Oxford Street / Ruthven Street	51.5	62.9
Oxford Street / Leswell Street / Mill Hill Road	32.9	42.9
Oxford Street / Denison Street	20.3	24.5
Oxford Street / Newland Street	175.1	181.2
Newland Street / Grafton Street	723.2	723.2

The comparison indicates an overall increase in queue length over the network, with significant increases at the Oxford Street / York Road intersection and at the Oxford Street / Nelson Street intersection.

Queueing along Oxford Street (at Nelson Street) extends to adjacent upstream intersections at York Road, Osmund Lane, Ruthven Street and Mill Hill Road.

A comparison of blockage probability under future and additional development traffic conditions reveals an increase along the Oxford Street west approach to the Oxford Street / Nelson Street intersection, shown in Figure 5.7, with the red area showing the most severe queuing.

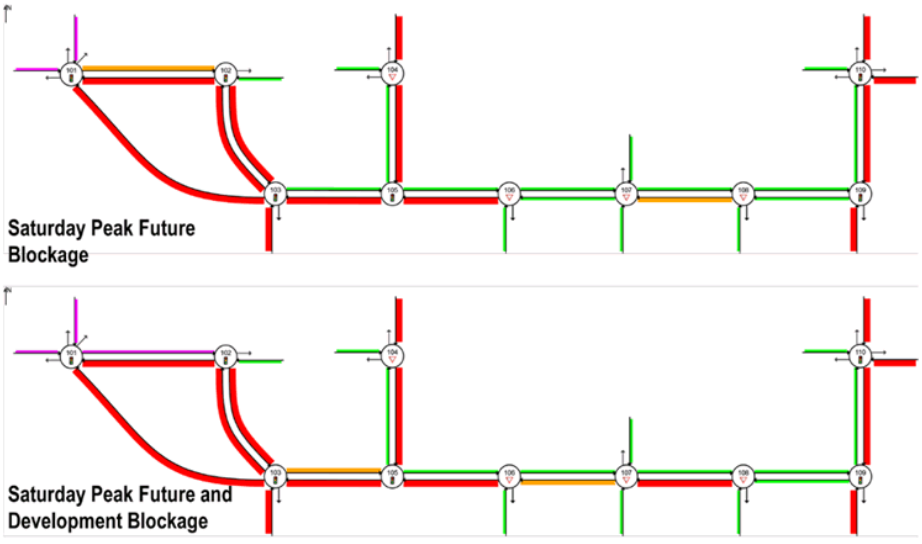


Figure 5.7 Saturday Peak Future Traffic Conditions Comparison (Blockage Probability)

6. PARKING ANALYSIS

A parking occupancy study was conducted to investigate resident parking behaviour during hours outside of parking restriction hours within the study area.

6.1 PARKING PROVISIONS

The site is located in Parking Zone 1 according to Section 8.1 of the *Waverley DCP (2012)*. Table 6.1 summarises the zone's description, proximity to public transport and parking rates. Table 6.2 outlines the minimum car parking requirements for high-density residential flat buildings within Parking Zone 1 based on the DCP.

Table 6.1: Parking Zone 1 Summary

Description	Location	Parking Provision Rate
High accessibility to public transport and services, high density and prone to traffic congestion	Within 800m of Bondi Junction Railway Station where multi-dwelling housing is permitted	Low

Source: Waverley DCP (2012)

Table 6.2: Car Parking Requirements

Land Use	Dwellings	Type	Parking Rate	Parking Required
Studio	8	Residents	0.5 spaces per dwelling	4 spaces
1 bedroom dwellings	41	Residents	0.6 spaces per dwelling	25 spaces
2 bedroom dwellings	22	Residents	0.9 spaces per dwelling	20 spaces
3 bedroom dwellings	23	Residents	1.4 spaces per dwelling	32 spaces
All of the above	94	Visitors	1 space per 5 dwellings	19 spaces
Total				**100 spaces**

6.2 PARKING OCCUPANCY STUDY

6.2.1 Context

To understand overnight parking behaviour in the local area, a parking occupancy study was undertaken.

A survey was conducted on the evening of Wednesday 24th May 2017 and the morning of Thursday 25th May 2017, to capture the number of vehicles parked, and the number of spaces available in the study area. The number of vehicles displaying Waverley Council residential parking permits was also identified.

The parking study area is shown in Figure 6.1 and includes the following street sections outlined in Table 6.3.

Table 6.3: Parking Occupancy Study Areas

Area	Street	Side	Section
A	Oxford Street	North	Nelson Street to Newland Street
B	Oxford Street	South	Newland Street to St James Road
C	St James Road	Both	Oxford Street to bend at Gowrie Street
D	Nelson Street	Both	Oxford Street to bend at Grafton Street
E	Ruthven Street	Both	Oxford Street to Gowrie Street
F	Leswell Street	Both	Oxford Street to Grafton Street
G	Mill Hill Road	Both	Oxford Street to 34 Mill Hill Road
H	Denison Street	Both	Oxford Street to Gowrie Street
I	Hegarty Lane	Both	Leswell Street to Vernon Street
J	Vernon Street	Both	Hegarty Lane to Oxford Street
K	Grafton Street	Both	Nelson Street to Newland Street

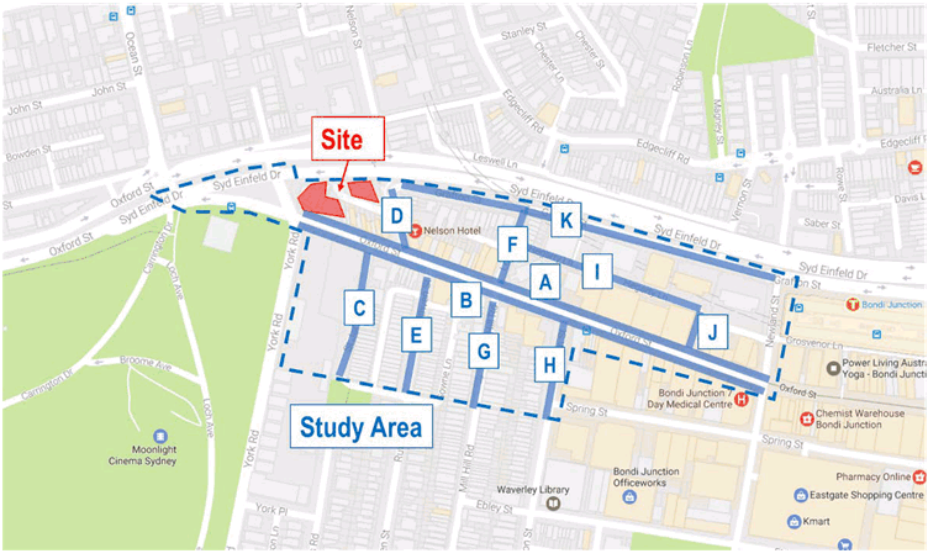


Figure 6.1: Parking Study Area

6.2.2 Parking Restrictions

Kerbside parking restrictions listed in Table 6.4 were identified in each of the study areas.

