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19 October 2021

Daniela Splitgerber Senior Statutory Planner Boroondara City Council 8 Inglesby Road, Camberwell VIC 3124

Dear Daniela,

DP21/002 | 135 BARKERS ROAD, KEW - XAVIER COLLEGE AMENDED DEVELOPMENT PLAN

Urbis continues to act on behalf of Xavier College in relation to the Senior School Development Plan at 135 Barkers Road, Kew. The Development Plan was recently re-advertised to the local community and referred to the Head, Transport for Victoria pursuant to Section 55 of the Planning and Environment Act.

A number of concerns were raised by the local community around the proposed signalised intersection. Additionally, the College also received confirmation that the Head, Transport for Victoria objects to the grant of the permit as without changes the proposed signalised intersection was incompatible with Barkers Road and public safety.

As such, we now submit a revised Development Plan and Traffic report which makes the following changes:

- The signalised intersection to Barkers Road has been deleted. The existing access will be upgraded and widened (by approximately 8m) on the west to protect the large tree (Tree 74) on the east. It will also provide separated vehicle entry and exit traffic lanes. Right turns out of the site will be banned between 8am-9.30am and 2.30pm-6pm. This is consistent with key school pick-up / drop-off periods. Buses will be excepted and able to turn right out of the site at all times.
- Retention of additional trees along the west side of the driveway accessed from Barkers Road. The revised design will require the removal of 3 trees, compared to the previous design which removed 7 trees.
- Additional wording has been included to ensure the protection of the significant tree to be retained to the south of the Chapel Oval (Tree 321) in response to arborist comments.
- Inclusion of change rooms and spectators shelter to the north of Plunkett Oval to be constructed into the existing embankment. This is carried over from the approved 2006 Development Plan.



We trust that the above and enclosed information addresses the concerns raised by the objectors and the Head, Transport for Victoria. Should you have any questions, please do not hesitate to contact me.

Kind regards,

Am

James Small Senior Consultant 9617 6622 jsmall@urbis.com.au

XAVIER COLLEGE SENIOR SCHOOL CAMPUS

Development Plan

October 2021



OUR INTENT

Xavier College aspires to form exceptional graduates through inspiring learning experiences and our distinct Jesuit character.

OUR GUIDING PRINCIPLES

We are guided by principles that call us to:

Protect and develop the whole person

- Having a personal concern and care (Cura Personalis) for the whole life of each morally, aesthetically, physically, socially and emotionally
- · Protecting and safeguarding the wellbeing of all students in our care

Form men and women of faith to work for justice in the world

- · Forming members of our community to serve God in the world
- for justice in the world

Pursue excellence in humanity

developing their God-given gifts to the best of their ability

Seek discernment and wisdom

- Developing a self-reflective disposition in members of our community, particularly conscience
- imagination and creativity, and the integration of faith and reason

Engage critically with the world

- Courageously and respectfully engaging with world cultures and perspectives
- Critically pursuing a depth of learning by reflecting on experience and being moved to action

Strive for the Magis

• Developing a desire to strive for the Magis. The Jesuit ideal of Magis is a thirst for of our time.

member of our College community forming our students intellectually, spiritually,

Having a committed and practical concern for those in need, such that students, staff and parents make an explicit connection between their Catholic faith and their work

• Welcoming all to Xavier College, where they can flourish and passionately pursue excellence in all things, encouraging each person to live out their vocation in life by

in students, preparing them to make informed decisions in accordance with their

• Preparing the individual to find God in all things through the use of each person's

'depth', for the greater good and for the most courageous response to the challenges

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OPENWORK

Traffix Group

1.0 **INTRODUCTION**

1.1 BACKGROUND

Xavier College has an approved Development Plan pursuant to Clause 43.04 of the Boroondara Planning Scheme. The development plan was approved by the City of Boroondara in April 2006 and has guided the College's development over the past 15 years.

The College recently released the 'XC150 1878-2028' Strategic Plan which centred on creating cultures, programmes and places to enhance and inspire the development of our students. To ensure the strategic vision for Xavier is aligned with the purposeful development of our facilities, it is necessary to prepare a new Development Plan.

In 2020, it was announced the College would close the Kostka Hall (Brighton) Campus and relocate all Year 7 & 8 students to the Senior School Campus. This will create a distinct Junior Campus at Burke Hall and a Senior Campus as Barkers Road.

As such, the College has now prepared a new Development Plan to plan for its development over the next 30 years.

The preparation of the new Development Plan has been based on a set of key principles, which provide the framework for the physical development of the College.



1.2 KEY PRINCIPLES

2







Develop and support the **health** and wellbeing of students and staff





Strengthen Xavier's identity at gateways and interfaces



Nurture **heritage** spaces and places

10







Recognise Indigenous and Torres Prioritise sustainability, resilience Strait Islander Peoples



and clever use of resources



3



Inspire contemporary learning within flexible, technology-enabled



Ensure the campus is safe, equitable and accessible

8



Engage with and enhance the site's natural features



Create a network of diverse open **spaces** and landscapes

1.3 STATUTORY REQUIREMENTS

Development Plan Overlay – Schedule 2 (DPO2)

The DPO2 requires a Development Plan to be prepared prior to the issue of a planning permit in relation to the majority of building and works for Institutional uses within the City of Boroondara. DPO2 sets down the specific requirements for Development Plans in relation to these education based uses.

This Development Plan includes the entire Xavier College campus, covered by the DPO2, and will require that any proposed works within this area to be generally in accordance with the approved Development Plan.

Community Consultation

The Development Plan is subject to a comprehensive Council process, including consultation with the surrounding community and relevant stakeholders, preapplication meetings with Council, Heritage Victoria, formal public notification and Council approval.







2.0 SITE CONTEXT AND EXISTING CONDITIONS

2.1 SUBJECT SITE

The Xavier College Senior School Campus is located on the northern side of Barkers Road and has an overall site area of approximately 16 hectares. The College is approximately 5km east of Melbourne's Central Business District. It is within a predominantly residential area with a mix of educational uses included Xavier College, Trinity Grammar School and Methodist Ladies' College.

The College also comprises the Burke Hall Junior Campus. It is located approximately 1.5 kilometres north-west of the Senior Campus at the corner of Studley Park Road and Nolan Avenue, Kew.





 Two large landholdings in the heart of Kew
 Located in a suburban context with close proximity to the Verre Biver and current and particular pattern environments.

3

4

the Yarra River and surrounding natural environments

Responsibility to support the area's biodiversity

Located in close proximity to tram and bus networks

Senior School campus Burke Hall campus Tram route Bus route

2.2 XAVIER COLLEGE & CAMPUS DEVELOPMENT HISTORY

Xavier College was first opened by the Society of Jesus (the Jesuits) in 1878. It belongs to a worldwide network of over 2,000 Jesuit educational institutions.

The land on which Xavier stands was known as Mornane's Paddock and was purchased by the Jesuits in 1872 from Patrick Mornane on a 20-year interest-free purchase plan. This enabled the Jesuits to get on with the funding and building of the College buildings almost immediately. Foundations for the South Wing commenced in 1872, with the front of the building completed in time for classes to begin in 1878.

Over the following century, there were several key developments that have established the College across the three Melbourne campuses.

- In 1921, Xavier Preparatory School opened and was later renamed Burke Hall in 1926 in honour of Mr TM Burke.
- The Kostka Hall location was opened in 1937 and was named in honour of St Stanislaus Kostka. To establish the second preparatory school, the Jesuits purchased two Brighton properties in mid-1936. Both were promptly remodelled to provide the facilities required for school life.
- In 2002 at Burke Hall Campus and in 2005 at Kostka Hall Campus, the College expanded its educational program, opening Early Years centres to provide the scope for a Jesuit education from the earliest ages.

In 2006, Council approved the Senior Campus Masterplan which enabled the following works:

- Construction of a new science and performing arts centre and relocation of affected parking
- Redesign of car parking areas
- Upgrade to the existing sporting facility
- Improve disability access to existing campus core buildings

These projects have now largely been completed.

The Senior School Campus currently accommodates the following number of students, staff and car parking numbers:

- Students 990
- Staff 180
- Car Parking Space 249 spaces

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2.3 INTERFACES

The site has the following interfaces:

NORTH

The northern interface generally comprises single and double storey residential properties. Stanley Street, Gellibrand Street and Stratford Avenue all run north-south between the College and Wellington Street.

The residential properties along the northern interface generally comprise of double storey detached dwellings. Given the slope of the land, most properties sit above the natural ground level of the College and are buffered by existing vegetation. Some properties have sidages / outbuildings immediately adjoining the common boundary whilst some have views towards the site.

Trinity Grammar School also adjoins the north-eastern corner of the College.









EAST

Charles Street which runs in a north-south direction between Wellington Street and Barkers Road adjoins to the site to the east. The site also adjoins the rear of several single and double storey properties which front Charles Street.

SOUTH

Barkers Road adjoins the College to the south. It is a 4-lane Road Zone Category 1 which runs in an east-west direction. It turns into Victoria Street and then Victoria Parade to the west and stops at Burke Road in the east.

WEST

The College adjoins an at-grade car park and multi-storey office building which is owned and operated by VicRoads. Denmark Street and single and double storey residential properties are located further west.

- 1 Northern residential interface
- 2 Charles Street residential interface
- 3 VicRoads site
- 4 Barkers Road
- 5 Trinity Grammar School



Legend

- ••• Porous edge condition
- Sensitive edge condition
- Impermeable edge condition
- IIIIIII Gateway/access interface

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INTERFACE PLAN - EXISTING SCALE 1:500



LEGEND

- EXISTING MAINTENANCE SHED AND BIN STORAGE AREA
- OUTDOOR BASKETBALL COURTS
- 3 EXISTING SENIOR BOARDING HOUSE
- STANLEY STREET 4
- 5
- JESUIT HOUSE PROPERTY 2 GELLIBRAND STREET (TWO STOREY 6.
- BRICK RENDERED DWELLING) GELLIBRAND STREET
- 1 VALENTINE STREET (TWO STOREY 8 BRICK RENDERED DWELLING)
- **3 VALENTINE STREET (TWO STOREY** 9 BRICK RENDERED DWELLING)



LEGEND

- SOCIAL GARDEN ZONE
- GELLIBRAND PLAZA- PEDESTRIAN
- FOCUSED ARRIVAL PLAZA
- PROPOSED ENVELOPE OF YEAR 7 AND BUILDING
- PROPOSED ENVELOPE OF FUTURE LEARNING AND TEACHING BUILDING 4
- SHARED PEDESTRIAN AND VEHICULAR 5 PATH WITH LANDSCAPED EDGE ON NORTHERN BOUNDARY
- STANLEY STREET 6.
- JESUIT HOUSE PROPERTY
- 2 GELLIBRAND STREET (TWO STOREY 8 BRICK RENDERED DWELLING)
- GELLIBRAND STREET
- 1 GELLIBRAND STREET (TWO STOREY BRICK RENDERED DWELLING)
- 3 GELLIBRAND STREET (TWO STOREY BRICK RENDERED DWELLING)



LEGEND

EXISTING BUILDING SITE TITLE BOUNDARY

HABITABLE ROOM WINDOW



INTERFACE PLAN - EXISTING SCALE 1:500



LEGEND

- EXISTING ON-GRADE PARKING
- EXISTING TENNIS CLUBHOUSE HOCKEY/TENNIS COURTS ON NATURAL TURF
- SERVICE ROAD
- 11 VALENTINE STREET (SINGLE STOREY WEATHERBOARD DWELLING) 5 6
- 13 VALENTINE STREET (SINGLE STOREY RENDERED DWELLING) 15 VALENTINE STREET (TWO STOREY
- RENDERED DWELLING) 17 VALENTINE STREET (TWO STOREY 8.
- BRICK DWELLING) 19 VALENTINE STREET (TWO STOREY
- RENDERED DWELLING) 21 VALENTINE STREET (TWO STOREY
- RENDERED DWELLING) 23 VALENTINE STREET (TWO STOREY
- RENDERED DWELLING) 15 STRATFORD STREET (TWO STOREY 12. BRICK DWELLING)
- 13 STRATFORD STREET (SINGLE STOREY WEATHERBOARD DWELLING) STRATFORD STREET 13.
- 14
- 15. VICROADS SITE



LEGEND

- PROPOSED BOARDING HOUSE WITH 1 GROUND FLOOR ARTICULATION ZONE
- BOARDERS QUAD LANDSCAPED 2
- COURTYARD SPACE LANDSCAPED ZONE PLANTED WITH DENSE VEGETATION 3.
- 4. SHARED PEDESTRIAN AND VEHICULAR PATH WITH LANDSCAPED EDGE ON NORTHERN BOUNDARY
- 11 VALENTINE STREET (SINGLE STOREY 5
- WEATHERBOARD DWELLING) 13 VALENTINE STREET (SINGLE STOREY 6. RENDERED DWELLING)
- 15 VALENTINE STREET (TWO STOREY RENDERED DWELLING)
- 17 VALENTINE STREET (TWO STOREY 8. BRICK DWELLING)
- 19 VALENTINE STREET (TWO STOREY RENDERED DWELLING) 21 VALENTINE STREET (TWO STOREY RENDERED DWELLING)
- 10.
- 23 VALENTINE STREET (TWO STOREY 11. RENDERED DWELLING)
- 12. 15 STRATFORD STREET (TWO STOREY BRICK DWELLING)
- 13. 13 STRATFORD STREET (SINGLE STOREY WEATHERBOARD DWELLING) 14. STRATFORD STREET
- 15. VICROADS SITE.
- POSSIBLE FUTURE CONNECTION 16. SUBJECT TO DISCUSSIONS WITH LAND OWNER





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2.4 EXISTING BUILDINGS

The College campus currently comprises two key precincts, including:

- The 'Campus Core' Precinct with all educational facilities.
- The 'Sporting' Precinct, comprising the existing Sports Centre, tennis courts and sports ovals.





Moderate condition Good condition Heritage value

Legend

DEMOLITION PLAN

Pursuant to the Boroondara Planning Scheme, demolition of existing buildings does not require a planning permit. Separate permission will be required and sought from Heritage Victoria.



BARKERS ROAD

LEGEND



EXISTING BUILDING SITE TITLE BOUNDARY FUTURE REFURBISHMENT

2.5 ZONES AND OVERLAYS

Xavier College is located in the Neighbourhood Residential Zone – Schedule 1 and in an area that is predominantly residential land. There are a variety of zones along Cotham Road and Denmark Street, including the Commercial 1 Zone, Public Park and Recreation Zone and Public Use Zone. The residential properties east of Charles Street are within the Heritage Overlay.

The College is affected by the Heritage Overlay (HO4) and is included on the Victorian Heritage Register (Ref No H893). Therefore, heritage impacts are to be considered by Heritage Victoria, rather than Council. Separate approval from Heritage Victoria is required for buildings and works and is a separate process, outside of the Development Plan approval process.

A Development Plan Overlay (DPO2) applies to the site which specifies the need to have a development plan approved by the Responsible Authority.



Zoning Plan



- Residential Growth 1 (RGZ1)
- Road Category 1 (RDZ1)



Heritage Overlay Plan



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Development Plan Overlay

- Subject Site
- Development Plan Overlay

2.6 PUBLIC TRANSPORT

A number of public transport facilities are accessible to Xavier College and are readily utilised by students, parents, visitors and staff of the school; these include:

- Bus Services running along Charles Street and Wellington Street (Route 609).
- Three Tram Services: Route 16 along Glenferrie Road (approximately 200 metres to the east) of XC along Wellington Street, Route 109 along Cotham Road and Route 48 along High Street.
- Connections to local train stations at Glenferrie and Hawthorn to the south of the school (approximately 1.5 kilometres), connecting to services along the Lilydale, Belgrave and Alamein lines.

Legend

••••• Walking distance

 \rightarrow Tram route \rightarrow Bus route

Senior School campus



3.0 THE **MASTERPLAN**

3.1 PURPOSE

Xavier College has undertaken an extensive master planning process to inform the future development, growth and spatial requirements of the College over the next 30 years. This was initiated by the development of the XC150 Strategic Plan.

Based on the principles and vision, the College structure, growth and mission have been reviewed to inform the future needs of the College, including changes to the School structure and campus precincts.