Table 6.4: Parking Restrictions in Parking Study Areas

Area	Street	Restriction	Time
A	Oxford Street (North)	1/2P Ticket	8am-12pm
		2P Ticket	12pm-7pm & 4pm-7pm
		Truck Zone	6:30am-4pm
B	Oxford Street (South)	Loading Zone	6:30am-4pm
		1/2P Ticket	8am-12pm
		2P Ticket	12pm-7pm & 4pm-7pm
C	St James Road	1P (east side only)	8am-6pm (Mon-Fri) Permit Holders Excepted Area 2 (east side)
		Unrestricted (Westside only)	Untimed
D	Nelson Street	1/2P Ticket	8am-12pm,
		Truck Zone	6:30am-4pm
		2P Ticket	4pm-7pm, 12pm-7pm
E	Ruthven Street	1P	8am-6pm(Mon-Sat) Permit Holders Excepted Area 22)
		2P	8am-6pm(Mon-Sat) Permit Holders Excepted Area 22)
		1/2P Ticket	8am-12pm
		2P Ticket	12pm-7pm
F	Leswell Street	Truck Zone	6:30am-4pm
		2P	4pm-7pm
		1/2P Ticket	8am-12pm (Permit Holders Excepted Area 22, Westside Only)
		2P Ticket	12pm-7pm, (Permit Holders Excepted Area 22, Westside Only)
G	Mill Hill Road	1P	8am-6pm (Permit Holders Excepted Area 22)
H	Denison Street	1/2P Ticket	8am-12pm
		2P Ticket	12pm-9pm
		Loading Zone	6:30am-4pm
I	Hegarty Lane	Unrestricted	Untimed
		Loading Zone	Untimed
J	Vernon Street	1/2P Ticket	8am-12pm
		2P Ticket	12pm-7pm
K	Grafton Street	1/2P Ticket	8am-12pm (Permit Holders Excepted Area 22, Northern side Only)
		2P Ticket	12pm-6pm (Permit Holders Excepted Area 22, Northern side Only)

6.3 SURVEY RESULTS

6.3.1 Parking Occupancy

Table 6.5 and Figure 6.2 summarises the findings of the parking survey

Table 6.5 Parking Occupancy Rates

Area	Street	Total Number of Spaces	Occupancy at 10pm (vehicles)	Occupancy at 6am (vehicles)
A	Oxford Street N	33	15	21
B	Oxford Street S	32	6	17
C	St James Road	27	26	24
D	Nelson Street	6	2	1
E	Ruthven Street	37	30	35
F	Leswell Street	15	7	7
G	Mill Hill Road	27	22	20
H	Denison Street	18	9	9
I	Hegarty Lane	5	4	4
J	Vernon Street	9	1	7
K	Grafton Street	68	50	48
	TOTAL	277	172	193

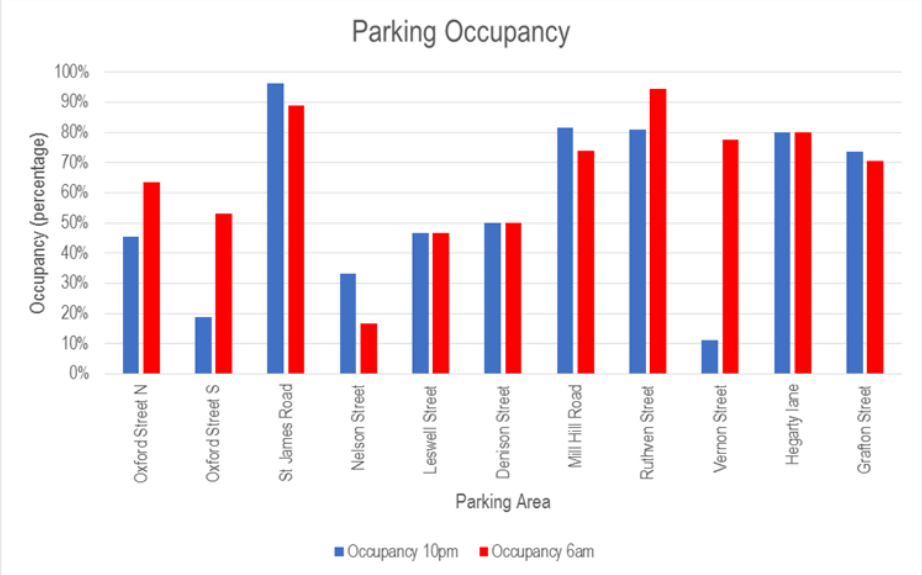


Figure 6.2 Parking Occupancy Survey Results

The survey results indicate that over 80 on-street parking spaces are spare in both count periods. Some streets, particularly St James Road and Ruthven Street are heavily occupied overnight, with occupancy rates remaining above 80% in both count periods.

6.3.2 Permit Holders

The number of vehicles displaying a residential parking permit is summarised in Table 6.6.

Table 6.6: Residential Permit Holders

Area	Street	Residential Permit Holders 10pm	Residential Permit Holders (%) 10pm	Residential Permit Holders 6am	Residential Permit Holders (%) 6am
A	Oxford Street N	33	6%	3	9%
B	Oxford Street S	32	3%	3	9%
C	St James Road	27	41%	12	36%
D	Nelson Street	6	0%	0	0%
E	Ruthven Street	37	33%	5	15%
F	Leswell Street	15	44%	9	27%
G	Mill Hill Road	27	59%	13	39%
H	Denison Street	18	41%	20	61%
I	Hegarty Lane	5	0%	4	12%
J	Vernon Street	9	0%	0	0%
K	Grafton Street	68	37%	24	73%
OVERALL		**83**	**30%**	**93**	**34%**

This data indicates most vehicles parked overnight may not belong to local residents with permits and are not exempt from some parking restrictions on residential streets. This may further indicate that parking turnover during parking restriction hours may be higher than expected due to low use by local residents.

7. PROPOSED OSMUND LANE SHARED ZONE

7.1 PROPOSAL

The urban street scaping upgrades as part of the planning proposal propose that Osmund Lane be converted to a 10km/h "Shared Zone". This street will provide vehicle access to the site's basement car park entry/exit and provide pedestrian access from Nelson Street and the proposed "Public Plazetta" through to the base of the towers and the site through link to Oxford Street. The proposed concept is shown in Figure 7.1.

Figure 7.1: Proposed Shared Zone on Osmund Lane

7.2 SHARED ZONE WARRANTS (FOR INFORMATION)

The suitability of a shared zone in Osmund Lane is subject to requirements set out by Transport for NSW's *Safer Speeds Policy and Guideline on Shared Zones*. The warrants are provided in Table 7.1 for information only.