This includes the closure of the Kostka Hall (Brighton) Campus and the relocation of all Year 7 & 8 students from Kostka Hall and Burke Hall to the Senior School Campus. Thus, creating a distinct Senior Campus at Barkers Road and a Junior Campus at Burke Hall.

There will also be a deliberate but gradual expansion of the boarding facilities at the Senior School Campus. Additionally, a redesign of the sporting facilities will ensure they meet the demands of the Associated Public Schools (APS) requirements.



3.2 STRATEGIES FOR THE DEVELOPMENT **PLAN**

The Development Plan offers a clear view of the long term character and form of the campus, including growth. Several campus scale strategies were prepared to ensure that any new development meets the future needs of the College.

Development Plan Strategies



Connect the campus with a clear and accessible pedestrian spine

Create a clear and accessible pedestrian walk along the northern edge of the campus Present different learning experiences along the spine to encourage curiosity. Connect high-quality indoor and

outdoor learning spaces.



Support Jesuit identity and Ignatian spirituality

Provide a variety of spaces both indoors and within the landscape for reflection, stillness and the conscious practice of Ignatian spirituality, with the Chapel at the heart.



Respond appropriately to campus interfaces, while reflecting Xavier's identity

Respond to the different edge conditions afforded by the site. Offer a fine grain and landscaped design response to residential interfaces.

Reflect the College's identity and values at street frontages.



Protect and enhance key heritage buildings. Strengthen views to heritage

buildings and to the city.

Arran spoke Create campo space



Separate people from cars

Remove cars from the campus core, limiting access to the loop connecting Barkers Road and Charles Street.

Create a new subterranean car park in a central location.



Create a diverse range of outdoor rooms

Enable learning in the landscape by creating a landscape of diverse rooms: sporting, learning and social.



Ensure the campus supports health, wellbeing and safety

Provide a safe, secure campus that encouraged physical activity for all.

Encourage informal recreation and active transport options through highquality and welcoming facilities.

Monitor access through clearly identified gateways.



Support a vibrant campus life

Enhance existing facilities to provide for Xavier's lively events calendar, ensuring spaces are generous, high-quality, accessible and safe, throughout the day and night, year-round. Conne Amplif studen Reinfor to recc comm future.



Arrange staff spaces in a hub and spoke model

Create a new staff hub in the campus core, with satellite staff spaces located in buildings across the campus.



Prioritise pedestrians

Prioritise the pedestrian experience, replacing car routes with pedestrian routes with clear entrances.

Ensure the site's topography is accessible for people of all abilities.



Connect to Country

Amplify the voices of First Nations students, staff and visitors.

Reinforce Xavier's commitment to reconciliation and First Nations communities, past present and



Express sustainability and resilience

Strive for ambitious environmental targets, consider precinct-based approaches to sustainability.

Express systems to provide learning opportunities.

Emphasise social sustainability by nurturing community and gathering spaces.

3.3 STUDENT AND STAFF NUMBER INCREASE

Due to the relocation of all Year 7 & 8 students to the Senior School Campus, the maximum number of students will increase from 1,000 (as approved by the 2006 Development Plan) to 1,500.

As a result of the increase in student numbers, the staff and associated car parking spaces required will also grow.

There will be no change to the after school / weekend activities at the Senior School Campus.

The Year 7 & 8 students already use the senior campus for sport and will continue to do so, as well as continue to use Burke Hall.

Below is a snapshot of the current and proposed student, staff and parking numbers.

	I		
	STUDENTS NUMBER INCREA	ASE	
	2006 MP CONDITIONS	2021	2024
	1,000 total enrolments Maximum	990 total enrolments Approximate	1,500 total enrolments New Development Plan required
	BOARDING		
	2020	2025+	
	57 boarders Across two houses	100 boarders In one house, possibly delivered in stages	
	STAFF NUMBERS		
2021	2021	2024	
	180	220 target	
	Current Staff members on site at any one	e time	
	PARKING (DURING SCHOOL HOURS)		
	2006	2021	
	245 spaces	249 spaces	350 - 400 spaces
	Development Plan Requirement	Current Spaces on site	Proposed ultimate scenario
	PARKING (AFTER SCHOOL F	IOURS)	
	2006	2021	
	314 spaces	300 spaces	350 - 400 spaces
	Development Plan Requirement	Current Spaces on site	Proposed ultimate scenario



4.0 THE DEVELOPMENT PLAN

The following section outlines the key projects for the College. The Development Plan separates the College into three distinct precincts:

- Eastern Precinct
- Central Precinct
- Western Precinct
- Southern Precinct

The future refurbishment works to the existing campus core in the Eastern Precinct will be completed at a later stage.















SECTION A SCALE 1:500

SECTION D SCALE 1:500





Year 7 & 8 Building

- Welcoming building for students transitioning from Junior to Senior School
- Connected yet distinct from the adjacent existing campus core
- Supporting the specific pedagogical, personal and spiritual growth of students in Years 7 and 8
- Creating dedicated areas for play and self-development
- Approximately 5000 m² of GFA
- The built form steps down to the west to respond to the topography of the site.
- The building envelope has been designed to ensure compliance with the ResCode side setback requirement.



BUILDING ENVELOPES



Chapel Oval and Car Parking

- Consolidate most on-grade car parking around the school into a car park with drop off facilities located under an upgraded Chapel Oval playing surface.
- Opportunities for water retention and storage, alongside new change-room facilities opposite the Sports Centre.
- Clear pedestrian exits and entries at key locations into and from the car park facility.
- 2006 Master Plan requires total car parking requirement of 314 for after school events.
- With 101 spaces to be retained on the campus, 175 is the minimum required in this car park to comply with the parking requirements at Clause 52.06 of the Boroondara Planning Scheme.

- The car park will provide a capacity of approximately 250-300 spaces.
- The proposed car park will also comprise additional bicycle storage.
- The footprint of the car park has been designed to ensure the retention of the existing significant trees to the south.
- The planning permit for the Chapel Oval project must demonstrate, with Arborist advice, the adequate ongoing growing conditions and health of Tree 321.
- Additional car parks have been proposed to allow for future growth, to reduce pressure on external roads, and to reduce community concerns.



SECTION E SCALE 1:500

BUILDING ENVELOPES

Teaching and Learning Building

- The removal of the Senior Boarding House creates a site that links between the heritage campus core and the proposed Year 7 and 8 Building.
- Opportunity for an architecturally unique 3 storey specialist learning and teaching building, potentially for the Creative Arts (gallery and teaching space) — able to be shared by Year 7 and 8 students and the rest of the Senior School.
- The Teaching and Learning Building will be designed to ensure key views of the Chapel Oval from Stanley Street are retained.
- Approximately 1,500 m² of GFA.



SCALE 1:500





SECTION B SCALE 1:500



Boarding House

- bathroom facilities.
- open space to the north.
- upper floors.

BUILDING ENVELOPES



• Proposed boarding facility to cater for approximately 100 boarders, with individual studio apartments and shared

• The Boarders Quad is a central courtyard which culminates the Xavier Spine experience and provides a dedicated green

• The Boarders Lawn provides an introspective, quieter space which could be used to host more intimate boarding events, and grow food within dedicated veggie gardens.

• Shared study space and informal gathering lounges on

• Opportunity to create a dedicated Study Centre located on the upper floor, and a roof terrace with vantage over the school grounds and towards the city skyline.

• Approximately 3500 m² of GFA.

• An articulation zone will be provided at the ground floor level to reduce the visual bulk to the north and ensure appropriate vehicle access arrangements to the maintenance building.

Sports Centre Upgrade

- Re-imagined Sports Centre with an additional playing courts for the Year 7 & 8 students and internal upgrades to bring the facilities up to modern standards.
- The upgraded Sports Centre will include an upgraded facade with a focus on a transparent ground floor ensuring visual connectivity between surrounding sport uses.
- Reconsidered loading and storage facilities on the lower level ensures efficiency in deliveries and sports storage.
- A proposed Tennis Hub will replace the existing tennis courts and provides opportunities to host intimate sporting events, with clear vantage over the tennis courts below.
- The function space will be relocated from the existing sports courts to a dedicate dining hall.
- A new maintenance shed will be located to the western end of the sports centre. This will move truck movement and maintenance vehicle movement away from the core student areas..



SECTION A SCALE 1:500



SCALE 1:500

4.3 SOUTHERN PRECINCT

- The proposed change room facility and viewing platform is being carried over from the 2006 Development Plan.
- The building will be constructed into the embankment to the north of Plunkett Oval.
- The proposed design will ensure the protection of all existing trees.
- The building envelope will be approximately 15m (length) x 8m (depth) x 3m (height).
- A multi-purpose play space will be constructed on the southern side of the change rooms.





BUILDING ENVELOPES







LEGEND



5.0 DESIGN **OBJECTIVES**

The following design objectives outline the desired direction for the identified key projects and the future development of the school.

Building projects within the College will be developed to be generally in accordance with the building envelopes shown within the Development Plan. The indicative RL's and the building footprints provide guidance for future planning permit applications. These future planning permit applications will provide full details of any proposed building on the campus and will include detailed plans including building heights, setbacks and materials.

When considering any future development proposals within the Xavier College site for any building that exceeds the building envelopes outlined within this document, any development proposal must demonstrate how it meets the Design Objectives of the Development Plan below:

- To create a focus for rounded learning and experience which fosters an educational environment that meets the needs of students and delivers educational programs into the future.
- To create an educational environment that is consistent with the Vision, Mission and Core Values of the School.
- To assist in developing the objectives of the XC150 Strategic Plan.
- To accommodate a progressive and adaptive learning and teaching environment that is capable of evolving to the increasing role of technology in education and future technological advancement.
- To create an educational facility that aligns with the College's structure and establishment of learning precincts.

- To assist in developing the desired sense of identity and address to the school within the surrounding environment.
- That the proposed layout responds to the opportunities and constraints of the site with innovation and appropriately responds to its interfaces and the surrounding environment.
- To ensure that the school continues to integrate into the surrounding community.
- To create a positive and attractive learning environment.
- To recognise the history of Xavier College and retain elements of the College that are acknowledged as being of heritage significance.
- To integrate landscaping through the school and to enrich the landscape setting of the school.
- To consider how preference is given to locating increases to building envelopes away from sensitive residential interfaces.
- To limit amenity impacts to adjoining residential interfaces.
- Construction Management Plans and Waste Management Plans will be provided during the permit application stages for each building to ensure impacts are appropriately mitigated.

5.1 ESD Objectives

Xavier College is committed to incorporating environmentally sustainable design initiatives into their future developments. This will ensure the College continues to integrate best practice energy and water efficient designs.

The College is committed to the following:

- Capture rainwater that falls on hard stand and roof surfaces for toilet flushing and landscape irrigation.
- Buildings are to incorporate high performance facade materials and glazing to achieve good passive thermal performance.
- Optimise external shading to all north facing spaces.
- Ensure buildings are designed to encourage natural ventilation.
- Incorporate efficient lighting systems.
- Provision of rooftop Solar PV systems to reduce dependance on mains electricity.
- Upgrading staff end of trip facilities.
- Incorporation of drought proof landscaping within the newly planted areas.
- Utilise canopy trees to provide shaded areas for students.
- Maximise the different waste streams to limit the amount of general waste going to landfill.



Xavier College Senior School Campus - Development Plan29

6.0 LANDSCAPE MASTER PLAN

The proposed campus layout will be integrated with landscaping to respond to the leafy character of the area and tie the campus together. The following is the overall landscape master plan prepared by Openwork. The proposed landscape masterplan incorporates the following strategies:

- Improved levels of accessibility and open spaces around the Chapel and Chapel Oval.
- Create a series of spaces in the landscape which support quiet reflection and prayer and a new ecology as sites for mindfulness, wellbeing and slowness.
- Build upon the strong heritage value of campus core building including the Great Hall, the West Wing and the South Wing.
- Embrace changes of grade as opportunities for new forms of occupation and gathering.
- Reduce roads and cars within the campus and transform the gained spaces into new rooms within the landscape for occupation and use.
- Utilise the existing and proposed canopy trees to provide a visual buffer to the neighbouring residential properties to the north.
- Retain and project all trees nominated on Boroondara's Significant
 Tree Register.
- Replace the Corymbia Citriodora (Lemon Scented Gum) species like for like.
- Reintroduce informal precolonial landscaping along the northern boundary.
- Recommend installation sizes of between 25L and 100L for all new trees. 100L sizes are to be used for all new Lemon Scented Gums and new Mana Gum feature trees.

Overall, the proposed landscape response seeks to remove 32 existing trees and plant an additional 175 (approx.) trees. This results in a removal/replacement ratio of 1:4.5.





OVERALL TREE RETENTION/ REMOVAL PLAN

TREE PROTECTION ZONE
INCURSION INTO TPZ
TREE- REMOVED
TREE- RETAINED

TREES - PROPOSED NOMINAL LOCATION

All trees within the proposed areas of construction will be considered for removal at each relevant stages of the development.



DETAILED TREE RETENTION/REMOVAL PLAN

LEGEND

- (TREE- REMOVED
- TREE- RETAINED
- TREE- REQUIRES LOCAL LAW FOR REMOVAL 畿

The trees highlighted purple will be subject to separate approval for removal under the City of Boroonodara Tree Protection Local Law.



TREE PROTECTION ZONES PLAN - CENTRAL PRECINCT



Tree 321 (Identified as Tree 228 on Boroondara's Significant Tree Register The planning permit for the Chapel Oval project must demonstrate, with Arborist advice, the adequate ongoing growing conditions and health of




KEY PLAN



TREE PROTECTION ZONE INCURSION INTO TPZ TREE- REMOVED TREE- RETAINED LOCATION OF TREE 74 SHOW APPROXIMATE

LEGEND

TREE PROTECTION ZONES PLAN - SOUTHERN PRECINCT

35 Xavier College Senior School Campus - Development Plan

7.0 **STAGING**

The Development Plan will guide the development of Xavier College over the next 10 years. The Development Plan also aims to provide for a long term vision and guidance in regard to the development of the College beyond the next decade, and for the next 30 years.

The projects outlined within the Development Plan will not occur all at once. Rather, the envisaged work will be staggered throughout the coming decades. This is in accordance with the Development Plan Overlay (Clause 43.04-4) of the Boroondara Planning Scheme which allows Development Plans to be implemented via stages.

The construction of the Year 7 & 8 Building and Chapel Oval Car Park are nominated as the priority projects for the works outlined within this Development Plan. The Year 7 & 8 Building will incorporate a multi-storey teaching and learning space to the west of the existing senior boarding house. The proposed car park will provide approximately 250-300 spaces, change room facilities and storage.

The College is committed to providing these works concurrently to limit disruption to the traffic volumes to the north of the College. Additionally, the College will ensure that the Year 7 & 8 Building will not open until the Chapel Oval Car Park is completed.

The reasons that these works are nominated as the priority project is to ensure the Senior School Campus can accommodate the Year 7 & 8 students that will be relocated from the Kostka Hall (Brighton) and Burke Hall Campuses by the start of Term 1 2024.

Priority project 1

Year 7 & 8 building & Chapel Oval Car Park

Priority project 2

Boarding House

All other projects

Specialist teaching and learning building Sports Centre upgrade New maintenance building



8.0 TRAFFIC, ACCESS AND PARKING

The proposal includes new car parking areas and improved traffic circulation. This includes:

- Basement car park below Chapel Oval.
- Reconfigure existing car parking areas.
- The existing access will be upgraded and widened (by approximately 8m) on the west to protect the large tree (Tree 74) on the east as well as providing separated vehicle entry and exit traffic lanes.

The Chapel Oval Car Park will be constructed concurrently with the Year 7 & 8 Building to ensure the increase in staff can be accommodated when the Year 7 & 8 Building Opens.



8.1 CAR PARKING

A key principle of the Development Plan is to provide a distinct separation of vehicles and students and ensure a sufficient number of car parking spaces are provided on site.

The construction of the car park under the Chapel Oval will incorporate a dedicated pick-up and drop-off area in addition to approximately 250-300 car parking spaces.

The Chapel Oval Car Park will be delivered concurrently with the Year 7 & 8 Building to ensure the increase in staff parking and student pick up and drop off can be accommodated on site.

Below is a breakdown of the current and proposed car parking provisions.