Table 7.1: Transport for NSW Shared Zone Warrant

Features	Shared Zone Criteria
Current traffic flows	≤ 100 vehicles per hour and ≤ 1000 vehicles per day
Current speed limit ≤ 50 km/h	≤ 50 km/h
Length of proposed Shared Zone	≤ 400m
Current speed limit of adjoining roads	≤ 50 km/h
Current carriageway width minimum trafficable width of 2.8 metres	minimum trafficable width of 2.8m
Route access	must not be located along bus routes or heavy vehicle routes except delivery or garbage trucks
Streets with narrow or no footpaths	where pedestrians are forced to use the road
Kerbs	kerbs must be removed unless excepted by the RMS (See Section 4)

7.3 ROAD SAFETY AUDIT

A Road Safety Audit (RSA) was conducted to determine the suitability of the proposed shared zone and identify possible risks and hazards to both pedestrians and road users. The RSA was conducted independently from this traffic assessment report and is located in Appendix C.

For the purpose of the Road Safety Audit of the proposed shared zone, it is assumed that all development generated traffic is to use the on-site basement car park, with proposed access located at the western end of Osmund Lane.

8. CONCLUSIONS

The assessment of current and future traffic demands with and without the development, as well as potential parking demands and an Independent RSA of the shared zone proposal has resulted in the following conclusions being drawn:

- The development produces an additional 121 vehicles during the critical PM peak hour;
- Most key intersections near the subject site are operating at capacity in the future regardless of the development. In this context, the additional development traffic has a marginal effect on the performance of intersections within the local road network.
- In all cases, queues form at the Oxford Street / Nelson Street intersection which consequentially affect upstream intersections along Oxford Street;
- In general and where possible, the targeted introduction of longer turning pockets/lanes will reduce the incidence of blocking and increase the capacity of intersections;
- Reasonable levels of on-street parking are available over-night, with over 80 spaces available across the study area at both 10pm and 6am. The development is not expected to have a significant impact on available overnight parking capacity;
- 30% of vehicles surveyed over-night displayed Residential Permits, and hence parking turnover during the hours with parking restriction may be higher than expected due to the expected low use by local residents during these times; and.
- The outcomes of the independent Road Safety Audit of the proposed Shared Zone are provided in Appendix C.

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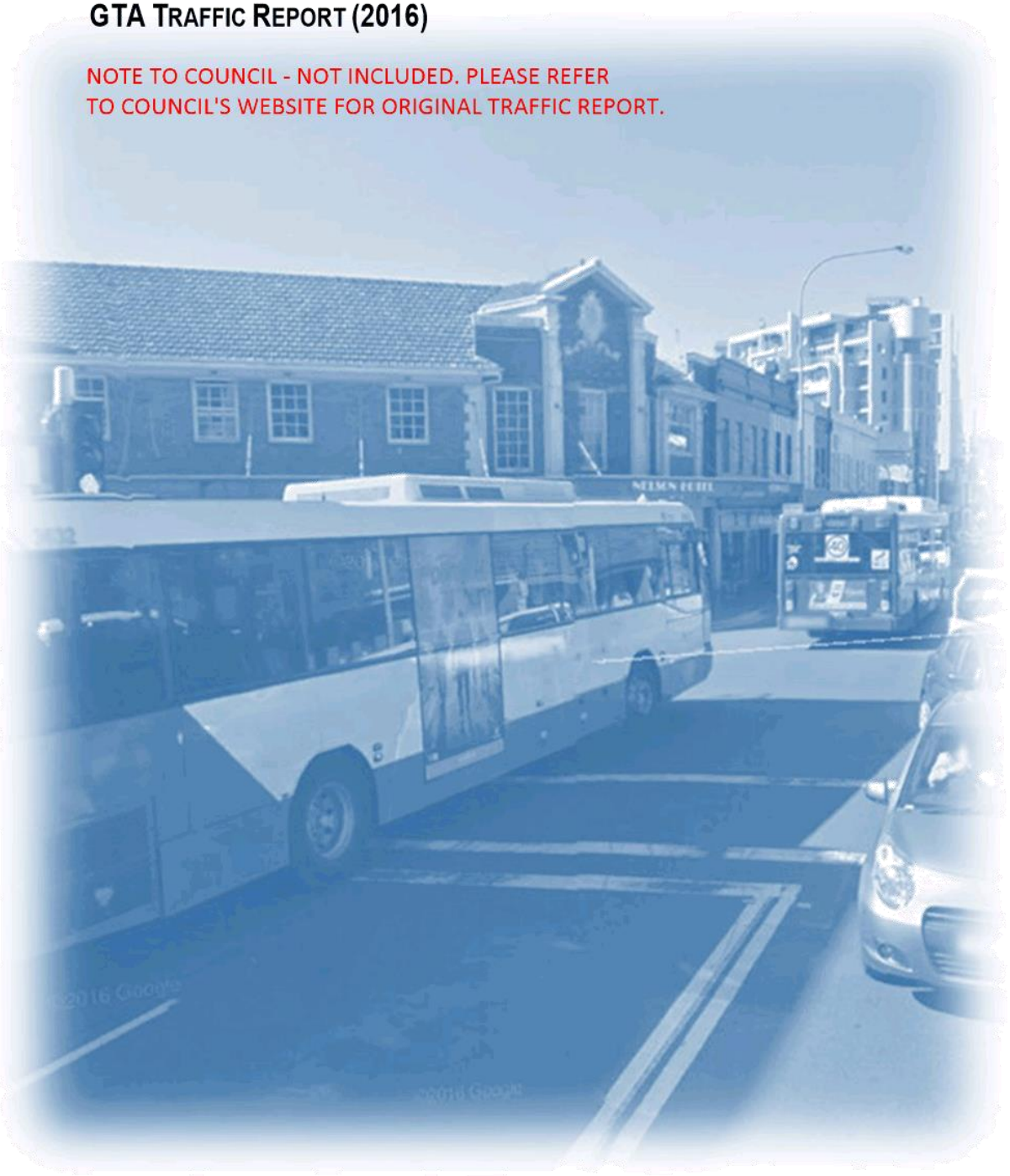
APPENDIX A

GTA TRAFFIC REPORT (2016)

NOTE TO COUNCIL - NOT INCLUDED. PLEASE REFER TO COUNCIL'S WEBSITE FOR ORIGINAL TRAFFIC REPORT.