School hours



2006 Development Plan – **245 spaces** Current Provision – **249 spaces** Ultimate Target – **350-400 spaces**

After school hours



2006 Development Plan – **314 spaces** Current Provision – **300 spaces** Ultimate Target – **350-400 spaces**



Car Parking Areas - Ultimate Scenrio (Development Plan)

8.2 ACCESS

Once the Year 7 & 8 Building and Chapel Oval projects are complete, staff, parent and visitor access points will be consolidated to two main locations at Barkers Road and Charles Street. This will move the majority of vehicle movements away from the existing residential interfaces to the north.

The Stratford Avenue and Gellibrand Street access points will be limited to service vehicles. It is anticipated that this will result in a decrease in vehicle movements from the existing conditions.

Given the anticipated increase in traffic movements associated with the provision of the Chapel Oval car park, it is proposed to widen the existing Barkers Road entrance to the west by approximately 8m. This will ensure the protection of Tree 74 to the east.

Right turn out to Barkers Road is to be banned at 8am-9.30am and 2.30pm-6pm, consistent with key school pick-up/drop-off periods. Buses will be excepted at all times.

Traffic signals will not be pursued at this time. Any future proposal would be subject to future discussions with Department of Transport and impacted Barkers Road property owners.



Vehicle Access Arrangements and Internal Road network -Ultimate Scenrio (Development Plan)

9.0 CONCLUSION



The Xavier College Senior School Development Plan (2021) has been established in line with the key principles for the long term character and form of the College campus. These ongoing principles have been drawn from the 'XC150' Strategic Plan to provide a framework for the physical development of the College over the next 30 years.

The Development Plan will form strong connections between each campus precinct which will inspire contemporary learning within flexible, technologyenabled spaces. Additionally, the Development Plan will reinforce the identity of Xavier College in the wider area.

This Development Plan has been prepared in consultation with key stakeholders to ensure that the vision for the College limits off-site amenity impacts and integrates within the surrounding residential environment.

The Development Plan ultimately reaffirms the overall intent form exceptional graduates through inspiring learning experiences and our distinct Jesuit character.







Traffix Group

Traffic Engineering Assessment

Development Plan

Xavier College (Senior Campus) – 135 Barkers Road, Kew

Prepared for Xavier College

October 2021

G28932R-02D

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Executive Summary

Context

Xavier College has three existing campuses, including the subject site, which currently operates as its Senior Campus (years 9-12). Recently the College announced that the Kostka Hall Campus is to close with all Year 7 & 8 students to be consolidated within the Senior Campus (subject site). The Development Plan has been prepared to respond to this change and to provide a plan to guide the development of the site across the next 30 years.

Proposal Summary

The proposed Development Plan incorporates an increase in staff and student numbers, buildings and works as well as modifications to car parking and vehicle access arrangements.

As a result of the Development Plan there is a proposed increase, relative to the 2006 Development Plan, in student numbers to 1,500 students (increase of 500 students) and staffing levels to 210 full-time equivalent staff (increase of 30 staff members).

We have been advised by the School that the movement of students between Burke Hall and the Senior School, as well as the intensity of before/after school sports and weekend sports, will remain generally consistent with current arrangements under the Development Plan. Specifically, year 7 & 8 students, who don't currently attend schooling at the Senior Campus, already attend sporting activities at the Senior Campus. The School has further advised that there may be a minor redistribution of the year levels who participate in sports/training onsite, however, the number of students participating is to remain generally consistent with existing conditions.

To facilitate these changes to the student/staff population and to provide improved facilities throughout the site, the following staged works are proposed:

• Priority Project 1 - Year 7 & 8 Building & Chapel Oval Car Park

<u>Works</u> – The Year 7 & 8 Building is proposed to replace the existing basketball courts, including removing car parking located on the basketball courts. The Chapel Oval Car Park incorporates the provision of car parking underneath the existing Chapel Oval, with the oval also to be increased in size.

<u>Car Parking</u> - Existing car parking on basketball courts to be removed. Rationalisation of car parking within the site with car parking to be removed from internal access roads. Provision of new Chapel Oval car park and retention of some existing on-site car parking.

<u>Vehicle Access</u> - Removal of the north-south orientated internal road link which connects through to Gellibrand Street¹. Proposed restriction on the right-turn exit movement from the site onto Barkers Road during peak school pick-up/drop-off periods.

¹ Vehicle access to Gellibrand Street to be retained for maintenance vehicle and loading access only.

• Priority Project 2 – Boarding House

This building is proposed within the existing tennis courts area within the north-western corner of the site. It is anticipated that minimal (if any) car parking² would be provided within this area.

- Other Future Projects
 - Specialist teaching and learning building
 - Sports Centre upgrade
 - New maintenance building

The above 'other future projects' would not result in a material change to car parking and traffic arrangements.

The Development Plan is shown below.



Figure A: Development Plan

² Any car parking would be for maintenance vehicles and/or boarding house staff.

Staff & Student Travel Behaviour

Traffix Group completed an online survey of staff and students to ascertain existing travel behaviours. Surveys were completed across February/March 2021 with a total of 617 responses received, comprising 130 staff and 487 parents/guardians of students.

We note that a small percentage of the parent/guardian responses were for students who board on campus and therefore do not travel to/from the school day to day. The responses of boarders have been excluded from our analysis/results.

The key results of the travel behaviour surveys are as follows:

- Staff 94% travel to site via car, all park on-site.
- Students 29% travel to the site via car. Of those who travel via car, 43% park on-site.

Car Parking

A summary of the existing on-site car parking, and that specified within the 2006 and proposed Development Plans, is presented within the below table.

Table A: Development Summary

	During School Hours	After School Hours
Existing Conditions	249 spaces	300 spaces
Development Plan (2006 Approved)	245 spaces	314 spaces
Development Plan (Proposed) [1]	351-401 spaces	351-401 spaces

[1] Exact car parking provision subject to detailed design of the Chapel Oval car park.

The Development Plan proposes a total of 351-401 on-site car parking spaces, both during and after school hours. This represents at least a 106 space increase during school hours and at least a 37 space increase to car parking after hours, compared with the 2006 Development Plan.

The Development Plan results in a statutory requirement to provide 36 additional car parking spaces during school hours and no additional car parking spaces after school hours. The proposed provision of on-site car parking exceeds statutory requirements.

The following figure has been prepared to illustrate the proposed location and provision of onsite car parking.





Figure B: Car Parking Areas – Development Plan

Statutory car parking rates are on the basis that schools are to accommodate staff car parking demands within the site itself and that the surrounding on-street road network is to be utilised for, and absorbs car parking demands associated with, pick-up/drop-off.

Increasingly, private schools are seeking to provide additional car parking within their sites to both allow for pick-up/drop-off, sporting, as well as other after-hours events. This is not a statutory imperative but rather an intent to provide increased convenience in accessing the site and to reduce the impact that their operations have on surrounding streets.

The increase in the student cohort by 50% will increase on-site demands as well as the demand for on-street car parking. It is difficult to quantify the exact extent to which on-street car parking demands will change as a result of the development proposal. Any increase in on-street car parking demands is anticipated to be limited to pick-up/drop-off periods with the Development Plan representing an increase to the on-site provision of car parking during school hours and after hours. It is noted that a dedicated pick-up/drop-off area is also proposed within the Chapel Oval Car Park.

Indeed, with respect to the above it is important to note that the use of on-site and on-street car parking surrounding schools typically reaches a natural equilibrium. This equilibrium is reached through parent's/guardian's understanding of the on-site/on-street car parking availability. Parents/guardians who commonly drive to the school understand the operation of the surrounding road network and on-site vs off-site car parking availability. This allows parents/guardians, along with their individual preferences and circumstances, to tailor both their trip timing and pick-up/drop-off location accordingly.

The above is considered an important frame of reference in viewing the proposed car parking arrangements. This is not to quantify the potential increase in on-street car parking demands, but rather to highlight that the majority (if not all) of on-site car parking spaces are likely to be utilised during pick-up/drop-off periods.

Vehicle Access

A rationalisation of staff/parent/visitor access points to a single location to both Barkers Road and Charles Street is proposed. It is proposed to ban right-turn movements out onto Barkers Road during peak school pick-up/drop-off periods (buses excepted). This turn ban has been identified as the existing right-turn exit movement onto Barkers Road was already observed to be at its practical capacity during these periods.

We note that previous iterations of the proposed Development Plan incorporated signalisation of the Barkers Road / Site Access intersection. Traffic signals will not be pursued at this time and any future proposal would be subject to future discussions with VicRoads and impacted Barkers Road property owners.

The existing access will be upgraded and widened (by approximately 8m) on the west to protect the large tree (Tree 74) on the east as well as providing separated vehicle entry and exit traffic lanes. Right turn out is to be banned at 8am-9.30am and 2.30pm-6pm, consistent with key school pick-up/drop-off periods, buses excepted at all times. The full details of the upgraded crossover such as detailed design and signage will be required at the planning permit stage.

Proposed vehicle access arrangements are illustrated within the following figure.





Figure C: Vehicle Access Arrangements & Internal Road Network – Development Plan

Traffic Volumes

Traffix Group commissioned traffic surveys of the key existing site access points in order to determine existing traffic volumes associated with the site. The surveys indicated three key peak hours, as follows:

- AM Peak 7:40am-8:40am
- Early PM Peak 3:20pm-4:20pm
- Late PM Peak 4:30pm-5:30pm

Based on the travel behaviour survey results, and rationale outlined within the report, we identified the following post development site generated traffic volumes which will occur at the site access points.

Table B: Total Site Traffic Generation

Peak Period	Site Traffic Generation
AM Peak	460 veh/hr
Early PM Peak	416 veh/hr
Late PM Peak	368 veh/hr

*veh/hr Denotes vehicles per hour

As shown above we derive a total anticipated post development site generated traffic volume at the site access points of 460, 416 and 368 vehicles during the respective AM, Early PM and Late PM peak hours.

We note that no increase in traffic volumes, other than associated with staff movements (note: 30 additional staff proposed), is assumed during the Late PM peak hour as the Development Plan will not result in an intensification or increase in the number of students undertaking sports training on-campus.

Traffic Impact

Our traffic assessment is based upon the AM, Early PM and Late PM peak hours. No assessment has been provided of other peak periods, namely Saturday mornings, noting our understanding that the intensity of Saturday morning sporting activities is not to change as a result of the Development Plan.

Whilst this is equally true for the 'Late PM' peak hour, the Late PM peak hour also more closely aligns with the road network peak hour for the surrounding road network than Saturday morning sporting times. Despite no change to after school activities during the Late PM peak it has been assessed, noting that general site access to Gellibrand Street is to be removed, along with right-turn movements from the site onto Barkers Roads, with an associated redistribution of traffic to/from the site.

Charles Street / Hansen Street / Site Access

The Charles Street / Hansen Street / Site Access intersection currently operates within acceptable limits and is predicted to continue to do so post development, that is, degree of saturation well below acceptable limits.

The Development Plan is not expected to result in a significant deterioration in the operation of this intersection, with all post development queues and delays also considered to be within acceptable limits and existing lane lengths/capacities.

Barkers Road / Site Access

The Barkers Road / Site Access intersection is anticipated to operate within acceptable limits during all assessed peak periods.

Indeed, the removal of the right-turn out movement to Barkers Road during peak school pickup/drop-off periods significantly improves the operation of the site access approach.

We are satisfied that the additional traffic generated as a result of the Development Plan can be accommodated within the Barkers Road / Site Access intersection.

Gellibrand Street

Gellibrand Street is to be limited to loading and maintenance vehicle movements only. This will represent a significant reduction in site generated traffic utilising Gellibrand Street comparative with existing conditions as staff/parent vehicles won't be able to exit the site via Gellibrand Street.

Stratford Avenue

Stratford Avenue is to be limited to loading and maintenance vehicle movements only. Site generated traffic volumes are anticipated to be generally consistent or slightly lower than existing conditions, albeit the proportion of heavy vehicles associated with the site utilising Stratford Avenue is anticipated to increase.

Bicycle Facilities

A total of 17 existing bicycle parking spaces are provided throughout the site, with all spaces to be retained following completion of the nominated works outlined within the Development Plan.

The Development Plan results in a statutory requirement to provide 102 additional bicycle parking facilities.

The travel behaviour surveys identified that currently only 1% of staff and 1% of students cycle to the site.

It is our recommendation that bicycle parking area(s) make a spatial allowance for bicycle parking commensurate with the statutory bicycle parking requirement.

It is further recommended that only part of the statutory bicycle parking requirement be provided initially with bicycle parking demands to be monitored and additional parking be provided as bicycle parking areas approach capacity.



Pedestrian Facilities

There are significant improvements proposed to the pedestrian network, including the following:

- The provision of direct pedestrian access between the Chapel Oval Car Park and on-site buildings.
- The provision of an east-west pedestrian spine located towards the northern edge of the site. This spine, along with a separate east-west service road for maintenance vehicles located at the northern boundary of the site, will separate pedestrians and vehicles.
- Removal of car parking and traffic movements, other than some potential disabled car spaces, within the loop road to the south of the Chapel and South Wing.

Bus Parking

Bus parking currently occurs within indented parallel bays within the internal loop road which connects Charles Street and Barkers Road. These arrangements are to be retained.

We have been advised by the School that they require pick-up/drop-off for up to four buses, of varying sizes, at any one time. The nominated area (approximately 52m in length) can accommodate four buses, also noting that there is potential to increase the length of this area (particularly to the west) through line marking modifications.

Loading, Maintenance & Waste Collection

A new maintenance building is ultimately proposed, as part of future works, within the northwestern corner of the site. Once completed, maintenance vehicle access will be via Stratford Avenue (Gate 8) and Gellibrand Street (Gate 7). An east-west aligned service road is proposed along the northern boundary of the site linking these two gates.

Additionally, a north-south aligned service road is proposed along the western boundary of the site. This service road would provide access to the new maintenance building, the Xavier Sports Centre as well as loading area(s) of the new boarding house.



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Appendix A Functional Layout Plan

Appendix B SIDRA Intersection Results

1 Introduction

Traffix Group has been engaged by Xavier College to undertake a traffic engineering assessment of the proposed Development Plan for the Xavier College Senior Campus located at 135 Barkers Road Kew.

Xavier College has three existing campuses as follows:

- Kostka Hall (Brighton): Years 6 -8
- Burke Hall (Kew): Early Learning Year 8
- Senior Campus (Kew, subject site): Years 9 12

Recently the College announced that the Kostka Hall Campus is to close with all Year 7 & 8 students to be consolidated within the Senior Campus (subject site). The Development Plan has been prepared to respond to this change and to provide a plan to guide the development of the site across the next 30 years.

The campus has an existing approved Development Plan, approved April 2006, pursuant to Clause 43.04 of the Boroondara Planning Scheme. Schedule 2 to Clause 43.04 Development Plan Overlay of the Boroondara Planning Scheme nominates the requirements for the Development Plan. Those requirements pertaining to traffic engineering considerations are as follows:

- "Proposed circulation and access systems for both vehicles and pedestrians.
- Parking and traffic management measures, including the location of on-site parking drop-off and pick-up areas, preferred access routes and measures to address vehicle queuing."

This report provides a traffic engineering assessment of the Development Plan, including an assessment of the above requirements.



2 Existing Conditions

2.1. Subject Site

The site is bounded to the south by Barkers Road, to the east by Charles Street, to the west by the DoT (VicRoads) head office and to the north partially by Trinity College and partially by residential properties. A locality plan of the subject site is presented at Figure 1.



Figure 1: Locality Plan

The subject site has frontages to Barkers Road and Charles Street of approximately 330 metres and 270 metres respectively.

The site is zoned Neighbourhood Residential Zone 1 (NRZ1) as indicated in Figure 2 below. Surrounding land uses are primarily residential. Notable exceptions include Trinity Grammar School to the north-east and VicRoads head office to the west. Kew Junction shopping precinct is located further north-west of the site with Ruyton Girls School and Methodist Ladies College located to further east of the site.



Figure 2: Land Use Zoning Map

The subject site is currently occupied by a number of education, sport, pastoral and performing arts facilities. The campus currently accommodates 990 students⁴ (years 9-12) including 57 boarders. A total of 180 full time equivalent staff are understood to work within the site, consistent with the maximum requirements of the 2006 Development Plan.

⁴ The Development Plan permits up to 1,000 students.

2.2. Vehicle Access & Internal Road Network

Existing site vehicle access and circulation arrangements are illustrated within Figure 3.