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APPENDIX B

SIDRA INTERSECTION PERFORMANCE SUMMARIES

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MOVEMENT SUMMARY

Network: N101 [Oxford Street West Precinct]

Site: 108 [Oxford Street / Denison Street]

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Denison Street													
9	L2	322	1.6	322	1.6	0.490	6.1	LOS A	2.1	14.6	0.34	0.58	24.9
7	R2	34	2.9	34	2.9	0.490	11.4	LOS A	2.1	14.6	0.34	0.58	24.9
Approach		356	1.7	356	1.7	0.490	6.6	LOS A	2.1	14.6	0.34	0.58	24.9
East: Oxford Street													
6	L2	63	0.0	63	0.0	0.141	4.6	LOS A	0.0	0.0	0.00	0.14	43.3
5	T1	187	21.4	187	21.4	0.141	0.0	LOS A	0.0	0.0	0.00	0.14	45.8
Approach		250	16.0	250	16.0	0.141	1.2	NA	0.0	0.0	0.00	0.14	45.0
West: Oxford Street													
11	T1	284	19.7	284	19.7	0.353	1.1	LOS A	2.5	19.3	0.43	0.30	28.4
10	R2	282	1.4	282	1.4	0.353	5.7	LOS A	2.5	19.3	0.43	0.30	33.5
Approach		566	10.6	566	10.6	0.353	3.4	NA	2.5	19.3	0.43	0.30	31.6
All Vehicles		1172	9.0	1172	9.0	0.490	3.9	NA	2.5	19.3	0.31	0.35	33.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 1.4 %

Number of Iterations: 30 (maximum specified: 30)

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MOVEMENT SUMMARY

Network: N101 [Oxford Street West Precinct]

Site: 109 [Oxford Street / Newland Street]

New Site
Signals - Fixed Time Coordinated Cycle Time = 107 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Newland Street													
9	L2	140	0.7	140	0.7	0.897	49.4	LOS D	16.5	116.7	1.00	1.04	3.7
8	T1	473	1.1	473	1.1	0.897	46.9	LOS D	16.8	118.9	1.00	1.01	3.7
Approach		613	1.0	613	1.0	0.897	47.5	LOS D	16.8	118.9	1.00	1.02	3.7
North: Newland Street													
2	T1	518	1.2	518	1.2	0.712	25.8	LOS B	16.9	119.6	0.81	0.73	14.0
1	R2	110	35.5	110	35.5	0.712	51.9	LOS D	9.1	75.3	0.96	1.00	6.6
Approach		628	7.2	628	7.2	0.712	30.4	LOS C	16.9	119.6	0.83	0.78	12.1
West: Oxford Street													
12	L2	164	33.5	164	33.5	0.198	13.6	LOS A	2.6	23.7	0.33	0.63	26.6
10	R2	154	1.3	154	1.3	0.213	25.3	LOS B	4.3	30.3	0.57	0.70	19.7
Approach		318	17.9	318	17.9	0.213	19.3	LOS B	4.3	30.3	0.44	0.66	22.5
All Vehicles		1559	6.9	1559	6.9	0.897	34.8	LOS C	16.9	119.6	0.82	0.85	10.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 1.4 %
Number of Iterations: 30 (maximum specified: 30)

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	50	47.8	LOS E	0.1	0.1	0.95	0.95
P3	North Full Crossing	50	47.8	LOS E	0.1	0.1	0.95	0.95
P4	West Full Crossing	50	47.8	LOS E	0.1	0.1	0.95	0.95
All Pedestrians		150	47.8	LOS E			0.95	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Network: N101 [Oxford Street West Precinct]

Site: 110 [Newland Street / Grafton Street]

New Site
Signals - Fixed Time Coordinated Cycle Time = 107 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Newland Street													
9	L2	52	0.0	52	0.0	0.420	11.8	LOS A	5.9	41.7	0.32	0.33	40.3
8	T1	337	0.9	337	0.9	0.420	7.3	LOS A	5.9	41.7	0.32	0.33	32.7
7	R2	194	1.5	194	1.5	0.643	51.2	LOS D	9.1	64.4	0.95	0.96	13.4
Approach		583	1.0	583	1.0	0.643	22.3	LOS B	9.1	64.4	0.53	0.54	22.2
East: Grafton Street													
6	L2	214	14.0	214	14.0	0.478	13.2	LOS A	3.6	28.4	0.34	0.64	24.9
5	T1	178	2.8	178	2.8	0.915	57.6	LOS E	15.3	108.5	0.92	1.06	20.6
4	R2	90	0.0	90	0.0	0.915	62.2	LOS E	15.3	108.5	0.92	1.06	12.6
Approach		482	7.3	482	7.3	0.915	38.8	LOS C	15.3	108.5	0.66	0.87	19.5
North: Newland Street													
3	L2	77	0.0	77	0.0	0.078	5.7	LOS A	0.2	1.3	0.09	0.55	38.1
2	T1	388	1.0	388	1.0	0.945	47.0	LOS D	24.6	174.0	1.00	1.15	7.7
Approach		465	0.9	465	0.9	0.945	40.1	LOS C	24.6	174.0	0.85	1.05	10.4
West: Grafton Street													
12	L2	44	2.3	44	2.3	0.887	60.0	LOS E	8.1	57.8	1.00	0.95	19.6
11	T1	99	2.0	99	2.0	0.887	55.4	LOS D	8.1	57.8	1.00	0.95	21.1
10	R2	16	6.3	16	6.3	0.092	52.9	LOS D	0.8	5.8	0.94	0.69	17.9
Approach		159	2.5	159	2.5	0.887	56.4	LOS D	8.1	57.8	0.99	0.92	20.4
All Vehicles		1689	2.9	1689	2.9	0.945	35.1	LOS C	24.6	174.0	0.70	0.81	18.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 1.4 %
Number of Iterations: 30 (maximum specified: 30)

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	50	38.8	LOS D	0.1	0.1	0.85	0.85
P2	East Full Crossing	50	31.5	LOS D	0.1	0.1	0.77	0.77
P3	North Full Crossing	50	47.8	LOS E	0.1	0.1	0.95	0.95
P4	West Full Crossing	50	16.9	LOS B	0.1	0.1	0.56	0.56
All Pedestrians		200	33.7	LOS D			0.78	0.78

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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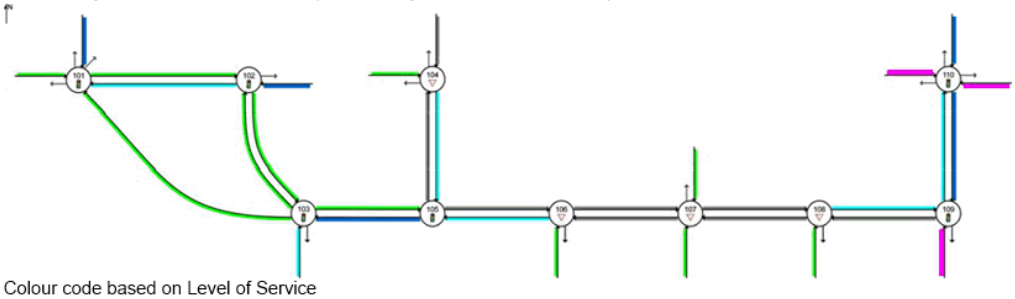
APPROACH LEVEL OF SERVICE

Approach Level of Service for Network Sites

Network: N101 [Oxford Street West Precinct+ Dev]

PM Existing Base + Dev Network
Network Cycle Time = 120 seconds (Network Cycle Time - User-Given)



Colour code based on Level of Service

LOS A LOS B LOS C LOS D LOS E LOS F TWSC Major Rd (HCM LOS Rule)

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Delay model settings are specified for individual Sites forming the Network.

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MOVEMENT SUMMARY

Network: N101 [Oxford Street West Precinct+Dev]

Site: 101 [101-Syd Einfeld Drive / Oxford Street / Ocean Street]

New Site
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Network Cycle Time - User-Given)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Oxford Street													
18	L1	788	5.1	788	5.1	0.648	5.1	LOS A	2.5	18.2	0.06	0.50	53.1
Approach		788	5.1	788	5.1	0.648	5.1	LOS A	2.5	18.2	0.06	0.50	53.1
East: Syd Einfeld Drive													
5	T1	874	2.3	874	2.3	0.239	3.6	LOS A	2.6	18.7	0.17	0.14	55.4
4	R2	691	2.6	691	2.6	0.893	36.0	LOS C	20.8	148.5	0.85	0.87	14.4
Approach		1565	2.4	1565	2.4	0.893	17.9	LOS B	20.8	148.5	0.47	0.47	36.7
North: Ocean Street													
17	L3	10	0.0	10	0.0	0.712	38.4	LOS C	12.6	91.6	0.76	0.79	13.7
1	L2	590	4.2	590	4.2	0.712	37.5	LOS C	12.7	92.1	0.76	0.78	8.4
Approach		600	4.2	600	4.2	0.712	37.6	LOS C	12.7	92.1	0.76	0.78	8.5
West: Oxford Street													
12	L2	56	1.8	56	1.8	0.049	9.2	LOS A	0.5	3.5	0.17	0.59	48.7
19	L1	161	0.0	161	0.0	0.153	17.9	LOS B	4.5	31.2	0.51	0.68	41.5
11	T1	2972	1.6	2972	1.6	0.718	3.3	LOS A	9.0	64.0	0.23	0.21	55.3
Approach		3189	1.5	3189	1.5	0.718	4.1	LOS A	9.0	64.0	0.24	0.24	54.1
All Vehicles		6142	2.5	6142	2.5	0.893	11.0	LOS A	20.8	148.5	0.33	0.38	44.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 1.0 %
Number of Iterations: 28 (maximum specified: 30)

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P3	North Full Crossing	50	40.1	LOS E	0.1	0.1	0.82	0.82
P41	West Stage 1	50	32.3	LOS D	0.1	0.1	0.73	0.73
P42	West Stage 2	50	40.9	LOS E	0.1	0.1	0.83	0.83
All Pedestrians		150	37.8	LOS D			0.79	0.79

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Network: N101 [Oxford Street West Precinct+Dev]

Site: 102 [Syd Einfeld Drive / York Road]

New Site
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Network Cycle Time - User-Given)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
South: York Road													
9	L2	492	2.0	492	2.0	0.212	6.8	LOS A	2.3	16.5	0.17	0.58	15.9
Approach		492	2.0	492	2.0	0.212	6.8	LOS A	2.3	16.5	0.17	0.58	15.9
East: Syd Einfeld Drive													
6	L2	65	16.9	65	16.9	0.805	43.6	LOS D	19.5	142.4	0.93	0.86	37.7
5	T1	1073	2.6	1073	2.6	0.805	37.6	LOS C	20.6	147.3	0.93	0.85	37.9
Approach		1138	3.4	1138	3.4	0.805	37.9	LOS C	20.6	147.3	0.93	0.85	37.9
West: Syd Einfeld Drive													
11	T1	2196	0.7	2196	0.7	0.390	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
10	R2	1366	4.2	1366	4.2	0.804	7.1	LOS A	5.0	36.0	0.10	0.60	29.0
Approach		3562	2.0	3562	2.0	0.804	2.7	LOS A	5.0	36.0	0.04	0.23	56.6
All Vehicles		5192	2.3	5192	2.3	0.805	10.8	LOS A	20.6	147.3	0.25	0.40	48.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 1.0 %
Number of Iterations: 28 (maximum specified: 30)

BITZIOS consulting

MOVEMENT SUMMARY

Network: N101 [Oxford Street West Precinct+Dev]

Site: 103 [Oxford Street / York Road]

New Site
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Network Cycle Time - User-Given)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: York Road													
9	L2	238	1.3	238	1.3	0.316	20.3	LOS B	9.0	63.6	0.56	0.71	25.6
8	L1	330	1.2	330	1.2	0.316	16.2	LOS B	9.0	63.6	0.43	0.64	28.1
7	R2	7	100.0	7	100.0	0.316	17.0	LOS B	6.0	43.7	0.40	0.63	28.7
Approach		575	2.4	575	2.4	0.316	17.9	LOS B	9.0	63.6	0.48	0.67	27.0
East: Oxford Street													
6	L2	44	13.6	44	13.6	0.262	30.2	LOS C	6.0	44.7	0.61	0.56	25.0
5	T1	550	6.7	550	6.7	0.847	35.4	LOS C	20.3	149.3	0.85	0.82	8.6
4	R1	162	3.7	162	3.7	0.847	42.2	LOS C	20.3	149.3	0.93	0.90	8.0
Approach		756	6.5	756	6.5	0.847	36.6	LOS C	20.3	149.3	0.86	0.82	9.6
NorthWest: York Road													
3	L1	602	8.1	602	8.1	0.378	2.3	LOS A	0.6	4.2	0.03	0.51	29.0
2	R1	829	2.4	829	2.4	0.844	4.0	LOS A	5.8	41.8	0.13	0.52	42.5
Approach		1431	4.8	1431	4.8	0.844	3.3	LOS A	5.8	41.8	0.09	0.51	41.1
All Vehicles		2762	4.8	2762	4.8	0.847	15.4	LOS B	20.3	149.3	0.38	0.63	24.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 1.0 %
Number of Iterations: 28 (maximum specified: 30)

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	50	29.5	LOS C	0.1	0.1	0.70	0.70
All Pedestrians		50	29.5	LOS C			0.70	0.70

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

BITZIOS consulting

MOVEMENT SUMMARY

Network: N101 [Oxford Street West Precinct+Dev]

Site: 104 [Nelson Street / Osmund Lane]