Figure 3: Existing Vehicle Access Arrangements & Internal Road Network

As shown within Figure 3 the School currently has four primary vehicle access points with all access points other than Gellibrand Street permitting full turning movements. The Gellibrand Street access point is controlled by a boom gate with exit movements only permitted from the College.

2.3. Road Network

Barkers Road is located within a Road Zone Category 1 (RDZ1), controlled by DoT, and provides an arterial road link between Burke Road, Hawthorn East and the Melbourne CBD via Victoria Street through Richmond. The road serves an important role providing a primary east-west road link.

In the vicinity of the site Barkers Road is a four-lane two-way road with parallel kerbside parking permitted in sections. Directly abutting the site frontage is a No Stopping restriction for approximately 30m either side of the site vehicle access. A clearway also operates between 6:30 and 9:30am (Monday to Friday) on the south side and between 4:00 and 6:30pm (Monday to Friday) on the north side.

A posted speed limit of 60km/h applies to Barkers Road along the site frontage, reducing to 40km/h from 8am-9:30am and 2:30pm-4pm on School Days.

Barkers Road, adjacent to the subject site, is presented at Figure 4 and Figure 5.



Figure 4: Barkers Road - View East

Figure 5: Barkers Road – View West

Charles Street is a local street that runs in a predominately north-south direction between Barkers Road and Wellington Street. Charles Street continues north of Wellington Street to High Street functioning as a collector road. The intersection of Charles Street and Wellington Street is signalised with a central median island in Charles Street providing two lanes on both the southern approach and departure side of the intersection in the immediate vicinity of the intersection (i.e. no parking permitted).

Charles Street is a two-lane two-way road in the vicinity of the site with a pavement width of around 7.9 metres. Traffic management towards the northern end of Charles Street includes speed humps and a raised school crossing combined with a slow point. Left-turn only access is permitted from Charles Street onto Barkers Road with regulatory signage and a traffic island restricting right-turn out movements at the intersection.

No Stopping restrictions exist on the west side of Charles Street in the vicinity of Gate 2. The No Stopping restrictions on the west side (along the college's frontage) span from midblock of the abutting property to the south of Gate 2 (i.e. Xavier College Property Office) to the pedestrian crossing further to the north (adjacent to Trinity Grammar). To the south of the Xavier College Property Office, kerbside parallel parking is permitted on the western side.

On the east side of Charles Street, along the College's frontage, there are No Stopping restrictions that span between midblock (No.18 Charles Street) to the pedestrian crossing to the north (adjacent to Trinity Grammar). To the south of the No Stopping restriction kerbside parallel parking is permitted on the eastern side.

Charles Street, adjacent to the subject site, is presented at Figure 6 and Figure 7.





Figure 6: Charles Street – View North

Figure 7: Charles Street - View South

Stanley Street is a local street which runs for a short distance to the south of Wellington Street and terminates as a dead-end. Gate 6 of Xavier College (pedestrian access only gate) is located at the dead-end section of the street. The carriageway is approximately 13.6 metres wide with restricted parallel kerbside parking on the west side and restricted kerbside angle parking on the east side.

Stanley Street is presented at Figure 8 and Figure 9.





Figure 9: Stanley Street - View South of Gate 6

Gellibrand Street is a local street which runs for a short distance to the south of Wellington Street to a dead-end/Gate 7 of Xavier College (exit only gate). The road is approximately 9.5 metres wide with restricted parallel kerbside parking on both sides.

Gellibrand Street is presented at Figure 10 and Figure 11.







Figure 10: Gellibrand Street – View North

Figure 11: Gellibrand Street - View South of Gate 7

Stratford Avenue is a residential street which runs for a short distance to the south of Wellington Street to a dead-end/Gate 8 of Xavier College (exit only gate). The road is approximately 6.0 metres wide, widening in the vicinity of the Gate 8 access, with restricted parallel kerbside parking on the eastern side of the carriageway.

Stratford Avenue, adjacent to the subject site, is presented at Figure 12 and Figure 13.



Figure 12: Stratford Avenue – View North

Figure 13: Stratford Avenue – View South of Gate 8

2.4. Car Parking Conditions

The approved 2006 Development Plan incorporates a car parking plan of the site as shown within Figure 14 below.

Traffic Engineering Assessment

Xavier College – 135 Barkers Road, Kew



Figure 14: On-Site Car Parking Plan (2006 Development Plan)

The 2006 Development Plan, as shown within Figure 14, nominates a total of 245 on-site spaces during school hours and 314 spaces after school hours. The 69-space difference between the during and after school hours parking provision is due to basketball court parking (Area N). That is, the 2006 Development Plan only envisages car parking on the basketball courts outside of school hours, specifically, after 6pm.

Given that the 2006 Development Plan was approved some 15 years ago Traffix Group completed a detailed review of the current on-site car parking provisions in January 2021. Our car parking inventory recorded a total of 249 on-site spaces (during school hours) and 300 spaces (after school hours), with 51 spaces being provided on the basketball courts.

The provision of car parking is generally consistent with the 2006 Development Plan, noting that the key difference between current on-site conditions and the 2006 Development Plan is the basketball courts which have 18 fewer spaces than nominated within the 2006 Development Plan.

The current on-site car parking provision is inclusive of eight spaces at no.10 & 12 Stanley Street. These properties were included as part of the 2006 Development Plan, with the car parking provisions reflected within the 2006 Development Plan and our review of current on-site car parking. Whilst these properties are owned and utilised by Xavier College (including for staff car parking) these properties <u>are not</u> part of the proposed Development Plan area and the car parking within these properties <u>has not</u> been included within the proposed Development Plan.

Based on a detailed review of historical aerial images and anecdotal observations provided by the School we understand that on-site car parking is typically well utilised during school hours. Despite this strong utilisation we understand that there is lower utilisation of the Stratford Avenue car park and car parking along the western side of the internal access road in the vicinity of Barkers Road.

2.5. Traffic Conditions

Traffix Group commissioned traffic surveys of key site access points on Monday 22 February 2021 between 5:30am-9:30am and 2:00pm-6:00pm. Traffic surveys were completed at the following locations⁵:

- Site Access / Gellibrand Street
- Site Access / Charles Street / Hansen Street
- Site Access / Barkers Road

⁵ Surveys were not completed of the site access point to Stratford Avenue. The on-site car park accessed via Stratford Avenue comprises a total of 15 car parking spaces with previous observations completed by Traffix Group indicating that this car park is not typically utilised for student pickup/drop-off.

We have been advised by the School that the survey day represented a typical⁶ school day with no on-site major events (or similar) and that attendance at before/after school extracurricular activities was relatively consistent with most school days.

The School advised that on the survey day in the order of 200 and 330 students attended before and after school on-site sporting activities respectively. We understand that there were negligible parents/guardians who were on-site to watch the before school activities with approximately 30 parents/guardians watching after school swimming activities on the survey day.

Traffic data was collected in five-minute intervals with traffic distribution to/from the site summarised within Figure 15 and Figure 16.



Figure 15: Traffic Movement Distribution (5 Minute Intervals)

⁶ Whilst some broader covid-19 government restrictions were in place at the time of the traffic surveys, there were no restrictions on student/staff numbers and the general operation of the school (from a traffic engineering perspective).



Traffic Engineering Assessment



Figure 16: Traffic Movement Distribution (One Hour Intervals)

As shown within Figure 15 and Figure 16 there are a number of distinct traffic peaks which were recorded across the survey period. The academic school day starts at 8:40am and concludes at 3:30pm, which generally coincides with morning and afternoon traffic peaks.

The afternoon site traffic peak occurs at 4:30pm-5:30pm which we understand generally coincides with staff departures as well as the end of many after school extracurricular activities. For the purposes of reporting, herein, the afternoon peaks are referred to as the 'Early PM' (3:20pm-4:20pm) and 'Late PM' (4:30pm-5:30pm) peak periods.



2.6. Staff & Student Travel Behaviour

2.6.1. Methodology

Traffix Group completed an online survey of staff and students to ascertain existing travel behaviours. Surveys were completed across February/March 2021 with a total of 617 responses received, comprising 130 staff and 487 parents/guardians of students.

We note that a small percentage of the parent/guardian responses were for students who board on campus and therefore do not travel to/from the school day to day. The responses of boarders have been excluded from our analysis/results.

The key results of the travel behaviour surveys are outlined below with the following sections.

2.6.2. Travel Mode

The travel mode split of students and staff is outlined in Figure 17 and Figure 18 respectively. The travel mode reflects the main method of travel to/from the site on a typical school day.



Figure 17: Student Travel Mode Survey Results

Traffic Engineering Assessment



Figure 18: Staff Travel Mode Survey Results

2.6.3. Arrival & Departure Time

The proportion of students and staff who arrive/depart before, during and after the AM and Early PM peak hours is outlined in Figure 19. The summary only relates to those staff and students who travel to/from the site by car.



Figure 19: Arrival/Departure Distribution - Car (Driver or Passenger) as Mode of Travel

2.6.4. Parking Location

A summary of the parking locations for students who drove or were driven to School are outlined in Figure 20. We note that the survey indicated that 100% of staff who drove or were driven to School parked on-campus.



Figure 20: Student Parking Location Results



3 Development Plan

3.1. The Rationale

The Development Plan offers an opportunity to re-imagine various elements of the campus. In determining the future design of the site, the following key strategies were identified with respect to traffic engineering considerations:

- · Connect the campus with a clear and accessible pedestrian spine,
- Prioritise pedestrians,
- Separate people from cars.

Based on the above strategies the following section outlines the Development Plan response to key traffic engineering considerations.

3.2. Proposal Summary

The proposed Development Plan incorporates an increase in staff and student numbers, buildings and works as well as modifications to car parking and vehicle access arrangements.

The Development Plan includes the following key staged works:

Priority Project 1 – Year 7 & 8 Building and Chapel Oval Car Park

The Year 7 & 8 Building is proposed to replace the existing basketball courts (which comprise 51 car parking spaces, available outside of school hours).

The Chapel Oval Car Park project incorporates the provision of car parking underneath the existing Chapel Oval, with the oval also to be increased in size. Works involve the removal of the north-south orientated internal road link which connects through to Gellibrand Street⁷.

Additionally, the right-turn exit movement at the Barkers Road access point is proposed to be restricted during peak school drop-off/pick-up periods (8am-9:30am & 2:30pm-6pm Mon-Fri) with buses excepted from this restriction.

As part of these works there is a rationalisation of car parking with car parking to be removed from internal access roads. Car parking is proposed, as outlined within the Development Plan, as follows:

- Chapel Oval Car Park (250-300 spaces⁸)
- Property Office Car Park (79 spaces)
- Potential disabled car parking to the south of the Chapel and South Wing
- Miscellaneous car parking (22 spaces) throughout the campus within staff and back of house areas, generally as per existing conditions.

⁷ Vehicle access to Gellibrand Street to be retained for maintenance/loading access only.

⁸ Approximate car parking provision. Exact provision subject to future detailed design.

Priority Project 2 – Boarding House

This building is proposed within the existing tennis courts area within the north-western corner of the site. It is anticipated that minimal (if any) car parking⁹ would be provided within this area.

- Other Future Projects
 - Specialist teaching and learning building
 - Sports Centre upgrade
 - New maintenance building

The above 'other future projects' would not result in a material change to car parking and traffic arrangements. Notwithstanding, the new maintenance building will result in changes to maintenance vehicle access to/from the site, with the new maintenance building to be located to the west of the existing Sports Centre. An east-west service road is proposed along the northern boundary of the site to accommodate maintenance and loading vehicle movements.

The Development Plan is shown within Figure 21.



Figure 21: Development Plan

⁹ Any car parking would be for maintenance vehicles and/or boarding house staff.
3.3. Student and Staff Numbers

A summary of the existing and proposed student (including boarders) and staff numbers is presented within Table 1.

Table 1: Comparison of Existing and Proposed Development Plan

	Development Plan					
	Existing 2006 Development Plan	Proposed Masterplan	Change			
Students (including boarders)	1,000	1,500	+500 students [2]			
Boarders	57	100	+43 boarders [2]			
Staff [1]	180	210	+30 staff			

[1] Full-time equivalent staff.

[2] Additional boarders are included within the 500-student increase. That is, 457 additional non-boarding students and 43 additional boarding students are proposed as part of the Development Plan.

As shown within Table 1, staff and student numbers are proposed to increase, along with the number of boarders.

The Development Plan will consolidate all year 7 & 8 students from the existing Kostka Hall and Burke Hall campuses within the subject site, forming a distinct Senior Campus.

It is important to note that the movement of students between Burke Hall and the Senior School, as well as the intensity of before/after school sports and weekend sports, will remain generally consistent with current arrangements under the Development Plan.



3.4. Car Parking

A summary of the existing on-site car parking and that specified within the 2006 and proposed Development Plans is presented within Table 1.

Table 2: Car Parking Summary

	During School Hours	After School Hours
Existing Conditions	249 spaces	300 spaces
Development Plan (2006 Approved)	245 spaces	314 spaces
Development Plan (Proposed) [1]	351-401 spaces	351-401 spaces

[1] Exact car parking provision subject to detailed design of the Chapel Oval car park.

As shown within Table 2 a total of 351-401 on-site car parking spaces are proposed. It is also noted that the Chapel Oval Car Park is proposed to incorporate a dedicated pick-up/drop-off area for students.

As nominated earlier the 2006 Development Plan includes eight spaces at no.10 & 12 Stanley Street. These properties and spaces <u>are not</u> located within the proposed Development Plan area and have not been included within the proposed car parking provisions.

In order to illustrate the proposed car parking arrangements, and further to Figure 14 (2006 Development Plan – Car Parking Plan), Figure 22 has been prepared to demonstrate key car parking areas.





Figure 22: Car Parking Areas –Development Plan



3.5. Vehicle Access

Proposed vehicle access arrangements are shown within Figure 23.



Figure 23: Vehicle Access Arrangements & Internal Road Network – Development Plan

As shown within Figure 23 a number of changes to vehicle access arrangements and internal vehicle circulation are proposed. A rationalisation of staff/parent/visitor access points to a single location to both Barkers Road and Charles Street is proposed. It is proposed to ban right-turn movements out onto Barkers Road from the site access point during peak school drop-off/pick-up periods (8am-9:30am & 2:30pm-6pm Mon-Fri), with buses excepted from this restriction. This turn ban has been identified as the existing right-turn exit movement onto Barkers Road was already observed to be at its practical capacity during these periods.

We note that previous iterations of the proposed Development Plan incorporated signalisation of the Barkers Road / Site Access intersection. Following submission of the previous Development Plan, and associated Authority and Community feedback, this traffic signal option is no longer being pursued.

3.6. Bicycle Facilities

A total of 17 existing bicycle parking spaces are provided throughout the site. These spaces are located adjacent to the Montague Quad as well as at the Sports Centre. It is our understanding that all 17 existing spaces would be retained as a result of the Development Plan.

Details regarding the proposed provision of bicycle facilities and associated recommendations is outlined within Section 5 of this report.

3.7. Pedestrian Facilities

As part of the Development Plan there are significant improvements to the pedestrian network within the site, including the following:

- The provision of direct pedestrian access between the Chapel Oval Car Park and on-site buildings (i.e. students won't need to cross the main internal access road to be pickedup/dropped off).
- The provision of an east-west pedestrian spine located towards the northern edge of the site. This spine, along with a separate east-west service road for maintenance vehicles located at the northern boundary of the site, will separate pedestrians and vehicles. That is, students/staff will no longer need to cross the internal north-south road which links to Gellibrand Street in travelling between the Sports Centre and academic buildings.
- Removal of car parking and traffic movements, other than some potential disabled car spaces, within the loop road to the south of the Chapel and South Wing. It was observed by Traffix Group that pedestrians regularly use this road in travelling between car parking areas (including the property office car park) and the school buildings.

3.8. Bus Parking

Bus parking currently occurs within indented parallel bays within the internal loop road which connects Charles Street and Barkers Road. These arrangements are to be retained.

We have been advised by the School that they require pick-up/drop-off for up to four buses, of varying sizes, at any one time. The nominated area (approximately 52m in length) can accommodate four buses, also noting that there is potential to increase the length of this area (particularly to the west) through line marking modifications.



3.9. Loading & Maintenance Arrangements

A new maintenance building is proposed within the north-western corner of the site, to the south of the proposed new boarding house building. Once completed, maintenance vehicle access will be via Stratford Avenue (Gate 8) and Gellibrand Street (Gate 7). An east-west aligned service road is proposed along the northern boundary of the site linking these two gates.