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Nelson Street													
9	L2	91	0.0	91	0.0	0.089	4.4	LOS A	0.3	2.1	0.31	0.56	25.7
8	T1	87	2.3	87	2.3	0.046	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		178	1.1	178	1.1	0.089	2.2	NA	0.3	2.1	0.16	0.29	30.8
North: Nelson Street													
2	T1	261	1.9	261	1.9	0.155	0.1	LOS A	2.8	19.7	0.05	0.03	43.5
1	R2	18	0.0	18	0.0	0.155	2.9	LOS A	2.8	19.7	0.05	0.03	27.7
Approach		279	1.8	279	1.8	0.155	0.2	NA	2.8	19.7	0.05	0.03	39.5
West: Osmund Lane													
12	L2	8	0.0	8	0.0	0.054	4.0	LOS A	0.1	0.9	0.27	0.56	22.3
10	R2	20	0.0	20	0.0	0.054	6.2	LOS A	0.1	0.9	0.27	0.56	21.9
Approach		28	0.0	28	0.0	0.054	5.6	LOS A	0.1	0.9	0.27	0.56	22.0
All Vehicles		485	1.4	485	1.4	0.155	1.3	NA	2.8	19.7	0.10	0.16	32.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 1.0 %

Number of Iterations: 28 (maximum specified: 30)

BITZIOS consulting

MOVEMENT SUMMARY

Network: N101 [Oxford Street West Precinct+Dev]

Site: 105 [Oxford Street / Nelson Street]

New Site
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Network Cycle Time - User-Given)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Oxford Street													
5	T1	507	8.9	507	8.9	0.539	26.0	LOS B	3.8	28.1	0.69	0.61	3.7
4	R2	42	2.4	42	2.4	0.539	33.2	LOS C	3.8	28.1	0.74	0.67	3.1
Approach		549	8.4	549	8.4	0.539	26.6	LOS B	3.8	28.1	0.70	0.62	3.6
North: Nelson Street													
3	L2	32	3.1	32	3.1	0.038	16.4	LOS B	0.7	4.8	0.38	0.59	7.9
1	R2	249	1.6	249	1.6	0.644	24.9	LOS B	6.2	44.1	0.66	0.75	5.0
Approach		281	1.8	281	1.8	0.644	23.9	LOS B	6.2	44.1	0.63	0.74	5.2
West: Oxford Street													
12	L2	136	0.7	136	0.7	0.195	30.2	LOS C	5.2	36.5	0.70	0.73	10.2
11	T1	473	11.6	473	11.6	0.643	8.5	LOS A	9.9	76.1	0.39	0.34	23.3
Approach		609	9.2	609	9.2	0.643	13.4	LOS A	9.9	76.1	0.45	0.43	18.0
All Vehicles		1439	7.4	1439	7.4	0.644	20.5	LOS B	9.9	76.1	0.58	0.56	9.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 1.0 %
Number of Iterations: 28 (maximum specified: 30)

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Average Back of Queue Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P3	North Full Crossing	50	24.1	LOS C	0.1	0.1	0.63	0.63
P4	West Full Crossing	50	20.5	LOS C	0.1	0.1	0.58	0.58
All Pedestrians		100	22.3	LOS C			0.61	0.61

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

BITZIOS consulting

MOVEMENT SUMMARY

Network: N101 [Oxford Street West Precinct+Dev]

Site: 106 [Oxford Street / Ruthven Street]

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Ruthven Street													
9	L2	39	2.6	39	2.6	0.271	4.1	LOS A	0.7	5.2	0.55	0.70	9.4
7	R2	39	12.8	39	12.8	0.271	17.2	LOS B	0.7	5.2	0.55	0.70	9.4
Approach		78	7.7	78	7.7	0.271	10.6	LOS A	0.7	5.2	0.55	0.70	9.4
East: Oxford Street													
6	L2	37	0.0	37	0.0	0.152	4.3	LOS A	9.4	70.3	0.00	0.07	38.8
5	T1	510	8.8	510	8.8	0.152	0.0	LOS A	9.4	70.3	0.00	0.03	47.3
Approach		547	8.2	547	8.2	0.152	0.3	NA	9.4	70.3	0.00	0.04	46.4
West: Oxford Street													
11	T1	457	12.0	457	12.0	0.321	0.8	LOS A	0.0	0.0	0.17	0.06	29.3
10	R2	48	2.1	48	2.1	0.321	6.6	LOS A	0.0	0.0	0.17	0.06	27.3
Approach		505	11.1	505	11.1	0.321	1.4	NA	0.0	0.0	0.17	0.06	28.9
All Vehicles		1130	9.5	1130	9.5	0.321	1.5	NA	9.4	70.3	0.11	0.09	34.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 1.0 %
Number of Iterations: 28 (maximum specified: 30)

BITZIOS consulting

MOVEMENT SUMMARY

Network: N101 [Oxford Street West Precinct+Dev]

Site: 107 [Oxford Street / Mill Hill Road / Leswell Street]

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Mill Hill Road													
9	L2	34	0.0	34	0.0	0.072	6.5	LOS A	0.2	1.4	0.52	0.69	34.1
8	T1	4	0.0	4	0.0	0.072	11.6	LOS A	0.2	1.4	0.52	0.69	34.3
7	R2	3	0.0	3	0.0	0.072	16.9	LOS B	0.2	1.4	0.52	0.69	34.1
Approach		41	0.0	41	0.0	0.072	7.7	LOS A	0.2	1.4	0.52	0.69	34.1
East: Oxford Street													
5	T1	476	9.5	476	9.5	0.316	0.6	LOS A	6.7	50.2	0.17	0.07	39.7
4	R2	53	0.0	53	0.0	0.316	7.8	LOS A	6.7	50.2	0.17	0.07	34.8
Approach		529	8.5	529	8.5	0.316	1.3	NA	6.7	50.2	0.17	0.07	38.9
North: Leswell Street													
3	L2	103	1.0	103	1.0	0.257	5.9	LOS A	0.9	6.2	0.59	0.78	16.1
1	R2	37	0.0	37	0.0	0.257	16.5	LOS B	0.9	6.2	0.59	0.78	16.1
Approach		140	0.7	140	0.7	0.257	8.7	LOS A	0.9	6.2	0.59	0.78	16.1
West: Oxford Street													
12	L2	34	2.9	34	2.9	0.283	4.3	LOS A	0.0	0.0	0.00	0.04	27.8
11	T1	462	12.8	462	12.8	0.283	0.0	LOS A	0.0	0.0	0.00	0.04	47.0
Approach		496	12.1	496	12.1	0.283	0.3	NA	0.0	0.0	0.00	0.04	43.8
All Vehicles		1206	8.8	1206	8.8	0.316	2.0	NA	6.7	50.2	0.16	0.16	35.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 1.0 %

Number of Iterations: 28 (maximum specified: 30)

BITZIOS consulting

MOVEMENT SUMMARY

Network: N101 [Oxford Street West Precinct+Dev]

Site: 108 [Oxford Street / Denison Street]