Additionally, a north-south aligned service road is proposed along the western boundary of the site. This service road would provide access to the new maintenance building, the Xavier Sports Centre as well as loading area(s) of the new boarding house.

We have been advised that loading is to occur via the Barkers Road access point (as much as practical).

3.10. Waste Collection

Waste collection arrangements are to be confirmed within a Waste Management Plan. The mandate to prepare such a plan(s) could be included by way of an appropriately worded permit condition for any future permit(s) granted for buildings and works within the site.

We have been advised that waste collection is to occur via the Barkers Road access point (as much as practical).



4 Car Parking Considerations

4.1. 2006 Development Plan Context

Traffix Group were involved in the preparation of the 2006 Development Plan for the subject site. The 2006 Development Plan nominated differing car parking requirements during and after school hours. Within the 2006 Development Plan traffic report 'after hours' refers to being after 6pm.

For context Table 3 outlines the statutory car parking assessment¹⁰ pertaining to the 2006 Development Plan.

	Statutory	s	Statutory Parking Requirement		
Use	Parking Rate	During School	After 6pm (After School)	During School	After 6pm (After School)
Secondary School	1.2 spaces / employee	180 staff	-	216 spaces	-
Place of Assembly (Eldon Hogan Performing Arts Centre)	0.3 spaces / seat	80 seats/persons	600 seats/persons	24 spaces	180 spaces
Xavier Sports Centre [1]	-	-	-		100 spaces
Total					280 spaces

Table 3: Statutory Car Parking Requirement (Clause 52.06) – 2006 Development Plan

[1] The Centre is understood to incorporate indoor basketball (2 courts), cricket and pool facilities with a specified rate not nominated within Clause 52.06 of the Boroondara Planning Scheme for all uses. A conservative car parking demand of up to 100 car parking spaces was adopted for the 2006 assessment.

The 2006 Development Plan nominates the provision of 245 and 314 on-site car parking spaces during and after school hours respectively. As such and having regard to the statutory

¹⁰ The Clause 52.06 'Secondary School' and 'Place of Assembly' statutory car parking rates adopted for the 2006 Development Plan remain consistent with current statutory car parking rates for these uses.

requirements specified within Table 3, the 2006 Development Plan nominates on-site car parking in excess of statutory requirements.

Further to Table 3 it is our understanding that the use of the Performing Arts Centre by external groups is limited to the following operational conditions:

- no more than 600 people in attendance after 6pm for an event held by external groups with no school events and normal operation of the Stephenson Centre, and
- no more than 80 people in attendance prior to 6pm for an event held by external groups when the school is fully operational i.e. 180 full time equivalent staff on-site.

Further to the above, it is our understanding that these existing arrangements are not sought to be amended as part of the Development Plan.



4.2. Statutory Car Parking Requirements

The land use category 'secondary school' will continue to apply to the site under Clause 73.03 of the Planning Scheme.

Clause 52.06-5 of the Planning Scheme states that where an existing use is increased by the measure specified in Column C of Table 1 for that use, the car parking requirement only applies to the increase, provided the existing number of car parking spaces currently being provided in connection with the existing use is not reduced.

As the Development Plan seeks to increase the existing provision of car parking the statutory requirements are only applicable to the increase in the statutory measure (number of staff).

Further to this, the Development Plan does not seek an increase in the capacity of on-site 'Place of Assembly' uses or an increase in the intensity of on-site sporting activities.

Based on the foregoing, the statutory car parking requirement for the Development Plan is outlined in Table 4.

Table 4: Statutory Car Parking Requirement (Clause 52.06)

Use	No.	Statutory Parking Rate	Statutory Parking Requirement
Secondary School	+30 staff	1.2 spaces to each employee that is part of the maximum number of employees on the site at any one time	+36 spaces

The Development Plan results in a statutory requirement to provide 36 additional car parking spaces during school hours and no additional car parking spaces after school hours, based on the methodology adopted for the 2006 Development Plan statutory assessment. No additional spaces are required after hours, noting that the statutory requirement applies to the secondary school use as opposed to the after-hours (after 6pm) use of facilities within the site.

The Development Plan proposes a total of 351-401 on-site car parking spaces, both during and after school hours. This represents at least a 106 space increase during school hours and at least a 37 space increase to car parking after hours, compared with the 2006 Development Plan. The proposed provision of on-site car parking exceeds statutory requirements.

Accordingly, we are satisfied that the proposed provision of car parking meets and indeed exceeds relevant statutory car parking requirements and those specified within the 2006 Development Plan.

4.3. Car Parking Arrangements

4.3.1. Preamble

The Development Plan meets and well exceeds the statutory car parking requirements specified within Clause 52.06 of the Boroondara Planning Scheme. Notwithstanding this, an assessment of the impact of, and relevant considerations associated with, the increased car parking demands, is outlined below.

4.3.2. Car Parking Arrangements

Clause 52.06 of the Boroondara Planning Scheme specifies a statutory car parking requirement of 1.2 spaces per staff member for a secondary school. This rate is slightly higher than that specified for a primary school of 1.0 spaces per staff member. In this regard, secondary school rates are slightly higher to allow for parking associated with some older students who are legally permitted to drive to/from school.

Fundamentally, these statutory car parking rates are on the basis that schools are to accommodate staff car parking demands within the site itself and that the surrounding onstreet road network is to be utilised for and absorbs car parking demands associated with pick-up/drop-off.

Increasingly, private schools are seeking to provide additional car parking within their sites to both allow for pick-up/drop-off, sporting, as well as other after-hours events. This is not a statutory imperative but rather an intent to provide increased convenience in accessing the site and to reduce the impact that their operations have on surrounding streets.

The increase in the student cohort by 50% will increase on-site demands as well as the demand for on-street car parking. It is difficult to quantify the exact extent to which on-street car parking demands will change as a result of the development proposal. Any increase in on-street car parking demands is anticipated to be limited to pick-up/drop-off periods with the Development Plan representing an increase to the on-site provision of car parking during school hours and after hours. It is noted that a dedicated pick-up/drop-off area is also proposed within the Chapel Oval Car Park.

Indeed, with respect to the above it is important to note that the use of on-site and on-street car parking surrounding schools typically reaches a natural equilibrium. This equilibrium is reached through parent/guardians understanding of the on-site/on-street car parking availability. Parents/guardians who commonly drive to the school understand the operation of the surrounding road network and on-site vs off-site car parking availability. This allows parents/guardians, along with their individual preferences and circumstances, to tailor both their trip timing and pick-up/drop-off location accordingly.

The above is considered an important frame of reference in viewing the proposed car parking arrangements. This is not to quantify the potential increase in on-street car parking demands but rather to highlight that the majority (if not all) on-site car parking spaces are likely to be utilised during pick-up/drop-off periods.

4.4. Car Parking Design

As part of our involvement in this project, Traffix Group has provided design input into the development of the Development Plan.

The design of car parking areas, including their dimensions, would be confirmed as part of subsequent planning permit application(s).

New car parking areas should accord with the relevant requirements of the Planning Scheme and Australian Standards.



5 Bicycle Parking Considerations

The statutory bicycle parking requirements for the Development Plan are outlined under Clause 52.34 of the Planning Scheme and are summarised below; noting that these requirements are only applicable to the proposed increase in student/staff numbers, also noting that there is to be no reduction to existing bicycle parking provision (17 spaces) in connection with the Development Plan.

The statutory bicycle parking requirement for the Development Plan is outlined in Table 4.

Table 5: Statutory Bicycle Parking Requirement (Clause 52.34)

Use	No.	Statutory Parking Rate	Statutory Parking Requirement
Secondary School (Staff)	+30 staff	1 space to each 20 employees	+2 spaces
Secondary School (Staff)	+500 students	1 space to each 5 students	+100 spaces

The Development Plan results in a statutory requirement to provide 102 additional bicycle parking facilities. As fewer than five additional employee bicycle parking spaces are required, there is a zero requirement to provide additional shower/change room facilities for staff.

The provision and layout of bicycle parking area(s) is to be formalised as part of future planning permit application(s).

The travel behaviour surveys (outlined in Section 2.6.2) identified that currently only 1% of staff and 1% of students cycle to the site.

It is our recommendation that bicycle parking area(s) within the site make a spatial allowance for bicycle parking commensurate with the statutory bicycle parking requirement, however, that only part of the statutory bicycle parking requirement be provided initially. That is, bicycle parking be initially provided commensurate with the existing bicycle parking rates within the site (or above as appropriate). This is not to say that the School won't be aspirational with respect to encouraging cycling as a mode of travel but rather be realistic as to initial demands to avoid providing an over-abundance of bicycle parking (in the short-term).

Given this recommendation, the utilisation of bicycle parking areas will need to be monitored, and additional bicycle parking be provided (as/if required) over and above the initial provisions should bicycle parking area(s) be at or approaching capacity in order to promote cycling as a mode of travel.

We would recommend that student bicycle parking be provided utilising horizontal systems such as bicycle hoops. Staff bicycle parking may utilise either horizontal or vertical parking systems.

6 Existing Traffic Conditions

6.1. Preamble

Our traffic assessment is based upon the aforementioned AM, Early PM and Late PM peak hours. No assessment has been provided of other peak periods, namely Saturday mornings, noting our understanding that the intensity of Saturday morning sporting activities is not to change as a result of the Development Plan.

Whilst this is equally true for the 'Late PM' peak hour, the Late PM peak hour also more closely aligns with the road network peak hour for the surrounding road network than Saturday morning sporting times. Despite no change to after school activities¹¹ during the Late PM peak it has been assessed, noting that general site access to Gellibrand Street is to be removed, with an associated re-distribution of traffic to/from the site.

6.2. Existing Traffic Volumes

Traffix Group commissioned traffic surveys of key site access points on Monday 22 February 2021 between 5:30am-9:30am and 2:00pm-6:00pm.

A summary of the recorded AM, Early PM and Late PM peak hours is provided within Figure 24, Figure 25 and Figure 26 respectively.

¹¹ Whilst there is understood to be no change to after school activities and associated traffic movements there will be a relatively minor increase in staff movements, which have been accounted for within our assessment.





Figure 24: Existing Conditions - AM Peak Hour



Figure 25: Existing Conditions - Early PM Peak Hour



Figure 26: Existing Conditions - Late PM Peak Hour

6.3. Base Case & Calibration

The Department of Transport requires that traffic assessments consider a 10-year future growth scenario or 'base' case. A base case includes 10 years of traffic growth on the surrounding road network without the 'development'.

In this regard, Traffix Group has sourced¹² existing historical traffic volume data for key roads in the vicinity of the subject site, including:

- Barkers Road
- Denmark Street
- Wellington Street
- Glenferrie Road
- Charles Street¹³.

A review of relevant historical traffic data for these roads showed that across the last available 15-year period that there has been negligible traffic volume growth on these roads, with a decrease in traffic volumes observed on a number of these roads.

¹² Department of Transport data.

¹³ Historical traffic volume data only available for Charles Street to the north of Wellington Street.

By way of example, Figure 27 illustrates Barkers Road traffic volumes across the last available 15-year period (2001-2015). Traffic volumes were recorded between Glenferrie Road and Denmark Street, on a weekday (during school terms), with no growth in traffic volumes across the 15-year period.



Figure 27: Barkers Road Traffic Volumes – Historical Trends

Given the above, no road network traffic growth has been adopted for the post-development scenario in reflecting a future 10-year scenario.

Additionally, whilst covid-19 related restrictions have resulted in changes to travel modes and activity on the metropolitan Melbourne road network, traffic volumes at the time of the traffic data collection had generally returned to 'pre-pandemic' levels. Additionally, anecdotal observations indicate that travel modes to/from schools via car are generally consistent, if not higher, than pre-pandemic levels (due to a shift from public transport in favour of private motor vehicles). No further calibration of the recorded 'existing conditions' traffic volumes is required in our view.

On the basis of the above, we are satisfied that the existing conditions traffic volumes both accurately capture existing conditions as well as base case conditions and are fit for purpose for our subsequent analysis.



6.4. Existing Distribution of Site Generated Traffic

A summary of the existing traffic distributions to/from the subject site for the three peak hours are provided within Figure 28 to Figure 30.



Figure 28: Existing Traffic Distribution - AM Peak Hour



Figure 29: Existing Traffic Distribution - Early PM Peak Hour



Figure 30: Existing Traffic Distribution - Late PM Peak Hour

7 Traffic Assessment

7.1. Preamble

Traffic volumes to/from the site are anticipated to change as a result of the increase in the on-site car parking supply, the consolidation of car parking facilities as well as the provision of a dedicated pick-up/drop-off area.

The Development Plan will result in significant changes to traffic distribution to/from the site. This is both as a result of the closure of the Gellibrand Street access to general traffic as well as the proposed changes to the Barkers Road access, with right turn movements out of the site to be prohibited during peak school pick-up/drop-off periods (buses excepted).

7.2. Site Generated Traffic

For the purposes of assessing the traffic generated by the site, we have relied on the travel survey data collected, which is outlined in section 2.6.

The AM and Early PM peak hour assessments are based on the total traffic to be generated by the site¹⁶. Conversely, the Late PM peak hour assessment considers existing vehicle movements as well as the addition of vehicle movements associated with staff, noting the student numbers/movements for after school sports are to be generally as per existing conditions.

7.2.1. Staff

The travel survey data indicated that 93% of staff currently drive to the site, with all staff parking occurring on-site. Additionally, of the staff that drive to the site, 63% arrive during the AM peak hour and 27% depart during the Early PM peak hour.

In deriving peak hour staff traffic generation rates, we have multiplied the percentage of staff who drive to the site (93%) by their movement spread across the AM peak (63% arrival) and Early PM peak (27% depart). On this basis, Table 6 has been prepared to show the anticipated post-development staff traffic volumes, based on a total of 210 staff members.

For the late PM peak hour, we have made an allowance for the additional 30 staff members on-site who may be departing during this period. We have multiplied the percentage of staff who drive to the site (93%) and conservatively assumed that all of the staff departing the site after the early PM peak hour (65%) may depart during the late PM peak hour.

¹⁶ This methodology is considered appropriate, as opposed to calculating the increase in site generated traffic and adding this to existing volumes for these peak hours. This is primarily due to the disproportionate increase in staff vs student numbers as well as changes to the existing proportionality of on-site vs on-street car parking (due to the provision of a dedicated pick-up/drop-off facility).



	IN		OUT	Total	
Peak Period	Traffic Rate (movements/staff)	Traffic Generation (movements)	Traffic Rate (movements/staff)	Traffic Generation (movements)	Peak Hour Volume (movements/hour)
AM Peak	0.59	124	-	-	124
Early PM Peak	-	-	0.25	52	52
Late PM Peak [1]	-	-	0.60	18 (applied only to additional 30 staff)	18 additional staff vehicle movements / hour

Table 6: Staff Traffic Generation – Post Development

[1] The Late PM peak hour nominated traffic movements reflect the anticipated increase in staff numbers/movements over and above existing conditions.

7.2.2. Students

Based on the travel survey data we can derive traffic generation rates to/from the School for students. We have multiplied the percentage of students who drive or are driven to school via car (29%) by the percentage who are anticipated to park on-site (55%, refer below discussion) and their movement spread across the AM peak (76% arrival) and PM peak (81% departure). For the purposes of our analysis, we have assumed that a peak hour movement includes both an entry and exit movement¹⁷. It is emphasised that these traffic generation rates are solely for on-site movements (i.e. traffic generation at the site access points) and do not reflect on-street pick-up/drop-off activities.

We do not anticipate that travel mode splits or the arrival and departure times will materially change. Nevertheless, given the provision of the Chapel Oval Car Park, providing consolidated parking facilities, a greater quantum of on-site car parking and a dedicated pick-up/drop-off facility, it is likely that there would be an uplift in the proportion of parents/students parking on-site relative to on-street.

We have allowed for a 25% increase in the proportion of student related on-site car parking vs on-street parking, compared with existing conditions. As such, we assume that in the order of 55% of students (currently 43%) who drive or are driven to the site will park on-site during the AM and Early PM Peak Hours. No changes are anticipated to the split of on-street vs on-site

¹⁷ This is considered to retain a small element of conservatism as not all movements associated with students will have an entry and exit movement within the same peak hour. For example, students who park on-site will only have an entry movement during the AM peak, not an entry and exit movement.

car parking during the Late PM peak hour, nor the number of vehicle movements, noting the student numbers/movements for after school sports are to be generally as per existing conditions.