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Denison Street													
9	L2	322	1.6	322	1.6	0.573	7.2	LOS A	2.7	19.0	0.36	0.63	22.8
7	R2	34	2.9	34	2.9	0.573	12.7	LOS A	2.7	19.0	0.36	0.63	22.8
Approach		356	1.7	356	1.7	0.573	7.7	LOS A	2.7	19.0	0.36	0.63	22.8
East: Oxford Street													
6	L2	63	0.0	63	0.0	0.151	4.6	LOS A	0.4	3.3	0.00	0.13	43.5
5	T1	207	19.3	207	19.3	0.151	0.0	LOS A	0.4	3.3	0.00	0.13	46.2
Approach		270	14.8	270	14.8	0.151	1.1	NA	0.4	3.3	0.00	0.13	45.3
West: Oxford Street													
11	T1	286	19.6	286	19.6	0.358	1.2	LOS A	2.6	19.7	0.44	0.31	28.2
10	R2	282	1.4	282	1.4	0.358	5.9	LOS A	2.6	19.7	0.44	0.31	33.3
Approach		568	10.6	568	10.6	0.358	3.5	NA	2.6	19.7	0.44	0.31	31.4
All Vehicles		1194	8.9	1194	8.9	0.573	4.2	NA	2.7	19.7	0.32	0.36	32.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 1.0 %
Number of Iterations: 28 (maximum specified: 30)

BITZIOS consulting

MOVEMENT SUMMARY

Network: N101 [Oxford Street West Precinct+Dev]

Site: 109 [Oxford Street / Newland Street]

New Site
Signals - Fixed Time Coordinated Cycle Time = 107 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Newland Street													
9	L2	153	0.7	153	0.7	0.912	51.1	LOS D	17.3	122.2	1.00	1.06	3.5
8	T1	473	1.1	473	1.1	0.912	48.6	LOS D	17.5	123.7	1.00	1.04	3.6
Approach		626	1.0	626	1.0	0.912	49.2	LOS D	17.5	123.7	1.00	1.04	3.6
North: Newland Street													
2	T1	518	1.2	518	1.2	0.726	25.8	LOS B	17.5	124.1	0.82	0.74	14.0
1	R2	117	33.3	117	33.3	0.726	53.0	LOS D	9.1	75.6	0.97	1.01	6.4
Approach		635	7.1	635	7.1	0.726	30.8	LOS C	17.5	124.1	0.84	0.79	12.0
West: Oxford Street													
12	L2	165	33.3	165	33.3	0.199	13.6	LOS A	2.6	23.8	0.33	0.63	26.6
10	R2	155	1.3	155	1.3	0.215	25.3	LOS B	4.3	30.5	0.57	0.70	19.7
Approach		320	17.8	320	17.8	0.215	19.3	LOS B	4.3	30.5	0.45	0.66	22.5
All Vehicles		1581	6.8	1581	6.8	0.912	35.8	LOS C	17.5	124.1	0.82	0.86	9.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 1.0 %
Number of Iterations: 28 (maximum specified: 30)

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Average Back of Queue Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P1	South Full Crossing	50	47.8	LOS E	0.1	0.1	0.95	0.95
P3	North Full Crossing	50	47.8	LOS E	0.1	0.1	0.95	0.95
P4	West Full Crossing	50	47.8	LOS E	0.1	0.1	0.95	0.95
All Pedestrians		150	47.8	LOS E			0.95	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Network: N101 [Oxford Street West Precinct+Dev]

Site: 110 [Newland Street / Grafton Street]

New Site
Signals - Fixed Time Coordinated Cycle Time = 107 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total	Demand Flows HV	Arrival Flows Total	Arrival Flows HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Newland Street													
9	L2	52	0.0	52	0.0	0.412	11.2	LOS A	5.5	38.6	0.29	0.31	40.9
8	T1	337	0.9	337	0.9	0.412	6.6	LOS A	5.5	38.6	0.29	0.31	33.7
7	R2	195	1.5	195	1.5	0.668	51.6	LOS D	9.2	65.6	0.96	0.96	13.3
Approach		584	1.0	584	1.0	0.668	22.0	LOS B	9.2	65.6	0.52	0.53	22.4
East: Grafton Street													
6	L2	221	13.6	221	13.6	0.544	15.4	LOS B	4.7	36.9	0.43	0.67	23.0
5	T1	178	2.8	178	2.8	0.952	70.4	LOS E	17.2	122.2	0.93	1.19	18.2
4	R2	90	0.0	90	0.0	0.952	74.9	LOS F	17.2	122.2	0.93	1.19	10.9
Approach		489	7.2	489	7.2	0.952	46.4	LOS D	17.2	122.2	0.71	0.96	17.3
North: Newland Street													
3	L2	77	0.0	77	0.0	0.076	5.4	LOS A	0.1	1.0	0.07	0.55	38.5
2	T1	388	1.0	388	1.0	0.939	43.8	LOS D	24.1	170.3	0.98	1.12	8.2
Approach		465	0.9	465	0.9	0.939	37.4	LOS C	24.1	170.3	0.83	1.03	11.0
West: Grafton Street													
12	L2	44	2.3	44	2.3	0.887	60.0	LOS E	8.1	57.8	1.00	0.95	19.6
11	T1	99	2.0	99	2.0	0.887	55.4	LOS D	8.1	57.8	1.00	0.95	21.1
10	R2	16	6.3	16	6.3	0.092	52.9	LOS D	0.8	5.8	0.94	0.69	17.9
Approach		159	2.5	159	2.5	0.887	56.4	LOS D	8.1	57.8	0.99	0.92	20.4
All Vehicles		1697	2.9	1697	2.9	0.952	36.5	LOS C	24.1	170.3	0.70	0.82	17.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 1.0 %
Number of Iterations: 28 (maximum specified: 30)

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Average Back of Queue Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P1	South Full Crossing	50	39.6	LOS D	0.1	0.1	0.86	0.86
P2	East Full Crossing	50	30.0	LOS C	0.1	0.1	0.75	0.75
P3	North Full Crossing	50	47.8	LOS E	0.1	0.1	0.95	0.95
P4	West Full Crossing	50	16.3	LOS B	0.1	0.1	0.55	0.55
All Pedestrians		200	33.4	LOS D			0.78	0.78

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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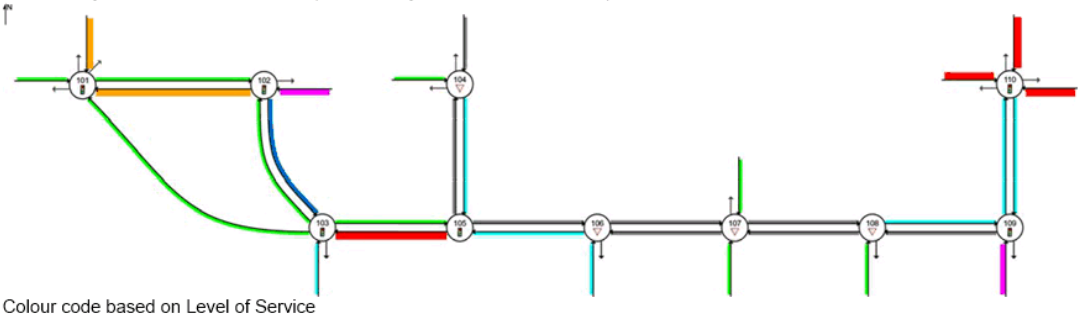
APPROACH LEVEL OF SERVICE

Approach Level of Service for Network Sites

Network: N101 [Oxford Street West Precinct]

PM Peak Future Base Network
Network Cycle Time = 120 seconds (Network Cycle Time - User-Given)



Colour code based on Level of Service

LOS A LOS B LOS C LOS D LOS E LOS F TWSC Major Rd (HCM LOS Rule)

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).