On the basis of the above methodology and calculations, student traffic generation rates and volumes are outlined within Table 7. The post-development traffic generation estimates are based on a student population of 1,400 students (i.e. 1,500 students minus the 100 boarders).

It is re-emphasised that the travel survey data reported above excludes results associated with boarders and that no additional student related vehicle movements are anticipated during the late PM peak hour (hence this peak hour has been excluded from Table 7).

Table 7: Studen	t Traffic	Generation	- Post	Development
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	IN		OUT	Total	
Peak Period	eak riod Traffic Rate (movements/student) (moveme		Traffic Rate (movements/student)	Traffic Generation (movements)	Peak Hour Volume (movements/hour)
AM Peak	0.12	168	0.12	168	336
Early PM Peak	0.13	182	0.13	182	364

7.2.3. Total

Based on the above, the anticipated level of site generated traffic that will utilise the Barkers Road and Charles Street access points is outlined in Table 8. We note that there will still be some movements associated with Gellibrand Street and Stratford Avenue, however, these will be limited to maintenance/loading activities.

We note that the late PM peak hour volumes outlined below are the sum of the existing volumes and additional staff movements expected outlined in Table 6.

Table 8: Total Site Traffic Generation – Post Development

Peak Period	IN	OUT	Total
AM Peak	292 veh/hr	168 veh/hr	460 veh/hr
Early PM Peak	182 veh/hr	234 veh/hr	416 veh/hr
Late PM Peak [1]	149 veh/hr	219 veh/hr	368 veh/hr

[1] The Late PM peak hour nominated traffic movements reflect the anticipated increase in staff numbers/movements over and above existing conditions.

7.3. Site Generated Traffic Distribution

Significant changes to the site's access arrangements are proposed, namely the closure of the Gellibrand Street exit and restriction of the right-out movement from the site's Barkers Road access during peak pick-up/drop-off periods. These amendments to the site's access arrangements will impact the distribution of site generated traffic entering and exiting the site at each access point.

We believe that the majority of traffic currently exiting the site via Gellibrand Street is generally travelling to a northerly or western destination. Moreover, the restriction of the right-out movement to Barkers Road during peak pick-up/drop-off periods will require vehicles heading west to utilise an alternate route.

Having regards to the above, and other relevant factors, the following key assumptions have been made in assessing the redistribution of site generated traffic:

- Gellibrand Street 25% of existing exit traffic to go straight out at Charles Street to Hansen Street,
- Gellibrand Street 75% of existing exit traffic to turn left-out at Charles Street.
- Barkers Road Right-Turn 25% of existing exit traffic to go straight out at Charles Street to Hansen Street,
- Barkers Road Right-Turn 75% of existing exit traffic to go left-out at Charles Street.
- Charles Street 50% of existing exit right-turn traffic to turn left-out at Barkers Road.
- Charles Street 50% of existing entry left-turn traffic to turn right-in at Barkers Road.

Based on these assumptions, when applied to existing distributions, the anticipated site generated traffic distribution to/from the site in the AM, Early PM and Late PM peak hours is outlined in Figure 31 to Figure 33.





Figure 31: Site Generated Traffic Distribution - AM Peak Hour (Development Plan)



Figure 32: Site Generated Traffic Distribution - Early PM Peak Hour (Development Plan)



Figure 33: Site Generated Traffic Distribution - Late PM Peak Hour (Development Plan)



7.4. Traffic Volumes

7.4.1. Site Generated

Based on the above distribution assumptions and site generated traffic volumes Figure 34 to Figure 36 have been prepared to demonstrate the anticipated AM, Early PM and Late PM peak hour site generated traffic volumes.



Figure 34: Site Generated Traffic Volumes - AM Peak Hour (Development Plan)





Figure 35: Site Generated Traffic Volumes - Early PM Peak Hour (Development Plan)



Figure 36: Site Generated Traffic Volumes - Late PM Peak Hour (Development Plan)

7.4.2. Post Development

By adding the anticipated site generated traffic volumes to existing traffic volumes¹⁹ we can derive post development traffic volumes²⁰ for the AM, Early PM and Late PM peak hours as shown within Figure 37 to Figure 39.



Figure 37: Post Development Traffic Volumes – AM Peak Hour

¹⁹ Excludes existing traffic volumes to/from the subject site. It is emphasised that the site generated traffic volumes represent all site generated movements not just the increase relative to existing conditions



Figure 38: Post Development Traffic Volumes – Early PM Peak Hour



Figure 39: Post Development Traffic Volumes – Late PM Peak Hour

7.5. Traffic Assessment Method

We have utilised SIDRA Intersection 9 to undertake an assessment of the following intersections/locations:

- Charles Street / Site Access / Hansen Street.
- Barkers Road / Site Access²¹.

SIDRA is a computer simulation package which assesses the operating performance of intersections and road networks.

A summary of key SIDRA outputs is as follows:

- **Degree of Saturation (DoS)** The ratio of traffic volume to maximum capacity for a particular turning movement.
- Average Delay (Avg. Delay) The average delay in seconds for a vehicle making a particular turning movement.
- 95th Percentile Queue (95% Queue) The 95th percentile queue length is the length in metres which 95 per cent of all observed cycle queues fall below (or 5% exceed) during the peak analysis period.

Typically, a DoS of 0.90 for unsignalised intersections is considered as the typical 'acceptable limit' for intersection operation, beyond which queues, and delays increase disproportionally with the addition of further traffic.

²¹ Barkers Road / Site Access proposed layout shown within Appendix A.



7.6. Traffic Impact Assessment

7.6.1. Traffic Modelling Results

The key findings of our SIDRA assessment are summarised in Table 9 to Table 11 with full results provided at Appendix B.

Table 9: SIDRA Movement Summary - AM Peak

Intersection	Intersection Leg	Existi	ing Condi	itions Post Development			ment
		DoS	Avg. Delay (s)	95% Queue (m)	DoS	Avg. Delay (s)	95% Queue (m)
Charles Street / Site Access	Charles St (South)	0.128	2.1	1.7	0.119	1.8	1.7
/ Hansen Street	Hansen St (East)	0.080	10.4	1.9	0.098	11.1	2.4
	Charles St (North)	0.136	3.2	3.6	0.152	3.5	4.6
	Site Access (West)	0.071	9.7	1.8	0.154	9.5	4.3
Barkers Road / Site Access	Barkers Rd (East)	0.294	0.5	3.6	0.332	1.7	13.1
	Site Access (North)	0.859	196.7	30.0	0.029	9.7	0.7
	Barkers Rd (West)	0.314	0.7	0.0	0.326	0.8	0.0

Intersection	Intersection	Existing Conditions			Post Development		
	3	DoS	Avg. Delay (s)	95% Queue (m)	DoS	Avg. Delay (s)	95% Queue (m)
Charles Street / Site Access /	Charles St (South)	0.068	0.8	0.4	0.068	0.8	0.4
Hansen Street	Hansen St (East)	0.031	8.7	0.7	0.046	9.4	1.1
	Charles St (North)	0.045	2.8	1.0	0.060	3.6	1.8
	Site Access (West)	0.047	8.6	1.2	0.186	8.7	5.6
Barkers Road / Site Access	Barkers Rd (East)	0.411	0.9	4.6	0.481	3.4	17.5
	Site Access (North)	0.428	69.8	9.8	0.024	10.6	0.7
	Barkers Rd (West)	0.394	0.6	0.0	0.413	0.7	0.0

Table 10: SIDRA Movement Summary - Early PM Peak

Intersection	Intersection Lea	Exist	ting Condit	ions	Post Development		
		DoS	Avg. Delay (s)	95% Queue (m)	DoS	Avg. Delay (s)	95% Queue (m)
Charles Street / Site Access /	Charles St (South)	0.065	1.5	0.4	0.058	1.0	0.4
Hansen Street	Hansen St (East)	0.015	8.8	0.4	0.016	9.1	0.4
	Charles St (North)	0.065	3.3	2.0	0.065	3.2	2.0
	Site Access (West)	0.080	8.6	2.1	0.172	8.6	5.1
Barkers Road / Site Access	Barkers Rd (East)	0.526	4.1	21.4.1	0.574	6.2	33.1
	Site Access (North)	0.671	165.5	15.8	0.045	11.3	1.2
	Barkers Rd (West)	0.321	0.3	0.0	0.321	0.3	0.0

Table 11: SIDRA Movement Summary - Late PM Peak

7.6.2. Charles Street / Hansen Street / Site Access

As shown in Table 9 to Table 11, the Charles Street / Hansen Street / Site Access intersection currently operates within acceptable limits (i.e. DoS less than 0.90 and low/moderate queues and delays) and is predicted to continue to do so post development. The Development Plan is not expected to result in any significant deterioration in the operation of this intersection, with all post development queues and delays also considered to be within acceptable limits and existing lane lengths/capacities.

7.6.3. Barkers Road / Site Access

As shown in Table 9 to Table 11, the Barkers Road / Site Access intersection is anticipated to operate within acceptable limits during all assessed peak periods.

Indeed, the removal of the right-turn out movement to Barkers Road during the assessed peak periods significantly improves the operation of the site access approach.

Appendix A illustrates the proposed amendments to the site access point to Barkers Road. The proposed modifications allow for the separation of entering and exiting motorists with a splitter island proposed, which also allows for pedestrians to store when crossing the driveway. The existing eastern kerb line of the site access road to Barkers Road is to be retained, thus, the site access road is not proposed to move any further east and closer to tree number 74.

We are satisfied that the proposed access arrangement to Barkers Road is appropriate.

7.6.4. Gellibrand Street

Gellibrand Street is to be limited to loading and maintenance vehicle movements only. This will represent a significant reduction in site generated traffic utilising Gellibrand Street, comparative with existing conditions.

7.6.5. Stratford Avenue

Stratford Avenue is to be limited to loading and maintenance vehicle movements only. Site generated traffic volumes are anticipated to be generally consistent or slightly lower than existing conditions, albeit the proportion of heavy vehicles associated with the site utilising Stratford Avenue is anticipated to increase.



8 Boroondara Council – Traffic Engineering Referral

Council's traffic engineer reviewed the proposed Development Plan and previous iteration of the Traffix Group report (dated 9 August 2021) and provided the internal referral comments within email correspondence dated 21 September 2021.

Council key findings are outlined below **(bolded)** with a response (as required) to each of these items following.

"On review of the revised submitted development plan dated August 2021, including a revised traffic engineering assessment prepared by Traffix Group, dated August 2021 and associated supporting documentation I provide the following additional feedback regarding the outstanding traffic and parking elements of the development plan only:

The currently endorsed 2006 Development Plan specifies a minimum of 245 on-site parking spaces during School Hours and 314 on-site parking spaces during After School Hours. Currently, a total of 249 spaces are provided during school hours and 300 spaces are provided during after school hours."

Noted.

"Under the proposed Development Plan it is intended to increase staff to a total of 210 staff, an increase of 30 staff from current staffing levels. On this basis, the 'Secondary School' use at the site is proposing to be increased, whereas, it does not seek to increase the capacity of on-site 'Place of Assembly' uses, or an increase in the intensity of on-site sporting activities. Therefore, there is a statutory parking requirement, as per Clause 52.06 of the Boroondara Planning Scheme, associated with the increase in the 'Secondary School' use, as proposed."

Noted.

"Based on the proposed increase of 30 staff as per the proposed Development Plan, there is a statutory requirement to provide an additional 36 on-site parking spaces. This increase in onsite parking capacity only applies during School Hours, or when there are a maximum number of employees on the site at any one time. After School Hours parking capacity is to be maintained as per the existing 2006 Development Plan."

Noted.

"It is proposed to provide a total of 351-401 on-site parking spaces as part of the development plan, including rationalisation of the existing on-site supply and the construction of the Chapel Oval car park. This will result in a minimum of 106 additional on-site parking spaces during school hours and at least an additional 37 spaces after-hours. The proposed increase in on-

site parking exceeds the statutory parking requirement of 36 spaces. On this basis, the onsite parking provision is considered appropriate in this instance." Noted.

"Vehicle access to/from the school is to be altered as part of the Development Plan, with general vehicle access points reduced to a single access to both Barkers Road and Charles Street only. There are also the retention of two additional access points as part of the development plan, of which one is restricted to Exit only and the other provides access to/from the tennis courts. These accesses are exclusively for service vehicle use only along with two other access points along the Charles Street site frontage."

Barkers Road access to be retained (unsignalised) with the existing right-turn exit movement proposed to be restricted. We re-emphasise that the previous proposal comprising traffic signals at the Barkers Road / Site Access intersection is no longer being pursued.

"Based on the proposed additional traffic generation and distributing these volumes across the existing and proposed access points around the site, post-development traffic volumes and intersection performance has been evaluated via the use of SIDRA Intersection software. A review of the traffic modelling presented for each of the proposed site accesses when including the additional post-development traffic volumes indicate that the Charles Street/Hansen Street/ site access intersection and the proximate intersection of Barkers Road/Denmark Street/Power Street will likely operate within acceptable limits and that the anticipated traffic volumes may be accommodated without significant impact."

Noted. An updated traffic assessment is outlined within Section 7 of this report.

"The proposal for the provision of traffic signals at the Barkers Road site access to regulate traffic movements has also been considered and modelled within SIDRA. It is further reiterated that this is classified as a major traffic control item and is subject to review and approval by VicRoads and the state government. The submitted traffic modelling indicates that anticipated traffic volumes and vehicle queues at this site access will be maintained within acceptable limits and will operate satisfactorily, based on the modelled conditions."

Traffic signals at the Barkers Road / Site Access intersection are no longer proposed. An updated traffic assessment is outlined within Section 7 of this report.

"The introduction of this type of road infrastructure will result in significant alterations to the existing streetscape, including the alteration of traffic lane configuration, the removal of a total of 29 on-street parking spaces on both sides of Barkers Road (14 spaces on the northern side, 15 spaces on the southern side) and the proposed introduction of vehicle detector loops within private property at 150 Barkers Road to regulate movements to/from the property, given the location of the proposed signals. The introduction of signals at this location is subject to the satisfaction of relevant warrants as specified by VicRoads and, as proposed is likely to result in significant impacts to directly abutting stakeholders, primarily via the



removal of on-street parking capacity and formal regulation of traffic movements in this vicinity. It is noted that a number of third party objectors have raised concerns in this regard."

Traffic signals at the Barkers Road / Site Access intersection are no longer proposed. An updated traffic assessment is outlined within Section 7 of this report. No changes are proposed to on-street car parking restrictions as part of the development proposal.

"Relevant permission for the installation of the detector loops within private property at 150 Barkers Road is subject to approval from the relevant property owners. It is still unclear whether this may be achieved. The review and approval of any proposed traffic signal functional layout will be subject to VicRoads design requirements and standards, including acceptable lane configurations and dimensions and functionality for all relevant stakeholders utilising the intersection. Relevant considerations should also be made for the allowance of access to/from properties in the vicinity of the proposed traffic signals, waste collection arrangements and/or additional operational and amenity impacts and incorporated into the functional design for further review."

As per above response.


9 Department of Transport – Traffic Engineering Response

The Department of Transport (DoT) reviewed the proposed Development Plan and previous iteration of the Traffix Group report (dated 9 August 2021) and provided a Notice of Refusal to the proposed Development Plan.

DoT's assessment and comments were based upon the previous iteration of the Development Plan which incorporated traffic signals at the intersection of Barkers Road and the Site Access.

DoT's grounds for objection were as follows:

- 1. "The proposed access is incompatible with the operation of Barkers Road and public safety due to unacceptable design layout.
- 2. The proposal will result in unacceptable road safety outcomes.
- 3. The proposal has not been agreed by the affected parties."

Whilst DoT objected to the proposal, they noted that they would fundamentally be accepting of traffic signals at this location, subject to satisfactory resolution of the above grounds which relate to design, safety and impact upon surrounding properties. DoT's comments in this regard are as follows:

"The Head, Transport for Victoria would like to accept an amended proposal which will address the above concerns. If any amended proposal is submitted in due course, it is advised to submit a Road Safety Audit which is prepared by an independent assessor (not the same Traffic Consultant Company) for review at the planning permit stage."

The above comments relate to traffic signals at the Barkers Road / Site Access intersection, which are no longer applicable.



10 Conclusions

Having undertaken a detailed traffic engineering assessment of the proposed Development Plan for the Xavier College Senior Campus located at 135 Barkers Road, Kew, we are of the opinion that:

- a) Our report appropriate addresses relevant matters specified within Schedule 2 to Clause 43.04 Development Plan Overlay of the Boroondara Planning Scheme,
- b) A total in the order of 351-401 on-site car parking spaces are proposed, representing an increase in the existing on-site car parking provision (both during and after school hours),
- c) The Development Plan seeks a 30 staff and 500 student increase, resulting in a statutory requirement to provide 36 additional on-site car parking spaces (during school hours),
- d) The proposed increase in the on-site car parking provision exceeds the statutory requirement and that specified previously within the Development Plan,
- e) Any increase in on-street demands is anticipated to be limited to pick-up/drop-off periods with the Development Plan representing an increase to the on-site provision of car parking during school hours and after hours,
- f) New car parking areas should be designed in accordance with the requirements of the Planning Scheme and/or relevant Australian Standards,
- g) It is our recommendation that bicycle parking area(s) make a spatial allowance for bicycle parking commensurate with the statutory bicycle parking requirement,
- h) It is further recommended that only part of the statutory bicycle parking requirement be provided initially with bicycle parking demands to be monitored and additional parking be provided as bicycle parking areas approach capacity,
- The increase in student/staff numbers is anticipated to result in a totals of 460, 416 and 368 vehicle movements at the site access points during the respective AM, Early PM and Late PM school peak hours,
- j) We have been advised by the School that the movement of students between Burke Hall and the Senior School, as well as the intensity of before/after school sports and weekend sports, will remain generally consistent with current arrangements under the Development Plan.
- k) A total of up to 18 additional staff movements are anticipated during the Late PM peak with traffic movements during the Saturday morning peak hour anticipated to be generally as per existing conditions,
- The Development Plan proposes removal of the right-turn exit movement from the site onto Barkers Road during peak school pick-up/drop-off periods (buses excepted), and
- m) The additional traffic predicted to be generated by the proposal can be satisfactorily accommodated, from a capacity perspective, within the surrounding road network.

Traffix Group



Appendix A

Functional Layout Plan

Traffix Group

G28932R-02D



SCALE 1:500 (A3)	0	2.5	5	7.5	10	SHEET No.	DWG No.	G28932-03-01



Appendix B

SIDRA Intersection Results

Traffix Group

G28932R-02D

o Site: 101 [Barkers Rd/Site Access - AM - Existing (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

Vehi	cle M	ovemen	t Perfoi	rmance										
Mov ID	Turn	INP VOLL	PUT JMES	DEM FLO	AND WS	Deg. Satn	Aver. Delav	Level of Service	95% BA QUI	ACK OF EUE	Prop. Que	Effective Stop	Aver. No.	Aver. Speed
		[Total	HV]	[Total	HV]				[Veh.	Dist]		Rate	Cycles	
		veh/h	%	veh/h	%	V/C	sec		veh	m				km/h
East:	Barke	ers Road												
5	T1	1015	5.0	1068	5.0	0.294	0.3	LOS A	0.5	3.9	0.04	0.01	0.05	59.3
6	R2	18	1.0	19	1.0	0.294	12.2	LOS B	0.5	3.9	0.10	0.02	0.12	57.2
Appr	oach	1033	4.9	1087	4.9	0.294	0.5	NA	0.5	3.9	0.05	0.01	0.05	59.3
North	n: Site	Access												
7	L2	18	1.0	19	1.0	0.859	134.3	LOS F	4.2	30.0	0.76	1.13	1.67	14.2
9	R2	29	1.0	31	1.0	0.859	235.5	LOS F	4.2	30.0	0.76	1.13	1.67	11.4
Appr	oach	47	1.0	49	1.0	0.859	196.7	LOS F	4.2	30.0	0.76	1.13	1.67	12.5
West	: Bark	ers Road												
10	L2	65	1.0	68	1.0	0.071	5.6	LOS A	0.0	0.0	0.00	0.29	0.00	54.5
11	T1	624	5.0	657	5.0	0.314	0.2	LOS A	0.0	0.0	0.00	0.03	0.00	59.4
Appr	oach	689	4.6	725	4.6	0.314	0.7	NA	0.0	0.0	0.00	0.06	0.00	58.9
All Vehic	cles	1769	4.7	1862	4.7	0.859	5.8	NA	4.2	30.0	0.05	0.06	0.08	53.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

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

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

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Dite: 101 [Barkers Rd/Site Access - AM - Existing (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Barkers Road

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Site: 101 [Barkers Rd/Site Access - AM - Ultimate (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

Vehi	cle M	ovemen	t Perfor	mance										
Mov	Turn	INF	TUY	DEM	AND	Deg.	Aver.	Level of	95% B/	ACK OF	Prop.	Effective	Aver.	Aver.
ID		VOLU	JMES	FLO	WS	Satn	Delay	Service	QU	EUE	Que	Stop	No.	Speed
		[Total	HV]	[Total	HV]				[Veh.	Dist]		Rate	Cycles	
		veh/h	%	veh/h	%	V/C	sec		veh	m				km/h
East:	Barke	rs Road												
5	T1	1015	5.0	1068	5.0	0.332	1.0	LOS A	1.8	13.1	0.13	0.04	0.17	58.0
6	R2	62	1.0	65	1.0	0.332	12.8	LOS B	1.8	13.1	0.33	0.10	0.42	54.8
Appr	oach	1077	4.8	1134	4.8	0.332	1.7	NA	1.8	13.1	0.14	0.04	0.18	57.8
North	n: Site /	Access												
7	L2	31	1.0	33	1.0	0.029	9.7	LOS A	0.1	0.7	0.13	0.91	0.13	51.7
Appr	oach	31	1.0	33	1.0	0.029	9.7	LOS A	0.1	0.7	0.13	0.91	0.13	51.7
West	: Barke	ers Road												
10	L2	90	1.0	95	1.0	0.074	5.6	LOS A	0.0	0.0	0.00	0.39	0.00	53.6
11	T1	624	5.0	657	5.0	0.326	0.2	LOS A	0.0	0.0	0.00	0.03	0.00	59.5
Appr	oach	714	4.5	752	4.5	0.326	0.8	NA	0.0	0.0	0.00	0.07	0.00	58.6
All Vehic	cles	1822	4.6	1918	4.6	0.332	1.5	NA	1.8	13.1	0.09	0.07	0.11	57.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

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

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

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o Site: 101 [Barkers Rd/Site Access - AM - Ultimate (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Barkers Road

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Site: 101 [Charles Street Access - AM - Existing (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

Vehi	cle M	ovemen	t Perfo	rmance										
Mov	Turn	INP	UT	DEM		Deg.	Aver.	Level of	95% BA		Prop. E	ffective	Aver.	Aver.
שו		VULU [Total		FLU [Total	vv5 н\/1	Sath	Delay	Service	QUI [\/eh	EUE Diet 1	Que	Siop	INO. Cycles	Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		Trate	Cycles	km/h
Sout	h: Cha	rles Stree	et											
1	L2	53	1.0	56	1.0	0.128	5.8	LOS A	0.2	1.7	0.10	0.19	0.10	56.2
2	T1	148	1.0	156	1.0	0.128	0.1	LOS A	0.2	1.7	0.10	0.19	0.10	57.8
3	R2	25	1.0	26	1.0	0.128	6.1	LOS A	0.2	1.7	0.10	0.19	0.10	55.6
Appro	oach	226	1.0	238	1.0	0.128	2.1	NA	0.2	1.7	0.10	0.19	0.10	57.2
East:	Hanse	en Street												
4	L2	4	1.0	4	1.0	0.080	8.5	LOS A	0.3	1.9	0.43	0.95	0.43	50.6
5	T1	18	1.0	19	1.0	0.080	10.4	LOS B	0.3	1.9	0.43	0.95	0.43	50.4
6	R2	29	1.0	31	1.0	0.080	10.6	LOS B	0.3	1.9	0.43	0.95	0.43	50.1
Appr	oach	51	1.0	54	1.0	0.080	10.4	LOS B	0.3	1.9	0.43	0.95	0.43	50.3
North	n: Char	les Stree	t											
7	L2	52	1.0	55	1.0	0.136	6.1	LOS A	0.5	3.6	0.22	0.26	0.22	55.1
8	T1	117	1.0	123	1.0	0.136	0.4	LOS A	0.5	3.6	0.22	0.26	0.22	56.7
9	R2	59	1.0	62	1.0	0.136	6.2	LOS A	0.5	3.6	0.22	0.26	0.22	54.6
Appr	oach	228	1.0	240	1.0	0.136	3.2	NA	0.5	3.6	0.22	0.26	0.22	55.8
West	: Site A	Access												
10	L2	24	1.0	25	1.0	0.071	8.7	LOS A	0.3	1.8	0.34	0.92	0.34	51.0
11	T1	16	1.0	17	1.0	0.071	10.4	LOS B	0.3	1.8	0.34	0.92	0.34	50.8
12	R2	16	1.0	17	1.0	0.071	10.5	LOS B	0.3	1.8	0.34	0.92	0.34	50.5
Appr	oach	56	1.0	59	1.0	0.071	9.7	LOS A	0.3	1.8	0.34	0.92	0.34	50.8
All Vehic	cles	561	1.0	591	1.0	0.136	4.1	NA	0.5	3.6	0.20	0.36	0.20	55.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

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

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

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Site: 101 [Charles Street Access - AM - Existing (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Site: 101 [Charles Street Access - AM - Ultimate (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

Vehi	cle M	ovemen	t Perfo	rmance										
Mov	Nov Turn INPUT D D VOLUMES F		DEM		Deg.	Aver.	Level of	95% BA		Prop. E	ffective	Aver.	Aver.	
שו		VULU [Total		FLU [Total	vv5 H\/1	Sath	Delay	Service	QUI [\/eh	EUE Diet 1	Que	Siop	INO. Cycles	Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		Trate	Cycles	km/h
Sout	h: Cha	rles Stree	et											
1	L2	37	1.0	39	1.0	0.119	5.8	LOS A	0.2	1.7	0.10	0.17	0.10	56.4
2	T1	148	1.0	156	1.0	0.119	0.1	LOS A	0.2	1.7	0.10	0.17	0.10	58.0
3	R2	25	1.0	26	1.0	0.119	6.1	LOS A	0.2	1.7	0.10	0.17	0.10	55.9
Appr	oach	210	1.0	221	1.0	0.119	1.8	NA	0.2	1.7	0.10	0.17	0.10	57.5
East:	Hanse	en Street												
4	L2	4	1.0	4	1.0	0.098	8.5	LOS A	0.3	2.4	0.46	0.97	0.46	50.2
5	T1	25	1.0	26	1.0	0.098	10.5	LOS B	0.3	2.4	0.46	0.97	0.46	50.0
6	R2	29	1.0	31	1.0	0.098	11.9	LOS B	0.3	2.4	0.46	0.97	0.46	49.8
Appr	oach	58	1.0	61	1.0	0.098	11.1	LOS B	0.3	2.4	0.46	0.97	0.46	49.9
North	n: Char	les Stree	t											
7	L2	52	1.0	55	1.0	0.152	6.1	LOS A	0.7	4.6	0.25	0.29	0.25	54.9
8	T1	117	1.0	123	1.0	0.152	0.4	LOS A	0.7	4.6	0.25	0.29	0.25	56.3
9	R2	82	1.0	86	1.0	0.152	6.2	LOS A	0.7	4.6	0.25	0.29	0.25	54.3
Appr	oach	251	1.0	264	1.0	0.152	3.5	NA	0.7	4.6	0.25	0.29	0.25	55.4
West	: Site A	Access												
10	L2	90	1.0	95	1.0	0.154	8.7	LOS A	0.6	4.3	0.32	0.92	0.32	51.2
11	T1	40	1.0	42	1.0	0.154	10.8	LOS B	0.6	4.3	0.32	0.92	0.32	50.9
12	R2	10	1.0	11	1.0	0.154	11.0	LOS B	0.6	4.3	0.32	0.92	0.32	50.7
Appr	oach	140	1.0	147	1.0	0.154	9.5	LOS A	0.6	4.3	0.32	0.92	0.32	51.0
All Vehio	cles	659	1.0	694	1.0	0.154	4.9	NA	0.7	4.6	0.24	0.44	0.24	54.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

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

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

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Site: 101 [Charles Street Access - AM - Ultimate (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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o Site: 101 [Barkers Rd/Site Access - Early PM - Existing (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

Vehi	icle M	ovemen	t Perfor	rmance										
Mov	Turn	INF	PUT	DEM	AND	Deg.	Aver.	Level of	95% BA	ACK OF	Prop.	Effective	Aver.	Aver.
ID		VOLL	JMES	FLO'	WS	Satn	Delay	Service	QUI	EUE	Que	Stop	No.	Speed
		[Total	HV]	[Total	HV]				[Veh.	Dist]		Rate	Cycles	
		veh/h	%	ven/h	%	V/C	sec		veh	m				Km/h
East	: Barke	ers Road												
5	T1	684	5.0	720	5.0	0.411	0.6	LOS A	0.6	4.6	0.07	0.01	0.10	58.8
6	R2	11	1.0	12	1.0	0.411	18.2	LOS C	0.6	4.6	0.07	0.01	0.10	57.3
Appr	oach	695	4.9	732	4.9	0.411	0.9	NA	0.6	4.6	0.07	0.01	0.10	58.8
North	n: Site	Access												
7	L2	9	1.0	9	1.0	0.428	27.5	LOS D	1.4	9.8	0.84	0.96	1.05	28.1
9	R2	24	1.0	25	1.0	0.428	85.7	LOS F	1.4	9.8	0.84	0.96	1.05	23.8
Appr	oach	33	1.0	35	1.0	0.428	69.8	LOS F	1.4	9.8	0.84	0.96	1.05	25.1
West	t: Bark	ers Road												
10	L2	33	1.0	35	1.0	0.089	5.6	LOS A	0.0	0.0	0.00	0.12	0.00	56.4
11	T1	833	5.0	877	5.0	0.394	0.4	LOS A	0.0	0.0	0.00	0.02	0.00	59.5
Appr	oach	866	4.8	912	4.8	0.394	0.6	NA	0.0	0.0	0.00	0.02	0.00	59.4
All Vehio	cles	1594	4.8	1678	4.8	0.428	2.2	NA	1.4	9.8	0.05	0.04	0.06	57.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

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

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

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Site: 101 [Barkers Rd/Site Access - Early PM - Existing (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Barkers Road

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Site: 101 [Barkers Rd/Site Access - Early PM - Ultimate (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

Vehi	icle M	ovemen	t Perfor	mance										
Mov	Turn	INF	DT	DEM	AND	Deg.	Aver.	Level of	95% B/	ACK OF	Prop.	Effective	Aver.	Aver.
ID		VOLU	JMES	FLO	WS	Satn	Delay	Service	QU	EUE	Que	Stop	No.	Speed
		[Total	HV]	[Total	HV]				[Veh.	Dist]		Rate	Cycles	
		veh/h	%	veh/h	%	V/C	sec		veh	m				km/h
East	: Barke	rs Road												
5	T1	684	5.0	720	5.0	0.481	2.5	LOS A	2.4	17.5	0.24	0.04	0.36	55.8
6	R2	37	1.0	39	1.0	0.481	20.3	LOS C	2.4	17.5	0.24	0.04	0.36	55.1
Appr	oach	721	4.8	759	4.8	0.481	3.4	NA	2.4	17.5	0.24	0.04	0.36	55.8
North	n: Site	Access												
7	L2	29	1.0	31	1.0	0.024	10.6	LOS B	0.1	0.7	0.21	0.88	0.21	51.7
Appr	oach	29	1.0	31	1.0	0.024	10.6	LOS B	0.1	0.7	0.21	0.88	0.21	51.7
West	t: Barke	ers Road												
10	L2	73	1.0	77	1.0	0.094	5.6	LOS A	0.0	0.0	0.00	0.25	0.00	55.0
11	T1	833	5.0	877	5.0	0.413	0.3	LOS A	0.0	0.0	0.00	0.03	0.00	59.3
Appr	oach	906	4.7	954	4.7	0.413	0.7	NA	0.0	0.0	0.00	0.05	0.00	59.0
All Vehio	cles	1656	4.7	1743	4.7	0.481	2.1	NA	2.4	17.5	0.11	0.06	0.16	57.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