Delay model settings are specified for individual Sites forming the Network.

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MOVEMENT SUMMARY

Network: N101 [Oxford Street West Precinct]

Site: 101 [101-Syd Einfeld Drive / Oxford Street / Ocean Street]

New Site
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Network Cycle Time - User-Given)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
SouthEast: Oxford Street													
18	L1	936	5.1	921	5.1	0.758	5.2	LOS A	4.1	30.1	0.08	0.51	53.0
Approach		936	5.1	921 N1	5.1	0.758	5.2	LOS A	4.1	30.1	0.08	0.51	53.0
East: Syd Einfeld Drive													
5	T1	1048	2.3	1047	2.3	0.287	3.7	LOS A	3.3	23.6	0.18	0.15	55.2
4	R2	828	2.6	827	2.6	1.069	144.7	LOS F	20.8	148.5	0.90	1.26	4.5
Approach		1876	2.4	1873 N1	2.4	1.069	66.0	LOS E	20.8	148.5	0.50	0.64	18.3
North: Ocean Street													
17	L3	12	0.0	12	0.0	0.940	69.8	LOS E	22.6	163.6	0.80	1.01	8.5
1	L2	695	4.3	695	4.3	0.940	68.7	LOS E	22.6	164.2	0.80	1.00	5.0
Approach		707	4.2	707	4.2	0.940	68.7	LOS E	22.6	164.2	0.80	1.00	5.0
West: Oxford Street													
12	L2	67	1.8	67	1.8	0.061	11.7	LOS A	0.9	6.2	0.24	0.59	46.6
19	L1	193	0.0	193	0.0	0.220	18.2	LOS B	5.4	38.1	0.52	0.68	41.3
11	T1	3476	1.7	3476	1.7	0.862	6.3	LOS A	20.1	142.4	0.38	0.37	51.4
Approach		3736	1.6	3736	1.6	0.862	7.0	LOS A	20.1	142.4	0.39	0.39	50.6
All Vehicles		7255	2.5	7237 N1	2.5	1.069	28.1	LOS B	22.6	164.2	0.42	0.53	32.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 58.2 %
Number of Iterations: 10 (maximum specified: 10)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P3	North Full Crossing	50	40.1	LOS E	0.1	0.1	0.82	0.82
P41	West Stage 1	50	32.3	LOS D	0.1	0.1	0.73	0.73
P42	West Stage 2	50	40.9	LOS E	0.1	0.1	0.83	0.83
All Pedestrians		150	37.8	LOS D			0.79	0.79

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Network: N101 [Oxford Street West Precinct]

Site: 102 [Syd Einfeld Drive / York Road]

New Site
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Network Cycle Time - User-Given)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: York Road													
9	L2	588	2.0	582	2.0	0.257	7.9	LOS A	3.3	23.7	0.21	0.60	14.4
Approach		588	2.0	582N1	2.0	0.257	7.9	LOS A	3.3	23.7	0.21	0.60	14.4
East: Syd Einfeld Drive													
6	L2	102	18.0	102	18.0	0.923	55.2	LOS D	28.9	213.2	1.00	1.06	33.8
5	T1	1288	2.6	1288	2.6	0.923	46.7	LOS D	29.8	213.4	1.00	1.03	34.9
Approach		1390	3.7	1390	3.7	0.923	47.3	LOS D	29.8	213.4	1.00	1.04	34.8
West: Syd Einfeld Drive													
11	T1	2635	0.7	2635	0.7	0.468	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
10	R2	1536	4.5	1536	4.5	0.929	14.8	LOS B	18.0	131.2	0.24	0.68	18.6
Approach		4171	2.1	4171	2.1	0.929	5.5	LOS A	18.0	131.2	0.09	0.25	53.6
All Vehicles		6149	2.5	6143N1	2.5	0.929	15.2	LOS B	29.8	213.4	0.31	0.46	45.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 58.2 %
Number of Iterations: 10 (maximum specified: 10)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

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MOVEMENT SUMMARY

Network: N101 [Oxford Street West Precinct]

Site: 103 [Oxford Street / York Road]

New Site
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Network Cycle Time - User-Given)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: York Road													
9	L2	286	1.3	286	1.3	0.394	21.0	LOS B	11.7	82.5	0.59	0.73	25.2
8	L1	396	1.2	396	1.2	0.394	17.0	LOS B	11.7	82.5	0.47	0.66	27.5
7	R2	9	100.0	9	100.0	0.394	17.7	LOS B	7.6	55.1	0.44	0.64	28.1
Approach		691	2.5	691	2.5	0.394	18.7	LOS B	11.7	82.5	0.52	0.69	26.5
East: Oxford Street													
6	L2	52	14.0	52	13.9	0.312	30.8	LOS C	7.3	55.0	0.63	0.58	24.7
5	T1	650	6.8	648	6.8	1.009	89.1	LOS F	20.3	149.3	0.91	1.21	3.8
4	R1	192	3.8	192	3.7	1.009	113.5	LOS F	20.3	149.3	1.00	1.42	3.2
Approach		894	6.6	892 N1	6.6	1.009	91.0	LOS F	20.3	149.3	0.91	1.22	4.3
NorthWest: York Road													
3	L1	643	9.1	643	9.1	0.406	2.3	LOS A	0.6	4.7	0.04	0.51	29.0
2	R1	995	2.4	995	2.4	1.013	54.8	LOS D	5.8	41.8	1.00	1.14	14.7
Approach		1638	5.1	1638	5.1	1.013	34.2	LOS C	5.8	41.8	0.62	0.89	15.2
All Vehicles		3223	4.9	3221 N1	4.9	1.013	46.6	LOS D	20.3	149.3	0.68	0.94	11.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 58.2 %
Number of Iterations: 10 (maximum specified: 10)
N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	50	29.5	LOS C	0.1	0.1	0.70	0.70
All Pedestrians		50	29.5	LOS C			0.70	0.70

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.