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

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

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Site: 101 [Barkers Rd/Site Access - Early PM - Ultimate (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Barkers Road

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Site: 101 [Charles Street Access - Early PM - Existing (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

Vehi	icle M	ovemen	t Perfo	rmance										
Mov	Turn	INP	UT	DEM	AND	Deg.	Aver.	Level of	95% B/	ACK OF	Prop. E	Effective	Aver.	Aver.
ID		VOLU		FLO	WS	Satn	Delay	Service	QU	EUE	Que	Stop	No.	Speed
		veh/h	⊢vj %	veh/h	нvј %	v/c	sec		ven.	DISLJ m		Rate	Cycles	km/h
Sout	h: Cha	rles Stree	et											
1	L2	11	1.0	12	1.0	0.068	5.6	LOS A	0.1	0.4	0.02	0.08	0.02	57.5
2	T1	106	1.0	112	1.0	0.068	0.0	LOS A	0.1	0.4	0.02	0.08	0.02	59.2
3	R2	6	1.0	6	1.0	0.068	5.6	LOS A	0.1	0.4	0.02	0.08	0.02	56.9
Appr	oach	123	1.0	129	1.0	0.068	0.8	NA	0.1	0.4	0.02	0.08	0.02	58.9
East	Hans	en Street												
4	L2	4	1.0	4	1.0	0.031	8.2	LOS A	0.1	0.7	0.22	0.92	0.22	51.5
5	T1	7	1.0	7	1.0	0.031	8.7	LOS A	0.1	0.7	0.22	0.92	0.22	51.3
6	R2	15	1.0	16	1.0	0.031	8.8	LOS A	0.1	0.7	0.22	0.92	0.22	51.0
Appr	oach	26	1.0	27	1.0	0.031	8.7	LOS A	0.1	0.7	0.22	0.92	0.22	51.2
North	n: Chai	rles Stree	t											
7	L2	17	1.0	18	1.0	0.045	5.8	LOS A	0.1	1.0	0.14	0.26	0.14	55.5
8	T1	41	1.0	43	1.0	0.045	0.2	LOS A	0.1	1.0	0.14	0.26	0.14	57.0
9	R2	19	1.0	20	1.0	0.045	5.8	LOS A	0.1	1.0	0.14	0.26	0.14	54.9
Appr	oach	77	1.0	81	1.0	0.045	2.8	NA	0.1	1.0	0.14	0.26	0.14	56.2
West	t: Site /	Access												
10	L2	27	1.0	28	1.0	0.047	8.5	LOS A	0.2	1.2	0.24	0.90	0.24	51.7
11	T1	11	1.0	12	1.0	0.047	8.7	LOS A	0.2	1.2	0.24	0.90	0.24	51.4
12	R2	10	1.0	11	1.0	0.047	8.7	LOS A	0.2	1.2	0.24	0.90	0.24	51.2
Appr	oach	48	1.0	51	1.0	0.047	8.6	LOS A	0.2	1.2	0.24	0.90	0.24	51.5
All Vehio	cles	274	1.0	288	1.0	0.068	3.5	NA	0.2	1.2	0.11	0.35	0.11	55.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

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

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

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Site: 101 [Charles Street Access - Early PM - Existing (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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5 Site: 101 [Charles Street Access - Early PM - Ultimate (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

Vehi	cle M	ovemen	t Perfo	rmance										
Mov	Mov Turn INPUT D VOLUMES		DEM	AND	Deg.	Aver.	Level of	95% B/	ACK OF	Prop. E	Effective	Aver.	Aver.	
ח ו		VULU [Total		FLU [Total	vvS ы\/1	Sath	Delay	Service	QU [\/eh	EUE Diet 1	Que	Stop	INO. Cycles	Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		Mate	Cycles	km/h
Sout	h: Cha	rles Stree	et											
1	L2	12	1.0	13	1.0	0.068	5.6	LOS A	0.1	0.4	0.02	0.09	0.02	57.5
2	T1	106	1.0	112	1.0	0.068	0.0	LOS A	0.1	0.4	0.02	0.09	0.02	59.1
3	R2	6	1.0	6	1.0	0.068	5.6	LOS A	0.1	0.4	0.02	0.09	0.02	56.9
Appr	oach	124	1.0	131	1.0	0.068	0.8	NA	0.1	0.4	0.02	0.09	0.02	58.9
East	Hanse	en Street												
4	L2	4	1.0	4	1.0	0.046	8.2	LOS A	0.2	1.1	0.26	0.94	0.26	51.1
5	T1	16	1.0	17	1.0	0.046	8.8	LOS A	0.2	1.1	0.26	0.94	0.26	50.8
6	R2	15	1.0	16	1.0	0.046	10.3	LOS B	0.2	1.1	0.26	0.94	0.26	50.6
Appr	oach	35	1.0	37	1.0	0.046	9.4	LOS A	0.2	1.1	0.26	0.94	0.26	50.8
North	n: Char	les Stree	t											
7	L2	17	1.0	18	1.0	0.060	5.9	LOS A	0.3	1.8	0.20	0.32	0.20	54.8
8	T1	41	1.0	43	1.0	0.060	0.3	LOS A	0.3	1.8	0.20	0.32	0.20	56.3
9	R2	42	1.0	44	1.0	0.060	5.8	LOS A	0.3	1.8	0.20	0.32	0.20	54.2
Appr	oach	100	1.0	105	1.0	0.060	3.6	NA	0.3	1.8	0.20	0.32	0.20	55.1
West	: Site A	Access												
10	L2	141	1.0	148	1.0	0.186	8.6	LOS A	0.8	5.6	0.26	0.91	0.26	51.6
11	T1	51	1.0	54	1.0	0.186	9.1	LOS A	0.8	5.6	0.26	0.91	0.26	51.4
12	R2	10	1.0	11	1.0	0.186	9.2	LOS A	0.8	5.6	0.26	0.91	0.26	51.1
Appr	oach	202	1.0	213	1.0	0.186	8.7	LOS A	0.8	5.6	0.26	0.91	0.26	51.5
All Vehio	cles	461	1.0	485	1.0	0.186	5.5	NA	0.8	5.6	0.18	0.56	0.18	54.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

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

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

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Site: 101 [Charles Street Access - Early PM - Ultimate (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Dite: 101 [Barkers Rd/Site Access - Late PM - Existing (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

Vehi	icle M	ovemen	t Perfor	rmance										
Mov	Turn	INF	TUY	DEM	AND	Deg.	Aver.	Level of	95% BA	ACK OF	Prop.	Effective	Aver.	Aver.
ID		VOLL	JMES	FLO'	WS	Satn	Delay	Service	QUI	EUE	Que	Stop	No.	Speed
		[Total	HV]	[Total	HV]				[Veh.	Dist]		Rate	Cycles	
		ven/n	%	ven/h	%	V/C	sec		veh	m				Km/h
East	: Barke	ers Road												
5	T1	771	5.0	812	5.0	0.526	3.3	LOS A	2.9	21.4	0.22	0.02	0.34	55.0
6	R2	25	1.0	26	1.0	0.526	29.8	LOS D	2.9	21.4	0.22	0.02	0.34	54.6
Appr	oach	796	4.9	838	4.9	0.526	4.1	NA	2.9	21.4	0.22	0.02	0.34	55.0
North	n: Site	Access												
7	L2	14	1.0	15	1.0	0.671	92.9	LOS F	2.2	15.8	0.96	1.12	1.39	16.2
9	R2	15	1.0	16	1.0	0.671	233.2	LOS F	2.2	15.8	0.96	1.12	1.39	13.0
Appr	oach	29	1.0	31	1.0	0.671	165.5	LOS F	2.2	15.8	0.96	1.12	1.39	14.6
West	t: Bark	ers Road												
10	L2	45	1.0	47	1.0	0.321	5.6	LOS A	0.0	0.0	0.00	0.05	0.00	57.1
11	T1	1120	5.0	1179	5.0	0.321	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	59.5
Appr	oach	1165	4.8	1226	4.8	0.321	0.3	NA	0.0	0.0	0.00	0.02	0.00	59.4
All Vehio	cles	1990	4.8	2095	4.8	0.671	4.2	NA	2.9	21.4	0.10	0.04	0.16	54.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

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

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

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Site: 101 [Barkers Rd/Site Access - Late PM - Existing (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Barkers Road

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Site: 101 [Barkers Rd/Site Access - Late PM - Ultimate (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

Vehi	cle M	ovemen	t Perfor	mance										
Mov ID	Turn	INP VOLL	PUT JMES	DEM/ FLO	AND WS	Deg. Satn	Aver. Delay	Level of Service	95% BA QUI	ACK OF EUE	Prop. Que	Effective Stop	Aver. No.	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %	v/c	sec		[Veh. veh	Dist] m		Rate	Cycles	km/h
East:	Barke	rs Road												
5	T1	771	5.0	812	5.0	0.574	5.0	LOS A	4.5	33.1	0.32	0.04	0.53	52.8
6	R2	38	1.0	40	1.0	0.574	30.6	LOS D	4.5	33.1	0.32	0.04	0.53	52.9
Appr	oach	809	4.8	852	4.8	0.574	6.2	NA	4.5	33.1	0.32	0.04	0.53	52.8
North	n: Site /	Access												
7	L2	31	1.0	33	1.0	0.045	11.3	LOS B	0.2	1.2	0.54	0.92	0.54	50.2
Appr	oach	31	1.0	33	1.0	0.045	11.3	LOS B	0.2	1.2	0.54	0.92	0.54	50.2
West	: Barke	ers Road												
10	L2	45	1.0	47	1.0	0.321	5.6	LOS A	0.0	0.0	0.00	0.05	0.00	57.1
11	T1	1120	5.0	1179	5.0	0.321	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	59.5
Appr	oach	1165	4.8	1226	4.8	0.321	0.3	NA	0.0	0.0	0.00	0.02	0.00	59.4
All Vehic	cles	2005	4.8	2111	4.8	0.574	2.8	NA	4.5	33.1	0.14	0.04	0.22	56.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

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

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

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Site: 101 [Barkers Rd/Site Access - Late PM - Ultimate (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Barkers Road

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o Site: 101 [Charles Street Access - Late PM - Existing (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

Vehi	cle M	ovemen	t Perfo	rmance										
Mov	Mov Turn INPUT D VOLUMES		DEM	AND	Deg.	Aver.	Level of	95% B/		Prop. E	ffective	Aver.	Aver.	
U		VULU [Total		FLU [Total]	vv5 ы\/ 1	Sath	Delay	Service	QUI [\/eh	EUE Diet 1	Que	Stop	NO. Cycles	Speed
		veh/h	%	veh/h	%	v/c	sec		veh	m		Trate	Cycles	km/h
Sout	h: Cha	rles Stree	et											
1	L2	26	1.0	27	1.0	0.065	5.6	LOS A	0.1	0.4	0.02	0.16	0.02	56.9
2	T1	86	1.0	91	1.0	0.065	0.0	LOS A	0.1	0.4	0.02	0.16	0.02	58.5
3	R2	6	1.0	6	1.0	0.065	5.7	LOS A	0.1	0.4	0.02	0.16	0.02	56.3
Appr	oach	118	1.0	124	1.0	0.065	1.5	NA	0.1	0.4	0.02	0.16	0.02	58.0
East	Hans	en Street												
4	L2	2	1.0	2	1.0	0.015	8.2	LOS A	0.1	0.4	0.24	0.92	0.24	51.5
5	T1	6	1.0	6	1.0	0.015	8.8	LOS A	0.1	0.4	0.24	0.92	0.24	51.3
6	R2	5	1.0	5	1.0	0.015	9.0	LOS A	0.1	0.4	0.24	0.92	0.24	51.0
Appr	oach	13	1.0	14	1.0	0.015	8.8	LOS A	0.1	0.4	0.24	0.92	0.24	51.2
North	n: Chai	les Stree	t											
7	L2	12	1.0	13	1.0	0.065	5.9	LOS A	0.3	2.0	0.20	0.30	0.20	55.0
8	T1	50	1.0	53	1.0	0.065	0.2	LOS A	0.3	2.0	0.20	0.30	0.20	56.5
9	R2	47	1.0	49	1.0	0.065	5.8	LOS A	0.3	2.0	0.20	0.30	0.20	54.5
Appr	oach	109	1.0	115	1.0	0.065	3.3	NA	0.3	2.0	0.20	0.30	0.20	55.4
West	: Site /	Access												
10	L2	39	1.0	41	1.0	0.080	8.4	LOS A	0.3	2.1	0.23	0.91	0.23	51.6
11	T1	11	1.0	12	1.0	0.080	8.9	LOS A	0.3	2.1	0.23	0.91	0.23	51.3
12	R2	28	1.0	29	1.0	0.080	8.9	LOS A	0.3	2.1	0.23	0.91	0.23	51.1
Appr	oach	78	1.0	82	1.0	0.080	8.6	LOS A	0.3	2.1	0.23	0.91	0.23	51.4
All Vehio	cles	318	1.0	335	1.0	0.080	4.2	NA	0.3	2.1	0.14	0.42	0.14	55.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

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

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

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Site: 101 [Charles Street Access - Late PM - Existing (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

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o Site: 101 [Charles Street Access - Late PM - Ultimate (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

Vehi	cle M	ovemen	t Perfo	rmance										
Mov	Turn					Deg.	Aver. Level of		95% BACK OF		Prop. Effective		Aver.	Aver.
ID		VOLU		FLO Tatal	WS LIV1	Satn	Delay	Service	QU [\/ab	EUE Dict 1	Que	Stop	No.	Speed
		veh/h	⊓vj %	veh/h	пvј %	v/c	sec		ven. veh	m Dist		Rate	Cycles	km/h
Sout	h: Cha	rles Stree	et											
1	L2	13	1.0	14	1.0	0.058	5.6	LOS A	0.1	0.4	0.03	0.11	0.03	57.3
2	T1	86	1.0	91	1.0	0.058	0.0	LOS A	0.1	0.4	0.03	0.11	0.03	58.9
3	R2	6	1.0	6	1.0	0.058	5.6	LOS A	0.1	0.4	0.03	0.11	0.03	56.7
Appr	oach	105	1.0	111	1.0	0.058	1.0	NA	0.1	0.4	0.03	0.11	0.03	58.6
East	Hans	en Street												
4	L2	2	1.0	2	1.0	0.016	8.2	LOS A	0.1	0.4	0.25	0.93	0.25	51.3
5	T1	6	1.0	6	1.0	0.016	8.7	LOS A	0.1	0.4	0.25	0.93	0.25	51.0
6	R2	5	1.0	5	1.0	0.016	10.0	LOS A	0.1	0.4	0.25	0.93	0.25	50.8
Appr	oach	13	1.0	14	1.0	0.016	9.1	LOS A	0.1	0.4	0.25	0.93	0.25	51.0
North: Charles Street														
7	L2	12	1.0	13	1.0	0.065	5.8	LOS A	0.3	2.0	0.18	0.30	0.18	55.1
8	T1	50	1.0	53	1.0	0.065	0.2	LOS A	0.3	2.0	0.18	0.30	0.18	56.6
9	R2	47	1.0	49	1.0	0.065	5.8	LOS A	0.3	2.0	0.18	0.30	0.18	54.5
Approach		109	1.0	115	1.0	0.065	3.2	NA	0.3	2.0	0.18	0.30	0.18	55.5
West: Site Access														
10	L2	132	1.0	139	1.0	0.172	8.4	LOS A	0.7	5.1	0.23	0.91	0.23	51.6
11	T1	42	1.0	44	1.0	0.172	9.0	LOS A	0.7	5.1	0.23	0.91	0.23	51.4
12	R2	15	1.0	16	1.0	0.172	9.0	LOS A	0.7	5.1	0.23	0.91	0.23	51.2
Appr	oach	189	1.0	199	1.0	0.172	8.6	LOS A	0.7	5.1	0.23	0.91	0.23	51.6
All Vehio	cles	416	1.0	438	1.0	0.172	5.3	NA	0.7	5.1	0.17	0.55	0.17	54.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

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

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

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Site: 101 [Charles Street Access - Late PM - Ultimate (Site Folder: Xavier Development Plan Analysis)]

New Site Site Category: (None) Stop (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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